Strengthening Michigan's Infrastructure and Sustainability

How Master and Capital Improvement Plans Can Help Build Green and Blue Economies

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ABSTRACT

This Co-Learning Plan examines the implementation of Michigan's municipal master plans and capital improvement plans (CIP) in the context of the challenges with public infrastructure systems and the opportunities for a future blue and green economy. Statewide information is assessed and municipal profiles are developed and compared to represent a range of population size, economic characteristics, and geographic location. This study's communities include Ann Arbor, Benton Harbor, Detroit, Flint, Grand Rapids, Holland, Marquette, Novi, Oakland County, Pittsfield Township, and Traverse City. Legislative, policy, and strategic management reforms are recommended to overcome impediments and to optimize public infrastructure systems in enhancing economic growth, protecting health, and increasing sustainability.

INTRODUCTION

Michigan's communities are in contest with the rest of the country to create and revitalize places that nurture, attract, retain, and connect people. Density, walkability, sustainability, creativity, and connectedness are today's driving factors of growth, and they are all shaped by a place's infrastructure. As the Michigan Economic Center report *Jobs, Michigan & Leadership in the Economy of Tomorrow* states: "Cradled by the Great Lakes, we have unparalleled outdoors, countless lakes, rivers and hundreds of miles of freshwater coastline. We have historic and iconic cities rich with culture, architecture and authenticity…We have a well-developed park system that is a base on which to build and a richness of water trails and green belts."[1]

Communities across the U.S. race to create places with the right conditions - high quality of life, improved amenities, even community values - that nurture, attract, retain, and connect talent. Preferences for a convenient, connected lifestyle with high levels of social interaction and a flexible work environment are creating increased demand for compact walkable and bikeable design patterns. These community preferences interact with other choices: how to travel efficiently (in terms of getting work done), sustainably (in terms of limiting impacts on the environment), collaboratively (in terms of networked and shared solutions), and healthily (embracing outdoor lifestyles and physical fitness). Together, these priorities are putting quality of life, lifestyle, and values at the center of community economic development, and challenging communities to align their master and capital improvement plans, infrastructure, and budget priorities to support this new growth and development dynamic.

Public infrastructure systems support the linkages necessary to capitalize on changing social patterns, demographic trends, consumer expectations, and economic circumstances. The need for a new approach to infrastructure is a perennial agenda item for the federal and state governments. But what is occurring at the municipal level where the infrastructure is actually placed, where the projects are managed, and where capital projects are paid for by local users or taxpayers? Infrastructure, as defined in a recent publication from the Brookings Institute, is: "a broad range of public capital that facilitates economic activity," including airports, bridges, roads, highways, transit systems, water and sewerage systems, public buildings, dams, power plants, schools, and information technology systems.[2] Clearly, all infrastructure is local, even when its funding streams include federal and state resources, or its impact is significant for a region, a state, or the nation. In fact, Michigan law puts the function of infrastructure planning primarily on municipal and county governments and (P.A. 33 of 2008) requires all municipal and county governments that have adopted a master plan to also adopt a capital improvement plan (CIP).[3]

An examination of Michigan's municipal master plans and CIPs highlights the statewide challenges with underfunded public infrastructure systems and corresponding regulatory agencies, as well as a series of local impediments such as a lack of access to centralized data, fragmented public authorities, and limited local staff capacity. Unfortunately, these obstacles are compounded in distressed communities. Michigan significantly lags in state and local public infrastructure investment. The Governor's 21st Century Infrastructure Commission affirmed the pattern of disinvestment noting that state and local infrastructure spending combined is at 6.4% in Michigan but 8.5% to 9.9% in neighboring states.[4] The problem is more than just money. According to the Michigan Economic Center's report on the blue economy, state, and local funding sources, regulatory oversight, and planning functions are in separate silos.[5]

At the same time, there are frameworks around sustainability in place and innovative investments being made in numerous Michigan communities that are leading the way to a more blue and green future, where public infrastructure systems purposefully integrate plants, soils, water, and built structures in order to

protect the natural environment, mitigate climate change, support resilience, generate local economic development opportunities, and promote placemaking and beautification. As the Michigan Economic Center report notes, the most ambitious and effective community plans in Michigan (and elsewhere) include setting community goals for:

- Clean energy
- Clean water, efficiency, and access
- Public health
- Broadband/Internet access
- Public transportation options and use
- Food ecosystems and access
- Land use and biodiversity
- Green space, water and bike trails
- Resilience and climate change mitigation

Many Michigan communities are tackling pieces of the sustainable and innovative community puzzle, including those that are part of the Michigan Green Communities initiative (a partnership of the Municipal League, Michigan Townships Association, and Michigan Association of Counties focused on clean energy). Others are part of "Blue Economy" community development efforts, leveraging water assets, or are involved in place-making efforts, extending broadband, development multimodal transportation, and engaged in greenways and agricultural preservation.

