



CDTC NEW VISIONS 2050 INFRASTRUCTURE WHITE PAPER

Preserving, Managing, and Renewing the Capital District's Infrastructure

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Capital District Transportation Committee

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1 Infrastructure Planning & Investment Principal

CDTC's New Visions Long Range Transportation Plan aims to lay the foundation of principals and strategies that will guide future investment in the Capital District's transportation system and drive the region towards CDTC's 2050 vision and goals. The Capital District's transportation system is comprised of critically important highways and bridges, along with intermodal and multimodal facilities including ports, airports, railways, sidewalks, and trails. This infrastructure is the essential substrate of the regional economy and maintaining it in a condition of good repair is vital for New York State and the Capital District to remain economically competitive in the future.

The principle of preserving and managing the region's transportation system continues to be CDTC's highest stated priority. CDTC's investment strategies indicate that preservation has higher priority than investment in expanded capacity and has the first claim on available resources. New Visions lays out a performance-based management strategy, integrating evaluations of both federal performance measures and targets and New Visions performance measures into TIP project evaluations, project development, linkage studies and various other areas of CDTC activities. CDTC's strong emphasis on maintaining transportation infrastructure can be seen in the allocation of resources, approximately 80% of which go to infrastructure repair and renewal.

In order to provide a framework for infrastructure planning and programming, CDTC's infrastructure Task Force (New Visions 2040) cooperatively developed a comprehensive planning and investment principal that includes more than highways, acknowledges equity issues, and highlights the preservation and renewal conflict. This principal was developed as part of the New Visions 2040 update, and is still supported as CDTC's Infrastructure Principal in New Visions 2050.

Infrastructure – Transportation funding must be sufficient to both repair and sometimes replace our highway, bridge, and transit infrastructure.

New Visions has made a strong commitment to keeping the region's transportation system functioning and in good condition. CDTC remains committed to the maintenance, repair, and renewal of the existing passenger and freight transportation facilities in a cost-effective manner that protects and enhances rideability, public safety, accessibility, and serviceability.

Currently the needs for repairing/reconstructing bridges and pavement, and investing in transit and port facilities outweigh available resources. Renewing existing infrastructure in our communities is fiscally responsible and consistent with New York's Smart Growth policy.

CDTC needs to ensure that system preservation and system renewal are balanced, and that roads and bridges in our cities and rural communities are equitably considered. Continued capital investment in the region's transit system, port, and airport – and their connections to other surface transport – will remain a priority.

2 Developing the 2050 New Visions Long Range Plan

As part of the New Visions 2050 update process, CDTC worked to build upon efforts of the Infrastructure Task Force which met regularly during the New Visions 2040 update. CDTC staff has evaluated numerous state and local data sources and documented changes in infrastructure condition over time in order to assess trends in infrastructure condition and determine current infrastructure condition performance. CDTC staff also utilized the most recent infrastructure condition data as inputs into the Highway Condition Projection Model (HCPM) to quantitatively test various pavement preservation and reconstruction strategies that could be used going forward and the impacts that each of these strategies could have on regional infrastructure targets. An infrastructure working group, made up of local and regional infrastructure experts, was developed to assist in the plan update by identifying highway, bridge, transit and other infrastructure needs throughout the region and providing valuable comments throughout the update process.

3 Capital District Transportation System

This white paper sets out to document conditions and prioritize investments within the CDTC planning area. In this paper, the terms “capital district” and “region” are used to define the CDTC planning area, which includes all of Albany, Schenectady, and Rensselaer Counties, and Saratoga County, excluding the Town of Moreau and Village of South Glens Falls. All data provided is for the CDTC planning area unless otherwise noted.

The transportation network in the CDTC planning area is composed of numerous public and privately owned infrastructure assets which serve all modes of transportation, including private automobiles, trucks, public transit, taxis, Transportation Network Companies (i.e. Uber and Lyft), bicyclists, pedestrians, rail, and aviation among others.

Below are a few measures that highlight the impact and criticality of some of the transportation infrastructure in the Capital Region.

- The Region’s transportation system includes over 14,000 lane-miles of roadway and over 1,000 bridges owned by the State, counties, cities, towns, and villages. Of the 26 highway and railroad bridges that cross the Hudson River, 16 are located in the Capital District, including 2 rail bridges and 1 mixed-use trail bridge. Total replacement value of the Capital District’s Highway and Bridge infrastructure is estimated at over \$20 billion.
- The replacement value of the region’s highways is estimated to be greater than \$10 billion.
- Similarly, the replacement value of the region’s bridges is estimated to be greater than \$10 billion.
- There are just less than 1,400 miles of bicycle and pedestrian infrastructure in the CDTC planning area, with a total replacement value of over \$1 billion.
- The Capital District Transportation Authority provides public transit service to the region’s four counties. CDTA operates assets that include a fleet of over 300 vehicles, 2,600 bus stops, 300 shelters, and 29 park-ride lots. CDTA introduced its first Bus Rapid Transit line, called BusPlus (Red Line) in 2011 serving the NY 5 corridor between downtown Albany and downtown Schenectady. CDTA plans to open a second BusPlus line (Blue Line) serving the municipalities along the Hudson River Corridor from Albany to Waterford in late 2020.

- The region's rail system also includes two large railroads serving the eastern coast (CSX and Norfolk Southern), and one transcontinental railroad (Canadian Pacific). Two of the largest freight railroad yards east of the Mississippi are located in Selkirk and City of Mechanicville.
- Albany International Airport encompasses 1,163 acres of land in the Town of Colonie, with assets valued at over \$450 million. The importance of the airport to the region is reflected in its estimated economic contribution to New York State of \$750 million annually.
- The 400 acre Port of Albany has grown into a regional economic hub for the Capital District, providing a key role in the movement of goods between New York and the rest of the world. The port's economic contribution to New York State is over \$800 million annually.

Capital District Roadways

- Total Regional Lane Miles – 14,289 *(2017 NYSDOT Highway Mileage Summary)*
- State Owned Lane Miles – 2,583 *(2017 NYSDOT Highway Mileage Summary)*
- Locally Owned Lane Miles* – 11,707 *(2017 NYSDOT Highway Mileage Summary)*
- Federal Aid Eligible Lane Miles – 4,158 *(2017 NYSDOT Highway Mileage Summary)*

Note: Roadway mileage includes all of Albany, Schenectady, Saratoga, and Rensselaer Counties

**Includes County, Local, and Other fields*

Capital District Bridges

- Regional Bridges – 1,000+ *(2017 NYSDOT Bridge File)*

Capital District Vehicle Miles Traveled

- Total Regional Daily Vehicle Miles Traveled – 22.7 million *(NYSDOT, CDTC VMT Estimates)*
- Regional Interstate Daily Vehicle Miles Traveled – 7.4 million *(NYSDOT, CDTC VMT Estimates)*
- Regional State System Daily vehicle Miles Traveled – 15.8 million *(NYSDOT, CDTC VMT Estimates)*
- Regional Locally Owned System Daily Vehicle Miles Traveled – 6.9 million *(NYSDOT, CDTC VMT Estimates)*

Capital District National Highway System

- 1,800+ Total Lane Miles *(CDTC estimate using 2017 State Pavement Data)*
- 1,400+ State Lane Miles *(CDTC estimate using 2017 State Pavement Data)*
- 170 + County, Town, City, or Village Lane Miles *(CDTC estimate using 2017 State Pavement Data)*
- 400+ National Highway System bridges *(CDTC estimate using 2017 State Pavement Data)*
- 12.7 million Daily Vehicle Miles Traveled *(NYSDOT, CDTC VMT Estimates)*

Table 1 – Capital District Transportation System by the Numbers

Capital District Transportation System By the Numbers				
	Lane Miles	% Regional Lane Miles	MDVMT*	% Regional MDVMT
State Owned	2,583	18%	15.8	70%
Locally Owned	11,707	82%	6.9	30%
Regional	14,289	100%	22.7	100%
NHS System	1,800	13%	12.7	56%
Federal Aid Eligible	4,158	29%	18.3	81%

*Million Daily Vehicle Miles Traveled

3.1 Aging Infrastructure and the Importance of Renewal

Much of the region's highway and bridge infrastructure was constructed during a period of build-out in the mid-20th century. During this period, federal spending on infrastructure as a percentage of total federal spending was twice what it is today. ¹

Highways and bridges built during this period will soon reach (or already have reached) the end of their intended service life. Preservation and repair projects may extend the usable life of these assets, but ultimately each must be replaced – or the region will lose a key link in its transportation network.

The table below displays many of the most critical links in the region's transportation network: bridge crossings over the Hudson and Mohawk Rivers. These bridges carry over 500,000 vehicles per day, and serve as vital freight and commuter corridors.

Table 2 – Hudson River Crossings in the Capital District

Hudson River Crossings			
Bridge(s)	Two-way AADT	Year built	Age (in 2020)
Castleton Bridge (NYS Thruway Berkshire Connector)	14,000	1958	62
Dunn Memorial Bridge (US-20)	35,000	1969	51
Livingston Avenue Bridge (CSX and Amtrak)	Rail bridge	1902	118
Patroon Island Bridge (I-90)	65,000	1968	52
Troy-Menands Bridge (NY-378)	37,000	1932	88
Congress Street Bridge (NY-2)	12,000	1969	51
Green Island Bridge	13,000	1982	38
Collar City Bridge (NY-7)	49,000	1981	39
NY-470 Bridge	14,000	1924	96
Troy-Waterford Bridge (US-4)	11,000	1909	111

¹ Eno Transportation Center. (May 12, 2016) *The 70-Year Trend in Federal Infrastructure Spending*. Retrieved from <https://www.enotrans.org/article/70-year-trend-federal-infrastructure-spending/>.

Hudson River Crossings			
Bridge(s)	Two-way AADT	Year built	Age (in 2020)
Mechanicville Bridge (NY-67)	7,000	1946	74
Rail Bridge in Stillwater (B&M Railroad)	Rail bridge	1914	106
Stillwater Bridge	4,000	1930	90
Schuylerville Bridge (NY-29)	9,000	1959	61
Dix Bridge (Shared-use trail)	Trail	1895	125
Northumberland Bridge	4,000	1917	103

The Hudson River bridges in the CDTC region carry over 270,000 vehicles per day. Excluding the rail and trail bridges, the vehicle-carrying bridges have an average age of over 70 years.

Table 3 - Mohawk River Crossings in the Capital District

Mohawk River Crossings			
Bridge(s)	Two-way AADT	Year built	Age (in 2020)
NY-32 Bridge	15,000	2018	2
D&H Railroad Bridge in Cohoes	Rail bridge	1921	99
Route 9 Bridge	20,000	1996	24
I-87 Thaddeus Kosciuszko Bridge ("Twin Bridges")	103,000	1959	61
Rexford Bridge (NY-146)	23,000	2017	3
D&H Railroad Bridge in Schenectady	Rail bridge	1911	109
Freeman's Bridge	26,000	1985	35
CSX Railroad Bridge in Schenectady	Rail bridge	1874	146
Western Gateway Bridge	23,000	1974	46
NY-890 Bridge (Thruway Bridge Interchange)	19,000	1998	22
Springfield Terminal Bridge in Rotterdam	Rail bridge	1912	108
NY-103 Bridge in Rotterdam	2,000	1914	106
CSX Bridge in Rotterdam	Rail bridge	1925	95

The Mohawk River Crossings carry over 230,000 vehicles per day. Nearly half of this traffic is carried by the I-87 Twin Bridges, now entering their 61st year of service.

In addition to the major river crossings listed in the tables above, much of the region's highway infrastructure is similarly aged. The New York State Thruway, for example, was completed in 1954 with many of its spurs built in the years following. Interstate 787 was constructed in the 1960s, and much of this highway is carried by an elevated steel structure that would be costly to replace.

Many key assets are expected to reach the end of their useful service life during the 30-year planning horizon of the New Visions 2050 plan. It is now time to begin conversation on how to fund the renewal of these vital pieces of the region's transportation system.

3.2 Capital District Infrastructure Condition

CDTC staff conducts regular surveys of the condition of federal-aid and non-federal-aid non-state roads and highways to document the historic conditions of these non-state roads. Together with similar surveys conducted by NYSDOT, and some local municipalities, the surveys help form a complete picture of the condition of all roads in the Region. In addition, NYSDOT conducts regular condition inspections of all area bridges. Even though the vast majority of funding in the Transportation Improvement Program (TIP) is for infrastructure improvements, the condition of transportation infrastructure is not improving.

3.3 Pavement Condition

Although New Visions 2050 advocates for the continued investment in transit and bicycle and pedestrian infrastructure, the network of highways and local roads in the Capital District remains a key component in moving people and goods throughout the region. A robust network of roads and bridges in good condition is vital to the region’s economic success and maintaining these assets should be a high priority for all levels government. CDTC staff has evaluated numerous state and local data sources to document the change in infrastructure condition over time.

The following notes outline key takeaways from CDTC’s pavement condition analysis.

- Average pavement condition in the Capital District has neither improved nor worsened since 2009 due to continued investment in preservation strategies by state and local governments.
- National Highway System (NHS) pavements continue to be in Good condition relative to other federal – aid facilities in the region.
- NHS Interstate pavements are in the best condition relative to other pavement categories in the region with 97% of pavement in Good and Excellent condition.
- Federal aid eligible road conditions can be categorized as Fair, however, conditions have improved slightly since 2009.
- Non-federal aid pavements remain in the poorest condition of all the roadway systems CDTC evaluated. The non-federal aid system has the highest percent Poor pavements at approximately 21% in 2018.

The following sections summarize the current pavement conditions on the National Highway System, Federal Aid roads system, and Non-Federal aid Roads system in the Capital District. Data used in the following figures was collected from NYSDOT Pavement Roadway Inventory System (RIS), NYSDOT Bridge Inventory data files and CDTC pavement inventories. **All data provided is for the CDTC planning area, which includes all of Albany, Schenectady, and Rensselaer Counties, and Saratoga County, excluding the Town of Moreau, unless otherwise noted.**

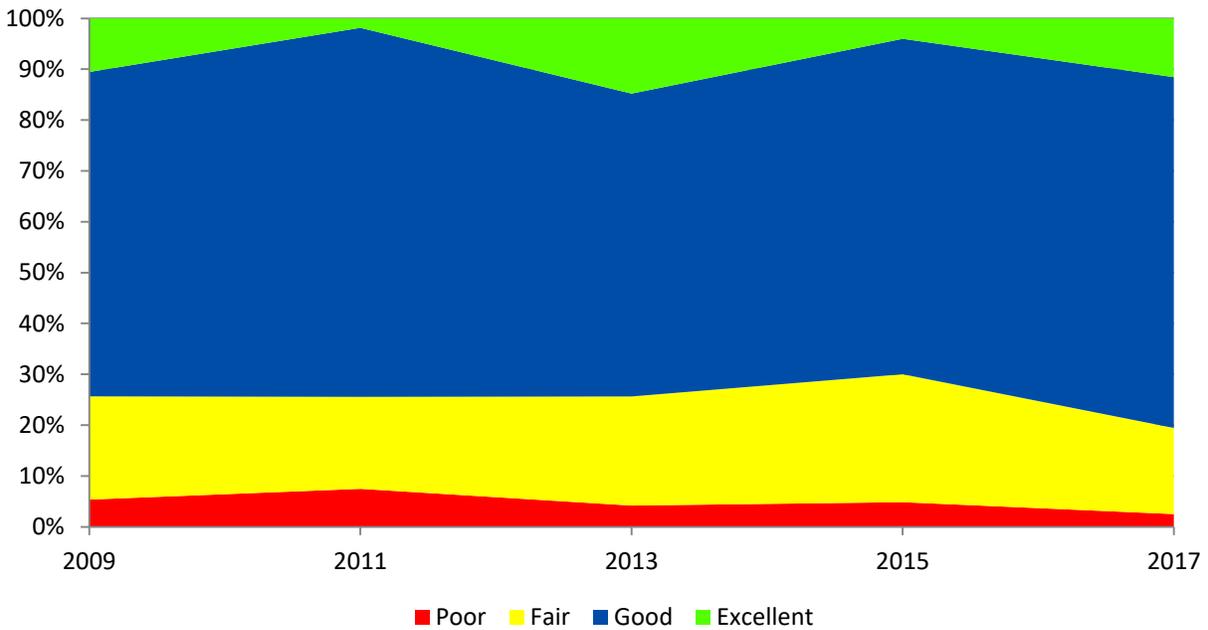
Pavement Condition	Surface Score
Poor	1-5
Fair	6
Good	7-8
Excellent	9-10

The table to the left summarizes the NYSDOT surface score and corresponding pavement condition used to document the pavement conditions in the Capital District.

