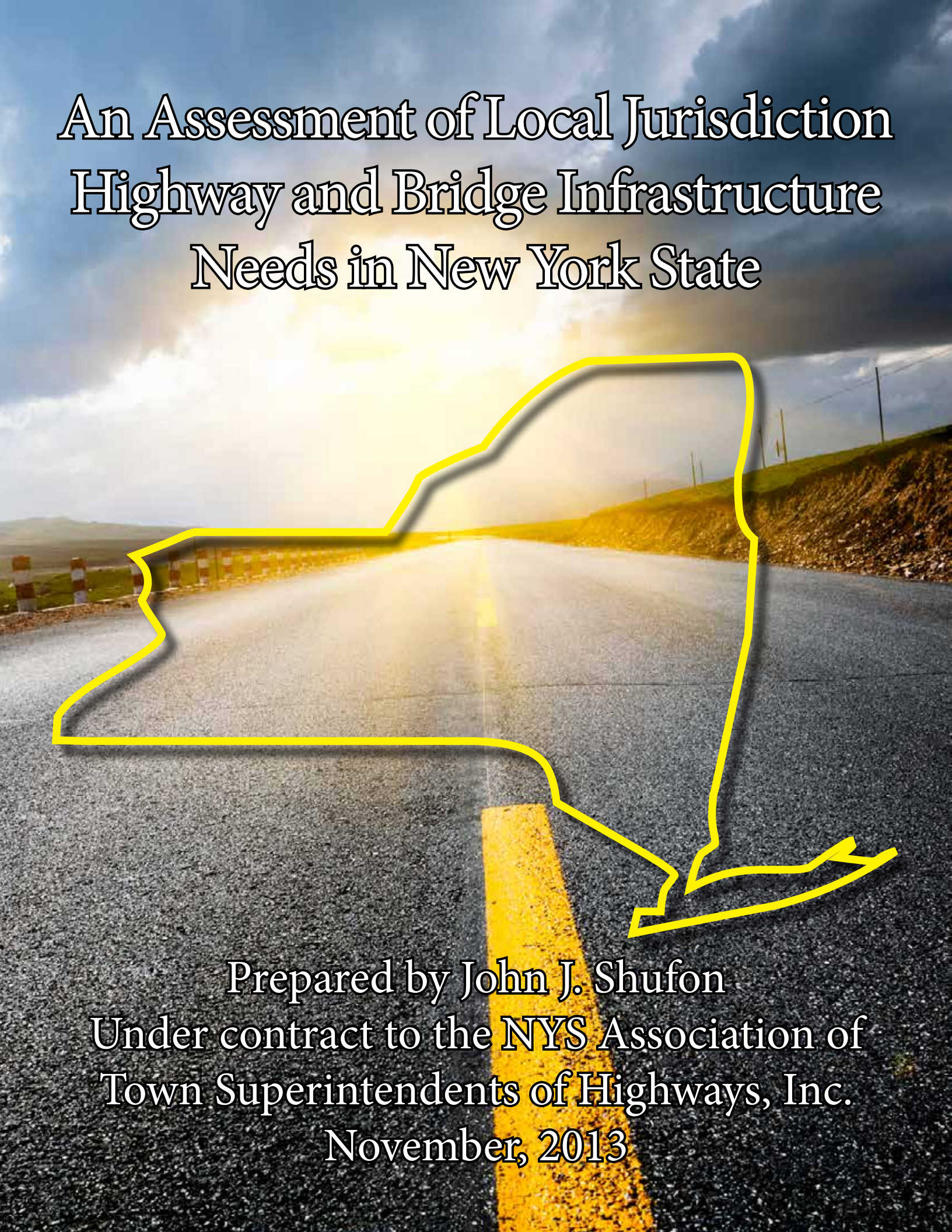
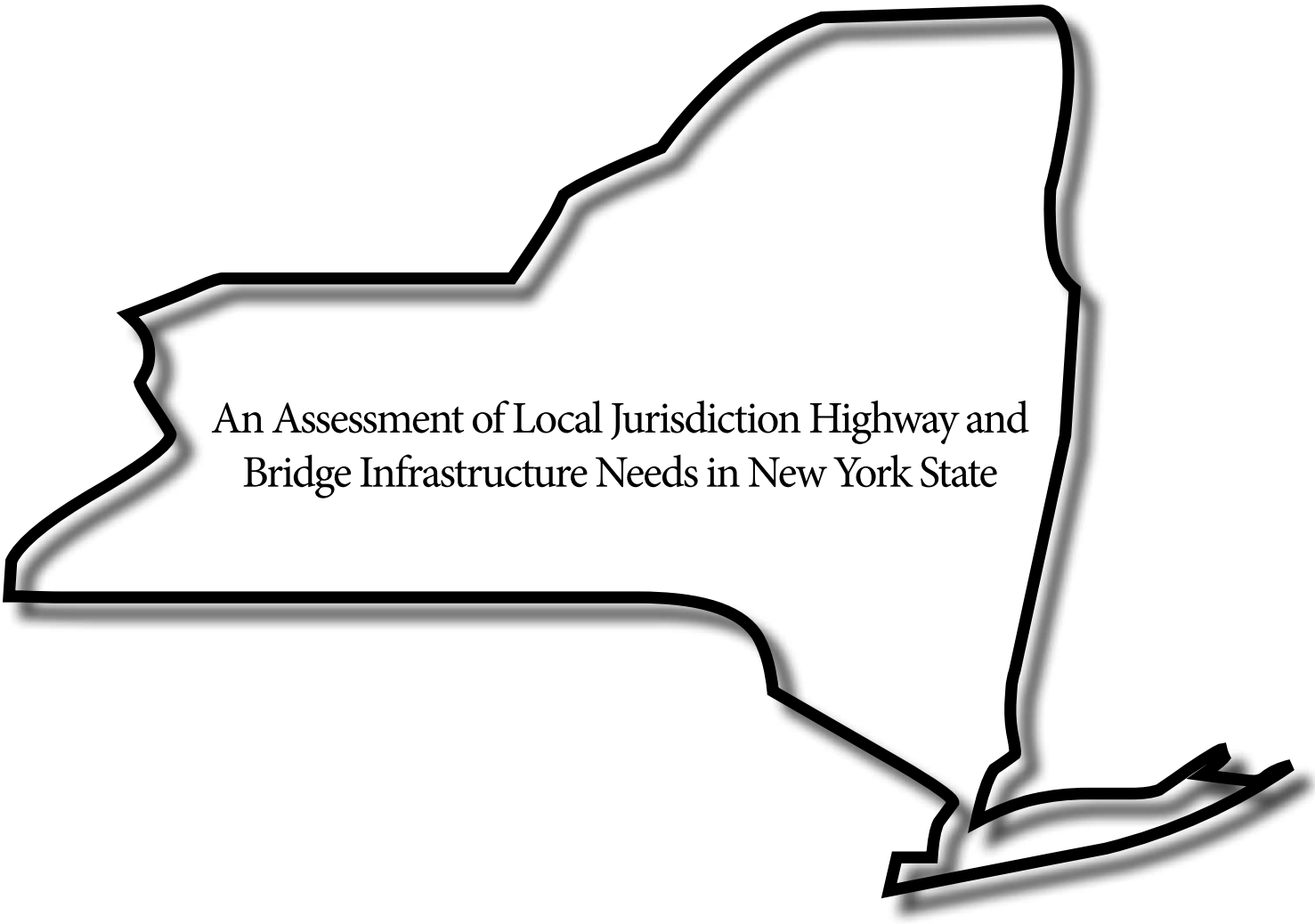
An Assessment of Local Jurisdiction Highway and Bridge Infrastructure Needs in New York State