Other communities are moving projects where abandoned factories, slag heaps and oil tanks left over from the earlier industrial era are being replaced with parks, marinas, educational institutions, art galleries, restaurants, and bars and hotels in cities such as Bay City, Muskegon and Marquette. The rapids are coming back to Grand Rapids. Riverbank Park in Flint is being transformed and naturalized. Port Huron's "Blue-Meets-Green" initiative is reconnecting the city to the waterfront.[6] These projects are just a few examples of hundreds of cutting-edge efforts spanning the spectrum of green and blue development: clean and renewable energy, water treatment and management; public transportation; and parks, trails, recreation, and ecological preservation. All of these initiatives around energy, water, transportation, and land use are sustainable development strategies that represent a significant reworking of physical infrastructure systems to support the new spaces and uses, reduce the carbon footprint, and increase resilience to climate change.

The questions are: a) What is the extent of underfunding public infrastructure covered by local capital improvement plans that crimp these sustainable and innovative community building efforts? b) What barriers exist to implementing capital improvement plans beyond financial factors? c) What are the opportunities and strategies to align capital and budget planning to develop more environmentally and financially sustainable "green" and "blue" infrastructures and link together fragmented systems? d) What state legislative and policy changes are necessary to optimize the strategic local management of public infrastructure?

This report includes local profiles representing a range of counties, cities, townships, and villages based on population size, economic characteristics, and geographic location, from Benton Harbor to Marquette and Detroit to Grand Rapids. The contents and format of different municipalities' CIPs vary widely, however, they share the common purpose of compiling and prioritizing major, non-recurring expenditures,

including new construction, extensions, and renovations on public facilities, infrastructure systems, property grounds, or equipment with a useful life of three years or more. CIPs also cover the acquisition of land for a public purpose and any feasibility, engineering, or design studies related to the above.[7] The majority of CIPs use a threshold of $10,000 for projects; however, smaller communities may include projects over $5,000, and the largest municipalities use $100,000. The significance of sustainability within municipal master and capital improvement plans also varies widely. Plans can include overarching measurable objectives to reduce carbon emissions or the redesign of a grey concrete storm sewer line with a green overflow. This diversity presents an opportunity for the identification of innovations, best practices, and barriers to sustainability planning and project implementation, as well as to reflect on where different places stand on a continuum toward building a more attractive, innovative, and sustainable community.

The goal is to recognize and take advantage of the opportunities for a future blue and green sustainable economy in Michigan. Therefore, legislative, policy, and strategic management reforms are necessary. Recommendations are proposed to overcome impediments and to optimize public infrastructure systems in enhancing economic growth, protecting health, and increasing sustainability, including fixing the basics of the municipal finance system, updating infrastructure funding tools, and reforming development programs.

CAPITAL PLANNING PROCESS

Capital improvement planning is a process in which communities and local government entities make decisions about public property and infrastructure investments. The Michigan Planning Enabling Act states that local units of government will prepare a capital improvement program on an annual basis in the following manner:

> *The capital improvements program shall show those public structures and improvements, in the general order of their priority…will be needed or desirable and can be undertaken within the ensuing 6-year period. The capital improvements program shall be based upon the requirements of the local unit of government for all types of public structures and improvements. Consequently, each agency or department of the local unit of government with authority for public structures or improvements shall upon request furnish the planning commission with lists, plans, and estimates of time and cost of those public structures and improvements.*[8]

The legal requirements mirror the best practices identified by scholars and practitioners, which call for integrated, multiyear plans for capital projects with the estimated costs and funding sources for each project.[9] Additionally, the Government Finance Officers Association recommends connecting capital planning to the budget process because, "it is extremely difficult for governments to address the current and long-term needs of their citizens without a sound multi-year capital plan that clearly identifies capital needs, funding options, and operating budget impacts."[10] Indeed, financial planning, capital planning, and project implementation are all related, as illustrated in the diagram below.

Figure 1. The Capital Planning Cycle

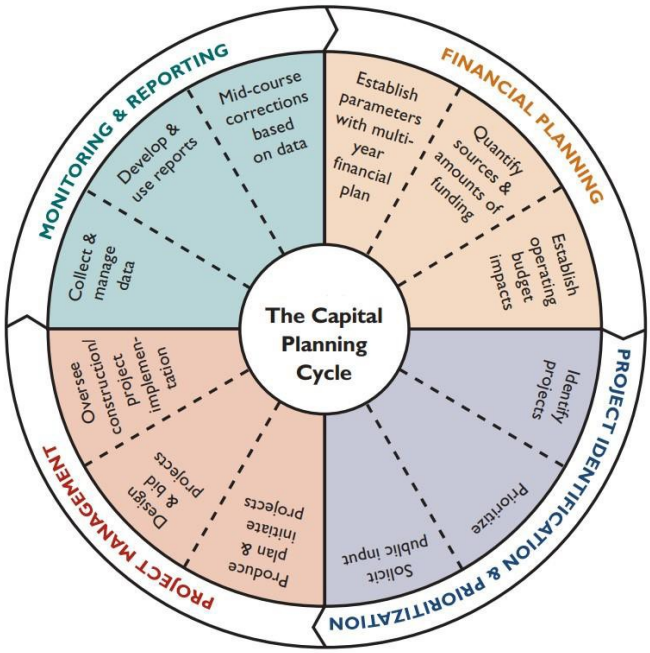

Diagram from Westerman, Nicole (2004). "Managing the Capital Planning Cycle: Best Practice Examples of Effective Capital Program Management," *Government Finance Review,* p. 27.

