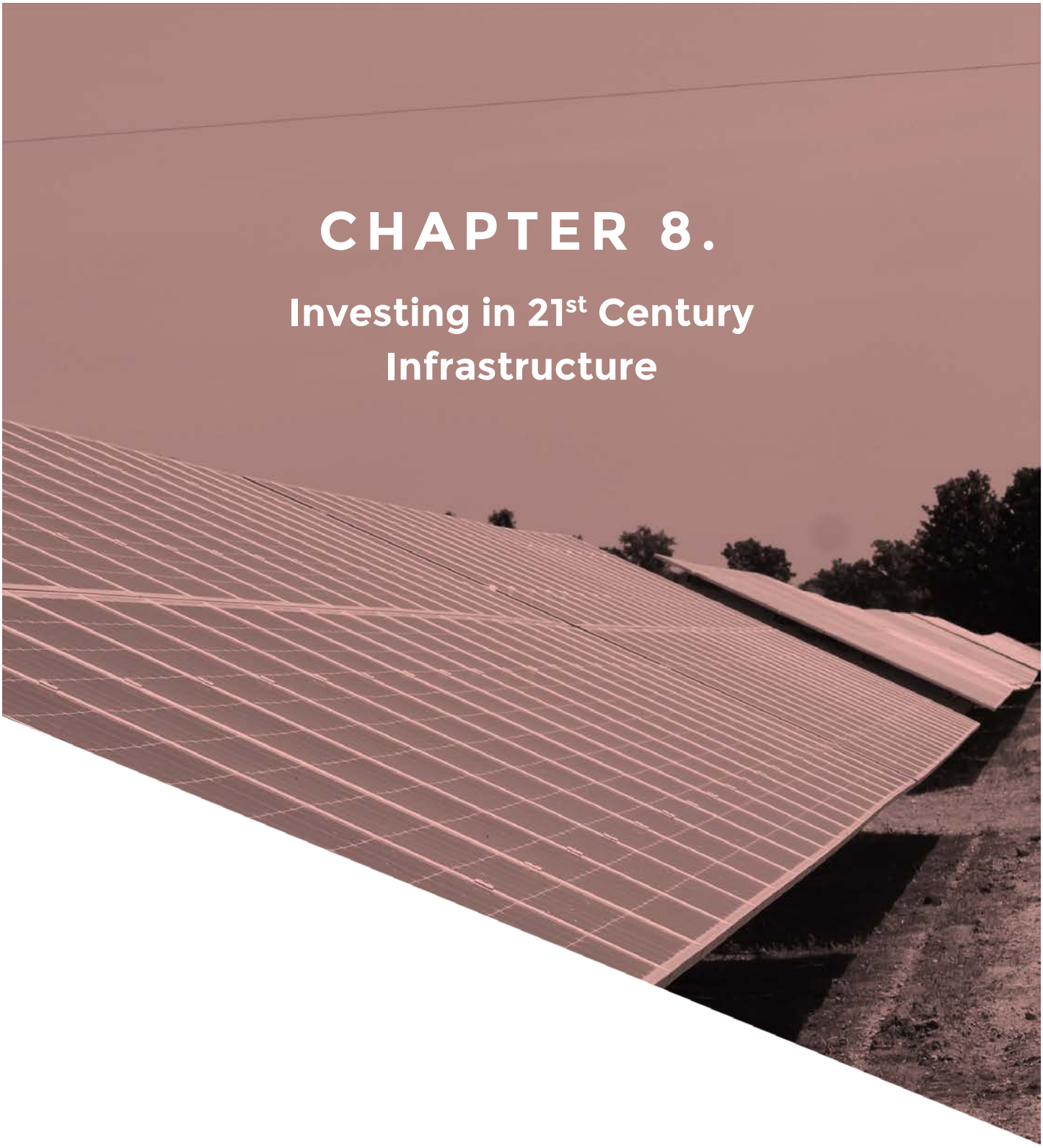


CHAPTER 8.

Investing in 21st Century Infrastructure

Investing in our infrastructure—our roads and bridges; water, sewer, and stormwater systems; and energy and communications networks—is essential for ensuring 1) public health and safety, 2) quality of life, and 3) sustainable economic growth for all Michigan residents.

Michigan's transportation and water infrastructure is in poor condition, getting a D rating from the American Society of Civil Engineers. Infrastructure funding gaps are growing rapidly, adding to the accelerated deterioration of our systems. Current poor conditions now require total reconstruction efforts instead of less costly maintenance programs. According to the U.S. Census Bureau, Michigan spends $470 per capita on transportation—the national average is $795. The average annual capital spending as a percent of total spending is 2.4 percent less than the Great Lakes regional average. This means Michigan spends $2.5 billion less per year than the rest of the Great Lakes states. Michigan is falling behind and needs a new model for the 21st century.

Investment in infrastructure provides a return on investment and can build a solid foundation for a 21st century Michigan that includes safe, reliable, cost-effective, and efficient infrastructure systems for the next 30 to 50 years.

This chapter provides an overview of report recommendations that require public investment to fully implement. It also outlines current and potential funding sources and financing mechanisms to meet 21st century infrastructure needs. The Commission identified the following principles to address funding needs, which will optimize further state investment:

- Maximize utilization of user fees in alignment with supply and demand principles
- Leverage federal funding, taking full advantage of all funding match opportunities
- Identify and prioritize efficiency and coordination through asset management
- Finance long-term investments to capitalize on the time value of money

The creation of a statewide asset management strategy and system and the Michigan Infrastructure Council will ensure the investments outlined in this chapter deliver 21st century infrastructure outcomes that:

- Coordinate across infrastructure types
- Identify and assess our water infrastructure
- Upgrade water infrastructure and clean up contaminated properties to keep Michigan's water drinkable, swimmable, and fishable
- Bring our roads and bridges to a good or fair condition
- Build on Michigan's reputation as a global center for intelligent transportation systems
- Develop Michigan as a top-five state for broadband access and adoption
- Establish Michigan as a global leader in smart technology development and adoption

Investing in 21st Century Infrastructure Strategy and Asset Management

The first key issue Michigan faces in developing a 21st century infrastructure system is assessing our current infrastructure and its condition. The best way to accomplish this is through asset management—the practice of managing infrastructure in a cost-effective and efficient manner based on continuous collection of data on the location and condition of infrastructure. Although Michigan is a national leader in transportation asset management data collection and planning, there is not a requirement for every road agency to have an asset management plan. Although most agencies deploy some elements of an asset management process, many have not adopted a written plan with goals, projections, a financial plan, and a corresponding capital improvement program. For water and sewer infrastructure location and condition, limited data exists at the local level, and no information exists at the statewide level.

