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2025 Co-Learning Plan Series

COMMUNITY COORDINATION OF MUNICIPAL WATER & SANITARY SEWER INFRASTRUCTURE

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Community Coordination of Municipal Water & Sanitary Sewer Infrastructure

A Case Study of the 10-County Region of Northwest Lower Michigan

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Michigan State University

Center for Community and Economic Development

EDA University Center for Regional Economic Innovation

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INTRODUCTION

Most communities are judged by the quality of their housing stocks, school districts, public spaces and labor market. These are the typical factors cited when people describe why they choose to live and work in a particular location. For this reason, these community features receive the most day-to-day attention, topping the list of talking points for local leaders. However, municipal water and sanitary sewer infrastructure are the unsung heroes of community and economic development. Simply put, there can be no growth without well-maintained water and sewer pipelines. Even with this understanding, communities throughout Michigan are failing to capitalize on potential growth because of the often difficult process of expanding water and sewer infrastructure across municipal boundaries. In addition, questions abound regarding who is responsible for the infrastructure, where its boundaries stop and how to effectively manage these costly assets.

Water and sewer infrastructure is a non-controversy in most areas until it rises to a level of critical importance. This comes in two forms: a system failure or the prospect of an annexation to support infrastructure expansion. Both of these occurrences can create unrest: between members of the public and local officials, or between neighboring municipalities. This paper describes the State of Michigan's unseen infrastructure and the legal mechanisms by which neighboring communities can partner to ensure that these local assets are both well-managed and mutually beneficial. Because of the vast number of local governments due to Michigan's use of townships, the political infeasibility of annexations, as well as the increased need for Infrastructure Asset Management, the authors here argue that Michigan's communities must collaborate on infrastructure management and funding. This claim is evaluated through a review of relevant literature as well as a case study analysis of the water and sanitary sewer systems of 60 municipalities and two Tribal Nations in Northwest Lower Michigan.

INFRASTRUCTURE: UNSEEN, CRITICALLY IMPORTANT

Municipal infrastructure is the often overlooked, critically important piece to any community's quality of life. While most people do not actively consider their municipal water and sanitary sewer systems on a day-to-day basis, they certainly notice them when they are inoperable or lacking in capacity. Many rural communities throughout Michigan allow residents and businesses to maintain their own well and septic systems. However, in most 'urbanized' areas, and adjacent rural areas including those with relatively small populations, the reliance is on municipal water and sewer. Therefore, important questions arise around the best ways to manage these systems, coordinate and connect them across municipal boundaries, and how to finance their expansion. This is especially cumbersome in the State of Michigan, where we have 1,240 townships, a form of government largely not seen outside of the Midwest United States. Because of the sheer volume of local units in the state, infrastructure sharing across municipal boundaries is necessary in many places. This paper reviews the current state of infrastructure in Michigan, as well as the legal mechanisms in place that municipal neighbors can and are using in order to attract and support development. Following this review, the authors present data collected in 2025 that highlights common practices communities in Northwest Lower Michigan are utilizing in order to collaboratively expand their water and sanitary sewer systems. Ultimately, communities are using other legal, more collaborative means to avoid controversial annexations in order to support development. Ultimately, infrastructure expansion is an economic development tool, most feasibly implemented through negotiated agreements between cities, villages and townships.

Master Planning: Infrastructure is Missing

The Master Plan is one of the most important documents for any community. This comprehensive report describes the current state of the planned area, trends that have occurred over a particular period of time and what steps the community's leadership will take in the near to long-term future in order to progress as desired. Done correctly, the plan relies heavily on input from residents and business owners in the community. The authors of this paper have written dozens of Master Plans and Economic Development Strategies, most notably in rural Northwest Lower Michigan. Their planning processes involve a variety of input techniques including surveys, facilitated discussions, visual preference surveys, mapping activities and design charrettes. When it comes to local deficiencies in recent years, most residents note a need for more housing, more locally owned businesses, job training, road repaving, agricultural land preservation and the redevelopment of blighted or underused sites. But rarely do they mention water and sewer infrastructure. Even in lakefront communities operating on private wells and septic systems, which often lack appropriate maintenance standards, the notion that more time, resources and funding should go to improving municipal infrastructure is hardly ever discussed. In this way, water and sewer infrastructure are the often overlooked features of many Michigan communities. People simply do not think about what they cannot see. That is, until something they cannot see becomes an undeniable nuisance or hindrance to growth.

Therefore, the authors here argue that water and sewer infrastructure must become a more routinized and integrated feature of the community planning process. Not only is infrastructure a component of community and economic development efforts, it is essential above nearly all else. Dense residential developments, business attraction, industrial siting: none of these can occur without well-maintained water and sanitary sewer capacity. Throughout this paper, the authors will describe the research that analyzes the importance of infrastructure for economic development, and the need for comprehensive asset management and the legal mechanisms by which municipalities can manage their systems. Michigan as a whole lacks comprehensive planning around infrastructure, and where this planning is present, other hindrances such as infrequent collaboration with neighbors or funding gaps lead to deferred development.

MANAGING INFRASTRUCTURE FOR ECONOMIC DEVELOPMENT

INFRASTRUCTURE ASSET MANAGEMENT

Forgotten infrastructure quickly becomes expensive for municipalities. Similar to maintaining a home's roof, siding and foundation, the cumbersome but smaller maintenance costs spread out over time are preferable to the high cost to repair a leaking roof. This is why asset management must be viewed as a component of economic development and sound municipal finance practice. Various research papers and anecdotal case studies have shown that maintenance and investment in water and sanitary sewer infrastructure are more cost effective than repairs when systems fail.

