



CDTC NEW VISIONS

INFRASTRUCTURE TASK FORCE WHITE PAPER

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

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Capital District Transportation Committee

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EXECUTIVE SUMMARY

AN INVESTMENT IN TRANSPORTATION INFRASTRUCTURE IS AN INVESTMENT IN THE CAPITAL DISTRICT **Highlights of the New Visions White Paper on Capital District Infrastructure**

New York's transportation system is critical to growing the State's economy, competing in national and world markets, creating jobs, and sustaining the quality of life in its cities and communities. This is true throughout the State, but especially so in metropolitan areas like the Capital District. According to a study prepared for the U.S. Conference of mayors, ".....the concentration of people and businesses in metro areas creates unique economic conditions that give rise to new industries, speed the diffusion of knowledge, spur technological innovation, increase productivity, and promote growth." There is little dispute as to the need to do a better job in maintaining and improving all of New York's – and the region's – transportation systems. But the question is: how do we do it?

CDTC's "New Visions" Long Range Transportation Plan, through extensive outreach and a committee structure providing technical support, sets out a framework of principles, strategies, and actions to help guide the region's transportation development in the future. The Infrastructure Task Force has been charged with evaluating current conditions on the region's entire system, projecting its future needs, and understanding how best to put limited financial resources to best use in order to benefit the region – including, and especially, by innovative means. The efforts of New Visions and the Infrastructure Task Force will inform how investment decisions are made within the Transportation Improvement Program (TIP), the five-year transportation capital improvement program.

The Capital District Transportation System

The Capital District is held together by a vast web of streets and highways, bus and rail systems, bike paths and trails. While often taken for granted, this network is vital to the health of the region. Consider that the region is home to over 15,000 miles of roadway and 1,087 bridges; three large Class I railroads; a four-county public transit service operated by the Capital District Transportation Authority (CDTA); AMTRAK passenger rail service with stations in Albany-Rensselaer, Schenectady, and Saratoga Springs; an international airport; and one of the few inland ports in New York; among other assets and services. With a current replacement value of over \$50 billion, preserving the region's transportation system so that it lasts for generations and meets changing needs has been a top priority for CDTC for the last 40 years.

Deteriorating Conditions in the Region

Today, unfortunately, the Capital District is faced with a challenge. Reduced investment levels combined with new demands placed on the region's transportation system has resulted in the physical infrastructure again beginning to decline, reversing years of progress made in the 1990's.

- Pavement condition of the region's federal-aid eligible roads – major streets and highways that carry most of the region's traffic – is beginning to decline after improving through the 1990's. Only half the system is in a state of good repair.
- The interstate system continues to age, and the resources needed for its eventual reconstruction are a looming concern. There have been few full reconstruction projects on these highways which are

now between 30 and 50 years old. The engineering life of a freeway generally lies between 50 and 70 years.

- Both federal-aid and non-federal aid facilities that are located in the less-populated, more rural parts of the region are in worse shape than facilities in more urban or developed areas.
- The region's non-federal aid system (both State and locally-owned facilities) is in the worst shape with more than 50 percent in need of repair or reconstruction. While less heavily travelled, these local roads provide critical links between highways, farms, markets, homes, jobs, schools, hospitals, and recreation.
- Bridges in New York and in the Capital District are well into middle age, and are deteriorating faster than they are being cared for. Of the 1,087 bridges in the Capital District, 33 percent are structurally or functionally deficient. Eight percent have some kind of structural deficiency. These values have risen over the last seven years.
- National Highway System (NHS) bridges are a particular concern. Forty percent of the region's 429 NHS bridges, are categorized as deficient. Interstate bridges were in even worse shape with 94 bridges (42 percent) categorized as deficient – versus 60 bridges in 2006. Non-interstate bridge conditions continue to slide as well with 37% of State-owned bridges categorized as deficient, up from 33% in 2006.
- The Capital District Transportation Authority (CDTA) provides public transit service to 2,300 square miles within the region, operating a fleet of 300 vehicles over 60 routes and including Bus Rapid Transit service. CDTA served a record-breaking 16.5 million passengers last year, and ridership keeps on climbing. However, CDTA has had to pursue life-extending repairs on aging buses in the fleet. The average bus age of over 7 years requires continual funding to be maintained or reduced.
- Port, Airport, and Transit owned assets, well in excess of \$0.5B in total replacement value, represent additional infrastructure needs which are extremely important and often overlooked.
- The effort and cost to bring the region's pedestrian facilities into ADA compliance looms large.

The transportation system, both in the Capital District and statewide, is under stress from age, heavy use, and the lack of adequate investment. The system is safe, but the conditions of many parts of the region's infrastructure will continue to worsen unless steps are taken to reverse the accumulated backlog of deferred maintenance. The impact of poor infrastructure could be felt in the form of lost jobs, a weakened economy, and a diminished quality of life.

Financial Challenges in the Region

Historically, funding has been cyclical, with public and political support for funding initiatives growing when viewed as urgent and worthwhile. In prior New Visions plans, CDTC has believed revenues would at least track inflation – and more likely grow moderately in proportion to the well-documented accumulating needs of the transportation system. However, we have instead seen continually declining receipts in the Highway Trust Fund as well as other unrelieved state, local, and Federal fiscal challenges. Revenues have declined

since the passage of MAP-21 – by as much as 50% in our region in a single year. Cyclical funding may no longer be the norm or at minimum the region may be experiencing an indefinitely extended funding trough.

The continued slow decline of pavement and bridge condition in the Capital District is not the result of CDTC's preference for new facilities over system preservation and renewal, ribbon-cutting over repaving. To the contrary, New Visions has been extremely careful to remain realistically financially constrained and to limit commitments to those that will not compromise the region's ability to preserve and renew its basic infrastructure. However, CDTC's investment principles also emphasize steady progress across all project types, meaning all systems are vulnerable to deterioration.

CDTC's Approach

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.

Since the passage of MAP-21, the approach to addressing road and bridge needs in the region, and throughout New York State, has changed. The approach to bridges has moved from routine replacement to "element specific" repair whenever possible and road surfaces are being repaved and not reconstructed. This approach dovetails with NYSDOT's "preservation first" strategy which emphasizes the optimization of the existing infrastructure through cost-effective preventative and corrective maintenance activities. The strategy of performing less-expensive and shorter-lasting repairs is likely to be the official policy for the region's pavements and bridges at least in the near term.

Insufficient resources have prevented the programming of necessary reconstruction work on facilities in poor condition. Directing most funds to preserving pavement and bridges also leaves very little available for support of other mobility needs. Within future capital programs focused on preservation, a mature and evolving definition of preservation will be explored and implemented which enables a balanced approach to stewardship of public facilities. Such an approach is likely to include:

- continued focus of resources on existing infrastructure over expansion or new facilities;
- some essential rehabilitation, renewal, and improvement projects within a preservation focused program;
- addressing critical infrastructure elements immediately outside bridge or pavement limit lines (such as complete street features on bridge approaches, or sidewalks adjacent to street paving projects); and
- continued focus on highest used facilities but with some additional attention to equity and to lower travelled facilities that have missed the window of opportunity for preservation funds and that would therefore be "orphaned" by a program with a strict or narrow preservation emphasis.
- Continued alignment with the range of New Visions goals

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With NYSDOT's main focus on state-owned facilities, the MPO is an appropriate setting in which to consider the entirety of a region's infrastructure needs regardless of type or ownership. Roads and bridges in the region remain important core elements which will be the most costly in future capital programs. The MPO is also equally concerned with additional assets including those related to transit, freight, ADA compliance, bicycle paths and facilities, sidewalks and striping, culverts, etc. – that is, in all of the infrastructure components related to mobility needs of people in the region.

The Role of Innovation

While many core aspects of funding stability loom larger than the activities of the regionally-based CDTC and its New Visions Regional Transportation Plan, the Infrastructure Task Force will nonetheless continue to explore and evaluate innovative financing techniques with regard to their projected yield, long-term reliability, equity, and feasibility.

Particular focus will be directed toward three of the more promising alternative approaches which may contribute to sustainable infrastructure capital improvement: mileage-based user fees; innovation through technology; and shared service agreements.

Strategies & Actions / Next Steps

The CDTC staff proposes that infrastructure planning in the Capital District be guided by a single strategy which simply states that *maintaining the region's roadways, bridges, trails, sidewalks, transit system, port, and airport in a state of good repair is the smart thing to do*. This overall strategy is supported by the Proposed Short-term Strategies and Actions.

CDTC's future efforts will be directed toward continued exploration of several issues: determining fiscal constraint, scenario planning, culvert inventory and management, developing an infrastructure report card, ADA compliance requirements, and adopting revised strategies and actions.

The white paper represents a summary of work to date and it is therefore important to note that the work of the infrastructure task force will continue with equal intensity over approximately the next 12 months, with some activities continuing indefinitely thereafter. Particularly given the highly technical, data-intensive nature of such topics within infrastructure as measurement of conditions, determination of need, data-driven decision making, impact of changes in funding, and quantitative effects of policy, the task force plans to dive into much greater detail in the coming months than is required or appropriate within the context of the white paper, which is essentially a summary-level document. It is important to note that the intent is not to pass judgment on communities or practices, nor to point out one community's performance versus another's, but rather to accumulate and assess available data and knowledge, further the data quality in the region, learn collectively from best practices, and ultimately help frame and guide regional policy which puts limited resources to highest and best use.

Proposed Short-Term Strategies and Actions

- Continued emphasis on infrastructure investment in CDTC's TIP
- Renewed attention to routine maintenance
- Focus on bridge and pavement preservation treatments
- Find a way to pursue reconstruction of major roads and bridges
- Consider community context in all infrastructure work
- Build a local coalition to advocate for regional transportation projects
- Pursue local funding mechanisms
- Encourage the use of shared services on a large scale
- Take advantage of technology innovation to reduce costs
- Pay attention to ADA compliance needs

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INFRASTRUCTURE TASK FORCE WHITE PAPER PRESERVING, MANAGING, AND RENEWING THE CAPITAL DISTRICT'S EXISTING INFRASTRUCTURE

Regulatory Basis

"The metropolitan transportation planning process shall.....emphasize the preservation of the existing transportation system." -23 CFR Section 450.306(a)(8)

DEVELOPING THE NEW VISIONS 2040 PLAN

The development of New Visions 2040 has triggered the need to review current and long-range State and locally-owned infrastructure condition and financing. An infrastructure task force was established to assist in the development of the plan by identifying highway, bridge, transit and other infrastructure needs. Towards this end, CDTC staff has examined changes in condition over time, and has assessed how well New Visions goals are being met. The impact of NYSDOT's preservation directive is being evaluated. CDTC's newly formed Bridge Group is looking into preservation opportunities for locally-owned bridges, most of which are located in the rural areas of the region. CDTC will dust off its Highway Condition Projection Model (HCPM) to quantitatively test various pavement preservation and reconstruction strategies.

Basis for Infrastructure Planning in the Capital District

The principle of preserving and managing the region's transportation system is CDTC's highest stated priority in New Visions 2030, and CDTC's investment strategies require that preservation has the first claim on available resources. New Visions lays out a performance-based management strategy (painting bridges before they corrode, building more durable pavements, matching design treatment to road function rather than ownership of funding category). CDTC's strong emphasis on maintaining transportation infrastructure can be seen in the allocation of resources, almost 70 percent of which go to infrastructure repair and renewal.

CDTC addresses the maintenance, repair, and renewal of the existing highway and bridge system in a cost-effective manner. Appropriate investment in repair and renewal is said to be a higher priority than investment in expanded capacity. Public transit, port and airport facilities, sidewalks and bicycle facilities are included in the considerations.

New Visions 2040 Infrastructure Principle

In order to provide a framework for infrastructure planning and programming, CDTC's Infrastructure Task Force cooperatively developed a comprehensive planning principle that includes more than highways, acknowledge equity issues, and to highlight the preservation/renewal conflict as follows:

CDTC's Infrastructure Task Force

- Frank Bonafide, NYSDOT Region 1
- Wayne Bonesteel, Rensselaer County
- Christopher Desany, Capital District Transportation Authority (CDTA)
- Michael Loftus, New York State Thruway Authority (NYSTA)
- Barbara McHugh, Town of Clifton Park
- Randy Milano, City of Albany
- Gregg Sagendorph, Town of Bethlehem
- Paul Sheldon, Schenectady County Department of Public Works
- Tom Speziale, Saratoga County Department of Public Works
- Chris Wallin, City of Schenectady

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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.

HISTORICAL FRAMEWORK

The fiscal crisis of the 1970's had a severe impact on the quality and safety of the State and Region's transportation system. Public investment in transportation fell and our transportation infrastructure deteriorated to unacceptable levels. For example, in 1987 more than 50 percent of the region's major streets and highways showed advanced deterioration, and nearly 65 percent of all bridges were characterized as deficient. Even while successfully offering a highly efficient service, more than 35 percent of CDTA's buses were past their retirement age, and were subject to frequent repairs. The terminal area and building infrastructure of the Albany County Airport (now known as the Albany International Airport) was facing physical and functional obsolescence. AMTRAK stations were severely outdated, inefficient, and uninviting. Sidewalks in the suburbs of the region were few and far between, and those that existed did not meet modern standards and were mostly inaccessible to the disabled community. A similar story could be told in metropolitan areas across the nation.

New York met this challenge with an aggressive funding program that leveraged new revenue through the sale of bonds. Congress also helped with the passage of TEA legislation, providing additional resources and programs to improve the condition of highways, bridges, and other infrastructure. By most measures, these programs were a success, bringing us back from the brink. Highway and bridge condition improved, and the CDTA, Airport, and Port have made significant progress in bringing these facilities to a state of good repair.

Today, unfortunately, the Capital District faces a new challenge. Due to declining receipts in the Highway Trust Fund, combined with new demands placed on the region's transportation system, the physical infrastructure has again begun to decline. Competition for dwindling resources at the local level is making it very difficult for many smaller municipalities to keep up with local road and bridge maintenance. Current transportation infrastructure, after years of improvement through the 90s, is starting to decline again, and conditions will worsen quickly without significant new investment and technological advances. The result could be lost jobs, a weakened economy, and a diminished quality of life. A recent National Association of Manufacturers report concluded that ".....the United States is stuck in a decade-long period of decline that will eventually harm job creation and our own ability to compete globally", and emphasized the need to

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“...re-invest in public infrastructure to ensure roads, bridges, transit, airports and ports are up-to-date and in good condition.”

THE CAPITAL DISTRICT TRANSPORTATION SYSTEM

The Capital District’s transportation system is complex. It is a mix of privately and publicly-owned infrastructure. Transportation modes include private automobiles and trucks, public transit buses, taxis, Hudson River ports, freight and passenger airports, general aviation airfields, intercity passenger rail, intermodal rail freight, intercity and municipal buses, bicyclists and pedestrians, and the connections between these modes. There have been studies exploring the potential of light rail transit and personal transit vehicles.

A few measures of this system give a sense of its scope, complexity, and criticality.

- The Region’s transportation system includes over 15,000 miles of roadway and 1,087 bridges owned by the State, counties, cities, towns, and villages. Of the 26 highway and railroad bridges that cross the Hudson River, 14 are located in the Capital District. The economic value of the region’s roads and bridges is estimated to exceed \$50 billion.
- 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.
- The Capital District Transportation Authority provides public transit service to the region’s four counties. CDTA operates 60 different routes over 2,300 square miles with a fleet of over 300 vehicles, 3,000 bus stops and shelters, and 24 park-ride lots. CDTA introduced its first Bus Rapid Transit line, called BusPlus in 2011 serving the NY 5 corridor. CDTA served a record-breaking 16.5 million passengers last year, and ridership keeps on climbing.
- Intercity passenger rail service is operated by AMTRAK primarily over freight railroad lines with stations in Rensselaer, Schenectady, and Saratoga Springs. Built and managed by CDTA, the Albany- Rensselaer station is one of the area’s most recognized gateways. Serving over 900,000 passengers annually, it is the 10th busiest in the nation. The Saratoga Springs Station, also rebuilt and managed by CDTA, includes a Greyhound/Trailways terminal, scenic rail service and special events offered by the Saratoga North Creek Railroad.
- A nationally recognized facility, the Port of Albany has grown into a major economic engine for the Capital Region and beyond, contributing more than \$813 million annually to the economy of the Capital District and State. As one of only a handful of inland ports in New York, the Port plays a

Capital District Street System by the Numbers

System Size:

- 15,400 lane-miles total regional
- 3,000 lane-miles State owned
- 12,400 lane-miles locally owned
- 7,500 rural lane-miles
- 4,500 federal-aid eligible lane-miles

National Highway System Mileage

- 1,107 total lane-miles
- 740 State-owned interstate lane-miles
- 351 State non-Interstate lane-miles
- 16 locally-owned mileage

Total Vehicle Miles Traveled (VMT) in 2013:

- 19.7 million region-wide travel
- 7.2 million (36 percent) Interstate travel
- 6.6 million (34 percent) State system
- 5.9 million (30 percent) local system

Replacement Value: \$26-30 billion

critical role for the movement of goods between New York and the rest of the world. Total port marine facilities are valued at \$78 million, and include wharfs on both sides of the Hudson River along with supportive infrastructure including cranes, storage and transfer facilities, and a system of roadways, switching rail, and transit sheds. Recent wharf improvements, and purchase of a new Liebherr crane, will allow the Port to handle more of today's larger ships and heavier cargo. The improved Port has been selected to handle cargo for the largest turbine contract in the history of General Electric.

- As the major air center for the Capital District, northeastern New York, and western New England, the Albany International Airport offers a wide variety of facilities and services to more than two million passenger boardings each year. The Airport encompasses 1,157 acres of land in the Town of Colonie. The airport's core capital assets are valued at more than \$267 million and include two primary runways, taxiway and road systems, hangars and air cargo facilities, control tower, modern 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. Continued public and private investment in additional terminal and airside improvements over the coming years will be required to maintain the Airport's facilities and services.
- More than 600 miles of sidewalk and bicycle paths in the region are becoming increasingly important for transportation, recreation, and tourism. Existing bike and pedestrian facilities enhance community livability and safety, providing the opportunity to get around without a car. Making sure that sidewalks are fully compliant with new Americans with Disabilities Act (ADA) requirements will be a challenge facing most Capital District communities over the next several years or more.

