

The Hudson Valley Infrastructure Gap

A critical shortage of funding and skilled municipal workers to care for our public works



HUDSON VALLEY
PATTERN *for* **PROGRESS**

CONTENTS

INTRODUCTION	3
MAJOR FINDINGS	4
MUNICIPAL RECOMMENDATIONS.....	14
POLICY RECOMMENDATIONS	19
HUDSON VALLEY ROADS.....	22
HUDSON VALLEY BRIDGES & CULVERTS	26
HUDSON VALLEY DRINKING WATER SYSTEMS	33
HUDSON VALLEY SEWERS & WASTEWATER TREATMENT	35
FUNDING ROADS AND BRIDGES.....	39
FUNDING SEWER AND WATER INFRASTRUCTURE	44
GREEN INFRASTRUCTURE	50
INFRASTRUCTURE SPENDING TRENDS.....	53
APPENDIX	61



INTRODUCTION

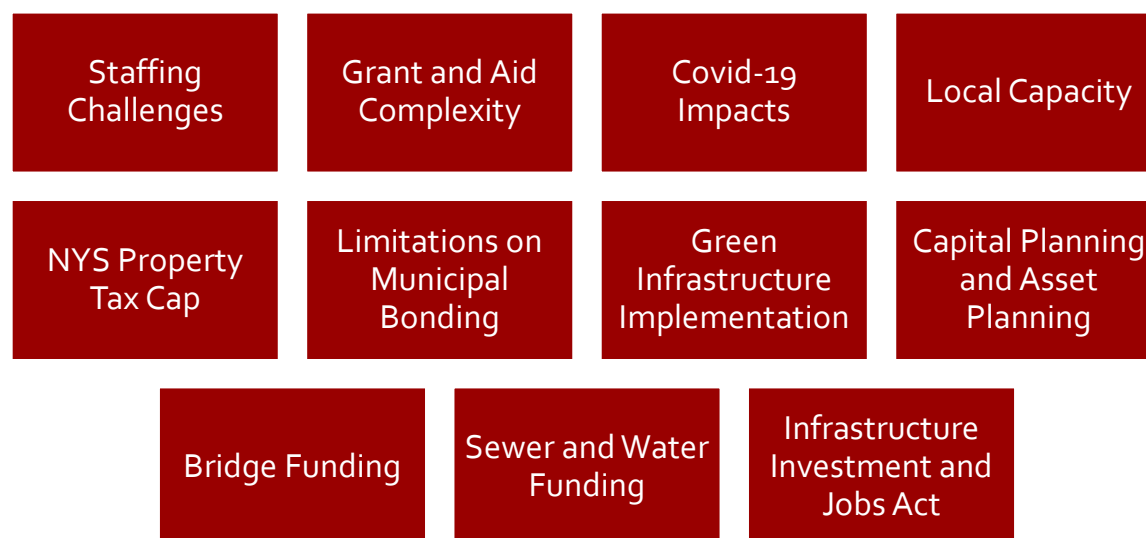
With the recent passage of the federal infrastructure bill, federal lawmakers have acknowledged the need to infuse funding into state and local governments for the construction, maintenance, and repair of infrastructure throughout the country. This need exists in the Hudson Valley region where aging infrastructure systems and financially constrained local governments are a common pairing. In recognition of these challenges, The Construction Industry Council of Westchester and the Hudson Valley contracted Hudson Valley Pattern for Progress to prepare this report about municipal infrastructure in the region. While there are many types of infrastructure, this report focuses on the four critical systems of roads, bridges, sewers, and water.

The “Hudson Valley” is defined in different ways by various state agencies. For the purposes of this report, the Hudson Valley region is defined as the nine counties of Columbia, Dutchess, Greene, Orange, Putnam, Rockland, Sullivan, Ulster, and Westchester. In this nine county region there are 13 cities, 138 towns, and 90 villages, for a total of 241 local municipalities. These municipalities vary drastically in size and population, but are all tasked with maintaining local infrastructure systems under their jurisdiction. Some towns and counties are further subdivided and fragmented into multiple, separate water and sewer districts. With so many different government entities responsible for their own municipal infrastructure, local needs, capacity, and condition is diverse.

To understand local municipal circumstances related to infrastructure, this study utilized many sources of information, including interviews, surveys, data analysis, and literature reviews. These methods were used to develop the major findings and subsequently inform the best practices and policy recommendations found in the beginning of this report. These recommendations are followed by an analysis of available infrastructure metrics and conditions, funding sources, and trends in infrastructure spending.

MAJOR FINDINGS

The following section details the major findings of this report. These findings were developed using a combination of interviews, surveying, analysis of available data and reports. Interviews included municipal representatives from DPW and highway departments, private engineering firms, government officials, and other industry professionals.



STAFFING INFRASTRUCTURE JOBS

Across the country virtually all job sectors have been affected by the COVID-19 pandemic. Changing workplace dynamics and labor shortages are among the most significant impacts on the workplace. However, in the Hudson Valley, many sectors have been struggling to find qualified employees for several years, and the situation has only been exacerbated by the pandemic.

There are several different types of jobs related to infrastructure ranging from machine operators and civil engineers to water and wastewater treatment plant operators. These types of jobs are being affected by nationwide trends mentioned above, but also have some unique challenges.

Overall, finding employees with the desired level of experience is a challenge. This can mean that a position goes unfilled for an extended amount of time. It also means that municipalities may have to increase salaries and benefits to compete with other municipalities or with the private sector. One of the highway superintendents interviewed said that benefit packages offered by public sector jobs used to give them an edge over private sector employers, but this is no longer the case as the quality of benefits has decreased. However, the private sector is having difficulty finding candidates as well. Many of the engineering firms interviewed for this study cited difficulty finding qualified candidates,

especially mid-career professionals with 5-10 years of experience. There is no single reason for this trend, but contributing factors include out-migration from the region and a wave of retirements by people in their 50s and 60s.

In the absence of candidates with the desired experience, some municipalities have taken to hiring recent graduates and training them on the job. However, this is not without risk as these recent hires may use the municipality to get a foot in the door, and then leave for a better paying job after the municipality has spent the time and resources to train them.

Another unique challenge related to infrastructure jobs is finding qualified candidates to operate large and complex water and wastewater treatment plants. These types of positions require rigorous qualification tests and benefit immensely from the institutional knowledge of operators that have worked there for many years. In recent years there has been a wave of wastewater treatment plant operators reaching retirement age with no one to replace them. Municipalities are increasingly utilizing external companies or private contractors instead of internal staff.

GRANT AND AID COMPLEXITY

Local municipalities often rely on grants and aid from the federal government and state aid to finance infrastructure repair or new construction. These sources are especially critical for large capital projects. However, several of the experts interviewed for this study noted that many state and federal funding sources have associated challenges including arduous application processes, strict design standards, and demanding reporting requirements.

The standards and procedures for projects that utilize federal funding can be particularly cumbersome. Due to their nature as federal programs that are applied throughout the country, there is a little room for adjustments to process and standards.

Paperwork and other administrative demands are typical of virtually all grant funding, and project oversight is a necessary component. However, the interviews conducted in this study provided overwhelming input that many of the state and federal sources for infrastructure funding are overly burdensome. In fact, the complexities and “red tape” associated with state and federal funding has caused instances where municipalities decide not to apply for needed infrastructure dollars.

COVID-19 IMPACTS

In early 2020, the COVID-19 pandemic had immediate and far-reaching impacts. Now, almost two years later, COVID-19 is still with us and still affecting many aspects of life. In many job sectors, work was brought to a standstill when the pandemic first hit.

Many jobs related to infrastructure were deemed “essential,” which meant that capital projects continued with little or no interruption, and highway and utility workers continued to report to their regular work locations. Several of the DPW commissioners and highway superintendents interviewed for this analysis reported that the amount of work was not greatly affected by the pandemic, but the day-to-day logistics changed as safety protocols were implemented. When asked: “Has the Pandemic impacted your municipality’s ability to finance / maintain / operate infrastructure systems?” 15 out of 24 (63%) municipal representatives from the Hudson Valley answered “no,” and nine (37%) answered “yes.”

Data from the NYS Office of the Comptroller shows that from 2019 to 2020, municipal infrastructure spending decreased across the board for cities, towns, and villages. Municipal spending on roads, bridges, sewer, and water all decreased from 2019 to 2020. Furthermore, municipal spending for all four of these categories had increased in the prior year, from 2018 to 2019. This suggests that overall infrastructure spending in the region decreased as a result of the uncertainty and direct financial strain caused by the COVID-19 pandemic. Infrastructure projects may have been put on hold as municipalities waited to understand the full financial impacts of the pandemic. Furthermore, COVID-19 safety protocols and missed time at work slowed construction, disbursement of funding, and spending.

Annual Municipal Infrastructure Expenditures (in millions) of Hudson Valley Municipalities- Inflation Adjusted

	2018	2019	2020	2018 to 2019 \$ Change	2018 to 2019 Percent Change	2019 to 2020 \$ Change	2019 to 2020 Percent Change
Roads	\$407	\$420	\$351	\$13	3%	-\$69	-16%
Bridges	\$5	\$7	\$3	\$2	29%	-\$3	-48%
Sewer	\$160	\$179	\$170	\$19	12%	-\$9	-5%
Water	\$254	\$258	\$241	\$4	2%	-\$17	-6%
Total	\$826	\$864	\$766	\$38	5%	-\$98	-11%

Source: Pattern for Progress Analysis of data from the NYS Office of the Comptroller

LOCAL CAPACITY

In the Hudson Valley, municipalities range from rural towns of a few hundred people, to dense urban cities of many thousand. With this variation comes a wide range of infrastructure needs and capacity for infrastructure management. In general, larger municipalities with correspondingly larger budgets tend to have more internal capacity for infrastructure management. Larger budgets allow for more infrastructure spending overall, larger staff, job specialization, and more opportunities to spend time on planning and funding applications. On the other end of the spectrum, smaller communities generally have smaller budgets, smaller departments, and less internal capacity.

In many cases, it does not make sense for small municipalities to have large public works departments or highway departments; however, a small staff, or even a staff of one person, does have some associated challenges. One challenge of a small staff is that workers need to have a broader range of skills and be less specialized. Another challenge is that a small staff may have their hands full just keeping up with the daily demands of the job, leaving little to no time for strategic planning and asset management planning. Furthermore, small staffs are more vulnerable to a significant loss of institutional knowledge as the result of one or a few people retiring or leaving.

Local capacity for infrastructure management can also be a challenge for rural municipalities and/or municipalities with low population density. Low-density municipalities may have a relatively small tax base but a substantial road network to maintain due to their geographic size. The combination of limited tax revenue and significant road networks creates financial strain on the municipal budget and limits the ability for financially sustainable infrastructure management.

Municipalities with less internal capacity are also at a disadvantage when it comes to securing funding for infrastructure projects. Most state and federal funding opportunities for infrastructure are competitive and include rigorous application requirements. Furthermore, projects that serve more people that are located in more urban and/or large municipalities are more likely to be prioritized for state and federal funding as they have an impact on a larger number of people. Some communities decide not to apply for much needed funding due to the combination of the cost and hours required to put together an application and the low chance for success.

THE NYS PROPERTY TAX CAP

In 2011, a property tax cap was instituted for all local governments outside of New York City. The cap limits the annual increase in taxes levied by 2% or the rate of inflation in that time period, whichever is smaller. The cap on property tax increases represents a constraint on a primary source of revenue for municipalities and a potential source of funding for road and bridge maintenance. Property taxes do not directly support water and sewer infrastructure with very few exceptions; however, the overall burden of taxes and fees is top of mind for politicians during the budgeting process.

The nature of certain infrastructure systems makes them a likely candidate for budget cuts. The impacts of deferring maintenance of infrastructure are typically not immediately felt, and can be a tempting short-term option to relieve pressure on municipal budgets in financial distress. Furthermore, infrastructure that is buried underground or is otherwise tucked away can be easier to ignore than public works that are visible to the citizens they serve, such as roads.

In the 2021 Pattern for Progress municipal infrastructure survey, the following question was asked: "In your opinion, has the New York State Real Property Tax Cap impacted your municipality's ability to finance / maintain / operate infrastructure systems? (YES or NO)" A total of 17 out of 25 respondents (68%) answered "yes" to this question. Interviews of highway superintendents, DPW leaders, and engineering consultants confirmed that infrastructure spending is likely impacted by the tax cap in some municipalities in the region. Another finding from the interviews is that in some municipalities the tax cap has led to cuts in personnel and jobs related to infrastructure more so than it effected capital projects. This may be due in part to the fact that many capital projects are bonded and therefore not directly impacted by the tax cap.

While it is clear that there are several individual examples where the tax cap has affected infrastructure spending decisions, it is difficult to say with certainty how it has affected infrastructure spending overall in the Hudson Valley. According to data from the NYS Comptroller, Infrastructure spending by cities, towns and villages in the Hudson Valley increased from \$275.5 million in 2011 (the year the tax cap was implemented and one year before it went into effect) to \$342.2 million in 2019. This increase of \$66.7 million represents a 24% increase in spending from 2011. This increase of \$66.7 million represents an average annual increase in spending of 3% per year. However, after adjusting for inflation, the average annual increase becomes just 0.9% per year.¹

¹ Inflation calculated using the U.S. Bureau of Labor Statistics CPI Inflation Calculator

LIMITATIONS ON MUNICIPAL BONDING

In order to issue bonded debt, a municipality must have bonding capacity to do so. Bonding capacity is a calculation based on a percentage of the prior five years total assessed valuation less any outstanding long-term debts. Water bonded debt is automatically excluded from the calculation, but other forms of debt for things like municipal buildings, fire trucks and ambulances, streets, roads, drainage and sewer are not excluded. While approval of the State Comptroller can be sought to exclude sewer debt, it is a difficult and time-consuming process. Small communities with small tax bases and increasing infrastructure costs are particularly hit hard by the inclusion of sewer debt in the municipal debt limit.

GREEN INFRASTRUCTURE IMPLEMENTATION

The term “green infrastructure” can be defined in a variety of ways. It is most commonly used to describe infrastructure systems that handle stormwater and runoff in a more environmentally friendly approach than traditional systems. In general, green infrastructure attempts to return water back into the environment in good condition and close to where it falls, instead of carrying the water away to another site where it can cause erosion or be mixed with pollutants along the way.

Interviews with local DPWs, engineering firms, and highway superintendents indicate that green infrastructure implementation in the Hudson Valley is not widespread. Though there are examples of green infrastructure throughout the region, the findings of this study indicate that broadly speaking, green infrastructure is implemented when there is strong community support and political will to do so and/or when funding is secured to directly support green infrastructure implementation. There are a number of grant opportunities that are covered in more detail later in this study, but they do not appear to be sufficient to incentivize widespread green infrastructure implementation. The major obstacles that were cited as impediments to green infrastructure include:

- **Higher costs relative to traditional infrastructure** – implementing green infrastructure can be more expensive than using traditional infrastructure methods. Implementing green infrastructure often means installing a completely new system or retrofitting an existing system, which is more expensive than keeping the status quo.
- **Additional maintenance and upkeep associated with green infrastructure** – many green infrastructure systems involve living plants that require a level of maintenance and monitoring that is not required of traditional infrastructure. Additionally, some permeable paving methods are associated with a shorter useful life and need to be repaired or replaced more often than traditional paving methods.
- **Hesitancy to work with something that is unfamiliar and new** – Many of the green infrastructure methods are new. In cases where existing infrastructure is operating as designed there may be a reluctance to change systems, i.e. “if it ain’t broke, don’t fix it.” Even with the capacity to train staff and implement green infrastructure, there is risk associated with trying something new.

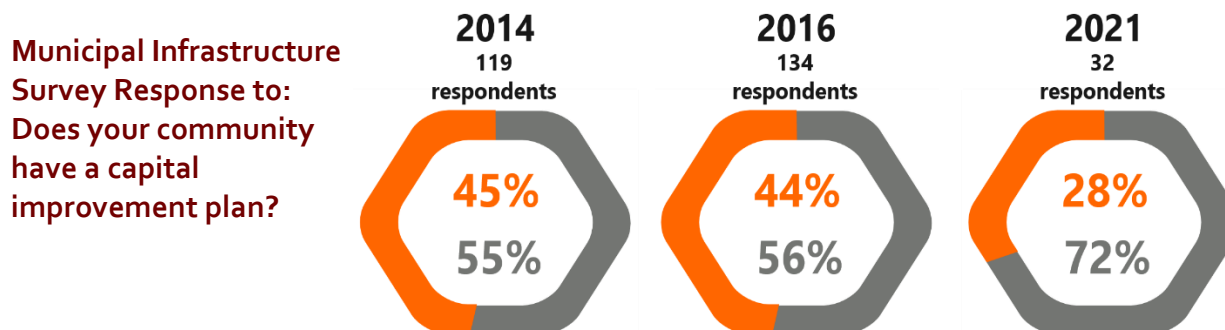
In addition to the above impediments, the geology and existing development patterns limit green infrastructure in some parts of the Hudson Valley. Many areas in the region have natural conditions that are not conducive to water infiltration such as clay soils and/or a high water table. In these areas green infrastructure, which is significantly predicated on stormwater infiltration, is not feasible to implement. The same is true in highly developed communities where the prevalence of impervious surfaces leaves too few locations for groundwater infiltration.

One of the difficulties with green infrastructure and other environmentally-minded practices is that the benefits are indirect, dispersed, and long-term. While it is generally agreed upon that green infrastructure methods are beneficial for environmental health and sustainability, at a local municipal level, these benefits may not be compelling enough to justify the cost, especially in financially constrained communities.

CAPITAL PLANNING AND ASSET PLANNING

Given the complexity and the long life cycle of infrastructure systems, strategic planning for infrastructure is a critical component of successful and sustained infrastructure management. Two primary tools for this type of strategic planning are Capital Plans and Asset Management Plans. These two types of planning are related but distinct. Asset management planning is a process that plans for the entire life cycle (acquisition, operation, maintenance, and disposal) of major physical assets like buildings, equipment, and infrastructure. Capital Plans similarly plan for the future, but specifically include projections of expenditures and revenues. Capital Plans are often informed by asset management planning.

Interviews and survey responses collected for this study suggest that more often than not, municipalities in the Hudson Valley do not have a capital improvement plan. Pattern for Progress conducted a survey of municipalities in 2014, 2016, and 2021. All of these surveys included the question: “Does your community have a capital improvement plan?” The table below shows the results from each survey. The major finding is that the number of municipalities that reported having no capital plan was larger than the number of municipalities that reported having one. The 2021 survey had a significantly lower response rate than the prior Pattern Infrastructure surveys. Given the small sample size, findings from this survey are far from conclusive. That being said, the 2021 survey continues a trend from 2014 and 2016 of more than half of respondents reporting having no capital improvement plan.



BRIDGE FUNDING

According to the 2021 National Bridge Inventory (NBI) maintained by the Federal Highway Administration (FHWA), there are 3,153 bridges in the Hudson Valley. Of those 3,153, counties have jurisdiction over 1,152, and local municipalities (cities, towns, and villages) have jurisdiction over 379.