FINANCIAL PLANNING

Financial planning is central to and the most appropriate starting point for capital planning because "resources are always more limited than needs."[11] While a capital improvement plan is not a binding financial commitment, ideally the first year of a six-year CIP would be consistent with the capital expenditures in the adopted budget.[12] However, this is not a requirement of Michigan law. It is mandatory for adopted municipal budgets to include, "an estimate of the expenditure amounts required to conduct, in the ensuing fiscal year, the government of the local unit, including its budgetary centers," yet an adopted CIP is not referenced in the Uniform Budgeting and Accounting Act.[13] It is also noted that a five-year or six-year horizon is insufficient for projecting infrastructure needs. Transportation and water systems in particular benefit from a 10- or 20-year outlook.[14]

The primary challenge with the financial aspect of capital improvement planning is estimating the various revenue streams that fund projects. The CIP for the City of Brighton, for instance, had a six-year total projected expenditure of $24.7 million between 2016 and 2022. In order to fund the capital projects, 10 revenue sources were identified: capital improvement bonds, capital loan, DDA financing, general fund appropriation, grants, major street fund revenue, public safety millage, special assessment bonds, utility bonds, and utility user fees.[15] The complications multiply in larger municipalities with more complex systems which require forecasting one-time revenue sources and pay-as-you-go funding targets as well as modeling debt affordability and mechanisms for cost recovery.

PROJECT PRIORITIZATION

Projects are the core of capital improvement plans. For example, the City of Grand Rapids CIP documents contain over 400 pages of project descriptions with information on each project's purpose, potential funding sources, costs of not completing the project, and relationship to the sustainability plan if relevant. Moreover, as Gary Donaldson recently wrote in *Government Finance Review,* "The prioritization of capital projects has taken on additional importance, given the limited availability of financial resources to meet the competing interests for infrastructure requirements."[16] The prioritization process may encompass a wide variety of criteria beyond financial feasibility such as: the necessity of meeting legal, compliance, or regulatory mandates; alignment with the master plan and development patterns; level of community support; benefits to public health, safety, and welfare; generating cost savings; and addressing outdated systems causing frequent maintenance or operational problems.[17] Software systems can be employed to model projects and to illustrate geographic affects, although local governmental units often utilize spreadsheets for project submission and review processes.

The review process can be structured to include internal stakeholders such as department heads and also citizen representatives. Optimally, there is significant public input in the decision-making process that results in a strategic CIP and not a wish list of projects.[18] Michigan law requires a planning commission to recommend the CIP be consistent with the master plan. This ensures a modicum of public participation and alignment with community priorities, but the best practice would be even more extensive engagement that educates people about capital needs and funding options.[19]

PROJECT MANAGEMENT AND MONITORING

The capital planning cycle also includes project management and monitoring; however, there are no legally prescribed standards or reports for carrying out these functions. This is an area that needs improvement in Michigan. The new state commissions on infrastructure and water will address this, but the problem with silos and the stratification of information is not resolved at this time.

COMMUNITY PLAN PROFILES

The following profiles represent communities with a range of population sizes, economic characteristics, and geographic locations across the State of Michigan. They focus on assessing the intersection of financial management and planning with sustainability objectives, projects, and measurable outcomes. Each profile includes an overview of the most recently adopted planning documents, key findings and observations, and notable accomplishments related to sustainability.

ANN ARBOR

(Population 120,782). The City of Ann Arbor's *City Master Plan* (adopted in 2015) includes a sustainability framework, a climate action plan, and a capital improvement plan. *SustainA2able*, the sustainability framework, integrates more than 20 plans developed over 20 years into a cohesive set of 16 goals in 4 theme areas:

1. Climate and Energy (including sustainable energy, energy conservation, and sustainable buildings)
2. Community (including engagement, diverse housing, human services, safety, active living, and economic vitality)
3. Land Use and Access (including transportation options, sustainable systems, and integrated land use)
4. Resource Management (including clean air and water, healthy ecosystems, responsible resource use, and local food).[20]

The City of Ann Arbor's *Climate Action Plan* is a leading example of a community recognizing the need to mitigate greenhouse gas emissions and to adapt to a changing climate. The inventory found that C02 emissions were 2.2 million metric tons in 2010. It was conducted by examining the following sectors: residential, commercial/industrial, transportation, waste, and university.[21] The initial target was to reduce emissions 25% by 2025, and while the data collected to date shows progress on numerous action items, the efforts have not achieved a measurable effect yet.[22] The city's capital improvement planning process is clear and well-organized. Each year an update is made to the six-year plan with total project costs and current year project costs. Only items greater than $100,000 are included. The most recent CIP includes 440 projects with a total funding need of $1.008 billion. The FY2018 spending plan is $82 million across all categories: building, parks, solid waste, airport, alternative transportation, bridges, new streets, other transportation, parking, street construction, sanitary system, stormwater management, and water system.[23] Ann Arbor's capital improvement planning process utilizes a model for prioritizing projects that includes sustainability and innovation. Indeed, the factors are: safety/ compliance, master plan objectives, coordination with other projects, innovation, sustainability framework, funding, user experience, and partnerships.[24] This tool is a best practice that could be utilized by other municipalities. As noted in the importance of user experience being factored into decision-making, Ann Arbor is also a leader in recognizing the value of civic engagement and citizen knowledge. In regards to sustainability initiatives, the city has numerous boards, commissions, and advisory bodies connected to the city council covering energy, environment, greenbelt, historic district, housing, planning, and parks. The implementation capacity of the City of Ann Arbor is impressive. As an example, the city's Energy Office manages projects, develops informational resources, and advises elected officials. The city also has a unique storm-water utility fee to fund green infrastructure improvements and protect the Huron River watershed, which shows how forward-looking planning, program management, and sustainability outcomes can be linked effectively.