Infrastructure Asset Management (IAM) is not a new term. It has evolved over time but primarily refers to the process of managing incremental updates to infrastructure and projecting the useful life of its various components in order to avoid widespread failures. A 2022 article in the academic journal *Water* notes that IAM has seen three phases, or generations, since its conceptual inception (Ugarelli & Saegrov, 2022). According to the authors Ugarelli and Saegrov, the first generation of IAM generated the recognition that overall infrastructure maintenance and repair costs are lower when it is proactive and predictive, rather than solely reactive. This conceptualization took place from the late 1990's to around 2005. Generation one consisted of rudimentary techniques for documenting the ages of pipes, for example, and the various costs for certain repairs. It also introduced methods for predicting the useful life of infrastructure system components and the optimal time to replace these components.

Generation one IAM is when the concept took on national attention. A 2004 report by the United States General Accounting Office to the U.S. Senate highlights this recognition by the country's highest offices (United States General Accounting Office, 2004). The 2004 report's findings were common sense by today's standards, but were pertinent to the U.S. federal government at the time as it was increasingly funding infrastructure improvements at the state and local levels. This helped to promote 'sticks and carrots' approaches by the U.S. government to ensure that federal funding to local infrastructure projects were accompanied by comprehensive asset management practices. Stated simply, the federal agencies wanted assurances that the water and sanitary sewer systems receiving federal dollars were being strategically managed. This is similar to how an angel investor in a start-up will want to check in with the business owner and review sales numbers on a regular basis.

Ugarelli and Saegrov (2022) describe the second generation of IAM as the introduction of risk. This generation took place from 2005-2010 as new and better technologies allowed public works managers the ability to make repairs based on the probability of failure and the related costs to repair. The improved technologies included new statistical methods such as, "preliminary hazard analysis, HAZOP, fault tree analysis, and event tree analysis" (Ugarelli & Saegrov, 2022). The authors conclude with generation three of IAM, which is where we currently find ourselves. This third generation is focused on the overall environmental, economic and social sustainability of utility systems. Water and sanitary sewer infrastructure is viewed as a necessary asset for all areas of human life. In addition, as the monitoring technology becomes more integrated and critical to operation, there is greater need for expertise and security to ensure ongoing operations.

ECONOMIC BENEFITS OF INFRASTRUCTURE INVESTMENT AND EXPANSION

Asset management may have been prompted by federal granting requirements, but its use has expanded naturally as public officials increasingly understand the community and economic development

contributions that effective systems make. For a growing area, community and economic development cannot occur without municipal water and sanitary sewer infrastructure. When planned for and expanded to meet or create rising demand, infrastructure is a powerful tool in the community development process. There are various studies that affirm this claim. The ensuing paragraphs briefly review this literature, but it can be summarized in the following: water and sanitary sewer infrastructure expansion has direct and indirect economic growth benefits, and the cost of system failure is highly detrimental economically, socially and environmentally.

As previously mentioned, local water and sewer projects can depend heavily on federal funding assistance. This is one of the impetuses for the expanded use of Infrastructure Asset Management as a best practice. In addition, various academic studies have sought to understand the effects of federal infrastructure investment on local economies. In other words, as federal funding for projects has increased, so too have studies measuring the economic impacts of these investments. It is important to note that other than the two reports provided by the Urban Institute in the following paragraphs, very little academic research exists in the 20th century measuring the relationship between spending on infrastructure and economic growth at the local level. For this reason, this brief review of the literature relies on studies from the 1990's. Much of the current literature related to economies and infrastructure is measured at the national level, leaving out the relevant questions of how local municipalities should be investing in their assets.

A 2002 report by Faqir S. Bagi is one of the more comprehensive studies of federally funded infrastructure projects and their impact on economically disadvantaged communities (Bagi, 2002). Bagi notes the important difference between the direct and indirect beneficiaries of infrastructure improvements. Direct beneficiaries are the firms and businesses that will use the water and sanitary sewer lines for their operations. The indirect beneficiaries are the businesses that relocate or are created as a result of the increased capacity, or those that grow in response to the growth of the direct beneficiary. For example, an expanded water and sewer boundary may allow a manufacturer to expand the scale of its operation. This is the direct beneficiary. With the new manufacturing jobs, the population increases and there is a need for more service industries to accommodate the new residents (groceries, medical, schools, etc.). In addition, there are firms like transportation warehouses and railroads who will benefit from the manufacturing company's expansion as well. The new service businesses and the industries related to manufacturing are the indirect beneficiaries.

The 2002 *Rural America* report (Bagi, 2002) studies 87 water and sewer projects in 30 different states. Fifty-four of the projects were in rural communities and 33 were in those designated as urban. The averages for the study population were as follows: 20.3% were below the poverty level, 19.7% were included in a minority population and the average community population was 36,189. Regarding impact, Bagi (2002) writes,

> *"Water/sewer projects can save and/or create jobs, spur private sector investment, attract government funds, and enlarge the property tax base. The 87 water/sewer projects studied, on average, created 16 full-time-equivalent construction jobs. Direct beneficiaries (businesses) saved, on average, 212 permanent jobs, created 402 new permanent jobs, made private investments of $17.8 million, leveraged $2.1 million of public funds, and added $17.0 million to the local property tax base. Indirect beneficiaries saved, on average, 31 permanent jobs, created 172 new permanent jobs, attracted $3.34 million in private-sector investment, leveraged $905,000 of public funds, and added $3.0 million to the local property tax base. This enlarged property tax*

base, at a mere 1-percent tax rate, would yield $200,000 in annual property tax to the community."

Bagi (2002) notes that the economic benefits were significant in both rural and urban settings but were more pronounced in urban areas, meaning effects are exponentially related to density.