The NBI includes estimates of the type and cost of work needed to improve bridges to the point that they will provide the type of service needed. Improvements can range from surface repair to total bridge replacement, but does not include maintenance. The table below shows the estimated cost in 2021 of needed bridge improvements for bridges under the jurisdiction of municipalities (cities, towns, and villages) and counties in the Hudson Valley. The data are also broken down by FHWA condition rating (Good, Fair, or Poor).

	FHWA Condition rating	Municipal Bridges		County Bridges	
		#	%	#	%
Number of Bridges	Good	89	23%	355	31%
	Fair	214	56%	619	54%
	Poor	76	20%	178	15%
	Total	379		1,152	
Total Estimated Cost of Improvements (in millions of dollars)	Good	\$161 M		\$571 M	
	Fair	\$317 M		\$957 M	
	Poor	\$193 M		\$300 M	
	Total	\$671 M		\$1,828 M	
Average Estimated Cost of Improvements per Bridge (in millions of dollars)	Good	\$1.8 M		\$1.6 M	
	Fair	\$1.5 M		\$1.5 M	
	Poor	\$2.5 M		\$1.7 M	
	All	\$1.8 M		\$1.6 M	

Source: Federal Highway Administration, National Bridge Inventory 2021

The data shows that an estimated \$671 million is needed for municipal bridge improvements, and \$1.8 billion is needed for county bridge improvements in the Hudson Valley. This does not include bridges maintained by the state and other agencies, which also have substantial estimated improvement costs. Leaving out bridges classified as Good or Fair, a combined \$493 million is necessary to address needed improvements just for municipal and county bridges with a classification of Poor. Bridges that are classified as Poor are not necessarily unsafe, but they are more likely than bridges in better condition to deteriorate to a point where they need a weight restriction or even need to be closed to traffic.

The financial implications of county and municipal bridge conditions in the Hudson Valley is brought into focus when the estimated funds required for bridge improvements is weighted against the grants available for bridge repair and replacement. Bridge-NY is the primary source of financial assistance for bridge work available local governments in New York State. For the fiscal years 2020-21 and 2021-22, a total of \$216 million in BRIDGE-NY funds were made available statewide. Out of the \$216 million, approximately \$28.4 million for bridge projects, and \$10.5 million for culvert projects was made available in the Hudson Valley.

This latest round of Bridge-NY funding adds to the nearly \$500 million that has been awarded statewide to municipalities in prior years. This means that the total amount of funds that has been made available statewide since the inception of the Bridge-NY program is less than half of the estimated \$2.5 billion needed for *only* county and municipal bridges in the Hudson Valley.

SEWER AND WATER FUNDING

In early 2010's, the New York State Department of Health estimated that a staggering \$36 billion in local government spending was needed by 2030 to ensure that safe drinking and wastewater services continued. In December 2021, the latest round of grants from the Water Quality Improvement Project program (WQIP) awarded \$272 million to 179 projects statewide. In the Hudson Valley region, \$61.9 million was awarded to 25 projects. Some of these funds are not for projects that are not infrastructure related such as land acquisition and habitat restoration. Still, even the full amount of \$272 million represents less than one percent of the estimated \$36 billion needed for water and wastewater infrastructure. While the WQIP is not the only source for water infrastructure spending, it highlights the significant gap between needed funding and what is actually available.

In 2017, New York State passed the Clean Water Infrastructure Act, which committed \$2.5 billion towards water infrastructure and water protection. Since the passage of the Act in 2017, a total of almost \$4 billion has been appropriated for water infrastructure and water protection projects. However, a 2021 report from the New York State Comptroller found that less than 11% of the appropriated \$3.9 billion had been spent as of March 2020.

INFRASTRUCTURE INVESTMENT AND JOBS ACT

In late 2021, President Joe Biden signed the Infrastructure Investment Jobs Act (IIJA) into law. The bipartisan legislation commits \$973 billion over five years to infrastructure funding. Among the most relevant provisions in the bill in relation to road, bridge, sewer, and water infrastructure are:

- Authorized a general fund transfer to the Highway Trust Fund, which was about to become insolvent.
- Reauthorized and increased funds appropriated through the Highway Trust Fund. The programs funded by the Highway Trust Fund are the primary sources of federal transportation aid.
- Created the *new* Promoting Resilient Operations for Transformative, Efficient and Cost Saving Transportation (PROTECT) Program. This program focuses on infrastructure resiliency and hazard mitigation. A total of \$7.3 billion over five years will be made available through this program.
- Within the Surface Transportation Block Grant, increased the set-aside for bridges that are not part of the National Highway System, thus increasing the funding available for bridges owned by counties and other municipalities.
- Created the *new* Bridge Investment Program designed to reduce the number of bridges that are in “Poor” condition or bridges that are in “Fair” condition but at risk of declining into “Poor” condition.
- Created the *new* Reconnecting Communities Pilot Program, which provides planning grants for feasibility studies for infrastructure investments that improve accessibility and facilitate economic development.
- Implemented USDOT requirements to streamline federal permitting.
- Authorized \$29.3 billion over five years for State Revolving Loan Funds (SRFs) for clean water and drinking water SRFs.



MUNICIPAL RECOMMENDATIONS

The following section is a series of recommended best practices for municipalities related to the management of infrastructure systems. These recommendations are based on the findings of this report and are informed by interviews with industry professionals and municipal employees.

Engage in Asset
Management Planning
and Capital Planning

Join Relevant Trade
Associations and
Groups

Establish Regular
Convenings with
Counterparts in Other
Municipalities

Be Proactive About
Getting Projects Listed
in the STIP

Establish a Pavement
Management Program

Build it Now

Consider the
Cost/Benefit of
Outsourcing
Infrastructure
Management

Capture Institutional
Knowledge

ENGAGE IN ASSET MANAGEMENT PLANNING AND CAPITAL PLANNING

Asset management and capital planning are essential tools for responsible long-term infrastructure management. They can identify potential problems on the horizon and put municipalities in a position to proactively maintain infrastructure to prevent emergency repairs or replacements.

Asset management plans and systems are useful tools for assessing the current condition of existing assets, planning regular maintenance tasks, identifying inefficiencies, and forecasting the lifecycle replacement timelines for public works infrastructure. Though asset management typically requires an upfront investment in time and money, if executed well, it can more than make up for the investment. Asset management systems streamline decision making and help to avoid major system failures through the automated scheduling of regular maintenance tasks. They also track information that can be used to demonstrate the need for funding to replace or upgrade infrastructure, providing a rational basis for budget requests.

Having a good understanding of your assets is often the first step in applying for grants or loans related to infrastructure. At a minimum, municipalities should be cognizant of the useful life of their major infrastructure systems so they can plan for them to be repaired or replaced. Asset management systems can range in complexity and sophistication depending on the needs of a community. There are several digital asset management programs available that can be set up to track conditions, set automatic reminders, and establish regular maintenance cycles.

JOIN RELEVANT TRADE ASSOCIATIONS AND GROUPS

There are several groups and associations in New York State where municipal employees can engage with counterparts from other counties, towns, villages and cities. Benefits of these associations include professional development from trainings, sharing of ideas among municipalities, and the ability to be a part of shaping policy recommendations and lobbying agendas. Associations include but are not limited to:

- NYS Association of Town Superintendents of Highways
- American Public Works Association - New York Chapter (APWA)
- American Water Works Association (AWWA)
- New York Water Environment Association (NYWEA)
- National Association of Wastewater Technicians (NYWAT)
- New York Society of Professional Engineers (NYSSPE)
- American Society of Civil Engineers (ASCE)
- New York State Conference of Mayors (NYCOM)
- National League of Cities (NLC)
- American Planning Association (APA)

ESTABLISH REGULAR CONVENINGS WITH COUNTERPARTS AT OTHER MUNICIPALITIES

Outside of formal trade groups and associations, municipal employees in highway and DPW departments should consider fostering a relationship with their peers in nearby municipalities. Benefits to regularly meeting with counterparts from other local municipalities include:

- sharing of ideas and best practices,
- identification of issues that transcend municipal borders, and
- improved cooperation and coordination in instances where aid is requested.

These cross-border collaborations have also yielded cost savings, such as the sharing of specialized equipment that is used only a handful of times each year and can be shared among more than one government unit. This type of regular convening is already practiced by some municipal employees in the Hudson Valley region. These range from informal meetings to an official county association of superintendents.

BE PROACTIVE ABOUT GETTING PROJECTS LISTED IN THE STIP

In order for an infrastructure project to receive federal aid, it must get included in the Statewide Transportation Improvement Program (STIP). For municipalities within a Metropolitan Planning Organization (MPO), this means projects need to be included in their MPOs Transportation Improvement Program (TIP). Municipalities that are not within an MPO must collaborate with their regional NYSDOT office to get projects listed in the STIP. These municipalities are at a disadvantage, as they do not have an entity actively working to qualify projects for federal funding like their counterparts within an MPO do. In the Hudson Valley region, the counties of Sullivan, Greene, and Columbia are the only counties that are not part of an MPO. These three counties all fall within different NYSDOT regions.

STIPs are mandated by federal law to cover a planning period of four years. This means municipalities with projects that need federal aid need to pay close attention to the planning cycles of the STIP, and if they are within an MPO, the planning cycle of the MPO's TIP. If the window of opportunity is missed, municipalities will have to wait a few years for the next opportunity to get a project listed on the STIP.

ESTABLISH A PAVEMENT MANAGEMENT PROGRAM

The general goal of a pavement management program is to establish a systematic maintenance cycle for roads based on tangible metrics and efficient management of resources. Pavement management plans provide valuable data that can help inform decision making, justify budget proposals, and improve long-term continuity within highway and DPW departments. There are a number of different pavement management programs of varying sophistication and cost. Deciding which pavement management program is right for a given municipality depends on population density, number of road miles, and capacity to effectively manage the program.

When considering implementing a pavement management program, municipalities should make use of the services provided by the Cornell Local Roads Program. The Cornell Local Roads program provides technical assistance and trainings about local road management and workforce development in the form of webinars, meetings, publications, and direct consultation. Municipal employees in highway and DPW departments should take full advantage of these resources, which cover many topics beyond pavement management.

Municipalities with limited resources or capacity to implement a pavement management program should consider applying to the Cornell Asset Management Program (CAMP) offered by the Cornell Local Roads Program. CAMP utilizes summer interns to collect information on road conditions and create a data-driven five-year pavement management plan. CAMP represents a cost effective way for municipalities to implement a pavement management plan, and may be particularly useful for municipalities with no prior experience using a pavement management plan.

BUILD IT NOW

There are several factors that will likely make the cost of infrastructure projects increase in the near future including:

- Labor shortages – As detailed in a previous finding, there is a nationwide labor force shortage. More specifically, both the private sector and public sector are having difficulty finding qualified workers for all types of infrastructure projects. This means that the available workers that are in demand can secure higher wages, thus increasing the project costs. The impacts of the labor shortage may be further impacted by the federal infrastructure bill. The federal infrastructure bill may lead to a wave of projects out for bid, further increasing the demand and cost of labor.
- Interest rate – In late 2021, the Federal Reserve indicated that it could raise interest rate three separate times in 2022. This would increase the cost of municipal bonding for infrastructure projects
- Material costs – construction material costs are high and may continue to rise due to supply chain issues, inflation, and COVID-19 disruptions.

Given the expected increases in project costs, municipal governments should strongly consider investing in infrastructure in the near future, especially communities that plan to utilize the municipal bond market. The rising cost of infrastructure projects may lead to fewer infrastructure projects being bid, contracted and completed.

CONSIDER THE COST/BENEFIT OF OUTSOURCING INFRASTRUCTURE MANAGEMENT

Municipalities should periodically evaluate their infrastructure needs and assess whether they are addressing those needs in the most efficient manner. There are pros and cons to outsourcing infrastructure work, but in some cases, it might make more sense to hire a private entity to complete certain tasks or even to manage entire infrastructure systems.

Outsourcing infrastructure work might make sense in instances where the in-house staff does not have the expertise to do perform a specific type of work, or if their time is better spent on other types of work. Outsourcing may also be useful or required in situations where in-house staff has insufficient time to complete necessary work without incurring overtime.

When considering the cost of using in-house staff or hiring a private contractor, the private contractor typically appears to be more expensive. However, to understand the true cost of in-house staff, municipalities must account for the cost of any medical and retirement benefits.

CAPTURE INSTITUTIONAL KNOWLEDGE

When someone leaves a job they have held for a long period of time, they often take with them a wealth of institutional knowledge and historical context they amassed during their time on the job. The knowledge gap they leave behind can be very problematic, especially if they held a key position such as DPW commissioner, highway superintendent, or a wastewater treatment plant operator. There are a number of strategies that municipalities can employ to mitigate these challenges:

- Open communication – Discuss the future plans of staff in key positions, especially those that are approaching retirement age. Plans are not set in stone, but this type of communication can provide a sense of when a replacement may be needed.
- Succession planning – Identify staff who could potentially take on a leadership position and provide them with mentorship opportunities to learn about the roles and responsibilities of that position.
- Apprenticeships - Consider establishing apprenticeship programs to provide an experience-based learning and creating a pipeline of qualified workers that could potentially be hired to a full time position.
- Written planning documents – Written planning documents such as inventories, asset management plans, and capital plans all help ensure that vital information is captured and does not only exist in the minds of current staff members. Furthermore, planning documents help smooth over leadership changes as the new person in charge can better understand the goals and rationale behind previous decisions.

POLICY RECOMMENDATIONS

**Dedicate a Portion of
Gasoline Sales Tax
Revenue to Road
Infrastructure Spending**

**Create an
Infrastructure Academy**

**Establish the Capital
Asset and
Infrastructure Council
Proposed by
Comptroller DiNapoli**

**Provide More Grant
Funding for Planning
and Asset
Management**

**Make CHIPS Funding
More Reliable**

DEDICATE A PORTION OF GASOLINE SALES TAX REVENUE TO ROAD INFRASTRUCTURE SPENDING

The federal gas tax is an excise tax on gasoline that has been in existence since the 1930s. As of 1997, the entirety of the federal gas tax goes into the federal Highway Trust Fund. In 1993, the gas tax was set at 18.4 cents per gallon, and has not been raised or lowered since. On top of the federal gas tax, every state in the country has some kind of state-level gas tax. In New York State, the Motor Fuel Tax and the Petroleum Business Tax are excise taxes on motor fuel and other types of petroleum-based fuels. Revenue from these taxes go towards supporting the Highway and Bridge Trust Fund and another portion goes towards supporting mass transit.

In New York State, gas taxes are a hotly debated political issue. Democrats in the New York State Senate have proposed legislation that would enact the Climate and Community Investment Act (CCIA). The CCIA is aimed at raising revenue from corporate polluters and using that revenue to create green jobs. The CCIA includes a proposed gas tax increase of .55 cents per gallon. On the other side of the political spectrum, Republican state senators are calling for the suspension of the gas tax amid rising inflation and fuel costs for New York State residents.

Given the political implications of the gasoline tax, any proposed changes may be difficult to achieve. However, while this topic is debated, many municipalities still face an urgent need for infrastructure funding. Pattern proposes that some of this need can be addressed at the county level. A certain portion of county sales tax revenue from gasoline sales should be diverted to a dedicated fund for highway and bridge spending. The portion of the tax collected could be indexed to the price of gasoline so when gas prices are high, the percentage diverted to roads and bridges is reduced, and when gas prices are lower, the percentage is increased. Some of the revenue raised would be shared with municipalities within the county for local highway and bridge spending, and some would be kept for the county. This proposal raises revenue for road and bridge spending without increasing the tax burden on consumers.

CREATE AN INFRASTRUCTURE ACADEMY

In recognition of the demand for qualified professionals in infrastructure-related fields of work, New York State should create an “Infrastructure Academy” to recruit people to the industry and train them. The Academy could be a public-private partnership, with the state administering the program, and private firms in the industry providing financial support and participating as instructors and mentors in an apprenticeship program. The Academy would help mitigate the labor shortage for infrastructure jobs, create a skilled workforce that can land well-paying jobs, and ensure that the latest in-demand skills and best practices are being taught.

ESTABLISH THE CAPITAL ASSET AND INFRASTRUCTURE COUNCIL PROPOSED BY COMPTROLLER DINAPOLI

A 2019 report published by the NYS Office of the Comptroller recommended the creation of a State-level Capital Asset and Infrastructure Council. The recommendation is in response to the report’s finding that there is no coordinated approach to capital planning and financing at the state level, nor is there comprehensive reporting of the state’s assets and the condition of those assets. The 2019 report follows reports from 2010 and 2014 on the topic of state capital spending trends. A major finding from the 2014 report is that money dedicated to the state Highway and Bridge Trust Fund was regularly being siphoned off to be used for other non-capital purposes.

The proposed Capital Asset and Infrastructure Council would comprise five members appointed by the Governor. Three of the appointments would be based on recommendation of the President of the Senate, the Speaker of the Assembly, and the Comptroller. Key components of the proposed Capital Asset and Infrastructure Council include:

- Establishing uniform criteria and procedures to conduct inventories and assessments of capital assets,
- Establishing formal standards and definitions to guide capital replacement cycles and justify capital repair and replacement decisions.
- Producing an annual statewide capital needs assessment,
- Producing a 20-year strategic plan that guides state capital planning process, to be updated every two years.

PROVIDE MORE GRANT FUNDING FOR PLANNING AND ASSET MANAGEMENT

In recognition of the significant upfront work required to apply for grants and financing through the Environmental Facilities Corporation (EFC), the EFC offers a Wastewater Engineering Planning Grant to assist applicants with the cost of preparing a certified engineering report. The idea behind this grant should be replicated and expanded to support planning activities for other types of infrastructure projects. Grants should be made available through the state that provide financial support for technical planning and asset management planning. This will help local governments that lack the financial or internal staffing capacity to meet requirements of certain grant applications such as technical reports or a comprehensive inventory of existing infrastructure assets.

MAKE CHIPS FUNDING MORE RELIABLE

Many local governments in the Hudson Valley region rely heavily on funds from the Consolidated Local Street and Highway Improvement Program (CHIPS) to finance local road maintenance and improvements. In past years, there have been instances where the level of CHIPS funding has been jeopardized and, in some cases, used as a bargaining tool in larger political negotiations. The annual uncertainty associated with CHIPS funding has an adverse effect on local road management as it complicates both immediate and long term planning.

To combat this year-to-year uncertainty, legislative action should be taken to guarantee a minimum amount of annual funding for the CHIPS program over a three-year or even five-year period. Under this proposal, the existing apportionment method would remain unchanged, but the minimum total amount to be disbursed under the CHIPS program would be locked in for a multi-year period.



HUDSON VALLEY ROADS

The Hudson Valley is home to more than 17,500 miles of public roads owned and managed by a mix of federal agencies, state agencies, county governments, and local governments. The chart below shows the number of road miles by managing entity for each county in the Hudson Valley. Westchester County has the most overall road miles in the region, as well as the most overall municipal roads. Interestingly, Westchester has relatively few county road miles compared to other counties in the region. Putnam County, one of the smallest counties in the state, has the smallest amount of overall road miles in the region.

