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**The Effect of the COVID-19 Recession on Public Infrastructure Needs
Interim Report: Lessons Learned from the Great Recession
(December 2007 – June 2009) and Early Observations
from Local Government Officials**

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The Effect of the COVID-19 Recession on Public Infrastructure Needs

Interim Report: Lessons Learned from the Great Recession (December 2007 – June 2009) and Early Observations from Local Government Officials

Across Tennessee, state and local government officials plan and implement capital improvement projects based on an analysis of their community's public infrastructure needs. They consider both the predictable lifespan of existing infrastructure and the anticipated infrastructure needed to accommodate growth or planned improvements. But beginning in early 2020, the world was faced with unanticipated challenges triggered by the spread of the Coronavirus Disease 2019 (COVID-19) and the resulting pandemic. Whether or the extent to which these challenges have affected the public infrastructure needs of Tennessee communities is among the many uncertainties stemming from the pandemic.

To help address this question, the Tennessee Advisory Commission on Intergovernmental Relations (TACIR) is conducting a two-part analysis of the data it collects on public infrastructure needs in Tennessee. Part one of this analysis—included in this report—examines the Great Recession, and the decade following it, to establish a baseline for analyzing data collected during the COVID-19 pandemic. Although Tennessee's reported public infrastructure needs increased alongside an expanding economy over the last decade, our analysis did not uncover any major shift in needs stemming from the Great Recession—whether in terms of dollar amount, project type, or project progression.

Part two of TACIR's analysis—to be presented in a follow-up report—will examine whether, or to what extent, the COVID-19 pandemic affected the public infrastructure needs reported in Tennessee. Staff will then compare those findings to conclusions from our analysis in part one. The Tennessee Department of Health reported the first confirmed case of COVID-19 in the state on March 5, 2020¹; closures of some schools, government offices, and businesses shortly followed. Since then, these government operations, businesses, and organizations have implemented measures intended to reduce the spread of COVID-19—including limiting in-person gatherings and moving to virtual platforms so as to continue operations when feasible. Some of these measures may have lasting implications.

Not only did COVID-19 cause a global health crisis, it also caused significant social and economic disruptions. But while cities and counties across Tennessee experienced a reduction in economic activity and high

Whether or the extent to which the pandemic has affected the public infrastructure needs of Tennessee communities is uncertain.

¹ Tennessee Office of the Governor 2021.

TACIR's *Public Infrastructure Needs Inventory* is a tool that can be used to assess the effects of the pandemic, if any, on public infrastructure needs.

unemployment as businesses shut down at the beginning of the pandemic, many local officials reported an unexpected increase in sales tax revenue from residents shopping locally or online.² This increase in sales tax revenue from online purchases is in part the result of laws and rule changes adopted in Tennessee following the US Supreme Court ruling in *South Dakota v. Wayfair* (2018), which overturned past rulings that had prohibited states from requiring out-of-state sellers to collect and remit sales tax from online sales. Furthermore, a drastically lower unemployment rate compared with the year prior and record-setting growth in new business filings, among other indicators, demonstrate a strong economic recovery is underway in the state.³ Despite the promise of a rebounding economy, life for many has not fully returned to the way things were before the pandemic, and the long-term effects of the pandemic are yet to be determined.

As noted above, the extent to which the COVID-19 pandemic has affected the public infrastructure needs of communities in Tennessee is an open question. For example, as more people work from home, commuting has declined, potentially reducing wear and tear on transportation infrastructure. At the same time, as consumers turn to online ordering and delivery services rather than shopping in person, long-distance transportation of consumer goods and home deliveries may increase road use by trucks and other delivery vehicles. For many Tennesseans, the shift to remote work and learning has highlighted needed improvements in broadband infrastructure. The pandemic has also highlighted technological infrastructure needs in public schools, including such items as computers and other electronic devices. In a survey of Tennessee local government officials, 95.8% responded that the pandemic had a significant effect on their school system. In those cities and counties that operate a school system, every official who responded to the survey indicated that the pandemic has increased the need for technology for public schools. Furthermore, the availability of funding for infrastructure projects is also uncertain. While tax collections in Tennessee performed better than expected overall in 2020 (and continue to grow) some public infrastructure revenue streams—such as the taxes on gasoline and motor fuel that help fund Tennessee's highway system and local roads⁴—have not performed as well since the pandemic began.

TACIR's *Public Infrastructure Needs Inventory* is a tool that can be used to assess the effects of the pandemic, if any, on public infrastructure needs. Recognizing the importance of public infrastructure, the Tennessee General Assembly in 1996 charged the Commission with creating and maintaining an inventory of public infrastructure needs "in order for the state, municipal, and county governments of Tennessee to develop goals, strategies, and programs which would

² Survey of Tennessee city and county government officials.

³ Hargett 2021.

⁴ Tennessee Department of Transportation.

- improve the quality of life of its citizens,
- support livable communities, and
- enhance and encourage the overall economic development of the state.”⁵

Public infrastructure is defined, for purposes of the inventory, as capital facilities and land assets under public ownership or operated or maintained for public benefit. To be included in the inventory, infrastructure projects must not be considered normal or routine maintenance and, with the exception of school technology infrastructure, must involve a capital cost of at least \$50,000. School technology infrastructure is included for existing schools regardless of cost⁶ because this information is not compiled on a statewide level by any other organization.

Each year, with assistance from the state’s nine development districts, Commission staff gather information from state and local officials for the inventory. Each new “inventory year” includes the infrastructure improvements reported as needed at some point in the following five years, such that the inventory year 2007 captures improvements that state and local officials said would be needed between July 1, 2007, and June 30, 2012, and so on. The reported information allows staff to assess a variety of changes in the state’s infrastructure needs over time—including whether there have been changes in the overall amount of needs reported, the relative amount of specific types of needs, and the progression of reported needs to completion. These changes, when analyzed alongside other socioeconomic factors, may help the state and local governments better understand whether, or to what extent, economic downturns affect public infrastructure needs and how to make adjustments in public infrastructure project planning and funding in response to any such effects.

The Great Recession does not appear to have shaped trends of needs reported in TACIR’s Public Infrastructure Needs Inventory.

Prior to the COVID-19 pandemic-induced recession, which occurred from February through April 2020,⁷ the most recent major economic downturn occurred from December 2007 through June 2009—the period known as the Great Recession. While analyzing historical data in the *Public Infrastructure Needs Inventory* from that period, Commission staff looked for trends in the average cost of needs reported and completed projects, the types of needs reported, and the progression of reported project needs.

⁵ Public Chapter 817, Acts of 1996.

⁶ Tennessee Advisory Commission on Intergovernmental Relations 2021.