Prepared by John J. Shufon
Under contract to the NYS Association of Town Superintendents of Highways, Inc.
November, 2013



ABOUT THE AUTHOR

This report was authored by John J. Shufon. John had almost 35 years of experience with the New York State Department of Transportation (NYSDOT) in the collection, analysis, and forecasting of infrastructure data. He is published in pavement management, congestion management and asset management, and for 15 years served as the Department's chief technical analyst in conducting a variety of needs studies for use in budget requests and capital program development. John retired from the Department in 2006 as the Director of the Data Analysis and Forecasting Bureau.

In 2007, John prepared the report entitled "A 20 Year Needs Assessment of Local Jurisdiction Highways and Bridges in New York State." In 2008, John was re-hired by NYSDOT as a consultant to assist in the development of the State's 2009-2014 multimodal transportation program.

EXECUTIVE SUMMARY

Purpose

- The purpose of the report is to provide a needs estimate for New York's local jurisdiction pavement and bridge infrastructure for the period 2015-2030. **The report updates the previous 20 year needsstudy commissioned by the NYS Association of Town Superintendents of Highways** and released in December, 2007, by focusing on the last 15 years of the analysis period.

- **The study is consistent with, and carries forward the goals and policies described in the"20 Year Transportation Needs Assessment (2010-2030)" prepared by the New York State Department of Transportation (NYSDOT)** and presented at the October 30, 2007 Capitol Budget Hearing held in Albany.

Importance of the Local Highway System

- Local jurisdiction highways are vital to the mobility and the economic well-being of New York State as local jurisdiction roads accommodate hundreds of thousands of daily work trips and are essential to the trucking, farming and tourist industry.

System Extent and Usage

- **The highway system owned by the 1600 local governments in New York State consists of over 97,000 centerline miles of roadways and 8600 highway bridges. (**versus 15,097 centerline miles and 7674 bridges owned by New York State).

- Highways owned by towns comprise 60% of total local mileage.

- Over 5,200 miles of local jurisdiction highways are classified as "arterials" and as such, by definition, are among the most important and heavily traveled roads in the state.

- **46% of the 350 million daily vehicle miles of travel (VMT) in New York occurs over local jurisdiction highways.**

Current Conditions

- Pavement condition data is not systematically collected for local highways. Pavement condition data, however, is available on segments of the local highway network which are evaluated as part of the NYSDOT annual condition survey. These highways, called State Touring Routes, are the 600 or so centerline miles of local jurisdiction roads signed with route shields for the convenience of the motoring public. The 2012 survey results show these local roads at 48% poor plus fair. State highways were rated at 39.8% poor plus fair. While the Touring Route data is not a statistically valid sample**, the data does suggest that local highways are in worse condition than the State highway system. The 2007 NYSDOT needs study estimated that these local roads alone will require an investment of $3.9 billion dollars over the 20 year analysis period ending in 2030.**

- NYSDOT does collect comprehensive condition data for the entire population of bridges on the State's public highway network. Over 17,000 bridges are inspected biennially or more often if conditions warrant. According to 2013 data (excluding New York City), **34.5% of local jurisdiction bridges and 31.5% of State bridges are deficient.**

Pavement and Bridge Needs

- **Local jurisdiction pavement and bridge needs (excluding New York City) were estimated based on the goals described in the aforementioned NYSDOT 20 year needs study**. For pavements, the goal is to establish a 12 year treatment or "paving cycle". The bridge goal is to decrease local bridge deficiencies by 5 percentage points over the analysis period.

- Pavement needs were calculated based on the distribution of functionally classified local jurisdiction roads within NYSDOT region. Based on the goal and repair strategies and contract costs supplied by NYSDOT, **the pavement need over the next 15 year period is estimated at $31.95 billion.**

- Local bridge needs were calculated based the standard deterioration curve used by NYSDOT and average contract costs to repair local bridges**. The bridge need over the 15 year period is $2.85 billion.**

Annual Expenditures on Local Roads

- According to the Office of the State Comptroller (OSC), **local governments invest approximately $1.0 billion annually on local roads and bridges outside of New York City**. Assuming this value holds constant over the analysis period; local governments will invest $15 billion over the period 2015-2030.