Janeski and Whitacre (2014) also seek to measure the effects of federal funding for infrastructure in their article published in the *Journal of Agricultural and Applied Economics*. While Bagi's (2002) research looked at funds from the Economic Development Administration (EDA), Janeski and Whitacre (2014) conduct a case study analysis of the United States Department of Agriculture's Rural Development (USDA RD) funds on projects in Oklahoma from 1990 to 2000. Using an Ordinary Least Squares (OLS) regression analysis comparing communities that had completed infrastructure projects to similar communities that had not, the researchers found only one statistically significant dependent variable. Only median house value was affected, and only in the long-term (greater than 10 years). The researchers therefore find that policymakers should not expect immediate direct impacts from infrastructure investment (Janeski & Whitacre, 2014).

The Urban Institute released two reports in 2024 related to infrastructure investment and economic development. Both focus on rural communities. In their first report, the authors interviewed eight business owners in the food processing, food services and hospitality industries (Marx, Scally, Kort, Polonius, Crutchfield, & Davis, 2024a). They also talked to economic development and water management professionals. Each interviewee operated in rural Arkansas, Mississippi or Texas. This methodology resulted in a case study of: a bed and breakfast, distillery, meat processing company, truck stop, recreational vehicle park, residential real estate development and a plastics company. The report by (Marx, et al., 2024a) ultimately emphasizes that infrastructure is a complex economic development process. There is an ongoing shortage of funding for most projects, municipalities must work collaboratively with various other governmental entities and lacking infrastructure can deter local investment. These findings support the suppositions described throughout this paper.

In the second Urban Institute report (Marx, Scally, Kort, Polonius, Crutchfield, & Davis, 2024b), the authors use a rural Mississippi town as a case study to understand the economic development implications associated with water and sanitary sewer infrastructure. The following are the key findings in the report:

- *"Wastewater infrastructure failures harm local businesses by causing severe disruptions to more minor inconveniences.*
- *Wastewater system capacity and reliability influence business attraction and growth.*
- *Sewer projects can spur additional community improvements that are attractive to businesses.*
- *Aging and inadequately maintained wastewater infrastructure…has broad and costly health and economic impacts.*
- *Maintenance of rural wastewater systems are often reactive rather than preventive…*
- *For underfunded Mississippi wastewater systems, compliance with federal and state regulations may cause financial strain."*

In regard to what communities have to lose when infrastructure fails, a 2019 paper in the *Journal of Pipeline Systems Engineering and Practice* uses a damage cost avoidance analysis to demonstrate the value in incremental investments (Jin Jun, Park, & Ho Bae, 2019). Interestingly, this study finds that the greatest cost to the infrastructure servicer in the event of a failure are the costs associated with public distrust. In other words, people become unwilling to drink tap water or rely on public utilities in the event of a failure. This is followed by effects to direct benefits such as reductions in economic loss and future water demand.

THE CURRENT STATE OF MICHIGAN'S INFRASTRUCTURE

While there is still debate as to the exact measurable link between infrastructure and overall community well-being, it is fairly intuitive and backed by the aforementioned academic literature that asset management and ongoing investment are necessary. So then, what is the State of Michigan's efforts to maintain a robust infrastructure environment? Periodically, the Michigan Section of the American Society of Civil Engineers (ASCE) publishes a report card for Michigan's infrastructure (Michigan Section of the American Society of Civil Engineers, 2023). Regarding the infrastructure pertinent to this publication, the ASCE rates the state's drinking water as a 'D+', its storm water as a 'D' and its wastewater (sanitary sewer) as a 'C'.

A 'C' rating indicates that the infrastructure is mediocre, and that there is enough deterioration to warrant immediate attention. Infrastructure with this rating is beginning to pose a significant risk to public health. A 'D' rating means that many of the system's elements are approaching the end of their useful life. There is also a high risk of system failure. Although the Flint water crisis spurred state officials and local elected leaders across Michigan to recognize the critical need for more infrastructure oversight and investment, there is still much to be done to avoid the same risks going forward.

CONDITION OF MICHIGAN'S DRINKING WATER

Michigan's drinking water systems are in great need of upgrades. Nearly three quarters of the state's population relies on a community water supply for their drinking water, with the effects of mismanagement creating health concerns. According to the ASCE report (2023),

> *"Most of the infrastructure within the State of Michigan's community water supply systems (CWS) are over 50 years old and a significant portion is approaching 100 years of service life. The state has a $860 million to $1.1 billion annual gap in water infrastructure needs compiled from decades of deferred maintenance and lack of knowledge on asset conditions… Drinking water upgrades have jump-started thanks to regulatory advancements on lead and copper, requirements for asset management planning, and recent influxes of funding for projects including replacement of over 27,000 lead service lines. Long-term, sustainable funding sources are needed to drive continued success."*

One interesting point that the 2023 report card makes is that although Michigan's population has remained relatively stagnant (around 10 million people) during the 21st century, migration patterns are still causing shifts in investment needs. In summary, more Michiganders are moving to the urbanized areas along Lake Michigan, Southeast Michigan (Metro Detroit) and Grand Traverse County. In contrast, post-industrial cities on the east side of Michigan are losing population. This poses two vexing problems. First, the communities on Michigan's west coast need to be updated for capacity, with many of the rural areas surrounding Grand Traverse, for example, still relying on private well and septic systems. Additionally,

the east side communities' loss in population and subsequent tax revenue declines mean that aging systems are more strained for local funding than in decades past. This emphasizes that while Michigan's population is stable, its infrastructure systems are still experiencing vastly changing needs as Michiganders migrate from older population centers to new ones.

The ASCE (2023) report calls for a range of policy initiatives to aid Michigan's 1,381 community water systems. These include long-term funding and execution of Capital Improvement Plans (CIP), greater state regulation of pollutants, an emphasis on local asset management, a higher standard for permitting and inspections, as well as more flexibility in regulatory controls.