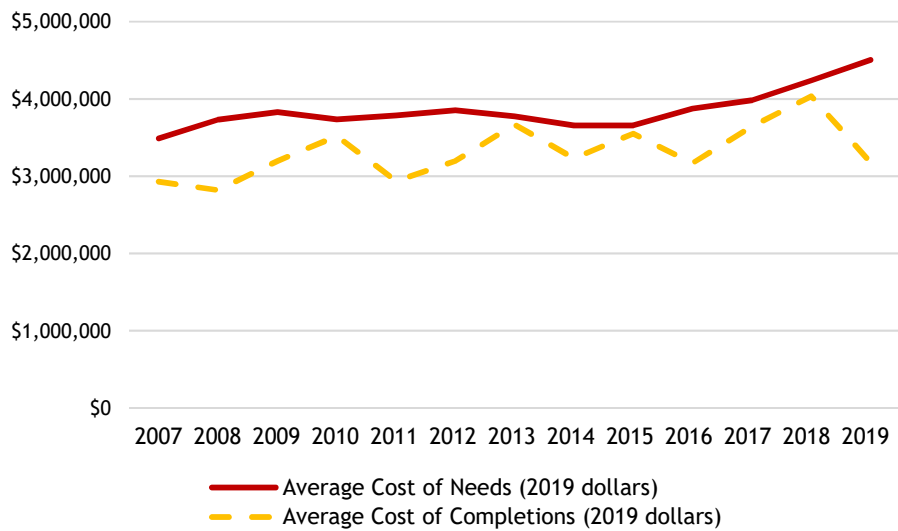
⁷ National Bureau of Economic Research 2021.

TACIR staff looked for trends in the average cost of needs reported and completed projects, the types of needs reported, and the progression of reported project needs.

Average Cost of Needs and Completed Projects Reported

From 2007 to 2019, both the dollar amount of reported infrastructure needs and the cost of projects completed in the *Public Infrastructure Needs Inventory* increased slightly overall. The inflation-adjusted average cost of completed projects fluctuated from year to year between 2007 and 2019 but trended upward overall during this period. The average cost of needs remained relatively flat between 2007 and 2015, when adjusted for inflation, and began increasing in 2016. From 2007 to 2019, the average cost of needed projects consistently remained higher than the average cost of completed projects, despite changing economic conditions during this period. See figure 1.

Figure 1. Average Cost of Needs and Completions (in 2019 dollars)



Source: TACIR staff analysis of data used in TACIR’s 2021 infrastructure report

The trends in average cost of reported needs and completed projects during and after the Great Recession did not show a connection between that major economic disruption and ensuing infrastructure needs or project completions. Prior TACIR analysis found that “population along with population growth and access to the resources needed to fund infrastructure are tied to both how much infrastructure is needed and how much is completed.”⁸ That analysis found five factors that are correlated with public infrastructure needs and the ability to meet those needs: taxable property, taxable sales, income, population, and population gain or loss. Of these factors, population is the most significant in relation to infrastructure needs and the second most significant for completed needs. Taxable property is the most significant factor for completed needs. The analysis demonstrates that the *need* for infrastructure is driven by

⁸ TACIR 2016.

population factors rather than by funding-related factors that could be affected by economic downturns.⁹ It is therefore unsurprising that we did not find a connection between the Great Recession and the average cost of infrastructure needs reported in the inventory.

In contrast, because the average cost of projects *completed* is more closely connected with taxable property¹⁰—a funding-related factor—one might anticipate that the Great Recession affected completions. However, the amount of taxable property in a community does not necessarily decrease during economic downturns, though property tax collections may. Moreover, during the Great Recession significant additional federal funding was made available to local governments, which could have helped offset decreases in other local revenue streams. As noted in TACIR’s 2020 report *Services Provided by Local Governments and the Sources of Revenue to Fund Them*, total revenues remained steady during and following the Great Recession.

The uptick in the average cost of needs reported in the 2009 and 2010 inventories occurred during a time when federal American Recovery and Reinvestment Act of 2009 (ARRA) funds became available, some of which were allocated for infrastructure projects. However, TACIR staff are unable to tie the bulk of ARRA funding directly to infrastructure needs reported in the inventory. The Office of the Tennessee Recovery Act Management estimated Tennessee’s share of ARRA funding for infrastructure at approximately \$686 million.¹¹ But the inventory for these years only captured approximately \$84 million in ARRA funding for infrastructure needs. TACIR noted this discrepancy in its 2011 infrastructure report, explaining that “some of the increase in federal funding in the inventory may be ARRA funding that was not reported as such . . . [and] some projects that qualified for stimulus funds do not meet the definition of infrastructure used in the inventory—for example, projects for paving or other maintenance needs.”¹² Transportation, along with water and wastewater, are among the project types for which federal ARRA funds were reported in the inventory as a source of funding.

Types of Needs Reported and Completed

The Great Recession and the subsequent recovery do not appear to have affected the types of infrastructure needs reported between 2007 to 2019, despite the availability of federal ARRA funds for particular project types. For example, in April 2009, then-Governor Phil Bredesen released a list of projects funded with ARRA funds, and the Tennessee Department of Transportation awarded contracts for projects using those funds in May

“Because the inventory is not limited to needs that can be funded in the short term, it may be the only formal opportunity officials have to consider the long-range benefits of infrastructure.”

Tennessee Advisory Commission on Intergovernmental Relations, *Building Tennessee’s Tomorrow: Anticipating the State’s Infrastructure Needs*.

⁹ Ibid.

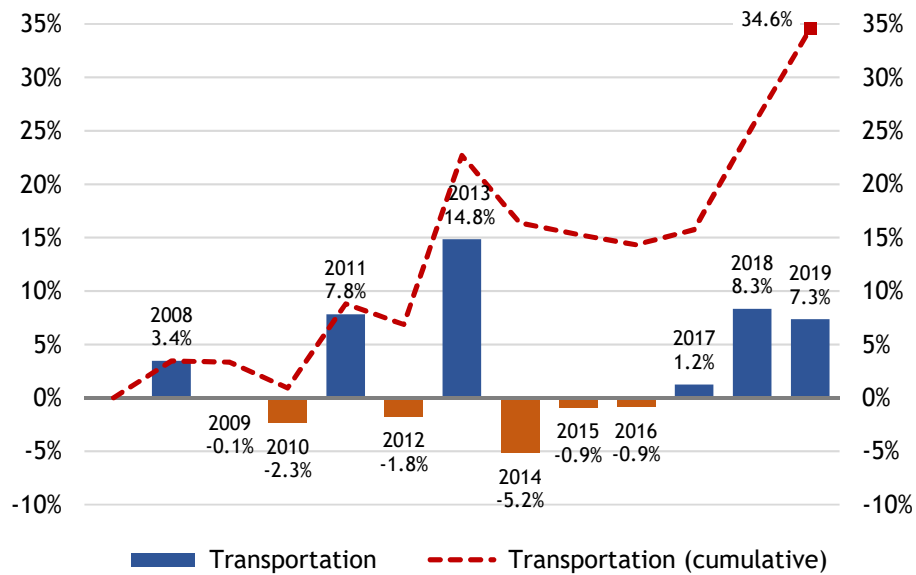
¹⁰ Ibid.