3.3.1 National Highway System Roads

The National Highway System was established to focus federal resources on the most important roads in the nation, including Interstate highways, principal arterials, and those serving regional ports and intermodal facilities. NHS roads make up only around 13% of total regional lane-miles in the Capital District but carry over 50% of the regional VMT. The conditions of NHS roads have fluctuated since 2009 and are considered to be in Good condition. As of 2017 data approximately 81% of the NHS system is in Good or Excellent condition. Figure 1 shows fairly stable percent Excellent, Good, Fair, and Poor pavement on NHS roads since 2009. (Data Source: NYSDOT RIS File – 2009, 2011, 2013, 2015, 2017)

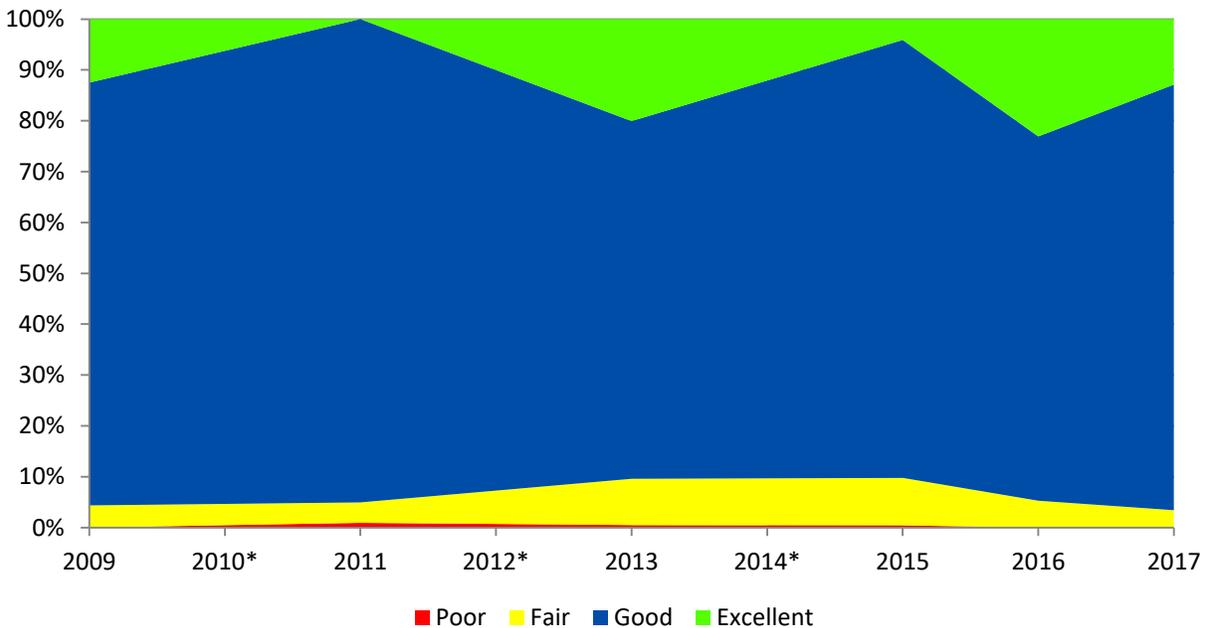
Figure 1 – Percent Excellent Good Fair and Poor Pavement All NHS Roads 2009 – 2017



3.3.2 National Highway System (Interstates)

Interstate Highways are a subset of the NHS and consist of over 800 lane-miles in the capital district. NHS Interstates are in good condition, compared to other federal-aid facilities. Figure 2 shows that over time the majority of NHS Interstate pavement has remained in Good or Excellent condition. Currently, over 90% of NHS Interstate pavement is in Good or Excellent condition. *(Data Source: NYSDOT RIS File – 2009, 2011, 2013, 2015, 2017)*

Figure 2 – Percent Excellent Good Fair and Poor Pavement NHS Interstates 2009 – 2017

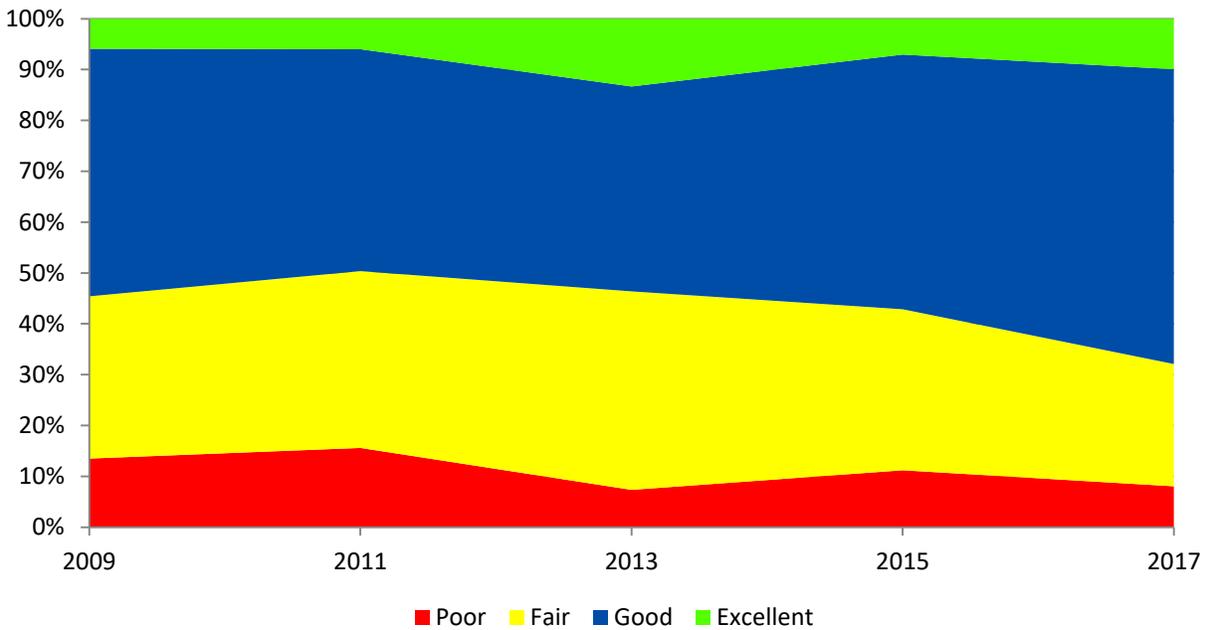


**No data points available for these years. Previous and subsequent years were averaged.*

3.3.3 Federal Aid Roads

The federal aid eligible road system in the Capital District consists of over 4,100 lane-miles (approximately 30% of regional lane miles) of pavement and carries over 80% of regional MDVMT. The federal aid system has remained in Fair condition since 2009. Figure 3 shows that there has been an increase in percent Good pavement and decrease in percent Poor pavement since 2009. Approximately 68% of the federal aid roads in the Capital District are in Good or Excellent condition as of 2017. *(Data Source: NYSDOT RIS File and CDTC Non-State Federal Aid Inventory – 2009, 2011, 2013, 2015, 2017)*

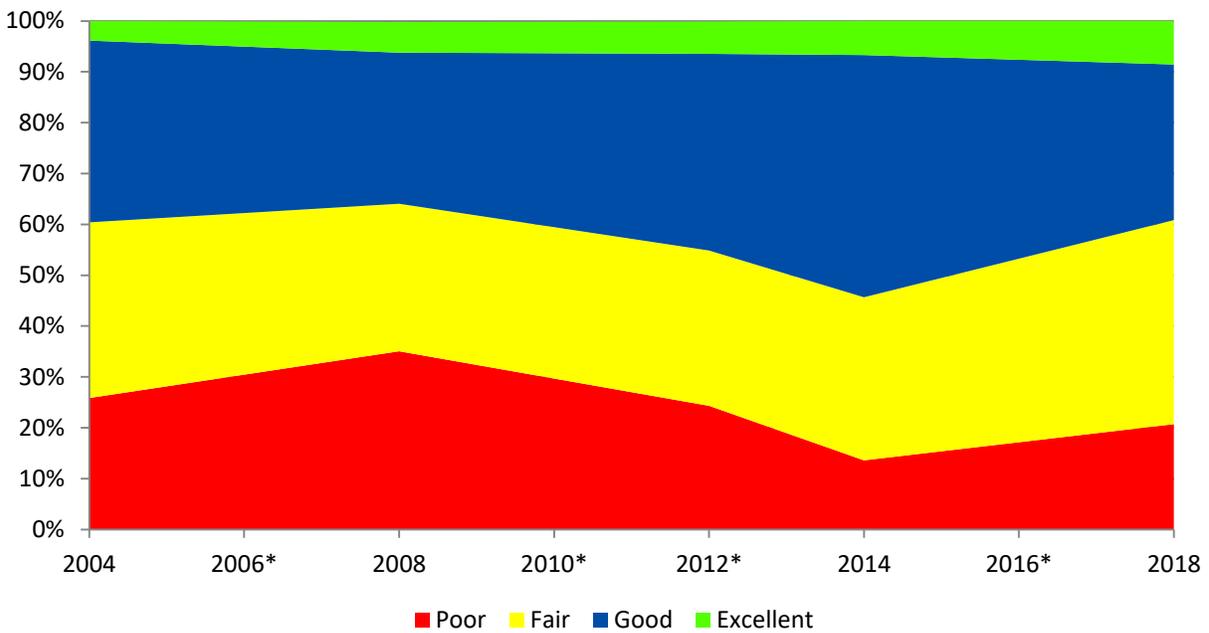
Figure 3 – Percent Excellent Good Fair and Poor Pavement All Federal Aid Roads 2009 – 2017



3.3.4 Non-Federal Aid Roads

The non-federal aid road system is made up of roads that are not eligible for federal aid funding and are primarily owned by local counties towns, cities and villages. The non-federal aid system consists of over 10,000 lane-miles of pavement. CDTC staff collects pavement conditions on a representative sample of non-federal aid roads every four years to track pavement conditions. Average pavement scores on non-federal aid roads have been increasing since 2004, however, they are in the poorest condition of all the roadway systems evaluated. The non-federal aid system also has the highest percent Poor pavements out of all the systems evaluated at approximately 21% in 2018 as shown in Figure 4. (Data Source: CDTC Local Roads Sample Inventory – 2004, 2008, 2014, 2018)

Figure 4 – Percent Excellent Good Fair and Poor Pavement Non-Federal Aid Roads 2004 – 2018



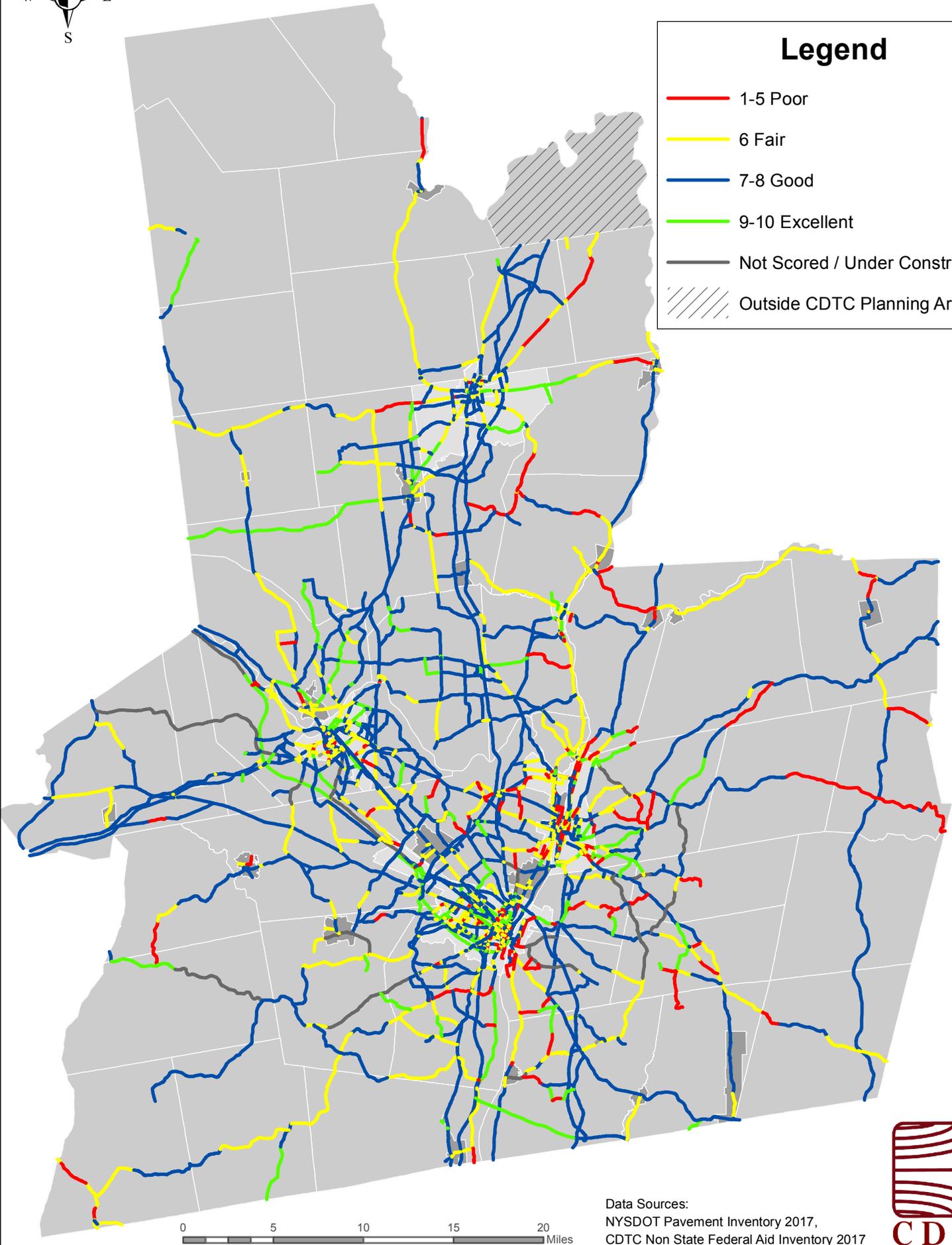
*No data points available for these years. Previous and subsequent years were averaged.