CONDITION OF MICHIGAN'S STORM AND WASTEWATER SYSTEMS

Similar to Michigan's drinking water systems, its storm and sanitary sewer infrastructure is also in need of significant upgrades to avoid expensive and potentially dangerous failures. This is accompanied by observable increases in storm severity since the beginning of the 20th century. According to the ASCE, "Total annual precipitation has increased by approximately 14%... but the amount of precipitation falling in the heaviest 1% of storms has increased by 35% since 1951" (Michigan Section of the American Society of Civil Engineers, 2023). Unfortunately, Michigan's storm water systems have not received the necessary capacity upgrades to accommodate increased storminess. Recall the Father's Day Storm of June, 2018 that destroyed homes, vehicles, roads and culverts in the Upper Peninsula's Houghton County. This is now considered to have been a thousand-year storm. As storminess increases, Michigan's infrastructure must be updated to accommodate.

Besides the damage that large storms can cause, there are also environmental concerns. In failing to capture rainwater on site, untreated flooding can stream into neighboring bodies of water, introducing a host of contaminants to the ecosystem. While Michigan remains a leader in storm water management practices through technology and policy advancements, its land use lags behind. For example, the ASCE notes that, "Between 1982 and 2012, the total urbanized area in Michigan increased by nearly 50%. During the same time-period, the population increased by only 8%" (Michigan Section of the American Society of Civil Engineers, 2023). This is an indicator of urban sprawl, wherein development occurs on previously undeveloped land rather than taking advantage of existing infrastructure within urbanized areas. This raises the concern for environmental contamination. More development often means more miles of storm, sanitary sewer and water infrastructure and an increased likelihood that increased storminess will affect more of Michigan's pristine natural habitats. Therefore, storm water management relies not only on increased funding, upgrades and asset management, but also on a critical consideration of how and where we develop.

Michigan's sanitary sewer systems suffer from many of the same issues that its storm water systems do. Increased storminess and the fact that many systems are nearing the end of their useful life means that without proper care, health issues are increasingly probable. Importantly, the ASCE (2023) notes that one of the issues, reiterated throughout this paper, is that systems are owned and operated by various entities. These range from county to local to state, as well as many communities that contract with private companies to manage publicly-owned infrastructure. Additionally, in many cases private systems serve specific developments, which are not accounted for within this research. To date, Michigan does not have a regulatory control for ongoing inspections to private septic systems, meaning that the responsibility nearly always falls on the landowner or the local municipality if they have an inspection ordinance in place. In summary, Michigan's infrastructure is nearing its end of useful life, and the responsibility and resources for making necessary improvements is often unclear.

INFRASTRUCTURE IN MICHIGAN: MANY ACTORS

One of the complicating factors in managing infrastructure in Michigan is that there is a plethora of actors. According to the 2020 U.S. Census, Michigan has 1,240 townships, 276 incorporated cities and 257 villages. This is a total of 1,773 local municipal governments. While local officials certainly know their boundaries and what is under their jurisdiction, a typical homeowner or business owner does not typically think about the financial or governmental implications of so much fragmentation. But this amount of ownership and cost-sharing raises questions around responsibility, and who exactly is tasked with infrastructure planning and implementation.

For the most part, cities, and sometimes villages with higher tax revenues, have the ability to support municipal water and sewer systems. These systems are a net asset to the community for the reasons mentioned earlier in this paper. However, as populations increase and development begins to occur in neighboring rural townships, the distinction between political boundaries becomes less clear to the eye. Over time, the well and septic systems that supported sparse development patterns become less tenable as density increases. The problem is that these neighboring townships often do not have the financial or staffing capital in place to house their own infrastructure systems. In addition, it would be overly redundant for every municipality in Michigan to have its own water and sanitary sewer service.

In the past, this issue was remedied through annexation. Annexation is a process by which a property owner, municipality or city under the Home Rule City Act (Public Act 279 of 1909) petitions to the State Boundary Commission (SBC) to have their land incorporated into the municipality providing the public services. Essentially, the land that will be serviced by water and/or sewer infrastructure or development is then officially part of the annexing city or village.

THE PROBLEM WITH ANNEXATION: ZERO SUM GAME

Annexation is used less today than in years past because of the zero sum game it creates. While annexation provides the property owner and the annexing city or village with their desired outcome, in the form of new development and increased tax revenue, it give little to no advantage to the township. The following are reasons why general law townships in Michigan do the most to avoid annexations of parts of their boundaries.

Loss of Tax Revenue

When annexed land is transferred from a township to a city or village, the township loses the tax revenue it was previously garnering from that area. Local government budgets are often constrained, and this is especially true in more rural areas. Therefore, a loss of tax revenue from a high value area can generate conflict between the two neighboring municipalities when that tax revenue is transferred from one municipality to another.

Loss of Land Control

In addition to the loss of tax revenue, the annexed land also falls out of the land use controls of the sending township. The applicable zoning and general use standards spelled out by the township's zoning and police power ordinances are then controlled by the land use regulations of the receiving city or village. While master plans in each municipality are supposed to delineate harmonious land uses between neighboring jurisdictions, there can still be disagreement regarding the ideal future for certain parcels. For instance, the township may desire for the area in question to remain preserved nature, while the city or village may want it to become a high-density housing development. Once annexed, the township has no legal oversight of an area's land use.

Political Implications

Cities and villages often seek to annex the most desirable parts of their neighboring townships. While this serves the people who live in these areas, in particular by connecting them with municipal water and sanitary sewer, it can harm the political standing of the township. For instance, the loss in population can affect the amount of state and federal funding the township can receive. Also, in losing its most desirable residential or commercial areas, the township has fewer assets to spur growth within its own boundaries. The loss in population and geographic area can also mean a loss of political power at the county and regional levels. This may come in the form of fewer positions on boards, fewer votes or less relevance from the county or region's perspective.