BENTON HARBOR

(Population 9,919). The City of Benton Harbor adopted a master plan in 2011 that includes, "the three pillars of sustainability: 1) environmental; 2) social; 3) economic sustainability," and identifies strategies such as following smart growth principles, protecting ecologically sensitive areas, and promoting recycling and local food growing initiatives.[25] The plan also recognizes that, "the St. Joseph and Paw Paw Rivers are significant environmental assets for the City… [that] were consistently identified by residents as top community assets throughout the planning process."[26] The plan outlines a vision for an expanded riverfront concept with the resurrection of a ship canal extending into the downtown area and the arts district for the purpose of creating new mixed-use redevelopment opportunities, as well as revitalizing nearby residential neighborhoods near the high school.[27] The earlier Harbor Shores brownfield redevelopment and the controversy around leasing part of a public park for a golf course is part of the context for the master plan. The long-term impact on the sustainability of the state-imposed redevelopment is yet to be determined; although, spending on park upkeep and visitor numbers are up from before the Great Recession. Currently, Benton Harbor is undertaking physical improvement projects even though it has not adopted a CIP. The renovation of the water department and the reconstruction of Main Street were both recently cited by Mayor Marcus Muhammad as examples of sustainability. Mayor Muhammad also noted the vital importance of the human dimension of sustainability: "Sustainability includes the word 'us,' which begins with 'U," and without you there can be no sustainability."[28]

DETROIT

(Population 672,795). The City of Detroit's *FY18-FY22 Capital Agenda* outlines spending needs of $1.39 billion over 5 years including buildings, streets, infrastructure, fleet, housing and neighborhoods, information technology, and parks. The general sources of funding are: DWSD Bonds $488 million; Federal Grants $367 million; State Formula Funds $333 million; City of Detroit/General Fund/Past Bonding $158 million; Public Lighting Authority Bond Funds $45 million. Water and sewer infrastructure and streets and sidewalks together make up 65% of the spending plan. The plan is explicit about the funding challenges and uncertainty: "The first task of a Capital Strategy is to identify the capital needs of the city. The second task is to identify, to the extent possible, the potential financing sources. For a program stretching into the future, not all funding sources can be fully identified today."[29] More than $1 billion in additional priority projects are noted for transit, public safety, neighborhood infrastructure, environmental quality, cultural institutions, and other city systems. The complexity of the challenges are immense, and it is recognized that the capital improvement planning process needs to continue. The document calls the agenda, "the start of a decision-making process requiring public input and choices about the city's public capital priorities."[30] Detroit's capital strategy is oriented towards the annual budget in part because the current master plan is nearly a decade old. While the current official capital improvement planning documents do not prioritize sustainability, there are a large number of related projects underway in Detroit; the city has created a Sustainability Office, and the more recent Detroit Future City Strategic Framework does include extensive guidance for moving toward "a more affordable, efficient, and environmentally sustainable city through reforms to service delivery throughout the city, and through transformation of the systems and networks that carry the city's water, waste, energy, and transportation."[31] This framework outlines designs for innovative landscapes of blue and green infrastructure that would strengthen environmental quality, improve public health, and have fiscal and economic benefits.

FLINT

(Population 97,386). The City of Flint adopted its first capital improvement plan in 2014 after also adopting the Imagine Flint: Master Plan for a Sustainable Flint in 2013. The City of Flint secured a

Community Challenge Planning Grant from the U.S. Department of Housing and Urban Development under the Partnership for Sustainable Communities. The Partnership for Sustainable Communities was a collaboration of HUD, EPA, and the U.S. Department of Transportation that was created in 2009 to coordinate public investments more efficiently and get better results for communities. In Flint, the federal grant was matched by funding from local foundations, the land bank, the chamber of commerce, and colleges and universities. As an aside, the federal interagency partnership is a model that could be adopted by the State of Michigan. With the *Imagine Flint* plan, Flint committed to a new land use pattern, a strategic approach to public investments, and to building partnerships. Numerous projects have been initiated such as restoring biodiversity within parks, remediating brownfields along the river, and increasing the miles of complete streets and bike lanes. With the overwhelming challenge of the Flint Water Crisis, the city designed a comprehensive infrastructure recovery plan based on the contours of the master plan and CIP. *Rebuild Flint the Right Way* addresses, "each and every component that is a part of the city's complicated and interconnected water delivery system... assembling a new water infrastructure system that fits the community's needs and delivers clean drinking water citywide...[and] constructing new multi-modal roads and green right of ways that reduce costs and support the city's ecosystem."[32] The total cost to rebuild Flint's water system is estimated to be more than $1 billion and additional community redesign and blight elimination is up to $3 billion more. This is far beyond the scope of what public authorities have committed to Flint to date and more funding is required. Looking ahead, reforms to public infrastructure systems need to bear in mind the fundamental importance of safe and healthy infrastructure as well as the catastrophic costs of failure, the risks to human lives, and the public health that is at stake.