Consolidated Highway Improvement Program and Marchiselli Funding

- CHIPs funding is a major component of state funding for local roads and bridges. Unfortunately, these CHIPs funds only represent a small fraction of highway taxes collected from motorists using the local road system. A recent analysis of New York State Taxation and Finance and Division of Budget records indicates approximately $6.3 billion is collected annually in gasoline taxes, sales tax on vehicles, and fees from the Department of Motor Vehicles. **Given that 46% of the vehicle miles travelled in New York are on local roads, then local governments should receive an additional $1.4 billion annually if they are to receive their fair share of highway related taxes and fees**.

Total Needs and the Funding Gap

- **Total pavement and bridge needs are calculated at $31.95 billion plus $2.84 billion or $34.79 billion over the analysis period. With expenditures estimated at $15.0 billion, this means the total funding gap over the 15 year period is $19.79 billion or about $1.3 billion annually.**

- **It should be recognized that this gap can be closed and the goals established by NYSDOT can be achieved if local governments received their fair share of revenues based on user taxes and fees**.

Conclusion

- The local jurisdiction pavement and bridge infrastructure is an integral part of the State's total transportation system. Current expenditures on local roads are not even close to keeping pace with pavement and bridge needs. Over $1.3 billion in additional revenue is needed annually to meet these needs. Without additional resources, the deterioration of the pavement and bridge infrastructure will accelerate and will adversely impact the motoring public and the economic vitality of New York State.

INTRODUCTION AND PURPOSE OF STUDY

The highway system owned by local government in New York State is a vast and complex network consisting of over 97,000 centerline miles of roadways and 8600 highway bridges. These highways are vital to the mobility and the economic well-being of New York State as local jurisdiction roads accommodate hundreds of thousands of daily work trips and are essential to the trucking, farming, and the tourist industry. In fact, 46% of the 350 million daily vehicle miles of travel (VMT) in New York occurs over local jurisdiction highways and bridges. The local network is maintained by 1600 municipalities--towns, villages, cities, and counties and is ever growing to meet demands for access to commercial, industrial and housing developments. Since 2005, approximately 1000 miles have been added to the local highway system.

The problem New York State is facing is that the local highway infrastructure is deteriorating and funding for repair is inadequate. This problem has been exacerbated by three natural disasters – Hurricane Sandy, and Tropical Storms Lee and Irene which wreaked havoc on the transportation infrastructure throughout the State. Rising fuel and asphalt prices are making matters worse by eating into budgets dedicated to local highway and bridge repair.

The purpose of this report is to provide a needs estimate for the local jurisdiction pavement and bridge infrastructure for the period 2015-2030. The report will update the previous 20 year needs study commissioned by the NYS Association of Town Superintendents of Highways and released in December, 2007, by focusing on the last 15 years of the analysis period. **It is important to note that the study is consistent with, and carries forward the goals and policies described in the"20 Year Transportation Needs Assessment (2010-2030)" prepared by the New York State Department of Transportation (NYSDOT) and presented at the October 30, 2007 Capitol Budget Hearing held in Albany.** The study will describe the magnitude of the local highway system by NYSDOT Region, provide condition data where available, and estimate statewide needs, available resources and the funding gap for the local jurisdiction pavement and bridge infrastructure. While New York City is included in the system extent data, the five boroughs are excluded from the needs estimates.

The geographic location of each NYSDOT region is as follows:

Region 1: Capital District

Counties: Albany, Essex, Greene, Rensselaer, Saratoga, Schenectady, Warren, Washington

Region 2: Mohawk Valley

Counties: Fulton, Hamilton, Herkimer, Madison, Montgomery, Oneida

Region 3: Central New York

Counties: Cayuga, Cortland, Onondaga, Oswego, Seneca, Tompkins

Region 4: Genesee Valley

Counties: Genesee, Livingston, Monroe, Ontario, Orleans, Wayne, Wyoming

Region 5: Western New York

Counties: Cattaraugus, Chautauqua, Erie, Niagara

Region 6: Southern Tier/ Central New York

Counties: Allegany, Chemung, Schuyler, Steuben, Tioga, Yates

Region 7: North Country

Counties: Clinton, Franklin, Jefferson, Lewis, St. Lawrence

Region 8: Hudson Valley

Counties: Columbia, Dutchess, Orange, Putnam, Rockland, Ulster, Westchester

Region 9: Southern Tier

Counties: Broome, Chenango, Delaware, Otsego, Schoharie, Sullivan

Region10: Long Island

Counties: Nassau, Suffolk

Region11: New York City

Counties: Bronx, Kings, New York, Queens, Richmond

THE LOCAL JURISDICTION HIGHWAY NETWORK

New York's State and Local Highway System.

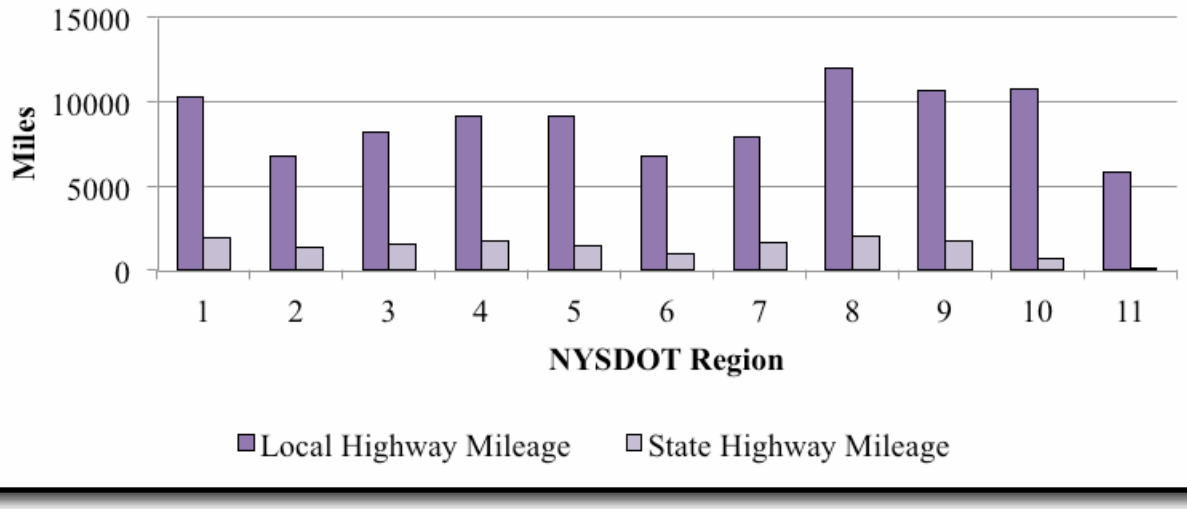
Table 1 and Figures 1and 2 demonstrate the sheer size of the local highway network. Centerline mileage and number of bridges are provided by region for both local jurisdiction and State DOT highways. As can be seen from the table, local highway mileage dwarfs State highways in all regions and local bridges outnumber their State counterparts by over 900.