Map 1: Capital District Federal Aid Roads Pavement Conditions: 2017



Legend

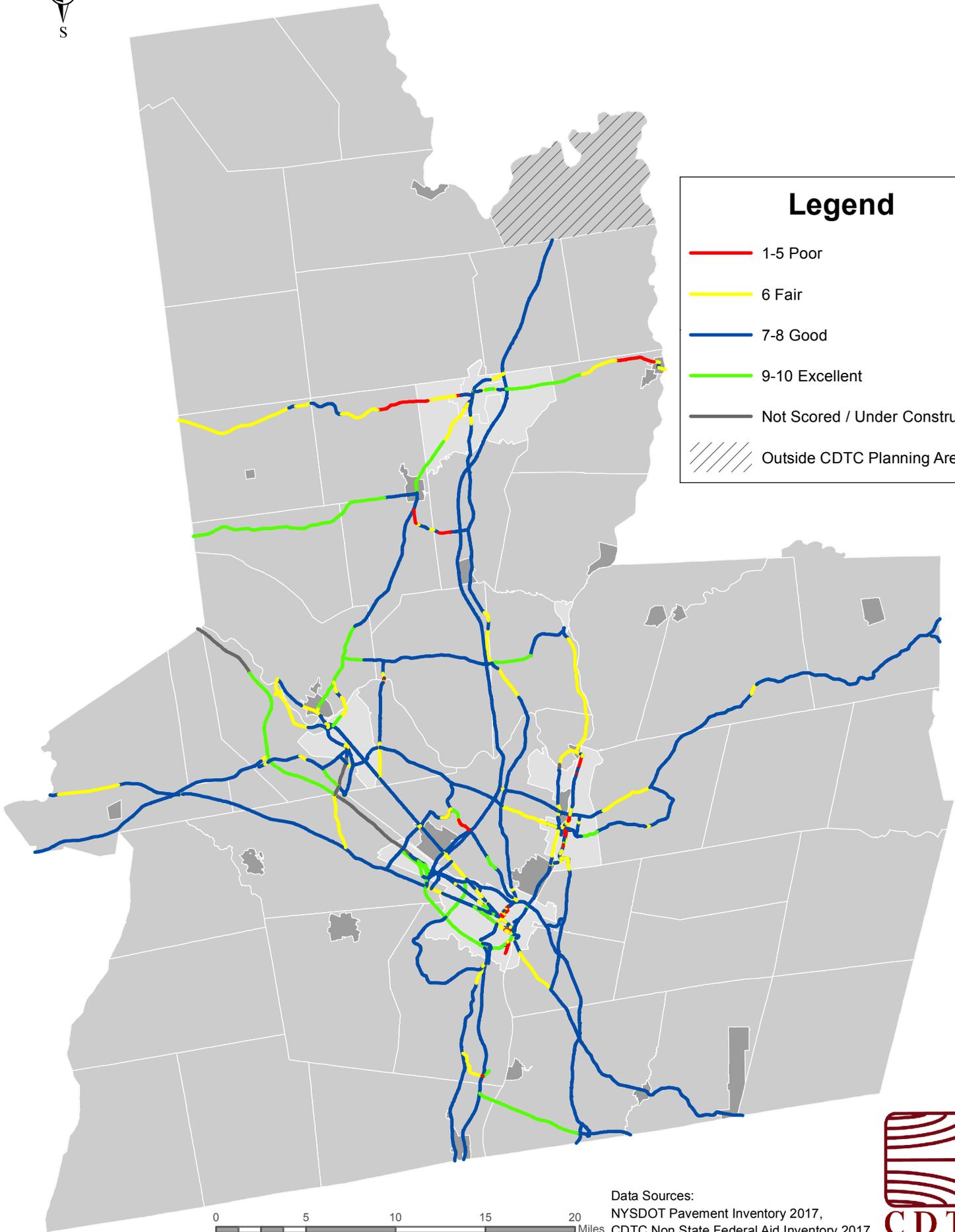
- 1-5 Poor
- 6 Fair
- 7-8 Good
- 9-10 Excellent
- Not Scored / Under Construction
- Outside CDTC Planning Area



Data Sources:
NYSDOT Pavement Inventory 2017,
CDTC Non State Federal Aid Inventory 2017



Map 2: Capital District NHS Roads Pavement Conditions: 2017



Legend

- 1-5 Poor
- 6 Fair
- 7-8 Good
- 9-10 Excellent
- Not Scored / Under Construction
- Outside CDTC Planning Area

Data Sources:
NYSDOT Pavement Inventory 2017,
CDTC Non State Federal Aid Inventory 2017



3.4 **Bridge Condition**

Overall bridge conditions in the Capital District are declining, and despite continued investment by the state and local bridge owners, conditions are deteriorating faster than they can be repaired.

The following notes outline some key takeaways from CDTC's bridge condition analysis.

- Conditions of NHS bridges have declined since 2013. Currently, approximately 11% of all National Highway System deck area is classified as structurally deficient. Given the criticality of NHS bridges to the region and the impact to state and federal performance measures, reversing this trend should be of a high priority.
- While the majority of historic New Visions Pavement goals are on target, Capital District bridges are performing well off their marks from New Visions Bridge goals established in 1995.
- Despite a decrease in the percentage of structurally deficient bridges in the Capital District the percentage of structurally deficient deck area has increased since 2013.
- Currently, just less than 10% of all bridge deck area in the Capital District is classified as structurally deficient.
- New York State Interstate bridges have the highest percentage of structurally deficient deck area at approximately 16%.
- Needs of locally owned bridges remain a high priority in the region. There are 370 locally maintained bridges in the Capital District with 42 being classified as structurally deficient.
- Conditions of New York State owned non-interstate bridges have improved since 2013. Structurally deficient deck area has declined from approximately 17% to 7%.

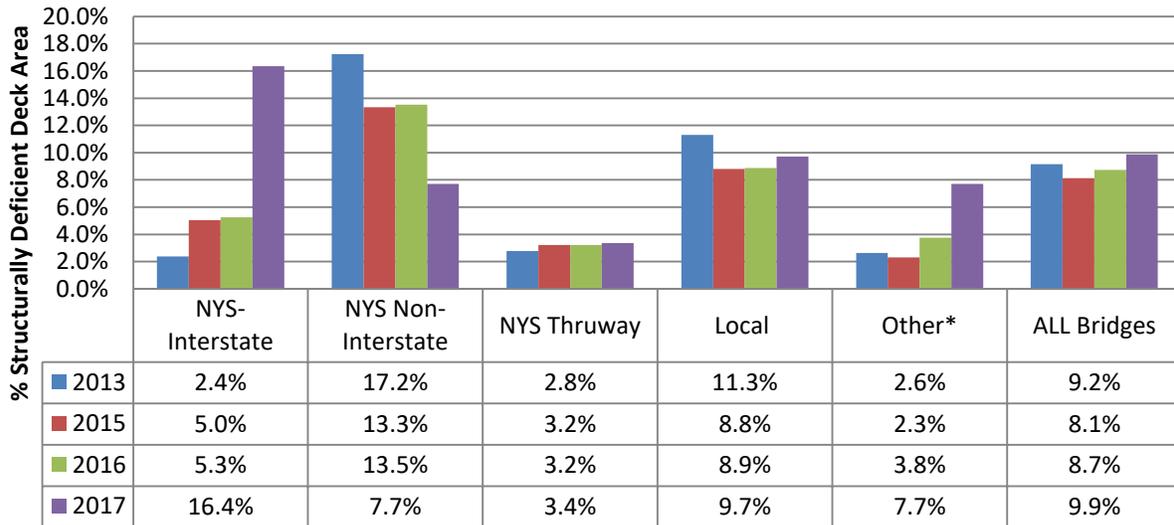
The following sections summarize the conditions of all Capital District bridges and specifically NHS bridge infrastructure. For consistency with federal performance measures percent of structurally deficient deck area is used as the measure of poor conditions. The following defines the conditions of a structurally deficient bridge. More information on bridge conditions using NYSDOT methodologies can be found in the performance measures section of this paper.

Structurally Deficient Bridge – Bridges are considered to be structurally deficient according to the FHWA, if the condition rating of one of its major components (deck, superstructure, substructure, and culvert) is less than 5; the bridge has inadequate load capacity, or repeated bridge flooding causes traffic delays. The fact that a bridge is structurally deficient does not imply that it is unsafe or likely to collapse.

3.4.1 **All Capital District Bridges**

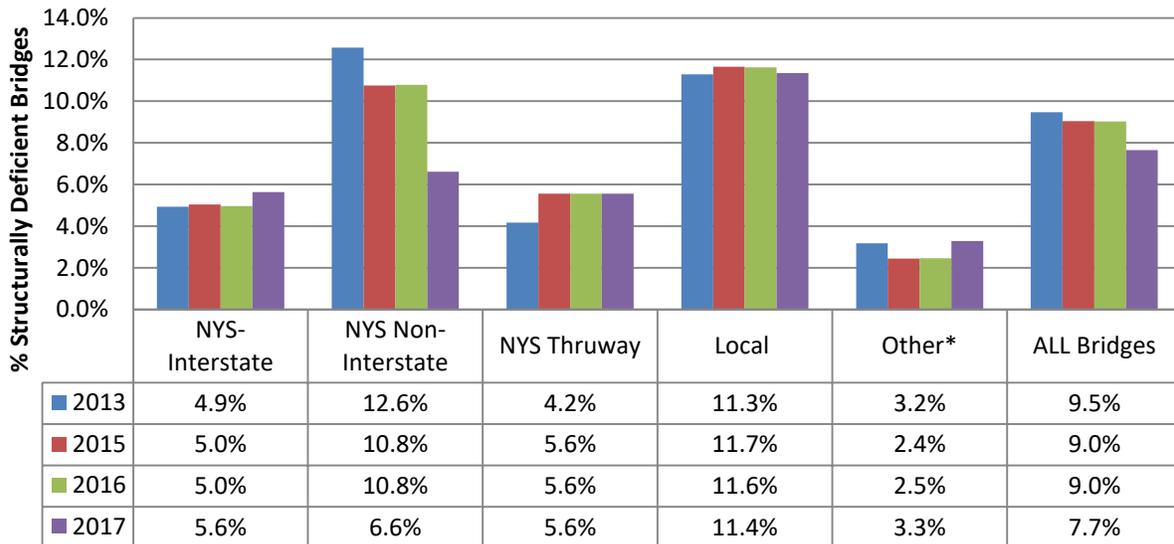
There are currently over 1,000 bridges in the Capital District. While the majority are owned and maintained by NYSDOT and New York State Thruway Authority, the region's counties, cities, villages, and towns are responsible for 370 structures with over 1 million square feet of deck area. Based on recent bridge inspection reports, over 80 bridges, regardless of ownership, are classified as structurally deficient. When looked at in terms of deck area, to normalize for the size of a bridge, just under 10% of total deck area of all bridges is considered structurally deficient and in need of some type of repair. Figures 5 and 6 on the following page indicate that although the percent of structurally deficient bridges in the region has decreased since 2013, the percent of structurally deficient deck area, which normalizes for the size of the bridges, has increased.

Figure 5 – Percent Structurally Deficient Deck Area



*Includes Railroad, Private Industrial, National Parks Service and Other ownership categories
 Data Source: NYSDOT Bridge File and FHWA NBI Bridge File – 2013, 2015, 2016, 2018

Figure 6 – Percent Structurally Deficient Bridges

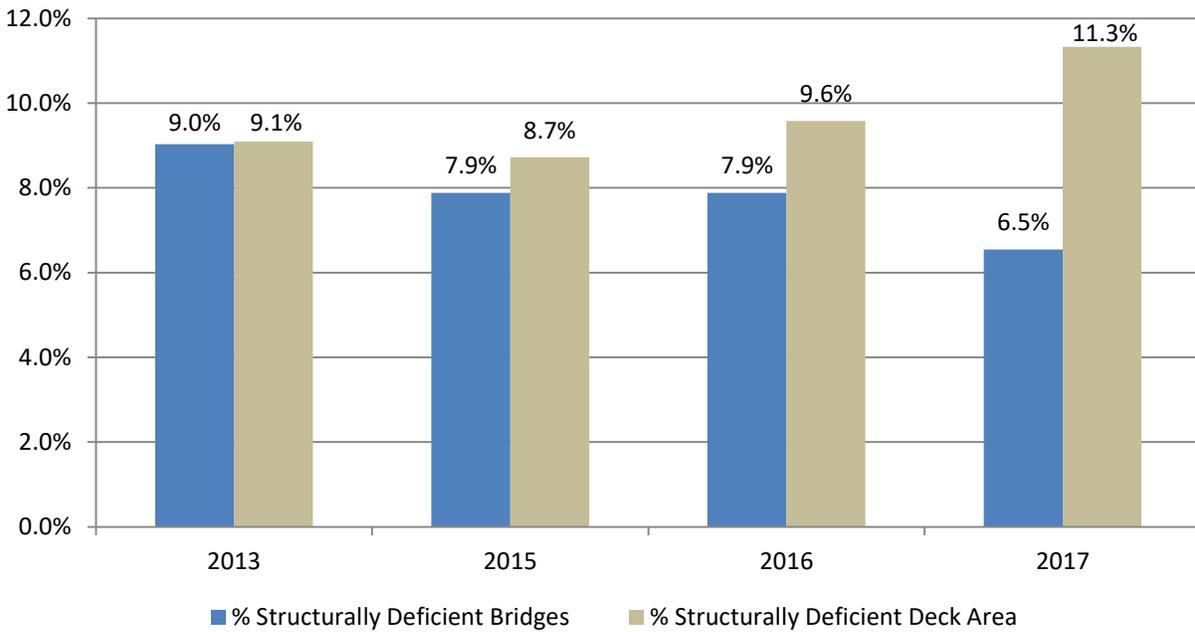


*Includes Railroad, Private Industrial, National Parks Service and Other ownership categories
 Data Source: NYSDOT Bridge File and FHWA NBI Bridge File – 2013, 2015, 2016, 2018

3.4.2 National Highway System Bridges

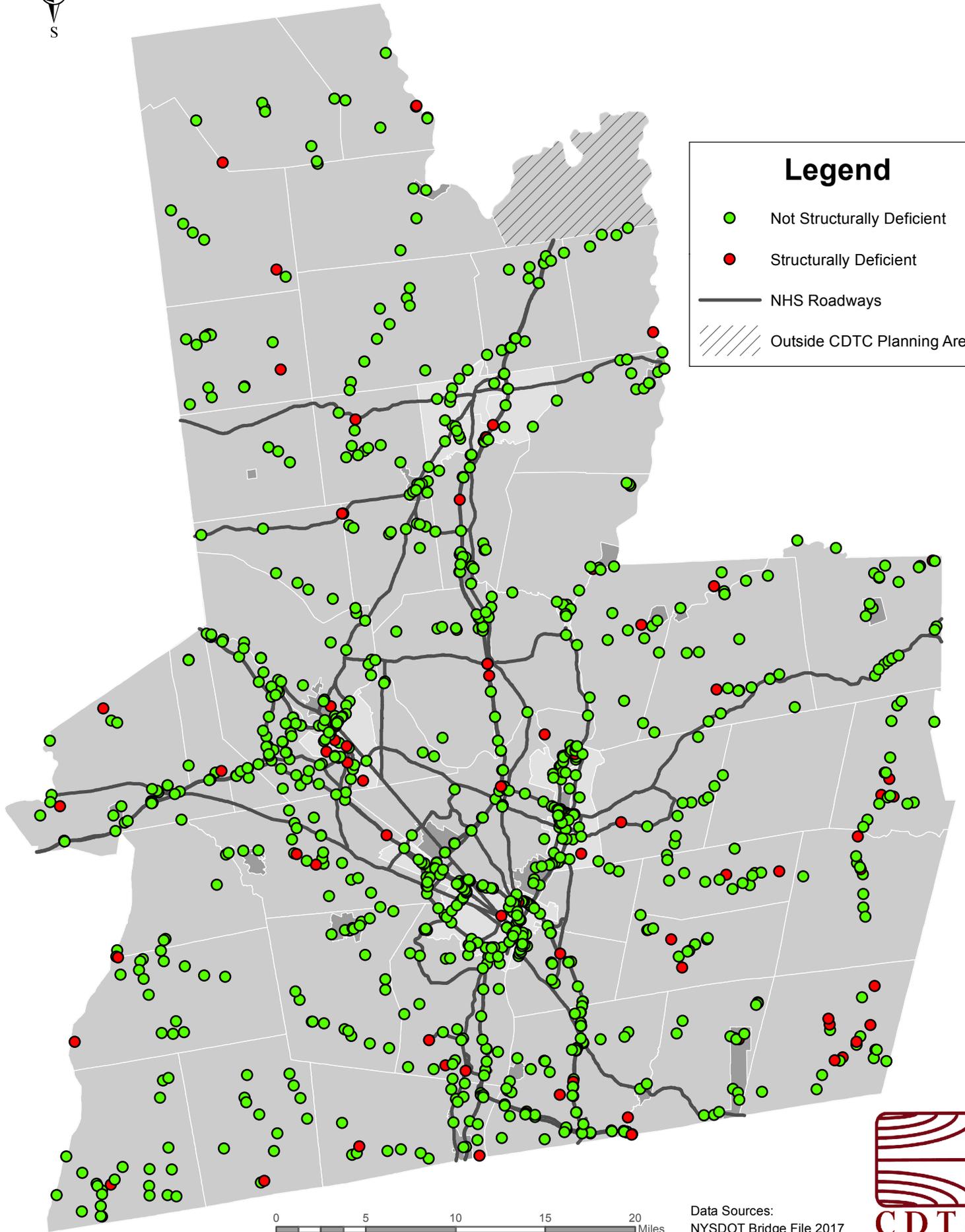
National Highway System bridges are critical to the region’s transportation system and economy. In the Capital District there are currently over 400 NHS bridges, totaling over 7.5 million square feet of NHS deck area. Approximately 6.5% of all NHS bridges are classified as structurally deficient and approximately 11% of all NHS deck area is on a structurally deficient bridge. Figure 7 below indicates that, similar to the trend seen in overall bridge conditions, the percent of structurally deficient NHS bridges in the region has decreased since 2013, however, the percent of structurally deficient NHS deck area, has increased.