GRAND RAPIDS

(Population 196,445). The City of Grand Rapids' *Five Year Capital Plan FY2017-2021* is one component of a comprehensive planning and fiscal package that includes an adopted master plan, a five-year fiscal plan, and a detailed capital projects list for FY2018.[33] More than $80 million in capital projects were budgeted for in FY2017. The 457 page document lists details on individual projects. The CIP is part of a wider local government transformation initiative to make Grand Rapids a "sustainable city."[34] The CIP generally follows the master plan adopted in 2002 and the updates in three areas adopted in 2012 through the *Green Grand Rapids* plan; it reflects the urban design concepts of smart growth and local guiding principles including partnership, leadership, choice, economic health, balance, equity, access, and sustainability.[35] The City of Grand Rapids has made a commitment to sustainability and has adopted a nationally-significant model, the "Quadruple Bottom Line" matrix of environmental quality, social responsibility, economic prosperity, and government accountability. The Office of Sustainability tracks enterprise-wide goals such as: "a) reduce the city's greenhouse gas emissions to 25% below 2009 levels by 2021; b) double water reuse and recovery by June 30, 2021; c) increase energy use from renewable sources such as wind, solar, biogas and geothermal from 30% today to 100% by June 30, 2025."[36] The outstanding commitment to sustainability in Grand Rapids is rightly attributed to former Mayor George Heartwell, whose leadership shifted the paradigm from undertaking environmentally-friendly projects to a comprehensive focus on sustainability. In a recent interview with *Groundwork*, Heartwell explained: "Moving the city away from traditional strategic planning to sustainability planning was a major step. Every single department head was assigned goals regarding the environment, social equity, and the economy. You will be measured, and evaluated on achieving those. It took a few years for people to see we really were serious about meeting the triple bottom line, but it became part of the culture."[37] The City of Grand Rapids has received recognition from the Mayors' Climate Protection Awards, the Earth Day Network, and the Great Lakes and St. Lawrence Cities Initiative. Beyond the local government, a wide group of stakeholders also embraced the opportunity for the city to become more sustainable as a whole. Grand Rapids created the first large-scale community sustainability partnership with leadership from the private sector business community which is housed at Grand Valley State University. All of this work has

resulted in positive community changes as well as global recognition, such as becoming the first U.S. city to be recognized by the United Nations as a Regional Center of Expertise for Education for Sustainable Development.[38]

HOLLAND

(Population 33,543). The City of Holland adopted a new comprehensive plan in 2017 following the "Resilient Holland" planning process which focused the community on its future in the context of change. The plan recognized: "As Michigan as a whole evolves from a manufacturing-based economy into something new, Holland must prepare by becoming a resilient, shock-proof economy…[that] can react and adapt to changes in the global or national economy and prepare for changes in climate over the long term."[39] The plan was informed by the Holland Sustainability Framework and the Sustainability Committee that was put into place in 2010. The initial year-long public process continued through a partnership with the City Council, Board of Public Works, and Hope College and has been supported by the Holland-Hope College Sustainability Institute. Holland's approach to sustainability includes core municipal functions around energy, transportation, economy, and quality of life as well as biking, local food, and human relations. Within the framework, a triple bottom line is used to evaluate capital projects. The city's annual budget includes a 5-year capital improvement for municipal buildings and parks, streets, bridges, and utilities. In FY2018, the total projected spending across all funds is $25.74 million, approximately 70% of which is for water, wastewater, and electric utilities.[40] The city's electric utility has been a leader in innovation and sustainability. In 2010, Power for the 21st Century (P21) was launched to engage the public around the challenge of the community's energy needs in a way that was socially, economically, and environmentally responsible. The process examined the sustainable return on investment of clean energy. The Sustainability Committee also collaborated with the Mayor's Energy Task Force and produced the Holland Community Energy Efficiency and Conservation Strategy, known as the Holland Community Energy Plan, to achieve a measurable decrease in the City's greenhouse gas emissions per capita from 24 metric tons in 2010 to 10 metric tons by 2050.[41] The strategy is to combine the benefits of multiple renewable and clean energy sources with district heating, compact design, energy efficiency, and conservation. The banner project was the new natural gas-fueled Holland Energy Park on the site of a former brownfield that opened in October of 2017.

MARQUETTE

(Population 20,570). The City of Marquette adopted *A Superior Vision for Marquette* as a community master plan in 2015. The vision statement includes 15 key points, all of which relate to the social, environmental, and economic dimensions of sustainability including nurturing a green economy, implementing downtown transit, preserving historic neighborhoods, emphasizing mixed-use and compact development, and valuing natural assets.[42] The current master plan builds on the success of the previous one from 2004 that provided a framework for Marquette growing as a sustainable community by becoming "the premier livable/walkable winter city in North America,' according to Dennis Stachewicz, the City of Marquette's Director of Community Development, who attributes a new linear parkway along an abandoned rail line to spurring community interest in a new approach to infrastructure.[43] Sub-area planning efforts and changes to the zoning ordinance in the past decade have created opportunities for public space in business districts and place-making enhancements. The important link between planning and zoning is highlighted in Marquette. The current master plan, for instance, calls for the creation of a new residential zoning designation called "Watershed Residential" to regulate development in environmentally sensitive areas along the brooks and creeks flowing into Lake Superior.[44] The current CIP was adopted in 2016 for FY2017-2022 with annual updates. Approximately $12 million in capital spending is proposed for each year. Projects are not linked to sustainability explicitly, and the scope of