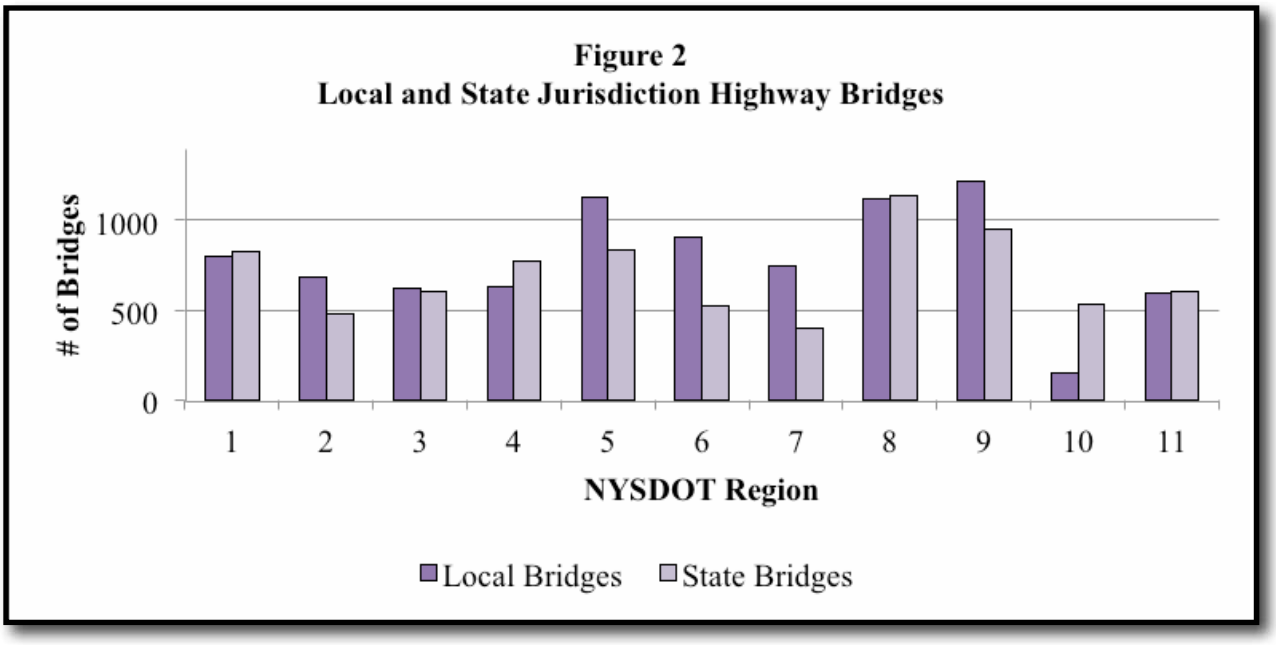
Table 1

Local and State Jurisdiction Centerline Mileage and Number of Highway Bridges

NYSDOT Region	Local Highway Mileage	State Highway Mileage	Local Bridges	State Bridges
1	10311	1951	800	823
2	6750	1335	687	483
3	8163	1496	618	606
4	9107	1719	629	770
5	9184	1456	1128	837
6	6773	930	905	529
7	7932	1626	750	396
8	12033	2025	1120	1138
9	10637	1738	1216	952
10	10730	681	154	531
11	5844	140	599	609
Total	97464	15097	8606	7674

Figure 1
Local and State Jurisdiction Centerline Mileage





*** Sources: NYSDOT 2011 Highway Performance Monitoring System (HPMS) submission to FHWA, NYSDOT 2013 Official Bridge Data

