

Vice President's Conversation on the Future

Trend Research: Infrastructure

Descriptor Definition

This descriptor white paper examines issues related to Ohio's infrastructure needs focusing on transportation, wastewater and drinking water, and telecommunications. Ohio has traditionally been a transportation hub with a wide variety of transportation resources; notably highways, air, rail, and water. The blessings of these systems have allowed Ohio to prosper, but investments need to be made in the systems to maintain and improve them. Likewise, Ohio has vast fresh water resources which have been developed for both industrial and domestic uses, but much of the domestic water infrastructure is old and needs reinvestment. Finally telecommunications can also be considered an infrastructure issue, but will be dealt with in a separate white paper.

Trends and Existing Assets/Descriptor Relevance¹

Access Ohio 2040, an inventory of current Ohio Transportation assets and an analysis of transportation need through 2040, outlines the following assets of the Ohio Transportation Systemⁱ.

Transportation

The state has 258,774 roadway lane miles of highways. The Ohio Department of Transportation maintains 43,211 lane miles (16.7%) with the remainder maintained by cities, villages, counties and townships. The state maintains 13,941 bridges (31.1%) out of a total of 44,766 bridges in the state. As of 2006, out of all the states, Ohio has the fourth-largest Interstate Highway System. Ohio also has the fifth-largest traffic volume and the third-largest quantity of truck traffic. Ohio ranks second in the nation in terms of the number of bridges for its Interstate Highway System.ⁱⁱ There are 104 publically owned airports and seven commercial airports in the state including several that are important in the movement of air cargo in the state and nation. The state has 716 miles of highways along the Ohio River and Lake Erie. There are 12 commercial ports in the state, nine along Lake Erie and three on the Ohio River in addition to numerous privately owned water ports. Over 5,902 miles of freight rail track is in the state operated by 35 railroads and the state ranks third in the nation in the number of rail miles operated. The state is second in the nation with thirteen intermodal terminals. Three Amtrak lines have at least one passenger stop in the state.

Ohio has 27 urban and 35 rural transit agencies providing 111 million trips in 2011, with the majority of ridership in Cleveland, Columbus and Cincinnati. Three private intercity bus companies serve the state. There are 4,207 lane miles of bikeway facilities in the state and 2,043 miles of sidewalks on U.S. and State Routes. The anticipated financial needs for Ohio's state owned highways, bridges and state-funded transit systems through 2040 is \$55 billion, while anticipated revenue under current funding formulas would only be \$41 billion, a \$14 billion dollar gap.



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Drinking Water

The drinking water picture is equally challenging. Ohio has reported a need for investment of \$12.6 billion dollars of maintenance and upgrade need in the next 20 years.ⁱⁱⁱ Leaks and breaks increase as much of the system is outdated, overused and underserved. Nationally, the average age of a broken water main is 47 years and a quarter of all water mains are over 50 years old. Deferred maintenance is becoming more of an issue. In 1980, ten percent of pipelines were in poor shape, while by 2010, forty five percent have moved into that category. Nationally, 16% of all treated water never reaches the faucet totaling seven billion dollars per day and costing 2.6 billion dollars.^{iv}

Wastewater

As for waste water, the U.S. EPA's 2008 Clean Watersheds Needs survey estimated Ohio's needs for waste water improvement to be \$14.2 billion dollars through 2028. The need in Ohio increased by 20% between 2004 and 2008 or \$2.4 billion dollars, while Ohio's federal allocation of Clean Water State Revolving Funds were only slightly over \$115 million dollars. The largest needs in the state are for correction of combined sewer overflow issues and for general sewer replacement and rehabilitation.^v

As the nation's seventh most populous state, Ohio has large infrastructure resources, and equally large infrastructure needs. Let's look at some options and proposals for addressing the state's infrastructure needs.

Transportation Recommendations/Options

Assess Ohio 2040 contains numerous recommendations for addressing the state's transportation needs including:

- Improve Performance Management in:
 - Safety
 - Economic Development
 - Pavement and bridge preservation
 - Travel time reliability & Snow and ice removal
 - On-time delivery of capital projects
- Leverage available resources
- Engage in a state and national dialogue on long term/ongoing funding for transportation
- Develop asset management systems within ODOT that allow the state to modernize their pavement and bridge management systems
- Study the need for improved two-land freight corridors to identify needed operational improvements
- Perform a statewide transit needs study to measure transit needs and performance
- Consider the impact that future climate variability may have on transportation infrastructure
- Work with local jurisdictions to designate US and state bicycle routes
- Foster and grow partnerships with regional transportation planning agencies