Lack of Perceived and Real Benefits

Ultimately, townships often fight annexations because they provide no benefit to the townships. It is a zero sum game where all of the gains go to the annexing city or village. One could argue that the societal benefit comes in the form of development and infrastructure expansion. Generally, residents and business owners agree with annexations because it means growth and progress. However, elected township boards do not have any incentive to allow annexations to occur. The following section describes the manner in which townships fight to maintain land control. This is succeeded by a section on the legal mechanisms in Michigan that allow municipalities to work together, through mutual benefit, to expand infrastructure across jurisdictional boundaries without using annexation.

HOW COMMUNITIES FIGHT ANNEXATION

The aforementioned lack of benefits to the annexed community has led local officials throughout the years to use various methods to avoid losing control of their land. These include incorporation as a city or village themselves; becoming a charter township; lawsuits, especially against the Michigan State Boundary Commission; efforts to develop their own water and sanitary sewer systems; and citizen-led referendums on the annexation.

Incorporation as a City or Village

This strategy was most notably used in Michigan during the post-WWII suburban boom. Largely a result of the Federal-Aid Highway Act of 1956, urban cores began seeing more of their population moving to the suburban fringe, placing added pressure on cities to annex land or lose massive amounts of tax revenue. Detroit is perhaps the best example of this nationally. The city is well-known for its massive geographic reach despite its relatively mild population size compared to other U.S. cities. Throughout the 1950's, the neighboring townships began to incorporate in order to avoid being annexed by Detroit. In fact, Southfield Township alone now accounts for four current Michigan cities or villages (City of Southfield, Village of Lathrup, Village of Beverly Hills & Village of Bingham Farms). Southfield Township incorporated as a city to avoid annexation by Detroit, and the aforementioned villages incorporated to avoid annexation by the newly formed City of Southfield. This rampant formation of new governmental entities was known as the 'race to the courthouse', as communities reacted swiftly to incorporate upon hearing news of a potential annexation. Many of the alternative practices listed in the next section function to deter this practice in modern land use policy.

Lawsuits , Referendums, Michigan State Boundary Commission

Townships can oppose annexations through the State Boundary Commission (SBC), who is tasked with overseeing changes in local governments' boundaries, either by annexations, 425 agreements, consolidation proposals or incorporations. The commission was established by the State Boundary Commission Act (Public Act 191 of 1968). The validity of the commission's decisions, especially around

annexation, have been argued through the legal system. Most notably, in *Clam Lake Township v. LARA/TeriDee LLC v. Haring Charter Township* (2017) the court ruled that the SBC cannot interpret the validity of a 425 agreement, only whether it is in effect, and that 425 agreements preempt annexation, even if this is against the wishes of the property owner.

Separate from the disputes between annexation and 425 interpretations in recent years, municipalities have also sought legal recourse for annexations. Many of these focus on the legitimacy of the procedure named in the Home Rule City Act to carry out an annexation, while others more clearly define the role of the SBC.

Charter Townships

There are two types of townships in Michigan: 'general law' townships and 'charter' townships. Under the Charter Township Act of Michigan (Public Act 359 of 1947), a general law township can become a charter township through a ballot proposition by not less than "10% of the vote cast for supervisor in the township at the last election" (MCL 42.3). In addition, a township board can vote to become a charter township (then wait 60 days and pass a resolution to officially become one). The township must have a population of at least 2,000 people to consider these steps.

Charter townships offer a variety of increased governing rights. For the purposes of this paper, we will only mention that charter townships that meet the following criteria can oppose annexations (MCL 42.34):

> *"(a) Has a state equalized valuation of not less than $25,000,000.00.*
> *(b) Has a minimum population density of 150 persons per square mile…*
> *(c) Provides fire protection service by contract or otherwise.*
> *(d) Is governed by a comprehensive zoning ordinance or master plan.*
> *(e) Provides solid waste disposal services to township residents, within or without the township, by contract, license, or municipal ownership.*
> *(f) Provides water or sewer services, or both, by contract or otherwise.*
> *(g) Provides police protection through contract with the sheriff in addition to normal sheriff patrol, through an intergovernmental contract, or through its own police department."*

Each of the options presented in this section are the opposite of collaborative, and require extensive legal work in order to accomplish. For communities with less than 2,000 people, or those who cannot support the staffing required with a charter township or city/village designation, or those who cannot provide adequate municipal services, other more collaborative means must be sought to avoid annexation. The next section briefly describes the municipal acts in Michigan's Compiled Laws that allow communities to share water and sanitary sewer responsibilities across political boundaries without the use of annexation.

ALTERNATIVES TO ANNEXATION FOR INFRASTRUCTURE EXPANSION

Intergovernmental Conditional Transfer of Property by Contract (Act 425 of 1984)

The intergovernmental conditional transfer of property by contract, short-titled '425 agreements', was introduced in Michigan as a clear, more politically feasible alternative to annexation. 425 agreements are a temporary negotiated form of annexation wherein the land is transferred (typically from township to city or village) for a period of not more than 50 years, after which time the agreement can be renewed.

425 agreements have obvious benefits to townships that were not present with annexation alone. Note that annexation is frequently described as a 'zero sum game'. Under a 425 agreement, the township does not permanently lose legal control of the land since the transfer is time bound. Second, the 'conditional' part of the MCL allows the township to negotiate with the city or village on tax revenue sharing, zoning specifics, development terms and conditions that would force the transfer of land back to the township prior to the originally agreed upon timeline. They can even negotiate a transfer back to the township in less than the maximum 50 years. Because of the flexibility and collaborative nature of 425 agreements, they are seen as a much more feasible option over annexations. However, through the case study survey research described later in this paper, even 425 agreements can be controversial despite the added flexibility. Any transfer of land at all, even when temporary, can cause political strife between communities.