Hudson Valley Public Road Miles –by Jurisdiction

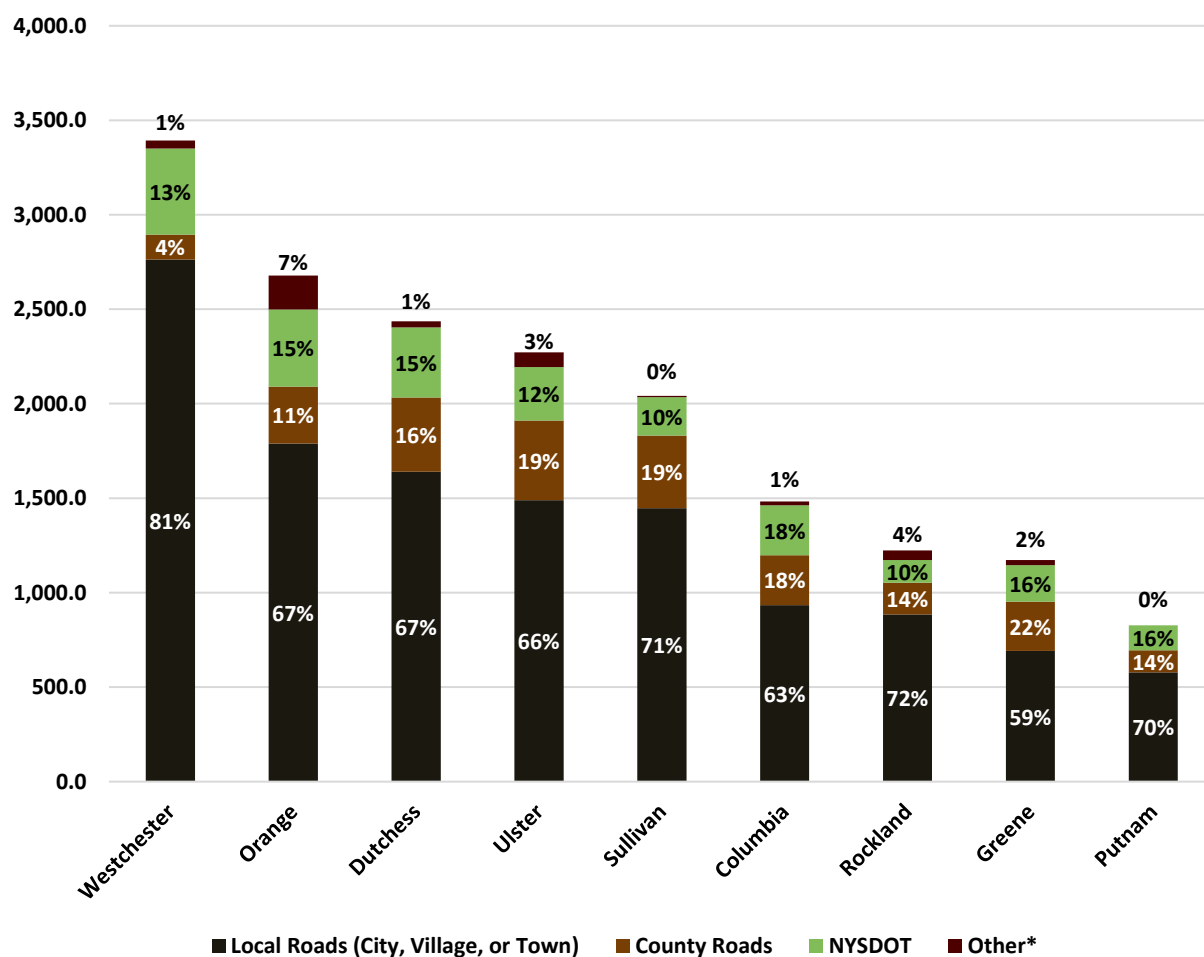
	Municipal (City, Village, or Town)	County	Total Local Roads (Municipal + County)	NYSDOT	Other*	Total (All jurisdictions)
Columbia	935	264	1,198	264	20	1,483
Dutchess	1,641	393	2,034	371	32	2,436
Greene	692	260	952	193	28	1,173
Orange	1,789	302	2,090	408	179	2,678
Putnam	578	116	695	133	0	828
Rockland	885	166	1,052	121	51	1,224
Sullivan	1,447	385	1,832	202	8	2,042
Ulster	1,489	422	1,911	283	78	2,272
Westchester	2,762	132	2,895	456	43	3,393
Hudson Valley	12,217	2,440	14,657	2,431	439	17,528

Source: NYSDOT Roadway Inventory 2017

* Other can include state parks, local parks, state agencies, local agencies, or the U.S. Army

The chart below uses the same data as the table above to visualize the distribution of road miles within each county by jurisdiction. One of the primary takeaways from this chart is that local roads account for more than half of all roads in every Hudson Valley county, and in most cases, it is closer to 70% of all roads. This illustrates the significant collective importance of every local municipal highway department. While some state and county roads may have higher traffic volume, the condition of local roads is a major factor for the quality of the overall road network.

Road Miles by Jurisdiction: Hudson Valley Counties

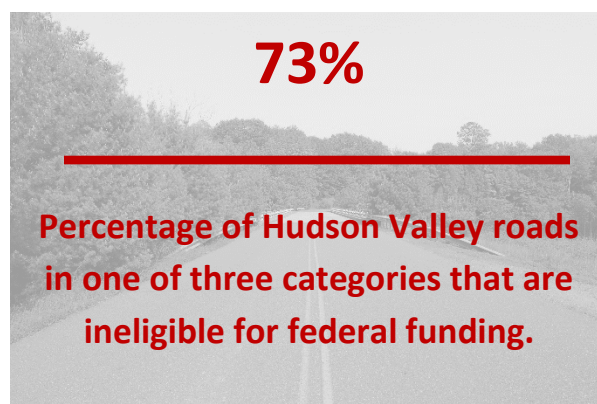


Source: NYSDOT Roadway Inventory 2017

The chart also reveals that more rural counties like Columbia, Greene, and Ulster, generally have a larger share of their roads (~20%) managed by the county. Orange County has the largest share of roads in the “Other” category. This is mostly explained by the presence of West Point military academy which is operated by the U.S. Army. The chart also reveals that Westchester County has both the most total number of municipal road miles and the largest share of municipal road miles in the region; 81% of road miles in Westchester County are under the jurisdiction of local municipalities.

All public roads in the United States are assigned a functional classification code by the Federal Highway Administration (FHWA). Functional classification codes are based on the purpose a road segment serves in the context of traffic flow in the broader road network. The ownership of a road has no bearing on its assigned Functional classification code. There is a hierarchy of seven functional classification codes. NYDOT further breaks down the seven categories into urban and rural, resulting in a total of fourteen functional classification codes.

Functional classifications codes are an important tool for understanding how a road network is designed to work internally, and how it connects and relates to road networks in neighboring communities. They can also be useful during transportation and capital planning processes as the codes can help prioritize investment to roads where it will be the most impactful. Functional classification codes also have federal funding implications; of the fourteen designations, there are three categories that are ineligible for Federal Aid through the Surface Transportation Program: Rural Local (09), Urban Local (19), and Rural Minor Collector (08). These road categories are too small to warrant federal spending, instead, federal aid focuses on more heavily trafficked roads to get more value per dollar spent. In the Hudson Valley, 73% of roads are classified as one of the three functional classification code categories that are ineligible for federal funding.



Road Miles by Function Classification Code

Functional Classification	Principal Arterial - Interstate		Principal Arterial – Other Freeway/ Expressway		Principal Arterial - Other		Minor Arterial		Major Collector		Minor Collector		Local	
FHWA	1		2		3		4		5		6		7	
NYSDOT	Rural 01	Urban 11	Rural 02	Urban 12	Rural 04	Urban 14	Rural 06	Urban 16	Rural 07	Urban 17	Rural 08	Urban 18	Rural 09	Urban 19
Columbia	15		32		62	23	42	31	85	22	206	6	811	147
Dutchess		18	27	14	65	80	23	72	99	196	155	10	751	925
Greene	23	1		1	5	2	66	11	119	21	132	2	741	50
Orange	19	53	4	27	9	77	44	203	32	363	59	17	324	1,449
Putnam		16	8	6	10	30	23	63	21	88	22	0	113	426
Rockland		21		27		68		175		137				795
Sullivan			25	21	14	10	29	29	140	49	271	20	1,197	238
Ulster	3	38		4	69	67	19	59	70	143	188	14	1,033	565
Westchester		63		110		209		419		298				2,294
Region	60	211	96	209	234	564	245	1,063	565	1,317	1,034	70	4,970	6,890

Source: NYSDOT Roadway Inventory 2017.

*red indicates ineligibility for Federal Surface Transportation Funding

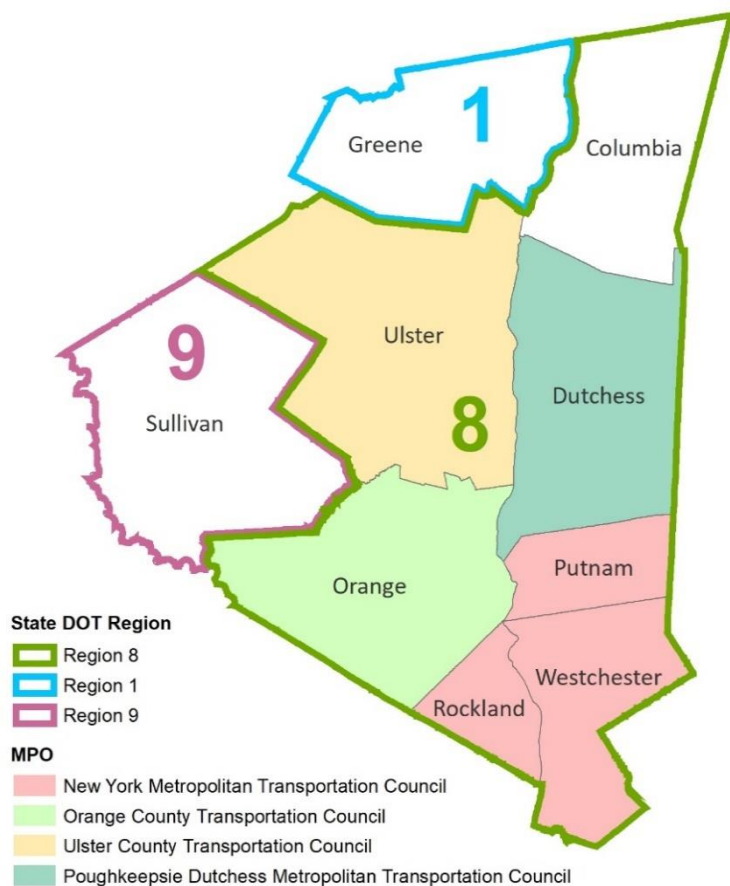
REGIONAL TRANSPORTATION PLANNING ENTITIES

For planning and operational purposes, NYSDOT divides the New York into 11 different DOT regions along county borders. Most of the counties in the Hudson Valley region are within DOT Region 8. Columbia County is DOT Region 1, and Sullivan County is in DOT Region 9.

Metropolitan Planning Organizations (MPOs) were created in the early 1960s by the federal government to encourage regional cooperation on transportation planning. Specific composition of MPO's vary, but they all include representatives from local government and relevant state agencies. Examples of agencies that are members of some MPOs in the region include: NYSDOT, MTA, or the NY Thruway Authority. MPOs are responsible for creating long range transportation plans that establish goals that play a key role in guiding funding priorities. MPOs also create Transportation Improvement Plans (TIPS), which establish a list of projects that are proposed to receive federal funding.

There are four MPOs that fall within the Hudson Valley region. The three counties of Greene, Columbia, and Sullivan are the only counties in the region not covered by an MPO. Part of the New York Metropolitan Transportation Council (NYMTC) extends into the Hudson Valley, covering Westchester, Rockland, and Putnam counties.

The Ulster County Transportation Council (UCTC), the Orange County Transportation Council (OCTC), and the Poughkeepsie Dutchess Metropolitan Transportation Council (PDMTC) are all completely within the Hudson Valley Region. Together, these three MPOs form the Mid-Hudson Valley Transportation Management Area (MHVTMA). Transportation Management Areas are created when an Urbanized Area, as defined by the U.S. Census Bureau, reaches a population of 200,000 or more. Transportation Management Areas are intended to foster additional coordination and regional transportation planning.



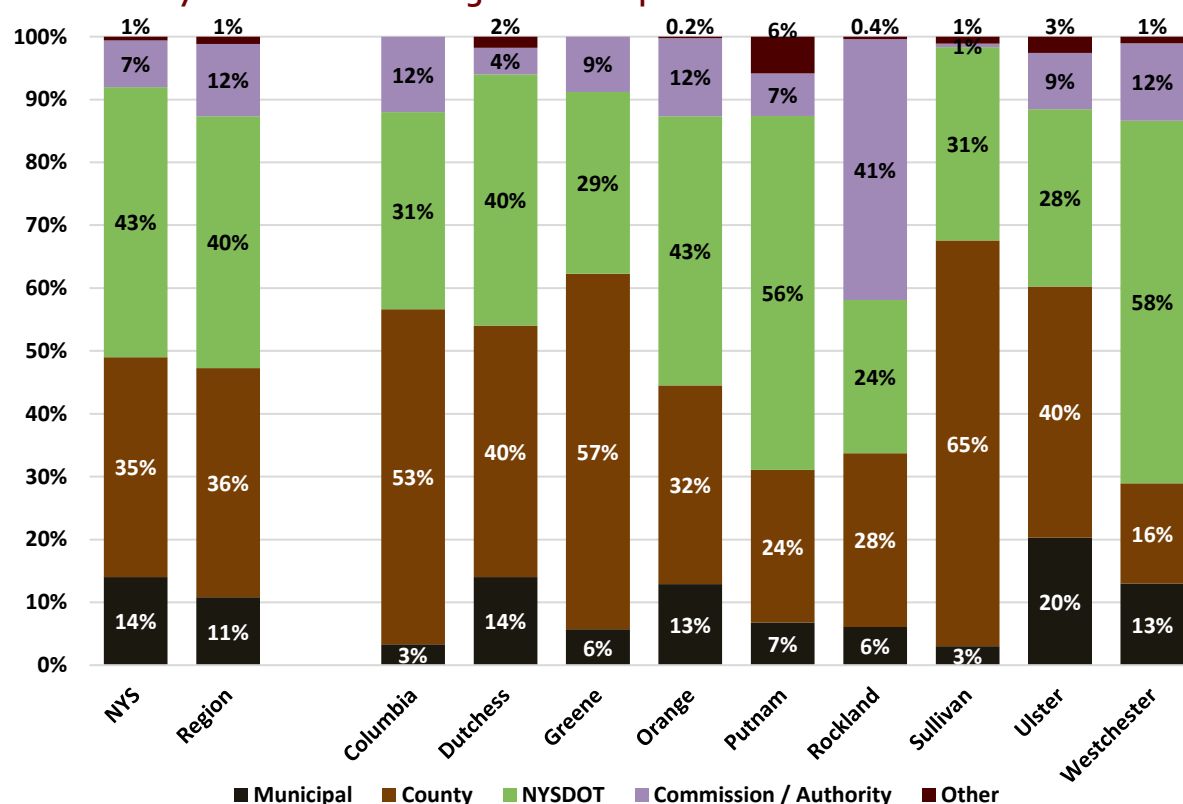
HUDSON VALLEY BRIDGES & CULVERTS

There are 3,136 Bridges in the Hudson Valley region with an average age of 54 years. Unlike roads, the vast majority of bridges are owned by counties or NYSDOT, not local municipalities (towns, villages, and cities). In the Hudson Valley region, 36% of bridges are owned by counties, 43% are owned by NYSDOT, and only 11% are owned by local municipalities. This distribution of bridge ownership closely matches the statewide distribution.

Within the Hudson Valley region, there is some variation in bridge ownership from county to county. For example, Rockland County has an unusually high percentage of bridges owned by a Commission / Authority. This is mostly due to the fact that many of the bridges in this small county are owned by the Palisades Interstate Park Commission. There are also several bridges in Rockland County that are owned by the NYS Thruway Authority.

The chart also reveals that the more rural counties in the region tend to have a greater percentage of their bridges owned by the county. In Sullivan County, for example, well over half (61%) of bridges are owned by the county. Similarly, over half of the bridges in the rural counties of Greene and Columbia County are county-owned.

Hudson Valley Distribution of Bridge Ownership



Source: NYS Department of Transportation; "Bridge Conditions" Dataset. Last Updated February 2020, Accessed September 2021.

NYSDOT does a biannual inspection of public highway bridges to determine structural condition and safety. A condition score is assigned to each bridge from 1 to 7. A score of 1 means that the bridge is totally deteriorated or in failed condition, and a score of 7 means that the bridge is in new condition with no deterioration. The average condition score for Hudson Valley is 5.3, slightly lower than the statewide average of 5.6. There are only three bridges in the region that have a condition score of 1. In many cases state bridge data is used by counties and municipalities to help prioritize maintenance and funding.

Hudson Valley Bridge Condition Score

	Average Age in 2021 (years)	Average Condition Score
Columbia	60	5.1
Dutchess	58	5.2
Greene	45	5.7
Orange	50	5.2
Putnam	60	5.0
Rockland	52	5.3
Sullivan	48	5.5
Ulster	48	5.1
Westchester	62	5.3
<i>Hudson Valley</i>	54	5.3
<i>New York State</i>	51	5.6

Source: NYS Department of Transportation; "Bridge Conditions" Dataset. Last Updated February 2020, Accessed September 2021.

Source (Condition Score): NYS Department of Transportation "NYS Bridges" GIS dataset. Last revised February 2019. Accessed 10/8/21

The Federal Highway Administration (FHWA) maintains the National Bridge Inventory (NBI) and uses bridge inspection data collected by NYSDOT to calculate a condition rating using criteria and a classification system that is different from NYSDOT. Since 2018, the FHWA has classified bridges as either Good, Fair, or Poor. The definition of “Poor” is the same as the “Structurally Deficient” which is a legacy classification used prior to 2018. 2021 data from the NBI shows that there are 411 bridges classified as Poor in the Hudson Valley, accounting for 13% of total bridges in the region. The data also shows that approximately a quarter of the bridges classified as poor in New York State are located in the Hudson Valley region.

Among the counties in the region, Ulster County has both the highest number (89) and highest percentage (23%) of bridges classified as Poor. Westchester County has one of the lowest percentage (9%) of bridges classified as Poor, but also one of the highest number (70) of bridges classified as Poor. This is due to the fact that Westchester County has the highest total number of bridges in the region.