projects is narrow. Despite a strong vision and strategic management framework, Marquette recognizes the funding constraints on realizing a more sustainable infrastructure system. The capital asset appendix to the master plan notes: "It is now a well told national story that a myriad of problems and staggering costs are the result of neglected and deferred physical development needs in many communities throughout the country. The City Master Plan provides goals to address these concerns and reverse the trends. And a strong commitment to funding is necessary to prevent a decline in meeting the needs of the community's infrastructure."[45] As a smaller city, the county and partner organizations play a greater role in the community. *The Climate Adaptation Plan for Marquette County, Michigan* was developed by the Superior Watershed Partnership. The first meeting was held in the City of Marquette where six themes were identified: land use, water resources, forest health, public health, food security, and tourism.[46]

NOVI

(Population 59,211). The City of Novi adopts a CIP annually, which is publicly available on an innovative online digital platform that allows citizens and stakeholders to review project summaries, costs, and location. The CIP covers the following categories: Roads; Intersections & Signals; Sidewalks & Pathways; Storm Sewer & Drainage; Sanitary Sewer; Water Distribution; Parks, Recreation, & Cultural Services; Parking Lots; Buildings & Property; Machinery & Equipment; and Technology.[47] Sustainability is incorporated throughout the CIP, which is one of the reasons the City of Novi was one of just five communities in Michigan in 2017 to receive a Gold certification in the Michigan Green Communities Challenge. The city was also recognized for implementing the plan and sustainability projects including: the automation upgrades and the replacement of municipal building air handling units with variable frequency drives to optimize power consumption; the installation of LEDs at the civic center, saving an average of 240 watts per fixture; the continued construction of new pathways and sidewalks.[48] Walkability is one of the priorities for Novi. The city has a Non-Motorized Plan and new pathways and sidewalks are included each year in the CIP. In the last 12 years, over 18 miles of public pathways and sidewalks were constructed and another 15 miles were put in as part of private developments.[49]

OAKLAND COUNTY

(Population 1,250,836). Oakland County's Planning Division has a strong orientation toward environmental stewardship, trails, brownfields, and recycling, even though the county does not have a planning commission and does not adopt a countywide master plan. It does have a Coordinating Zoning Committee to work with other local units of government and uphold the county's legal planning and zoning functions. Oakland County has a 2016-2025 Capital Improvement Plan in place. The plan notes the financial challenges of the past decade and sets a vision for future investments: "Through FY 2012, no new capital projects were launched except for those that provided a monetary return on investment in the form of productivity improvements, were required by state or federal mandates, or were necessary to keep the capital asset in good working order. Facility improvements were limited to critical repairs and the most essential maintenance projects. The county recognizes the need for reinvestment and has significantly increased funding in the 2016-2025 CIP."[50] Oakland is one of Michigan's most affluent counties, illustrating the depth of the municipal financing problem. Green infrastructure planning is one area of focus and is defined as, "an interconnected network of green space that conserves natural ecosystem values and functions, guides sustainable development, and provides associated economic and quality of life benefits to local communities."[51] The county also supports the Oakland County Trail Network, Water Resources Initiatives, and Environmental Related Place-Making.

PITTSFIELD TOWNSHIP

(Population 38,434). Pittsfield Township adopted a Master Plan in 2010 oriented around comprehensive development and preservation patterns that provide for sustainable growth. Additional follow-up planning resulted in the 2020 Sustainable Vision Master Plan, adopted by the Pittsfield Township Board of Trustees in 2017, with an overarching goal to: "to hard-code sustainability into the DNA of [Pittsfield Township's] work processes and products."[52] Sustainability is defined primarily around green space, multi-modal transportation, and reducing gray infrastructure. The plan acknowledges that: "this focus on sustainability arises as much from a need to preserve our environment as it does from creating a sense of place for all, including seniors and youth, such that everyone not only feels welcome but enjoys living, working and recreating in Pittsfield Township."[53] The township has begun implementing the sustainability plan with a dedicated Sustainability Committee. Green and blue capital improvements have been made including new pathways and greenways. The township was also awarded a SAW grant (Stormwater, Asset Management, and Wastewater) for $1.2 million to collect condition information and to create an asset management plan. A corresponding master plan for parks and recreation is also in place.

TRAVERSE CITY

(Population 15,479). Traverse City adopted a Capital Improvement Plan in March of 2018 consistent with the current master plan. The plan uses three categories to code projects based on the source of funds: capital, visionary, or operations and maintenance. The stated goals of new capital projects are to benefit public health, safety, the economy, energy efficiency, cost effectiveness, regional partnerships, and neighborhood equity. While the master plan recognizes the value of sustainability, climate adaptation, and natural resource preservation, the capital improvement planning process does not prioritize blue and green infrastructure apart from cost efficiency.[54] The visionary category is an explicit recognition that necessary projects are unfunded—again highlighting the limits of local governments to address infrastructure challenges within a broken municipal finance system. Nevertheless, Traverse City is going green. The city adopted a Climate Action Plan in 2011 and has set ambitious goals for the, "transition toward energy independence through…environmental stewardship and economic sustainability."[55] One of the most prominent goals is to have all municipal operations 100% powered by renewable energy by 2020. The new M-72 Solar Project with Traverse City Light & Power brings the municipality to more than 20% from clean energy sources.[56] At the community level, Traverse City Light & Power's community solar initiative is a model.