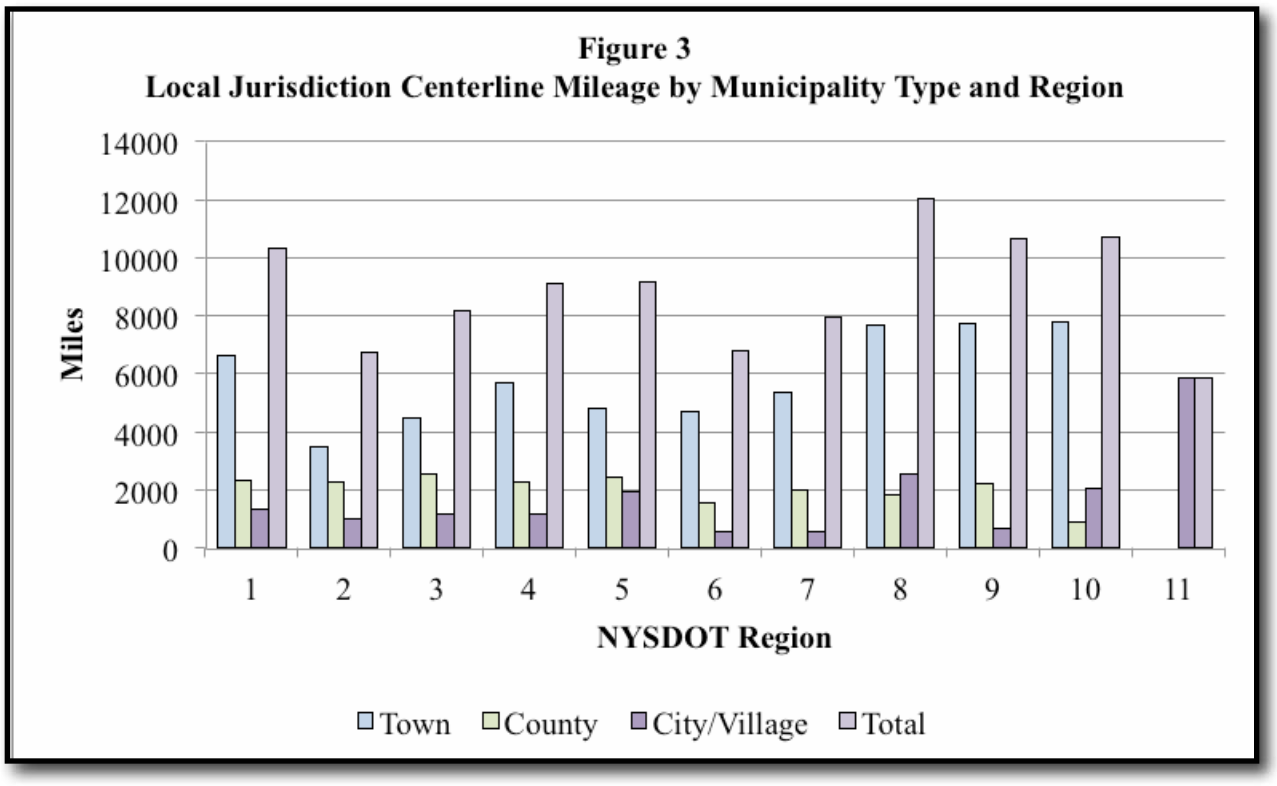
Local Roads by Jurisdiction

Table 2 and Figure 3 provide a regional breakdown of local jurisdiction centerline mileage by municipality type. The table shows town owned highways comprise 60% of total local mileage.

Table 2

Local Jurisdiction Centerline Mileage by Municipality Type and Region

NYSDOT Region	Town	County	City/Village	Total
1	6631	2344	1336	10311
2	3493	2240	1017	6750
3	4488	2515	1160	8163
4	5679	2245	1183	9107
5	4806	2416	1962	9184
6	4672	1568	532	6773
7	5379	1988	565	7932
8	7661	1812	2560	12033
9	7745	2233	659	10637
10	7802	908	2020	10730
11	-----	-----	5844	5844
Total	58356	20269	18839	97464



*** Source: NYSDOT 2011 HPMS submission to FHWA

Serving All Levels of Traffic Volume

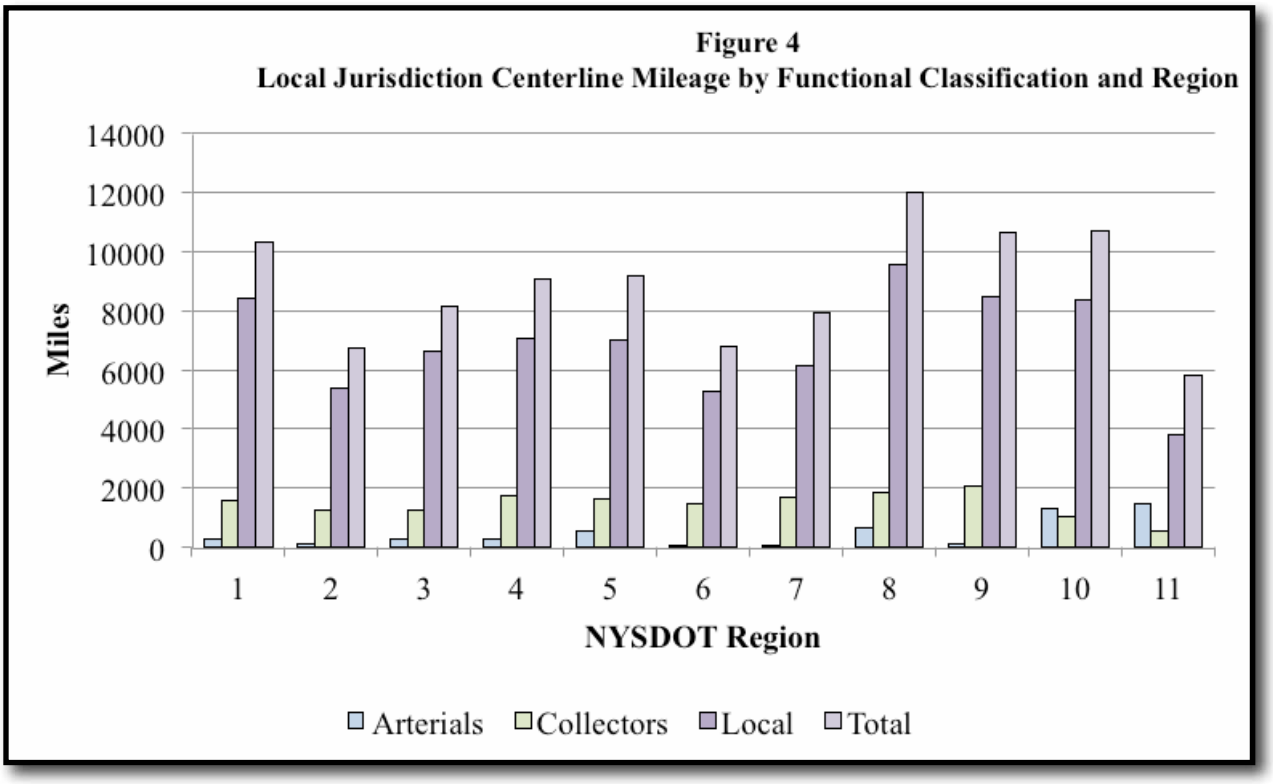
Table 3 and Figure 4 provide a summary of local highway centerline mileage by functional classification. Functional classification is a process used by the Federal Highway Administration (FHWA) to group streets and highways into classes or systems according to the character of service they are intended to provide. The highest functional class called "arterials" generally provides for mobility service (e.g. longer trips on major roadways such as the Interstate System) while the lowest level system called "locals" provides mostly accessibility service. The intermediate category, "collectors", gathers traffic from locals and connects these facilities to the arterial network. There are several subcategories of functional classes for both urban and rural roads. For the sake of simplicity, all categories have been grouped into the three major functional classes as described above. It should be noted that functional classification is independent of ownership, thus the term "local", in this case, does not imply jurisdiction.