The direct users of these transportation facilities and services, including commuters, shoppers, tourists, and shippers are not the only beneficiaries. Employers and all consumers of shipped goods benefit as well. Every citizen is a stakeholder, and it is only by maintaining these transportation facilities can the Capital District economy thrive.

CDTC STREET, HIGHWAY, AND BRIDGE CONDITION ASSESSMENT

The majority of the Capital District's transportation infrastructure is in the form of roads and bridges. CDTC staff conducts regular surveys of the condition of federal-aid and non-federal-aid non-state roads and highways. 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 is for infrastructure improvements, there has been a slow but steady decline in condition, as even reported by NYSDOT on its own system.

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Supporting exhibits are attached as follows:

- Table 1: Street & Highway Condition Summarized by Federal-Aid Classification & Ownership: 2004-13
- Table 2: Measurement of How Well New Visions Pavement Goals are Being Met
- Table 3: Capital District Bridge Condition Compared to New Visions Goals: 2006-13
- Table 4: Capital District Bridge Deficiencies Expressed in Terms of Bridge Deck Area

- Figure 1: Pavement Condition of Capital District Federal-Aid Roads: 1983-2014
- Figure 2: Pavement Condition of Capital District National Highway System Roads: 2012-13
- Figure 3: Pavement Condition of Capital District Urban & Rural Federal-Aid Roads: 2012-13
- Figure 4: Change in the Number of Deficient Bridges in New York State: 1992-2013
- Figure 5: Bridge Condition for all Capital District Bridges by Ownership: 2006-13

- Map 1: Interstate System Age Based on Year of Original Construction/Latest Reconstruction
- Map 2: NYSDOT State Federal-Aid Roads Pavement Condition: 2012
- Map 3: CDTC Non-State Federal-Aid Pavement Condition: 2013
- Map 4: Capital District Bridges by Ownership and Locations: 2013
- Map 5: Capital District Bridges by NYSDOT Condition Rating: 2013
- Map 6: Capital District Deficient Bridges by Deficiency Type: 2013
- Map 7: Capital District Deficient Bridges by Ownership: 2013
- Map 8: Capital District Functionally Deficient Bridges by Ownership: 2013
- Map 9: Capital District Structurally Deficient Bridges by Ownership: 2013
- Map 10: Condition Rating of Bridges on the National Highway System: 2013
- Map 11: Agencies Responsible of Capital District NHS Bridges: 2013
- Map 12: Capital District Interstate/Non-Interstate NHS Bridges: 2013

Continued Slow Decline of Capital District Highway Condition

A well-connected street and highway system, maintained in good condition, is critical to the region's economy. With a current replacement value of \$26-30 billion, preserving the system of roads so that they last for generations and meet changing needs should be a top priority for all levels of government. Even with continued growth in public transit, bike-pedestrian facilities, and a national commitment to reduce greenhouse gas emissions from vehicles, roads remain a vital component of the system that moves people and goods throughout the region. However, despite continued local, State, and Federal investment in the region's infrastructure, many roads, particularly in the rural areas of the region, are in poor condition.

Years of wear and tear, steady traffic growth, an explosion of heavy trucks, weather conditions, and delayed maintenance in some communities because of tight budgets and increased construction costs have taken the toll on Capital District roadways:

- As shown in Table 1 and Figure 1, pavement condition of the region's federal-aid eligible roads – major streets and highways that carry most of the region's traffic -- is beginning to decline after improving through the 1990s. The emphasis of preservation under CDTC's New Visions Plan and the TEA legislation through the 1990s has helped the Region – and New York – address the sizable inventory of roads creaking past their useful lives. Increased funding in the TEA era dramatically improved regional pavement condition on both the State and locally-owned systems, reducing fair and poor mileage to around 35 percent from a high of more than 50 percent in the late 80s and early

90s. As Federal and State funding levels decreased during the last decade, condition declined with fair and poor pavements climbing back up to 50 percent.

- 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 port and intermodal facilities. In the Capital District, NHS roads are in very good shape, compared to other federal-aid facilities. Figure 2 shows 67 percent of NHS roads in good or excellent condition.
- According to the data, the only pavement condition rating that has consistently improved since the early 90s is on the Interstate System. Current Interstate condition is far better than other federal-aid roads with only nine percent in fair/poor condition, compared to 49 percent for all other federal-aid roads, largely because of NYSDOT's preservation first strategy and the Thruway's continuing reconstruction efforts.
- A central issue raised in the New Visions 2030 Plan is the aging of the Interstate system, and the resources needed for eventual reconstruction of that system. These highways are now between 30 and 50 years old (see Map 1), and there have been few full reconstruction projects on these facilities. While NYSDOT has done a very good job of keeping interstate facilities in good condition through preservation treatments, little progress has been made toward the New Visions 2030 goal of significant reconstruction of the region's (non-Thruway) expressway system that will range between 60 and 85 years of age by 2040. The cost of reconstructing portions of the Interstate system could exceed \$1.3 billion or more. While the Thruway has reconstructed significant portions of its system central to the region in Albany County beginning in the 1990's, areas to the west and south will require a similar level of investment.
- Pavement conditions on federal-aid non-interstate arterials and collectors have declined from 1994 conditions on both the State and non-State systems, especially over the past eight years. Financial triage has prevented CDTC from programming necessary reconstruction work on federal-aid pavements in poor condition. As a result, pavement condition on state-owned arterials appears to be more similar to those on locally-owned arterials than to conditions on the Interstate system.
- On a more positive note, counties and local governments seem to be doing a fairly decent job of keeping local non-federal-aid pavements in serviceable condition. Pavement conditions on non-federal-aid roads (70 percent of the total lane-miles in the four counties) are similar to federal-aid roads, with the total percentage rated fair or poor holding at roughly 50 percent since 2004.
- As shown on Map 2 and Figure 3, both federal-aid and non-federal aid facilities that are located in the less-populated, more rural parts of the region are in worse shape than facilities in more developed urban and suburban areas. Figure 3 shows that 56 percent of all federal-aid rural roads are in fair or poor condition, compared to only 42 percent of urban facilities. Local roads in the region's larger, more developed communities seem to be doing well.
- More than 75 percent of all roadway mileage in the Capital District is owned and maintained by the region's counties, cities, and towns. Even though the region's local federal and non-federal aid roads carry less than 25 percent of regional VMT, they are critical pieces of the region's street and highway system. They are essential links to the State-owned highway system. They link farms, markets,

homes, and jobs to each other. They provide public access to outdoor recreation and social infrastructure such as schools and hospitals.

- Little progress has been made toward reaching New Visions pavement goals -- except for roads on the National Highway System. Measured against existing New Visions goals, Table 2 shows that the NHS system has reached the goal set for this important class of roads. Importantly, the region's Interstate system, as a class of NHS roads, has exceeded its goal for fair/poor pavements -- at least for the short-term. Because most of the region's interstate mileage is now operating well beyond its expected lifespan, it will require reconstruction at some point in order to keep it in optimal condition.
- The cost to reconstruct poor federal-aid pavements alone to bring them into a state of good repair (no capacity work) is estimated to total \$900 million. Since the value of the current five-year TIP totals roughly \$120 million inclusive of pavement repair, capacity work, and safety improvements, it is unrealistic to expect that federal resources alone will cover all of the region's infrastructure needs. Long-term needs are currently being evaluated using CDTC's Highway Condition Projection Model. The New Visions 2030 Plan conservatively estimated pavement needs to total between \$55-90 million annually for the next 20 years.

Capital District Bridge Condition Trends Are Similar

Few things draw attention to the condition of the nation's infrastructure like high profile bridge collapses. The tragedy of the I-35 bridge collapse in Minneapolis in 2007, and more recently the I-5 bridge collapse in Washington State in 2013, has appropriately prompted many to inquire about the condition and safety of bridges closer to home. Much of the public discussion of this issue has focused on current bridge conditions and adequacy of ongoing inspection programs.

Bridges in New York and in the Capital District are well into middle age, and are deteriorating faster than they are being cared for.

- There are 1,087 bridges in the Capital District. While the majority are owned and maintained by NYSDOT and Thruway, the region's counties, cities, villages, and towns are responsible for 376 structures. Based on 2013 inspection reports, 355 bridges (about 33 percent of all bridges) are structurally or functionally deficient. 92 Bridges (over eight percent) are considered structurally deficient. In terms of deck area, Table 4 shows about 50 percent, or 5.5 million square feet of total deck area is considered deficient and in need of some type of repair. Deck area normalizes for size, giving a better basis for calculating cost-to-repair.
- As shown in Figure 4, conditions (statewide) noticeably improved during the 90s because of resources provided under the TEA legislation, gaining quite a bit of ground towards the long-term bridge condition goals of New Visions. Table 3 and Figure 5 shows that the number of deficient bridges in the region began creeping upward from a low of 30 percent in 2006 to 33 percent in 2013. Locally-owned bridges in rural areas of the region are in the worst condition, with more than 35 percent categorized as deficient. The silver lining is that deficient deck area dropped substantially from 58 percent in 2010 to 50 percent in 2013.
- Unlike NHS pavements, NHS bridges are in tough shape. In 2013, 197 bridges, or 44 percent, of the region's 452 NHS bridges were categorized as deficient. Interstate bridges were in even in

somewhat better shape, with roughly 42 percent, or 94 interstate bridges, categorized as deficient; however, deficient interstate bridges did climb from 60 bridges in 2006. According to the New Visions 2030 Plan, repairs to Interstate bridges are estimated to require more than one-half of the region's total bridge budget over the next 25 years. The condition of other state-owned bridge continue to slide as well with 37 percent of State-owned bridges categorized as deficient, up from 33 percent in 2006. Less than 32 percent of local NHS bridges were categorized as deficient in 2013, but only made up less than four percent of total NHS bridges.

- County and municipal bridge needs remain substantial. The number of deficient structures increased by three percent over the last six years, climbing to 33 percent, or 119 of the 386 locally-owned bridges. Most locally-owned bridges – 250 of them -- are located in the rural areas of the region. Roughly 35 percent of rural bridges are deficient, compared to 28 percent of urban bridges. Most urban bridges are federal-aid eligible, while most rural bridges are not.
- Low cost preservation treatments can go a long way in improving the condition of federal-aid eligible bridges. CDTC formed a Bridge Group in 2013 to discuss various issues related to bridge preservation for TIP programming, and to help sort out longer-term bridge replacement and preservation needs and costs for the New Visions Plan update. Preliminary results of a study that was commissioned to assist the group, suggests that of the 88 local on-system (federal-aid eligible) bridges, 46 are preservation candidates. The preservation cost attendant to these 46 bridges is estimated to total about \$15 million, compared to \$85 million for replacement. Preservation costs of off-system (not federal-aid eligible) bridges (currently under review) could total another \$20-30 million. Current TIP resources are not nearly enough to cover existing preservation needs, especially for off-system bridges.

Reasons for the Decline in Road and Bridge Condition

The transportation system, both in the Capital District and statewide, is under stress from age, heavy use, and the lack of adequate investment. The system is safe, but the conditions of many parts of the region's infrastructure are worsening.

The continued slow decline of pavement and bridge condition in the Capital District is not the result of CDTC's preference for new facilities over system preservation and renewal, ribbon-cutting over repaving. New Visions has been extremely careful to limit commitments to those that will not compromise the region's ability to preserve and renew its basic infrastructure. However, CDTC's investment principles emphasize steady progress across all project types, which means all systems are vulnerable to deterioration.

- *Erosion of Buying Power:* CDTC once believed that it was reasonable to anticipate that revenues would at least track inflation. Prior New Visions plans, while fiscally constrained, anticipated funding levels would be maintained and would be likely to grow in approximate proportion to the well-documented increasing needs of the transportation system. Plans concluded that flat or declining revenues would lead to serious declines in physical condition which would be deemed unacceptable. Funding for surface transportation historically has been cyclical, with funding initiatives achieving public and political support when viewed as urgent and worthwhile. However, declines in revenues since the passage of MAP-21 (detailed below) indicate that this may no longer be the case or that we have been experiencing an extended trough in the funding cycle.

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- *MAP-21 Put the Squeeze on Bridge Repair.* In the past, the region's bridges typically were fixed using dedicated repair funds from the former Highway Bridge Program. But MAP-21 eliminated that program, and shifted its funding to the National Highway Performance Program (NHPP), which can only be used to repair bridges on the National Highway System, including interstates. More than half of the region's bridges aren't covered by the NHPP. Shifting repair of non-NHS and local off-system bridges to the STP without a proportionate increase in funding has severely increased the competition for other STP-eligible projects. Local off-system bridge projects will be especially disadvantaged
- *Declining Revenues Beginning in the Last TIP period:* Financing for transportation capital improvements has declined at the Federal, State, and Local levels. Federal funding for the CDTC region decreased dramatically beginning in 2012-13 at the time of transition from the final year of extensions of SAFETEA-LU to the new legislation entitled MAP-21. The chart below summarizes the changes in all Title 1 fund sources as well as in select funding sources examined in more detail. These select highway fund sources include Surface Transportation (STP) sources, National Highway System (NHS), Interstate Maintenance (IM) and Highway Bridge Replacement and Rehabilitation (HBRR), compared to their corresponding STP sources and National Highway Performance Program (NHPP) under MAP-21.

	Fund Sources	FFY 11-12 SAFETEA-LU Incl. Equity	FFY 12-13 MAP21	Dollar Increase	% Increase
US	All HWY	\$ 35.8 B	\$ 37.5 B	\$ 1.7 B	5%
US	Select ¹	\$ 31.4 B	\$ 32.4 B	\$ 1 B	3%
NY	Select ¹	\$ 1294.8 M	\$ 1315.4 M	\$ 20.6 M	2%
CDTC	Select ¹	\$ 121.8 M	\$ 53.2 M	-\$ 68.6 M	-56%

NOTES:

1. Select fund sources are STP sources, NHS, IM and HBRR in SAFETEA-LU; and their corresponding STP sources and NHPP for MAP-21.
2. HBRR was about half of CDTC's funding, but MAP-21 compensated for this loss by Proportionally increasing NHPP and STP sources
3. SAFETEA-LU also contained an equity bonus program (replacing TEA-21's Minimum Guarantee Program) which allowed adjustments to States' funding based on rates of returns on contributions to the Highway Trust Fund and on average annual shares under TEA-21 in order to provide continuity. The Equity Bonus funds apportioned to New York State are included in the above funding sources.

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BRINGING REGIONAL SIDEWALKS AND CROSSWALKS INTO COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA)

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. Providing pedestrian facilities is an example of such a program. At this time, FHWA is renewing emphasis on the need for local government compliance with ADA requirements due to the fact that new standards came into effect in 2012 [ADA Accessibility Guidelines \(ADAAG\)](#), and that additional guidance and standards specific to the public right of way ([PROWAG](#)) have been incorporated into the NYSDOT Highway Design Manual and will be adopted this year at the federal level.

The Capital District is home to more than 600 miles of sidewalk and multi-use paths, and 800 intersection crossings. These facilities, valued at roughly \$300 million, have become increasingly important for transportation, recreation, and tourism in many of the region's communities, both small and large. Existing bike and pedestrian facilities enhance community livability and safety, providing region's residents and workers the ability to get around without a car. Making sure that sidewalks, signalized intersections, and other street crossings are fully compliant with new ADA requirements will be a challenge facing most Capital District communities over the next several years or more. Based on very limited information available, the staff has estimated that more than 70 percent of the Region's sidewalks and 50 percent of crossings are not in compliance with current ADA standards. If this estimate is correct, the cost to repair these facilities would exceed \$120 million.

During this past summer, several CDTC staff and Planning Committee members attended a training session sponsored by NYSDOT and FHWA related to developing ADA compliance plans and programs for pedestrian accessibility. The message CDTC staff took away from the two-day training session was that communities in the region (and throughout New York and the nation) which own or maintain sidewalks or other pedestrian facilities will have to prepare a formal Transition Plan, sooner rather than later. NYSDOT already has a preliminary plan in place for State-owned facilities. Based on discussions with Planning Committee members and several Department of Public Works officials, it seems most communities in the region may not be aware of the requirement. The training emphasized that developing a plan is the recommended course for all government agencies to protect against liability issues. FHWA made it clear that absence of a plan could make a community or agency vulnerable to court action.

The Infrastructure Task Force directed the CDTC staff to work with NYSDOT ADA specialists and NYSDOT Region 1 planning staff to develop a specific methodology to assess sidewalk and crossing condition that would help the region's 78 municipalities meet obligations under ADA. The information collected under that effort would be used to develop a better cost estimate for sidewalk and crossing improvements.

ADDITIONAL NEEDS OF TRANSIT, PORT, AND AIRPORT INFRASTRUCTURE

While roads and bridges are core elements of the region's infrastructure, and represent the bulk of the financial need, a broader view of transportation infrastructure cannot be neglectful of the needs of transit, the Port, and the Airport. These rely heavily on the quality of the network of regional roads and bridges, which are experiencing the challenges detailed above, but have additional and unique needs of their own. In combination, the region's total investment in these facilities, or approximate replacement value, totals roughly \$500 million. As described in more detail in the following sections, continuing to maintain and

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improve transit, the port, and the airport will require annual capital expenditures totaling over \$80 million. Below are outlined some of the characteristics and needs of the region's transit, port, and airport infrastructure which are experiencing many of the financial challenges in common with the region's roads and bridges.

Public Transit Infrastructure

The region's transit assets are comprised of a significant bus fleet, shelters and street amenities and several stations, park and ride lots, and supportive facilities and infrastructure. CDTA's transit bus fleet includes 210 fixed route 40' buses and 32 paratransit vehicles in addition to non-revenue vehicles. Their asset inventory includes approximately 300 shelters and 3000 stops, with seating, lighting, and landscaping amenities. The system has 40 park & ride lots under a mix of ownerships and leasing arrangements.

Capital investment in the region has focused first on existing assets and state of good repair, and has looked first to cost reduction before added funding. CDTA has implemented a phased plan of 15-20 new bus purchases per year and 4-5 paratransit vehicles per year in order to continually invest in fleet quality. Given that buses and stops are the major public interface, a more aggressive annual budget for renewal of shelters and amenities has also been put in place. Some of the focus of recent capital investment beyond maintenance of existing services and facilities has been on the vehicles, stations, and technology for the Bus Rapid Transit (BRT) program.