¹¹ Tennessee State Government 2009.

¹² Tennessee Advisory Commission on Intergovernmental Relations 2011.

and June of 2009.¹³ But the inflation-adjusted reported cost per capita of infrastructure needs in the inventory for transportation projects—the project type for which the majority of ARRA funding was directed¹⁴—decreased by 0.1% in 2009 and decreased again in 2010 by 2.3%. Year-over-year increases of 7.8% and 14.8% occurred in 2011 and 2013 respectively, despite no new federal stimulus funds being awarded in these years. See figure 2.

Figure 2. Cost per Capita of Reported Transportation Needs (in 2019 dollars)



Source: TACIR staff analysis of data used in TACIR’s 2021 infrastructure report.

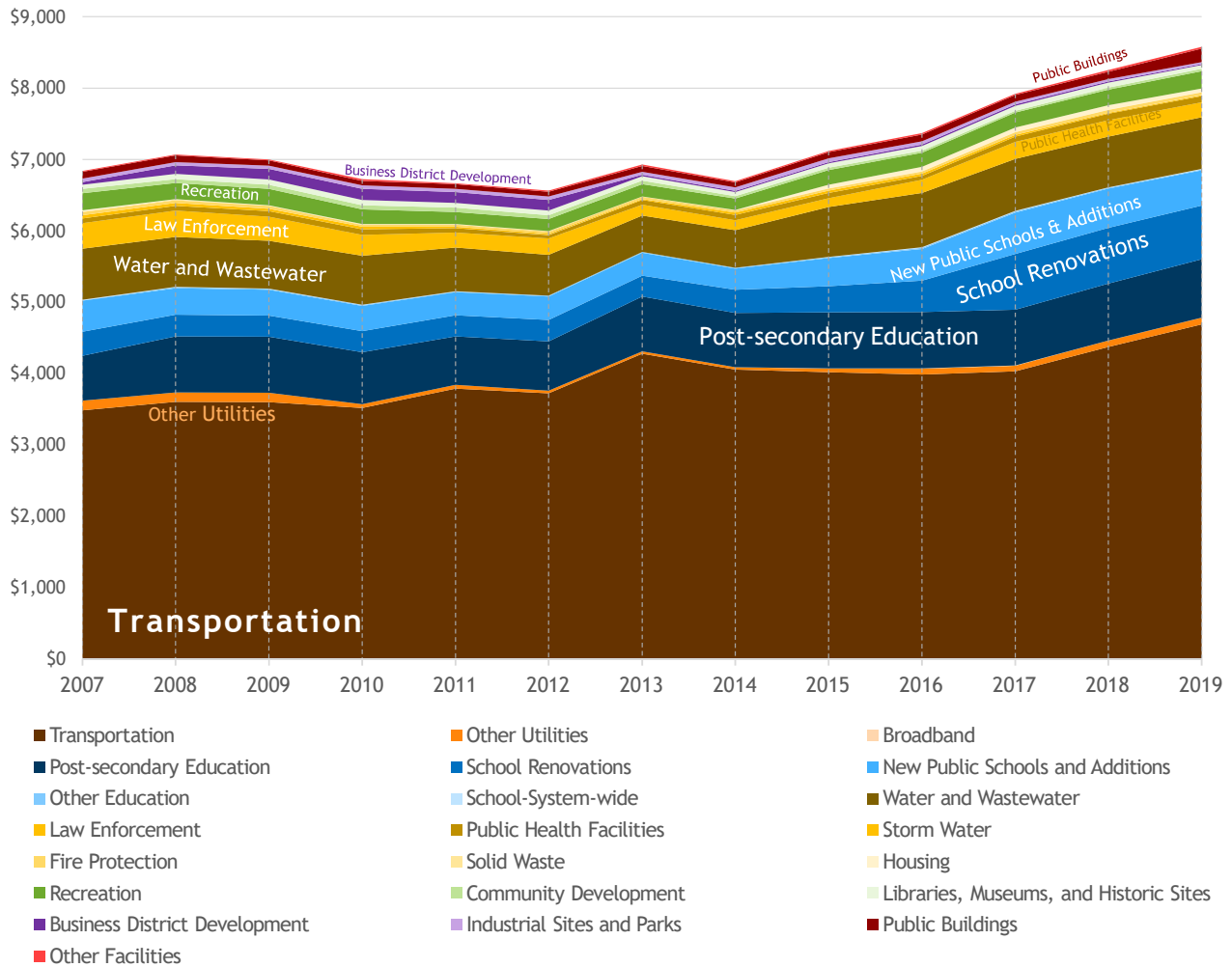
Year-over-year changes in the per capita cost of needs reported for each project type may be attributed to the project-specific nature of the data contained in the inventory. Large projects, or a lack thereof, can cause significant increases or decreases in any given project type from year to year. For example, in 2008, a \$455 million need for a convention center was identified, increasing the business district development category by 207.8% from the previous year. Year-over-year changes can also be explained by the cumulative cost to complete many new projects being reported in a given category, such as in 2016 when 16 new school-system-wide projects were reported, increasing the category by 104.4% over the previous year. See appendix A.

¹³ Clarksville Online 2009.

¹⁴ TACIR’s 2011 infrastructure report notes that “half of all ARRA funding reported in this year’s inventory is for transportation infrastructure.” Also, according to an Office of Tennessee Recovery Act Management reporting summary for the 2010 second quarter (April 1– June 30), reports for ARRA fund spending were submitted by state agencies for 385 projects, 317 of which were for transportation projects.

One trend is apparent, despite the significant changes from year to year caused by individual large projects and large numbers of projects in a particular category: the dollar amount of reported needs in the inventory generally increased for many individual categories as the economy grew following the Great Recession. See figure 3.