CAPITAL IMPROVEMENT FUNDING & MANAGEMENT

There are a multitude of revenue sources for local capital improvement projects in Michigan, yet the underlying reality is that infrastructure systems in general are woefully underfunded and state policies are behind the best practices. Local units of government must have the tools for, "achieving financial solvency and then sustaining local fiscal strength," according to the report *Michigan's Urban and Metropolitan Strategy* from Public Sector Consultants and The Brookings Institution.[57] At the same time, the American Society of Civil Engineers (ASCE) grade for Michigan's infrastructure in 2018 is a "D+." The association's policy recommendations are to: "support innovative policies, increase state funding and prioritize public health and safety."[58]

ASCE's Michigan report card rates each infrastructure category as follows: "Infrastructure is graded based on eight criteria: capacity, condition, funding, future need, operation and maintenance, public safety, resilience and innovation. ASCE grades on the following scale and defines these grades as: (A) Exceptional, Fit for the Future; (B) Good, Adequate for Now; (C) Mediocre, Requires Attention; (D) Poor, At Risk; (F) Failing/Critical, Unfit for Purpose."[59]

Figure 2: ASCE-Michigan 2018 Report Card

The categories of drinking water, roads, schools, and stormwater received the lowest grades. Drinking water, for instance, is rated as "D" which means Michigan's systems are at-risk. In regards to investment and funding for drinking water, the report concludes, "some funding is being established for replacing Michigan's drinking water infrastructure but at insufficient levels."[60] The majority of financing options for water infrastructure rely on local revenue streams which compound existing strains in distressed communities.

In fact, apart from roads, Michigan's infrastructure systems are dependent on local dollars collected through mechanisms with limited eligibility and applicability. It is a challenge for local officials to braid together many narrow streams in order to undertake necessary capital improvements. Management difficulties, beyond financial limitations, are evident too. The primary problem is that, other than roads, public infrastructure systems do not have standardized condition data. With roads, the PASER (pavement surface evaluation and rating system) standards and requirements for reporting show 40% of federal-aid eligible paved roads and 49% of other paved local roads are in poor condition.[61] The condition of water systems, however, is assessed in many different ways.[62] "Furthermore, the important role of resources is highlighted in the report. Whereas monetary and personnel resources were common limiting factors for UGI planning and implementation, several starting points for overcoming these constraints were identified, such as knowledge building, better coordination and collaboration, and adopting interdisciplinary and integrative approaches."[63]

GREEN AND BLUE COMMUNITY INFRASTRUCTURE BUILDING

Local communities across the country and around the world are pursuing a path to economic revitalization around innovation and sustainability. The best public infrastructure systems are more than adequate for today's uses: they are designed for the future. As the Michigan Economic Center recently reported, "the challenges the world faces create interest and opportunity for business growth and new job creation in the sustainable 'green and blue' sectors driven by the need for sustainable solutions."[64] Municipalities are also organizing around sustainability initiatives as part of broader efforts to attract and keep residents and new talent by providing rich quality of life and amenities today's mobile workers demand.

Numerous Michigan communities are claiming leadership in the economy of tomorrow based around innovation and sustainability. As many Michigan Communities are demonstrating from Muskegon in the west, Traverse City and Marquette to the North, and even Port Huron to the east, when you clean up your former industrial areas and waterfronts, reconnect to them, layer your communities with green space and new green infrastructure, provide transportation options, facilitate connectivity, and preserve your farmlands, you create an irresistibly attractive community and support entrepreneurs and businesses successfully. These attributes, in part, create the conditions that keep our own citizens and young people in Michigan, while attracting new business and entrepreneurs from miles away.

The vanguard cities, such as Ann Arbor, Grand Rapids, and Holland are undertaking these initiatives at a community-wide scale with institutional force. Grand Rapids, for instance, where business leaders saw the opportunity for transformative change, has set goals for reducing energy and water consumption, increasing public transit use and options, and lowering carbon emissions, all of which have created economic and reputational benefits.[65] These strategic sustainable development efforts around energy, water, transportation, and land use represent a significant reworking of physical infrastructure systems to support the new spaces and uses, reduce the carbon footprint, and increase resilience to climate change. At the same time, Grand Rapids has put in place organizational and institutional features to ensure the project-based work is effective and durable. The Quadruple Bottom Line matrix is used in the City of Grand Rapids' budgeting and management while the Office of Sustainability is staffed to provide additional capacity to other city departments.

Other Michigan communities such as Benton Harbor, Detroit, and Flint are taking steps towards sustainability planning and beginning to incorporate green and blue infrastructure projects into the existing conventional capital portfolio. The City of Detroit, for example, does not yet have a process for systematically evaluating capital projects in regards to sustainability, but there are a large number of blue and green infrastructure projects underway. The groundwork for the Detroit Future City Strategic Framework could be leveraged for an official update of the city's master plan. In Benton Harbor, the adopted master plan outlines numerous opportunities for the city and community to incorporate blue and green infrastructure. As the state's municipal finance system and the economy both improve, hopefully Benton Harbor will have the capacity and resources necessary to realize their vision.