- Incorporate the Strategic Transportation System (SIS) for programs that make transportation investments above and beyond a state of good repair
- Address regional needs based on condition, demographic, and economic data along with stakeholder input.^{vi}

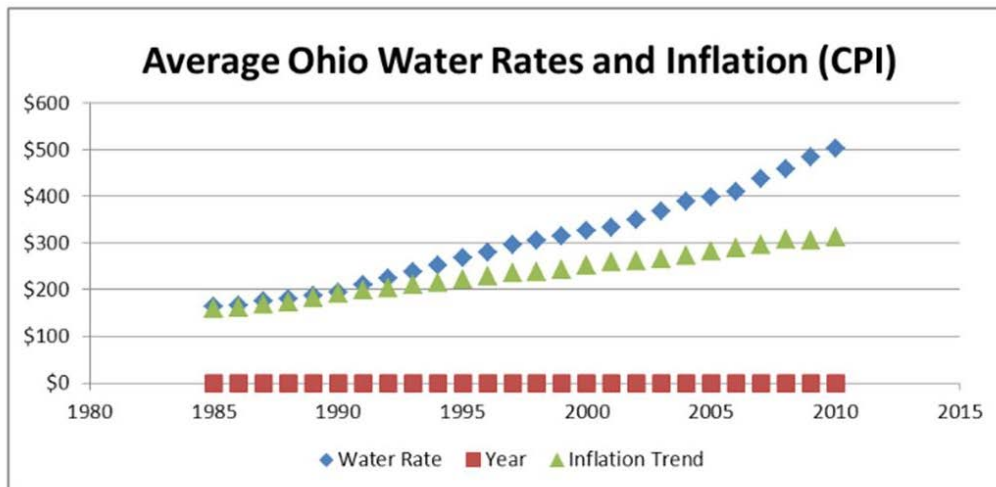
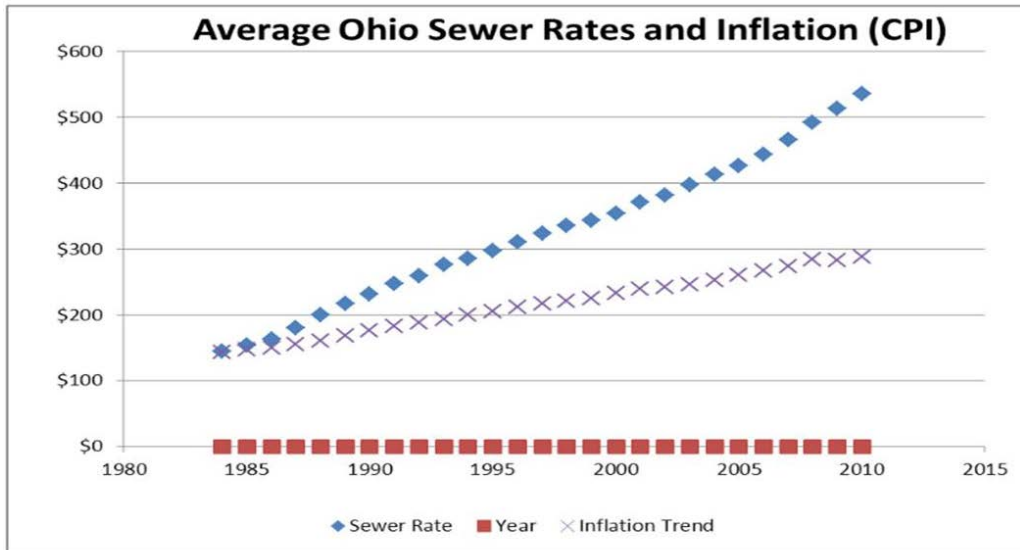
What other issues may influence transportation issues in future years? As more work is being done on autonomous/self-driving cars, will these vehicles require significant change to the highway infrastructure or will they adapt to the current infrastructure? If autonomous cars become a significant portion of the vehicle fleet will they reduce the need for new infrastructure by both lessening delays from accidents and by making the overall traffic flow less congested? As alternative fuels and electric vehicles become more prevalent will this reduce the revenue from state and federal gasoline taxes? How should the state/federal government tax fully battery powered electric vehicles or vehicles fueled with compressed natural gas, fuel cells or hydrogen? If we are successful in doubling the national average mileage of vehicles from current standards to 54.5 miles per gallon in 2025, what effect will that have on gas tax revenues? Will states increase funds for new projects by privatizing current assets as Ohio has proposed with the Turnpike and Indiana has done? Will private institutions use similar methods to raise funds as OSU has done with campus parking? Will states begin to move away from traditional gas taxes and move to a per mile tax as is being piloted in Oregon?^{vii} Will oil/gas severance taxes be enacted and used for improvements to transportation, water and sewer infrastructure, in shale counties or in the state as a whole?