In recent years, the CTDA capital program budget has ranged from \$8.3 million in 2012 to \$20.6 million in 2013, depending on needs programmed for investment in a particular year. Major facilities reinvestment or purchases account for year-to-year fluctuations. The average projected yearly capital need over the next five years ranges between \$35-40 million. A core budgetary component, the fleet replacement program alone is valued at approximately \$12 million per year. Approximately three quarters of CDTA's vehicle budget is for maintaining the core fleet, with the remainder dedicated to capacity relief or expansion. Shelters and amenities may require \$0.150-0.500 million per year. More aggressive investment in transit would help establish remaining BRT lines, roll-out regional transit centers, and maintain service quality, reliability, accessibility, and safety.

Uncertain funding challenges transit operations and capital programs. Collectively, Upstate NY transit services project a total five year capital need of \$604 million, 75 percent of which is attributable to core vehicle, facilities, and system needs. This is contrasted with expected resources of \$287 million over the same period, representing a \$317 million funding gap. Notably, no multi-year state capital funding program exists to address transit infrastructure needs (other than in the unique case of MTA). Uncertain and inadequate capital funding has also taxed operations and maintenance budgets.

While the average life expectancy industry-wide for standard fleet vehicles is 12 years/500,000 miles (and five years for paratransit vehicles), insufficient transit funding has required CDTA to pursue life-extending activities to stretch these to 15 years and seven years respectively. Approximately 25 percent of CDTA's fleet is beyond useful life; this subset of the fleet costs twice as much to maintain and may experience reduced reliability. Also notable, calls for newer, cleaner and more efficient technologies could mean more expensive buses in the future. Depending upon the technology, there is the possibility or risk of more costly and uncertain repairs, and the associated costs of new refueling facilities as well as new tools and training. While the growth in ridership has been a major positive for CDTA, it has meant suffering some overcapacity issues which translate into greater capital needs; higher-capacity articulated buses are being explored as an option.

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Through creative management CDTA has remained a vital portion of the region's mobility but more funding support will be necessary to continue to reduce deferred maintenance backlog and accomplish other initiatives.

Port of Albany Infrastructure

The Port of Albany encompasses 5,400 feet of wharf on both sides of the Hudson River. Total port marine facilities capital assets are valued at \$78.5 million, including supportive infrastructure such as on-dock rail, harbor cranes, 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

A significant recent \$12.7 million investment in port infrastructure included the rehabilitation of the Rensselaer Wharf, half of which had been unusable from age and deterioration. The project doubled capacity, added a second mobile harbor crane on the Albany wharf, and involved the largest Consolidated Funding Application grant funding in Capital Region REDC. Other recent capital investments include a timber piles replacement project (\$1.5 million) and a project stabilizing 1,400 ft. of rail access to the largest single-story warehouse in Port District (\$0.2 million).

While the recent wharf and dock 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 improves. The Port may also need to invest in publicly owned roads within its precinct in order to maintain and improve conditions and important connections. The Port's total capital investments in recent years have ranged from \$2.4 million in 2012 to \$8.8 million in 2013, 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 therefore easily amount to \$7 million or more per year, on average. Significant new capacity expansion or modernization projects would likely exceed this value. Absent a steady and increasing investment in the port, regional freight may be impacted with consequence limiting effect to regional economic growth.

Albany International Airport Infrastructure

Albany International Airport encompasses 1,157 acres of land in the Town of Colonie. The Airport's core capital assets are valued at over \$267 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 totaling more than \$60 million have included the construction of a new terminal; parking garage; several runway extensions and rehabs; removal of a municipal water tank; and numerous improvement to 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 Five-Year Capital Plans totaled almost \$265 million for 2005-09 and \$132 million for 2010-2010. Highlights of the current capital program include a \$30 million investment 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 are substantial, and ongoing capital program financial needs may easily average \$40 million annually. 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). Beyond these, the airport has long referenced its need for better interstate system connectivity. The airport's need for continued investment is critical to the region's economy and to inter-regional mobility.

A 21ST CENTURY APPROACH TO INFRASTRUCTURE RENEWAL

Bridges need to be repaired or replaced. Transit systems need expansion. Roads are in want of repair – a long-delayed problem made worse by the potholes left in the wake of very harsh winters. But the traditional system for financing transportation infrastructure – revenue from the Highway Trust Fund and from Congressional legislation – has diminished or is not being authorized.

Since the passage of MAP-21, the approach to addressing road and bridge needs in the region, and throughout New York State, has changed. The approach to bridges has moved from routine replacement to “element specific” repair whenever possible and road surfaces are being repaved and not reconstructed. This approach dovetails with NYSDOT's “preservation first” strategy which emphasizes the optimization of the existing infrastructure through cost-effective preventative and corrective maintenance activities. The strategy of performing less-expensive and shorter-lasting repairs is likely to be the official policy for the region's pavements and bridges at least in the near term.

The Role of NYSDOT's Transportation Asset Management Plan

Discussion of the future of financing and repairing infrastructure in the region suggests a need for careful review and coordination with New York State DOT's Transportation Asset Management Plan (TAMP). Indeed, the draft of the TAMP explicitly encourages a “partnering with other owners of NHS assets.” Among these other owners, MPO regions represent an 18% ownership stake. While the TAMP is focused largely on managing the conditions of State owned facilities, along with some attention given to Thruway Authority assets in the TAMP document, 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 are the most costly, the MPO is also equally concerned with additional assets including those related to ADA compliance, sidewalks, bicycle facilities, striping, culverts, transit, etc. – that is, in all of the infrastructure components related to mobility needs.

The future financial picture and associated goal setting within the TAMP, which covers the 10-year period of 2013-2023, 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 \$1.7B per year for bridges and pavements (compared to current annual funding levels of \$750M) if a state of good repair 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 funding scarcity. It should be noted that the

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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.

Against this setting of limited funding and the attempt to minimize deterioration, the TAMP codifies or restates NYSDOT's recent commitment to an investment strategy known as "Preservation First." While all dimensions of this strategy have not been outlined, its core tenet 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. Notably, it is implied in the TAMP that pursuing this cost effective strategy eventually frees up funding to rehabilitate assets in poorer condition which had not been eligible for preservation treatments – although a specific time frame for the freeing up of this future surplus funding is not proposed within the TAMP.

Also relevant to the progress of capital improvement of our region's transportation infrastructure, the TAMP includes some language suggestive of an evolving definition of preservation. There is suggestion of a future broadening of the strict definition of preservation so as to include some costs outside of bridge or pavement limits as well as in some cases rehabilitation projects within preservation programs. The TAMP also notes that some portion of funding will be dedicated to projects which are categorized as "beyond preservation." According to the TAMP, 40% of projects are 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. Additionally, whereas policy ordinarily dictates that the highest user benefit is achieved by addressing the most heavily travelled facilities – and this will continue to influence and guide preservation decisions – the TAMP also introduces a new category called "Demand Recovery" which is intended to address the needs of lower VMT facilities that have missed the window of opportunity for preservation funds and are therefore "orphaned" by a program with a strict preservation emphasis.

New Visions Transportation Infrastructure Finance Planning and Renewal

New Visions has a longer time horizon than the TAMP (looking out to 2040 rather than 2023) and, as described above, is obligated 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, and 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 would align 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 and goal setting by CDTC's New Visions. Such long range goal setting, as in past New Visions plans, would nonetheless still remain realistic and fiscally constrained rather than purely 'aspirational'. While economic turnaround has been painfully slow following the Great Recession which began in 2008, and may only mildly improve over the next five or more years, an economic malaise lasting for 25 more years would be an historical oddity.

While historically funding has been cyclical, with public and political support for funding initiatives growing when viewed as urgent and worthwhile, more recent time periods have shown a departure from this norm and we have instead seen a sustained low revenue condition. CDTC has projected in prior New Visions plans that revenues would at least track inflation – and more likely grow moderately in proportion to the well-documented accumulating needs of the transportation system. However, since we have instead seen continually declining finance, cyclical transportation funding may no longer be the norm or at minimum the region may be experiencing an indefinitely extended funding trough.

Several alternative funding scenarios for the future could be compared and analyzed in CDTC's forthcoming goal setting and scenario planning explorations (see also the section entitled Outstanding Issues to be Explored over the Next 12 Months for more information on these efforts). Among the alternative scenarios considered could be:

- declining revenue and budgets;
- indefinitely flat funding and austerity budgeting; and
- a return to cyclical funding in which is projected a rise in long term transportation funding corresponding to some level of projected future growth (i.e., funding is correlated to some economic measure such as GDP).

This last alternative scenario could include long-range (e.g., 2025-2040) planning for a growth in GDP which is more in line with historical trends, after the initial period (e.g., 5 to 10 years) in which funding level is essentially flat or adjusted only for inflation. A 25 year history of GDP shows an average of +2.5% per year or +85% in total over 25 years. A theoretical funding baseline could track such a projected rise in GDP (less projected inflation) or could be positioned partway between flat funding and such an increase. Some judgment is required because neither tax revenue nor transportation funding necessarily directly track with economic measures such as GDP. Judgment is also required to frame such a projection as one alternative among several alternatives which might be used to inform a more aggressive and yet still realistic long range program of transportation capital improvement.

Given the evolving definition of preservation 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. CDTC's 2030 Plan determined that the level of funding fell short of the levels needed to meet basic infrastructure requirements by nearly \$200 million annually. As CDTC staff makes significant efforts in the coming months at reviewing infrastructure finance and needs, and tests several potential scenarios, it will be important above all to set

appropriately aggressive goals for conditions while at the same time acknowledging and being guided by realistic fiscally-constrained capital programming.

As of this writing, Federal legislation extending or replacing MAP-21 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. While incremental sales taxes dedicated to transportation experience a success rate in ballot measures nationwide of 54 percent, 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. Many core aspects of funding stability loom larger than the activities of the regionally-based Infrastructure Task Force, or 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.

ALTERNATIVE APPROACHES TO INFRASTRUCTURE FINANCING AND MANAGEMENT

The New Visions transit task force has explored some of the options described above as well as a range of additional potential sustainable funding mechanisms for transit operations. While regional coordination and political unpopularity of tax increases were noted by the transit task force as significant barriers, innovative financing of some form will be required. Similar attention is needed for sustainable infrastructure capital improvements.

For longer-term sustainable revenues, the following are being discussed among policy makers:

- Self-sufficiency at the State level
- Fuel taxes at the State level
- Traditional and innovative tolling
- Public/Private partnerships and alternative project delivery mechanisms
- Mileage-based user fees
- Innovation through technology
- Shared service agreements

Three of the more promising alternative approaches – mileage-based user fees, innovating through technology, and shared service agreements – are discussed in more substantial detail in the sections that follow.

Financing Infrastructure Renewal Through Mileage-Based User Fees

If recent history is any guide, the price of road and bridge repair and reconstruction will continue to rise, and New York's transportation system will compete harder for new tax dollars against many other underfunded social priorities. Advances in automobile technology have successfully reduced the demand for gasoline – a good thing for our natural environment, but bad for highway trust funds that have successfully been the cornerstone of infrastructure repair for more than 50 years. This paper, and others like it authored by experts across the political spectrum over the last decade, demonstrate that the revenue streams on which

our transportation system have historically depended – namely fuel taxes – are insufficient to address basic infrastructure renewal needs.

With the Highway Trust Fund virtually broke, and because automobile technology advancements are accelerating, there is widespread agreement that continued reliance on the present structure of fuel tax contributions, both at the federal and state levels will no longer meet our growing transportation infrastructure needs. One of the most promising ways to replace the fuel-based tax involves the use of vehicle miles traveled–based fees. HNTB’s *Think* magazine recently reported that the State of Oregon has experimented with ways to address diminishing fuel tax revenues for more than a decade. As a result of this work, on July 1, 2015 Oregon will launch the nation’s first operational program that charges motorists directly for their road usage. To many, this 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. As the Empire State, New York has the opportunity to build on Oregon’s success in this arena and is encouraged to begin feasibility testing.

Role of Innovation in Infrastructure Repair and Renewal

Amid the discussion about how the upgrade to the region’s (and State’s) infrastructure can be paid for, it is important not to lose sight of the equally critical question of how infrastructure of the future will be built and maintained. Research and innovation will be a key part of the answer to these questions. The challenges that the region faces today demand increasingly innovative and cost-effective solutions. The technologies of the 1950s, 1960s and 1970s simply won’t cut it in the 21st century.

Some examples of the work that is being done:

- A research team at the University of British Columbia has created synthetic high performance fibers that can be sprayed through a high-pressure hose directly onto cold concrete bridges to increase their strength and durability. The spray coating is also fitted with fiber optic sensors that can send digital signals that monitor the structure’s condition in real time.
- Researchers have created a cement additive that strengthens concrete by up to 40 percent, and reduces greenhouse gas emissions by using less material, making it both green and cost-effective over the long-term.
- Self-healing asphalt and concrete can double the surface life of roads by allowing repairs through the simple application of induction heat and steel fibers similar to steel wool within the pavement. When cracks or other defects in the pavement occur, induction heat is applied and conducted by the steel, which in turn melts the asphaltic material within the pavement allowing it to rebind the aggregates and heal the damaged road. New research shows it also possible to create concrete that has self-healing properties by embedding calcite-precipitating bacteria in the concrete mixture.
- The use of advanced composite materials have transformed the design of everything from aircraft to formula-1 racing cars, and are now set to revolutionize the way bridges are built. Fiber reinforced polymers are light, meaning that it can be installed in half the time of a conventional bridge deck, and its corrosion and frost-resisting properties mean maintenance costs could be up to 50 percent lower.
- 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.

- Many states, including New York, have opened their bidding processes to allow design/build approaches. This project delivery process allows designers and contractors to team up to propose design concepts, taking advantage of expertise in specialized design and materials.
- 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.

It may be years before the cost benefits of these new techniques can be quantified. Analyses by universities in the United States, Canada, and Great Britain suggest these and other innovative materials and construction techniques can dramatically reduce direct construction and user costs, perhaps by more than 50 percent over the long-term.

Shared Services and Functional Consolidation

With the continued decline in revenue for infrastructure repair and renewal, there is a heightened interest in exploring innovative ways to stretch the buying power of each infrastructure dollar through shared-service agreements. Although the concepts of shared services and functional consolidation are not new, they are receiving greater attention in the media, and from taxpayers and policymakers at all levels of government. New York State's Office of the Comptroller has documented more than 180 examples of shared services across the State related to public safety, water services, facility sharing, purchasing, and others. In the past three years, the Town of North Hempstead, New York, saved its villages and special districts over \$1 million by sharing a fuel depot; sharing highway department equipment for sign-making, snow plowing and removal, street sweeping, and repaving services. One million dollars can replace a small bridge or repair four or more deficient bridges, repave two miles of federal-aid road, or to make 100 intersections ADA compliant.

Locally, the Town of Bethlehem has increased the cost effectiveness of its in-house paving program in several innovative ways. In order to control costs by self-performing some work, Bethlehem purchased its own paving machine to be operated by town crews. Given that the several-week paving season represents only an incremental labor cost within the town budget, project costs are primarily defined by material costs and as such a typical paving overlay can be done for a similar cost to that of an independent contractor providing a chipseal or similar surface treatment. The town also reports higher quality control. Of perhaps greatest interest, Bethlehem has entered into joint arrangements with the Town of New Scotland which further multiplies cost savings. Given the short duration of the seasonal requirements for the paver, Bethlehem is able to loan it to New Scotland for use during part of the season. In return, Bethlehem often provides crews to Bethlehem to further reduce labor costs of Bethlehem road repair work.

STRATEGIES AND ACTIONS DESIGNED TO SUPPORT INFRASTRUCTURE INVESTMENT IN THE REGION

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 legislation also requires regions to use a performance-based programming process when identifying how federal transportation funds will be allocated, and to assess progress towards meeting regional and statewide goals.

CDTC's New Visions Plan responds to this mandate in its regional transportation goals and objectives. This section of the Infrastructure Task Force White Paper identifies strategies that address how the region will

make progress toward achieving infrastructure goals and objectives. The strategies identify specific actions that will be taken by regional partners to help achieve those goals. Many of the supporting actions identified in this report are, in large part, similar or the same as the actions described in the 2030 Plan. Several of these strategies and actions have existed in some form for the past several versions of the Plan, although some have been combined or re-phrased to better fit the new preservation paradigm of the new plan. CDTC and its regional partners have been advancing the work described in all of them for years.

Updated Strategies and Actions

The CDTC staff proposes that infrastructure planning in the Capital District be guided by a single strategy that simply states that *maintaining the region's roadways, bridges, trails, sidewalks, transit system, port, and airport in a state of good repair is the smart thing to do*. This strategy is supported by the following actions:

- Devote significant TIP resources to infrastructure preservation and renewal, including continued local and State investment in routine maintenance.
- Given the atmosphere of a shortage of funding, the strategy to perform less costly and shorter-lasting road and bridge repairs should continue for the foreseeable future. This maximizes the pavement and bridge benefit, at least for the short term.
- The region cannot solely rely on preservation treatments to reverse the decline in pavement and bridge condition. Lower-scale repair (preservation) treatments alone may not be sufficient to maintain good pavement condition on local roads; the importance of many of these roads warrants more significant work to produce a longer repair life, safer operations, and other benefits. Pursuing an effective highway and bridge reconstruction program will be necessary to some degree. (The optimum mix of preservation and renewal treatments will be derived from a comprehensive evaluation using the HCPM and other models). Currently the work on both State and local roads is limited.
- Preservation and renewal treatments must seriously consider community context regardless of facility ownership. The design process must incorporate complete street features wherever possible.
- Build a local coalition to advocate for regional transportation projects. CDTC and its members must communicate regularly with the region's representatives in Congress and other governmental bodies. Success in achieving support for "big ticket" initiatives and other road and transit expansion projects can "free-up" scarce State and federal formula-based resources for maintenance and preservation projects.
- Pursue local funding mechanisms, especially 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 the use of shared services on a larger scale. For every million dollars saved, the region can replace 3.3 miles of road, repair 3-5 bridges, or build one mile of new sidewalk and bike path.
- Technology innovation should be encouraged within New York. Even though it may take years to "make the switch" to new ways of designing and building our bridges and highways, the long-term savings cannot be minimized.
- Pay greater attention to ADA compliance needs.