FHWA Bridge Condition Score

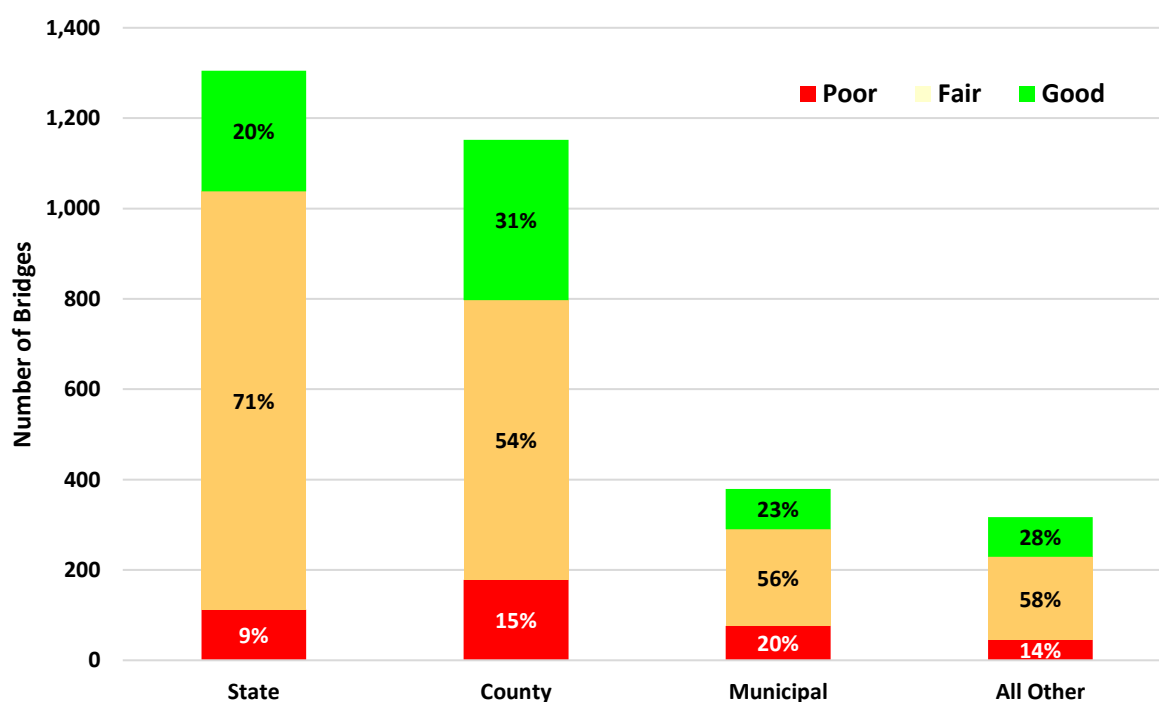
	Total Bridges	Condition Score			% Poor
		Good	Fair	Poor	
Columbia	242	45	153	44	18%
Dutchess	334	73	218	43	13%
Greene	228	91	117	20	9%
Orange	472	114	284	74	16%
Putnam	104	17	75	12	12%
Rockland	246	62	166	18	7%
Sullivan	368	135	192	41	11%
Ulster	390	76	225	89	23%
Westchester	769	186	513	70	9%
Hudson Valley	3,153	799	1,943	411	13%
New York State	17,555	6,355	9,528	1,672	10%

Source: Federal Highway Administration, National Bridge Inventory 2021

An examination of bridge conditions and ownership in the Hudson Valley reveals that the state owns the most bridges, closely followed by counties in the region. Bridges that are owned by entities other than New York State, a county, or a municipality are grouped together in the “All Other” category. Examples of entities in the “All Other” category include transit authorities, toll authorities, and the federal government.

The chart also shows that a higher share of county-owned bridges (15%) are classified as Poor compared to only 9% of State-owned bridges. Municipally owned bridges have the highest percentage (20%) of bridges classified as Poor; however, there are relatively fewer total municipally owned bridges compared to counties and the State.

Hudson Valley Bridge Condition by Ownership



Source: Federal Highway Administration, National Bridge Inventory 2021

The NBI includes estimates of the type and cost of work needed to improve bridges to the point that they will provide the type of service needed. Improvements can range from surface repair to total bridge replacement, but does not include maintenance. The table below shows the estimated cost in 2021 of needed bridge improvements for bridges under the jurisdiction of municipalities (cities, towns, and villages) and counties in the Hudson Valley. The data is also broken down by FHWA condition rating (Good, Fair, or Poor).

The data show that an estimated \$671 million is needed for municipal bridge improvements, and \$1.8 billion is needed for county bridge improvements in the Hudson Valley. This does not include bridges maintained by the state and other agencies, which also have substantial estimated improvement costs. Leaving out bridges classified as Good or Fair, a combined \$493 million is necessary to address needed improvements just for municipal and county bridges with a classification of Poor.

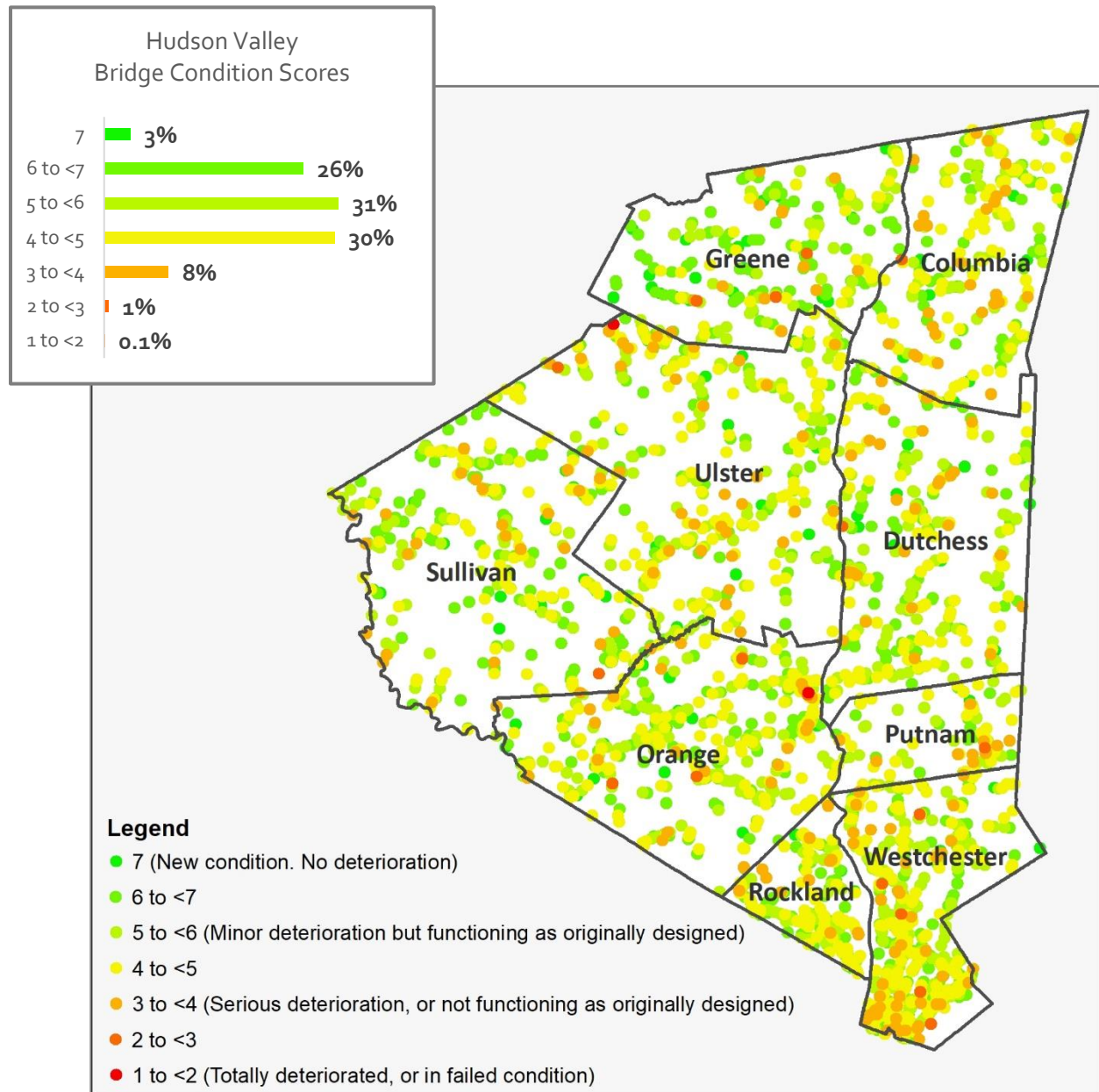


The data also shows that improvements to bridges with a classification of Poor have a higher average cost than bridges with a classification of Good or Fair. Bridges with a classification of Fair have the lowest average cost. This indicates that when maintenance is deferred and bridges are allowed to reach a classification of “Poor,” the cost to repair or replace the bridge increases.

	FHWA Condition rating	Municipal Bridges		County Bridges	
		#	%	#	%
Number of Bridges	Good	89	23%	355	31%
	Fair	214	56%	619	54%
	Poor	76	20%	178	15%
	Total	379		1,152	
Total Estimated Cost of Improvements (in millions of dollars)	Good	\$161 M		\$571 M	
	Fair	\$317 M		\$957 M	
	Poor	\$193 M		\$300 M	
	Total	\$671 M		\$1,828 M	
Average Estimated Cost of Improvements per Bridge (in millions of dollars)	Good	\$1.8 M		\$1.6 M	
	Fair	\$1.5 M		\$1.5 M	
	Poor	\$2.5 M		\$1.7 M	
	All	\$1.8 M		\$1.6 M	

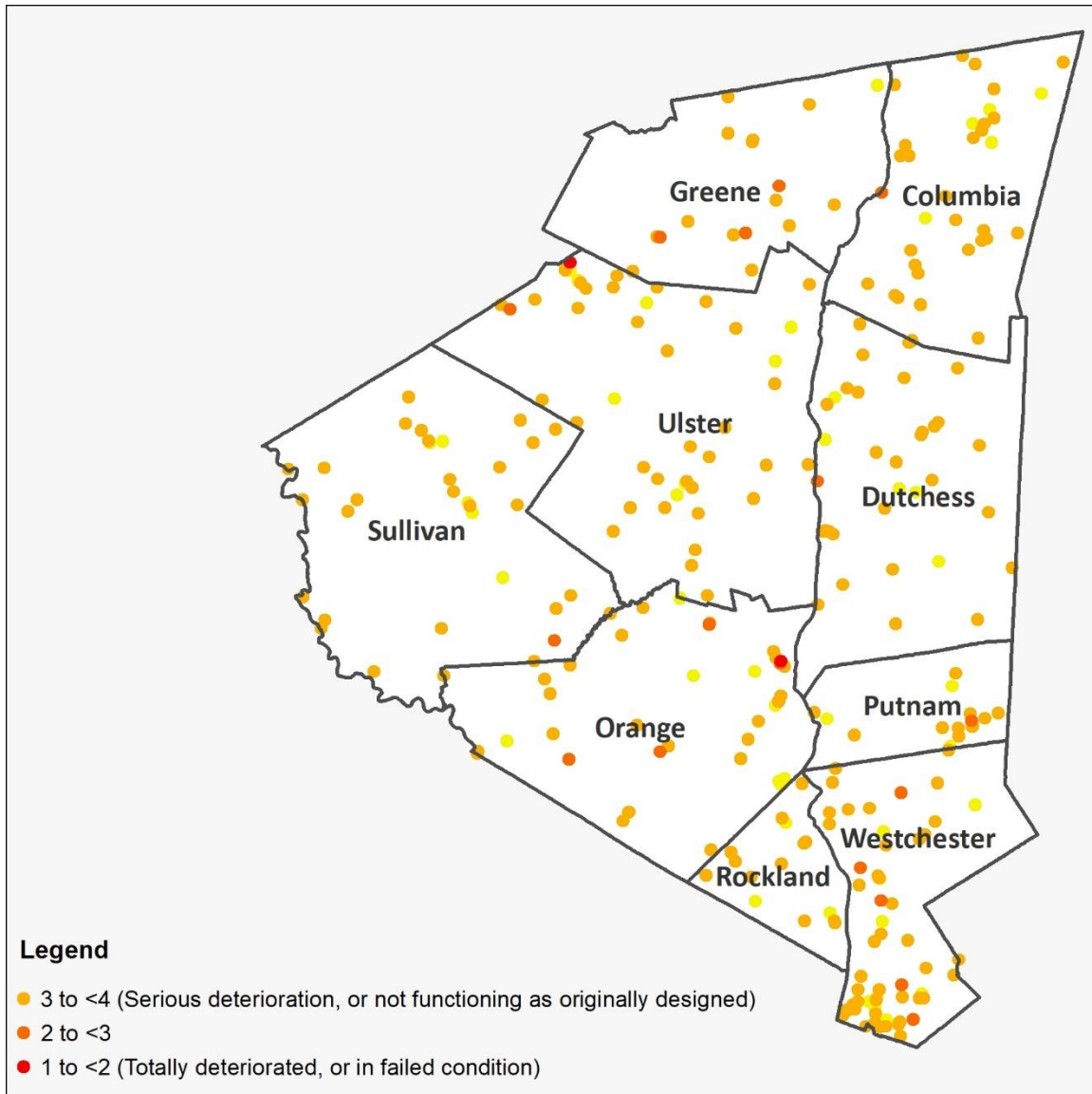
Source: Federal Highway Administration, National Bridge Inventory 2021

There is a high concentration of bridges in Westchester County, especially in the south where there is high population density and a more urban environment. With 770 total bridges, Westchester County by far has the most bridges of any county in the region. Westchester County bridges also have the highest average age in the region at 62.



Source: NYS Department of Transportation "NYS Bridges" GIS dataset. Last revised February 2019. Accessed 10/8/21

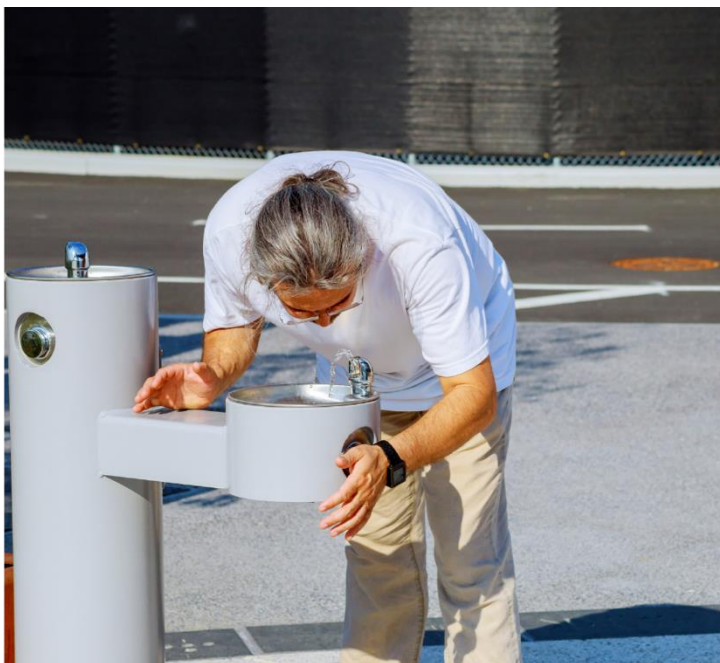
The map below is the same as the one on the previous page, but only shows bridges with a rating of 1 through less than four. Overall, 9% of bridges in the Hudson Valley have a score of less than four. Among the nine counties in the region, Putnam and Columbia have the largest percentage (15%) of bridges with a score of less than four. However, Putnam County has a relatively low number of bridges overall, and is in fact tied with Rockland County for the lowest number of bridges with a score less than four, at 15 bridges.



Source: NYS Department of Transportation "NYS Bridges" GIS dataset. Last revised February 2019. Accessed 10/8/21

HUDSON VALLEY DRINKING WATER SYSTEMS

Drinking water is supplied to the public using infrastructure systems that vary in ownership structure, size, and complexity. Throughout the Hudson Valley and New York State, there is a mix of publicly owned and privately owned drinking water systems. Approximately 80% of the Hudson Valley population gets water from a public water system. The rest of the population accesses water through private water systems and private wells.



For the most part, local municipal governments (towns, villages, and cities) operate the public water systems that serve large populations. Some communities in New York State have established water authorities to operate their water systems. Water authorities are public corporations established by State legislation. In the Hudson Valley, there are two county-wide water authorities: The Dutchess County Water and Sewer Authority and the Orange County Water Authority. Rockland County is unique in that the majority of its public drinking water supply is managed by a large private entity, Suez Water NY. In December 2021, the New York Public Service commission approved a merger between Suez Water NY and Veolia North America, both of which are subsidiaries of large international companies. The Public Service Commission also agreed to a study examining whether Rockland County's water system should be de-privatized.

Throughout the Hudson Valley region, there are many drinking water systems that are aging and are reaching the end of their useful lives. Aging drinking water infrastructure is associated with a number of problems including water loss, contamination, inaccurate meter readings and more. Exacerbating these issues is the fact that replacing or repairing drinking water infrastructure is typically extremely expensive. This can be very problematic for municipalities that do not have a good working knowledge of their drinking water infrastructure or have otherwise not planned for the expense of repairing or replacing drinking water infrastructure systems. Funding drinking water infrastructure is covered in more detail later in this report.

Public water systems are generally classified in two major categories: community water systems (CWS) and non-community water systems. Non-community water systems are further categorized into transient non-community water systems (TNCWS) and non-transient non-community water systems (NTNCWS). The CDC, which has an interest in drinking water systems due to their impact on public health, defines these categories as follows:

- **Community Water System (CWS):** A public water system that supplies water to the same population year-round.
- **Transient Non-Community Water System (TNCWS):** A public water system that provides water in a place such as a gas station or campground where people do not remain for long periods of time.
- **Non-Transient Non-Community Water System (NTNCWS):** A public water system that regularly supplies water to at least 25 of the same people at least six months per year. Some examples are schools, factories, office buildings, and hospitals, which have their own water systems.

In the Hudson Valley region, approximately 80% of the Hudson Valley population gets water from a public community water system (CWS). The rest of the population accesses water for residential purposes through private water systems and private wells. Among the counties in the region, Putnam County has the lowest percentage of its population that is served by a CWS.

	Estimated Population Served	2020 Population	Estimated Percent of Population Served
Columbia	27,875	61,570	45%
Dutchess	202,060	295,911	68%
Greene	28,457	47,931	59%
Orange	317,281	401,310	79%
Putnam	36,916	97,668	38%
Rockland	303,513	338,329	90%
Sullivan	48,392	78,624	62%
Ulster	95,615	181,851	53%
Westchester	925,663	1,004,457	92%
Hudson Valley	1,985,772	2,507,651	79%

Source: Pattern for Progress analysis of data from the New York State Department of Health and the U.S. Census Bureau, 2020 Decennial Census

HUDSON VALLEY SEWERS & WASTEWATER TREATMENT

Similar to drinking water systems, municipal sewer systems and wastewater treatment plants vary considerably in size and complexity. There are essentially three major categories of sewer systems.

- Sanitary sewer systems – these systems are designed for human waste only. They consist of a closed system pipes and sometimes pump stations designed to carry the waste to a waste water treatment plant.
- Storm / surface systems – these systems are designed to collect precipitation and runoff and purvey it back into the environment untreated. Storm systems are more necessary in urbanized area with a significant amount of impervious surfaces
- Combined Systems – Combined systems are designed to collect both human waste and stormwater and carry it to a wastewater treatment plant. These systems are typically designed to have overflow outlets into waterbodies in cases where the system becomes overloaded, such as when there is heavy precipitation. In these instances, untreated wastewater is put directly into the environment. Given the health and safety concerns associated with combined sewers, these types of historical systems are considered outdated and no new systems are designed this way. The focus has shifted to replacing or retrofitting them to mitigate their harmful impacts.

Municipalities handle wastewater treatment in a variety of ways. Some municipalities own and operate their own wastewater treatment plants, or own a wastewater treatment plant but outsource its operation to a private company. Some municipalities enter into agreements to have wastewater purveyed to and treated by a wastewater treatment plant in a different municipality. Like drinking water, some wastewater infrastructure is managed by an established authority, such as The Dutchess County Water and Sewer Authority.