Drinking Water and Wastewater Recommendations/Options

Since many of the issues and possible options for drinking water and wastewater are similar, they will be considered together.

As with transportation, the state's needs for drinking water and wastewater rehabilitation and improvements are massive. To some degree, the size of the community involved plays a role in how improvements have historically been made. Counties with over 450,000 population have historically been able to self-finance to a larger degree than smaller counties due to a larger willingness/ability to issue debt through municipal bonds.^{viii}

Rates for Ohio consumers for sewer and water service have increased considerably faster than the overall consumer price index as is shown in the two graphs below.^{ix}



There is an alphabet soup of programs providing grant and/or loan funding for water/wastewater construction projects in the state that involve a mixture of state and federal sources. As overall rates to consumers continue to rise there may be some limit to the ability to increase rates both for the purposes of operations and management and to raise additional funds to expand or rebuild systems.

Although water and wastewater systems are important to maintain a competitive economic climate for the state, this infrastructure may not be of the highest priority to state and local politicians. With state and federal funds likely to remain stable at best, barring another round of economic stimulus dollars, communities need to determine how to best use the existing resources. What can the state do to best use limited financial resources?

- Maximize limited grant and below market rate loan programs
- Consider cooperation/consolidation/regionalization of existing governmental providers to minimize overhead costs

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- Work to prioritize projects to obtain maximum delivery per dollar invested.^x

This last point may put rural projects at some disadvantage in the state as the cost to lay water or sewer lines may be similar throughout the state, but the number of customers in rural areas is smaller resulting in less of an ability to generate funds.

Author Insights-Alternative States and Possible Trends for the Future

1. New funding sources abound, costs of construction and maintenance decrease, availability and usage of mass transit increases, improved rail, water and air systems allow just in time delivery to all Ohio industries, bike, hiking, and water trails are found all around the state, driverless cars are available and in wide use reducing the need for additional roads due to better utilization. All residents of the state have available public water and wastewater treatment at reasonable prices. Internet and cell phone is ubiquitous. These attributes provide a utopian glimpse of Ohio's infrastructure future.
2. Modest progress, often in fits-and-starts, allows Ohio to make some needed improvements to transportation, water and sewer, and telecommunications systems around the state. However, it always seems to be an uphill battle and a balancing act pitting old vs. new, rich vs. poor, urban vs. rural and traditional vs. innovative. Major new projects continue to be debated such as high speed interurban rail, reconstruction of major portions of an aging Interstate highway system, decades old water and sewage treatment systems. Our rail, air and water systems continue to perform at or slightly above current levels, but as other areas of the nation and world expand and renew these systems, Ohio industry continues to look for locations outside the state.
3. State and national economies crumble leaving almost no new money for infrastructure improvements. The state and local governments struggle to provide basic services and citizens refuse to vote any new taxes or programs to help build or maintain infrastructure. Copper phone lines become a thing of the past as the telecoms move to an all wireless system that leaves large areas of rural Ohio with little or no service. Industry flees and a viscous downward spiral takes hold.

The above paragraphs offer various alternative futures for the state. What may be most likely? The challenges for maintenance of transportation, drinking water and wastewater systems in Ohio are significant. If we do nothing but what we have done in the past, we will likely not even tread water but will fall further behind on maintenance and lack funds to grow and expand our systems. The state will likely continue to look at new programs, both internally developed and borrowed and modified from other states. Some of the changes may occur voluntarily while others will be mandated either by legislative fiat or local financial duress. Other states, and activities within our state, will continue to be a fertile ground for new ideas and Ohio will continue to experiment with ways to deal with ongoing infrastructure issues.

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¹Along with the research-based data and statistics included in this document, is information provided by the research paper author(s). Although these author insights are not directly cited with research references, they reflect research, observation, logic, intuition, and well-considered expectations compiled by the author(s). The Author Insights sections of this paper are offered for discussion and to help provide a wider perspective for incorporating the descriptor data into the possible future trends. These conclusions are drawn by the author(s) using their knowledge of the scholarly references and their years of professional experience related to the descriptor, and are provided to help the reader more effectively envision the future impact and effects of the descriptor.

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