Outstanding Issues to be Explored in the Coming Months


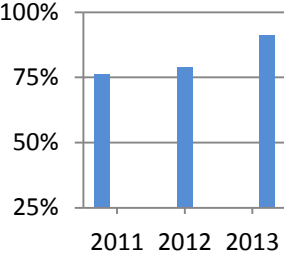

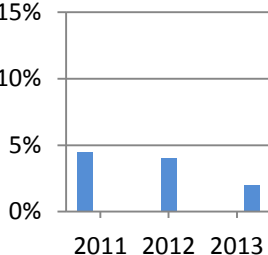
The white paper represents a summary of work to date and it is therefore important to note that the work of the infrastructure task force will continue with equal intensity over approximately the next 12 months, with some activities continuing indefinitely thereafter. Particularly given the highly technical, data-intensive nature of such topics within infrastructure as measurement of conditions, determination of need, data-driven decision making, impact of changes in funding, and quantitative effects of policy, the task force plans to dive into much greater detail in the coming months than is required or appropriate within the context of the white paper, which is essentially a summary-level document. It is important to note that the intent is not to pass judgment on communities or practices, nor to point out one community's performance versus another's, but rather to accumulate and assess available data and knowledge, further the data quality in the region, learn collectively from best practices, and ultimately help frame and guide regional policy which puts limited resources to highest and best use.

- *Determining Fiscal Constraint:* CDTC's 2030 Plan determined that the level of funding fell short of the levels needed to meet basic infrastructure requirements by nearly \$200 million annually. In the coming months, staff will make a significant effort at reviewing long-range federal, state, and local infrastructure financing. Staff will review previous examination of the components of historic increases in unit costs for infrastructure work, and estimate the long-range fiscal impacts of these costs on plan implementation. Special attention will be given to costs related to recent bridge and pavement preservation actions.
- *Scenario Planning:* As part of this plan update, the Task Force will investigate the long-term funding needs for the region's streets, highways, and bridges. One tool CDTC will utilize is the Highway Condition Projection Model (HCPM). Features of the HCPM allow it to perform several types of 'what-if' analyses when planning for the future. The CDTC staff with the assistance of NYSDOT experts will work the Task Force to assess the impacts potential future funding levels and of alternative pavement and bridge repair policies. For example, the model can be run sequencing repairs in the order of 'worst first', or by a strategy which first preserves facilities above a certain rating, or by other repair strategies vetted by the Task Force. **Reviewing existing New Visions 2030 infrastructure goals within the context of NYSDOT's draft Asset Management Plan (TAMP) will be a necessary component of scenario planning.** Please consult [Appendix A](#) for information on the following:
 - Work completed to date, including interviews conducted by CDTC staff with ten local infrastructure owners in a range of representative communities in order to help improve our understanding of local highway and bridge maintenance and investment policies and practices. Also described is the plan on how this information will be used together with highway and bridge condition data, calculated pavement deterioration rates, federal investment levels, and other data to help forecast future condition and investment needs for different classes of roads.
 - An explanation of The Highway Condition Projection Model, including background, purpose, data requirements, assumptions, model operation, and capabilities for use in scenario planning.

- *Culverts:* In addition to pavements and bridges, maintaining culverts is essential to the safety, reliability, and longevity of the region's street and highway infrastructure. Many aging culverts have deteriorated beyond the point where they can withstand maximum flow, while others have filled with sediment, reducing their capacity which causes them to overflow prematurely. State-owned culverts are inspected by NYSDOT in a manner similar to bridges. Currently of the 1,109 large culverts maintained by NYSDOT, 228, or 20 percent are rated structurally deficient. Information on locally-owned culverts is severely incomplete and will require a major effort to locate, inspect, and evaluate. The Infrastructure Task Force suggested that consideration be given to conducting a comprehensive inventory of culverts maintained by the region's counties, towns, and villages to supplement the State's inventory.
- *ADA Compliance Requirements:* The CDTC staff, with help from the Infrastructure Task Force, will work with NYSDOT ADA specialists and Region 1 planning staff to develop a specific methodology to assess sidewalk and road crossing condition that would help the region's 78 municipalities meet their obligations under ADA. The CDTC Planning Committee at its January 7, 2013 meeting directed staff to form an ADA Working Group to help with this task.
- *Infrastructure Report Card:* CDTC will Develop and Publish an Infrastructure Report Card for Roads, Bridges and Other Assets. The proposed Report Card can be thought of as an asset management tool which will be used to help satisfy performance measurement requirements of MAP-21. The report card will highlight individual components of the region's transportation infrastructure (roads, bridges, sidewalks, etc), their physical condition, infrastructure TIP and local projects completed during the previous one or two years, and how well individual goals are being met. An example of a report is shown below:

CDTC New Visions Infrastructure Task Force White Paper

PAVEMENT CONDITION REPORT CARD FOR CAPITAL DISTRICT STREETS & HIGHWAYS

INTERSTATES	RATING	TARGET	ACTUAL	CHANGE OVER TIME	EXPLANATION
Percentage of interstate mileage in Good/ excellent condition		80 %	91 %		The only pavement rating that has consistently improved since the early 90's is the interstate. Current interstate condition is far better than other federal-aid roads largely because of NYSDOT's preservation first strategy and NYSTA's reconstruction program.
Percentage of interstate mileage in poor condition		0 %	0 %		
LOCAL FEDERAL-AID					
LOCAL NON-FEDERAL AID					

CDTC New Visions Infrastructure Task Force White Paper

Table 1
Capital District Street & Highway Condition Summarized by
Federal-Aid Classification and Ownership: 2004-2013

Road Type	Lane Miles	2004/05		2008/09		2013/14	
		Percent Poor/ Fair	Total	Percent Poor/ Fair	Total	Percent Poor/ Fair	Total
Federal Aid							
New York State	2,850	10/37	47	8/32	40	9/40	49
Non-State	1,668	19/28	47	20/34	54	14/34	48
<i>All Federal Aid</i>	<i>4,518</i>	<i>13/34</i>	<i>47</i>	<i>12/33</i>	<i>45</i>	<i>11/38</i>	<i>49</i>
Non-Federal Aid							
Local	10,764	27/23	50	28/30	58	14/32	49
State	166	10/52	62	6/48	54	16/33	79
All Roads	15,488	23/27	50	17/29	46	13/35	53

Notes:

1. Federal-aid roads are typically the most heavily traveled routes, and are functionally classified as interstate arterials or collections, serving both regional and inter-municipal travel needs. Most federal-aid routes are owned and maintained by New York State. The remaining street - - classified as local – primarily serve as property access. Roads on the “federal-aid” system are eligible to compete for certain categories of federal transportation funds through CDTC’s Transportation Improvement Program (TIP). Federal-aid designation does not guarantee that the cost of roadway preservation treatments or reconstruction will be covered by the region’s federal-aid resources.
2. Highway mileage and pavement condition for facilities owned and maintained by New York State was derived from NYSDOT’s 2005 Sufficiency Rating, 2009 Pavement Condition Summary table provided by NYSDOT, and NYSDOT’s Roadway Inventory System (RIS). Information for non-state federal-aid and local non-federal-aid roads was derived from CDTC’s Pavement Condition Inventory. Non-state federal-aid data is based on surveys completed in 2005, 2009, and 2013. Local non-federal-aid data is based on 2004, 2008, and 2014 surveys. NYS federal-aid data included highways under jurisdiction of the NYSTA.

CDTC New Visions Infrastructure Task Force White Paper

Table 2
Measurements of How Well New Visions Pavement Goals
Are Being Met in Terms of Pavements Categorized as Poor & Fair

Roadway Classification	Year			
	Base Year 1994	New Visions Goals	2005	2013
National Highway System (NHS)				
All NHS Roads	34 %	25 %	45 %	25 %
Interstate System Only	29 %	20 %	10 %	9 %
Federal Aid System				
State Owned Roads & Highways	39 %	28/30	58	14/32
Non-State Owned Roads & Highways	37 %	6/48	54	16/33
Local (Non-Federal Aid System)	32 %	35 %	50 %	46 %

Notes:

1. The original goals were established in 1995 by the Infrastructure Task Force, which was comprised of representations of 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 New Visions Infrastructure Task Force White Paper

Table 3
Capital District Existing & Historic Bridge Condition Compared to New Visions 2030 Goals

Ownership	Number of Structures	Deficient Structures							
		2006		2010		2013		2018 Forecast	New Visions Goal
New York State:									
NYSDOT Interstate	151	30%	(44)	38%	(56)	42%	(64)	47%	24%
NYSDOT Non-Interstate/OGS	371	33%	(116)	34%	(123)	37%	(136)	31%	20%
NYS Thruway	72	24%	(16)	35%	(24)	42%	(30)	24%	24%
Local	366	30%	(104)	32%	(110)	33%	(119)	39%	20%
Other	127	-	-	47%	(9)	5%	(6)	-	-
All Bridges	1087	30%	(283)	34%	(322)	33%	(355)	40%	22%

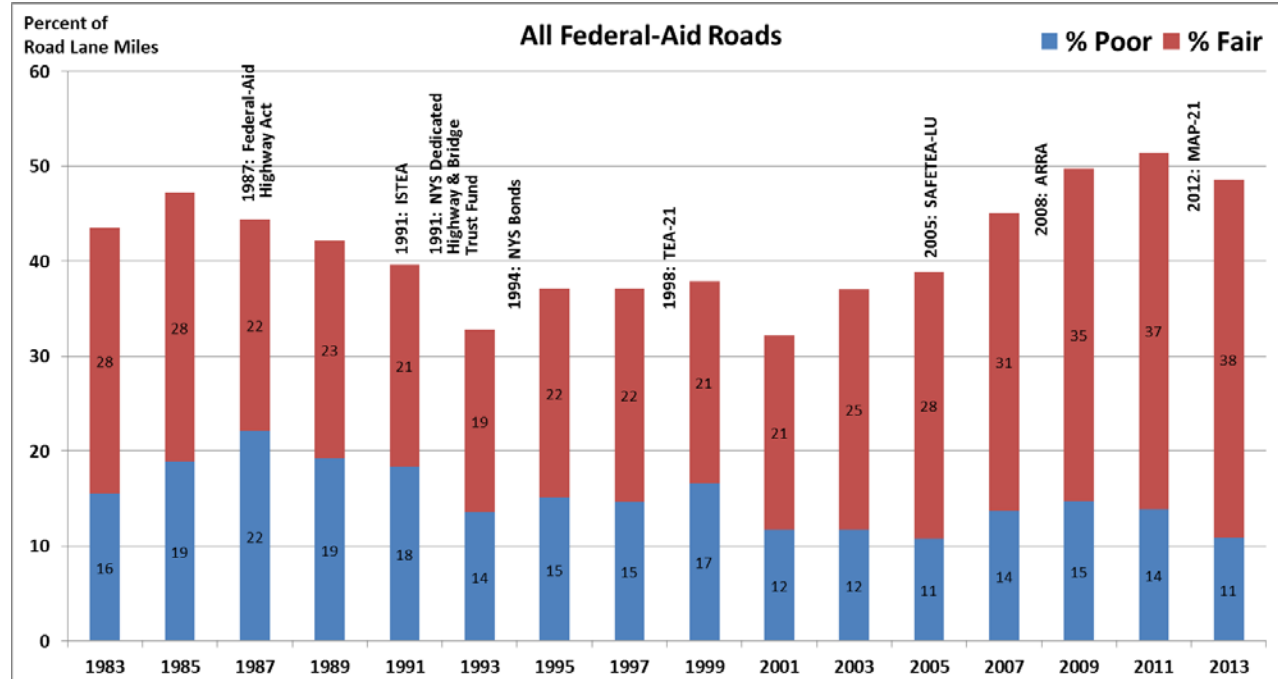
For All Bridges in the Capital District by Ownership: 2006-13

Table 4
Capital District Bridge Deficiencies Expressed in Terms of Bridge Deck Area

Ownership	Deck Area (Square Feet)	Deficient Deck Area					
		2006	2010	2013		2018 Forecast	New Visions Goal
New York State:							
NYSDOT Interstate	3,112,225	65%	70%	68%	(2,112,680)	68%	11%
NYSDOT Non-Interstate/ OGS	4,311,923	47%	54%	54%	(2,311,256)	36%	20%
NYS Thruway	1,176,095	-	55%	58%	(676,870)	-	-
Local	1,046,210	45%	40%	32%	(335,106)	37%	20%
Other	1,448,201	-	69%	5%	(76,288)	-	-
All Bridges	11,094,654	-	58%	50%	(5,512,200)	-	-

- Information in this table was derived from NYSDOT's Annual Bridge Reports. Values shown in parentheses Table 3 represent number of structures. NYSDOT defines a deficient bridge as one with a condition rating less than 5 on a 1-7 scale. A deficient condition rating indicates the presence of sufficient deterioration and/or loss of function to require corrective maintenance or rehabilitation. It does not mean that the bridge is unsafe. The federal bridge rating scale (not shown here) distinguishes between 'structural deficiency' and 'functional adequacy'. According to the federal scale only about 25% of deficient bridges identified by NYSDOT can be considered 'structurally deficient'. Even then, federally identified 'structurally deficient' bridges are not necessarily considered unsafe.
- The total number of structures in 2013 is 1,087 and total deck area was 11,094,654.
- Unrated bridges are included in 2013 data for total number of structures and deck area. There are 2 unrated NYSDOT Non-Interstate and OGS bridges, 12 unrated Local bridges, and 112 unrated Other bridges. Unrated bridges are not considered deficient.
- The values shown in parenthesis in Table 4 represent deck area in square feet. Deck area is considered a better indicator of financial need because it normalizes for bridge size.

Figure 1: Pavement Condition of Capital District Federal Aid Streets and Highways: 1983-2014



Note: The chart shows the timeline for the passage of various federal and State transportation legislation.

CDTC New Visions Infrastructure Task Force White Paper

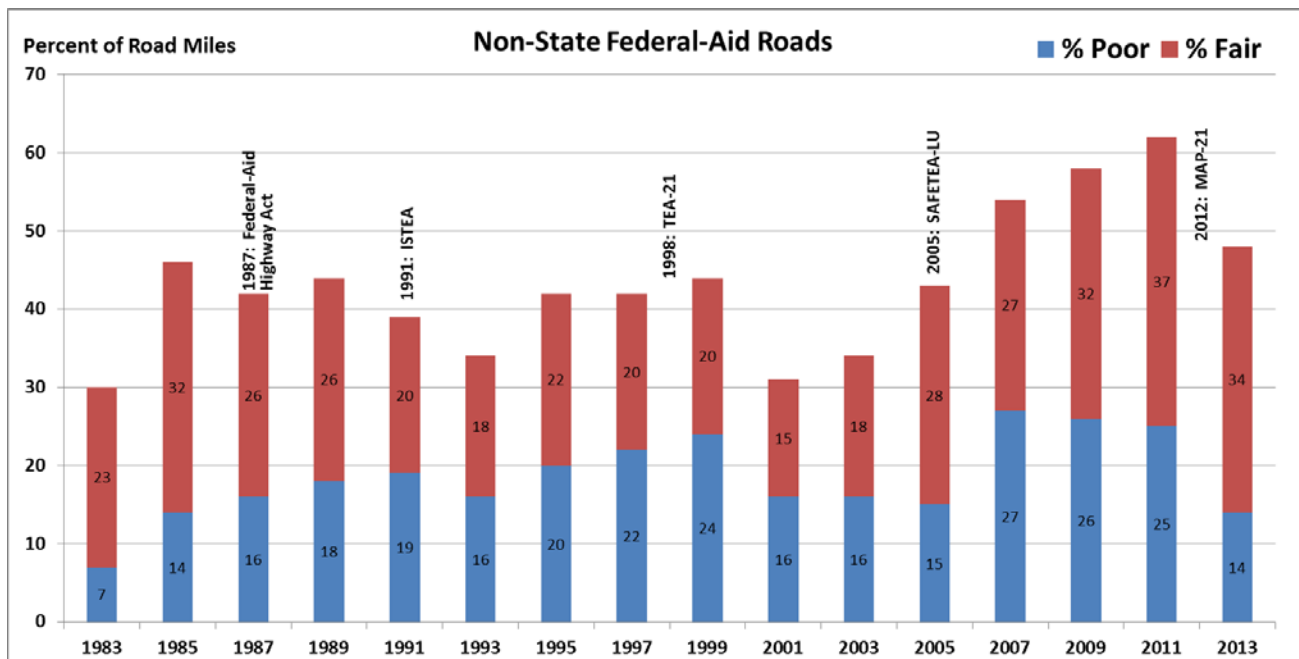
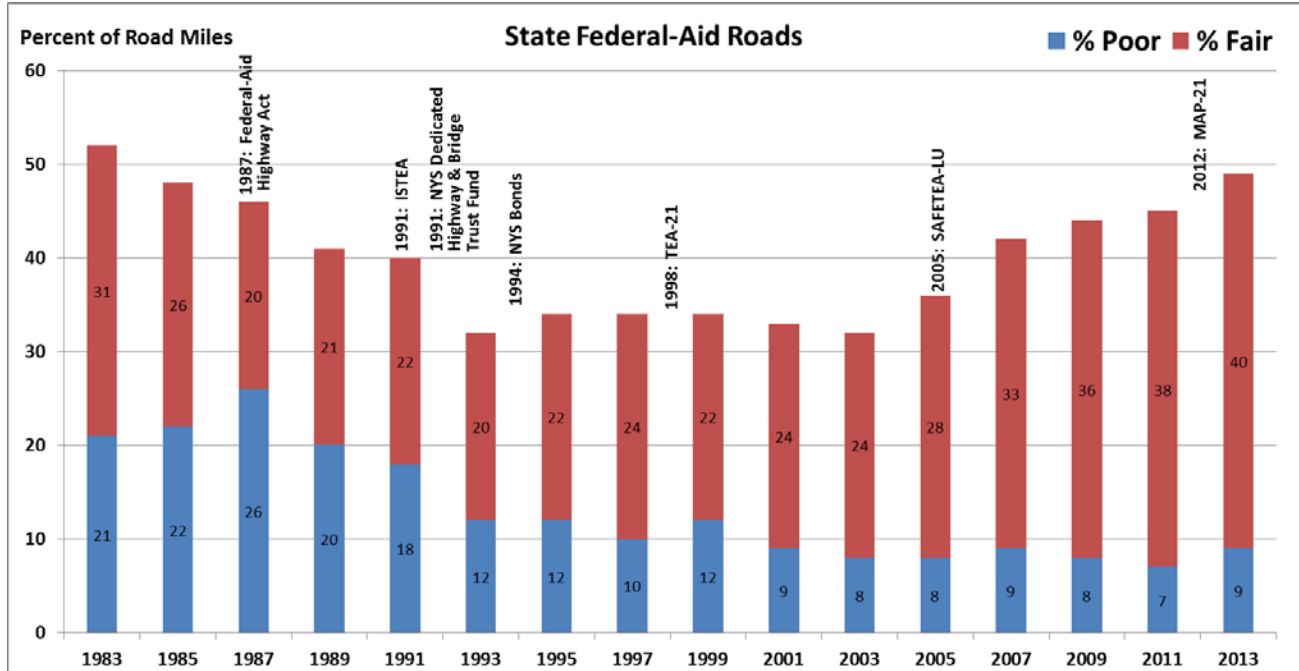