Figure 7 – Percent Structurally Deficient Bridges - NHS



Data Source: NYSDOT Bridge File and FHWA NBI Bridge File – 2013, 2015, 2016, 2018

Map 3: Capital District Structurally Deficient Bridges: 2017



Legend

- Not Structurally Deficient
- Structurally Deficient
- NHS Roadways
- ▨ Outside CDTC Planning Area

Data Sources:
NYSDOT Bridge File 2017



Map 4: Capital District NHS Bridges by Condition: 2017



Legend

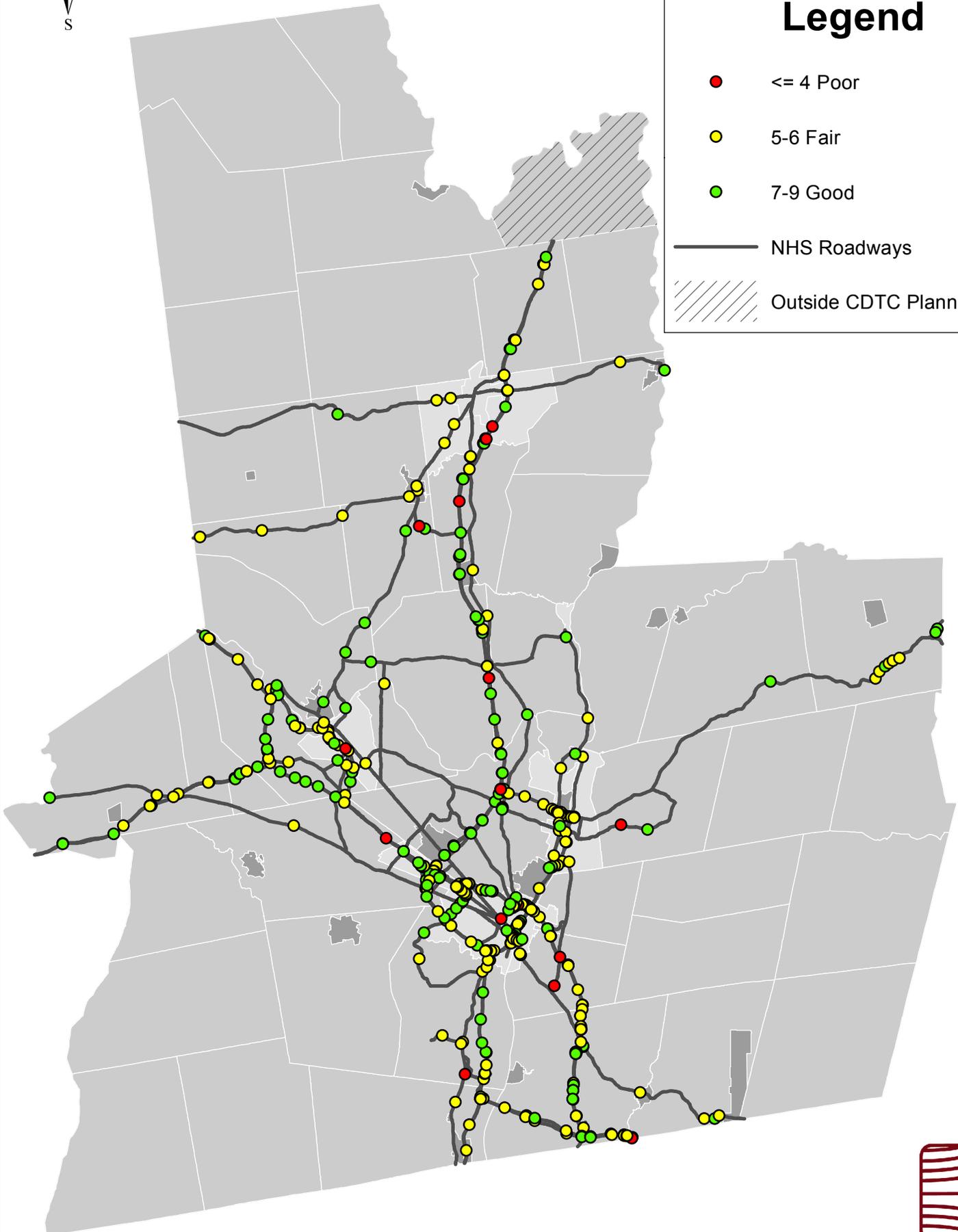
● ≤ 4 Poor

● 5-6 Fair

● 7-9 Good

— NHS Roadways

▨ Outside CDTC Planning Area



0 5 10 15 20 Miles

Data Sources:
FHWA NBI Bridge File 2017



3.5 Bicycle and Pedestrian Infrastructure

Bicycle and Pedestrian infrastructure in the Capital District has become increasingly important for transportation, recreation, and tourism in many of the region’s communities and remains a high priority for CDTC. Existing bike and pedestrian facilities enhance community livability and safety, providing the region’s residents and workers the ability to travel throughout the region without a car.

In 2017 CDTC completed an inventory which documented the presence of sidewalk infrastructure throughout the region and highlighted gaps in the pedestrian network.

The following notes outline some key takeaways from CDTC’s sidewalk inventory

- There are over 1,200 miles of sidewalks within the CDTC planning area
- Approximately 20% of the regions centerline road mileage has associated sidewalks
- Almost 70% of the region’s sidewalks are located within Cities
- Eight towns in the Capital District do not have any sidewalk infrastructure
- The majority of sidewalks within rural and suburban towns and villages exist along NYS routes and local streets in hamlet areas

CDTC also recently completed the “Capital District Trails Plan” in 2018 which documented the current and future presence of multi-use trails and on-road bike routes in the Capital District. Currently, there are over 130 miles of dedicated off-road multi-use trails in the Capital District and another 30 miles of on-road bike facilities throughout the region. Using these estimates, that brings the total bicycle and pedestrian infrastructure mileage to just less than 1,400 miles, with a total estimated replacement value of over \$1.00 billion. For complete evaluation of bicycle and pedestrian facilities in the Capital District and a full list of recommendations for bicycle and pedestrian improvements please see the *New Visions 2050 Bicycle and Pedestrian White Paper*.

CDTC has tracked the conditions of bridge and highway infrastructure since the early 1980s, giving us a firm grasp on the conditions of pavement and bridges within the region. The condition of bicycle and pedestrian infrastructure, however, has very little documentation and is less clear. Sidewalks in the region have been built over many decades and received various levels of maintenance over the years. Sidewalk repairs are often performed as part of associated highway or bridge preservation projects and CDTC’s merit evaluation process prioritizes these projects as part of the TIP project review process.

Repairing existing sidewalks to “good” condition and adding all ADA compliant features would require various levels of funding. Using current cost estimates for full reconstruction of sidewalks and ADA curb ramp installation from the NYSDOT Quick Estimator Reference - Upstate, a high level cost estimate for repairing sidewalk infrastructure can be estimated for various scenarios of Poor sidewalk conditions. Table 3 below outlines regional cost estimates for repairing sidewalk infrastructure.

Table 4 – Sidewalk Replacement Cost Estimates

Percent Sidewalks in Poor Condition	Sidewalk Miles	Total Cost (\$M)
10%	123	99.876
20%	246	199.752
30%	369	299.628

Percent Sidewalks in Poor Condition	Sidewalk Miles	Total Cost (\$M)
40%	492	399.504
50%	615	499.380
75%	923	749.070
100%	1,230	998.760

Americans with Disabilities Act (ADA) Compliance

Title II (28CFR Part 35) of the Americans with Disabilities Act of 1990 (ADA) requires that both State and local governments must ensure that individuals with disabilities are not excluded from programs, services, and activities that receive federal funding. Providing pedestrian facilities is an example of such a program. The law requires local governments to develop Transition Plans to identify a course of action to bring deficient pedestrian facilities into ADA compliance. CDTC’s Sidewalk Inventory was intended to be used as a baseline or first step in assisting municipalities with developing a screening process to evaluate ADA compliance of their existing sidewalk facilities.

Making sure that sidewalks, signalized intersections, and other street crossings are fully compliant with new ADA requirements is a challenge facing most Capital District communities. CDTC is considering assisting local communities in developing portions of their ADA Transition Plans associated with pedestrian infrastructure. Currently, there are two municipalities in the Capital District that have adopted ADA transition plans that include a comprehensive condition rating of all sidewalks. CDTC maintains a regional ADA Compliance Set-Aside on the Transportation Improvement Program for implementation of NYSDOT’s Transition Plan, including curb ramp and sidewalk improvements on state owned routes.

4 Additional Infrastructure Needs

While roads and bridges are the core elements of the region’s infrastructure, and represent the bulk of the financial need, a broader view of transportation infrastructure must include the needs of transit, and major intermodal facilities like the Port, and the Airport. These assets rely heavily on the quality of the regional road and bridge network that connect them, and are affected by the challenges those systems face. The CDTC Freight Priority Network (FPN) highlights the routes that serve these major intermodal facilities and provides a logical system of roads and bridges that facilitate efficient and safe truck mobility within, to, and from the CDTC region. The primary function of FPN designation is to bring roads that carry critical freight and goods movements to the forefront in freight-related investment decisions. For more detail on CDTC’s FPN and a full list of intermodal facilities in the region please see the *New Visions 2050 Freight White Paper*.

The following sections describe in more detail the recent investments, ongoing needs, and financial challenges of regional transit, Port and Airport facilities.

4.1 Transit Infrastructure

The Capital District Transportation Authority (CDTA) is a public benefit corporation that provides transportation and other services within Albany, Rensselaer, Saratoga and Schenectady Counties. The vast majority of CDTA's trips are for work and shopping purposes with the rest being for school, medical or recreation purposes. Along with fixed route services, CDTA provides commuter express services (including the Northway Express operated by Upstate Transit) and paratransit services for people with disabilities. In the last few years, CDTA has expanded its scope of transportation services to include the region's bike share program (CDPHP Cycle!), trolleys, and microtransit. CDTA also owns and operates the Rensselaer Rail Station and the Saratoga Springs Train Station. CDTA has been designated by New York State to be the primary recipient of federal funds through the Federal Transit Administration (FTA) in the four county Capital Region. CDTA can apply for and use FTA funding for its own services or can sub allocate funding as needed.

The region's transit assets are comprised of a significant bus fleet, shelters and street amenities, several stations, park and ride lots, and supportive facilities and infrastructure. CDTA's asset inventory includes over 2,600 total stops and over 300 bus shelters. The transit bus fleet includes over 250 transit busses ranging from 20 to 60 feet in length and approximately 30 paratransit vehicles. The lifespan of these vehicles can be impacted by roadway conditions. Poor pavements result in greater wear and tear on vehicles and uncomfortable rides for customers. It is important that this relationship be considered in pavement management practices and capital project prioritization. In recent years, the CDTA capital program budget has ranged from \$33.8 million in 2018, \$21.6 million in 2019, and \$26.66 million in 2020 depending on needs programmed for investment in a particular year. Major facilities reinvestment or purchases account for year-to-year fluctuations.

Currently, CDTA's transit fleet is aging while at the same time experiencing ridership declines, impacting the cost effectiveness of the services being offered. However, more people currently have access to transit than in the past, the overall quality of transit has improved, and CDTA remains a vital portion of the region's mobility. For a complete evaluation of Transit in the Capital District and a full list of recommended future strategies and actions for Transit please see the *New Visions 2050 Transit White Paper*.

4.2 Port Infrastructure

The Port of Albany encompasses 400 acres on both sides of the Hudson River in the Cities of Albany and Rensselaer and in the Town of Bethlehem and is located in a designated Environmental Justice Area. Total port marine facilities include 5,400 feet of wharf on the east and west sides of the Hudson River. Total facility assets are valued at \$112 million, including supportive infrastructure such as fully rebuilt and increased capacity wharf, on-dock rail, harbor cranes, approximately 300,000 square feet of maritime warehouse space, grain elevator, storage and transfer facilities, and a system of roadways, switching rail, and transit sheds. The Port's economic contribution to New York State has been estimated at \$813 million.

The Port of Albany is undergoing a multi-year \$50 million maritime infrastructure improvement plan. Construction of a new \$8 million climate controlled heavy capacity clear span warehouse and re-construction of a new roll on roll off barge system have recently been completed. Design and engineering is underway for a new 60,000 SF marine terminal warehouse and terminal surface and roadway improvements. The Port is gaining capacity to handle heavier equipment, cargo, and can support new customers from around the world all while attracting additional private investment. The Albany Port District Commission (APDC) is in the process of securing permits and approvals to undertake

a \$100+ Million Port expansion project to support regional manufacturing and supply chain activities and collaborate with New York State's Off Shore Wind Initiative to enhance renewable energy solutions.

While the recent upgrades greatly modernize the Port, heavy freight transshipment is very taxing and costly to physical assets. Freight is growing and capacity needs are only expected to increase, particularly in the long run as the economy shifts and calls for renewable energy increases. The Port has committed to invest in publicly owned roads within its district in order to maintain and improve conditions and important connections and support local neighborhoods by providing an alternative truck route through the Port. The Port's total capital investments in recent years have increased, with higher values in years programmed for the letting of major contracts related to capital-intensive reinvestment in infrastructure. Moving forward, annual capital program financial needs may easily amount to \$12 million or more per year, on average. Significant new capacity expansion or modernization projects would likely exceed this value. For more detail on Port of Albany activities please see the [Port of Albany 2018 Annual Report](#).

4.3 Airport Infrastructure

Albany International Airport encompasses 1,163 acres of land in the Town of Colonie. The airport's core capital assets are valued at \$454 million and include two primary runways (8,500 and 7,200 feet), taxiway and road systems, hangars and cargo facilities, control tower, terminal and parking structures, and supportive infrastructure. The importance of the airport to the region is reflected in its estimated economic contribution to New York State of \$750 million annually.

Since the 1990's key investments in the airport have totaled more than \$207 million. These investments include the construction of a new passenger terminal, air cargo terminal, parking garage, several runway extensions and rehabs, removal of a municipal water tank, and numerous improvements to other airport infrastructure and aircraft maintenance facilities. These investments underscore the range and scale of investments required to maintain, operate, and modernize the airport.

The Airport's 5-Year Capital Plan totaled \$265 million for 2005-09 and \$132 million for 2010-2014, \$137 million for 2015-19, and \$180 million for 2020-24. Highlights of the current capital program include \$30 million for runway pavement repair, taxiway renovation, apron and ramp rehabilitation, lighting and navigation aids, and service access road additions.

Given the high levels of recent attention to improving runway and associated conditions, as well as the modern terminal and parking facilities, the airport assets overall are in stable and good condition. Absent unexpectedly high growth in air travel, expansion is not an immediate concern. However, continuing needs to preserve safety and capacity are substantial, and ongoing capital program financial needs average \$40 million per year. Land use management (including related to noise and obstructions to approach angles) is a continual asset management need as is improvement to environmental impact (e.g., through on-site storage and processing of glycol aircraft deicing fluid). The airport has long referenced its need for better interstate system connectivity to move forward with new needed and planned projects. The new I-87 exit 3-4 interchange is currently under construction and will provide direct interstate access to the airport and create new opportunity for growth. To capitalize on this opportunity and bolster its role in the region's economy and to inter-regional mobility, the airport will require continued and improved financial resources. For more detail on Albany County Airport Authority activities please see the [2018 Comprehensive Annual Financial Report](#).

5 Financing Infrastructure Renewal

There is no question Capital District transportation infrastructure is in need of renewal, whether it is highway reconstruction, bridge replacement or repair, or maintaining existing bicycle and pedestrian infrastructure, all sectors of transportation infrastructure deserve attention. With this need comes the need for funding. Traditionally, funding needs have been met with revenue from the Highway Trust Fund and congressional legislation; however, the Highway Trust Fund has been insolvent since 2008 and has depended on over \$140 billion in revenue transfers to sustain authorized funding levels committed to the states. The result has been relatively flat funding over the past decade leaving significant gaps in funding for infrastructure maintenance and new construction.

Since the passage of MAP 21 in 2012 and the FAST Act in 2015, the approach to addressing the needs of roads and bridges throughout the state and in the Capital District has shifted. In the past, bridges were routinely replaced and highways were often reconstructed when in need of maintenance. More recently, the approach is to perform “element specific” bridge repairs and repave highways whenever possible in order to extend the useful life of these valuable assets. This “preservation first” strategy emphasizes the importance of maintaining existing infrastructure and implementing less expensive short term treatments to keep the transportation system in good repair. Given the current uncertainty in future federal transportation legislation, this approach will likely remain the strategy for the region in the near future.