As seen on the table, over 5200 miles of local jurisdiction highways are classified as arterials and as such, by definition, are among the most important and heavily traveled roads in the state.

Table 3

Local Jurisdiction Centerline Mileage by Functional Classification and Region

NYSDOT Region	Arterials	Collectors	Local	Total
1	297	1598	8416	10311
2	114	1255	5381	6750
3	293	1228	6642	8163
4	293	1722	7092	9107
5	554	1641	6989	9184
6	65	1454	5254	6773
7	60	1708	6164	7932
8	632	1836	9565	12033
9	123	2057	8457	10637
10	1307	1026	8397	10730
11	1478	548	3818	5844
Total	5216	16073	76175	97484



*** Source: NYSDOT 2011 HPMS submission to FHWA

PAVEMENT CONDITIONS

Local Roads are in Worse Condition than State Roads.

Condition surveys are essential to transportation asset management. NYSDOT annually collects pavement condition data on the entire universe of State maintained highways. The survey is conducted by regional staff trained in the use of carefully developed photographic scales of pavement condition where each scale point was originally selected to represent a pavement in need of a specific repair strategy (i.e. do nothing, major rehabilitation, minor rehabilitation, corrective maintenance or preventive maintenance). Each scale point represents a surface condition rating of "1" (very poor) to "10" (newly constructed pavement). Survey results are generally reported in terms of the percentage of pavements rated poor (surface condition rating of 1 through 5), fair (rating of 6), good (rating of 7 or 8) or excellent (rating of 9 or 10). Pavements rated poor and fair are candidates for improvement.

Unfortunately, a similar survey has never been systematically conducted on local highways. Pavement condition data, however, is available on segments of the local highway network which are evaluated as part of the NYSDOT annual condition survey. These highways, called State Touring Routes, are the 600 or so centerline miles of local jurisdiction roads signed with route shields for the convenience of the motoring public. Table 4 provides pavement condition for Touring Routes and compares this data to the condition of all State owned highways. It is important to understand that the Touring Route data is not a statistically valid sample and only includes local roads on the higher functional classes. Therefore, the data should not be viewed as an absolute, but should only be viewed as a general indication of local system condition for higher volume roads**. The table does suggest that local highways are in worse condition than the State highway system.** The 2007 NYSDOT needs study estimated that these local roads alone will require an investment of $3.9 billion dollars over the 20 year analysis period ending in 2030.

Table 4

Comparison of Pavement Condition for State Touring Routes Owned by Local Government to State System Condition

NYSDOT Region	Local Highways % Poor and Fair	State Highways % Poor and Fair
1	50.0	50.9
2	40.8	31.9
3	59.7	61.1
4	43.4	29.5
5	48.3	24.6
6	58.1	55.7
7	34.6	33.6
8	46.1	35.1
9	65.3	54.8
10	20.3	19.3
11	53.4	41.5
Statewide	48.0	39.8

*** Source: Pavement Condition of New York's Highways: 2012, NYSDOT

BRIDGE CONDITIONS

NYSDOT collects comprehensive condition data for the entire population of bridges on the State's public highway network. Over 17,000 bridges are inspected biennially or more often if conditions warrant. Various components or elements of each bridge span are rated on an integer scale of "1" (poor condition) to "7" (new condition) which reflects the component's ability to function structurally relative to when it was originally constructed. Individual element ratings are combined by formula to compute an overall or "average" bridge condition rating. If a bridge has multiple spans, the lowest individual span element rating is used in the formula. Bridges with average condition ratings less than "5" are considered deficient, while bridges with condition ratings less than "3" are considered critically deficient. Table 5 provides a condition comparison by region of highway bridges on the local and State highway networks. The table shows local bridges are in slightly worse condition than bridges on the State highway system. Table 6 compares 2007 deficiency levels to today but excludes New York City data from the analysis. Interestingly, the table shows the percentage of deficient local bridges actually decreased over the last five year period even given the tough economic times. This is great news for the motoring public and is a tribute to prudent investment choices made by local highway agencies and NYSDOT.

Table 5

Condition Summary for Local and State Jurisdiction Highway Bridges

NYSDOT Region	% Deficient Local Bridges	% Deficient State Bridges
1	32.5	37.6
2	41.5	26.9
3	45.6	41.1
4	34.0	31.0
5	31.7	17.2
6	18.2	26.6
7	40.4	34.1
8	42.3	43.1
9	27.9	31.3
10	52.6	17.0
11	55.1	58.1
Statewide	35.9	33.6

***Source: 2013 Official Bridge Data, NYSDOT

Table 6

Change in Highway Bridge Condition since 2007(Excluding NYC Bridges)

	%Deficient 2007	%Deficient 2013	Change
State Bridges	27.0	31.5	+4.5
Local Bridges	36.7	34.5	-2.2

***Sources**:* Calculated from 2007 and 2013 Official Bridge Data

NEEDS ESTIMATE PAVEMENTS

$32 Billion to Restore Local Roads.

As already stated, pavement condition data is not available for the universe of local jurisdiction roads. It was decided therefore to apply the NYSDOT goal of a 12 year treatment or "paving cycle" (an industry standard) to the local highway network, and to estimate the cost to attain this goal. By definition, a paving cycle is the time it takes, in years, to resurface or improve an entire highway network.