Exploring the cluster of green and blue infrastructure activities underway in the Michigan communities profiled in this report demonstrates the range of possibilities along a continuum, from just getting started to setting goals, aligning budget, and planning priorities. The research also highlights the importance of strong public management systems in planning, budgeting, finance, and partnership-building.

In order to advance Michigan's infrastructure and sustainability, the options need to be clearly articulated. The green and blue community infrastructure cluster diagram illustrates how development initiatives and projects may combine core sustainability elements of energy, water, land, and transportation. The

vanguard cities have dozens of initiatives that are layering on top of each other; cities that are getting started or seeking the funding for project investments and institutional capacity only have a handful.

Figure 3. Green and Blue Community Infrastructure Cluster

Diagram adapted from Hansen, R. et. al. (2016). "Advanced Urban Green Infrastructure Planning and Implementation," *Green Surge,* p. 14.

The inner elemental core is connected to a diverse range of infrastructure-related challenges (illustrated through blue and green rings), such as food access, drinking water quality, biodiversity conservation, climate change adaptation, brownfield revitalization, the green economy, and public health. These are just a handful of examples spanning the spectrum of green and blue development. Local communities should be looking at their blue and green assets, as much as examining the public infrastructure challenges, in order to identify opportunities that connect to the agricultural landscape, parks, greenways, non-motorized trails, historic buildings, and brownfields.[66] In this way, blue and green infrastructure envisioned in local master and capital improvement plans can be drivers for smart development and economic growth that contribute to long-term resilience. As a recent federal report on sustainability stated, "We are at a point where it no longer makes sense to make these types of investments in infrastructure and communities without considering how they will affect and be affected by climate change."[67]

CONCLUSION

As the American Society of Civil Engineers proposed, "Michigan residents, business owners, and policymakers must decide how much we value the personal and economic advantages that come from a modern, safe, and efficient infrastructure network."[68] It is time for legislative, policy, and strategic management reforms to overcome impediments and to optimize public infrastructure systems in enhancing economic growth, protecting health, and increasing sustainability. The state should recognize and incentivize the innovative and creative work being done by Michigan's municipalities around blue and green infrastructure, then create a framework for developing the blue and green cluster around quality of life and the economy of tomorrow. In general, the state should set benchmarks for Michigan and Michigan's communities around leadership in the emerging economy.

Fix the Basics: The State of Michigan has made numerous fiscal policy and budget reforms in the past decade without regard for the effects on local units of government. The most urgent need is to reset state revenue sharing of the sales tax in the budget to the level in the original statute, not to mention the $8 billion that has been withheld from municipal governments by the state since 2002. When municipalities do not have adequate dollars for public safety services, capital intensive infrastructure systems suffer. The State also needs to allow in statute, or permit, additional dedicated local revenues for infrastructure improvements. Finally, any maintenance system depends on good data, so there needs to be a standardization of infrastructure condition assessment protocols.

Update Funding Tools: The state's funding tools to assist with public infrastructure improvements are outdated and lack coordination. The roads funding formula set in Public Act 51 of 1951 needs to be reformed to take into account the current condition and usage of the roads. Transportation infrastructure funding also needs to be coordinated with drinking water, sewer, trail, IT, and energy system upgrades, which can be accomplished by creating an integrated state infrastructure bank. Additional integration and coordination around sustainable blue and green infrastructure would be increased if the State established a sustainability partnership modeled on the successful federal model.

Convert Grey and Brown to Green: Because of Michigan's industrial legacy, there are multiple opportunities to revitalize brownfields as greenways and multi-use development and reclaim vacant property for blue and green infrastructure. The State Parks are prime for reinvestment to create greater access and to support biodiversity. The State should also be rethinking IT (broadband, fiber, and Wi-Fi) access to support the expansion of a more green economy.

Reform Development Programs: There is an opportunity to incorporate blue and green infrastructure into community and economic development programs; to expand the Natural Resources Trust Fund, Conservation Fund, and Rural Economic Development Fund purposes and funding limits; and to enhance the Pure Michigan campaign by promoting sustainability and innovation in Michigan's local communities.

Communities can't wait. Following the lead of Ann Arbor, Grand Rapids, and Marquette, municipal governments should set their own standards for clean energy use and other features like water access, carbon emissions, transportation options and use, access to food, and Internet access, which is central to community quality of life and to incent innovation in the private sector. As a practical matter today, local governments can take steps to advance their sustainability and improve their infrastructure through master and capital improvement planning that incorporate the following:

1. A Community Sustainability Partnership: The Grand Valley State University Office of Sustainability Practices is working with dozens of cities and regions across the state to convene stakeholders around sustainability.
2. Blue and Green Landscape design: Michigan has world-class architecture in colleges, universities, and the private sector that can be tapped to enhance conventional municipal planning approaches.
3. A Triple Bottom Line Approach: Measuring the social, economic, and environmental inputs and outputs that go through municipal public works and planning departments is important for creating the data set to improve decisions going forward. Prioritizing capital improvement projects with sustainability in mind will improve the portfolio's performance.
4. Take the Green Challenge: The Michigan Green Communities Network provides support to local governments taking steps to be more green and sustainable. Each year participants are recognized for their accomplishments.

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