Aging sewer infrastructure, particularly buried sewer pipes, is a challenge for many communities in the Hudson Valley. It is especially problematic for municipalities that were established hundreds of years ago and have active sewer infrastructure that was built well over a hundred years ago.

In the Hudson Valley region, the average municipal wastewater treatment plant was built in 1969, meaning the average facility was built over 50 years ago. As technology and regulations changed over time, many of the treatment plants have been updated or retrofitted.

Age of Municipal Wastewater Treatment Plants

	Average Year Built	Average Age in 2021
Columbia	1960	61
Dutchess	1969	52
Greene	1981	40
Orange	1968	53
Putnam	1980	41
Rockland	1963	59
Sullivan	1967	54
Ulster	1968	54
Westchester	1963	58
Hudson Valley	1969	52

Source: NYSDEC: "Current Descriptive Data of Municipal Wastewater Treatment Plants," Updated June 10, 2019, Accessed October 2021

In New York State, wastewater discharge and wastewater treatment is regulated through the Department of Environmental Conservation's State Pollutant Discharge Elimination System (SPDES). A SPDES permit is required for the following activities:

- Using or building a pipe or outlet that discharges wastewater into surface or groundwater,
- Operating or building a waste disposal or treatment system

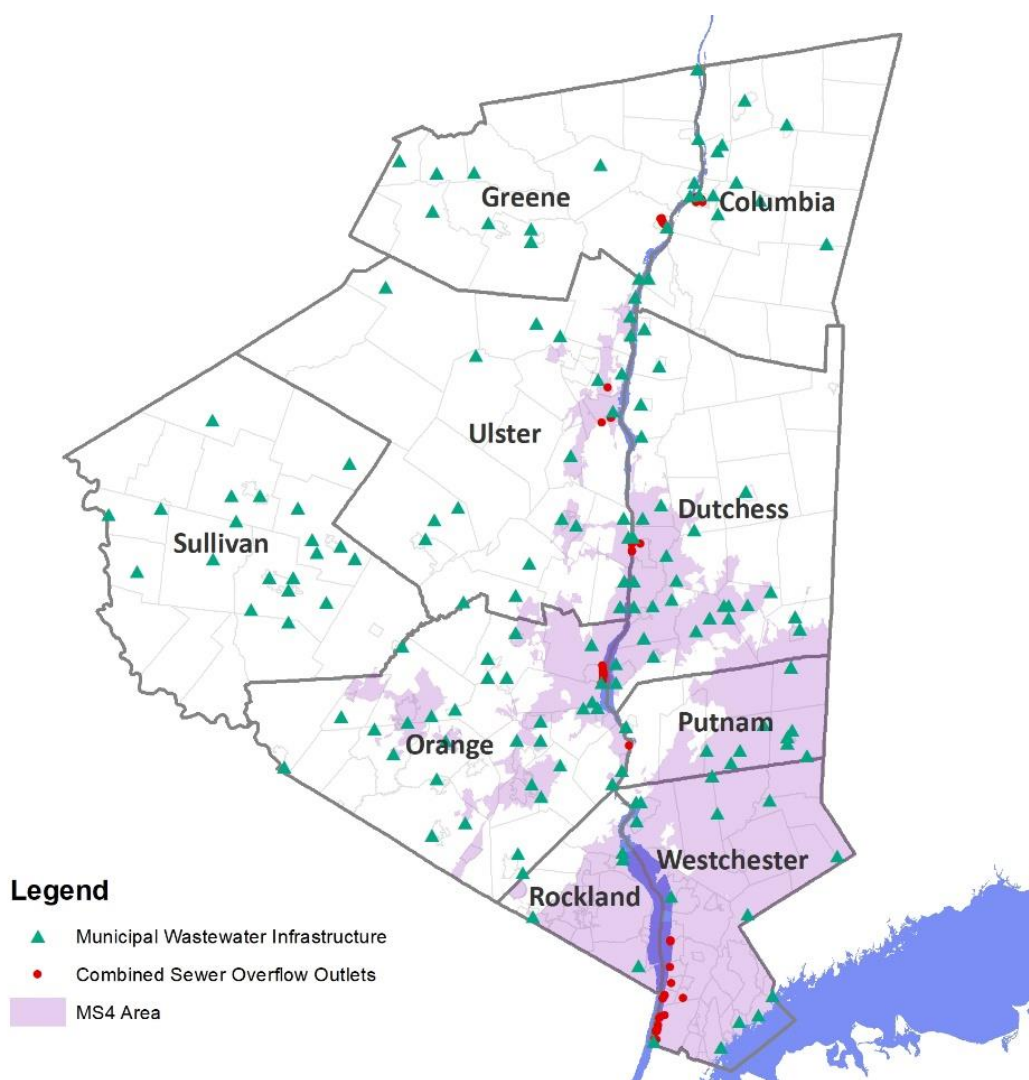
Furthermore, under a federal law commonly referred to as "Stormwater Phase II," there are additional regulatory requirements for municipal stormwater systems located in census-designated urbanized areas and other certain designated areas. These systems are called Municipal Separate Storm Sewer Systems (MS4s). MS4 operators are required to implement a stormwater management plan that utilizes approved best practices and includes six specific minimum control measures:

1. Public Education and Outreach
2. Public Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-construction Runoff Control
6. Pollution Prevention/Good Housekeeping

The map below shows three different elements related to sewers and wastewater treatment in the Hudson Valley:

1. the location of municipal wastewater treatment plants and municipal pump stations (green triangles)
2. the outlet location of combined sewer overflows (red circles)
3. Areas subject to the MS₄ regulation (shaded purple)

The Map reveals that much of the lower Hudson Valley is subject to MS₄ regulation, including virtually all of Westchester County and Rockland County outside of Harriman State Park. It also reveals that combined sewer overflow outlets are primarily found in cities along the Hudson River such as Hudson, Kingston, Poughkeepsie, Newburgh, and Yonkers.



Sources: NYSDEC: "Municipal Wastewater Treatment Plants," Updated December 2, 2020, Accessed October 2021; "Combined Sewer Overflows (CSOs): Beginning 2013," Updated November 10, 2020, Accessed October, 2021; "Stormwater Regulated MS₄ Areas," Updated March 2020, Accessed October, 2021

FUNDING ROADS AND BRIDGES

The entity in charge of budgeting for roads and bridges varies from municipality to municipality. Some municipalities have a Department of Public Works department (DPW). The head of the DPW may be responsible for creating the budget for roads and bridges, or there may be a highway superintendent or someone else who is responsible for roads and bridges. Many municipalities have no DPW department but do have a superintendent of highways. Staffing levels for highway departments and highway vary based on the size of the municipality and how much work is done by in-house staff, and how much is contracted out.

As demonstrated earlier in this report, local municipalities are responsible for a small percentage of the total bridges in the region. In fact, some municipalities have no bridges under their jurisdiction. The responsibility of maintaining and repairing bridges commonly falls within the same municipal department or person in charge of roads.

Ideally, large investments in roads and bridges are guided by a capital plan adopted by the municipality. Capital plans take the long-term view of investments, help spread the cost of large investment over multiple years, and allows decision makers to make spending decisions in the context of the big picture.

Municipal road and bridge capital improvement projects are primarily funded through a mix of debt financing and grant / aid money from the state and federal government. There typically are not any user fees associated with local roads and bridges meaning there is no revenue source directly attributed to roads and bridges. Many municipalities rely heavily on state aid to fund their road work. This dependence creates situations where municipalities create work plans based on the amount of funding they receive instead of first assessing the work that needs to be done first, and then calculating the funds necessary to complete the work.



\$476.8 million

The gap between the estimated cost of \$493 million to repair 17% of Municipal and county-owned bridges in the Hudson Valley that are classified as being in poor condition and the latest round of Bridge-NY funding award of \$16.2 million to bridge projects in the Hudson Valley.

DEBT FINANCING

One of the primary debt financing mechanism used by local governments to finance infrastructure projects is the municipal bond market. Municipal bonds are an attractive option for municipalities as interest rates are generally lower than loans from commercial banks. This is due to the fact that interest municipal bonds is exempt from federal taxation. Municipal governments may also finance infrastructure projects using direct loans from private commercial banks.

CHIPS PAVE-NY, and EWR

CHIPS (Consolidated Local Street and Highway Improvement Program), is a New York State program created in 1981 for funding municipal transportation infrastructure that is not part of the state highway system. Eligible projects include highway resurfacing or reconstruction, traffic control devices, bridge/culvert rehabilitation or replacement, and other transportation related projects. EWR (Extreme Weather Recovery) is another State program that provides funding municipal transportation infrastructure that is not part of the state highway system. Project eligibility for EWR is the same as CHIPS. PAVE-NY is yet another state program that provides funding to municipalities for construction and rehabilitation of roads. Unlike CHIPS and EWR, PAVE-NY funds cannot be used for bridge/culvert repair or replacement.

Together, the CHIPS, EWR, and PAVE-NY represent a significant funding stream that is heavily relied upon by many municipalities in the region. Following the approval of the State budget every year, a CHIPS, PAVE-NY, and EWR dollars are allocated to each municipality in the state. The allocation is determined by an apportionment formula based on metrics such as motor vehicle registrations, centerline highway mileage, and vehicle miles traveled.

CHIPS, PAVE-NY, and EWR funding is distributed to municipalities as a reimbursement. Municipalities wishing to access these funds must certify that they have adhered to the requirements of the program and request reimbursement. Program requirements include things like design standards, a minimum expected useful service life of 10 years, and proper documentation.

CHIPS, PAVE-NY, and EWR funding can be used as matching funds for other Federally or State funded capital projects. This provides an opportunity for municipalities to secure additional infrastructure funding. If CHIPS, PAVE-NY, or EWR funds are used as a local match, the project must comply with New York State's Complete Streets Law, which includes provisions to increase street accessibility and inclusion. If CHIPS, PAVE-NY, or EWR funds are used a local match for a Federal-aid project, the project is subject to NYSDOT's Local Projects Manual (LPM), which includes additional requirements such as design standards, record keeping, and construction specifications.

Additional CHIPS resources:

LINK: [CHIP Guidelines](#)

LINK: [Eligible Projects for CHIP & EWR](#)

LINK: [Eligible projects for PAVE-NY](#)

BRIDGE-NY

BRIDGE-NY is a state reimbursement program that provides funds for public bridge and culvert replacement and rehabilitation. Only public bridges that carry vehicular traffic are eligible for BRIDGE-NY funds. Similarly, only culverts that are on a public highway are eligible for this program.

The BRIDGE-NY Program has a 2-year funding cycle. For the past two funding cycles, the deadline for draft applications has been spring of the first year. In the previous funding cycle (2018), 25 bridge and culvert projects were awarded in the Hudson Valley with an average value of \$1.3 million. As of the publishing of this report, the 2021-2022 funding cycle deadline has already passed.

For the fiscal years 2020-21 and 2021-22, a total of \$216 million in BRIDGE-NY funds were made available statewide. Out of the \$216 million, approximately \$28.4 million for bridge projects, and \$10.5 million for culvert projects was made available in the Hudson Valley. The maximum award for a bridge project is \$5 million and the maximum award per bridge cannot exceed \$250,000. The maximum award for a culvert project is \$1 million and the maximum award per culvert cannot exceed \$50,000. NYSDOT will provide up to 95% of project costs for bridge projects (5% local match needed) and up to 100% of project costs for culvert projects.

BRIDGE-NY is a competitive program. Applications are scored in a two-step process that accounts for existing conditions, facility importance, and resiliency. The first step produces a data-driven score from zero to one hundred. The second step involves qualitative and additional quantitative review by experts at NYSDOT, representatives from the Town and County Highway Superintendents Associations, and representatives from Empire State Development.

Additional Bridge-NY Resources:

LINK: [BRIDGE-NY website](#)

LINK: [BRIDGE-NY overview](#)

LINK: [BRIDGE-NY Frequently Asked Questions](#)

FEDERAL HIGHWAY ADMINISTRATION FUNDING FHWA

Federal funding highway spending started in earnest in the late 1950s when the Highway Trust Fund was established in 1956 to fund interstate highways. The Highway trust fund still provides surface transportation financing today through revenue generated by user fees such as gas tax. These federal funds are dispersed to State DOTs who then distribute to the funds to Metropolitan Planning Organizations MPOs and local public agencies.

In 2015, the Fixing America's Surface Transportation Act (FAST Act) was signed into law. The FAST Act authorized \$305 billion in federal infrastructure spending over the five years of 2016 to 2020. The FAST Act established a level of certainty for federal infrastructure spending. The FAST Act, which was originally set to expire in December of 2020, was extended several times. In September 2020, the FAST Act was extended by a year until late September. In late 2021, in the midst of the Bipartisan Infrastructure Bill, the FAST Act was extended by a month until October 31 and then again until December 3. From 2016 to 2021, New York State received over \$10.8 billion in from the FAST Act. The majority of that money came through programs dedicated to road and bridge infrastructure by way of the following programs.

- **The National Highway Performance Program (NHPP)** - This program provides funds for the National Highway System. Eligible activities include but are not limited to: reconstruction or rehabilitation of federal-aid eligible bridges and roads, installation of highway communication equipment, and training bridge and tunnel inspectors. In 2020, \$968 million was apportioned to New York State under this program.
- **The Surface Transportation Block Grant Program** - Formally called the Surface Transportation Program (STP). The most flexible federal-aid highway program in terms of eligible activities. This program can generally be used for projects that improve or preserve the condition of federal-aid eligible highways, bridges, and tunnels as well as bicycle and pedestrian infrastructure. In 2020, \$487 million was apportioned to New York State under this program.
- **The Highway Safety Improvement Program** - The goal of this program is to fund projects that reduce traffic accidents and fatalities. Eligible activities under this program are, in general, infrastructure projects that improve safety. In 2020, \$99 million apportioned to New York State in under this program.

MARCHESELLI PROGRAM

Most federal funding provides up to 80% of total project cost, with the remaining 20% needing to be matched. One way municipalities in New York can account for the remaining 20% is through the Marcheselli program. The Marcheselli program is a revenue sharing program between the state and local municipalities, including counties. The program is competitive and municipalities must apply for these funds. Marcheselli funds can cover up to 75% of the remaining project cost that is not covered by the federal aid. In a typical federal aid project, this means that the breakdown of funding source would be 80% federal, 15% state, and 5% local. Municipalities that are not within an MPO have a harder time accessing this program, as it is more difficult for them to get projects listed on the STIP and therefore be eligible for federal aid.

STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM (STIP) AND TRANSPORTATION IMPROVEMENT PLANS (TIP)

NYSDOT is required by federal law to produce a Statewide Transportation Improvement Plan (STIP). The primary function of the STIP is to create a comprehensive statewide list of all projects that are proposed to be the recipient of federal transportation funds. Though there are some exceptions, the majority of federal funding is only available for roads and bridges that are part of the national highway system.

STIPs are required to be updated at least every four years. The development of the STIP is done with significant collaboration with Metropolitan Planning Organizations (MPOs) in the state. MPOs create their own Transportation Improvement Program (TIP) with a list of projects proposed to receive federal aid. The most recently adopted STIP for New York State is for the years 2020 through 2023.

For municipalities that are not within an MPO, projects are included in the STIP through direct collaboration with their regional NYSDOT office. In the Hudson Valley region, the counties of Sullivan, Greene, and Columbia are the only counties that are not part of an MPO. These three counties all fall within different NYSDOT regions so municipalities in these counties have different NYSDOT regional offices that they work with to get projects included in the STIP.

FUNDING SEWER AND WATER INFRASTRUCTURE

As previously mentioned, replacing or even repairing sewer and water infrastructure systems can be very expensive given their complexity and the fact that much of these systems are underground. Though they are expensive, these systems are critical to the health, safety, and livability of the communities that rely on them. This highlights how important it is for municipal sewer and water systems to be properly funded.

At a local level, sewer and water infrastructure can be difficult to manage for several reasons. It can be difficult and expensive to properly assess the condition of the buried portions of these systems. In some cases, municipalities do not even have a good handle on where some of the underground infrastructure is located. The useful life of a sewer and water infrastructure is far longer than the terms of most elected officials. This can put a damper on the political will for large investments or long-term borrowing for infrastructure projects. Furthermore, raising water and sewer rates is typically unpopular, even if it is the prudent thing to do.

All these challenges contribute to deferred maintenance of sewer and water infrastructure, as it is out of sight and affected by the false impression that it can always be dealt with next year or by the next elected official. Unfortunately, this approach often ends up costing more in the long run as regular maintenance can increase the longevity of systems, and deferred maintenance can cause system failures that leave the municipality scrambling to find the money for emergency repairs or replacement.

Sewer and water systems often have an associated user fees as a mechanism to generate revenue that supports loan repayment. Many municipalities form a water district and/or a sewer district in which the service is provided, and residents within the district that benefit from the improvement are charged a user fee. In towns and counties, New York State law requires the creation of special sewer and water taxing districts that encompass only properties that benefit from the infrastructure. In cities and villages, user fees are charged to properties connected to the water or sewer system to fund both capital debt as well as operations and maintenance.

Instead of building their own water infrastructure, some municipalities elect to pay other municipalities to deliver the service. This is typically accomplished through an intermunicipal agreement where the users in the served community pay a fee to the community providing the service. Intermunicipal sharing and cooperation such as this often represents a more efficient use of resources compared to each municipality building their own separate systems.

Aside from debt financing, there are a number of state and federal funding sources available to municipalities for sewer and water infrastructure. These programs, detailed below, include grant programs and low interest financing options for municipalities.

DEBT FINANCING

Debt financing is the primary way municipalities finance sewer and water infrastructure. Municipal bonds are an attractive option for municipalities as interest rates are generally lower than loans from commercial banks. This is due to the fact that interest on municipal bonds are exempt from federal taxation. It is rare for a municipality to have sufficient funding from rents or user fees to fund capital improvements directly, those revenues are more typically used to fund maintenance and operations.

WATER QUALITY IMPROVEMENT PROJECT PROGRAM – DEPARTMENT OF ENVIRONMENTAL CONSERVATION

The Water Quality Improvement Project (WQIP) program is a competitive grant program administered by the New York State Department of Environmental Conservation. The WQIP program funds projects that improve water quality, improve aquatic habitats, or protect sources of drinking water. Eligible projects related to infrastructure include:

- **Wastewater Treatment Improvement** – Projects of this type include upgrades to existing wastewater treatment plants and construction of new wastewater treatment plants. Certain types of projects such as upgrading combined sewer overflow systems are of higher priority. Primary and secondary priority projects have a local matching requirement of 25%. The match requirement for all other wastewater treatment improvement projects is 60%. The maximum award for most project types in this category is \$10 million.
- **Non-Agricultural Nonpoint Source Abatement and Control** – Examples of projects in this category include decentralized wastewater treatment facilities, green infrastructure designed to reduce pollutants, and stormwater infrastructure retrofits. The maximum award amount ranges from \$325 thousand to \$3 million. The required match is 25% for all projects.