Preservation techniques may be applied to pavement and bridges. Pavement preservation and bridge preservation are defined as follows:

Pavement Preservation: treatments intended to slow structural deterioration and extend roadway usable life before major rehabilitation is needed. For asphalt pavements, examples of preservation projects include microsurfacing, chip seal, slurry seal, and other minor rehabilitation². Preservation *does not* include full-depth rehabilitation or reconstruction. Applying preservation treatments to the right roads at the right time will reduce the lifecycle cost of the roadway; per NYSDOT, “Once these assets are in the lower-cost preservation cycle, the future year savings are applied to other candidates to bring them into a state of good repair.”³

Bridge Preservation: Per FHWA, “Bridge preservation is defined as actions or strategies that prevent, delay, or reduce deterioration of bridges or bridge elements; restore the function of existing bridges; keep bridges in good or fair condition; and extend their service life. Preservation actions may be cyclic or condition-driven.”⁴

5.1 NYS Transportation Asset Management Plan

Discussion of the future of financing and repairing infrastructure in the region suggests the need for careful review and coordination with New York State DOT’s Transportation Asset Management Plan

² FHWA. (May 30, 2018). *Every Day Counts - Pavement Preservation (When, Where, and How)*. Retrieved from: https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/pavement.cfm.

³ NYSDOT. *Forward Four: Leading us Forward to a Sustainable Future*. Retrieved from: <https://www.dot.ny.gov/divisions/operating/opdm/local-programs-bureau/srts/repository/guiding%20principles.pdf>.

⁴ FHWA. (Spring 2018). *Bridge Preservation Guide Maintaining a Resilient Infrastructure to Preserve Mobility*. Retrieved from: <https://www.fhwa.dot.gov/bridge/preservation/guide/guide.pdf>.

(TAMP). The TAMP explicitly encourages a “partnering with other owners of NHS assets.” Among these other owners, local counties, towns, villages, and cities represent a 17% ownership stake in NHS facilities statewide. While the TAMP is focused largely on managing the conditions of State owned facilities, along with some attention given to Thruway Authority assets, the MPO is an appropriate setting in which to consider the entirety of a region’s infrastructure needs. It is worth noting, in the interest of a complete picture of regional infrastructure needs, that the TAMP primarily reports on and guides the management of roads and bridges. While these important core elements may be the most costly, CDTC is equally concerned with additional transportation assets including those related to ADA compliance, transit, sidewalks, bicycle facilities, trails, striping, culverts, etc.

The future financial picture and associated goal setting within the TAMP, which covers the 10-year period of 2018-2028, are of great interest and potentially great impact to our region’s future. Uncertain future Federal funding and a realistic assessment of future state fiscal capacity underlie the TAMP’s projection of a continuance of relatively ‘flat’ or mildly diminishing available funds in NYSDOT’s program. NYSDOT notes a financial shortfall of \$1.6B per year (compared to current annual funding levels of \$875M) if a state of good repair on the NHS system were to be pursued and achieved within 10 years. As a consequence of this fiscally constrained projection, the TAMP does not set ‘aspirational’ goals but rather a goal of minimizing deterioration of existing infrastructure in an environment of scarce funding. It should be noted that the TAMP’s fiscally conservative outlook which eschews aspirational goal setting is not at odds with the legacy of CDTC New Visions plans which were also governed by a realism about the resources required to implement those plans.

Placed between the setting of limited funding and the attempt to maintain existing infrastructure, the TAMP reinforces NYSDOT’s commitment to the investment strategy known as “Preservation First”. While all dimensions of this strategy have not been outlined, its core philosophy is that it is more cost effective to keep assets in higher condition states than to postpone treatments until assets deteriorate and require more aggressive reconstruction projects. In general, this translates into higher spending levels on better condition assets and deferment of more expensive repairs on poorer condition assets until some future date.

It is implied in the TAMP that pursuing this cost effective strategy is done in conjunction with a “Beyond Preservation” strategy which addresses and rehabilitate assets in poorer condition which had not been eligible for preservation treatments. These projects consist primarily of highway reconstruction and bridge replacement and can be broken down into two subsets, System Renewal and System Improvement. According to the TAMP, 40% of funding is likely to be system renewal and improvement projects which both improve infrastructure conditions and also enhance the economy or provide sustainability benefits, including environmental enhancements or resiliency to extreme weather events. The remaining 60% of funding should be dedicated to preservation.

5.2 New Visions Infrastructure Financing

The New Visions Long Range Plan has a longer time horizon than the TAMP (looking out to 2050 rather than 2028) and, as described above, is required to give attention to a broader range of infrastructure classes and infrastructure owners. Both of these will influence the establishing of goals which are likely to be overlapping and yet at times possibly slightly divergent from the goals of the TAMP. The financial picture for the region over the next 5 to 10 years is as uncertain as the statewide picture painted within the TAMP, for many of the same underlying reasons. Consequently, it may be reasonable to accept relatively flat funding over this time period, along with the implied slight decline in some measures of asset conditions. In the near term, CDTC’s New Visions financial planning for the region aligns closely with NYSDOT’s statewide financial planning in the TAMP.

Over the longer term, a time period beyond the TAMP and in which NYSDOT suggests the preservation approach “frees up” additional funding for more costly rehabilitation or reconstruction of poorer condition assets, there may be opportunities for a more optimistic outlook from CDTC New Visions. Such long range goal setting, as in past New Visions plans, would still remain realistic and fiscally constrained rather than purely ‘aspirational’.

Given the preservation first strategy presented within the TAMP, and above stated financial goals and restrictions, CDTC might consider projecting or advocating a period of 5 to 10 years which follows a preservation focus in accord with NYSDOT’s TAMP – although, notably, including multimodal and universal access elements such as transit supportive features and ADA compliant sidewalks, for example. Beyond an initial 10-year more conservative time period which coincides with the TAMP, more attention might be devoted to a growing share of rehabilitation and reconstruction. Goal setting might therefore follow a short- and long-range time horizon for not only funding but also condition states of various asset categories. The near term might attempt a relative stabilization (or only slight decrease) of fair and good condition roads while accepting a moderate decrease in the conditions of poorer roads and facilities. The longer term might argue for continued stabilization of better condition facilities while targeting a reduction in the percentage of poorer condition assets.

By law, and as a part of responsible and effective planning, a regional transportation plan must be respectful of fiscal constraints and realistic about the resources required to implement the plan. As of this writing, Federal legislation extending or replacing the FAST Act is a significant unknown, as are any mechanisms to address the long-range shortfall in the Highway Trust Fund. Also unknown is what share of New York State’s limited fiscal plan capacity will be devoted to transportation. Many core aspects of funding stability loom larger than the the scope of the New Visions Regional Transportation Plan. Nonetheless, innovative financing techniques will continue to be explored and evaluated with regard to their projected yield, long-term reliability, equity, and feasibility.

Table 5 on the following page shows the average annual historic and forecast revenues for Highway, Bridge, and Intermodal Infrastructure. It was assumed that federal, state, and local funding levels would be maintained at an average inflation rate of 2.6 percent over the plan's design period. In general, for federal highway funds, the estimate of available funding is based on funding levels allocated to the region by the State for each funding program. In addition, the region has been successful in being awarded a modest amount of federal funding through a competitive statewide process. With respect to federal transit funds, the available funding estimates are based on historic levels of funding that have been allocated to the State and region. With respect to State funds, the estimate of available funding is based on historic funding levels that are generally received by the region for highway and transit capital and operating projects.

Two budgets were prepared for this table. The 'reduced funding scenario' is based on recent reductions in TIP federal-aid and State Dedicated Fund (SDF) allocations to the region. The 'full funding scenario' is consistent with expectations that the support for continued governmental responsibility for transportation at the federal level will remain strong, a principle articulated in the previous New Visions Plans. The reduced funding scenario will have serious negative impact to the region's pavement and bridge infrastructure.

Table 5 – Regional Transportation Plan Budget by Infrastructure Element
(Annualized Cost in Millions)

Program Element	(2007-2012)	(2016-2021)	New Visions 2050 Full Implementation	
	Previous Investment Levels	Current Investment Levels	Reduced Funding Scenario*	Full Funding Scenario
Intermodal Facilities	31.900	31.000	25.000	42.000
Transit Infrastructure	30.000	36.000	36.000	55.000
Highway Rehabilitation and Reconstruction (PN & Other)	67.500	23.300	60.000	154.000
Bridge Rehabilitation and Reconstruction	55.100	33.500	72.000	106.000
Highway and Bridge Maintenance	191.000	191.000	218.000	242.000
Total Highway and Bridge Rehab/Maintenance/Reconstruction	313.600	247.800	350.000	502.000
Total Plan Cost	506.000	435.200	512.000	775.000

For more detail on the future of financing transportation infrastructure in the Capital District please see the *New Visions 2050 Financial Plan*.

5.3 Alternative Funding Approaches

With the future of funding from the Highway Trust Fund uncertain, federal state and local governments must be open to developing a range of additional funding methods that will be sustainable in the long term. The New Visions Transit Task Force (New Visions 2040) explored a range of potential sustainable funding mechanisms for transportation operations. While regional coordination and political unpopularity of tax increases were noted by the Transit Task Force as significant barriers, innovative financing for transportation projects of some form will be required in the future.

For longer-term sustainable revenues, the following are options that can be considered by policy makers:

- Self-sufficiency at the State level
- Fuel taxes at the State level
- Traditional and innovative tolling
- Generic Environmental Impact Statements
- Mileage-based user fees
- Shared service agreements

The sections below discuss several of these alternatives in more detail.

5.3.1 Generic Environmental Impact Statements

In this constrained funding environment, undertaking major highway or transit initiatives must include local and private investment. Implementing small scale public private partnerships at the local level is one option to supplement federal funding and stretch the use of public dollars. One option is the use of mitigation cost, developed through the Generic Environmental Impact Statement (GEIS) process. Mitigation Cost programs typically identify needed projects within a municipality based on projected growth and scale private investment based on each new developments percent consumption of new peak-hour, peak direction capacity. Local implementation of these types of mitigation costs can free-up public resources for more routine kinds of projects. Several municipalities in the Capital District are already using a GEIS process and CDTC has been approached by others interested in using the process as well. This process has been highly successful in raising funds for needed infrastructure improvements in growth areas.

5.3.2 Mileage Based User Fees

While incremental sales taxes dedicated to transportation have experienced a success rate in ballot measures nationwide, according to an NCHRP Report entitled “Future Financing Options to Meet Highway and Transit Needs,” it is assumed that most traditional fuel or sales tax increases would be extremely challenging politically and administratively, and are in any case well beyond the purview and mission of the MPO. However, the price of building and repairing transportation infrastructure will continue to rise and ongoing advances in fuel efficient technology, although beneficial to our environment and emissions goals, result in decreased revenue from the existing gas tax structure.

One of the most promising ways to replace the fuel-based tax in a sustainable and equitable way involves the use of mileage based user fees. The State of Oregon has begun to explore the option of a vehicle miles traveled user fee through the “OReGO” program. OReGO is a road user fee system that charges drivers on their usage of public roads by mile rather than consumption of fuel. The program first

began pilot operation in July 2015 on a volunteer basis, where volunteers install a mileage reporting device into their vehicle. The “Oregon’ Road User Charge Final Report” published in April 2017, indicated that at the time over 1,300 volunteers had enrolled in the program. The report notes that although the cost of administration is high, and must be reduced before the program can be a viable option to be mandatory on a statewide level, charging drivers on a per mile basis instead of per gallon of fuel consumed is possible. This program is the first step toward a future in which technology-enabled pay-for-use approach replaces per gallon fees as the prevailing method for collecting money to finance road repair and construction.

6 Innovation Through New Technologies

A part of the discussion of how preservation and renewal of the regional and statewide infrastructure can be funded in the future, the question of how this infrastructure should be built and maintained should also be asked. The challenges that the region faces now and through 2050 will require increasingly innovative and cost-effective solutions.

- New and emerging technologies in asphalt paving have the ability to reduce costs and extend the service life of many pavements in the Capital District. Polymer modified asphalts, warm mix asphalts, and recycled asphalts may not be new, but technology has improved and they are becoming more popular among paving contractors for their financial and environmental benefits compared to traditional paving methods.
 - Polymer Modified Asphalts can reduce distress levels in pavement and increase service life. When used in the surface course, pavements can have up to a 50% increase in surface life.
 - Warm Mix Asphalt technology uses much lower temperatures than traditional hot mix asphalt during production. The reduced temperature improves asphalt compaction which helps achieve proper pavement density and improved durability and also reduces time and labor costs.
 - Recycled Asphalts or reclaimed asphalt pavements (RAP) use recycled materials from the milling process or other sources as aggregate particles in new pavements. Using recycled materials provides economic and environmental benefits due to reduced consumption of new raw materials and transportation costs. As technology improves higher percentages of RAP may be able to be used.
- The use of Fiber Reinforced Polymers in bridge construction and repair can reduce installation time and labor costs compared to conventional bridge decks. Fiber Reinforced Polymers are also high strength, and have a high resistance to corrosion, reducing maintenance costs over time.
- In addition to the array of new materials, innovative construction techniques are being devised to speed the construction of bridges. One method involves segmenting bridge girders into smaller units that can be economically fabricated off-site, easily transported to the site, and erected more quickly and easily. Accelerated bridge construction has been proven to cut user costs and reduce safety concerns.
- Evolving smart technologies in vehicles and infrastructure are signaling better utilization of infrastructure in the future, possibly reducing the need for future capacity expansions and allowing instead for a right-sizing of transportation facilities and systems.

- Overloaded trucks deal significant damage to roadways and bridges, and may reduce the longevity of these assets. Weight-in-Motion (WIM) stations may be installed on roadways with high heavy vehicle volumes to weigh every vehicle at highway speed. When coupled with enforcement activities, WIM may improve compliance with legal weight limits. WIM technology provides data on overloaded truck prevalence that is useful for pavement and bridge monitoring and design. WIM also provides benefits in the areas of safety, congestion, and emissions by reducing the number of trucks that must stop during enforcement activities. Finally, WIM stations act as permanent vehicle counting stations, providing valuable data for planning and forecasting purposes.

7 Recommended Strategies and Future Actions

Current federal transportation legislation mandates a streamlined and performance-based process for transportation planning, implementation, and assessment that shows how regional agencies such as CDTC will meet national and regional infrastructure goals. The strategies and future actions identified below represent the approach that will be taken by CDTC and regional partners to help achieve performance based goals for regional and statewide infrastructure. Many of the strategies identified in this report are similar or the same as the actions described in previous versions of the New Visions Plan, however, some have been combined or re-phrased to better fit the current vision of CDTC.

Recommended Strategies

CDTC recommends integrating the following strategies into the planning process to meet the regional and statewide goals for the future of transportation infrastructure.

- Devote significant TIP resources to infrastructure preservation and renewal, including continued local and State investment in routine maintenance.
- Support less costly and shorter-lasting road and bridge repairs for the foreseeable future. This maximizes the investments in pavement and bridges in the short term.
- Evaluate TIP projects according to CDTC identified merit categories. Criteria identified in the appropriate infrastructure merit category prioritize projects that propose preservation and renewal of existing infrastructure.
- Encourage the use of alternative funding approaches, especially local funding mechanisms and small-scale public-private financing opportunities. In this constrained funding environment, undertaking major highway or transit initiatives must include local and private investment. The use of mitigation cost, developed through the GEIS process, can free-up public resources for more routine kinds of projects.
- Encourage technology innovation within New York State. Although it may take years to adopt new technologies and new ways of designing and building our bridges and highways, the long-term savings cannot be minimized.
- Encourage sidewalk repairs, transition plan implementation, and connecting gaps in the existing bicycle and pedestrian network before extending new bicycle and pedestrian infrastructure.
- Support the integration of complete street features in preservation and renewal treatments wherever possible and heavily consider community context regardless of facility ownership.

- Support the integration of non-required ADA accessibility elements in pavement and bridge preservation and renewal treatments wherever possible.
- Support NYSDOT efforts to expand coverage of weigh-in-motion (WIM) and e-screening technologies on the State Freight Core Network.

Future Actions

It is important to note that infrastructure planning is a continuous effort at CDTC. Given the highly technical, data-intensive nature of topics within infrastructure, CDTC staff guided by input from regional infrastructure experts will continue to pursue efforts to collect and analyze available data, learn collectively from best practices, and ultimately frame and guide regional policy which aims to put limited resources to the highest and best use.

CDTC has identified the following future actions to improve future efforts in transportation infrastructure planning and programming.

- CDTC will evaluate re-establishing both the bridge and pavement goals originally developed in 1995 relative to current needs and funding. As part of this process CDTC will re-evaluate pavement and bridge Performance Measure categories.
- CDTC will evaluate resources needed to collect and maintain better data on regional costs of bicycle and pedestrian infrastructure construction and maintenance.
- CDTC will evaluate resources needed to collect and maintain a regional traffic signal inventory, documenting the quantity and condition of the traffic signals in the Capital District.
- CDTC will evaluate the needs of emerging vehicle technologies like Automated and Electric Vehicles (AVs and EVs) and assess the impacts they might have on the physical transportation infrastructure as their total market share increases.
- CDTC will evaluate scenarios to determine the most cost effective mix of preservation and renewal treatments using HCPM and other available models. We know that the region cannot continue to rely on preservation treatments to improve overall pavement and bridge conditions. More significant reconstruction strategies that result in longer useful life will be necessary in the future.