MUNICIPAL SEWAGE AND WATER SUPPLY SYSTEMS (ACT 233 OF 1955)

The Municipal Sewage and Water Supply Systems legislation (Act 233 of 1955) is used for the express purpose of forming a multi-jurisdictional authority. More specifically, the act states,

> *"Any 2 or more municipalities may incorporate an authority for the purpose of acquiring, owning, improving, enlarging, extending, and operating a sewage disposal system, a water supply system, a solid waste management system, or a combination of systems by the adoption of articles of incorporation by the legislative body of each of the municipalities." (MCL 124.282).*

The newly formed authority is a separate legal entity from the municipal governments that created it. The act is quite specific in regard to the formation and function of water and sewer authorities. The only exceptions that would have to be negotiated at the onset include cost sharing, the authority's geographic boundary and board representation. For municipalities with a sewer or water authority, this is the legislation that allows said arrangement.

URBAN COOPERATION ACT OF 1967 (ACT 7 OF 1967)

The Urban Cooperation Act of 1967 allows public agencies, broadly defined, to perform joint operations on, for example, sewer and water infrastructure. Under this act, 'public agency' is wide in scope and even includes the U.S. federal government, other states and political subdivisions of Canada. The act allows these entities to optionally form a joint entity, also broadly defined. This is a separate political entity that has the ability to, if each participating party is legally authorized, issue revenue bonds, receive grants and finance projects (i.e. borrow money). Most of the specifics of this arrangement are stipulated in the contract agreed upon by all participating public agencies. This is different from Act 233, wherein state legislation dictates most of the authority's makeup, the manner in which board members are assigned, bonding mechanisms and legal powers. Entities formed under the Urban Cooperation Act tend to be for a more specific time bound effort.

INTERGOVERNMENTAL CONTRACTS BETWEEN MUNICIPAL CORPORATIONS (ACT 35 OF 1951)

For brevity we will refer to the Intergovernmental Contracts Between Municipal Corporations Act as 'contract agreements'. Contract agreements, similar to the Urban Cooperation Act, allow neighboring municipalities to share costs and responsibilities for managing and upgrading infrastructure. However, contract agreements are more limited in scope than what is typically formed through an authority or an agreement using the Urban Cooperation Act. Participants are specifically Michigan local and county governments, as well as districts like schools, courts and drains. Through this legislative act, municipalities can enter contractual agreements for services. For example, a township may own and

operate its own sanitary sewer pipelines but will contract with the city for wastewater treatment. Or, a township may have a more populated area that they want to service with potable water. The township could contract with the nearby city for the construction and management of water pipelines. These agreements, differing from others in this section, do not create a separate entity. Only powers and costs are transferred, as needed and agreed upon.

THE METROPOLITAN DISTRICT ACT (ACT 312 OF 1929)

The Metropolitan District Act (Act 312 of 1929) allows municipalities to form a special ('metropolitan') district to operate municipal systems that cross political boundaries. These can include a wide range of activities including sewer, water, lighting, waste management, fire, roads and transportation, as well as buildings and facilities. The metropolitan district functions similar to a school district or a drainage district in that it is a separate legal entity from the participating municipalities. Because this practice is most often used in more urbanized areas like the metros of Detroit and Grand Rapids, none of the reviewed systems in Northwest Lower Michigan utilize this method of collaborative infrastructure management.

Table 1 (below) summarizes the overall use and features of the five Michigan legislative acts that promote shared infrastructure amongst communities.

Table 1. Michigan Acts Allowing for Collaborative Infrastructure Management

	Summary Definition	Entity Created	Fiscal Powers	Party Responsible for Infrastructure
425 Agreements (Act 425 of 1984)	Temporary transfer of property for the purposes of development, especially infrastructure	None	None	Receiving municipality
Water & Sewer Authorities (Act 233 of 1955)	Allows municipalities to create a water and/or sewer authority	Yes – legally recognized authority	User fees, bonding authority, borrow funds, create enterprise funds	Authority
Urban Cooperation Act (Act 7 of 1967)	Allows public agencies flexibility in establishing joint agencies for a range of purposes	Option to create a separate water and/or entity, but not automatic – negotiated structure	As defined and given by the participating municipalities	All municipalities participating in agreement
Intergovernmental Contracts (Act 35 of 1951)	Service contracts between two or more municipal governments	None	None	As determined by contractual agreements
Metropolitan District Act (Act 312 of 1929)	Creation of a metropolitan district to service a multi-jurisdictional geographic area's public service needs	Yes – legally recognized district	Taxing and bonding authority	The district itself – all municipalities participating in district

INFRASTRUCTURE AGREEMENTS IN NORTHWEST LOWER MICHIGAN

Upon review of the preceding sections, it is reasonable to ask: What are communities in rural Michigan actually using to implement and manage their infrastructure? It is clear that collaboration is needed, asset management is at an all-time high in need, the state's migration has led some communities to shrink while others see growing demand for water and sewer and land transfers are often out of the question. To answer this question in light of the provided context, the authors sought to interview the managing entities of all municipal water and sewer systems in Northwest Lower Michigan.

Overview

The research team established an approach and methodology to identify local units of government who are included in an agreement for coordination of either drinking water or sanitary sewer and confined to the 10-county region of Northwest Lower Michigan. These include the counties of Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manistee, Missaukee and Wexford. The data collection for this research are meant to serve two key purposes: first, to identify the municipalities with water and sanitary sewer infrastructure, their boundaries and any agreements in place between jurisdictions. In other words, where the infrastructure is and who manages it. Second, the team wanted an anecdotal account of each community's status of infrastructure in regard to condition and capacity, their current system needs and any additional thoughts regarding the infrastructure they manage.