Figure 2: Pavement Condition of Capital District National Highway System (NHS) Roads: 2012-13

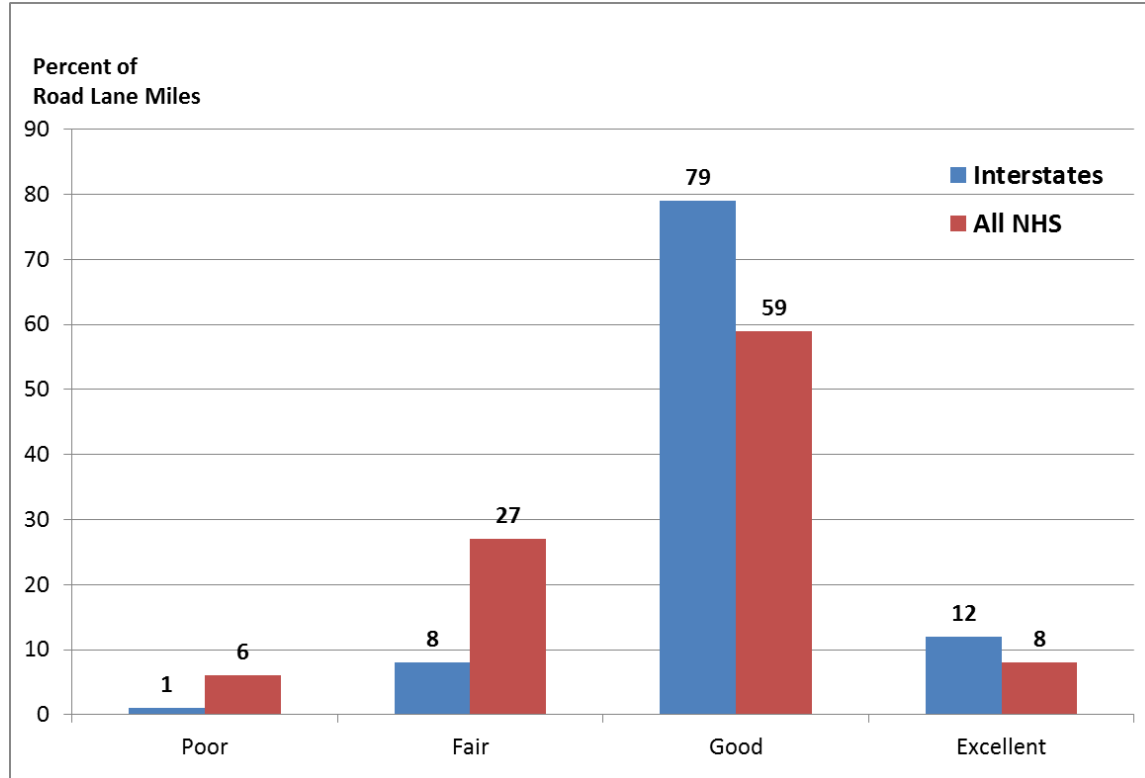


Figure 3: Pavement Condition of Capital District Urban & Rural Federal-aid Roads: 2012-13

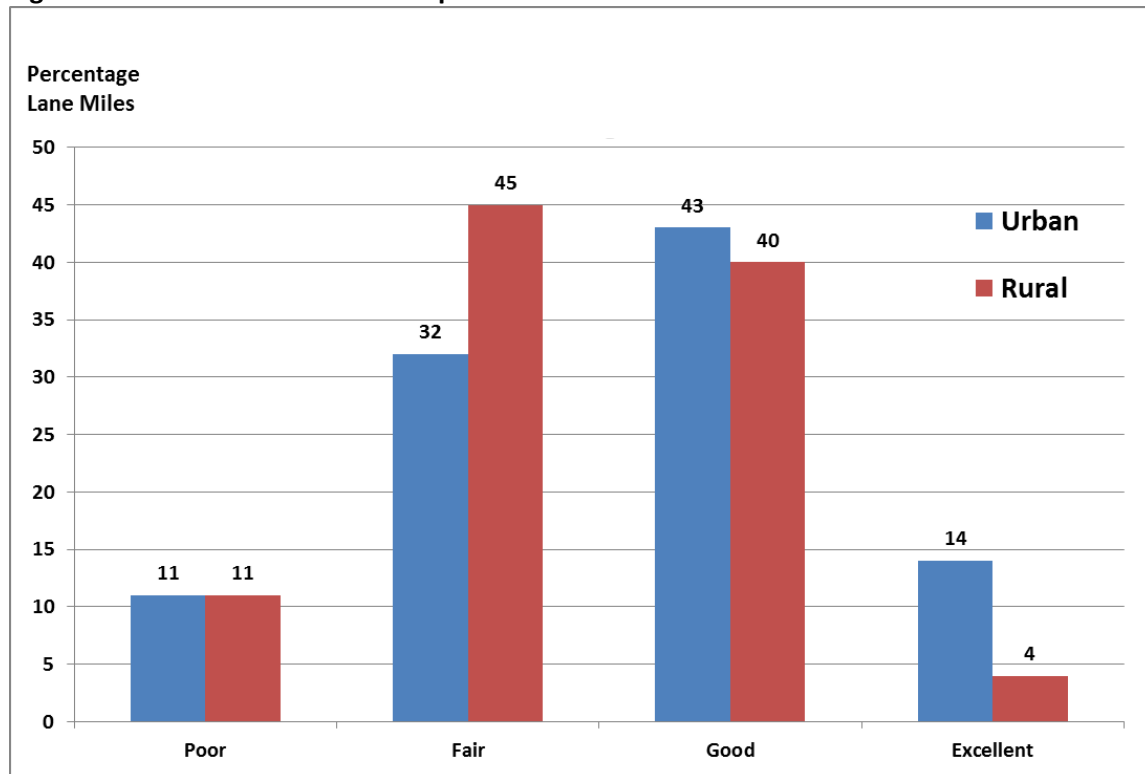


Figure 4: Change in the Number of Deficient Bridges in New York State: 1992-2012

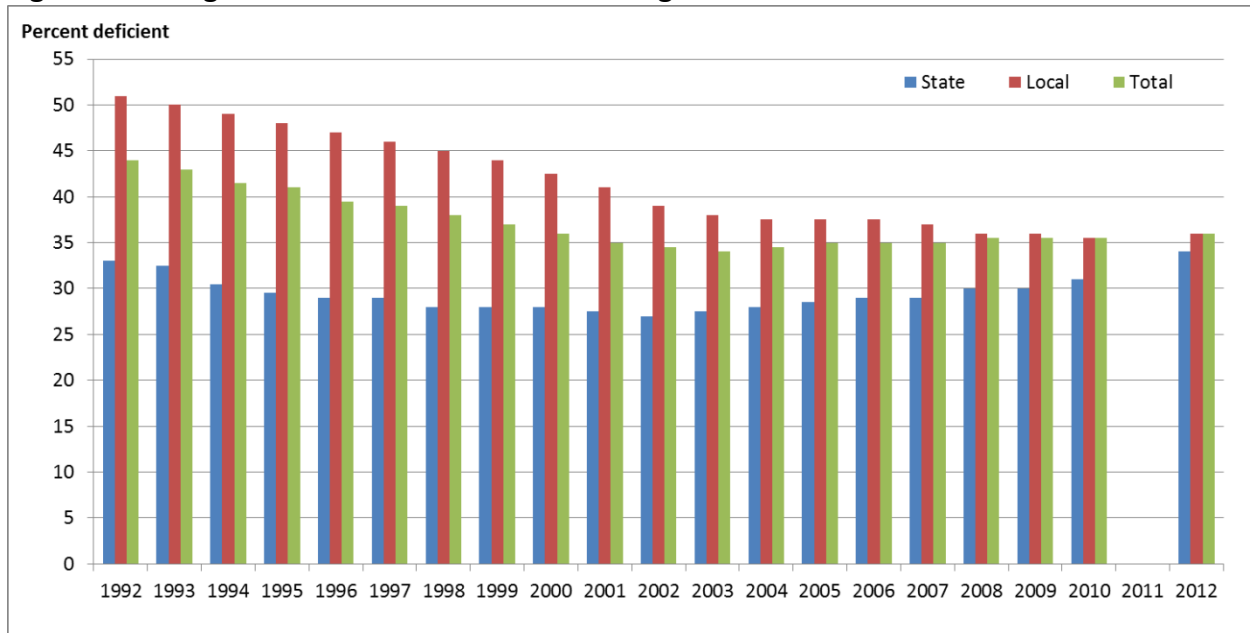
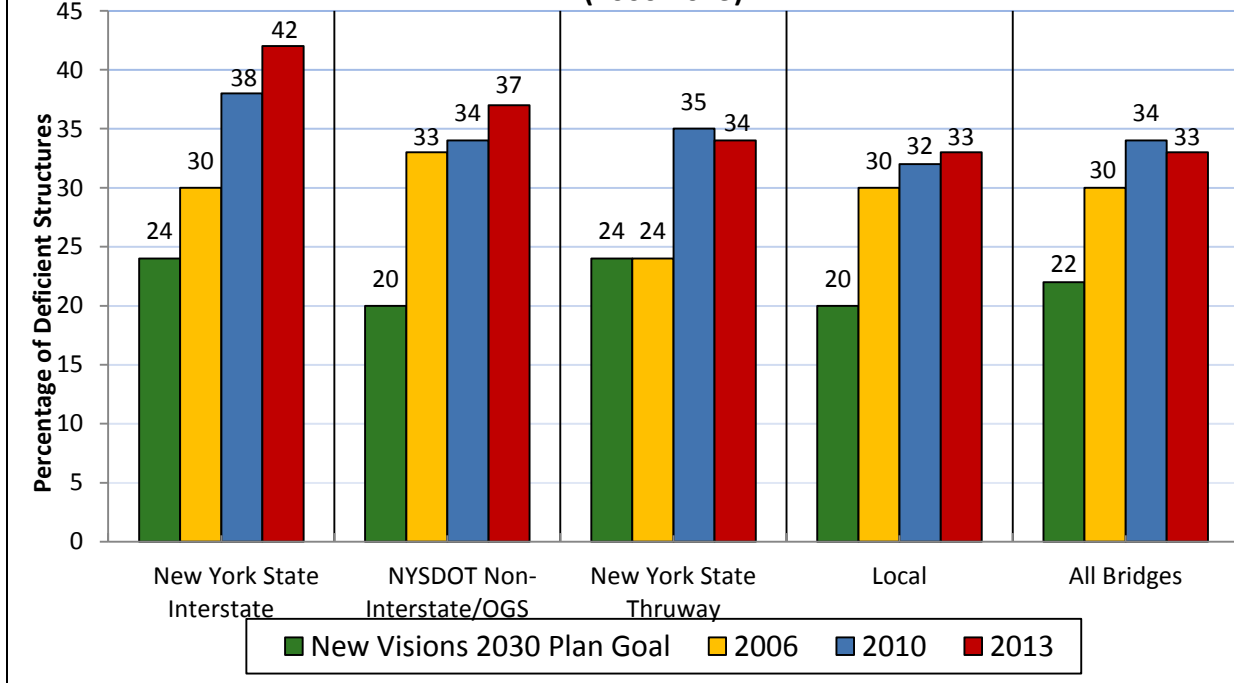
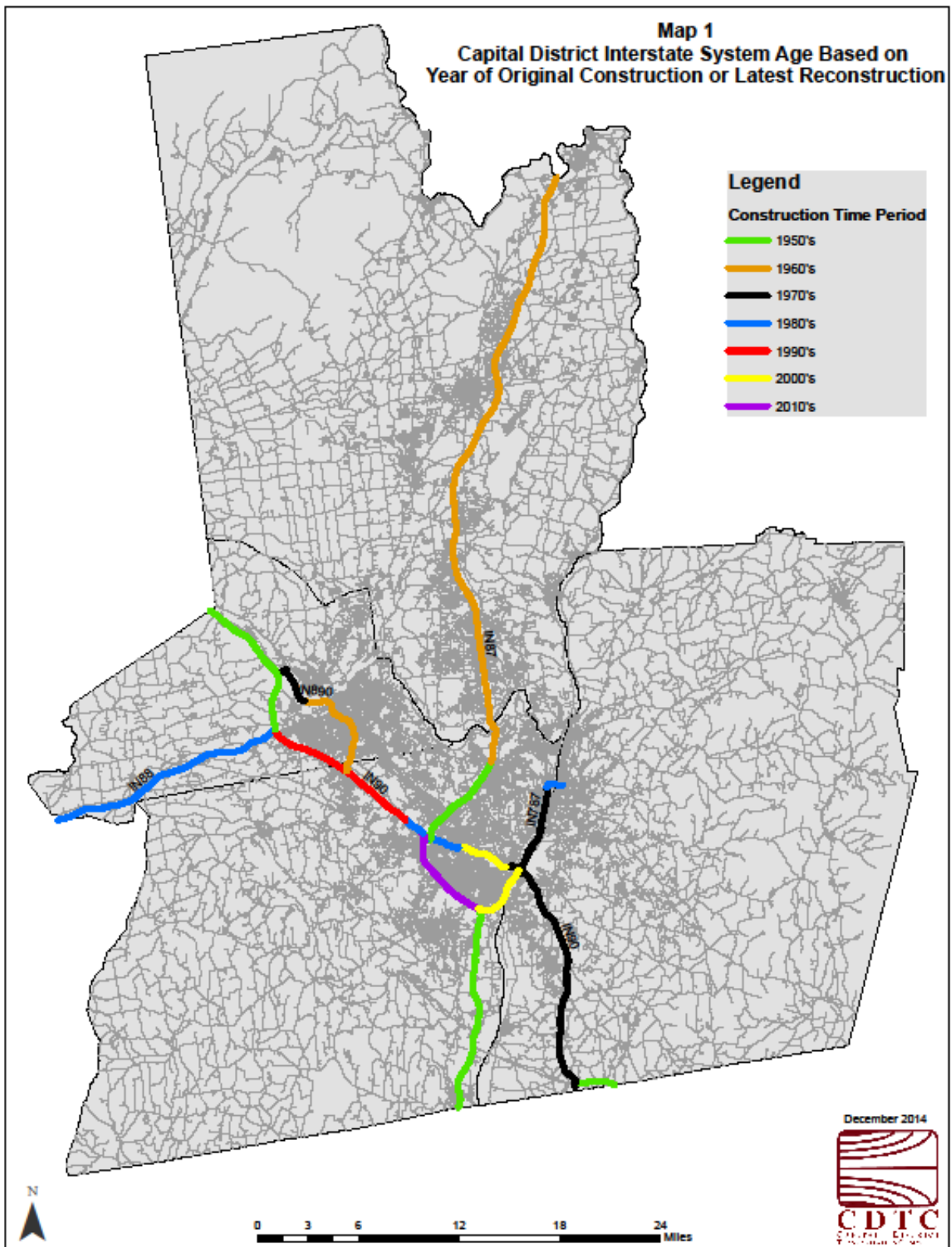
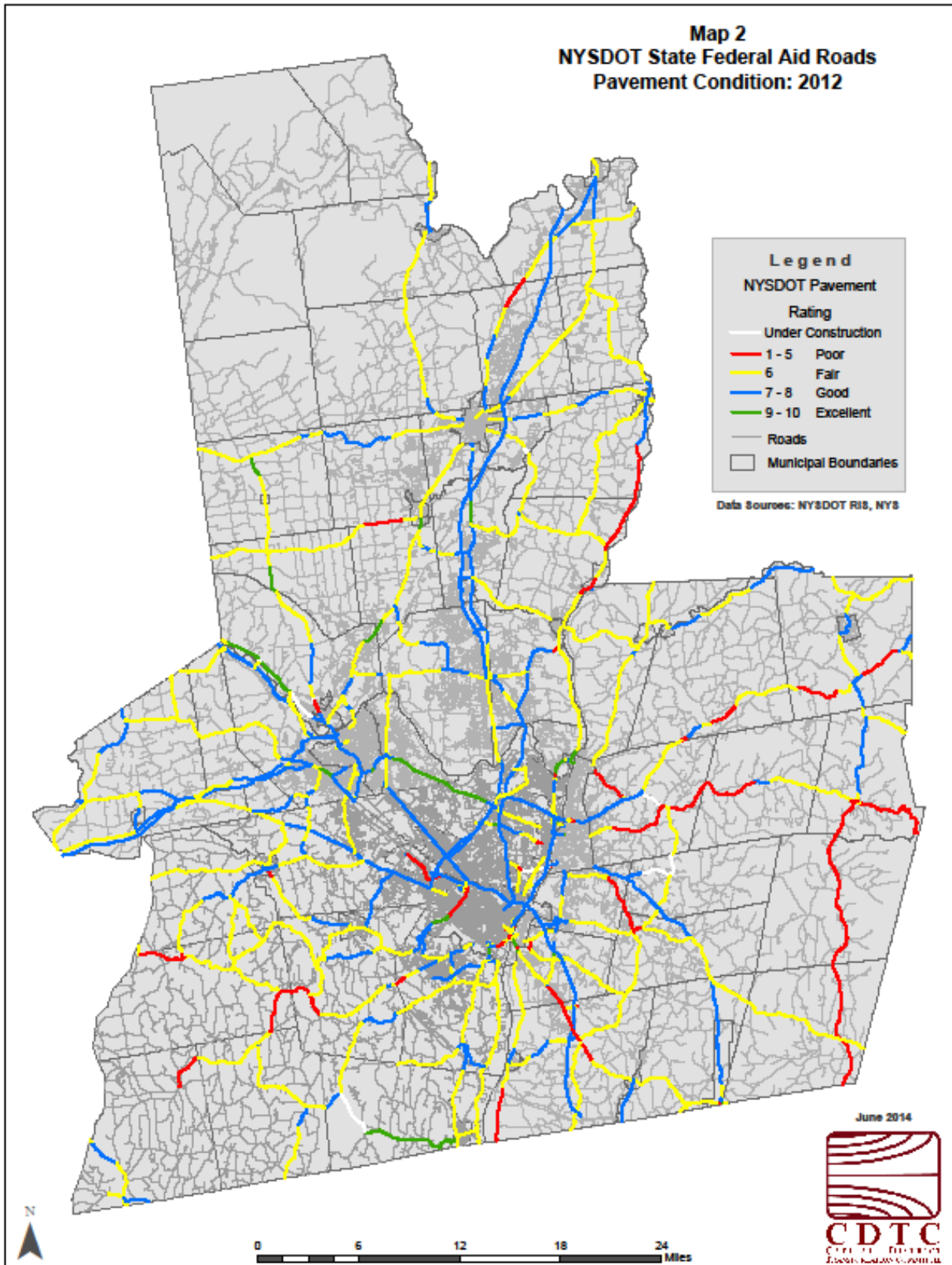
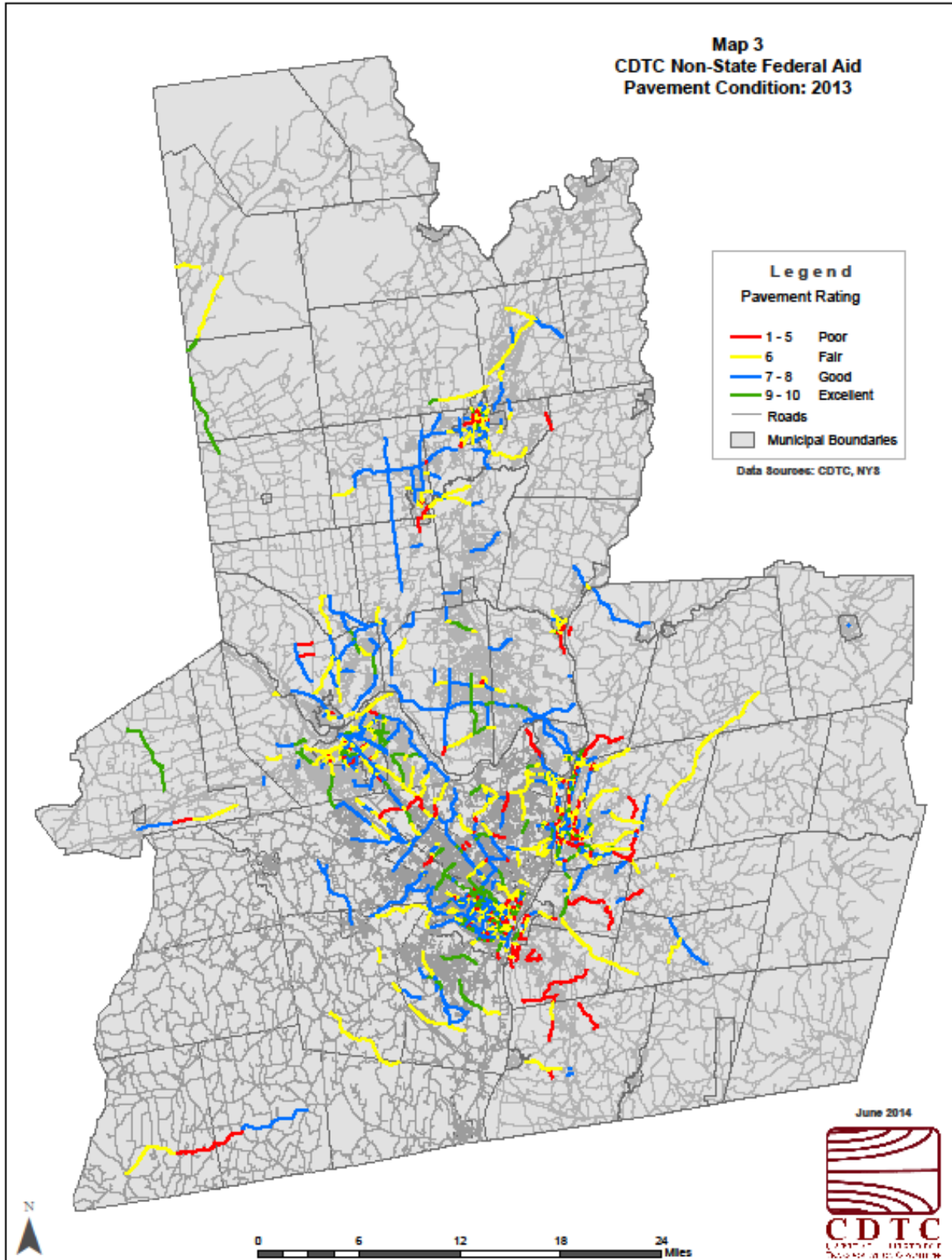