Commitment to Preservation and Renewal

New Visions remains committed to the maintenance, repair, replacement, reconstruction and right-sizing of the existing infrastructure, in a cost-effective manner that protects and enhances conditions, public safety, accessibility, and serviceability. Renewing existing infrastructure in our communities is fiscally responsible and consistent with smart growth principals valued by CDTC and its members.

CDTC’s current strategy of infrastructure preservation is directly reflected in TIP programming. During the previous two TIP updates, a significant portion of projects programmed and overall funding was programmed towards projects with elements of highway and bridge preservation and renewal. Approximately 80% of newly programmed projects in each update have had a preservation and renewal element and 20% of newly programmed projects had no impact on preservation and renewal, as determined by CDTC staff during the merit review process. Figure 12 shows percent of new programming in each of the past two TIP updates with elements of preservation and renewal. Table 4 outlines the corresponding criteria for the merit evaluation score point system used during the CDTC TIP project evaluation process.

Figure 8 – Preservation and Renewal TIP Programming

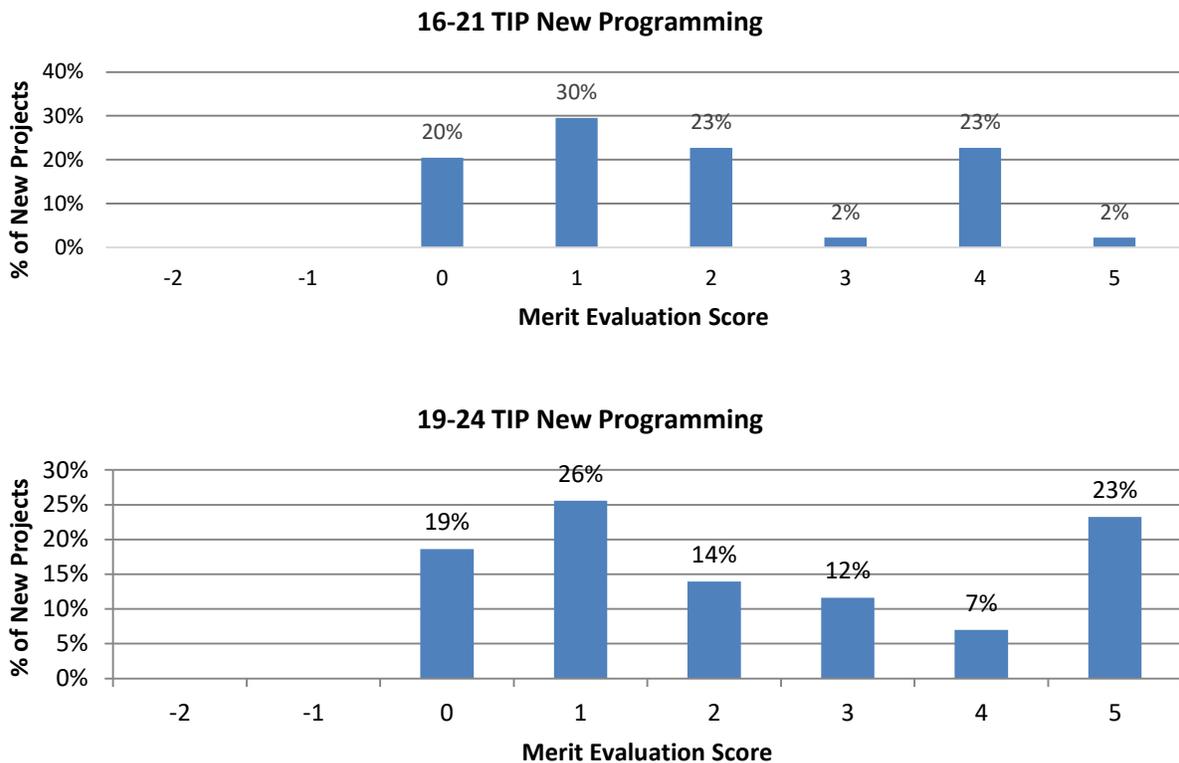


Table 6 – CDTC TIP Preservation and Renewal Merit Evaluation Criteria

Preservation and Renewal of Existing Infrastructure (Up to 5 Points Possible)	
Merit Evaluation Criteria	Merit Eval. Score
Project reconstructs, renews, or preserves infrastructure (highway and bridge) with regional significance (inclusive of 3 or more municipalities) to the transportation system, such as a port, airport, transit system, or interstate system.	5
Project preserves or renews critical infrastructure or critical linkages (defined as facilities with greater importance to the transportation system, such as: bridges lacking a reasonable redundant parallel route, major arterial providing community access or connectivity, etc.); and includes preservation, renewal, or upgrade to adjacent or associated facilities, such as: sidewalks, pedestrian crossings, ADA compliant features, safety components, bike lanes, etc.	4
Project preserves or renews critical infrastructure or critical linkages; or reduces future maintenance burden such as by reducing travel lanes of a roadway or removing a significantly underutilized facility from regional inventory.	3
Project has a primary or substantial portion of scope devoted to preservation of pavement, bridges, sidewalks, or other elements; and includes preservation, renewal, or upgrade to adjacent or associated facilities, such as: sidewalks, pedestrian crossings, ADA compliant features, safety components, bike lanes, etc.	2
Project has a primary or substantial portion of scope devoted to preservation of pavement, bridges, sidewalks, or other elements.	1
Project has neutral effect (no known impact, positive or negative) on preservation/renewal of existing infrastructure.	0
Project purpose is to add new auto capacity to an existing facility rather than improving existing system conditions or operational efficiency.	-1
Project purpose is to create an entirely new substantial roadway or other major auto capacity initiative which is not justified by a regional economic development project or a demonstrated serious congestion problem (e.g., an output from traffic model showing deterioration to unacceptable level of service).	-2

8 Performance Measures

The CDTC New Visions Plan has historically used performance measures to describe the goals of infrastructure in the region and potential outcomes of the Plan. New Visions performance measures are continually integrated into TIP project evaluations, project development, linkage studies and various other areas of CDTC activities. Moving Ahead for Progress in the 21st Century Act (MAP 21) and the FAST Act, provide a strong emphasis on performance measures and require states and MPOs to incorporate federal performance measures, objectives and targets into planning and programming.

In addition to the adoption of federal performance measures and targets, CDTC developed objectives and corresponding performance measures for each program area as part of New Visions 2040 to further integrate the performance based planning approach into the long range planning process.

8.1 Pavement and Bridge Condition Measures (PM2)

FHWA published the Pavement and Bridge Condition Performance Measures Final Rule in January 2017. This rule, which is also referred to as the PM2 rule, establishes six performance measures for pavement and bridge condition on Interstate and non-Interstate National Highway System (NHS) roads. The PM2 measures are:

- Percent of Interstate pavements in good condition;
- Percent of Interstate pavements in poor condition;
- Percent of non-Interstate NHS pavements in good condition;
- Percent of non-Interstate NHS pavements in poor condition;
- Percent of NHS bridges (by deck area) classified as in good condition; and
- Percent of NHS bridges (by deck area) classified as in poor condition.

On September 6, 2018 via resolution #18-4 CDTC agreed to support the following NYSDOT statewide targets for NHS pavement and bridge conditions, therefore agreeing to plan and program projects that contribute toward their accomplishment as required by 23 CFR Part 490.

The following table compares current CDTC regional performance with statewide performance targets.

Table 7 – CDTC Region PM2 Performance

Performance Measures	New York Performance (Baseline)	CDTC Performance (2017)**	New York 2-year Target (2019)	New York 4-year Target (2021)
Percent of Interstate pavements in good condition	N/A*	34.1%	N/A*	47.3%
Percent of Interstate pavements in poor condition	N/A*	0.0%	N/A*	4.0%
Percent of non-Interstate NHS pavements in good condition	36.7%	18.7%	14.6%	14.7%

Performance Measures	New York Performance (Baseline)	CDTC Performance (2017)**	New York 2-year Target (2019)	New York 4-year Target (2021)
Percent of non-Interstate NHS pavements in poor condition	26.7%	7.8%	12.0%	14.3%
Percent of NHS bridges (by deck area) in good condition	22.8%	29.9%	23.0%	24.0%
Percent of NHS bridges (by deck area) in poor condition	10.6%	11.7%	11.6%	11.7%

**For the first performance period only (January 1, 2018 through December 31, 2021), baseline condition and 2-year targets are not required for the Interstate pavement condition measures.*

***Data Sources: NYSDOT Pavement Inventory File 2017, NYSDOT Bridge File 2017 and NBI Bridge File 2017: NYSDOT pavement surface score ratings ≥ 8 equate to federal measure 'good', surface score rating ≤ 5 equate to federal measure 'poor'. The federal bridge regulation defines three classes for bridge condition assessment using the lowest of the four NBI ratings (Deck, Superstructure, Substructure and Culverts) on a 0-9 Scale, Good when the lowest rating is ≥ 7 , Fair if lowest rating is 5 or 6, and Poor if lowest rating is ≤ 4 .*

The CDTC planning region contains over 1,300 lane miles of NHS pavement and over 400 NHS bridges. Within the region, the NHS system carries over 50% of total vehicle miles traveled. Prior to the adoption of statewide targets CDTC staff evaluated the regions baseline performance in respect to each performance measure using the most recent pavement and bridge data available. CDTC determined that regional metrics for the proposed measures aligned with statewide metrics and it was reasonable to adopt statewide targets.

New Visions 2050 supports preservation of the transportation system, identifies infrastructure needs within the CDTC planning area, and recommends funding for targeted pavement and bridge condition improvements. New Visions 2050 is based on a principal of infrastructure preservation and renewal and highlights that priority by identifying strategies that recommend devoting significant TIP resources to infrastructure preservation and renewal, supporting less costly and shorter-term road and bridge repairs for the foreseeable future and maximizing investments in pavement and bridges in the short term. CDTC also integrated the evaluation of PM2 and other federal performance measures into the TIP project merit evaluation process as part of the 2019-24 TIP update process. As part of this update, approximately 40% of newly programmed projects were part of the NHS system. These projects made up over 70% of new dollars programmed during the update.

8.2 Historic New Visions Performance

The original New Visions pavement and bridge goals were established in 1995 by the Infrastructure Task Force, which was comprised of representation from NYSDOT, NYSTA, the four Capital District Counties, and the Consultant community. After discussion of a range of goals for different types of roads, and modeling of several options, the final goals for New Visions were established. The goal setting was informed by local knowledge of road conditions and maintenance practices. Specific targets were set according to the importance of road classes and with respect to the then-current 1994 data on condition states. For roads considered more strategically important and heavily traveled, such as Interstates and Non-Interstate NHS Roads, lower ‘% poor’ goals were established. Irrespective of ownership or roadway classification, however, a constant ‘% fair’ level was established in all categories, reflecting a commitment to the range of infrastructure owners and road types. CDTC pavements are performing well compared to these goals, meeting or exceeding % poor conditions for all roadway classifications except Local (non-federal aid). New Visions bridge goals, however, are well off from their marks and all bridge classifications are performing under the originally established goals.

As part of future Infrastructure planning efforts, CDTC will evaluate re-establishing both the bridge and pavement goals relative to current needs and funding. Until new goals are established, CDTC will continue to collect data on pavement and bridge conditions and track performance. Tables 6-8 outline current performance as compared to the original New Visions pavement and bridge goals established in 1995. A more detailed summary of Capital District Infrastructure performance can be found in the following section.

Table 8 – Pavement Performance Compared to Original New Visions Goals - % Poor

Roadway Classification	New Visions Goals % Poor (1995)	Current Conditions % Poor
National Highway System		
Interstates	0%	0%
Non-Interstate NHS	5%	2%
Federal Aid Road System		
Non-NHS Principal Arterials	10%	NA
Other Federal Aid Roads	15%	10%
Local (Non-Federal Aid System)		
Local (Non-Federal Aid System)	15%	21%

Table 9 – Pavement Performance Compared to Original New Visions Goals - % Fair

Roadway Classification	New Visions Goals % Fair (1995)	Current Conditions % Fair
National Highway System		
Interstates	20%	3%
Non-Interstate NHS	20%	23%
Federal Aid Road System		
Non-NHS Principal Arterials	20%	NA
Other Federal Aid Roads	20%	34%
Local (Non-Federal Aid System)		
Local (Non-Federal Aid System)	20%	40%

Table 10 – Bridge Performance Compared to Original New Visions Goals (Deck Area)

Bridge Classification	% Deficient Bridges by Deck Area		
	NV Base Year Conditions (1994)	Current Conditions (2017)	New Visions Goal
New York State Bridges			
NYSDOT Interstate	NA	52%	11%
NYSDOT Non-Interstate/OGS	NA	49%	20%
NYS Thruway			
NYS Thruway	NA	66%	NA
Local			
Local	NA	23%	20%
Other			
Other	NA	8%	NA
All Bridges			
All Bridges	NA	46%	NA

Table 11 – Bridge Performance Compared to Original New Visions Goals (Number)

Bridge Classification	% Number of Deficient Bridges		
	NV Base Year Conditions (1994)	Current Conditions (2017)	New Visions Goal
New York State Bridges			
NYS DOT Interstate	NA	34%	24%
NYS DOT Non-Interstate/OGS	NA	34%	20%
NYS Thruway			
NYS Thruway	NA	36%	24%
Local			
Local	NA	27%	20%
Other			
Other	NA	4%	NA
All Bridges			
All Bridges	NA	28%	22%

8.3 New Visions 2050 Performance Objective and Measures

Listed below is the performance objective for Capital District Infrastructure and corresponding performance measures previously developed by the Infrastructure Task Force during the New Visions 2040 update.

Objective:

Maintain the region’s roadways, bridges, trails, sidewalks, and transit system in a state of good repair using a performance-based management strategy.

Pavement Performance Measures:

Pavement Categories:

- 1) All National Highway System (NHS) roads
- 2) Interstate NHS roads
- 3) State owned Federal Aid Roads
- 4) Non-State owned Federal Aid Roads
- 5) Local (Non-Federal Aid System Roads)

Measures:

- a) Percent Good Pavement
- b) Percent Fair Pavement
- c) Percent Poor Pavement

ADA Performance Measures:

ADA Compliance Categories:

- 1) Sidewalks
- 2) Intersections

Measures:

- a) *Percent ADA Compliant

Bridge Performance Measures:

Bridge Categories:

- 1) NYSDOT Interstate
- 2) NYSDOT Non-Interstate
- 3) NYS Thruway
- 4) Local
- 5) Other

Measures:

- a) Percent number of Deficient Bridges
- b) Percent deck area of Deficient Bridges
- c) Percent number of Structurally Deficient Bridges
- d) **Percent deck area of Structurally Deficient Bridges
- e) Percent deck area of Good Condition Bridges
- f) Percent deck area of Poor Condition Bridges

*There is currently no data for this performance measure. CDTC is evaluating how this metric can be accurately measured regionally.

**For consistency with federal performance measures CDTC has added ‘Percent deck area of Structurally Deficient Bridges’ as a measure during the 2050 update

8.4 Performance Measures Data

The following charts and tables document the current conditions for Capital District Infrastructure performance, based on the identified performance measures and available data for each performance measure. Pavement data was gathered from historic NYSDOT and CDTC pavement inventories. Bridge data was gathered from historic NYSDOT bridge files and FHWA NBI bridge files.

Please Note: The following tables and figures use different methodologies for pavement and bridge conditions than federally required PM2 measures and targets. New Visions Performance Measures evaluate pavement based on NYSDOT surface score criteria and use a combination of federal and NYS methodologies to document bridge conditions.

The following summarizes the terms and methodology used to document the New Visions Infrastructure performance measures.