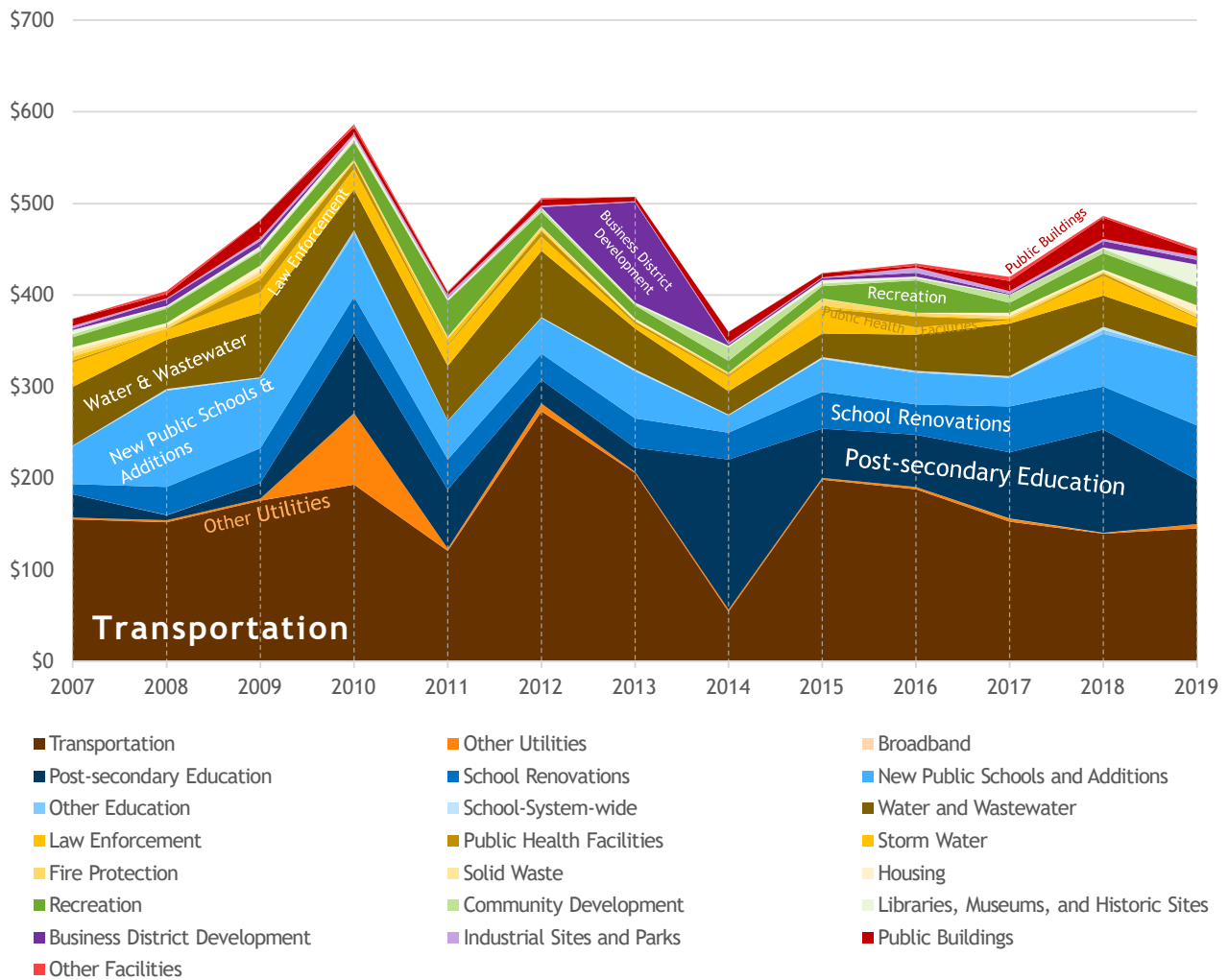
Figure 3. Cost per Capita of Reported Needs by Project Type (in 2019 dollars)



Source: TACIR staff analysis of data used in TACIR's 2021 infrastructure report.

Though it does not appear that the Great Recession or subsequent recovery caused a major shift in the types of infrastructure needs reported, it may have contributed to the completion of projects in categories for which ARRA funds were directed, such as transportation. See figure 4 for year-to-year changes in the cost of public infrastructure needs reported as complete by category.

Figure 4. Reported Costs for Completed Projects per Capita (in 2019 dollars)



Source: TACIR staff analysis of data used in TACIR’s 2021 infrastructure report.

The total cost of completed transportation projects increased in 2010 and again in 2012. The 2009 inventory recorded a \$1.5 billion increase in fully funded needs from state and federal funding, for transportation infrastructure, previously reported as unfunded. It is possible that funding for these needs became available because ARRA funds for transportation maintenance needs (e.g., paving), which are not included in the inventory, freed up other federal and state dollars for road construction projects.¹⁵

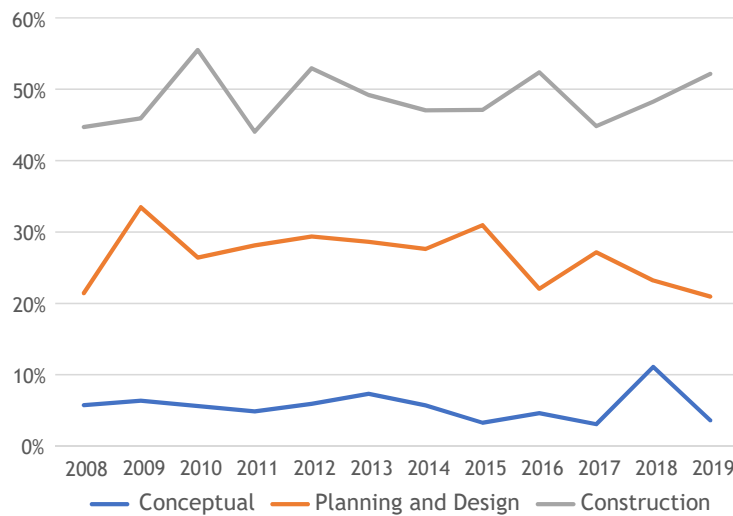
Project Progression

While the federal stimulus funds that followed the Great Recession may have contributed to projects in targeted categories being completed earlier than they would have without the funds, changing economic conditions during and following the Great Recession do not appear to have affected the overall rate at which

¹⁵ TACIR 2011.

infrastructure projects progressed from the conceptual to completed stages—according to data from 2007 to 2019 as reported in the *Public Infrastructure Needs Inventory*. The percentage of projects progressing from construction to completed phases in 2010 increased from 46% to 55% over the previous year, but the percentage fell to 44% in 2011 before leveling out. It is unclear whether the temporary availability of ARRA funding contributed to this brief increase and corresponding decrease as those funds became unavailable.¹⁶ See figure 5.