The application requirements and scoring criteria vary by project type. Typically, municipalities that are under an order of consent from the DEC receive a boost in scoring. While this scoring boost is designed to help communities that are most in need, it also creates an unintentional incentive to let systems deteriorate to a point where an order of consent is implemented as a way to improve the odds of being awarded a grant. Many applications through this program will require technical elements such as mapping, engineering reports, or feasibility studies. All projects must include construction or implementation; projects that only involve planning cannot be funded by this program.

WQIP grants are administered and awarded through the annual New York State Consolidated Funding Application (CFA). In 2021 up to \$65 million was available to be awarded through this program.

Additional WQIP Resources:

LINK: [WQIP Program](#)

LINK: [2022 Program Overview](#)

STATE REVOLVING FUNDS – ENVIRONMENTAL FACILITIES CORPORATION

The Environmental Facilities Corporation (EFC) provides low interest and interest-free financing for municipal water infrastructure projects through the Drinking Water State Revolving Fund (DWSRF) and the Clean Water State Revolving Fund (CWSRF). When loans are paid back, the funds enter back into the pool that is available to be disbursed for other projects. These revolving funds are important financing tools for large municipal water infrastructure projects. The DWSRF funds community water systems. Eligible projects for the CWSRF include municipal wastewater treatment facilities, Stormwater/non-point source projects, and national estuary projects.

The first step to accessing DWSRF or CWSRF funds is getting a project listed on the Intended Use Plan (IUP). An IUP is created twice a year by the New York State Department of Health. It is required by law that any project funded by one of these revolving funds be listed on the IUP. The application process for getting listed on the IUP includes providing a general description of the project, a project schedule, and a budget. In addition, there are a number of forms and actions that are required as part of the application process including a certified engineering report and documentation of the non-grant funds that will be used to complete the project. Engineering reports must be in compliance with a specific outline and must be prepared by an engineer that is licensed and registered in New York State. Examples of documentation of non-grant funds include a municipal resolution committing existing funds or a bond resolution. Adopting a bond resolution can be a significant challenge for many municipalities that do not have professional support to assist with process.

Projects listed on the IUP are given a priority score and ranked against all of the other projects submitted. The scoring system accounts for things like financial need, the degree of water protection, and the degree of water quality improvement.

Additional SRF Resources:

LINK: [DWSRF](#)

LINK: [CWSRF](#)

LINK: [CWSRF IUP scoring](#)

WATER INFRASTRUCTURE IMPROVEMENT ACT (WIIA) AND INTERMUNICIPAL GRANT PROGRAM (IMG) - ENVIRONMENTAL FACILITIES CORPORATION

In 2017, New York State passed the Clean Water Infrastructure Act, which committed \$2.5 billion towards water infrastructure and water protection. Since the passage of the bill in 2017, a total of almost \$4 billion has been appropriated for water infrastructure and water protection projects. As part of this legislation, EFC offers grant funding for municipal projects for water infrastructure construction and improvement through the following grant programs:

- **Wastewater Infrastructure Improvement Act (WIIA) Clean Water Grant** - this program is for construction or repair of wastewater infrastructure projects such as upgrading combined sewer overflow systems. Projects are awarded 25% of net eligible project costs or \$25 million, whichever is less. The annual limit awarded through this program is \$5 million.
- **Wastewater Infrastructure Improvement Act (WIIA) Drinking Water Grant** - This program is for construction or repair of drinking water infrastructure projects that address emerging contaminants such as PFOA and PFOS. Projects addressing emerging contaminants are awarded 60% of net eligible project costs. All other projects are awarded 60% of net eligible project costs or \$3 million, whichever is less. The annual limit awarded through this program is \$3 million.
- **Intermunicipal Grant (IMG)** - IMG grants are awarded to water infrastructure projects that serve multiple municipalities. Projects are awarded 40% of net eligible project costs or \$30 million, whichever is less.

These grant programs can be used in conjunction with SRF financing. Similar to the DWSRF and CWSRF, applications for these grant programs have a series of required supporting documents including an engineering report, a smart growth assessment form, an environmental review determination, and a SHPO project review determination letter. The table below succinctly summarizes these grant programs and their associated requirements.

Grant 2021	Eligible Projects	MWBE & SDVOB Goals	Required Documentation	Additional Programmatic Requirements
Clean Water WIIA Grant	<ul style="list-style-type: none"> • Municipally-owned sewage treatment works • Must result in construction of the project • Have not closed a long-term financing • Have not started construction prior to October 1, 2019 • Construction not completed prior to November 1, 2021 	<p>If not seeking SRF Financing: GOALS:</p>	<p>For ALL applicants:</p> <ul style="list-style-type: none"> • Grant Application • Engineering Report • Smart Growth Assessment • Environmental Review (SEQR/SHPO) • Bond Resolution (Certified) and/ or Board Resolution (Certified) • Proof of District Formation <p>If seeking SRF Financing:</p> <ul style="list-style-type: none"> • CWSRF/DWSRF Financing Application 	<p>For ALL applicants:</p> <ul style="list-style-type: none"> • Smart Growth • Environmental Review (SEQR/SHPO) • EEO
Drinking Water WIIA Grant	<ul style="list-style-type: none"> • Municipally-owned public water system • Must result in construction of the project • Have not closed a long-term financing • Have not started construction prior to October 1, 2019 • Construction not completed prior to November 1, 2021 	<p>MWBE - 30% SDVOB - 6%</p> <p>If seeking SRF Financing: GOAL:</p>		<p>Additionally, if seeking SRF financing:</p> <ul style="list-style-type: none"> • American Iron and Steel • Davis-Bacon
IMG Grant (Clean Water and Drinking Water)	<ul style="list-style-type: none"> • Municipally-owned sewage treatment works and public water systems • Must result in construction of the project • Have not closed a long-term financing • Have not started construction prior to October 1, 2019 • Construction not completed prior to November 1, 2021 	<p>MWBE - 20%</p>	<p>All of the above AND:</p> <ul style="list-style-type: none"> • Current, valid, and binding project IMA between at least two cooperating municipalities 	<p>For ALL executed contracts, applicable Mandatory Terms and Conditions must be included</p>

Source: Environmental Facilities Corporation

Additional WIIA & IMG Resources:

LINK: [WIIA & IMG Summary](#)

LINK: [2021 NYS Water Grants Webinar Slides](#)

WASTEWATER INFRASTRUCTURE ENGINEERING PLANNING GRANT - ENVIRONMENTAL FACILITIES CORPORATION

Engineering reports are a required component for both SRF and grant funding from the EFC. To help municipalities with this requirement, EFC offers grants for up to \$100,000 to fund the development of the engineering reports. While this program offers up to \$100,000, the majority of awards are closer to \$30,000 to \$50,000. This is a matching grant program; municipalities are required to match 20% of the requested amount. The match can be in-kind services or cash, but cannot be sourced from a different grant.

This grant is only available for municipalities that meet certain income eligibility requirements. For communities in the Mid-Hudson REDC region (counties of Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, and Westchester), only communities where the median household income is less than or equal to \$90,000 are eligible. The median household income is defined using data from the U.S. Census Bureau.

Water & Waste Disposal Loan & Grant Program – US Department of Agriculture

The U.S. Department of Agriculture (USDA) administers the Water & Waste Disposal Loan & Grant Program. The program is available only to municipalities with a population of 10,000 or less. The goal of the program is to help financially distressed rural communities with their waste and water infrastructure needs. The program primarily provides long-term low interest loans with a payback period of up to 40 years, but it may also include a grant with the loan in some cases. The grants awarded through this program typically represent a small percentage of total project cost, and are awarded based on the level of municipal financial distress.

Primary eligible activities for this program are:

- Drinking water sourcing, treatment, storage and distribution
- Sewer collection, transmission, treatment and disposal
- Solid waste collection, disposal and closure
- Stormwater collection, transmission and disposal

Additional USDA Loan & Grant Program Resources:

LINK: [Program summary](#)

GREEN INFRASTRUCTURE

Green infrastructure is infrastructure that uses natural processes to handle stormwater runoff in a more environmentally friendly way than traditional infrastructure. Rather than diverting and conveying stormwater away, green infrastructure focuses on retention and slow release infiltration that mitigates the impact of heavy rain events. This is especially impactful for communities with combined sewer overflow systems where heavy rain events can lead to raw sewage entering into the environment. Green infrastructure represents a way to enhance the capacity of existing systems.

To encourage the proliferation of green infrastructure, New York State has a handful of programs that incentivize municipalities to implement green infrastructure methods. Despite these incentives, green infrastructure is not widely used in the Hudson Valley. That being said, there are some examples of communities in the region that have embraced green infrastructure methods.

CLIMATE SMART COMMUNITIES PROGRAM – DEPARTMENT OF ENVIRONMENTAL CONSERVATION

The climate smart communities Program is a framework for municipalities to take actions that reduce their impact on climate change. Participating municipalities choose from a list of various types of actions that are worth a given amount of points. Depending on the number of points accumulated, municipalities can achieve certified status levels of Gold, Silver, or Bronze. Aside from the direct benefits of the actions in this program, municipalities are further incentivized to participate in the program by a boost in scoring on some DEC grant applications for certified climate smart communities.

There are two actions within the climate smart community program that directly relate to Green infrastructure:

- PE6 Action: Green Parking Lot Policies (1-4 points)
- PE7 Action: Green Infrastructure (1-14 points)

These actions incentivize green infrastructure implementation for communities participating in the climate smart communities program.

GREEN INFRASTRUCTURE GRANT PROGRAM – ENVIRONMENTAL FACILITIES CORPORATION

The Environmental Facility Corporation administers the Green Infrastructure Innovation Program (GIGP), a competitive grant program designed to support the implementation of green infrastructure practices. There are three categories of green infrastructure practices included in the GIGP: Green Stormwater Infrastructure, Energy Efficiency, and Water efficiency

Eligible practices under the Green Stormwater infrastructure Component include:

- **Bioretention** – Vegetated areas designed to remove pollutants from the environment and reduce stormwater runoff.
- **Downspout Disconnection** – Redirecting roof runoff away from a combined sewer or a storm sewer to a vegetated area where the water can infiltrate back into the environment.
- **Establishment or Restoration of Floodplains, Riparian Buffers, Streams or Wetlands** – restorative activities for Floodplains, Riparian Buffers, Streams or Wetlands. Examples include stream bank stabilization, stream daylighting, and creating wetlands
- **Green Roofs and Green Walls** – vegetated walls or rooftops that capture rainwater and reduce stormwater runoff.
- **Permeable Pavement** – pavement techniques and materials that allow for water infiltration
- **Stormwater Harvesting and Reuse** – systems to capture stormwater and use it for other non-potable purposes
- **Stormwater Street Trees/Urban Forestry Programs** – Tree planting programs to track existing trees and plan for new tree plantings in urbanized places

Green stormwater infrastructure projects can be awarded up to 75% of eligible project costs. If projects address an environmental justice issue or are located in a low-income community, projects can be awarded up to 90% of eligible project costs. In 2020, 70% of all GIGP grants were awarded to projects serving environmental justice communities. The GGIC application process is part of the New York State Consolidated Funding Application (CFA) program.

WATER QUALITY IMPROVEMENT PROJECT PROGRAM – DEPARTMENT OF ENVIRONMENTAL CONSERVATION

As detailed above, The Water Quality Improvement Project (WQIP) program is a competitive grant program administered by the New York State Department of Environmental Conservation. The WQIP program funds projects that improve water quality, improve aquatic habitats, or protect sources of drinking water. "Green Infrastructure Practices" is an eligible activity under this program as a method of Non-Agricultural Nonpoint Source Abatement and Control.

Eligible Green Infrastructure Practices under this program are:

- Bioretention
- Rain gardens
- Constructed wetlands
- Porous pavement
- Green roofs
- Downspout disconnection
- Stormwater street trees
- Stormwater harvesting and reuse
- Stream daylighting

Green Infrastructure projects under the WQIP program can be awarded up to \$1 million with a 25% local match requirement. WQIP grants are administered and awarded through the annual New York State Consolidated Funding Application (CFA). In 2021 up to \$65 million was available to be awarded through this program. Each year, this program typically has more money available than is awarded.

INFRASTRUCTURE SPENDING TRENDS

The following sections contain analysis of data collected from the Office of New York State Comptroller. Data from the Comptroller includes complete audited information on financial revenues and expenditures, broken out by type of expenditure. Though there may be some variation among municipalities in the way certain expenditures are reported, this data generally provides an accurate portrayal of spending by category.

There is a hierarchy of categories and subcategories within the Comptroller data. At a certain level of detail, every expenditure type is classified in one of three ways: "Contractual," "Equipment and Capital Outlay," and "Personal Services." The Personal Services category primarily captures the cost of employee salaries. The Equipment and Capital Outlay category refers spending on maintaining, acquiring, or building physical assets. The Contractual category is somewhat of a catch-all for expenses that are not in the other two categories; in general, it captures spending on contract services including but not limited to things like consulting fees and fees for service.

TOTAL INFRASTRUCTURE SPENDING

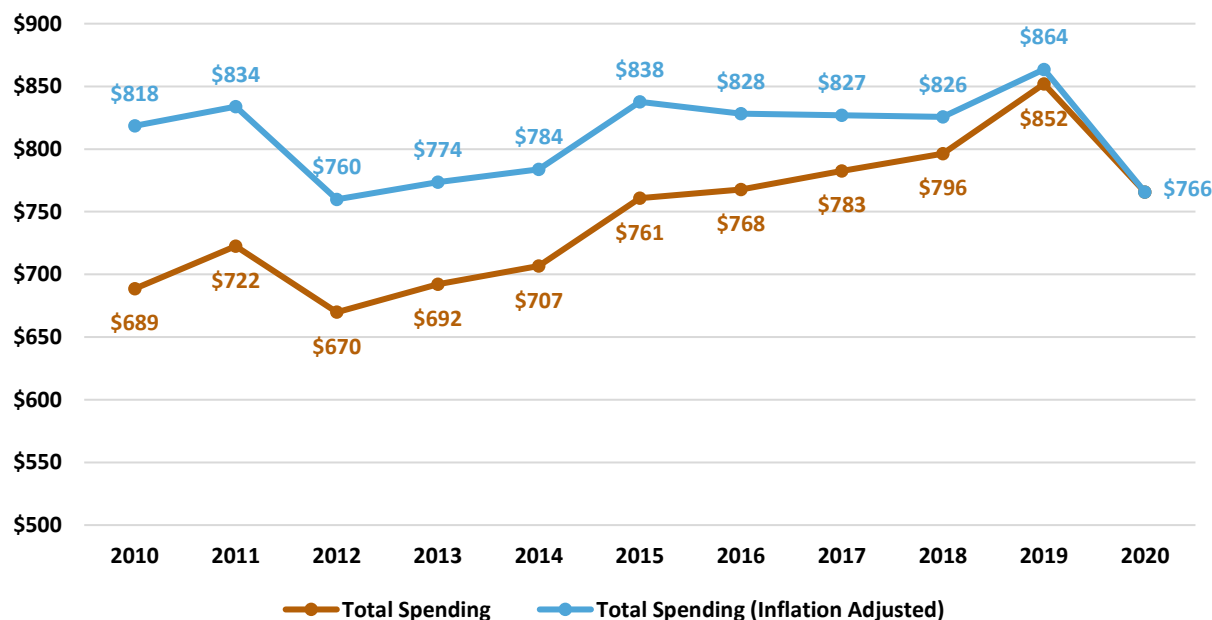
The chart below shows the combined infrastructure spending of Hudson Valley municipalities (cities, towns, and villages) from 2010 to 2020. To account for the effects of inflation, this chart also includes inflation adjusted spending totals which are expressed in 2020 dollars (blue line on the chart).

Without adjusting for inflation, the data appears to show that infrastructure spending increased by \$163 million (24%) from 2010 to 2019, and then declined in 2020 due to the pandemic. Even with the decline in 2020, the unadjusted numbers show an overall increase in spending of 11% from 2010 to 2020 for an average annual increase of 1.1%.

However, the inflation adjusted numbers provide a more accurate representation of how infrastructure spending has changed over time. When spending from previous years are expressed as 2020 dollars, the apparent increase in infrastructure spending is wiped out. The inflation adjusted numbers show a more modest increase of 5.5% from 2010 to 2019, prior to the impacts of the pandemic in 2020. When the decrease in spending in 2020 is included, the data shows that infrastructure spending in 2020 (\$766 million) is actually lower than inflation adjusted spending in 2010 (\$818 million).

The impact of inflation is particularly evident from 2015 to 2018. Over this three-year time period, infrastructure spending increased every year for an average annual increase of 1.6%. However, after adjusting for inflation, this trend is reversed and shows an average annual decrease in infrastructure spending of -0.5% per year. This means that over this time period the rate of inflation outpaced increases in infrastructure spending.

Total Infrastructure Spending (in millions) of Hudson Valley Municipalities



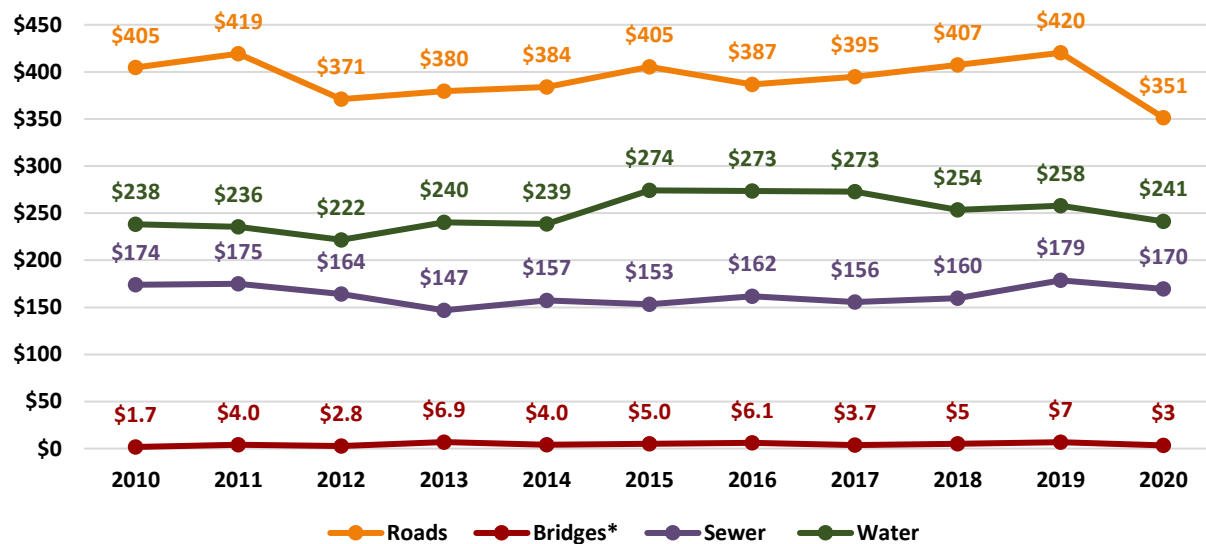
Source: Pattern for Progress analysis of data from the NYS Office of the Comptroller

TOTAL INFRASTRUCTURE SPENDING BY TYPE OF INFRASTRUCTURE

Municipalities consistently spent the most on road infrastructure, followed by water, sewer, and bridges. Overall spending has remained relatively stable in the past decade. In the 10 years from 2010 to 2020, spending on roads, sewers, and water never fluctuated more than 20% from the 10-year average. The change in road spending from 2019 to 2020 was the largest change in spending of any infrastructure type since 2010. Municipal road spending in the Hudson Valley dropped 16% from \$420 million in 2019 to \$351 million in 2020, a \$69 million decrease.