Methodology

The State of Michigan maintains an accessible public database of governmental contract agreements, such as 425 Agreements, shared use agreements and franchise agreements (intergovernmental contracts). This database also contains an account of state and local actions permitted by public acts and other official acts and agreements as defined by law. However, the database's search function rendered the database nearly impossible to navigate for this research paper's purposes. The researchers took a different approach and performed outreach to the State of Michigan EGLE Drinking Water Division and the EGLE Sanitary Sewer Division. Through the assistance of these state agencies the researchers obtained permit lists for public units of government for licensed drinking water facilities and for licensed sanitary sewer facilities.

The permit lists were combined to create a single list of local units of government with a permitted water and/or sewer facility. Each communities' website was then reviewed for information pertaining to infrastructure, and lead staff contact information was referenced against the permit information. The original list provided by the state was updated in this way. The researchers then sent a letter to each community's public works official that outlined the research purpose. This letter provided researcher contact information and requested a reply by email, but also stated the research team would place a phone call to each notified individual.

A total of 60 local units of government were identified as having drinking water or sanitary sewer within their geographic boundaries according to state permit data. The researchers were able to conduct 40 interviews with at least one representative from each local unit of government. Upon completion of the interview processes, a total of 60 municipalities and two Tribal Nations were identified as having infrastructure within their boundaries and were included in the research data.

The research team identified at least seven local units of government who are included in the state permit list, but with whom the team was unable to secure interviews. These local units of government were not identified as having coordinated infrastructure with neighboring units of government through completed surveys, and no information on these communities or their systems was obtained.

The discrepancy in the data between the local units of government identified through state permits and the tallied list compiled through the survey process is the result of some communities having infrastructure, but not having a drinking water source or sanitary treatment facility that requires a state permit. Units of government who do not manage their own infrastructure or are not named as a party to a coordinated effort, appear to not be included in the State of Michigan's databases. For instance, a township with an intergovernmental agreement that allows a city to build and manage water infrastructure in said township would not show up in the database because the township itself does not need a permit. Only the city does. A shortcoming of not holding interviews with all local units of government is the inability to acquire information on infrastructure capacity, condition and impacts to land use and development.

KEY FINDINGS

Out of a sample size of 62 units of government the following characteristics were identified:

- Sixty local units of government (LUG) were identified as having some form of infrastructure.
- Two Sovereign Tribal Nations were identified as having some form of infrastructure.
- Forty-eight of the municipalities are participating in some form of collaborative infrastructure management or cost-sharing.
- Thirty-six LUG's have both drinking water and sanitary sewer service areas within their jurisdictional boundaries.
- Seven LUG's have only drinking water service areas within their jurisdictional boundaries.
- Seventeen LUG's have only sanitary sewer service areas within their jurisdictional boundaries.
- There are a total of six established Water [and/or] Sewer Authorities comprised of two, three or four LUG's working cooperatively.
- There are total of nine coordinated efforts established by Intergovernmental contracts with as few as two members in one circumstance and as many as seven members in another circumstance.
- There are a total of four valid 425 Agreement coordinated efforts, all of which are coordination between two LUG's.

The data collected establishes that throughout Northwest Lower Michigan coordinated efforts for infrastructure are ongoing and well established within the communities of this region. There were no identified instances where annexation was being used for development or infrastructure expansion purposes. In place of annexation, 80 percent of the studied municipalities formally collaborate with their neighbors on water or sanitary sewer infrastructure services.

Additional findings are outlined and detailed below:

- Methods for obtaining agreements and acts through the State of Michigan is difficult given the required query parameters (must know contract's year of execution or approval).
- Permit data obtained from EGLE, in a few instances, was incomplete in regard to community contact information, and was inaccurate in one instance of oversight and contact for a Utility Authority. The department that provided oversight of that particular authority was eliminated in 2015.
- A permit number was assigned for a drinking water permit for a village that does not have a system. The village has private wells that have tested positive for PFAS and efforts are underway to support implementation of a municipal drinking water system.
- There is a wide range of statuses in regard to the current maintenance and upkeep of systems. A more detailed analysis is necessary for any true inventory of conditions (i.e. IAM). Most

communities operate under a planning document such as a Capital Improvement Plan or Infrastructure Asset Management Plan. All communities are actively working to address any existing infrastructure issues. Some communities are much better positioned in regard to capacity, technology and funding for infrastructure.

- All communities expressed needs for funding for upgrades, maintenance and expansion.
- All communities expressed pride with their system even in some difficult circumstances, and all are actively making efforts for improvements when resources become available.
- Most communities noted a need for development to support expansion efforts if the expansion is not funded through a state or federal grant. Connection fees are required by every community who offers connection and has available capacity.
- Some communities could not provide information on the types of collaborative agreements in place, the year the agreements were executed, or any background information as to how negotiations occurred. This was expressed as a lack of institutional knowledge, as local leadership has transitioned out of their roles and information has not been well tracked or passed down amongst community leadership.
- The lack of institutional knowledge also impacts the known status of some community systems. This is in reference to why/how past expansions were made and/or needed, and at times limited the knowledge of what is actually in the ground in terms of pipe material, sizes, locations and condition.
- The pattern of community coordination and methods of coordination has led to a very complex fabric of partnerships.
- It is evident through the conversations that infrastructure supports development, allows for development and density that would not otherwise occur and supports growth in rural communities adjacent to more urbanized areas (villages, cities, densely populated townships). This was clearly expressed with detailed discussions on the types of projects needed to support the local economy (industrial, commercial, high density residential and mixed uses).
- Collaborative management through contractual agreements is the only feasible route for many rural communities to be able to access water and sanitary sewer infrastructure. This is due to the necessary staff capacity, knowledge of technology and certifications that support the management of these systems. The overall costs associated with management and expansion also promote collaboration.
- 425 agreements were executed in four communities for the intended purpose of coordinated land use planning and infrastructure. In each instance, the coordinated effort for expansion of infrastructure was for specific land uses within a small defined area. In one case, the extension of infrastructure from a village to a neighboring township was specifically for a high density mobile home park. In another case the extension was from a village to a township for a predefined limited number of higher density single family homes in a neighborhood. In the final two cases the extension was from a city to a neighboring township for a higher density housing development and a mixed-use development with density.
- A fifth use of a 425 agreement was found between two townships that was not conducted for the appropriate purpose, according to the State Boundary Commission. This instance preceded the execution of one of the four valid uses of a 425 Agreement noted above. In this situation, a developer owned a parcel in “Township A”, and wished to coordinate and have infrastructure extended from “City B”. “City B” was open and available to extend the infrastructure to “Township A”. Leadership at “Township A” did not want to see this infrastructure extended into their community as they did not want to see this development occur, nor did they want to lose this land through annexation. “Township A” reached out to another adjacent neighbor “Township C”.