Figure 5. Project Progression Through Stages of Development



Source: TACIR staff analysis of data used in TACIR’s 2021 infrastructure report. Projects progress through four stages of development—conceptual, planning & design, construction, and completion.

Of course, being fully funded is one of the factors that affects whether or not a project progresses.¹⁷ For inventory years 2007 to 2013, with each inventory year accounting for needs reported for a five-year period, approximately 50% to 67% of projects that were fully funded were completed within five years, compared with 7% to 12% for projects that were not fully funded. See table.

Projects recorded in the inventory may pass through four stages of development: conceptual, planning and design, construction, and completed.

¹⁶ Murray et al. 2011.

¹⁷ A project is considered fully funded for purposes of the public infrastructure needs inventory if the amount of funding needed for the project is reported as \$0.

Table. Comparing the Percentage of Fully Funded and Not-Fully Funded Needs Completed for Inventory Years 2007 through 2013

Year	Fully Funded	Not Fully Funded
2007	50%	9%
2008	67%	7%
2009	63%	11%
2010	63%	12%
2011	65%	11%
2012	61%	11%
2013	46%	9%

Source: TACIR staff analysis of data used in TACIR’s 2021 infrastructure report. Each Inventory year (IY) covers five years; for example, IY 2013 includes needs from July 1, 2013, through June 30, 2018. The data exclude improvements needed at existing schools and those drawn from capital budget requests submitted by state agencies.

TACIR staff’s analysis of reported projects in the inventory did not uncover any major shift in needs stemming from the Great Recession.

The percentage of projects that progress from the conceptual and construction phases began to rise in 2018 (included in inventory year 2013), but it is not yet known whether this trend will continue despite the current COVID-19-induced recession.

The extent to which the COVID-19 Pandemic affects public infrastructure needs in Tennessee remains to be seen.

TACIR staff’s analysis of reported projects in the *Public Infrastructure Needs Inventory* found increases in reported needs alongside an expanding economy, but it did not uncover any major shift in needs stemming from the Great Recession—whether in terms of dollar amount, project type, or project progression. However, it is reasonable to suspect that our forthcoming analysis of inventory data, which will capture the COVID-19 recession, might differ from our analysis of the inventory following the Great Recession. To determine whether local governments in Tennessee anticipate that these disruptions will affect infrastructure needs in their communities, TACIR staff surveyed city and county mayors from November 2020 through January 2021. When asked how the effect of the COVID-19 pandemic compares to past challenges, many local officials noted that the scope and duration of the pandemic’s effects are unprecedented.

While all recessions are characterized by declining Gross Domestic Product (GDP)¹⁸ or rising unemployment, there are key differences between the two

¹⁸ GDP is the monetary value of goods and services produced in a given jurisdiction, in this case, the United States.

most recent recessions. The recessions were triggered by different events: the Great Recession was caused by a financial crisis primarily starting in the housing sector, and the current recession was caused by public health responses to a pandemic. These public health responses caused many government officials to rethink the provision of public services that involve social interaction, which in turn shifted the demand for some public infrastructure at least temporarily.

The stock market reacted differently to the two recessions as well. Between October 2007 and March 2009, the S&P 500 index fell by over 57% and did not regain its 2007 level until April 2013. In 2020, the S&P 500 fell 28% between February 24 and March 23 but had regained its February level by mid-August, according to the Wall Street Journal. Unlike the Great Recession, which persisted for over a year, the Federal Reserve and foreign central banks cooperated to largely alleviate the 2020 financial crisis in a matter of months.

While economic recovery from the ongoing 2020 recession has been faster than that of the Great Recession, the effect the recession on unemployment has been more significant. Unemployment in the United States peaked at 10% following the Great Recession,¹⁹ compared with 14.8% during the ongoing COVID-19 pandemic.²⁰ In Tennessee, the unemployment rate peaked at 10.5% following the Great Recession, compared with 15.8% during the pandemic.²¹ Although, as of May 2021,²² both the national and state unemployment rates have decreased to 5.8% and 5.0% respectively, some measures taken to reduce the spread of COVID-19 during the height of the pandemic are ongoing, such as shifting to remote work.

Social disruptions may affect the types of new infrastructure needs reported or the prioritization of existing needs.

COVID-19, and the public health responses to it, affected many facets of public services, including those involving health systems, education, transportation, government operations, and recreation. For example, once they reopened to the public, visits to state parks across Tennessee skyrocketed during the pandemic, increasing approximately 75% in November 2020 (compared with November 2019) and causing the state to adjust operations to keep up with demand.²³ In nearly every state during the pandemic, the surge in park visitors “brought attention to needed maintenance and upgrades necessary to deal with the record crowds.”²⁴

¹⁹ United States Department of Labor, Bureau of Labor Statistics 2012.

²⁰ Falk et al. 2021.

²¹ United States Department of Labor, Bureau of Labor Statistics. Local Area Unemployment Statistics.

²² United States Department of Labor, Bureau of Labor Statistics 2021.

²³ Interview with Brian Clifford, director of strategic initiatives, Tennessee Department of Environment and Conservation, February 17, 2021.

²⁴ Brown 2021.

COVID-19, and the public health responses to it, affected many facets of public services.

Many Tennessee local officials identified infrastructure needs in technology for education—for both equipment and broadband—and broadband generally.

In many communities, these and other disruptions to patterns of daily life, stemming from the pandemic, have shifted the way we use existing infrastructure, and it is unclear whether these shifts will have a lasting effect on our public infrastructure needs in a post-pandemic world.

In TACIR's survey of city and county officials, 86.6% said that the pandemic caused operational changes in how their local governments do business. For example, many entities limited public access to buildings and increased the use of online or drive-through services. Some local officials noted new needs to accommodate social distancing and transportation, the latter in less populated communities as travel to more rural areas in the state has increased. But technology for education—for both equipment and broadband—and broadband generally were the most prevalent areas of need identified by city and county officials. The officials largely attributed these needs to the shift to virtual classes in many school systems. Approximately 95.8% of local officials agreed that the pandemic had a significant effect on their school system. Every one of the officials who responded to the survey whose city or county operates a school system indicated that the pandemic has increased the need for technology in public schools.

TACIR staff also interviewed representatives of state agencies, public universities and community colleges, and utility districts to determine whether the pandemic has affected their budgets, operations, or infrastructure needs. State agency and higher education representatives echoed many of the responses from local government officials and emphasized shifting operations to accommodate social distancing, including adjustments and restrictions on facility use and enhancements to technology to accommodate working and learning from home. While most respondents said the prioritization of existing infrastructure projects did not change, some noted project delays resulting from supply chain issues. Almost all respondents noted that the pandemic has affected their budgets in some capacity, whether by an increased cost of materials, conservative budget practices during uncertainty, or changes to their sources of revenue. See appendix B for survey questions and appendix C for a summary of survey and interview responses.