The key to the needs assessment process is to realistically estimate repair strategies and costs for local highways. This is not a simple process due to the diversity of the local network from high volume county roads on Long Island to the unpaved local functionally classified roads throughout rural New York State. In order to determine repair strategies, costs, and ultimately "needs" the following steps were undertaken:

1) Working with both local officials and representatives from the construction industry, and with significant input from the NYSDOT Pavement Management Unit, baseline upstate and downstate repair costs were determined for four general treatment types--major rehabilitation, minor rehabilitation or "preservation", corrective maintenance, and surface treatment. It should be noted that consistent with NYSDOT analyses, these costs are contract costs and include repair of roadside furniture (guide rail, drainage structures, etc.) at the project site.

2) The mix of repair strategies to be applied to the mileage necessary to reach the 12 year paving cycle goal was based on region and the distribution of functionally classified roads within that region. For example, local roads in a region with a high proportion of urban principal arterials are assumed to receive a more rigorous mix of treatments (major rehab vs. minor rehab vs. maintenance) than local roads in a region with a high proportion of rural collectors and roads functionally classified as local. Table 7 provides the treatment mix matrix used in the analysis.

Table 7

Treatment Mix Matrix by NYSDOT Region

NYSDOT Regions	Functional Class	Major Rehab/ Recon.	Minor Rehab/ Preserv.	Corrective Maintenance	Surface Treatment
1,3,4,5	Arterials	50%	50%		
	Collectors		50%	50%	
	Local			30%	70%
2,6,7,9	Arterials	40%	60%		
	Collectors		40%	60%	
	Local			20%	80%
8,10	Arterials	60%	40%		
	Collectors		60%	40%	
	Local			40%	60%

3) Pavement capital needs were calculated by multiplying the mileage in each cell of the matrix by the appropriate costs as determined in steps 1 and 2 above. One preventive maintenance treatment (e.g. crack sealing) per 12 year paving cycle is included for roads receiving a major or minor rehabilitation.

The resultant pavement need (excluding NYC) is calculated at $31.95 billion for the 15 year period ending in 2030.

NEEDS ESTIMATE BRIDGES

$2.84 Billion Needed for Local Bridges.

The long term goal for local jurisdiction bridges as stated in the 2007 NYSDOT needs study is to reduce the number of deficient local bridges by 5 percentage points by 2030.As stated earlier in this report, some progress has already been made towards this goal as local governments have reduced the number of bridge deficiencies by 2.2 percentage points. However, given the current condition distribution of local bridges, much more needs to be done to maintain these gains and to further reduce deficiencies. For example, based on the standard deterioration curve used by NYSDOT in condition forecasting, over 5400 bridges will be rated less than 5 if no work is done(null scenario) over the next 15 year period. It should be noted that the deterioration curve used for this analysis does not include the effects of corrective maintenance over time.

Table 6 shows the local bridge deficiency level at 36.7% in 2007 with New York City bridges excluded from the calculation. This means the goal for 2030 is to reduce local bridge deficiencies to 31.7%.Subtracting these bridges from the null scenario results in the universe of bridges which must be improved to reach the goal. **The estimated cost to improve these bridges is $2.84 billion over the 15 year analysis period.**

ANNUAL EXPENDITURES ON LOCAL ROADS

Estimating local government expenditures on highway and bridge capital improvements has never been a straightforward endeavor. One source is the FHWA report entitled

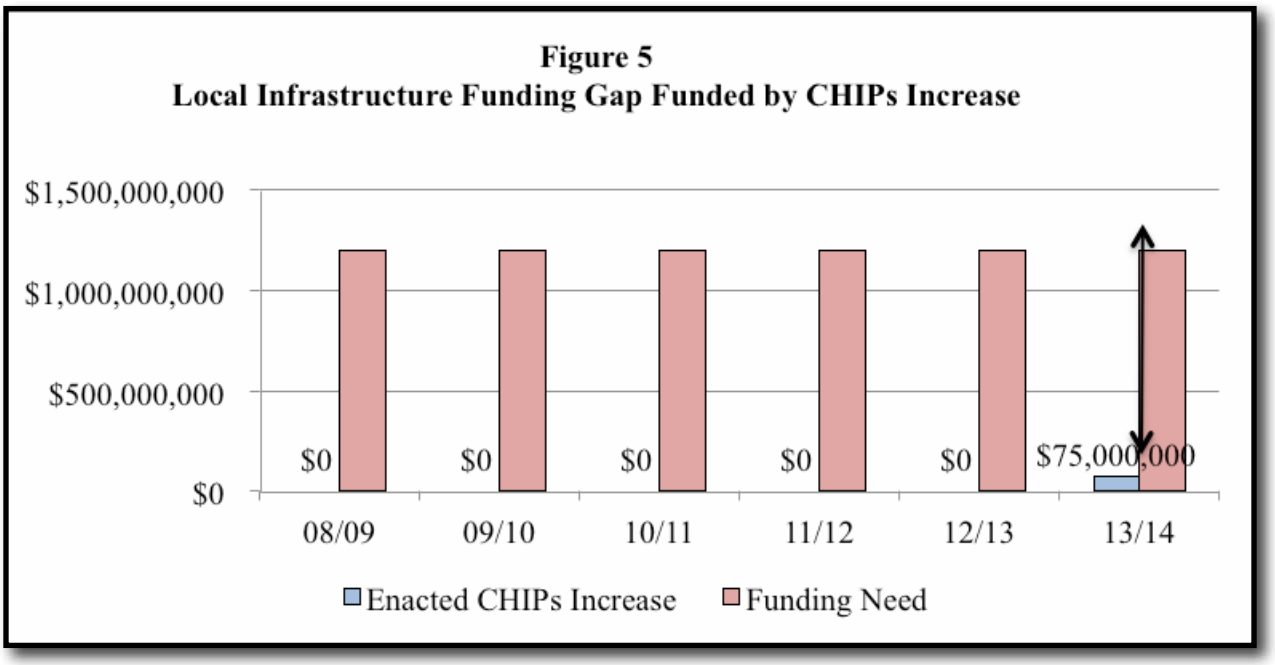
Highway Statistics: 2011. In a table called Local Government Disbursements for Highways, the report provides the total annual capital outlay by local governments for "road and street construction and system preservation." The problem with this data is that it includes expenditures by New York City.