Figure 5: Bridge Condition for all Bridges in the Capital District by Ownership (2006-2013)

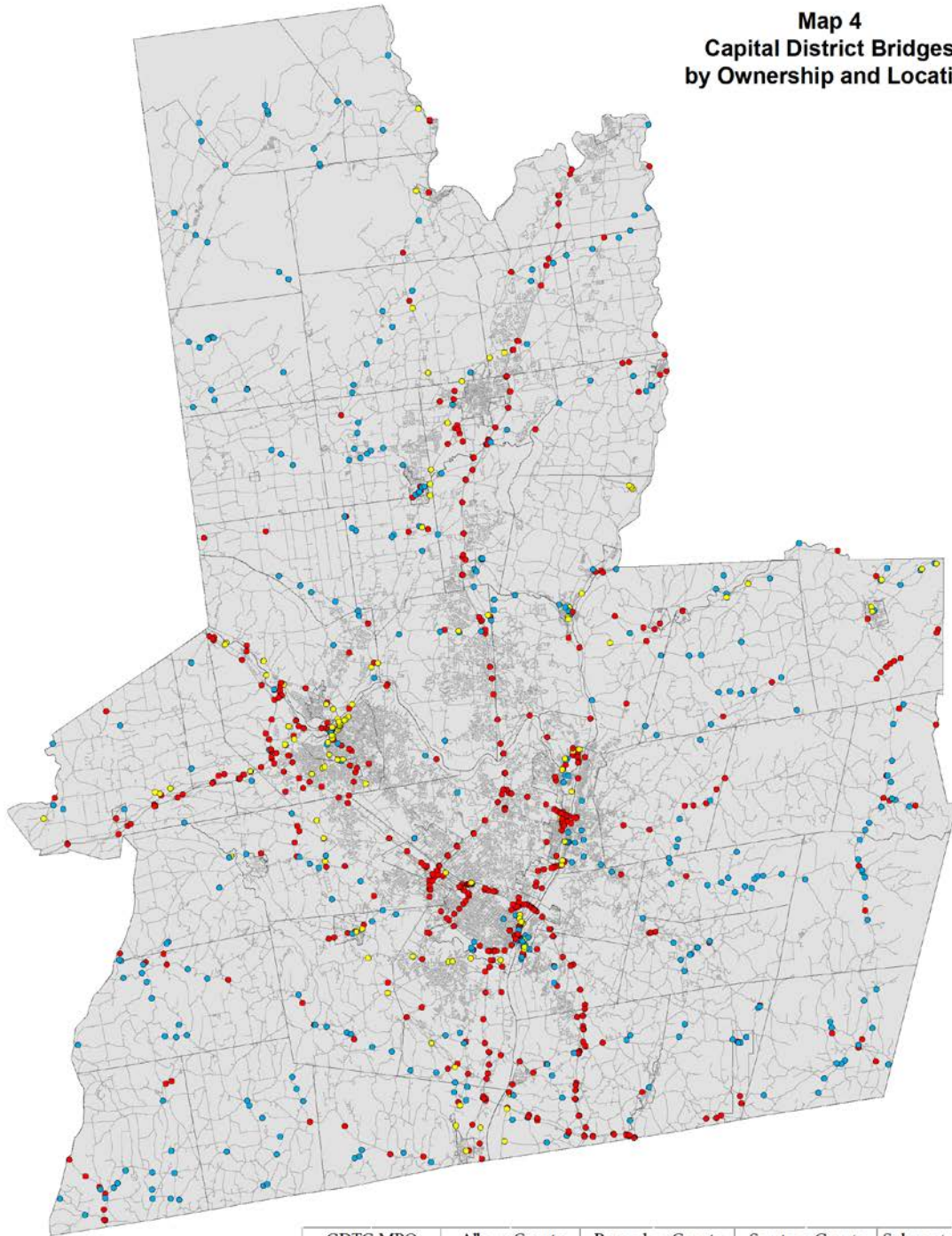








Map 4
Capital District Bridges
by Ownership and Location



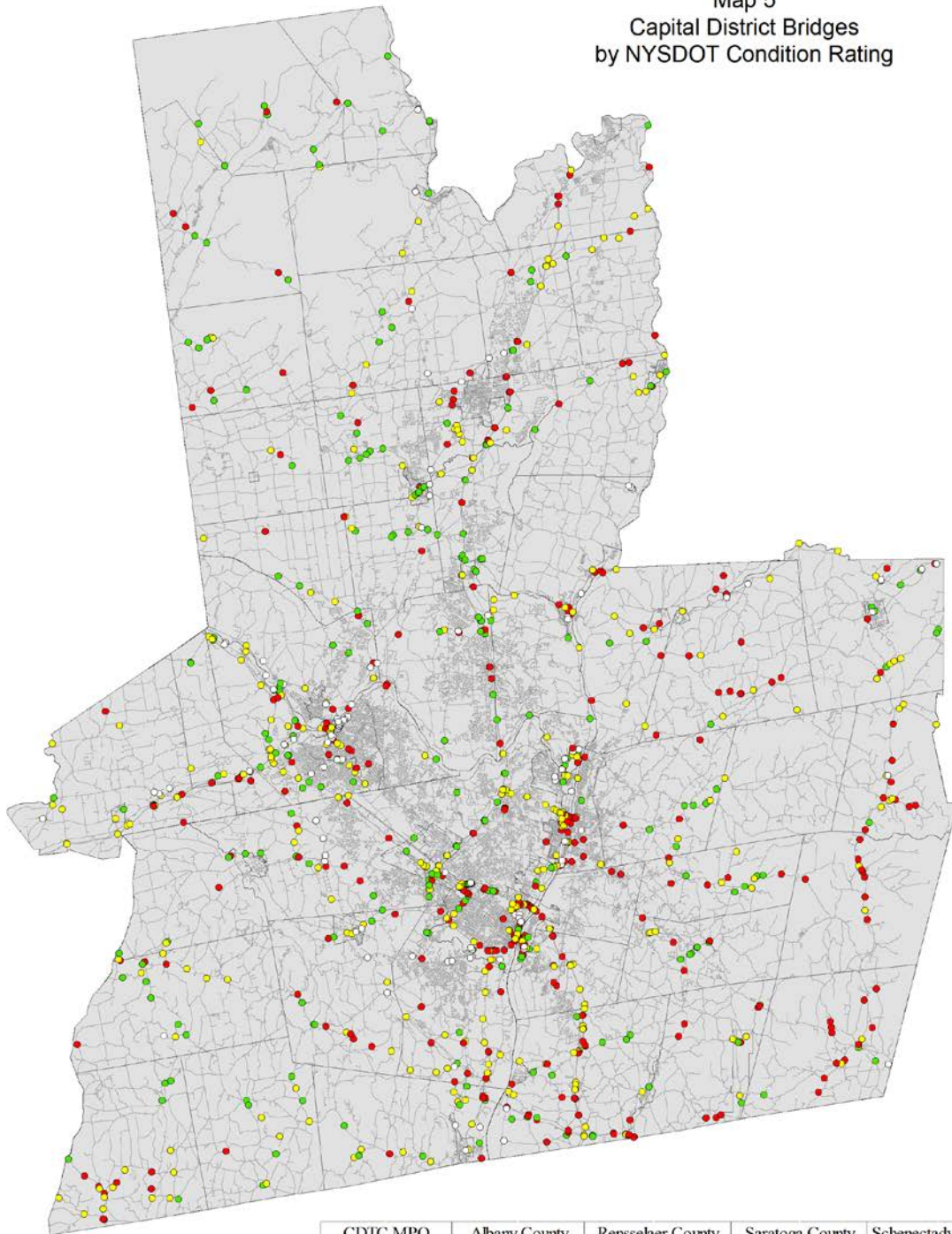
Ownership	CDTC MPO		Albany County		Rensselaer County		Saratoga County		Schenectady County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Local	366	34%	90	24%	135	46%	116	47%	25	15%
State	594	54%	253	67%	138	48%	107	43%	96	57%
Other	127	12%	36	9%	18	6%	25	10%	48	28%
Total	1087	--	379	--	291	--	248	--	169	--

Data Source: NYSDOT March 2013

Map Created: June 2014



Map 5
Capital District Bridges
by NYSDOT Condition Rating



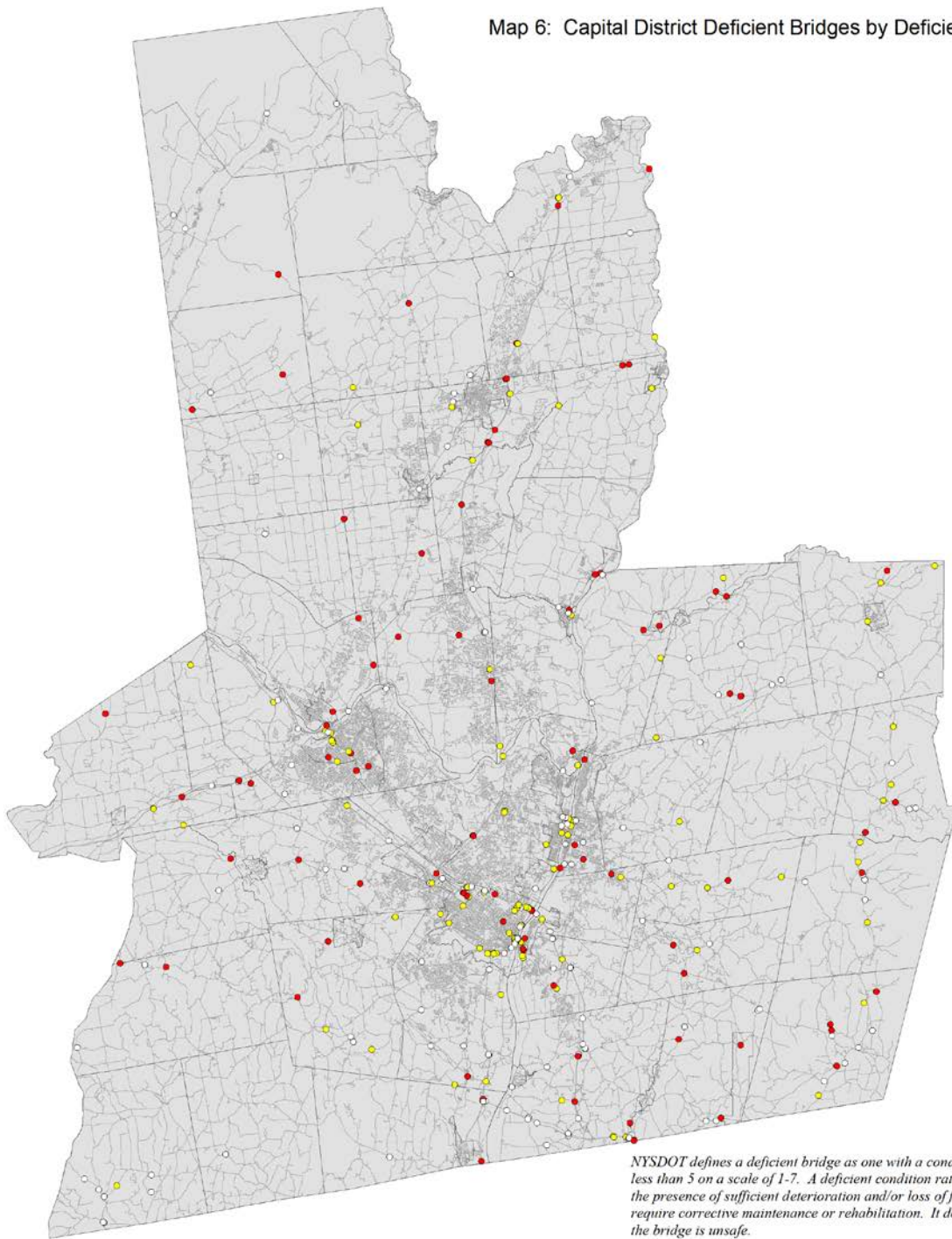
Condition Rating	CDTC MPO		Albany County		Rensselaer County		Saratoga County		Schenectady County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
○ Not Rated	126	11%	40	11%	19	7%	23	9%	44	26%
● Less than 5	355	33%	122	32%	132	45%	64	26%	37	22%
● 5 - 5.9	358	33%	144	38%	88	30%	70	28%	56	33%
● 6 or Greater	248	23%	73	19%	52	18%	91	37%	32	19%
Total	1087	--	379	--	291	--	248	--	169	--

Data Source: NYSDOT March 2013
Map Created: June 2014

0 5 10 20 30 40 Miles



Map 6: Capital District Deficient Bridges by Deficiency Type



NYS DOT defines a deficient bridge as one with a condition rating less than 5 on a scale of 1-7. A deficient condition rating indicates the presence of sufficient deterioration and/or loss of function to require corrective maintenance or rehabilitation. It does not mean the bridge is unsafe.