Just as social disruptions stemming from the pandemic have the potential to affect Tennessean's public infrastructure needs, so too do new arrivals to the state. In 2020, Tennessee was ranked the third-highest inbound state for household moves within the United States.²⁵ As noted previously, population is the most significant factor in determining public infrastructure needs. Public infrastructure needs in Tennessee communities will almost certainly be affected if the state continues to be ranked as one of the highest inbound states.

²⁵ North American Van Lines 2020.

Funding for Public Infrastructure Needs

In the United States, public infrastructure is mostly funded by local governments and state spending, and much of the revenue generated for infrastructure funding is derived from taxes and fees.²⁶ Federal funding for public infrastructure varies by state and by project type, but it ranges from approximately 25% to 35% of public infrastructure funding nationally.²⁷ Federal funding for public infrastructure peaked in 1977 at approximately 38%. The limited federal support for public infrastructure has placed much of the burden on state and local governments in the United States.²⁸ The Commission's most recent infrastructure report identified the following categories for which more than 10% of the funding source was reported as federal: transportation and utilities; health, safety, and welfare; recreation and culture; and general government.²⁹

However, in response to the hardships caused by the COVID-19 pandemic, the federal government is providing funding assistance, which has included the Coronavirus Aid, Relief, and Economic Security (CARES) Act, 2020 [P.L. 116-136]; the Coronavirus Preparedness and Response Supplemental Appropriations Act, 2020, [P.L. 116-123]; and the Families First Coronavirus Response Act, 2020 [P.L. 116-127]. Additional federal pandemic relief funding, including \$350 billion for state and local governments under the American Rescue Plan Act of 2021, will allow government entities to make significant investments in public infrastructure needs.³⁰

Beyond the influx of federal pandemic relief funding, changes in state and local funding sources—in particular, sales tax and gas and motor fuel taxes—occurred because of social disruptions stemming from COVID-19. Businesses dependent on the in-person gathering of consumers—such as travel, tourism, restaurants, and traditional retail—were adversely affected. However, businesses involved with e-commerce benefited because of a shift from shopping at brick and mortar retail establishments to online shopping during the height of the pandemic, which prevented sales tax revenue from declining as initially feared.

Many local officials surveyed by TACIR staff attributed their respective city's or county's financial health amid the COVID-19-induced recession to online sales tax collection, reporting that “our budget is fine mainly because of the [South Dakota v. Wayfair] decision and additional sales tax” from increased online shopping. With the passage of a series of public acts and Tennessee Department of Revenue rules following the 2018 United States Supreme Court decision in *Wayfair*, Tennessee collects revenue from certain online sales. Effective October 2019, the Tennessee Department of

“If nothing else the pandemic has helped our local economy due to individuals shopping online instead of traveling to urban shopping areas. This has brought more sales tax collections to the county.”

Mayor Tibbals, Scott County

²⁶ Institute for Government 2018.

²⁷ Council on Foreign Relations 2021.

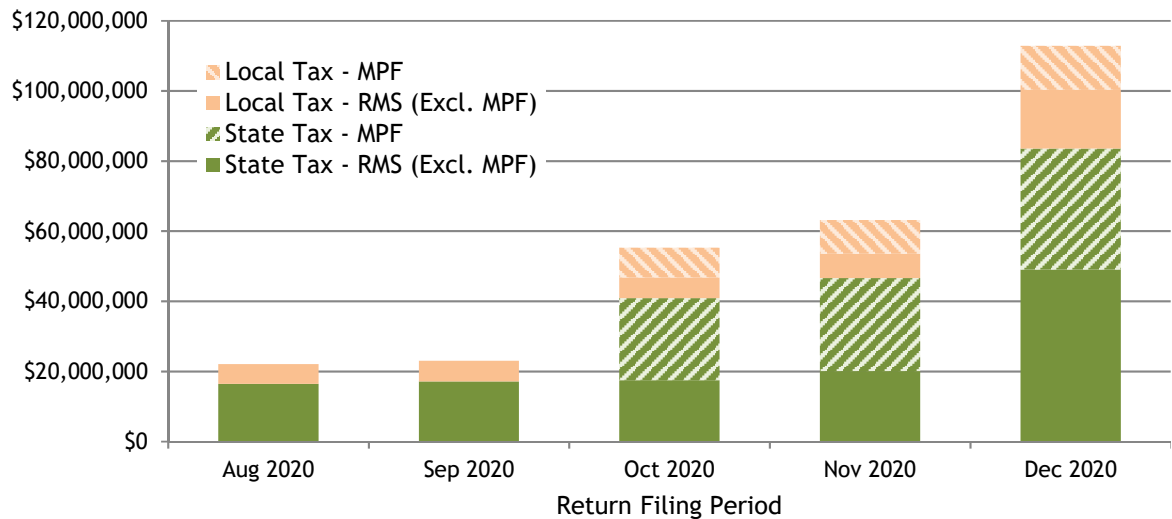
²⁸ Ibid.

²⁹ TACIR 2021.

³⁰ United States Department of Treasury 2021.

Revenue began requiring out-of-state sellers who have more than \$500,000 in annual sales to collect and remit sales tax even though they have no physical presence in the state. The following year, the 111th General Assembly lowered the \$500,000 threshold to \$100,000 in sales.³¹ The legislature also enacted Public Chapter 646, Acts of 2020, and Public Chapter 759, Acts of 2020, requiring marketplace facilitators—such as Amazon, eBay, and Etsy—that make or facilitate \$100,000 in sales in Tennessee to remit sales tax. See figure 6 for state and local sales tax collected by remote sellers and marketplace facilitators following the implementation of this legislation. While tax revenues typically decline during a recession, “collections performed much better during the COVID-19 recession and initial rebound than in previous economic downturns,”³² which may help keep projects fully funded and improve their prospects of completion.

Figure 6. State and Local Sales Tax Collected by Remote Sellers



Source: Tennessee Department of Revenue analysis of state and local taxes collected by marketplace facilitators (MPF) and remote sellers (RMS).

Despite a better than expected economic outlook for the state as a whole, economic recovery from the COVID-19-induced recession varies across different parts of the state and among different sectors of the state’s economy. The distribution of revenue collected from online sales differs from the distribution of revenue from in-person sales, and the shift to online sales “redirects the sales tax from the [urban areas] to the government the consumer lives in,” which tends to help local governments in rural and suburban parts of the state.³³ For example, sales tax revenue in Knox County declined approximately 5% from May 2019 to May 2020, while

³¹ Public Chapter 759, Acts of 2020.