The Commission has identified as a top priority the establishment of an information system allowing coordinated planning between communications, energy, transportation, and water projects at local, regional, and statewide levels. Coordinating asset management at all levels, along with implementing full-cost accounting practices will enable communities to ensure systems are financially self-sustaining and provide revenue through appropriate rate setting to cover the cost of that infrastructure over the whole useful life of that asset and the full cost of service.

As outlined in Chapter 3, the Commission recommends the creation of a regional infrastructure pilot to operationalize coordinated asset management. To initiate the pilot, the State should invest $2 million for the initial development of an analytics database, data collection, and initial training for public and private stakeholders to inventory asset condition, identify needs, and develop plans. This will enable integrated infrastructure planning and adaptive management of assets. Additional funding will be required to expand deployment across the state.

A key recommendation to support development of 21st century infrastructure systems includes the establishment of the Michigan Infrastructure Council (referred to as “the Council”). The Council should assess the effectiveness of the pilot database and work toward implementation and maintenance of a common statewide asset management database. In addition to developing a long-term, integrated statewide infrastructure strategy in coordination with infrastructure decision-making bodies, the Council should design, oversee, and coordinate the distribution of incentives and funding for new infrastructure investments. The Council should ensure that funding cycles and processes promote cooperation and efficiencies between asset owners and reward projects that address multiple infrastructure needs with cost-effective collaboration and best practice funding and financing plans.

Investing in 21st Century Communications Infrastructure

Current Funding Sources and Financing Mechanisms

Michigan's communications infrastructure is funded primarily through the private sector based on an anticipated return on investment from consumer, business, and public sector subscribers. Other funding for communications infrastructure comes from federal programs, such as the Federal Communications Commission's Universal Service Fund Programs that have provided resources to Michigan, including the following:

- The Connect America Fund has provided a total of $645.7 million to support delivering broadband access to rural areas.
- The Lifeline Program provides approximately $6.5 million annually to support discounted broadband service for low-income consumers.
- The Schools and Libraries Program of the Universal Service Fund, commonly known as the E-Rate Program, provided approximately $58 million annually between 1998 and 2015 to help schools and libraries to obtain affordable broadband.
- The FCC Healthcare Connect Fund provides funding to increase access to broadband for eligible healthcare providers, primarily in rural areas. In 2015, the program brought approximately $3.25 million to Michigan to support broadband for rural healthcare providers (FCC August 26, 2016).

Beyond these federal funds from the Universal Service Fund, Michigan also received one-time funding of $171 million from the American Recovery and Reinvestment Act of 2009. There has also been limited state and local investment in communications infrastructure, as well as direct investment through educational institutions, which usually target very specific needs.

Investment Needs

Broadband Access and Adoption

Through incentives provided by federal programs and investments made by the state's broadband providers, Michigan has come a long way in improving fixed and mobile broadband access and adoption. However, 17 percent of households in Michigan lack fixed broadband coverage with download speeds of 100 Mbps and 11 percent of Michigan households lack mobile broadband coverage with 25 Mbps download speeds. Although Michigan is keeping pace nationally, we fall short of our goal of 100 percent access for both fixed and mobile broadband.

As detailed in Chapter 4, the Commission recommends steps to close this gap and position Michigan as a top-five state for broadband access and adoption. This includes the establishment of an advisory body—the Michigan Consortium on Advanced Networks—to coordinate policy, provide technical assistance, expand mapping and research of broadband access and adoption, expand digital literacy programs, and identify funding and financing mechanisms for mobile and broadband access and adoption.

To address funding needs, the Consortium needs to ensure all opportunities for federal funding and matching funds are fully utilized, including private sources of funding and financing, as well as innovative delivery options. Expanding broadband access could also be funded by an increase in the fee charged to telecommunications providers through the METRO Act, which was designed to assist in managing and maintaining public rights-of-way and to reduce conflicts with providers. Providers currently pay an annual fee of five cents per linear foot, which generates between $25 and $30 million per year and is distributed to local governments on a formula basis (MML 2015). Funding could also be provided through a surcharge to broadband service subscribers or through the state's General Fund. Expanding broadband access could also be financed as part of an infrastructure bond, bank, or P3.

The Michigan Legislature may also consider creation of a broadband technology tax credit for broadband service providers to encourage deployment of high-speed access.

Smart Technologies

The Commission also recommends the creation of a fund to support efforts that will make Michigan a global leader in smart technology development and deployment. The fund would provide seed and matching funds to incent innovative research and development on advanced communications and other smart technologies. In addition, this fund would support cities in identifying, implementing, and funding smart technology investments that appropriately serve their community. The Commission recommends this fund be established by the MEDC in partnership with other relevant state agencies—it could be funded through the Michigan Strategic Fund or the state's General Fund.

Cyber Security

To maintain Michigan's position as a top-five state for cyber security, the Commission recommends steps to continually keep pace with and respond to threats for critical infrastructure, as well as develop and implement programs to attract and retain talent in the cyber field. Cyber security recommendations could be funded through the state's General Fund and administered by DTMB.

Exhibit 15 summarizes recommendations for needed investment in Michigan's communications infrastructure.