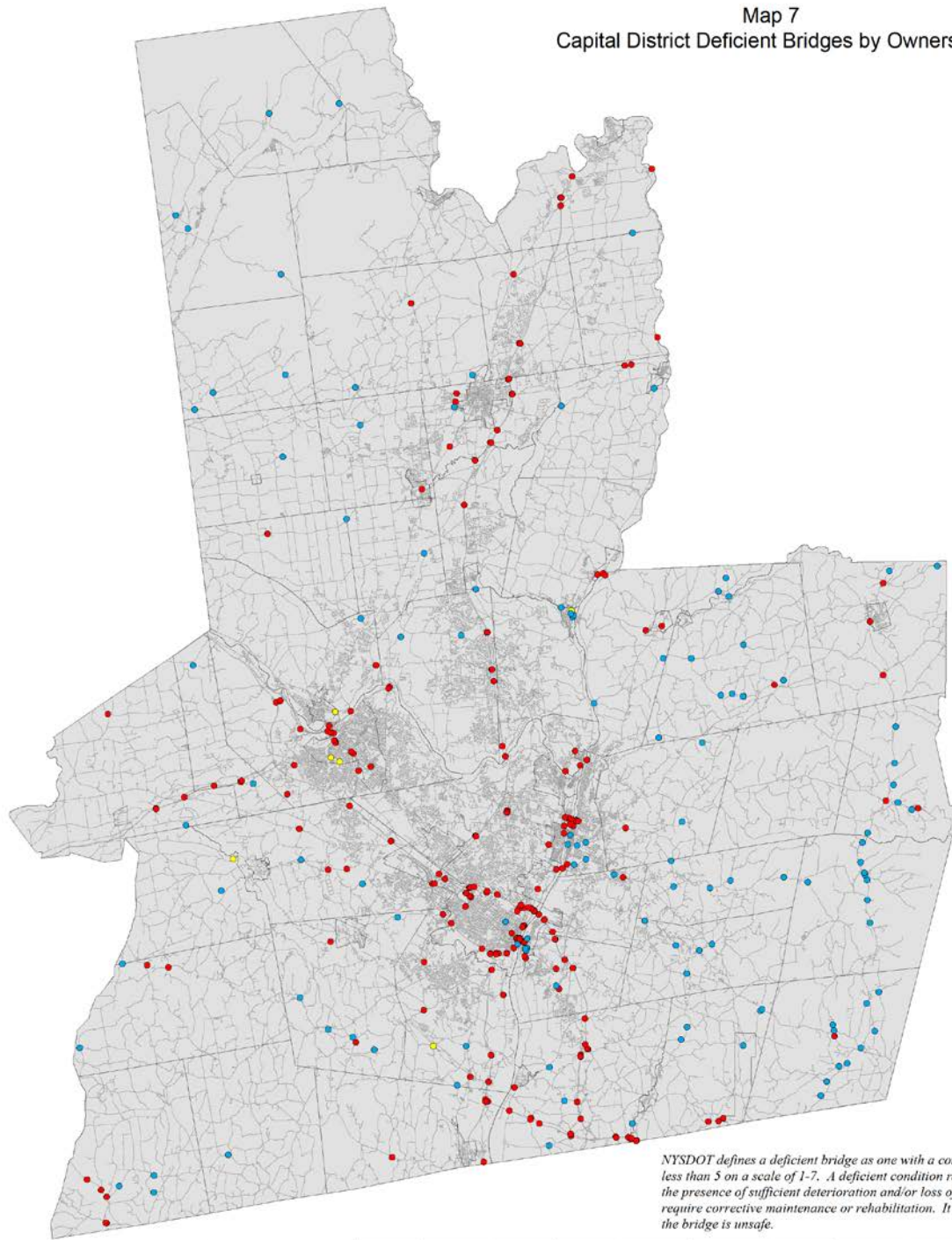


Deficiency	CDTC MPO		Albany County		Rensselaer County		Saratoga County		Schenectady County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Functionally Obsolete	123	35%	56	46%	36	27%	18	28%	13	35%
Structurally Deficient	92	26%	20	16%	36	27%	24	38%	12	32.5%
Undefined	140	39%	46	38%	60	46%	22	34%	12	32.5%
Total	355	--	122	--	132	--	64	--	37	--

Data Source: NYSDOT March 2013
Map Created: June 2014

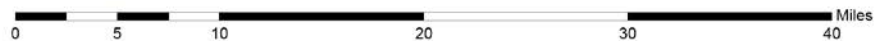


Map 7
Capital District Deficient Bridges by Ownership

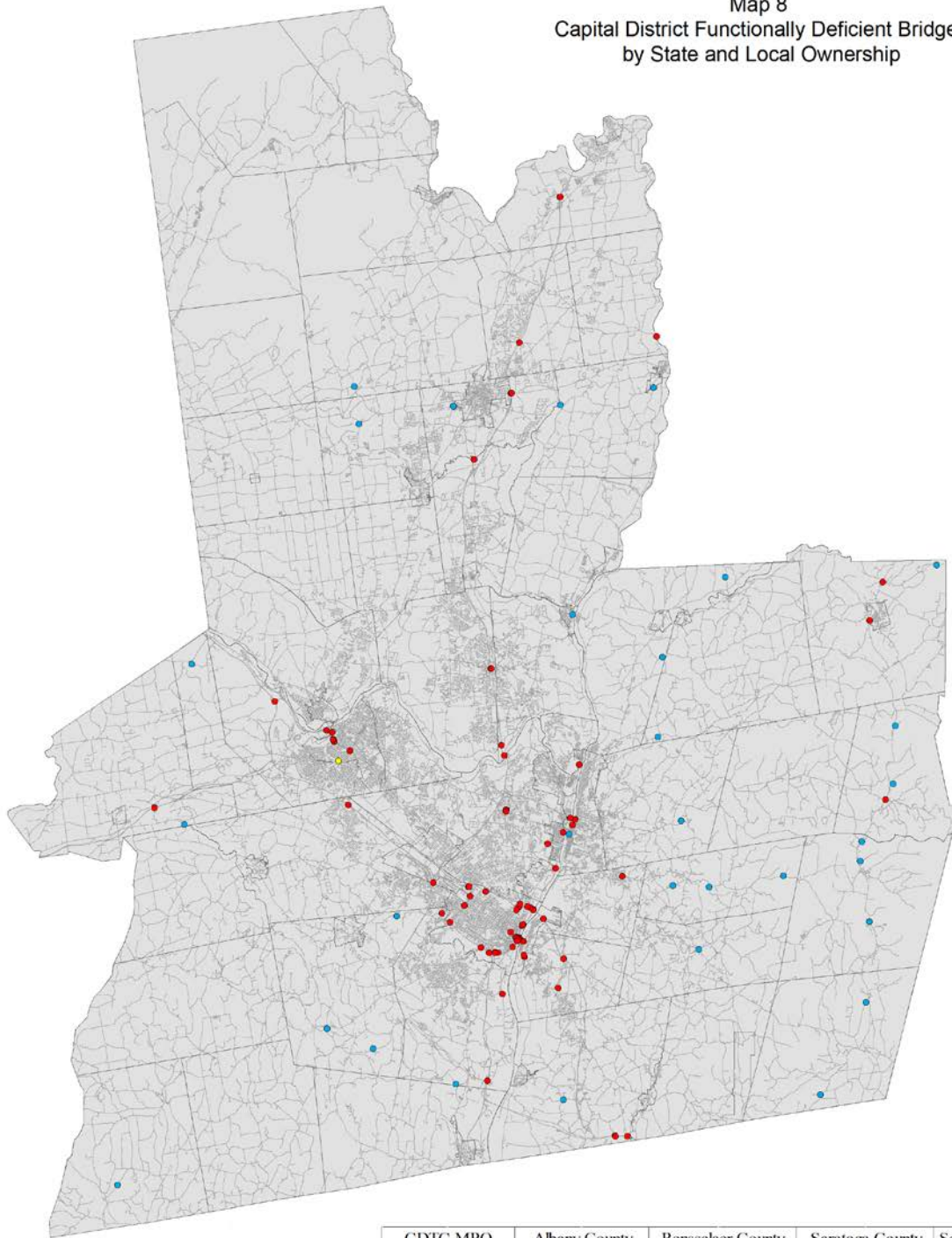


Ownership	CDTC MPO		Albany County		Rensselaer County		Saratoga County		Schenectady County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Local	119	33%	18	15%	72	55%	25	39%	4	11%
State	230	65%	102	84%	60	45%	38	59%	30	81%
Other	6	2%	2	1%	0	0%	1	2%	3	8%
Total	355	--	122	--	132	--	64	--	37	--

Data Source: NYSDOT March 2013
Map Created: June 2014



Map 8
Capital District Functionally Deficient Bridges
by State and Local Ownership

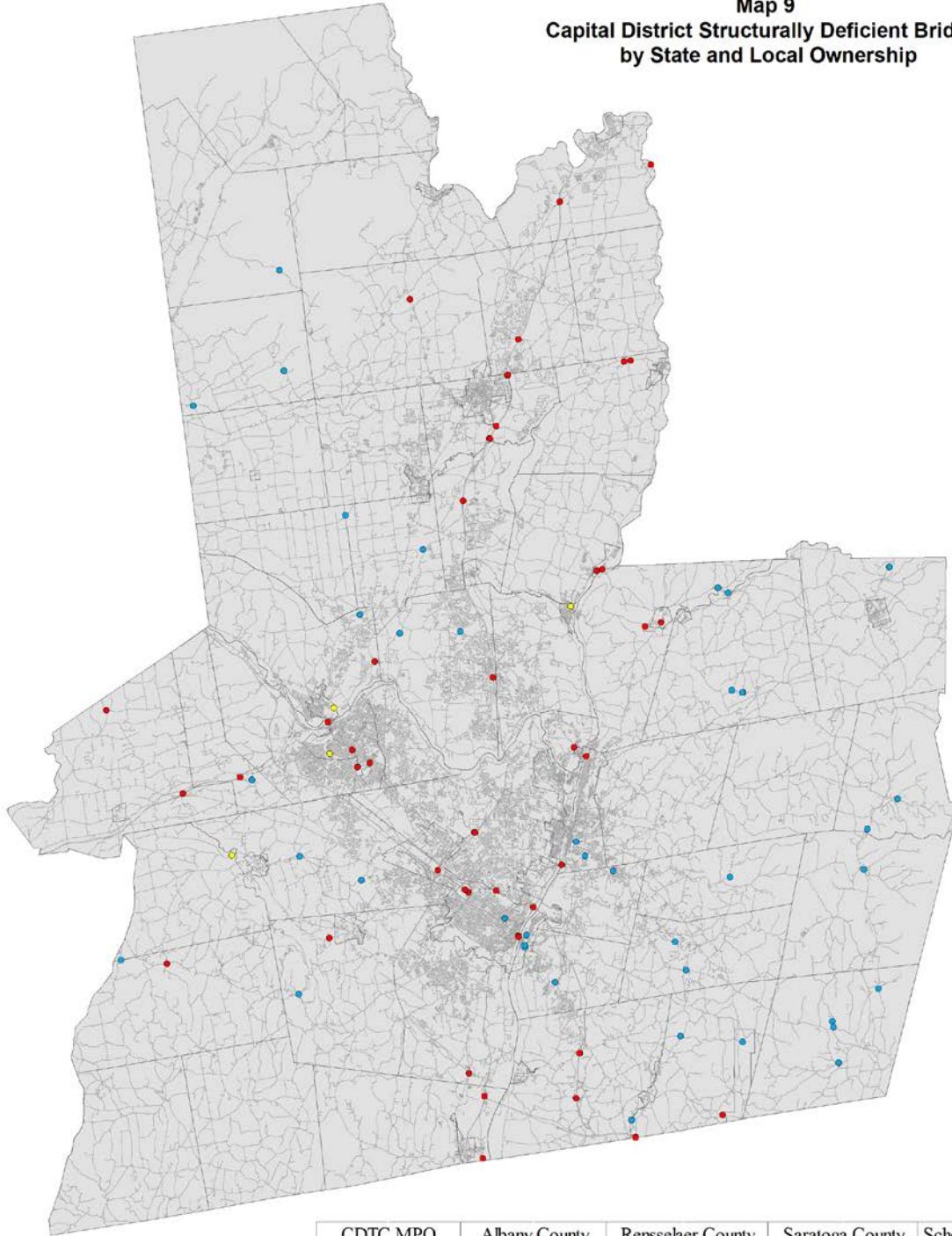


Ownership	CDTC MPO		Albany County		Rensselaer County		Saratoga County		Schenectady County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Local	31	25%	5	9%	18	50%	6	33%	2	15%
State	91	74%	51	91%	18	50%	12	67%	10	77%
Other	1	1%	0	0%	0	0%	0	0%	1	8%
Total	123	--	56	--	36	--	18	--	13	--

Data Source: NYSDOT March 2013
Map Created: June 2014



Map 9
Capital District Structurally Deficient Bridges
by State and Local Ownership