³² Kessler et al. 2021.

³³ Kessler et al. 2021.

sales tax revenue in nearby Anderson County increased nearly 10% over the same period.³⁴ Furthermore, not all revenue streams have rebounded. According to the Tennessee Department of Tourist Development, the leisure and hospitality industry “remains the single largest source of lost sales and use tax revenue due to the COVID-19 pandemic.”³⁵ Leisure and hospitality sales and use tax collections declined by \$284 million between March and November 2020—a 26% decrease from the same period the previous year. But not all regions across Tennessee have been equally affected: “Tennessee’s urban tourism destinations continue to observe losses while rural tourism destinations have experienced growth since businesses reopened last summer.”³⁶ And local officials responding to the TACIR survey reported that improvements to parks and other natural areas are needed as more people in the community enjoyed outdoor recreation over other types of entertainment during the pandemic. Many of these trends might suggest a shift in consumer behaviors and infrastructure needs from urban to rural areas. However, it remains to be seen whether this will continue following the conclusion of the pandemic. And as TACIR discussed before in its 2016 staff report, *Just How Rural or Urban are Tennessee’s 95 Counties?*, the divide between urban and rural regions is often one of degree. Many rural communities sit within larger metropolitan areas, and the economies of rural communities are often more specialized than urban ones. If the current shift towards more rural areas continues into the longer term, it is difficult to predict how exactly it might affect infrastructure needs.³⁷

Another area of uncertainty for government revenues comes from the decline in gasoline and motor fuel taxes—the revenue from which is restricted for use on transportation projects—as more people worked from home, attended school virtually, and postponed vacations. In March 2020, gasoline tax revenue remained strong—increasing by \$6.8 million (12.36%) over 2019, while other motor fuel taxes increased by \$3.5 million (18.89%) over the prior year (see figure 7). However, by March 2021, gasoline tax revenue dropped by \$7.1 million from the March 2020 revenue—an 11.44% decrease, as other motor fuel tax revenue also dropped by \$896,887—a 4.02% decrease from 2020.³⁸

It remains to be seen whether shifts in consumer behaviors that may affect public infrastructure needs will continue.

³⁴ Ibid.

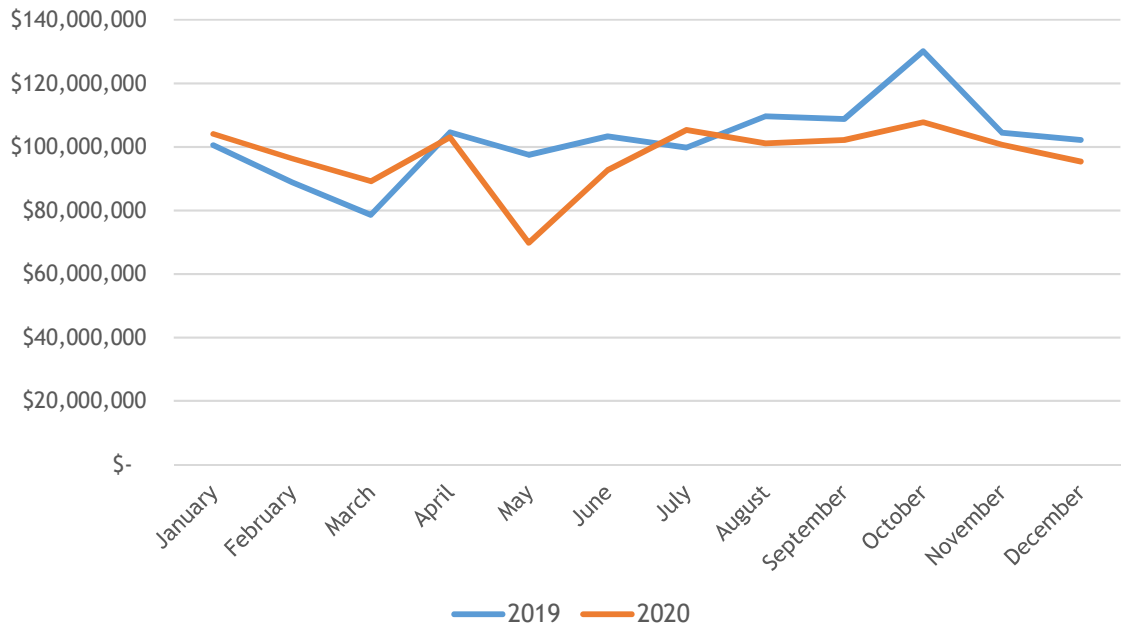
³⁵ Email from Ashley Fuqua, legislative liaison, Tennessee Department of Tourist Development, February 18, 2021.

³⁶ Email from Ashley Fuqua, legislative liaison, Tennessee Department of Tourist Development, February 18, 2021.

³⁷ Roehrich-Patrick and Moreo 2016.

³⁸ Tennessee Department of Revenue 2021.

Figure 7. Monthly Fuel Tax Collections, January 2019 to December 2020



Source: TACIR staff analysis of Tennessee Department of Revenue collections data.

Although the IMPROVE Act of 2017 phased-in increases to the state’s gasoline and motor fuel tax rates—from 20 and 17 cents per gallon, respectively, in fiscal year 2016-17, to 26 and 27 cents in fiscal year 2019-20³⁹—a continued trend in lower than projected fuel tax collections could have implications for sources of funding for transportation infrastructure projects going forward.

TACIR staff will analyze public infrastructure needs data collected during 2019 and 2020 to look for effects from the pandemic.

With the COVID-19 pandemic ongoing, it is uncertain whether or to what extent the pandemic will affect public infrastructure needs long-term. In the short term, the pandemic and resulting recession drastically changed the daily operations of many schools and businesses and shifted government revenue streams. An analysis of the public infrastructure inventory needs data collected during the pandemic will be presented in a follow-up report.

³⁹ Public Chapter 181, Acts of 2017.