Pavement Condition	Surface Score
Poor	1-5
Fair	6
Good	7-8
Excellent	9-10

Current Trends

- Increase = Most recent three data points consistently trend upward
- Decrease = Most recent three data points consistently trend downward
- No Trend = Most recent three data points fluctuate and have no consistent trend

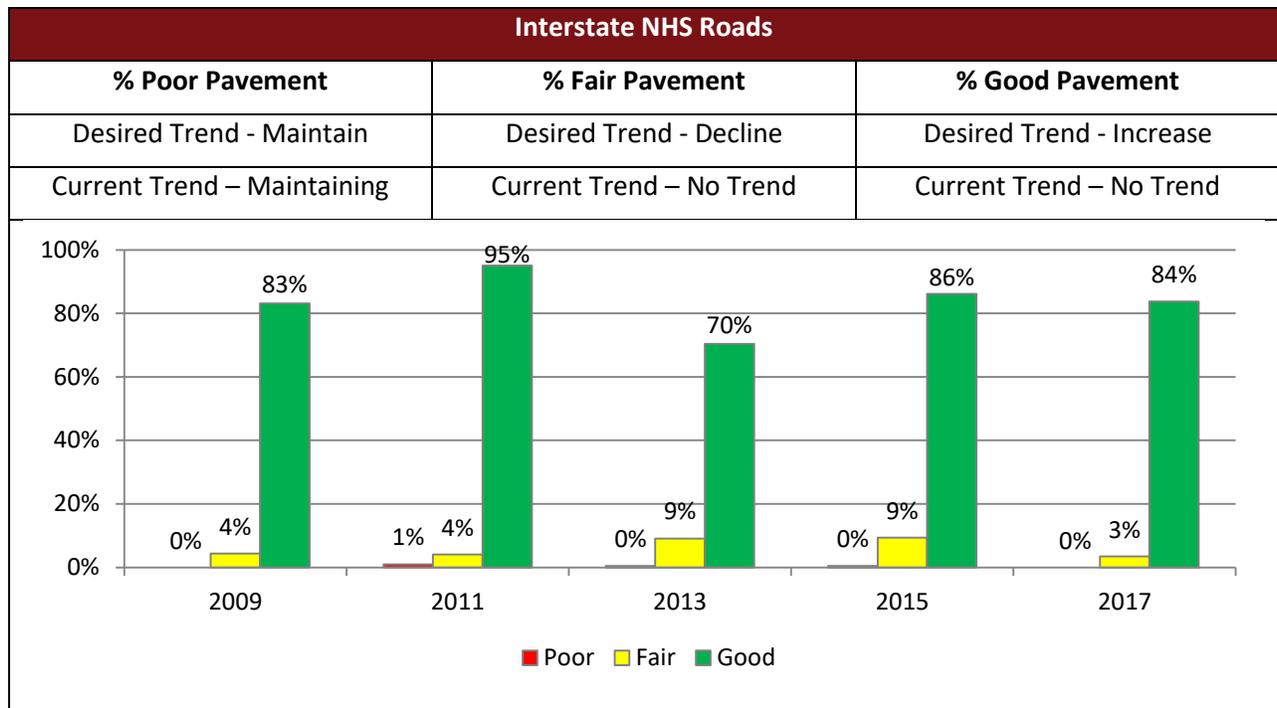
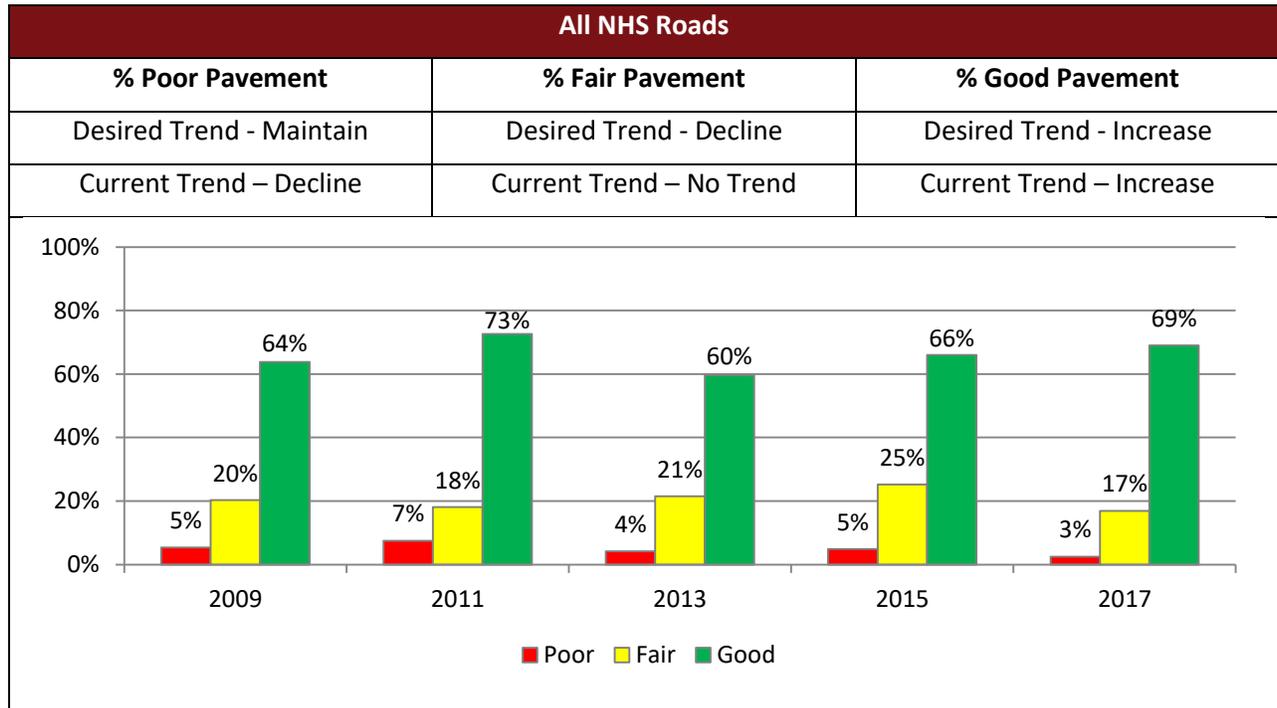
Deficient Bridge (NYS Measure) – NYS defines a deficient bridge as one with a State condition rating less than 5.0. A deficient condition rating indicates deterioration at a level that requires corrective maintenance or rehabilitation to restore the bridge to its fully functional, non-deficient condition. It does not mean the bridge is unsafe.

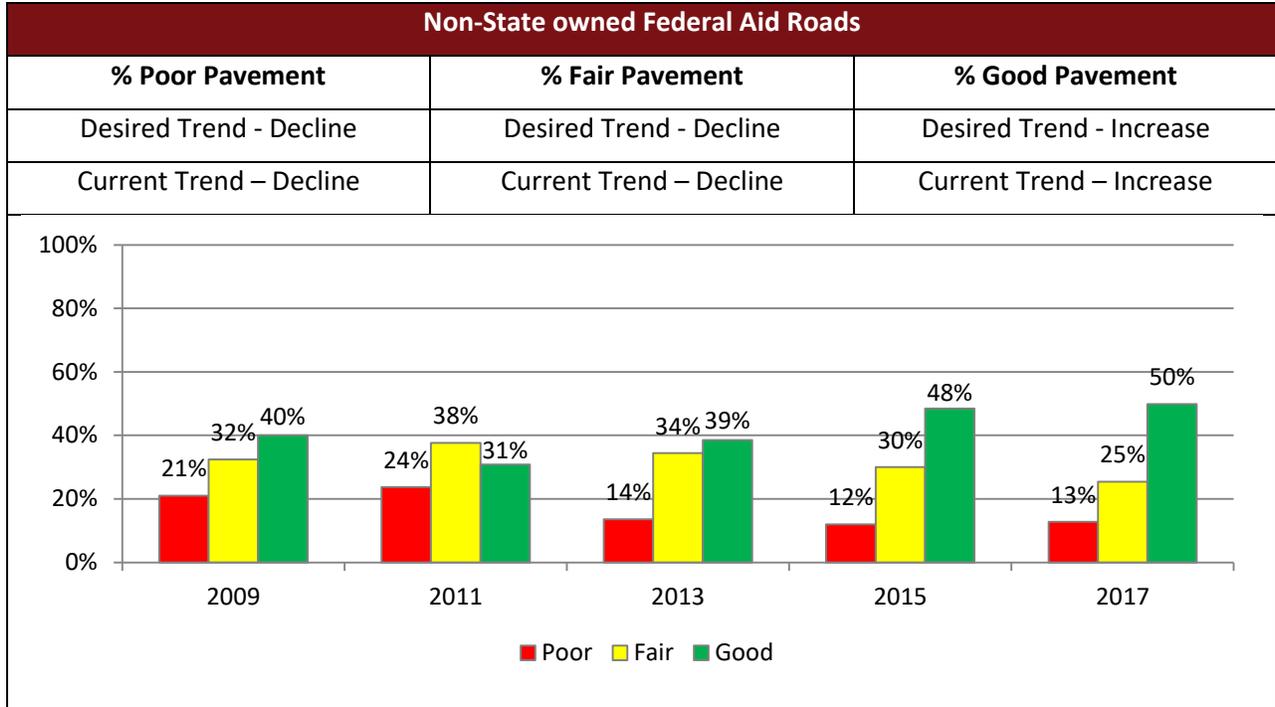
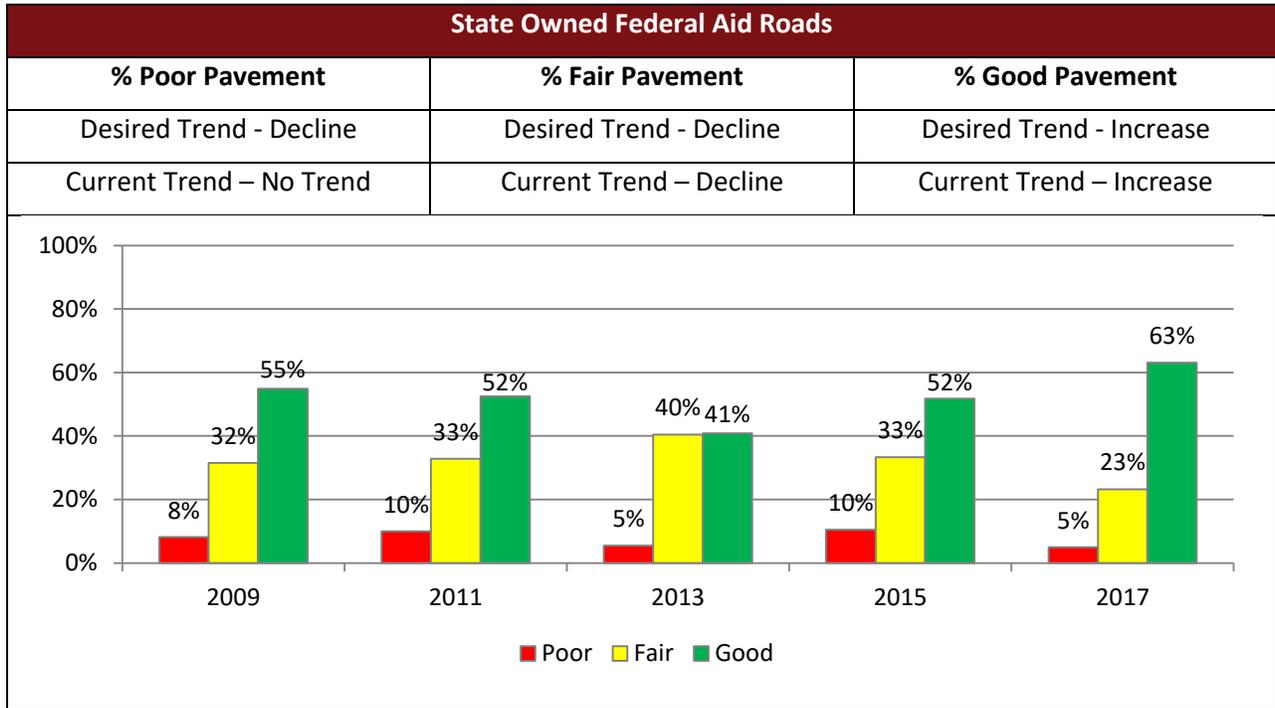
Structurally Deficient Bridge (Federal Measure) – Bridges are considered to be structurally deficient according to the FHWA, if the condition rating of one of its major components (deck, superstructure, substructure, and culvert) is less than 5, the bridge has inadequate load capacity, or repeated bridge flooding causes traffic delays. The fact that a bridge is structurally deficient does not imply that it is unsafe or likely to collapse.

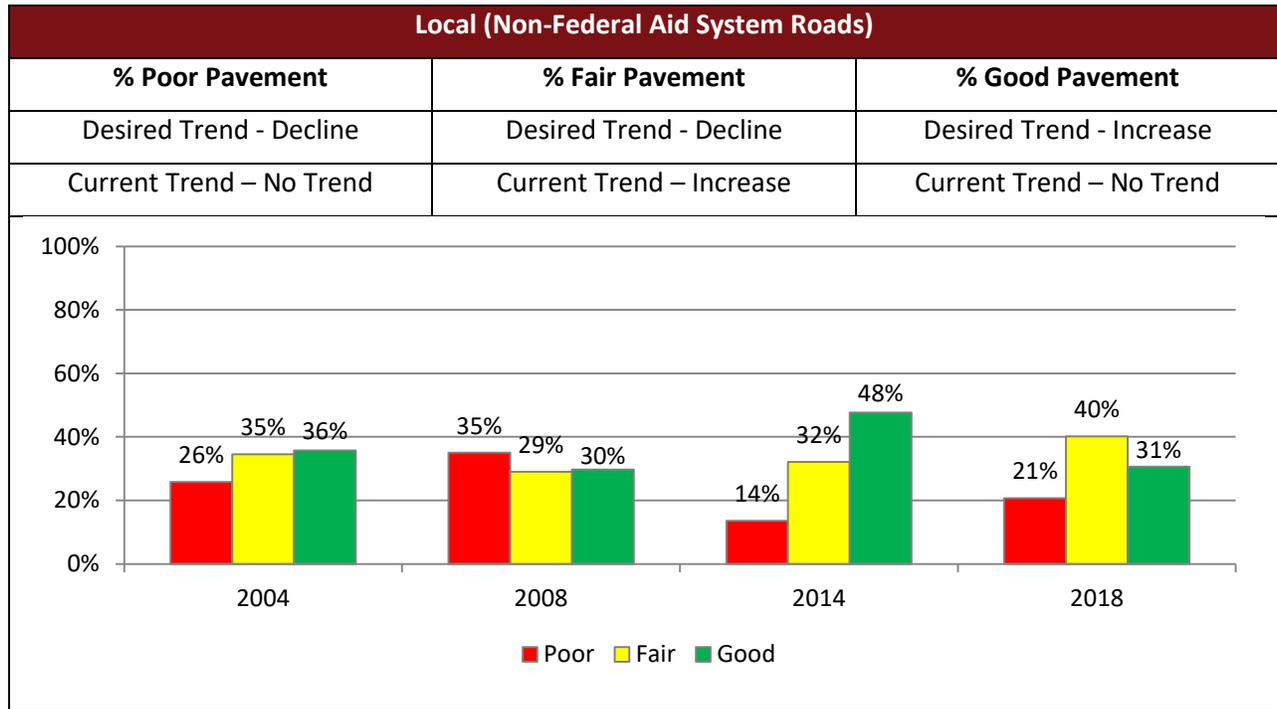
Bridge in Good Condition (Federal Measure) – When the lowest of the four NBI categories (deck, superstructure, substructure, and culvert) is greater than or equal to 7.

Bridge in Poor Condition (Federal Measure) – When the lowest of the four NBI categories (deck, superstructure, substructure, and culvert) is less than or equal to 4.