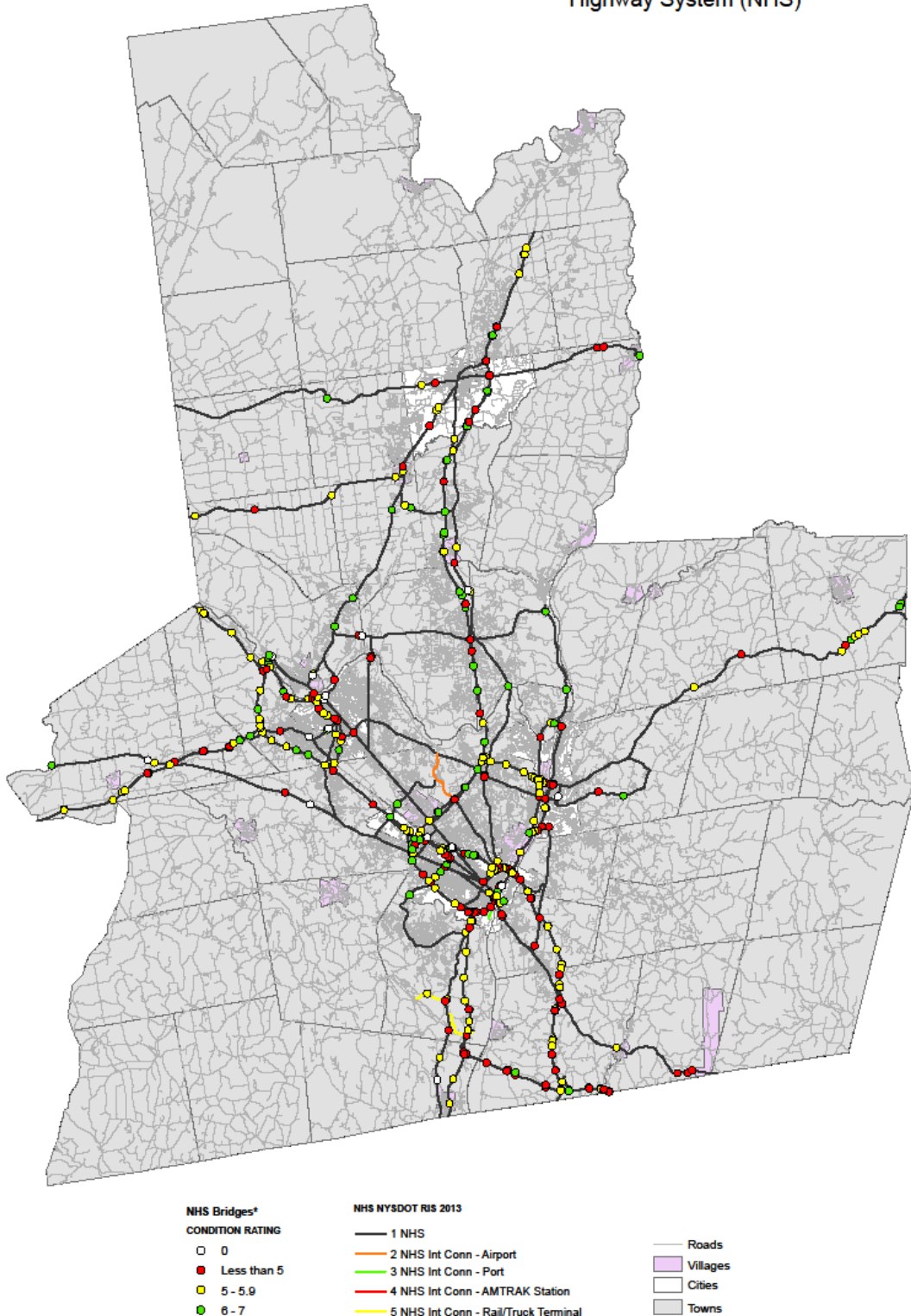


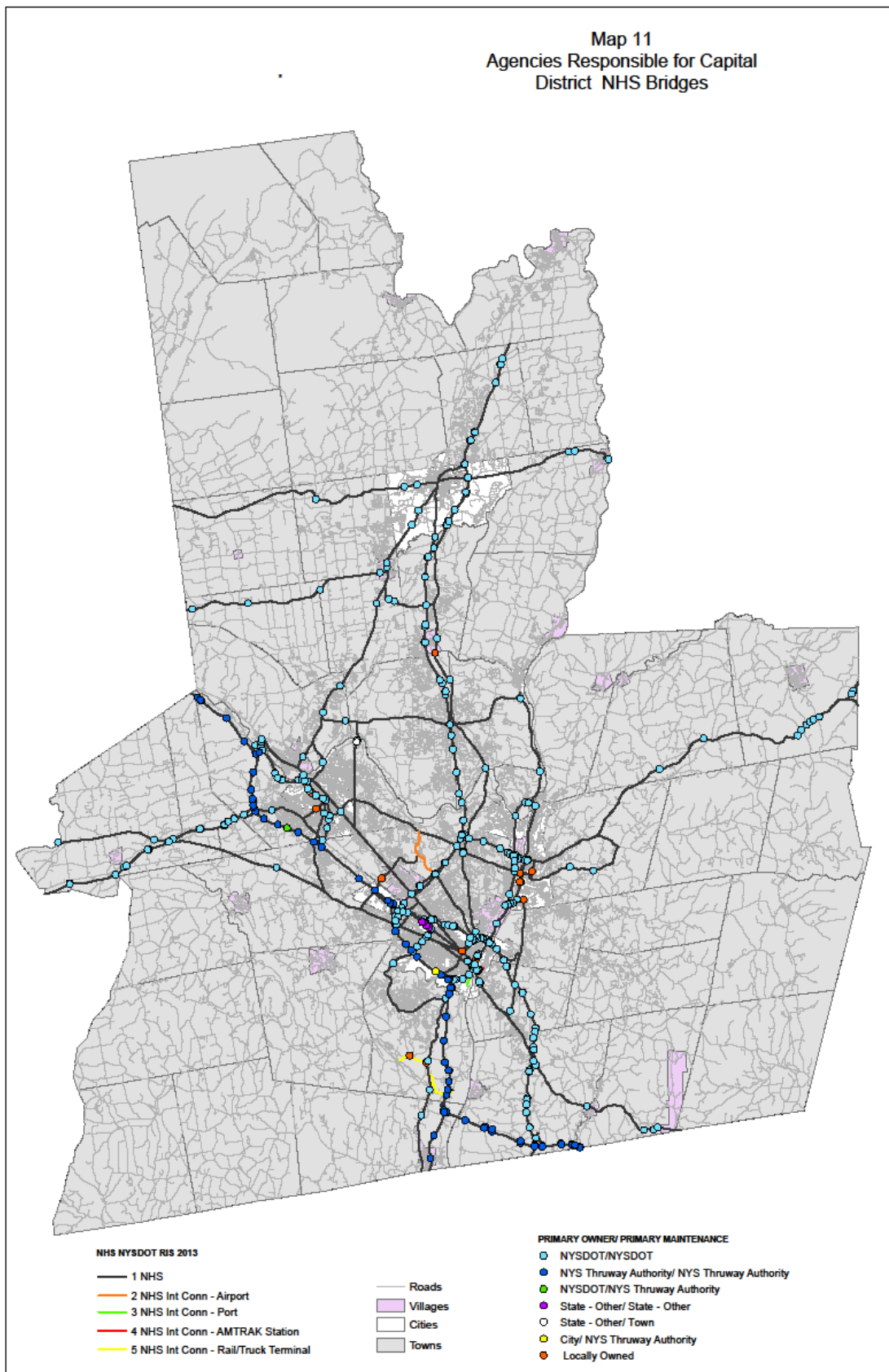
Ownership	CDTC MPO		Albany County		Rensselaer County		Saratoga County		Schenectady County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Local	40	44%	5	25%	26	72%	7	29%	2	17%
State	48	52%	14	70%	10	28%	16	67%	8	66%
Other	4	4%	1	5%	0	0%	1	4%	2	17%
Total	92	--	20	--	36	--	24	--	12	--

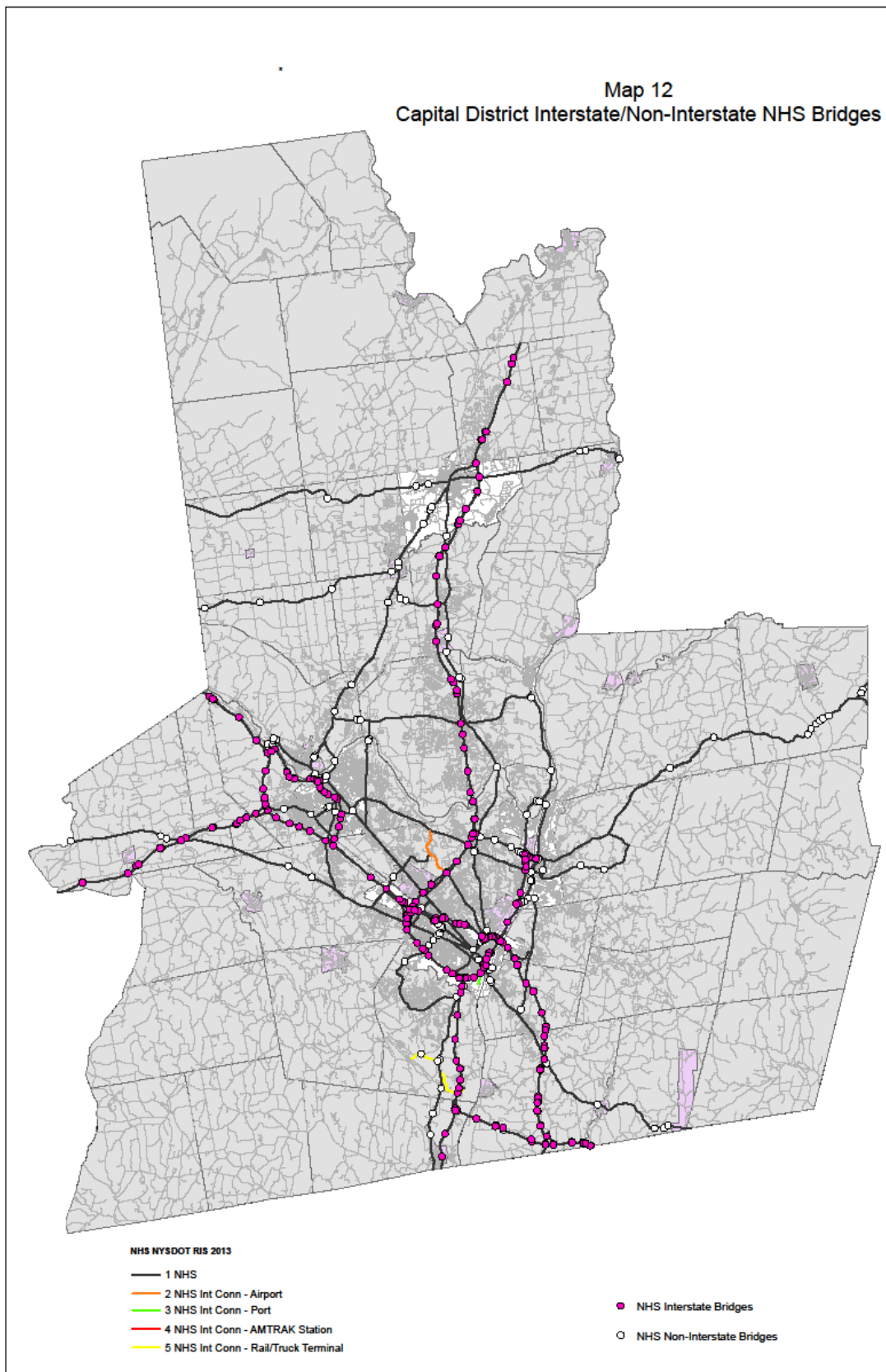
Data Source: NYSDOT March 2013
Map Created: June 2014



Map 10
Condition Rating of Bridges on the National Highway System (NHS)







CDTC New Visions Infrastructure Task Force White Paper

INFRASTRUCTURE TASK FORCE WHITE PAPER – APPENDIX A:

Understanding Conditions on the Local System And Using NYSDOT’s Highway Condition Projection Model (HCPM) to develop Pavement Condition Forecasts for the New Visions 2040 Plan.

UNDERSTANDING CONDITIONS ON THE LOCAL SYSTEM

Background on Interviews with Local Owners

CDTC has made two major efforts in past history to forecast system conditions and the financial needs of the region’s locally owned road network. CDTC has also collected and maintained an inventory of paving conditions data for large portions of the system since 1983. In the course of developing the current Infrastructure white paper as part of the New Visions update, it was decided that a more abbreviated effort would be undertaken utilizing representative interviews and data which would enable CDTC to reasonably generalize about the totality of the system. During the summer of 2014, CDTC staff conducted interviews with local owners of transportation infrastructure in order to better understand their conditions, investment levels, needs, and other issues. The interviews concentrated on roads and bridges, with some additional questions on other asset classes such as sidewalks and culverts.

The key topics CDTC covered in interviews included:

- The criteria a municipality uses to rate conditions and to determine which streets need repair;
- The kinds of repairs performed, what determines which treatment type is used, and the expected life of various repairs;
- The costs of repairs, including unit costs, soft costs, escalation effects (buying power over time), contracted work versus self-performed, etc.;
- The total yearly program including annual budget, total mileage repaired, percentages by repair type, program emphasis (e.g. ‘worst first’, preservation, or various combinations), and the adequacy and stability of funding;
- Local funding of repairs to roads on the Federal-Aid system;
- Number of local bridges, their conditions, and repair strategies;
- Degree of knowledge of extent and conditions of culverts, sidewalks, and paths as well as repairs and budgeting on these items; and
- Special issues encountered and innovative strategies pursued.

CDTC’s expectation was that interviews would reveal trends such as whether the system is stable over time, improving, or worsening. It was hoped that questions might uncover the effectiveness of preservation strategies which concentrated more exclusively on preservation versus a combination of preservation and addressing worse condition assets. Funding history and current and near-term funding needs were important points of discussion. Questions on program history and current projects were

asked with an eye toward the future – investigating how well our region’s system is doing and projecting the system’s needs. The intent is that ultimately the information on investment levels, repair types, and conditions would be transformed into inputs into CDTC’s Highway Condition Projection Model (HCPM) which would help guide answers to such questions as where we are headed under current investment levels or other aspirational levels.

Findings from Local Owner Interviews

Detailed findings were yielded from interviews of a total of ten local entities, including three counties, a city, three large towns, two smaller or more rural towns/villages, and a representative of the Association of Highway Superintendents. These owners represent 1792 total centerline miles of roadway. All owners had a well-documented approach to tracking road conditions and using objective criteria to prioritize repairs. The range of program cycles varied greatly with owners addressing between 20% and under 4% of system mileage yearly, resulting in program cycles from under 6 years to nearly 30 years. The average program cycle was found to be 15 years. A county and two towns which had program cycles of 5.8, 8.1, and 11 years would appear to be optimal and easily sustainable. Several counties and towns at or near the average 15 year cycle are sub-optimal but might be expected to keep pace or experience slightly lessened conditions over time, as well as struggle with any unexpected shocks to the system. The two systems approaching the 30 year program cycle would be likely to be unsustainable in the long run; both are newer systems not requiring an aggressive approach at present but they will likely need increased funding in the next decade.

The repair types used also varied greatly over a range which includes total reconstructions, recycled base, mill and fill, several types and depths of overlays, and range of several superficial preservation treatments such as crack filling and sealants. It was found that total reconstructions were exceedingly rare in the region. Typical overlay treatments are most common, followed by mill and fill. While a few smaller entities focus almost exclusively on preservation treatments, most local owners are utilizing an effective mix of strategies – colloquially referred to as “burning the candle at both ends” – to simultaneously address a range of conditions. This approach permits owners to: 1) preserve good condition assets with lower costs treatments, 2) provide repairs during the time window before the asset slips into a lower score range where a substantially more costly repair is required, and 3) generally keep pace with addressing at least a few of the very poor assets which require more ambitious and costly repairs. The greatest emphasis in most programs was placed on addressing roads in fair condition ranges which were eligible for overlays, or sometimes mill and fill treatments, in order to intercept these roads before deteriorating into a poor score category which would require a cold in place recycle or similar treatment. Several other types of information weighed into decision making, such as VMT or intensity of use, and sequencing and coordination of work.

What appeared less well understood by owners were projections of the long range needs of the roadway system and whether adequate funding would be available to make the paving program sustainable. A few instances of 5- or 10- year capital program budgeting exercises were performed which indicated a greater forthcoming financial need and implied the necessity of a “catch-up” budget in order to keep pace with the expected need for repairs. Most system owners reported systems which had moderately increasingly deferred maintenance backlog or which were relatively stable with only minor slippage in conditions.

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It appears that local owners have a greater range of unique issues on their systems given the widely ranging geography, system characteristics, and history of built infrastructure. Some reported issues included:

- drainage and water problems;
- history of accumulated overlays beginning to create problems associated with raised elevations;
- rural roads with low VMT (and thus low funding priority) and often with poor or uncertain bases;
- roads constructed to varying standards either due to older history or to empowerment of private developers; and
- issues with low tax revenues and instability of tax base (including overreliance on sales taxes which are adversely impacted by economic downcycles).

One major theme which arose is the necessity, due to limited budgets, of doing overlays or preservation treatments to roads which might under better funding circumstances warrant more substantial reconstructions. Because addressing poor road base conditions is often unaffordable, many overlay treatments fail prematurely and are economically inefficient.

The next step which CDTC is now beginning to undertake is entering all the collected local owner data into the HCPM model in order to forecast conditions, project needed investment levels, and test various scenarios related to financing and investment strategy decisions.

USING NYSDOT'S HIGHWAY CONDITION PROJECTION MODEL (HCPM) TO DEVELOP PAVEMENT CONDITION FORECASTS FOR THE NEW VISIONS 2040 PLAN.

Introduction

As part of CDTC's long-range transportation plan update, the task force has been investigating the long-term funding needs for the region's street and highway system. In this regard, we have been improving our understanding of local highway maintenance and investment policies and practices by meeting with DPW experts in both the region's small and large municipalities and counties. This information will be used together with highway condition data, calculated pavement deterioration rates, federal investment levels, and other data to help us forecast future condition and investment needs for different classes of roads. This will be the third time since the mid-1990's that CDTC has undertaken such a projection. The Highway Condition Projection Model (HCPM) is the tool the staff will be using to test various investment and repair strategies.

Model Background and Purpose

The Highway Condition Projection Model (HCPM) is a computer-based tool developed by NYSDOT in the early 1980's to help forecast short and long-term highway condition. CDTC modified it slightly to reflect local conditions, and used it to help forecast highway infrastructure needs for the first generation New Visions Plan in 1997 and subsequent updates. NYSDOT currently uses a newer model called the Pavement Needs Assessment Model (PNAM) which is much more data intensive.

The HCPM will be used to assist CDTC in:

1. Long-range (20-30 year) prediction of highway condition and total system repair costs; and
2. Long range planning by evaluating conditions impacts of future funding levels as well as effects of alternative repair strategies.

Other secondary uses have arisen for the HCPM, including the model's capability to provide lists of specific road segments requiring repairs over an intermediate time frame (e.g., 5 years). These could become the basis to assist in generating initial project candidates. The model nonetheless remains most well-suited for system-level and long-range analysis.

Data Requirements and Assumptions

The HCPM requires information and assumptions on highway conditions scores, deterioration rates, and repair strategies.

The highway conditions scores involve data fields related to: type of road (e.g., Non-State Federal-Aid, etc.), year of data, condition score (e.g., number within 1-to-10 rating system), and grouping by pavement type (e.g., rigid, flexible, overlay). Data can be entered as lane miles for each condition score or by individual segment. Issues of note related to conditions scores include whether all road scores are available or whether a procedure must be used to generalize from a partial representative sample. In addition, it must be understood whether the equivalent of NYSDOT visual conditions scores were used or whether an analysis must be done to normalize the data.

Deterioration rates are defined as the point value a road will lose every year if no contract maintenance takes place. The original HCPM deterioration rate was constant, which is still considered accurate over the long range. Subsequent research indicates that deterioration is variable, depending on the road type and its condition score. The HCPM can utilize CDTC's history of data, which dates to 1983, in order to simulate realistic variable deterioration.

The HCPM requires several dimensions of repair information. A repair matrix is utilized which establishes for each pavement type a list of repair actions (e.g., resurface, reconstruct) required for each condition score. For example, the matrix may specify: 10-no repair, 9-no repair, ... , 6-resurfacing, ...

Additional repair data include assumptions of costs per two-lane mile, improvement in condition score after a repair, and the maximum number of times a given repair type can be performed without a greater repair being required. For instance, regarding this last point, the model can be programmed to assume that roads cannot be resurfaced indefinitely and therefore at some point in the future a more substantial reconstruction would eventually be triggered.

Operation of the Model

Running the model requires the user to input and store highway conditions scores for an area. The user must also input assumptions into the matrix of repair policy, indicating what scores are addressed with what repair types. The program is run for a given time horizon (normally, 30 years). For each year, the HCPM checks the score for each road against the repair matrix. If the road does not qualify for repair within the matrix for a given year, it is deteriorated by the deterioration rate. If the road is specified by

the matrix for repair in that year, the road's condition is upgraded and the cost of repair is calculated and stored.

The model can be run to repair all roads and report on total cost. Alternatively, the model can be run to repair roads up to available funding and defer remaining repairs (deteriorating the roads which did not receive repairs). In this latter situation of running the model with funding restrictions, repairs are deferred by a policy. The policy can involve repairing in the order of lowest-to-highest score until funds are "used up," in the order of highest-to-lowest score, or in randomized order. The model can also be run under a scenario which forces certain repair types or forces repairs to specified segments first if there is not enough funding to repair all roads in a given year.

Scenario Planning

Features of the HCPM allow it to perform several types of 'what-if' analyses when utilizing modeling to plan for the future. MAP-21 encourages MPOs to use scenario planning in the development of metropolitan transportation plans. The law notes that "A metropolitan planning organization may, while fitting the needs and complexity of its communities, voluntarily elect to develop multiple scenarios for consideration as part of the development of the metropolitan transportation plan." It seems to encourage the option of comparing the impact of different funding levels, which would be especially relevant to forecasting pavement and bridge condition. The potential value of the HCPM model in New Visions scenario planning might include:

1. Determining future funding needs by running the model with no funding constraint.
2. Comparing impacts of possible future funding levels by running the model with several alternative funding constraint projections and assessing resulting systems conditions. Funding can vary by year and road type.
3. Determining funding level needed for the system to achieve a specified condition by running the model trial and error until the condition is reached, at which point the funding associated with that condition state can then be reported.
4. Assessing impacts over time of alternative repair policies (including prioritizing certain types of repairs) by running the model with several different repair matrices and reporting results. For example, the model can be run sequencing repairs in the order of "worst first"...or by a strategy which first preserves roads above a certain rating...or by other repair strategies.