EXHIBIT 15. Communications Infrastructure Investment Gaps

Rec. #	Description	Annual Investment Gap	Investment Term	Total Investment Gap	Investment Impact
4.1.2	Smart Technology Fund: Seed and matching funds to incent innovation of smart technologies	$10 million	5 years	$50 million	Michigan is a global leader in the evolution, deployment, and adoption of new technologies, and the creation of smart environments and communities.
4.2.1	Broadband investment in areas of need	$50 million	10 years	$500 million	Michigan is a top-five state for broadband access and adoption.
4.3.1	Cyber hub development	$3 million	2 years	$6 million	Michigan remains a top-five state for cyber security, where residents, businesses, and institutions can fully and confidently engage in a digital society and the digital economy.
4.3.2	Regional cyber security education collaboration	$1 million	2 years	$2 million	
4.3.3	Michigan Civilian Cyber Corps	$2 million	5 years	$10 million	
4.3.4	Virtual chief information security office	$375,000	2 years	$750,000	
4.3.5	Threat intelligence enhancements	$3 million	5 years	$15 million	
4.3.7	Cyber safety public awareness campaign	$2 million	5 years	$10 million	
4.3.8	Technology curriculum design and adoption	$960,000	5 years	$4.8 million	
4.3.9a	Develop next-generation identity and authentication solutions	$5 million	One-time	$5 million	
4.3.9b	Implement next-generation identity and authentication solutions	$3 million	5 years	$15 million	
Total				**$618.6 million**	

Investing in 21st Century Energy Infrastructure

Current Funding Sources and Financing Mechanisms

Despite being largely privately owned, the vast majority of Michigan's energy infrastructure is subject to regulation at the state, federal, or local level. These regulatory entities review utilities' prices, customer service, planning, and investment, allowing for reimbursement of appropriate expenditures. Generally speaking, to make investments in infrastructure, investor-owned utilities must first seek approval from regulators tasked with reviewing proposed expenditures and determining if costs are reasonable and prudent.

Investment Needs

Michigan's energy infrastructure has an existing funding structure for investment; thus, the Commission's recommendations do not include funding recommendations. However, the state's energy infrastructure is likely to require significant investment in the coming years. A majority of Michigan's electricity has traditionally been generated with coal as a fuel source, and most of the plants that were constructed in the sixties and seventies in Michigan were coal-fired. Many of those plants are coming to the end of their lives for regulatory and economic reasons. Other sources of energy, notably natural gas and renewable sources, will likely replace those plants. Reducing energy waste will also need to play an increasing role in our resource mix. The electric grid will need to undergo modernization to allow Michigan to take full advantage of these newer technologies and savings opportunities. Additionally, many of our natural gas pipelines were constructed with older materials and need to be replaced with newer materials that can provide better long-term safety.

Michigan needs to make many important and long-reaching energy decisions in the coming years. The state's decision-making processes should be improved to better look at the various alternatives and weigh them for adaptability, reliability, affordability, and protection of the environment. Updates to current federal and state processes for decision making could complement funding mechanisms in the current law to ensure Michigan's energy infrastructure meets—and continues to meet—the state's goals for reliability, affordability, and protection of the environment.

Investing in 21st Century Transportation Infrastructure

Current Funding Sources and Financing Mechanisms

Funding for the maintenance and preservation of Michigan's transportation system comes primarily from three sources: state fuel taxes, federal fuel taxes, and state vehicle registration fees. Only in the past few years has significant funding for roads been provided by Michigan's General Fund.

State Funding

Revenue from state gas and diesel taxes and registration fees is deposited into the MTF. The Michigan Constitution restricts the use of that revenue to roads, with up to 10 percent available for transit. Beginning in January 2017, the MTF will begin to see an increase in revenue, thanks to 2015 legislative action that will increase gas taxes by 7.3 cents per gallon, diesel taxes by 11.3 cents per gallon, and vehicle registration fees by 20 percent.

Funds flowing to the MTF are distributed to more than 700 transportation agencies across the state. After a series of administrative and other deductions are taken from the MTF, the remainder flows to MDOT, county road commissions, municipalities, and the CTF, which funds local bus transit, passenger and freight rail improvements, intercity bus transportation, and public ferries. These distributions are required by Public Act 51 of 1951, as amended.

The CTF derives its revenue from the MTF distribution, as well as 4.65 percent (of the 6 percent) of sales tax revenue collected from automotive-related retailers (gas stations and auto dealers). For example, in 2017, $91 million in auto-related sales taxes will flow to the CTF (MDOT 2016). Appropriation of General Fund revenues to the CTF varies from year to year.

Federal Funding

Federal aid provides roughly one third of Michigan's transportation budget each year, and is a vital part of the transportation capital construction budget. Federal fuel taxes, and other minor federal transportation-related taxes, are credited to the federal Highway Trust Fund. Federal highway aid is not cash, but a reimbursement for qualifying capital expenditures. It cannot be used for routine maintenance, such as snow plowing or pothole patching, which must be funded from state revenues. Federal highway aid must be matched from state or local funds, typically at a ratio of 80:20 percent. About $1.1 billion per year in federal funds is available for six major highway programs. Federal highway aid is divided by Act 51; 75 percent goes to state highways and 25 percent goes to local roads and streets.

Federal transit funding is generally allocated directly to public transit agencies. About $240 million per year in federal transit aid is provided to local public transit agencies or for discretionary grants for public transportation projects.

In FY 2015, the U.S. Department of Transportation initiated the FASTLANE program, which provides competitive grant funding for projects that address critical freight issues facing our nation's highways and bridges. The inaugural FASTLANE program provided $800 million in grants nationwide, although no Michigan projects were selected as part of that competitive process.

Local Funding

Local road and transit agencies in Michigan (83 county road commissions, 533 cities and villages, and 79 transit agencies) also invest in transportation infrastructure, and townships invest in county roads within their borders. According to Act 51 financial reports filed with the state, contributions by Michigan counties, cities, villages, and townships totaled $192 million in 2015 for local road and bridge maintenance, construction, and reconstruction. Michigan townships contributed an additional $46 million to road projects in 2015; cities and villages contributed an additional $235 million to transportation (CRA 2016). Local government contributions are generated from a variety

of sources, including local general funds, special assessments, millages, and public-private partnerships.

In the past decade, as transportation agencies struggled to find sufficient funds to sustain the condition of their transportation systems, the number of county-wide millages used for roads increased from 11 counties to 28 counties (CRA 2016).

Investment Needs

Roads and Bridges

In 2007, Michigan achieved established goals for the condition of state highways and bridges (90 percent good/fair) through asset management planning; however, the state has not been able to sustain that high level of performance. Through the roads package passed by the Michigan Legislature in 2015, beginning in 2017, an expected $450 million in new revenue from state gas taxes and vehicle registration fees will be distributed to more than 700 transportation agencies. That number rises to $600 million in 2018, and the full distribution of the entire $1.2 billion revenue package will occur in 2021. But even with these investments, an estimated $2.2 billion annual gap will remain. Closing this gap is essential to reach the state's goals for road condition—95 percent good or fair condition for Interstates and principal arterials; 85 percent good or fair condition for state highways and bridges; and, 85 percent good or fair condition for local roads and bridges—and to ensure Michigan is building and maintaining 21st century transportation infrastructure.