Pavement Performance Measures:







Bridge Performance Measures:

NYS DOT Interstate Bridges

Measure	2013	2015	2016	2017
a) Percent number of Deficient Bridges	42%	44%	45%	34%
b) Percent deck area of Deficient Bridges	68%	66%	65%	52%
c) Percent number of Structurally Deficient Bridges	4.9%	5.0%	5.0%	5.6%
d) Percent deck area of Structurally Deficient Bridges	2.4%	5.0%	5.3%	16.4%
e) Percent deck area of Good Condition Bridges	NA	NA	NA	21.7%
f) Percent deck area of Poor Condition Bridges	NA	NA	NA	14.7%

NYS DOT Non-Interstate

Measure	2013	2015	2016	2017
a) Percent number of Deficient Bridges	37%	36%	36%	34%
b) Percent deck area of Deficient Bridges	54%	51%	50%	49%
c) Percent number of Structurally Deficient Bridges	12.6%	10.8%	10.8%	6.6%
d) Percent deck area of Structurally Deficient Bridges	17.2%	13.3%	13.5%	7.7%
e) Percent deck area of Good Condition Bridges	NA	NA	NA	22.6%
f) Percent deck area of Poor Condition Bridges	NA	NA	NA	8.6%

NYS Thruway

Measure	2013	2015	2016	2017
a) Percent number of Deficient Bridges	42%	47%	43%	36%
b) Percent deck area of Deficient Bridges	58%	69%	67%	66%
c) Percent number of Structurally Deficient Bridges	4.2%	5.6%	5.6%	5.6%
d) Percent deck area of Structurally Deficient Bridges	2.8%	3.2%	3.2%	3.4%
e) Percent deck area of Good Condition Bridges	NA	NA	NA	18.9%
f) Percent deck area of Poor Condition Bridges	NA	NA	NA	3.4%

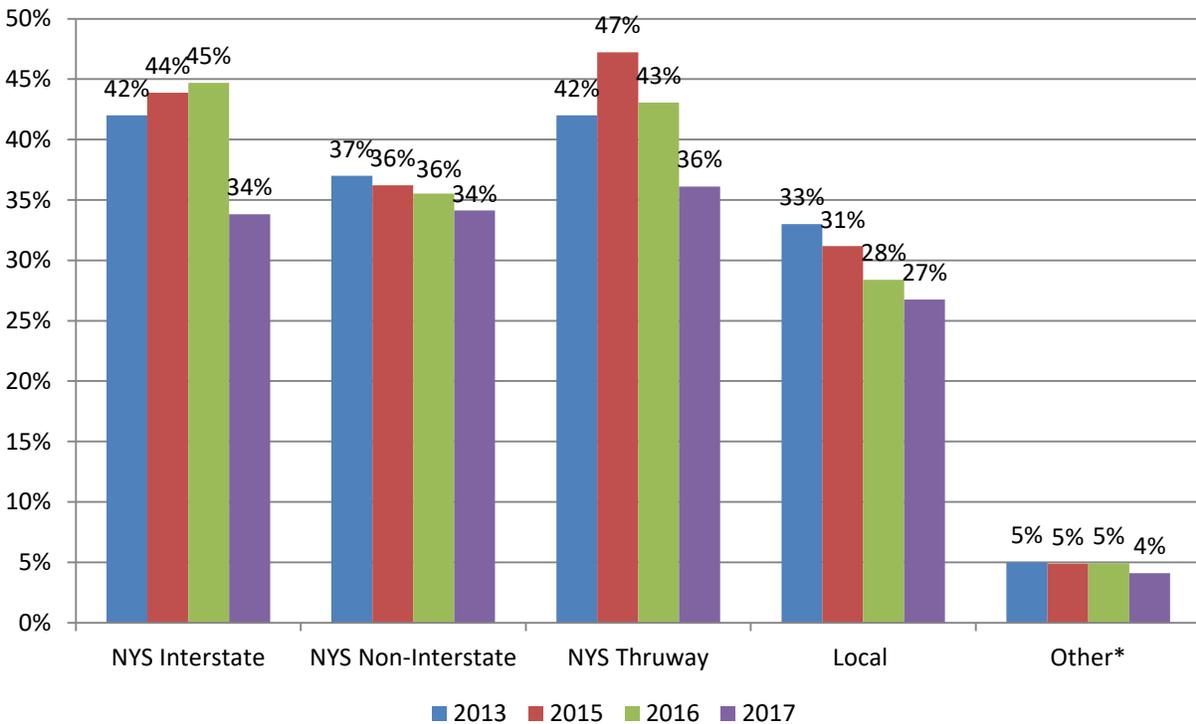
Local

Measure	2013	2015	2016	2017
a) Percent number of Deficient Bridges	33%	31%	28%	27%
b) Percent deck area of Deficient Bridges	32%	28%	26%	23%
c) Percent number of Structurally Deficient Bridges	11.3%	11.7%	11.6%	11.4%
d) Percent deck area of Structurally Deficient Bridges	11.3%	8.8%	8.9%	9.7%
e) Percent deck area of Good Condition Bridges	NA	NA	NA	40.7%
f) Percent deck area of Poor Condition Bridges	NA	NA	NA	12.0%

Other

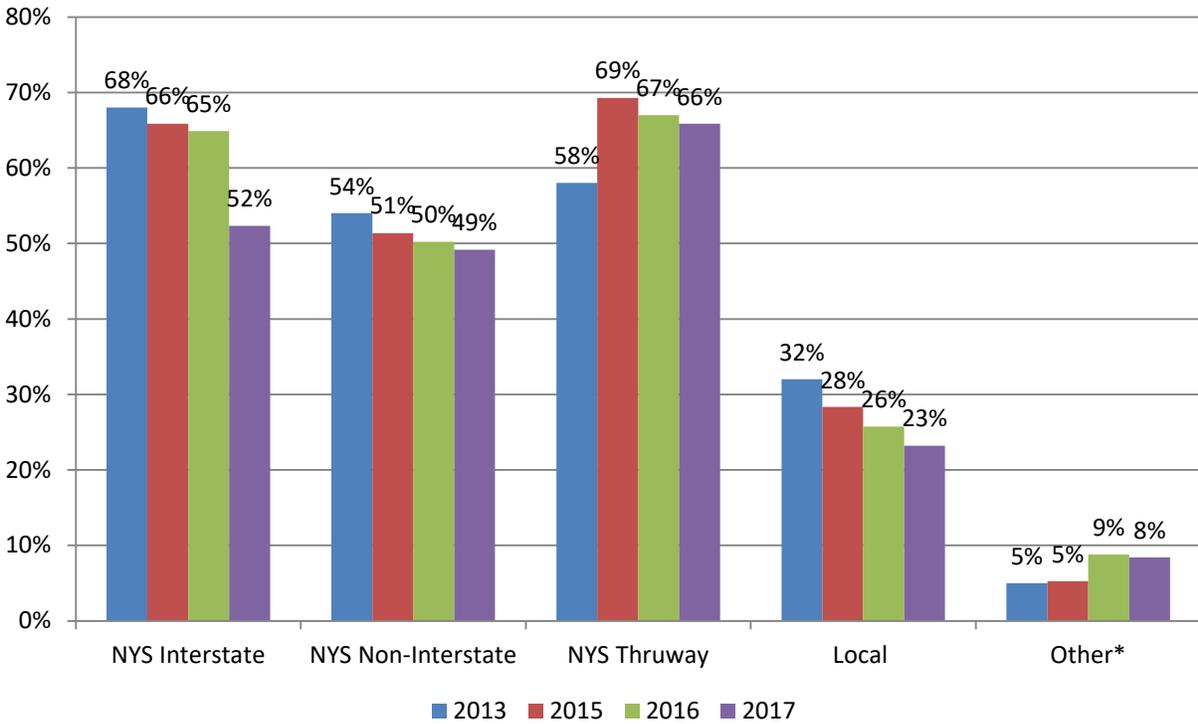
Measure	2013	2015	2016	2017
a) Percent number of Deficient Bridges	5%	5%	5%	4%
b) Percent deck area of Deficient Bridges	5%	5%	9%	8%
c) Percent number of Structurally Deficient Bridges	3.2%	2.4%	2.5%	3.3%
d) Percent deck area of Structurally Deficient Bridges	2.6%	2.3%	3.8%	7.7%
e) Percent deck area of Good Condition Bridges	NA	NA	NA	13.7%
f) Percent deck area of Poor Condition Bridges	NA	NA	NA	12.1%

Percent Number of Deficient Bridges



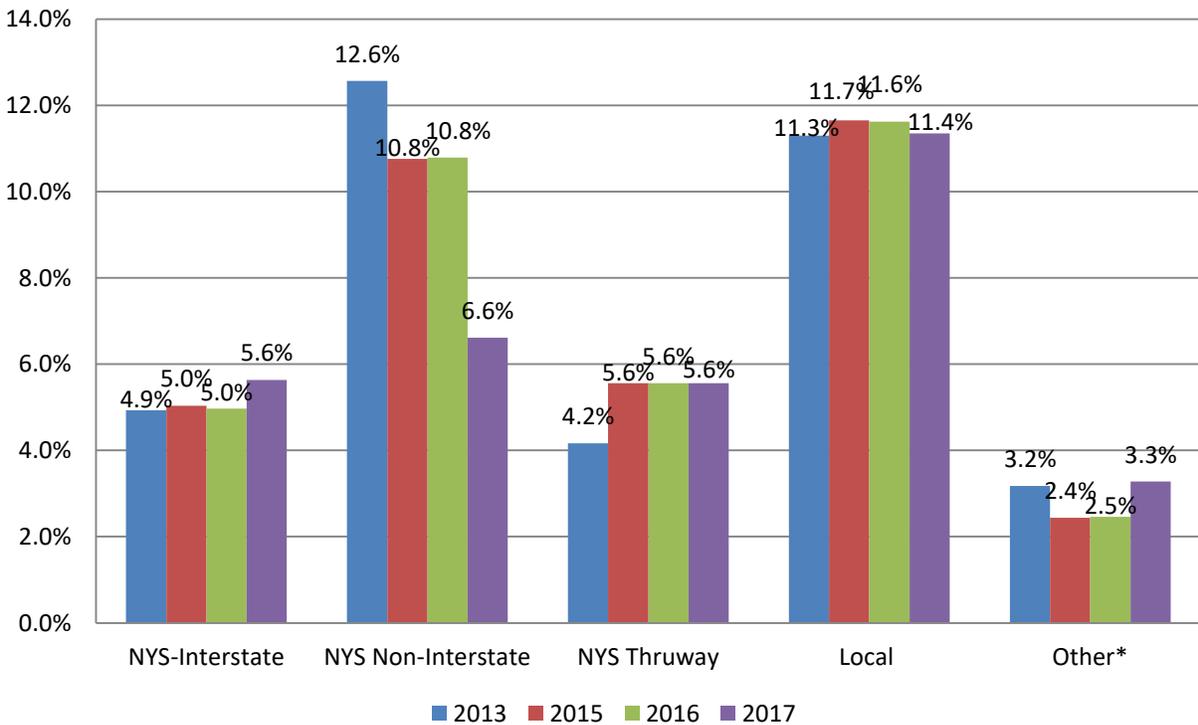
*Includes Railroad, Private Industrial, National Parks Service and Other ownership categories

Percent Deck Area of Deficient Bridges



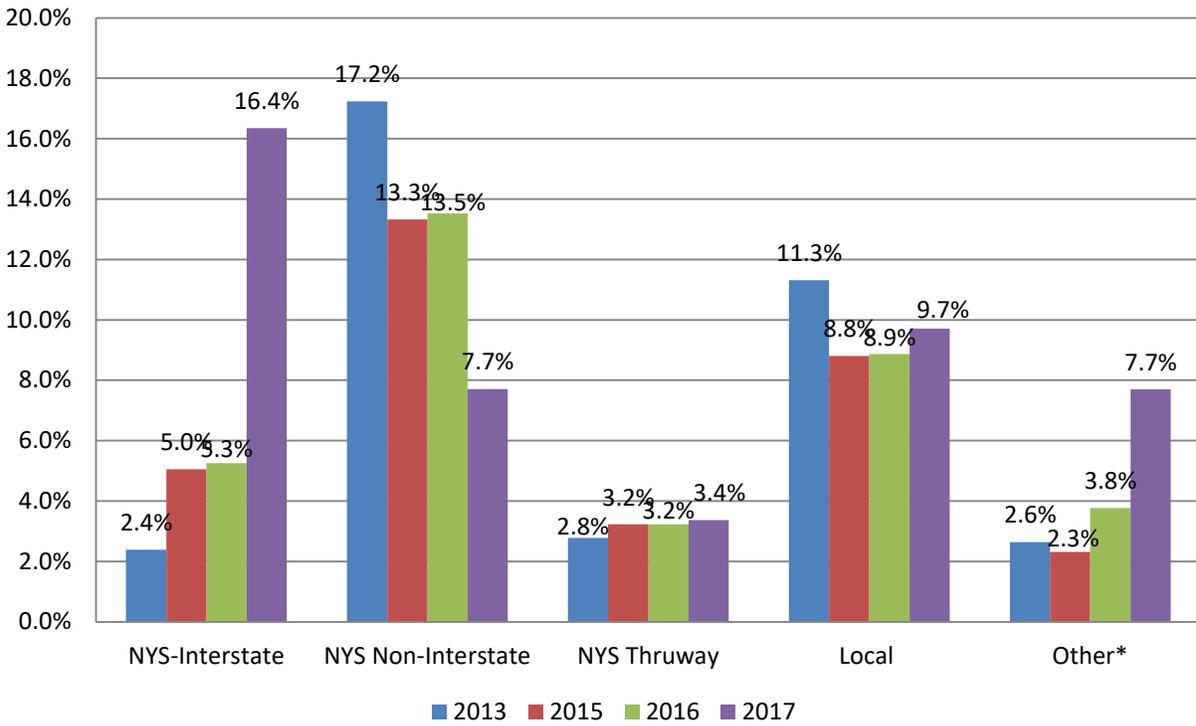
*Includes Railroad, Private Industrial, National Parks Service and Other ownership categories

Percent Number of Structurally Deficient Bridges



*Includes Railroad, Private Industrial, National Parks Service and Other ownership categories

Percent Deck Area of Structurally Deficient Bridges



**Includes Railroad, Private Industrial, National Parks Service and Other ownership categories*

9 Capital Infrastructure Projects

Several capital infrastructure projects have been identified as key pieces of highway and bridge infrastructure that will need to be replaced over the next 30 years. The projects identified below represent only a subset of the numerous infrastructure replacement projects that will need to occur, however, the high-value and regional importance of these projects warrant further discussion in the coming years. It should also be noted that each of these projects is located in an Environmental Justice Area.



SR 378 – Troy-Menands Bridge

State Road (SR) 378 Bridge Replacement

The State Road (SR) 378 Troy-Menands Bridge provides a major connection between Albany and Rensselaer Counties in the Capital District, carrying 37,000 vehicles per day. The bridge was built in 1932 and is in need of replacement. A Planning and Environmental Linkage (PEL) Study is currently funded to evaluate potential replacement options for of the bridge. The study will be used to explore various bridge relocation alternatives, seek public input, and upon completion, accelerate preliminary design phases. Preliminary cost estimates from NYSDOT for the replacement of the SR 378 Troy – Menands Bridge are over \$300 million.

Interstate-787 Feasibility Studies

The Interstate I-787 (I-787) corridor is made up of extensive and elaborate transportation infrastructure, which is costly to maintain. Significant investment has been made recently to extend the service life of this infrastructure, however, ongoing maintenance to continue the longer-term preservation of this network of roadways and bridges in a state of good repair will continue to be a significant financial commitment for the region leading up to a point where the entire facility has reached the end of its serviceable and useful life. The estimated total cost to maintain the existing I-787 pavement and bridge infrastructure for the next 20 years is over \$300 million and the estimated cost for eventual reconstruction is approximately \$890 million (in 2015 dollars).

The I-787 / Hudson Waterfront Study, released in 2018 by CDTC, identified potential future strategies for the I-787 corridor (from I-787 Interchange 2 to I-787 Interchange 9 (NY Route 7)) that support and balance economic development and revitalization efforts, transportation network resilience, and improved walking, biking, transit, and visual access to the Hudson River waterfront. The study evaluated



I-787 Infrastructure, Albany

a variety of long-term strategies with the ability to change the current configuration of the I-787 corridor. The following strategies were evaluated and recommended for further feasibility study.

- I-787 Reconfiguration (from Clinton Avenue to Madison Avenue)
- CP Rail changes in operations and facility modifications / relocation
- I-787 / Dunn Memorial Bridge / South Mall Expressway Interchange Reconfiguration

- NY Route 378 Interchange reconfigurations
- Inner Harbor Marina

For more information on these feasibility studies please see the [I-787 Hudson Waterfront Corridor Study](#).

Livingston Avenue Bridge Replacement

The Livingston Avenue Bridge is a critical link in the New York's Empire Corridor passenger rail and is crossed approximately 20 times each day (14 Amtrak passenger trains and 6 freight trains). Built in 1902, the bridge is at the end of its service life and does not meet current rail or river navigation needs or standards. Current levels of deterioration limits trains to crossing one at a time at 15 miles per hour, and causes unpredictable operations of the swing span mechanism, which causes delays for rail and marine traffic. Restoration of the original pedestrian walkway on the bridge is will also provide a key connection of the Capital District bicycle and pedestrian trail network across the Hudson River. CDTC estimates the replacement cost of the Livingston Avenue Bridge to be over \$70 million.



Livingston Avenue Bridge