Fortunately, in December 2012, the Office of the State Comptroller (OSC) released a study which provides actual local government capital expenditures on roads and bridges. The data was collected as part of the "annual update document" where local governments report financial data for a number of different categories. The OSC study which excludes New York City shows expenditures at approximately $1.0 billion. Assuming this value holds constant over the analysis period, **local governments will invest $15 billion on capital improvements for roads and bridges over the 15 year period.**

CHIPS AND MARCHISELLI FUNDING

The above local government expenditures include funding from the state Consolidated Local Street and Highway Improvement Program (CHIPs) and the Municipal Streets and Highway Program(Marchiselli). Combined, the two programs deliver approximately $382 million annually to local governments outside of New York City. From fiscal year 2008/2009 to 2012/2013 the amount of CHIPs and Marchiselli funds available was held flat. In 2013, CHIPs funding was increased by $75 million. This marginal growth represents only a 3 percent increase over the six year period. Figure 5 demonstrates the relationship between the CHIPs funding increase and the overall funding gap in local highway financing as presented in the 2007 local needs study.

CHIPs funding is a major component of state funding for local roads and bridges. Unfortunately, these CHIPs funds only represent a small fraction of highway taxes collected from motorists using the local road system. A recent analysis of New York State Taxation and Finance and Division of Budget records indicates approximately $6.3 billion is collected annually in gasoline taxes, sales tax on vehicles, and fees from the Department of Motor Vehicles. Given that 46% of the vehicle miles travelled in New York are on local roads**, then local governments should receive an additional $1.4 billion annually if they are to receive their fair share of highway related taxes and fees.**



TOTAL NEEDS AND FUNDING GAP

At Least $1.3 Billion Needed Annually in Additional Local Highway Aid.

Total pavement and bridge needs are calculated at $31.95 billion plus $2.84 billion or $34.79 billion over the analysis period.

With expenditures estimated at $15.0 billion, this means the total funding gap over the 15 year period is $19.79 billion or about $1.3 billion annually.

It should be recognized that **this gap can be closed and the goals established by NYSDOT can be achieved if local governments received their fair share of revenues based on user taxes and fees.**

In addition, it is important to note that the shortfall is a conservative estimate for the following reasons:

1. The needs estimate addresses capital construction for the repair of pavements and bridges only and does not include highway maintenance/operations conducted by municipal employees, expenditures for vehicle fleets and facilities or any contract add-ons for preliminary engineering, construction inspection, etc.

2. Consistent with the NYSDOT analysis, the needs presented do not eliminate all infrastructure deficiencies. For example, even if the goal of reducing deficient bridges by 5 percentage points is achieved, almost 1/3 of local jurisdiction bridges will still remain deficient at the end of the analysis period.

3. The needs estimate does not address other transportation responsibilities borne by local governments such as transit systems or airports.

4. Consistent with the 2007 NYSDOT assessment, the needs estimate does not include the effects of construction inflation over time. **Inflation alone could significantly increase the funding gap over the 15 year period.**

SUMMARY AND CONCLUSION

The local jurisdiction pavement and bridge infrastructure is an integral part of the State's total transportation system. Current expenditures on local roads are not even close to keeping pace with pavement and bridge needs. Over $1.3 billion in additional revenue is needed annually to meet these needs.

The problem is that due to competing priorities and limited tax dollars, local governments simply do not have the resources necessary to finance the funding shortfall. In 2006, the New State Comptroller published a report that warned "local governments across the state continue to operate amid a barrage of fiscal pressure that shows no sign of letting up." And these remarks were published before the storms which ravaged the local highway infrastructure or the recession which crippled economies throughout the State. In December 2012, the Comptroller published another report with the message clearly captured in the report title," Growing Cracks in the Foundation: Local Governments are Losing Ground in Addressing Vital Infrastructure Needs".

This report further reinforces the bottom line. That is, local governments need a larger infusion of highway funding from both State and Federal sources, and they need it now. Without additional resources, the deterioration of the pavement and bridge infrastructure will accelerate and will adversely impact the motoring public and the economic vitality of New York State.

REFERENCES

1) Shufon, John J. A 20 Year Needs Assessment of Local Jurisdiction Highways and Bridges in New York State, December, 2007.

2) Testimony on 20 Year Needs Assessment by Commissioner Astrid Glynn, NYSDOT, Capitol Budget Hearing, October, 2007.

3) Highway Mileage Report for New York State, NYSDOT, 2011.

4) Functional Classification Guidelines, FHWA website.

5) Highway Performance Monitoring System (HPMS) submission to FHWA, 2011.

6) Shufon J. J. and L.H. Adams. Conceptual Framework for Defining and Developing an Integrated Asset Management System, Transportation Research Record 1848, 2003.

7) Pavement Condition of New York's Highways, NYSDOT, 2012.

8) Official Bridge Data, NYSDOT, 2007, and 2013.

9) State Fiscal Year 2009-2010 and 2010-2011 Annual Report Bridge Management and Inspection Programs, NYSDOT.

10) Delisle, R.D., J.J.Shufon, and L.H.Adams.Development of Network-Level Bridge Deterioration Curves for Use in NYSDOT's Asset Management Process, NYSDOT, 2003.

11) 2006Annual Report on Local Governments, Office of the New York State Comptroller, November,2006.

12) Growing Cracks in the Foundation: Local Governments are Losing Ground on Addressing Vital Infrastructure Needs, Office of the State Comptroller, Division of Local Government and School Accountability, December, 2012.

13) An analysis of highway taxation conducted by Ostroff, Hiffa & Associates, Inc., November, 2013.