Multimodal Transportation Systems

Michigan's bus transit, passenger rail, and freight systems all compete for the same funding from the CTF, which is funded largely through a distribution of the MTF. The estimated MTF transfer to the CTF for FY 2015–16 is $169.3 million (Hamilton 2016). A smaller revenue source for the CTF is the auto-related sales tax, which was estimated to total $97.1 million in FY 2015–16. Interest on the fund balance and other revenue sources bring the total CTF revenue to approximately $267 million for FY 2015–16. While the CTF will receive a share of the increase to state gas taxes and registration fees in 2017 and beyond, the CTF was not included in the distribution of general funds proposed by the Michigan Legislature for roads and bridges in 2019, 2020, and 2021.

Recognizing that because of increasing fuel-efficiency standards, the gas tax will not remain a viable source of transportation funding indefinitely, the Commission has recommended alternative funding sources to fund roads and bridges. These alternatives are described in detail in Chapter 6 and outlined in Exhibit 21. While these options could help address the transportation funding gap in the long term, they will take time to implement. Meanwhile, a substantial funding shortfall remains (see Exhibit 16). Beyond further increases in the state gas tax and continued General Fund contributions, viable options to support critical road and bridge infrastructure in the near term are limited. Financing critical reconstruction needs through a bond, bank, or P3 should be considered. Increased federal funding for transportation must also be part of the solution. Through successful asset management, Michigan is well positioned to make good use of federal funding for transportation infrastructure.

EXHIBIT 16. Roads, Bridges, and Multimodal Transportation Annual Investment Gaps

Transportation Mode	Current Annual Investment	Annual Investment Need	Annual Gap
Interstates and other principal arterials	$1.2 billion	$2.2 billion	$1.0 billion
State highways and bridges	$250 million	$850 million	$600 million
Local roads and bridges	$740 million	$1.34 billion	$600 million
Multimodal	$420 million	$850 million	$430 million
Total	**$2.61 billion**	**$5.24 billion**	**$2.63 billion**

Bridge and Culvert Inspections

As described in Chapter 6, there are safety, environmental, economic, and social impacts when there are bridge and culvert failures, especially when flooding occurs at older bridge or road-stream crossings. The Commission recommends an annual state investment to support design, installation and inspection of road-stream crossings to ensure safe passage, natural stream function, aquatic organism passage, support of commercial activity and uninterrupted traffic flow. Local inspections could be funded through the state's General Fund. Design changes and construction of new crossings identified as a result of inspections could be funded through the MTF.

Intelligent Vehicle Technology

As described in Chapter 6, cooperation between the public and private sectors is helping to position Michigan as the global center of mobility and intelligent vehicle technology. While Michigan is already preparing to implement intelligent vehicles, the implications for infrastructure investment are not certain, given rapidly advancing technologies. The Commission has made a series of recommendations to continue to advance Michigan as a global mobility center, including investment in continued installation and implementation of intelligent vehicle technology, partnership development, and continued implementation of traffic signal synchronization. These investments could be funded through a combination of general funds and the Michigan Strategic Fund, and P3s could be a potential financing or project delivery source.

Exhibit 17 summarizes recommendations for additional needed investment in Michigan's transportation infrastructure.

EXHIBIT 17. Transportation Infrastructure Investment Gaps

Rec. #	Description	Annual Investment Gap	Investment Term	Total Investment Gap	Investment Impact
6.1.1	Reconstruct Interstate and other principal arterials	$1.0 billion	15 years	$15 billion	95 percent of Interstates and other principal arterials are in good or fair condition.
6.1.1	Reconstruct other state highways	$600 million	15 years	$9 billion	85 percent of other state highways are in good or fair condition.
6.1.1	Reconstruct roads under county or city jurisdiction	$600 million	15 years	$9 billion	85 percent of county primary roads and city major streets are in good or fair condition.
6.2.1	Design and install stream crossings	$40 million	5 years	$200 million	Road infrastructure, wetlands, and water quality are protected and safe passage of people and freight is ensured through continued viability of culverts.
6.2.3	Inspect local culverts greater than five feet in diameter	$4 million	5 years	$20 million	
6.4.1	Invest in multimodal (bus transit, passenger rail, and freight) systems[39]	$430 million	15 years	$6.45 billion	Michigan has a reliable, safe, and integrated multimodal system serving both urban and rural communities throughout the state.
6.4.3	Develop components of the DIFT	$323 million[40]	One-time	$323 million	Rail yards in southeast Michigan are consolidated resulting in relieved congestion, improved service, and environmental justice.
6.9.2	Install and implement intelligent vehicle technology	$20 million	10 years	$200 million	Michigan's positon as a global mobility center is advanced.
6.9.4	Advance intelligent vehicle technology industry through P3s	$2 million	10 years	$20 million	
Total				**$40.2 billion**	

Source: U.S. DOT FHA 2016; MDOT 2016.

[39] Multimodal investments include operating assistance required by Act 51.

[40] Includes only public investment needs; the total investment need for the DIFT is $539 million and this difference is expected to be funded through private investment. Tax increment financing could be utilized to support the public portion of the DIFT investment.

Investing in 21st Century Water Infrastructure

Current Funding Sources and Financing Mechanisms

Michigan's public drinking water and wastewater treatment systems are funded primarily through user fees, although some municipalities choose to underwrite these costs with general funds. When financing the initial capital improvements for new infrastructure and large-scale replacements, communities sometimes borrow money through the state's revolving loan funds, including the Clean Water State Revolving Loan Fund and the Drinking Water Revolving Loan Fund. Additionally, Michigan has a long history of voter support for general obligation bonds, such as the Clean Michigan Initiative and the Great Lakes Water Quality bond, to support environmental quality and water-related infrastructure. While the Clean Michigan Initiative has provided funding since 1998, the funds are expected to be fully depleted in 2017. Given current low interest rates, and to decrease administrative burden, many communities are turning to the open bond market to finance water infrastructure improvements. The USDA Rural Development Department also provides funding to rural communities to support water infrastructure. Private water wells, onsite wastewater treatment systems, stormwater infrastructure, and dams are the responsibility of individual owners.