"Township C" agreed to enter into a 425 Agreement with "Township A" for the specific property under consideration for development, in order to prevent "City B" from being able to extend infrastructure through annexation. The situation went to court, where the court ruled this was an improper use of a 425 Agreement since it was utilized to prohibit development and the extension of infrastructure. This situation ended with the valid execution of a 425 Agreement structured between "Township A" and "City B" for 50 years for the determined area, and the completion of the originally proposed development and infrastructure expansion, plus water connections to "Township A's" business district.

- There was an instance of concern regarding differing regulatory permitting and control thresholds for drinking water and sanitary systems, where the oversight authority differed from the State to a Federal agency. Systems under Federal oversight are not closely monitored, and are not held to the same standards as state permits. This has led to concern, particularly when the systems are shared between a local unit that is under state authority and a system that is under Federal authority.
- All municipalities with coordinated infrastructure, regardless of agreement type (425, Intergovernmental Contract, Utility Authority), stated that annexation was never going to be an option in their community. The reasons given include a lack of political will, limited resident support and the availability of alternative methods for collaboration.
- Two communities spoke to likely future use of 425 agreements in consideration of upcoming growth, and a need to address specific land use and infrastructure limitations located along jurisdictional borders. These communities have been cooperatively planning for expansion of systems and taking into account land use considerations for several years.

CONCLUSION & CALL FOR FUTURE RESEARCH

In summary, the researchers were correct in their supposition that annexation is no longer a politically feasible method to expand infrastructure in Michigan. Michigan legislation is flexible enough to allow communities to negotiate with one another, share costs, contract out the management of systems and share ownership of infrastructure. This is a positive development for a state with so many municipalities in deep need of collaboration. However, the state is also woefully behind in its Infrastructure Asset Management (IAM), investment in infrastructure upgrades, and even its understanding of where the pipes are and who manages them. For this reason, the research points to an easier, more politically sound future of collaboration. But this must also be met with greater state oversight, a comprehensive inventory of systems statewide, an analysis of whether collaborative partnerships are more cost-effective for consumers than annexation, improvements in IAM technology and more funding for infrastructure maintenance.

State-Wide Coordination

It is evident through this project that the State of Michigan has very little organized or comprehensive data on infrastructure. This includes not knowing where pipelines, culverts, etc. are located, what their conditions are and who exactly manages them. In fact, there seems to be little to no knowledge of which areas of the state have access to water or sanitary sewer connections. This is a major deterrent to statewide economic development and has only exacerbated the problems created by in-state migration patterns (east to west). In addition, each municipality manages and inventories its system differently. There is no uniform method for IAM in the state, nor is there a set of guidelines to help communities accomplish this task.

Service Area Boundaries and Capacity

It is not only the state's responsibility to more proactively inventory their systems. Local units, counties and regional governments may take a more active role in mapping service boundaries and projecting maintenance costs and timelines. This information can then be utilized in models that include additional information such as parcel data, location of primary transportation routes, location of schools, and areas of employment. This would help to target specific locations for potential development activities.

Coordinated Infrastructure, Efficiency and Cost Savings

Through the interview survey the researchers were able to ascertain anecdotal information from lead staff overseeing infrastructure systems and collaborative processes with their neighbors. The lead staff's responses showed that there were perceived benefits of shared professional capacity, technology and assets. The actual threshold of efficiency of the coordinated efforts, however, was not measured. A more in-depth data collection process with a focus on information pertaining to costs for capacity, technology, training/certification, infrastructure maintenance and improvements and costs associated with infrastructure types should be conducted. Data should be collected for both communities with coordinated infrastructure, and communities that operate independently. This would allow for a comparative analysis of the benefits, or lack thereof, for collaboration.

Systems and Technology

Communities vary greatly in their access to IAM technology and the overall ability to inventory needs. First, there should be more research conducted on the best analyses to use during IAM so that communities can effectively place weight on certain factors (e.g. pipeline material, cost to repair, failure rate, etc.) and then integrate this information within their localized context. In fact, there isn't a single methodology for conducting these inventories. While the Michigan Infrastructure Council has begun training local leadership on how to manage their assets through their Asset Management Champions program, there is

very little common sense in this area of local governance. Therefore, researchers and the State of Michigan should identify how exactly to conduct asset management, develop an optional tool that can be replicated across the state for communities beginning this process and provide educational programming to implement this practice.

GRANT PROGRAMS AND IMPACTS

The effect of grant programs that fund infrastructure maintenance and expansion has not been effectively measured. Grants support community infrastructure improvements, but in many rural communities the inability to effectively pursue grants, manage them once they are received or the inability to provide required matching funds can limit the effectiveness of these programs in the communities that need them most. More research should be conducted on the constraints experienced by local units of government in pursuing infrastructure grants so that these programs can balance sound investment expectations from the state's perspective while also being accessible to rural communities. This would help to avoid a 'winner-take-all' scenario where the well-staffed, high tax base localities are the only ones receiving funding assistance.

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