Annual spending on bridge maintenance is by far the lowest among the four types of infrastructure analyzed. This is in part due to the fact that Hudson Valley municipalities collectively own 379 bridges, which amounts to just 12% of bridges in the region. However, the bridge spending data on this chart may be artificially low as some municipalities report spending on bridges as part of their “Highways” spending.

Infrastructure Spending (in millions) of Hudson Valley Municipalities-Inflation Adjusted



*Some “Bridges” spending may be captured in the “Roads” spending

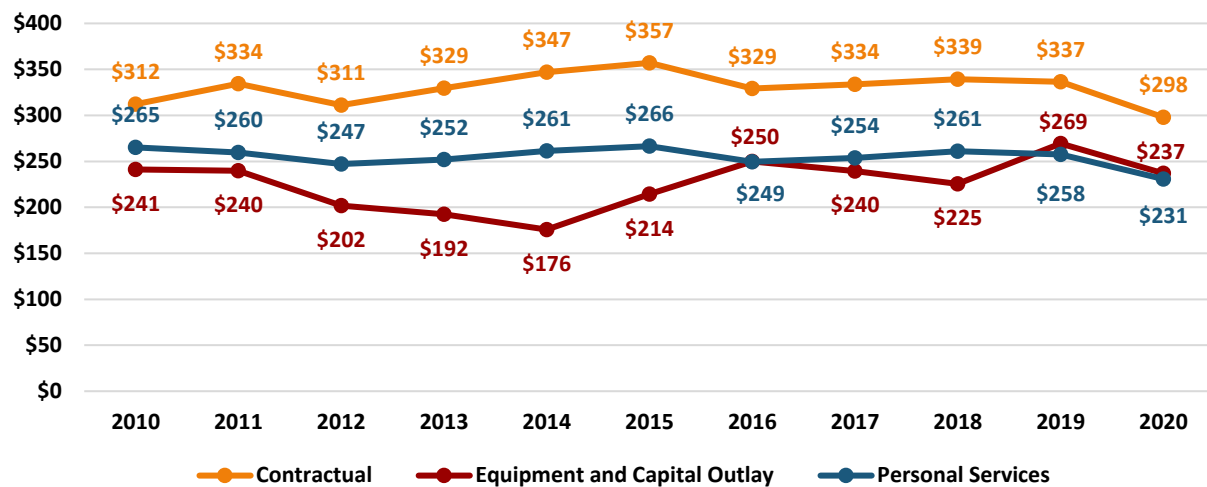
Source: Pattern for Progress analysis of data from the NYS Office of the Comptroller

TOTAL INFRASTRUCTURE SPENDING BY TYPE OF SPENDING

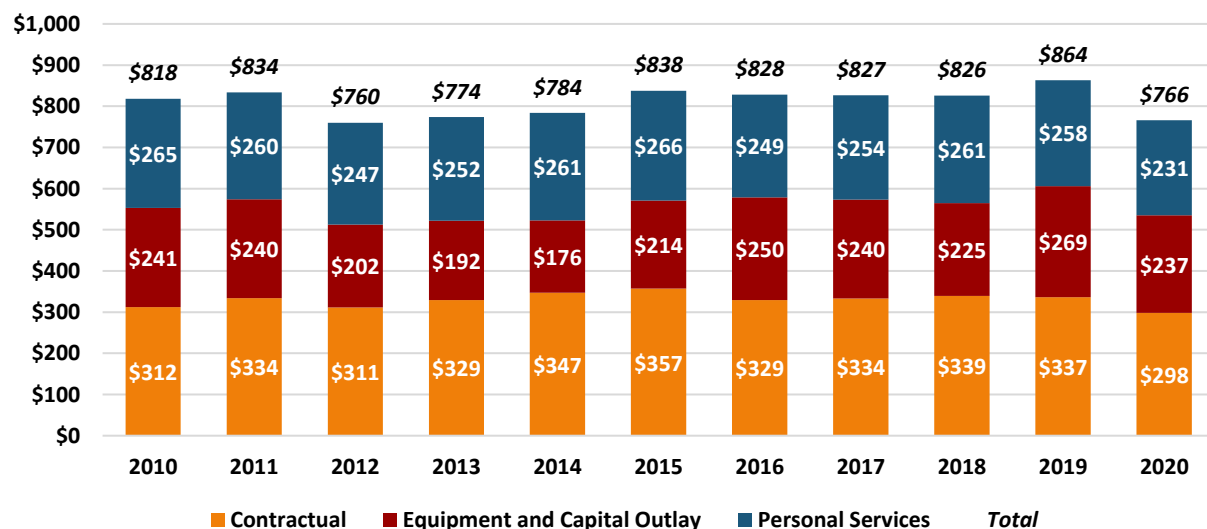
Since 2010, contractual spending has been the highest among types of infrastructure spending by municipalities every year. Municipal infrastructure spending on equipment and capital projects has been very similar to spending on personal services. All three types of spending decreased by about 10% from 2019 to 2020.

Spending on equipment and capital notably decreased in the first half of the decade, reaching a low of \$176 million in 2014 (adjusted for inflation). Since 2014, spending on equipment and capital has been up and down, but overall increased back to a level similar to 2010.

Infrastructure Spending (in millions) of Hudson Valley Municipalities by Type—Inflation Adjusted



Total Infrastructure Spending (in millions) of Hudson Valley Municipalities – Inflation Adjusted



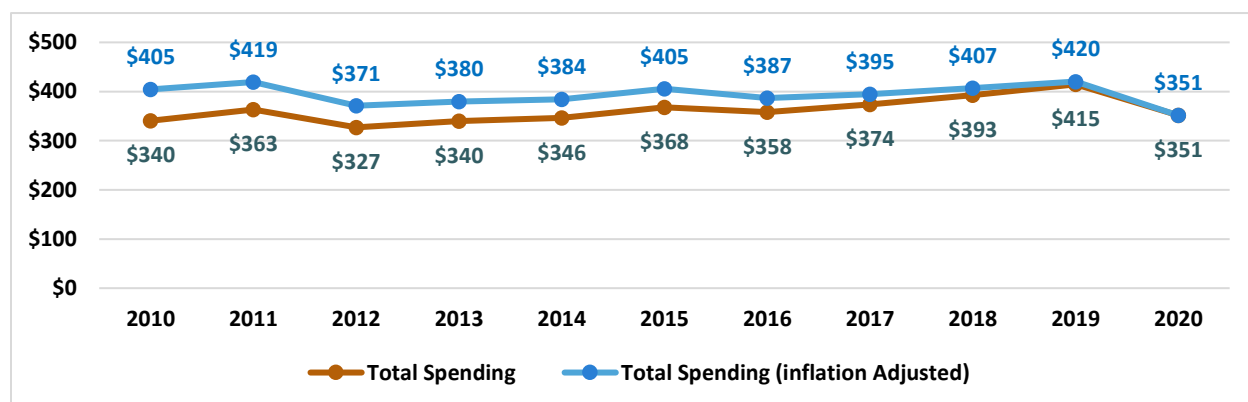
Source: Pattern for Progress analysis of data from the NYS Office of the Comptroller

ROADS SPENDING

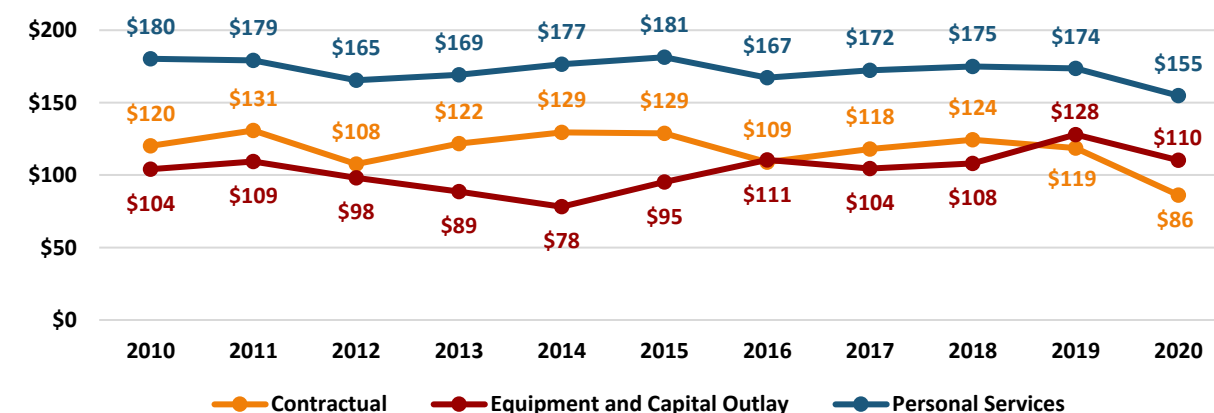
In the comptroller data, there is a category of expenditure called “Highways” which best captures municipal spending on roads. Examples of subcategories within the “Highways” category include: “Maintenance of Streets,” “Engineering,” and “Highway Capital Projects.” For the purposes of this analysis, the only subcategory that was removed was “Maintenance of Bridges” which is analyzed separately in the following section of this report.

The chart below shows “Highways” expenditures for every city, town, and village in the Hudson Valley region from 2010 to 2020. The dollar values in the charts are represented in millions of dollars and have been adjusted for inflation. The chart shows that personal services account for the largest portion of highways spending in the region. The chart also shows that spending on equipment and capital outlay has been trending up since 2014. The most spending on equipment and capital outlay in the region occurred in 2019 when \$128 million (in 2020 dollars) was spent. Overall spending on roads decreased significantly from 2019 to 2020, likely as a result of the COVID-19 pandemic.

Total “Highways” Spending (in millions) by Hudson Valley Municipalities



“Highways” Spending (in millions) of Hudson Valley Municipalities by Type of Spending- Inflation Adjusted



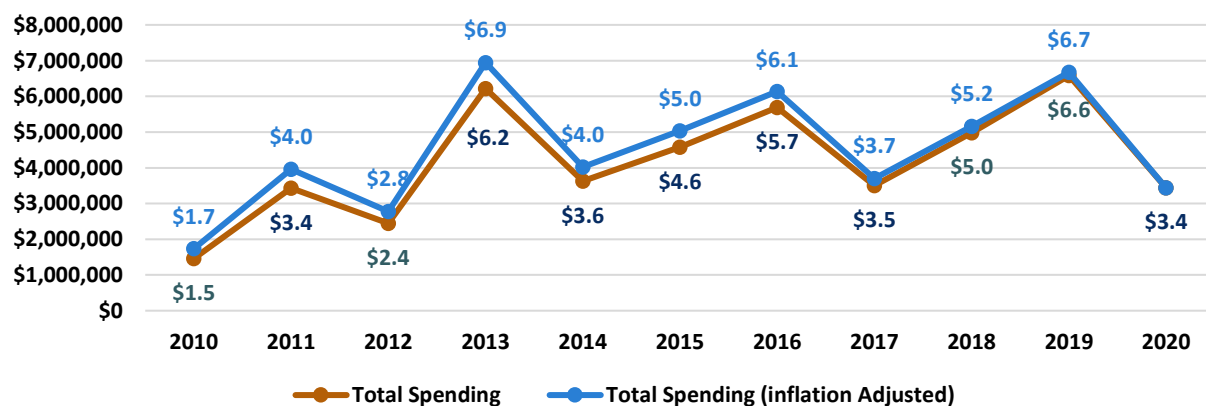
Source: Pattern for Progress analysis of data from the NYS Office of the Comptroller

BRIDGE SPENDING

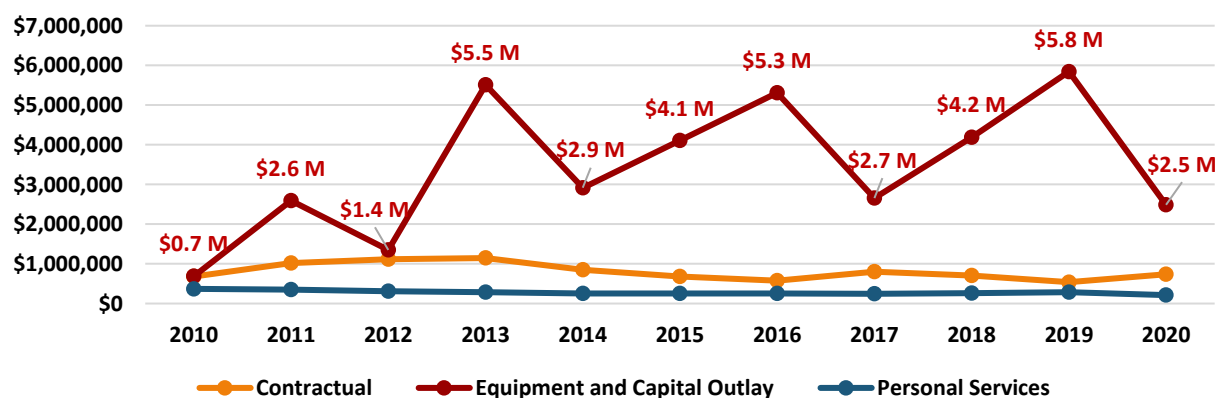
As indicated above, within the “Highways” category of the Comptroller data, there is a subcategory called “Bridge Maintenance.” This is the only categorization of spending that is attributed specifically to bridges. Given different reporting methods from municipalities, and the fact that bridge work is often the responsibility of highway departments, it can be assumed that a portion of spending on bridges is grouped in with the “Highways” spending in the prior section, and is not reflected in this chart. It is also important to note that municipalities generally do not have responsibility for many bridges. Bridges are more likely to be under the jurisdiction of counties or state agencies.

The charts below show “Bridge Maintenance” spending for every city, village, and town in the Hudson Valley region from 2010 to 2020. The data illustrates that equipment and capital outlay accounts for the largest portion of overall bridge spending. There is no clear upward and downward trend in bridge spending, though virtually all the changes from year to year are the result of shifts in equipment and capital outlay spending. Spending on equipment and capital outlay in 2020 was the lowest it has been in the region since 2012, though it was very similar to spending levels in 2014 and 2017.

Total “Bridge Maintenance” Spending of Hudson Valley Municipalities



“Bridge Maintenance” Spending of Hudson Valley Municipalities by Type of Spending - Inflation Adjusted



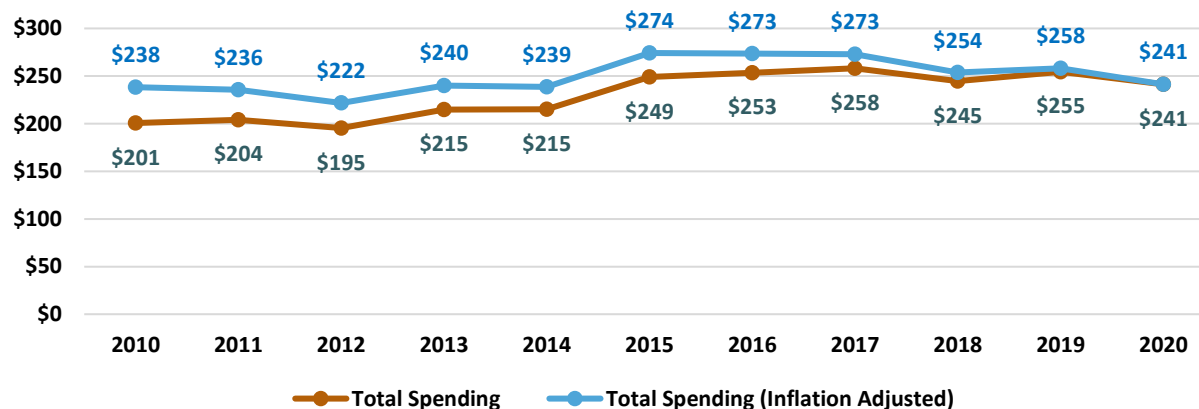
Source: Pattern for Progress analysis of data from the NYS Office of the Comptroller

WATER SPENDING

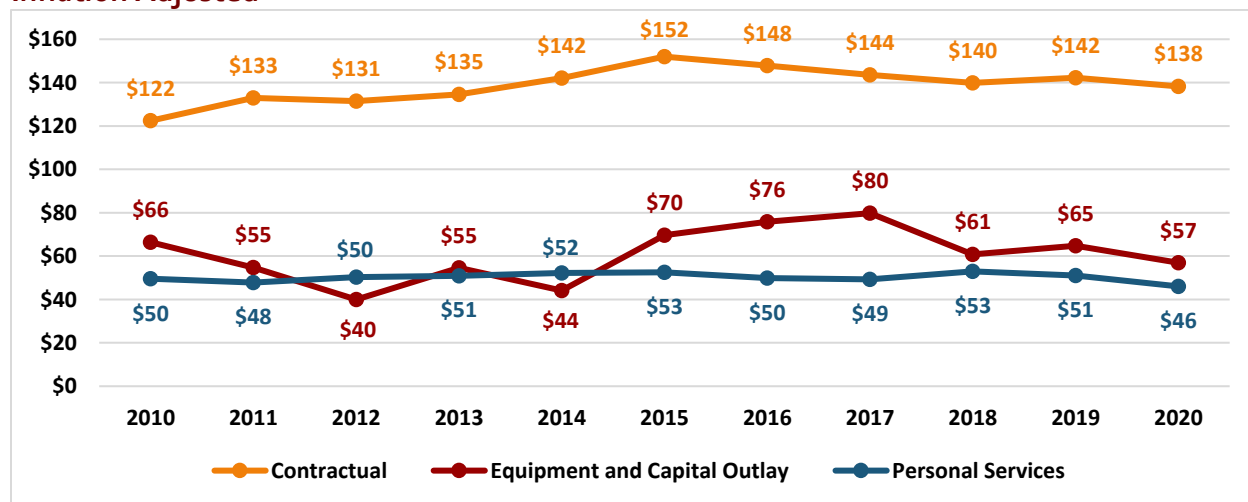
Similar to the “Highways” category, “Water” is a high-level category in the Comptroller data that includes a series of subcategories. Examples of subcategories include: “Water Transportation and Distribution,” “Source Supply Power and Pump,” and “Water Capital Projects.”

The charts below show “Water” spending for every city, village, and town in the Hudson Valley region from 2010 to 2020. The data reveals that contractual spending accounts for the largest portion of municipal spending on water. Overall municipal spending on water has been relatively consistent in the past decade. There was an increase in spending in 2015 in both contractual spending and equipment and capital outlay spending. The increases in spending in 2015 have been generally sustained for the past five years.