Urban stormwater infrastructure is frequently funded when new development occurs as part of the original development costs. However, due to regulatory challenges, few communities have established a dedicated funding mechanism, such as a stormwater utility, to support maintenance and replacement costs, leaving municipalities to defer maintenance or pay for these expenses through their general funds. Drains outside of cities are frequently owned and operated by drain commissions as special purpose public corporations and paid for by property owners in the watershed on a proportional basis, depending on how much water they contribute to the drain.

Investment Needs

Asset Management

Michigan has an estimated $800 million annual gap in water and sewer infrastructure needs, compiled from decades of deferred maintenance. However, there is a high level of uncertainty regarding this need, due to a lack of data on infrastructure condition. While revenue to support infrastructure needs is primarily provided by ratepayers and local general funds, investment in asset management planning is essential to aligning rates with needs.

The State began awarding funds through the Stormwater, Asset Management, and Wastewater (SAW) program in 2014 to assist communities in asset management planning for wastewater and stormwater systems; stormwater management planning; innovative technology and project planning; and design for wastewater and stormwater systems. SAW awards grants and low-interest loans for wastewater construction projects designed to protect water quality and public health. The funds for SAW are expected to be fully utilized by 2018, while most wastewater and stormwater systems will still need asset management plans. As described in Chapter 7, the Commission recommends additional state investment in asset management planning and expansion of SAW to include drinking water.

Asset management planning is a short-term investment that has a long-term impact; therefore, it is appropriate for financing. Current SAW grants for wastewater and stormwater asset management planning are funded through general obligation debt authorized through the Great Lakes Water Quality Bond of 2002. Debt service on the bond is provided through the General Fund. The State should utilize the remaining $290 million of authorization available in the Great Lakes Water Quality Bond to provide additional SAW grants and continue to fund debt service through the General Fund. An additional $460 million in general obligation debt will need to be issued to completely fund stormwater, wastewater, and drinking water asset management planning.

These investments will enable system managers to align water and sewer rates with the full cost of providing water, sewer, and stormwater service, ensuring fiscally sustainable pricing models. Sustainable pricing models are essential to ensure the most value for investments, protection of public health and the environment, reliable service to customers, and a reduction in local general fund subsidies for water. Accurate reporting of needs also positions Michigan to optimize federal funding allocation for wastewater and drinking water revolving loan funds.

Drinking Water and Wastewater Investments

As detailed in Chapter 7, the Commission recommends investments in the state's aging drinking water and wastewater infrastructure. These recommendations include dedicated funding to address immediate public health risks and to meet drinking water regulations, as well as funding to support drinking water testing and remediation in schools, contaminated site cleanup, and monitoring expansion. These investments will enable Michigan to protect public safety and environmental health and result in safe, reliable, cost-effective, and efficient water-related infrastructure systems.

Rural Water Infrastructure Improvements

As described in Chapter 7, Michigan does not have a uniform standard for septic system performance, inspections, or periodic maintenance. The Commission recommends appropriate state agencies develop a financing mechanism such as a low-interest revolving loan fund or loan loss reserve program to support maintenance and replacement of existing onsite and community systems for system owners with a demonstrated need for financial assistance. These investments will help ensure safe and affordable drinking water, as well as wastewater disposal in rural areas. The Commission also recommends investments in wastewater treatment capacity, potable water, and drain infrastructure in rural communities to promote land-based industries—such as food, fiber crops, tourism, and mining—which will help rural communities to compete in the global economy.

Water Technology Innovations

The Commission also makes recommendations to encourage water technology innovation, which can provide cost savings and enhance environmental outcomes. This includes partnerships with Michigan universities to expand research programs in the drinking water and wastewater fields.

Dam Maintenance and Removal

Dam deterioration and failures can cause significant ecological and economic damage, affecting public health. As described in Chapter 7, dams are not routinely assessed to ensure informed decisions on reinvestment, repair, removal, or replacement. Adequate, consistent, and long-term

funding sources are limited for dam removal and removal costs are highly variable. The Commission recommends investments to inventory dam conditions and provide ongoing funding for the maintenance and removal of dams depending on the individual benefits of each dam. These investments will help to ensure improved safety, fish and wildlife habitat, and recreation opportunities.

Exhibit 18 summarizes recommendations for needed investment in Michigan's water infrastructure.

EXHIBIT 18. Water Infrastructure Investment Gaps

Rec. #	Description	Annual Investment Gap	Investment Term	Total Investment Gap	Investment Impact
7	Water and sewer infrastructure capital investments	$800 million[41]	20 years	$16 billion	All Michigan public water and sewer infrastructure is maintained resulting in reduced water main breaks, increased response to emergency infrastructure needs, and reduced public health risks.
7.1.1	Community infrastructure emergency response	$25 million[42]	20 years	$500 million	Public health and environmental emergencies are immediately mitigated by accessing emergency funds for failing infrastructure.
7.1.3	Drinking water infrastructure regulatory upgrades	$50 million	10 years	$500 million	All drinking water systems are upgraded to meet new state drinking water standards.
7.1.4	School drinking water testing and remediation planning	$4.5 million	One-time	$4.5 million	All Michigan schools use science-based methods to evaluate drinking water quality and develop appropriate remediation strategies.
7.1.6	Contaminated site cleanup	$35 million	10 years	$350 million	3,000 contaminated properties are cleaned up, protecting public health and drinking water supplies.
7.1.8	Real-time surface and groundwater monitoring expansion	$1 million	20 years	$20 million	Michigan's drinking water sources are protected with the highest level of security, resulting in early warnings to residents over concerns with water quality.
7.2.1	Stormwater and wastewater asset management planning	$80 million[43]	5 years	$400 million	All permitted drinking water, wastewater, and stormwater facilities identify and assess the condition of public water and sewer infrastructure.
7.2.2	Drinking water asset management planning	$70 million	5 years	$350 million	

[41] This figure includes an estimated annual gap in water and sewer infrastructure needs. This is considered a conservative estimate using the best information available. As condition assessments are completed, this estimate is expected to increase. Ratepayers are the primary funding source for this investment gap.

[42] Based on investment the State made in Flint for approximately 10 percent of the service line replacements, a similar amount may be needed for various other communities across the state.

[43] The average investment over the last three years is $97 million; current SAW funding ends in 2018.