Total “Water” Spending (in millions) of Hudson Valley Municipalities



“Water” Spending (in millions) of Hudson Valley Municipalities by Type of Spending – Inflation Adjusted



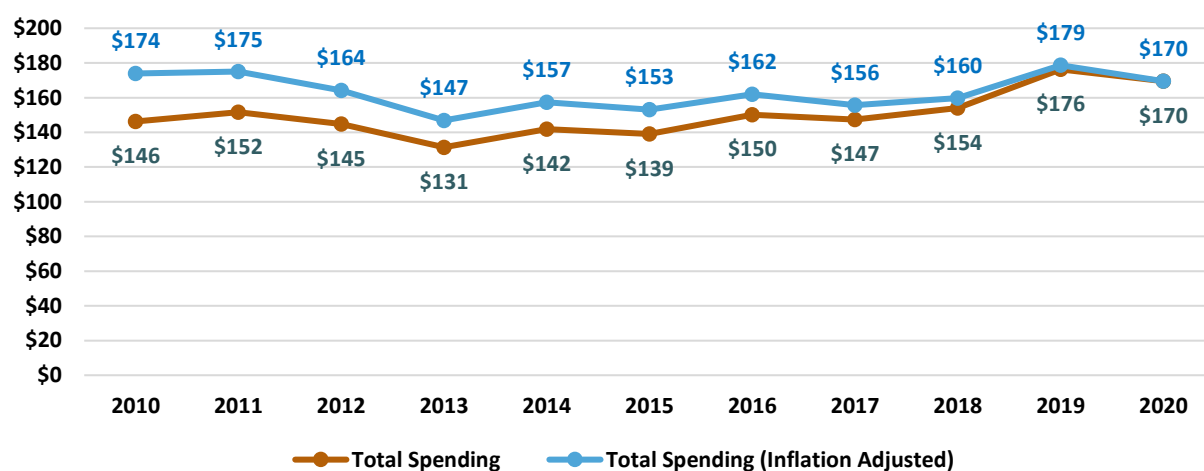
Source: Pattern for Progress analysis of data from the NYS Office of the Comptroller

SEWER SPENDING

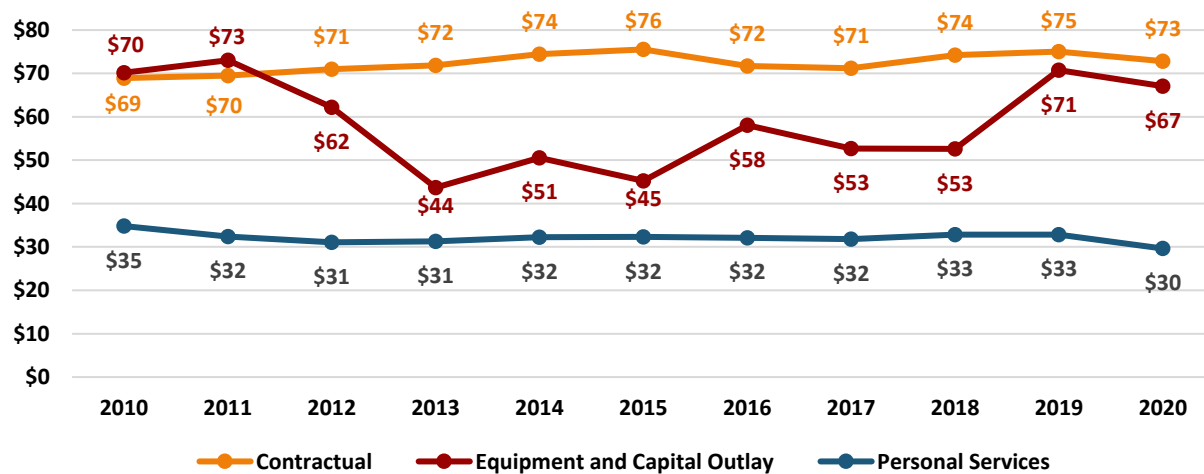
Three expenditure categories within the Comptroller data were combined to analyze sewer spending. The combined categories were "Sewer," "Drainage," and "Storm Sewer."

In the most years since 2010, spending on contracts has accounted for the largest portion of overall sewer spending in the Hudson Valley region. The data shows that contractual spending and personal services spending has been relatively constant while equipment and capital spending has been more variable. Equipment and capital spending decreased by approximately 40% over the 2-year time period of 2011 to 2013. Spending then remained below \$60 million until 2019 when increased back up to spending levels similar to those seen in 2010 and 2011.

Total Sewer Spending (in millions) of Hudson Valley Municipalities



Sewer Spending (in millions) of Hudson Valley Municipalities by Type of Spending-Inflation Adjusted



Source: Pattern for Progress analysis of data from the NYS Office of the Comptroller

APPENDIX

List of Interviews

Pattern for Progress thanks the following people for donating their time to the interview process.

Municipal Representatives

- Ed McAndrew, Commissioner of Public Works, Sullivan County
- Fred Pena, Commissioner of Highways and Facilities, Putnam County
- Erik Denga, Commissioner of Public Works, Orange County
- Travis Ewald, Deputy Commissioner of Public Works, Orange County
- Charles Vezzetti, Highway Superintendent, Rockland County
- Hugh Greechan Jr., Commissioner of Public Works, Westchester County
- Chris Ghent, Commissioner of Public Works, City of Poughkeepsie
- Robert Perry, Superintendent of Public Works Department, City of Hudson
- Rich Benjamin, Highway Superintendent, Town of Thompson
- Ed Brancati, Village Manager, Village/Town of Mount Kisco
- Mike Messenger, Superintendent of Water and Sewer, Town of Thompson

Private Engineering Firms

- Mary Beth Bianconi, Partner, Delaware Engineering, D.P.C.
- Christon Robbins, Senior Technical Director, AKRF, Inc.
- Nicole Shute, Project Engineer, WSP USA
- Bill Gorton, Senior Manager for Transportation Services, WSP USA; Former Region 8 Director, New York State Department of Transportation
- Langan Engineering & Environmental Services
- Dennis Larios, President, Brinnier & Larios, P.C.
- Mark Stier, Executive Vice President, Tectonic Engineering
- Richard Williams, Principal Engineer, Insite Engineering. Surveying & Landscape Architecture, P.C.

Other Professionals

- Kelly Turturro, Region 3 Director, Department of Environmental Conservation.
- David Orr, Director, Cornell Local Roads
- Fred Hiffa, Managing Director, Park Strategies
- John Peckham, Peckham Industries

Municipal Infrastructure Survey

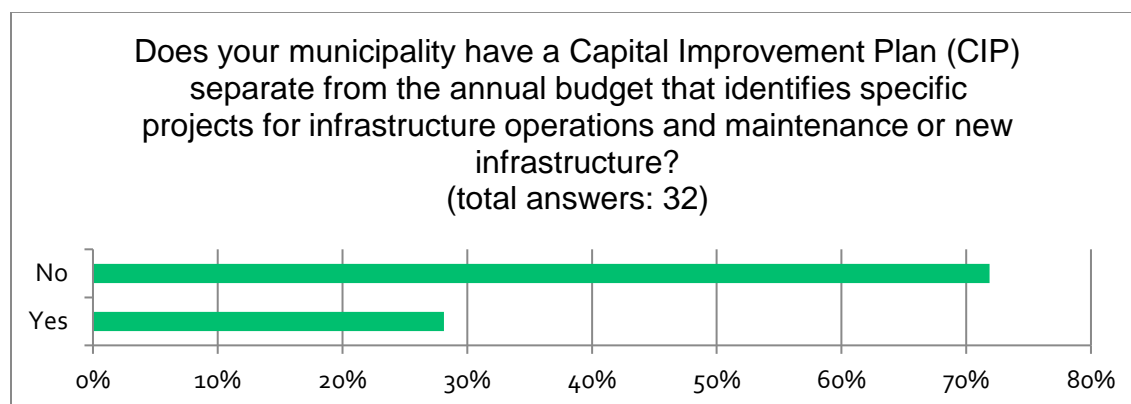
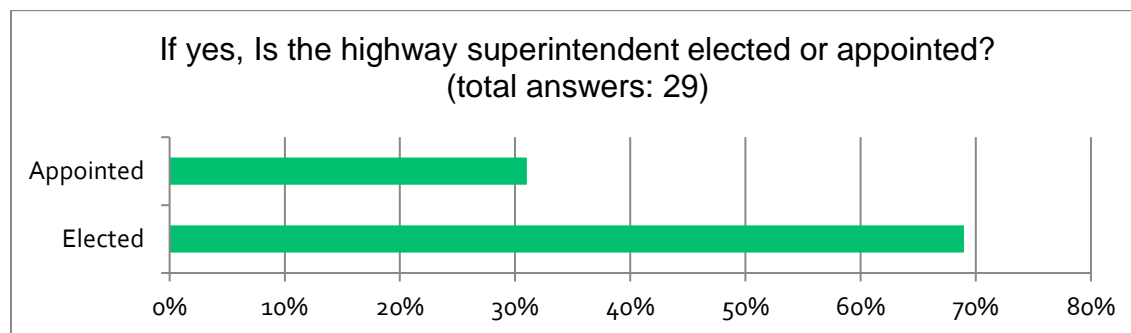
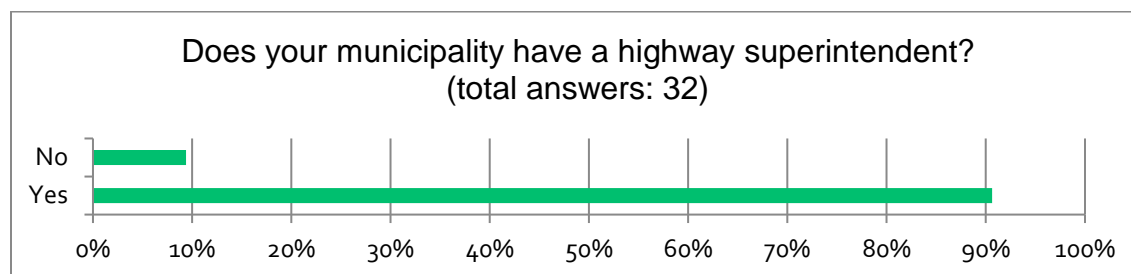
In the fall of 2021, Pattern for Progress developed a web-based survey on the topic of infrastructure. The survey was distributed to municipalities throughout the Hudson Valley and was open from September 2021, to November 2021. Pattern for Progress thanks the following people who responded to the 2021 survey.

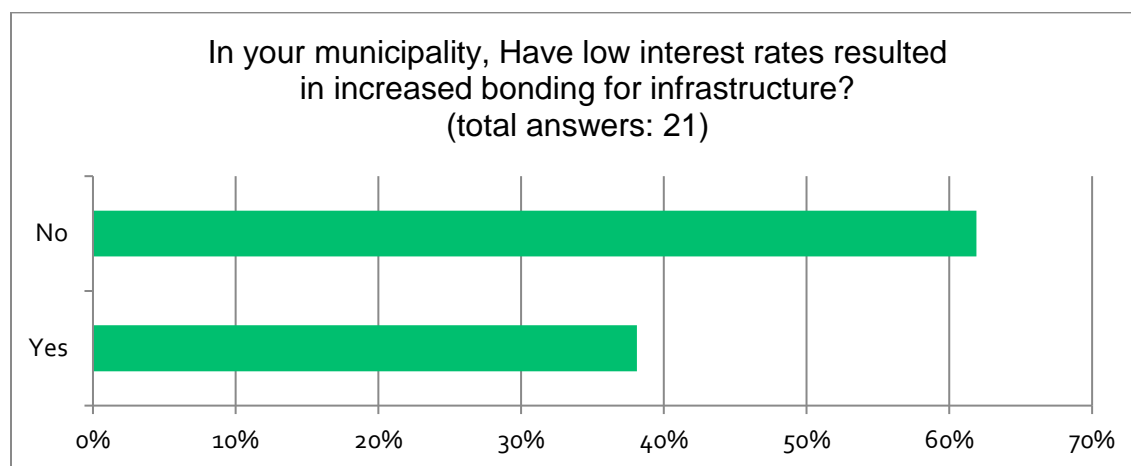
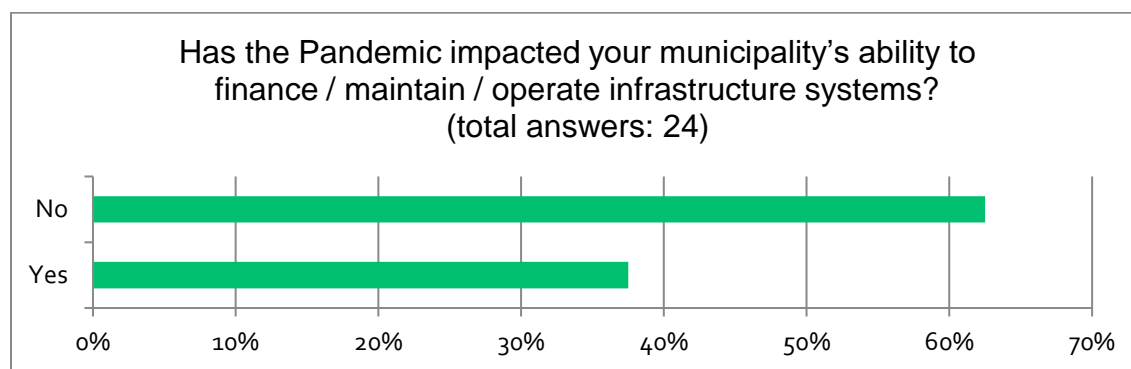
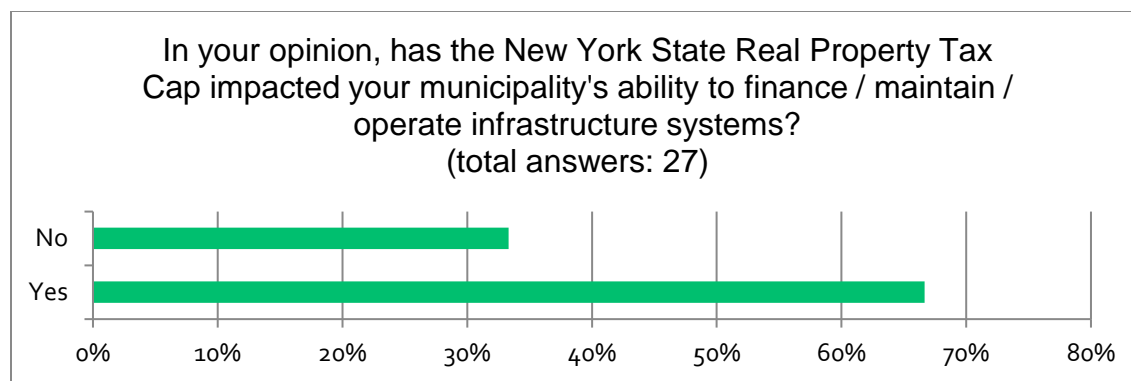
2021 Survey Respondents

- Christopher Kennan, Supervisor, Town of North East
- Glenn Butler, Supt. of Highways, Town of Milan
- Jay Sherb, Highway Superintendent, Village of Monticello
- Jenn Najdek, Mayor, Village of Millerton
- Jim Myers, Highway Superintendent, Town of Stanford
- John Baxter, Highway Superintendent, Pleasant Valley
- John Farrell, Highway Superintendent, Town of Athens
- Lisa Simmons, Administrative Assistant, Town of Poughkeepsie
- Louis Ingrassia Jr., DPW/OEM Commissioner, Town of Wallkill
- Matthew Grossmann, Highway Superintendent, Village of Hunter
- Michael Ryman, Chief Operator, Village of Ellenville
- Michael Simone, Highway Superintendent, Town of Carmel
- Michael Warren, Village Manager, Village of Ellenville
- Peter Ripperger, Highway superintendent, Town of Lewisboro
- Phil Tolmach, Planning Board Chairman, Town of Kent
- Raymon Oberly, Town Supervisor, Town of Clinton
- Rich Benjamin, Superintendent of Highways, Town of Thompson
- Robert L. Hufcut, Highway Superintendent, Town of Mamakating
- Robert Wyant, Highway Superintendent, Town of Rhinebeck
- Ron Knott, Supervisor, Town of Stuyvesant
- Sarah Jones, Town Board Member, Pine Plains
- Sharon, Deputy Village Clerk, Village of Airmont
- Stephen Tuomey, Working Supervisor, Village of Tannersville
- Theresa Burke, Highway Superintendent, Town of Red Hook
- Thomas Goldsworthy, Economic Development Advisory Committee Chair, Town of Copake
- Travis Hunt, Carpenter, Town of Kent
- Victoria Perotti, Supervisor, Town of Armenia
- Walter Lindner, Trustee, Village of Montgomery

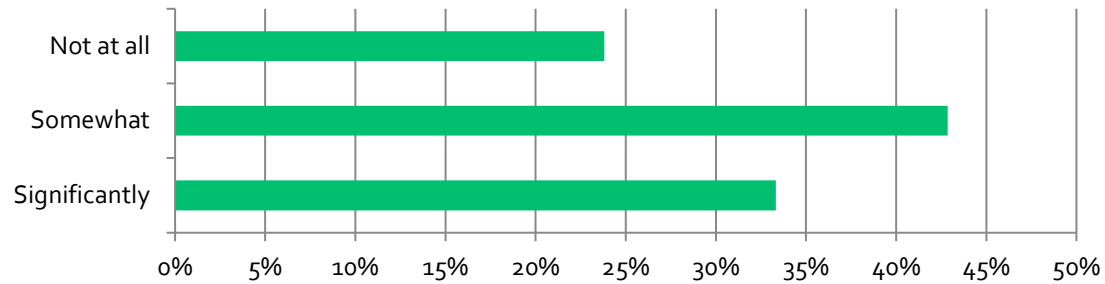
2021 Survey Responses

Overall survey response was low compared to prior pattern infrastructure survey. The low response rate may be attributed to additional work burdens as a result of the pandemic. 32 people responded to the survey, and only 22 people completed the full survey. Due to this low response rate, conclusions cannot be drawn solely from the survey responses; however, they still provide some insight into municipal infrastructure and related topics. Furthermore, some of the questions were open-ended, which allowed the opportunity for respondents to provide a more nuanced response or comment. These open-ended comments were a valuable source of information for this report. Below are the answers to the quantifiable questions included in the survey.

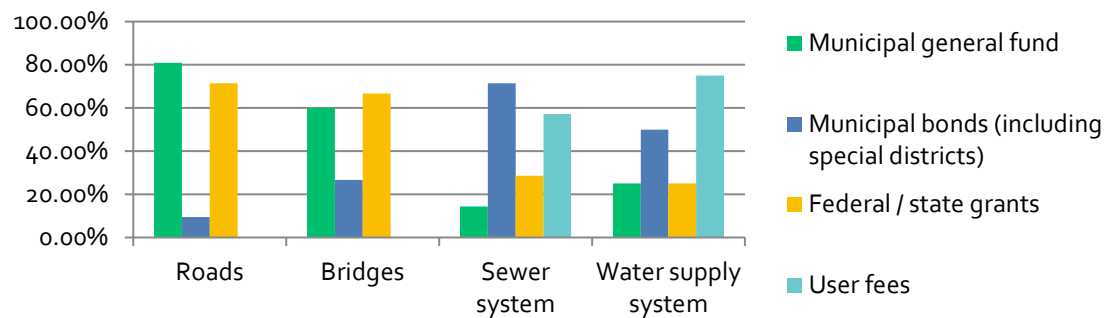




To what degree does your municipality's amount of debt service influence infrastructure decisions?
(total answers: 21)



For each of the following types of infrastructure, please indicate funding sources used to build / maintain / operate these systems. (Check all that apply)
(total answers: 21)



For each of the following types of infrastructure, please select the best description of how often your municipality secures adequate funding
(total answers: 21)