Rec. #	Description	Annual Investment Gap	Investment Term	Total Investment Gap	Investment Impact
7.3.2	Rural wastewater, potable water, and drain infrastructure	$10 million	20 years	$200 million	Five rural local units of government are selected each year for the research, planning, design, and/or construction of wastewater, potable water, or drain infrastructure projects to support rural economic development, public health and the environment.
7.6.7	Need-based septic system replacement and maintenance revolving loan program	$20 million[44]	20 years	$400 million	Onsite and community wastewater systems are maintained or replaced for those with demonstrated financial need protecting public health and environmental quality.
7.7.6	Water innovation partnerships	$1 million	10 years	$10 million	Michigan incorporates innovative technologies into infrastructure, resulting in reduced costs for residents and improved service.
7.8.1a	Dam database, inventory, and field assessments	$2 million	One-time	$2 million	The State, communities, and dam owners have decision-support tools and training to assess reinvestment and removal options for dams.
7.8.1b	Dam maintenance and removal	$11.25 million	20 years	$225 million	Michigan's 2,600 dams are maintained or removed, resulting in improved safety for unanticipated failures, improved fish and wildlife habitat, and better recreation opportunities.
Total				**$19 billion**	

[44] This figure is based on the annual estimated cost of replacing 10 percent of failing septic systems. The State investment would subsidize low-income septic system owners who do not have resources to replace failing systems.

Asset management will help to ensure rates can fully align with infrastructure investment needs. The Council should work collaboratively with state departments to establish parameters for administration of these funding needs. In addition, a water infrastructure user fee could be established to support need-based infrastructure investments.

Addressing the Investment Gap

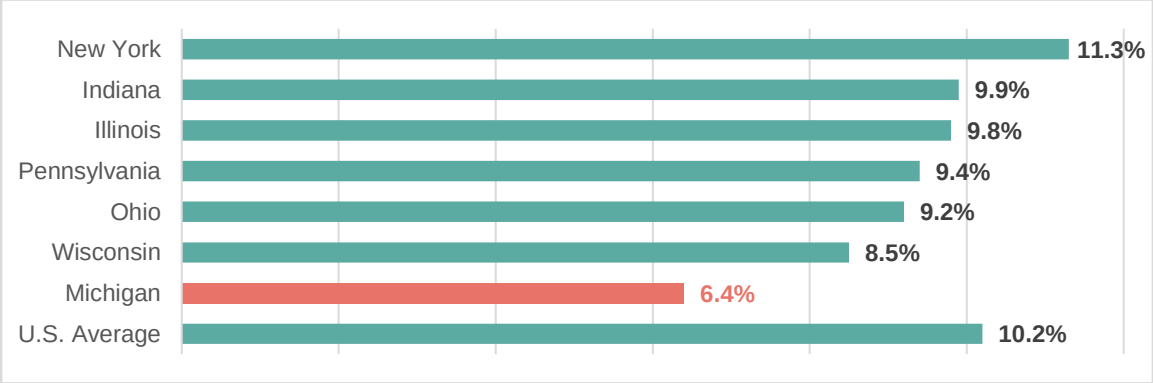
Michigan's infrastructure investment gap exceeds $60 billion over the next 20 years with an **annual investment gap of nearly $4 billion,** as seen in Exhibit 19.

EXHIBIT 19. Infrastructure Investment Gaps Summary

	Transportation	Water	Communications	Energy
Forecasted Annual Investment Gaps	Approximately $2.7 billion	Approximately $1 billion	Approximately $70 million	N/A, largely private utility investment
Forecasted Investment Gaps Over the Next 20 Years	Approximately $40 billion	Approximately $19 billion[45]	Approximately $600 million	N/A

As depicted in Exhibit 20, relative to neighboring states and the national average, Michigan underinvests in capital infrastructure spending at the state and local level (Deloitte 2016). Addressing this substantial gap will require a combination of local, state, federal, private, and user fee investments, as well as financing strategies to meet long-term needs.

EXHIBIT 20. State and Local Capital Spending Comparison



Note: Percent of total expenditure, annual average 2010-14.
Source: Deloitte 2016.

[45] This figure includes an estimated $800 million annual gap in water and sewer infrastructure needs. This is considered a conservative estimate using best information available. As condition assessments are completed, this estimate is expected to increase and rate structures should be adjusted to serve as the primary source for funding this gap.

Potential Revenue Options

Exhibit 21 outlines examples of revenue sources that could provide funding for infrastructure needs. This is not an all-inclusive list of revenue sources; it does not include local user fees, federal funding opportunities, or private investment. This table and the descriptions that follow provide a menu of options for consideration to directly fund infrastructure needs or to provide revenue for debt service to finance long-term needs.

EXHIBIT 21. Examples: Revenue Generation Options

Potential Revenue Sources	Asset Type	Example Scenario	Estimated Annual Revenue Generation Potential
Dedicated sales tax for infrastructure	All infrastructure	1 percent increase	$1.5 billion
Dedicated statewide property tax	All infrastructure	1 mill increase	$325 million
Broadband service surcharge	Communications	$1.54 per month surcharge on 2.7 million broadband service bills	$50 million
METRO fee	Communications	11 cents per linear foot increase	$50 million
Fuel tax	Transportation	10 cent per gallon increase	$500 million
Local revenue generation options	Transportation	Up to $40 county-wide registration fee or ten-cent county-wide gas tax	$400-500 million
Mileage-based user fee	Transportation	1 cent per mile based on current average miles driven statewide	$970 million
Nonmotorized transportation registration fee	Transportation	$10 per year, for two million bikes, kayaks, canoes	$20 million
Tolling	Transportation	5 cents per mile on 360 miles of US-23	$138 million
Vehicle registration fee	Transportation	20 percent increase	$200 million
Water infrastructure user fee	Water	$1 per 10,000 gallons based on the state's annual water withdrawal	$36 million

Definitions

- **Dedicated sales tax for infrastructure:** Sales taxes are collected when nonexempt goods and services are sold. A dedicated sales tax could be used to support infrastructure investment needs for all asset types. A constitutional amendment would need to be enacted, which would require a vote of the people.
- **Dedicated property tax for infrastructure:** Property taxes are a commonly used method of raising revenue to support public services and investment. Michigan provides funding to K–12 schools through a statewide dedicated property tax. A similar approach could be used to support infrastructure investments. A constitutional amendment may need to be enacted, which would require a vote of the people.

- **Broadband service surcharge:** There are approximately 2.7 million households with fixed, terrestrial broadband services. A surcharge placed on broadband bills could provide funding to support broadband access and adoption statewide.
- **METRO fee:** Telecommunications providers that own facilities located in a public right-of-way are subject to METRO fees that assess an amount for each linear foot of right-of-way use. Increasing the current fee from $.05 to $.16 could provide funding to support broadband access and adoption investment needs.
- **Fuel tax:** Fuel taxes are charged on gasoline sales to support transportation infrastructure on a per gallon basis. An additional fuel tax increase could generate funding to support road and bridge infrastructure investment needs.
- **Local revenue generation options:** Counties, cities, and villages supplement state aid with local funds. Currently, property taxes are the only locally controlled tax available for additional local funding. The Legislature could enable new methods of generating local revenue, such as regional-option sales taxes, gas taxes, vehicle registration fees, and land impact fees to invest in local road and transit infrastructure.
- **Mileage-based user fee:** An alternative or supplement to a fuel tax charges motorists based on the number of miles traveled. Depending on the complexity of the assessment, fees can be adjusted based on travel locations, times, congestion levels, road type, and ability of the user to pay.
- **Nonmotorized transportation registration fee:** Registration fees are a commonly used approach to support infrastructure investments for different modes of transportation. For example, motor vehicles, watercraft, and even airplanes are charged registration fees to support roads, harbors, and airports. Nonmotorized transportation registration fees on bicycles, kayaks, canoes, and other modes could generate revenue to support the development and maintenance of nonmotorized transportation routes.
- **Tolling:** Tolls are fees charged for passage on a public or private roadway that are used to support development and maintenance of roadways. Tolling on some Michigan freeways could provide funding to support road and bridge infrastructure investments needed for those freeways.
- **Vehicle registration fee:** Motor vehicles are required to register with the Secretary of State on an annual basis. These fees are used to support development and maintenance of roadways. An additional increase in the vehicle registration fee could generate funding to support transportation infrastructure needs.
- **Water infrastructure user fee:** Households and commercial operations use water for a variety of purposes such as cooking, cleaning, and hygiene. On a statewide basis, municipal water supplies withdraw approximately 360 billion gallons annually. A $1 fee per 10,000 gallons could provide revenue to support water-related infrastructure investments (Great Lakes Commission 2015).

Financing Strategies

Historically, public funding for infrastructure has occurred on a "pay as you go" cycle in which annual operating and capital budgets allocate dollars to maintain or expand infrastructure. Increasingly, states and cities have relied on general obligation and other types of bonds to finance infrastructure projects. As states and countries diversify funding sources, some have set explicit limits or targets for levels of indebtedness. Oregon, for example, has capped the amount of debt the State will issue for infrastructure projects and has focused on other sources of funding such as fees, special revenues (e.g., lottery), and private investments (State of Oregon Office of the Governor 2012).

Today, best practice–level infrastructure management systems utilize a diverse mix of funding, including public and private investments, to maintain, improve, and expand infrastructure. In addition to the traditional public funding mechanisms like general funds and traditional bonds, some states and countries have utilized more innovative tools to ensure adequate capital to fund projects, and to improve efficiencies. These tools include infrastructure banks and P3s.

State Bond Financing

Bond financing is a funding strategy that involves the State borrowing money from bond holders with a promise to pay back the principal plus interest at a predetermined future date. This strategy lends itself well to some infrastructure projects. Bonding should only be used for projects with a long useful life, and bond funds should not be used to pay for operations. Bonds are generally structured to be paid back over the useful life of a project. The principal and interest on the bonds can be repaid with user fees or some other revenue source. One advantage of bond financing is that the users receiving the benefits can also be made to pay the costs of the system. For example, if bonds are used to pay for a water system, users can be charged for the debt service as part of their water bills. If funds were saved in advance to pay for a project, current taxpayers would be paying to support a project that benefits future taxpayers.

There are two primary types of bonds issued by the State of Michigan. General obligation (GO) bonds are backed by the full faith and credit of the State; nongeneral obligation (non-GO) bonds, also referred to as revenue bonds, are debt instruments supported by a dedicated revenue source or a state appropriation (Zin 2016).

GO bonds are provided for under Article IX, Section 15 of the Michigan Constitution. The full faith and credit pledge means that the debt service for these bonds has priority over other obligations. Basically, the State promises to do whatever it takes to pay these bonds, including raising taxes if necessary. Issuing GO bonds requires an affirmative vote of two-thirds of the Legislature, and a majority vote in a statewide general election.

Non-GO bonds are provided for under Article IX, Sections 9 and 13. The Legislature can authorize the issuance of these bonds through the enactment of statutes—a new statute is not needed every time bonds are issued. The Legislature can give the authority to issue bonds as needed to a government entity. Non-GO bonds are not backed by the full faith and credit of the State, and are subject to "appropriation risk," meaning there is a risk that the Legislature will not appropriate sufficient funds to fully pay the debt service when bond payments are due. Non-GO bonds are seen as slightly riskier than GO bonds by lenders. They generally carry a lower bond rating and a slightly higher interest rate. Non-GO bonds are much more commonly issued due to the difficulty of issuing GO bonds.

The State should determine the most cost-efficient options over the longterm to fund and finance priority infrastructure needs. One financing option to consider is bond financing for priority infrastructure needs, given currently low interest rates, our favorable credit rating, and financing capacity. Michigan's current Moody's credit rating is Aa1 stable and our net tax-supported debt as a percentage of personal income is 1.8 percent compared to a median of 2.5 percent amongst other states. A bond could provide some funding for much needed investments in stormwater and drinking water asset management, critical drinking water infrastructure, road and bridge reconstruction, and expansion of broadband access statewide. Financing $1 billion over 30 years at a 3 percent interest rate would require approximately $50–55 million in annual debt service. This would equate to approximately $13 per Michigan household annually or $1.10 per month. The Council could advise on how the bond funding could be utilized and options for providing debt service in conjunction with appropriate authorities and agencies. Exhibit 22 includes an example of potential uses of an infrastructure bond.

EXHIBIT 22. Infrastructure Bond Example

Asset Type	Potential Investment	Example Investment
Water	Drinking water asset management	$250 million
	Wastewater asset management	$250 million
	Critical drinking water infrastructure	$100 million
Transportation	State road and bridge reconstruction	$250 million
	Matching funds for local transportation investments	$100 million
Communications	Broadband access expansion	$50 million
Total		**$1 billion**

Infrastructure Banks

Infrastructure banks are state-owned banks that can finance and coordinate high-value infrastructure investments. Banks allow for borrowing (or loan guarantees) from public and private entities to fund public-serving infrastructure projects. Infrastructure banks can be used for projects requiring large lines of credit, which in some cases, allows an entity to multiply its infrastructure investment capacity. Infrastructure bank loans also use delayed-repayment mechanisms, which allows key projects to move forward even if they will not generate user fees or yield savings for many years (Miller et al. 2012).

Several states have public banks that play some role in infrastructure. One of the oldest such institutions is the Bank of North Dakota, although its infrastructure participation in recent years has been limited (Bank of North Dakota 2016). Created in 1994, the California Infrastructure and Economic Development Bank finances public infrastructure and private development to promote jobs, contribute to a strong economy, and improve quality of life (State of California 2015). The Pennsylvania Infrastructure Bank leverages state and federal funds to accelerate priority

transportation projects by providing low-interest loans (Pennsylvania Department of Transportation 2016). In addition, Connecticut recently established both an infrastructure bank to assist public and private entities with infrastructure financing and a green bank to finance energy efficiency projects (Connecticut Green Bank 2016; S.B. 402 2016).

Michigan may consider implementing a multisector infrastructure bank with a major focus on economic development as a solution to address the broad range of infrastructure needs. Legislation would need to be passed in Michigan to establish an infrastructure bank. Michigan has a history of comparable infrastructure financing mechanisms, including the Drinking Water State Revolving Loan Fund and the Clean Water State Revolving Loan Fund. A bank structured as an authority with a board could be aligned with the asset management planning and technical assistance body to vet and prioritize projects. The Council could serve as a planning and policy authority for an infrastructure bank in conjunction with appropriate boards and agencies. Exhibit 23 includes an example of potential uses of an infrastructure bank.

EXHIBIT 23. Infrastructure Investment Bank Example

Asset Type	Potential Investment	Example Annual Investment
Water	Drinking water system upgrades	$50 million
	Community emergency response	$25 million
	Septic system loan fund	$20 million
Transportation	Local roads, bridges, and transit reconstruction	$150 million
Communications	Broadband access expansion	$25 million
Water and Transportation	Emergency needs	$30 million
Total		**$300 million**

Public-Private Partnerships

A ***public-private partnership*** is a long-term, performance-based, contractual arrangement between a public agency and a private sector entity. A P3 arrangement allows for the use of private dollars to construct a public asset, and the private investor is repaid through future, long-term revenue streams associated with constructed assets. P3s usually involve one or more private company investors, private equity funds, and/or institutional investors (Deloitte 2016).

In essence, P3 is another method available to public authorities to procure and deliver major infrastructure projects. P3s may take a variety of forms and generally involve some combination of key aspects of a project, including the design, construction, finance, operation, and maintenance. There is also a variety of payment mechanisms associated with P3 projects, which include user fees/tolls, service fee or availability payments, and milestone payments, among others. Financing

required for P3 deals may be raised by the private partner, or by the public authority, depending on the nature of the P3 transaction.

While P3 is not suitable for all infrastructure projects, on large or more complex projects it has proven to be effective at bringing innovation, optimized risk transfer, accelerated delivery, and a whole-life costing approach (that involve more sophisticated preventative and predictive asset management techniques, which can significantly reduce long-term cost of ownership of the asset) which can bring the lowest overall total cost of ownership to the public sector. Some form of P3s can be utilized in a number of sectors, including transportation, water and wastewater, social infrastructure (public buildings, universities, schools, court houses, corrections facilities, VA hospitals, social housing), energy and utilities, and technology (broadband, data centers).

P3 may not deliver the cheapest source of financing but if well-structured can deliver infrastructure more efficiently and cost effectively over the whole life of the asset. The synergies inherent in private sector innovation across design, build, finance and maintenance can provide significant value to the public sector while ensuring high quality service to the public users. Better value includes fewer cost overruns and project delays (due to increased construction, operational, and demand efficiencies such that taxpayers or ratepayers do not bear costs if the project exceeds time expectations, goes over budget, or underperforms), as well as greater investment in durable, flexible infrastructure because of the private sector responsibility for the asset. All of this results in lower life-cycle costs through decreased energy usage, lower maintenance costs, and enhanced resiliency (Sabol 2014).

P3s build and operate many tolls and some bridges, water and energy assets, and airports. Virginia and Florida are two states that have led the way with the implementation of large-scale and innovative toll road P3s to improve infrastructure condition and boost capacity. Virginia has supplemented their economy with billions of dollars from the private sector leading to road upgrades such as express lanes and high occupancy toll (HOT) lanes. Florida encourages private investment in roads and has a Florida Council for P3s to share knowledge between the public and private sectors (Deloitte 2016).

The use of P3s is enhanced by the State of Michigan's creation of a public-private partnership commission, the use of design-build-finance for certain projects by the Michigan Department of Transportation, and encouragement for the state, municipalities, and private industry to undertake projects utilizing P3s. P3s are further encouraged by recent federal policy. Presently pending and working its way through the Michigan Legislature is a new P3 bill intended to further the development of infrastructure (Foster Swift 2016). This may provide a signal to private sector investors that the state is receptive to alternative project delivery options. The Council should explore opportunities to utilize P3s to support infrastructure investment needs, particularly in the transportation sector.

Conclusion

Michigan has an annual funding gap of nearly $4 billion to address critically required infrastructure improvements and maintenance. Current taxes and user fees do not raise sufficient revenue and the state lacks sustainable funding sources to build infrastructure systems for today, as well as for the future. Coordinated asset management and the Michigan Infrastructure Council's leadership can help to prioritize infrastructure planning and investment, as well as provide incentives that encourage collaboration and efficiencies to deliver value to Michigan's residents, who pay the tab. User fees and existing ratepayer structures are the primary funding sources for improvements to infrastructure. Some one-time costs for system build-outs, management tools, and high-risk needs can be frontloaded in this low-interest environment. These one-time and immediate investments get Michigan back on track for safe and reliable infrastructure providing a return on investment, jobs, and economic prosperity. Now is the time to plan for the next 30 to 50 years, driving sound investments for the 21st century.