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Appendix A: Year-to-Year Changes in Reported Needs by Project Type

Type of Infrastructure	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Transportation	3.4%	-0.1%	-2.3%	7.8%	-1.8%	14.8%	-5.2%	-0.9%	-0.9%	1.2%	8.3%	7.3%
Other Utilities	-3.2%	-0.1%	-58.2%	-9.6%	-27.9%	-0.9%	-3.3%	48.8%	63.8%	-6.5%	21.1%	-0.3%
Broadband	-5.9%	-0.4%	-3.5%	-3.8%	-3.1%	-3.8%	-2.9%	-0.7%	163.5%	-14.0%	-9.6%	-10.1%
Post-secondary Education	24.6%	-0.3%	-7.3%	-6.8%	2.2%	11.2%	-1.3%	4.1%	0.2%	-0.8%	1.7%	2.3%
School Renovations and Replacements	-9.7%	-2.0%	-0.5%	1.3%	0.2%	-2.9%	11.1%	12.2%	21.6%	75.5%	0.5%	-3.5%
New Public Schools and Additions	-13.9%	-2.8%	-2.1%	-8.5%	1.2%	-2.7%	-7.5%	33.7%	12.1%	31.1%	-5.1%	-10.2%
Other Education	129.4%	-0.4%	-29.3%	-18.5%	3.6%	42.7%	2.0%	-0.4%	3.6%	21.9%	-40.9%	7.8%
School-System-wide	-51.9%	17.1%	-13.8%	-42.9%	-17.0%	63.2%	-1.1%	81.2%	104.4%	-19.2%	-28.6%	-9.2%
Water and Wastewater	-2.4%	-4.4%	3.1%	-10.9%	-6.8%	-11.9%	4.8%	32.1%	9.4%	-4.8%	-2.0%	2.2%
Law Enforcement	2.6%	-8.0%	-13.8%	-28.5%	10.2%	-31.0%	-13.5%	-8.0%	45.7%	31.3%	-4.6%	-9.0%
Public Health Facilities	0.6%	9.2%	7.0%	-19.6%	-22.7%	25.7%	21.3%	-1.5%	-24.2%	30.4%	25.4%	-4.4%
Storm Water	-7.1%	-9.6%	-11.0%	-42.4%	-8.3%	-6.8%	94.3%	-4.9%	-5.2%	-3.6%	-58.1%	6.7%
Fire Protection	-13.6%	-1.6%	-17.7%	-4.9%	0.1%	-0.3%	-1.2%	4.2%	8.4%	0.5%	22.7%	4.1%
Solid Waste	-8.5%	-24.3%	-7.9%	-18.3%	5.7%	-7.9%	-16.9%	-18.5%	8.9%	26.6%	-2.4%	-0.1%
Housing*	-42.6%	-66.0%	-2.5%	-5.2%	-8.9%	-92.7%	70.5%	16,145.4%	21.9%	4.1%	-5.9%	-19.9%
Recreation	-6.4%	4.2%	-10.9%	-19.1%	0.8%	1.3%	-4.3%	23.6%	-3.2%	6.2%	4.1%	11.7%
Community Development	-7.6%	2.2%	-1.0%	14.5%	-15.8%	-7.6%	-30.0%	-8.3%	2.6%	-23.7%	30.5%	7.9%
Libraries, Museums, and Historic Sites	19.7%	3.5%	-2.4%	-5.0%	-4.1%	-5.6%	-10.0%	11.8%	6.0%	6.7%	1.3%	-27.9%
Business District Development	207.8%	23.7%	4.8%	-4.4%	-2.1%	-86.6%	-9.8%	28.1%	-17.7%	-2.5%	-13.4%	-33.8%
Industrial Sites and Parks	-1.6%	-5.4%	18.9%	-12.6%	6.1%	-8.9%	10.0%	-2.6%	-11.2%	-8.0%	-25.6%	6.7%
Public Buildings	-2.7%	-18.0%	-20.0%	2.7%	8.7%	20.1%	-12.3%	22.1%	9.9%	-3.4%	14.6%	78.8%
Other Facilities	3.5%	-20.1%	102.2%	-25.6%	0.3%	21.4%	-37.2%	44.2%	1.4%	-3.8%	23.7%	11.2%

*The 2015 increase in the housing project type reflects a change in reporting practices.

Appendix B: Survey Questions

The effects of social disruptions and economic downturns on public infrastructure needs

COVID-19 effects on public infrastructure needs

The original legislation establishing the Public Infrastructure Needs Inventory was passed in 1996 as Public Chapter 817. That Act gave the Tennessee Advisory Commission on Intergovernmental Relations (TACIR) responsibility for the inventory and directed the Commission to implement the inventory through contracts with the nine development districts across the state. This special research project will examine the historical rate at which project development progressed from the conceptual stage through future stages from 2007 through 2019. To the extent possible, the phase-one research will assess correlations between major social and economic events versus public infrastructure project development or project priorities (e.g., identifying any significant shifts in public infrastructure needs between categories). Examples include the 2007 – 2008 economic recession induced by the housing financial system collapse; the subsequent 2009 American Recovery and Reinvestment Act; the 2017 Improve Act; and the economic effects of the COVID-19 pandemic.

* 1. Please provide contact information for the person responding to this survey.

Your Name	<input type="text"/>
Title or Position and Department	<input type="text"/>
Name of Local Government	<input type="text"/>
Email Address	<input type="text"/>
Phone Number	<input type="text"/>

* 2. Please indicate the type of government that you represent.

- City
 Metropolitan Government
 County

The effects of social disruptions and economic downturns on public infrastructure needs

Agree or Disagree

There are 16 statements in this section. Indicate your degree of agreement or disagreement with each statement. For those statements where you have a brief example that illustrates the situation in your jurisdiction, you may provide an example if you wish.

* 3. Our local government completely re-prioritized the public infrastructure projects in our jurisdiction because of the COVID-19 pandemic.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please provide a brief example, if available.

* 4. The COVID-19 pandemic did not affect the priority of any of the public infrastructure projects in our jurisdiction.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

You may provide a comment, if you wish.

* 5. The COVID-19 pandemic created a significant need for new public infrastructure projects in our jurisdiction.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please provide a brief example, if available.

* 6. The COVID-19 pandemic did not generate any new public infrastructure needs for our jurisdiction.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

You may provide a comment, if you wish.

* 7. The COVID-19 pandemic had a significant effect on our local government budget.

- | | |
|--|---|
| <input type="radio"/> Strongly agree | <input type="radio"/> Disagree |
| <input type="radio"/> Agree | <input type="radio"/> Strongly disagree |
| <input type="radio"/> Neither agree nor disagree | |

Please provide a brief example, if available.

* 8. The COVID-19 pandemic did not have any effect on our local government budget.

- | | |
|--|---|
| <input type="radio"/> Strongly agree | <input type="radio"/> Disagree |
| <input type="radio"/> Agree | <input type="radio"/> Strongly disagree |
| <input type="radio"/> Neither agree nor disagree | |

You may provide a comment, if you wish.

* 9. The COVID-19 pandemic caused changes to the way our local government does business.

- | | |
|--|---|
| <input type="radio"/> Strongly agree | <input type="radio"/> Disagree |
| <input type="radio"/> Agree | <input type="radio"/> Strongly disagree |
| <input type="radio"/> Neither agree nor disagree | |

Please provide a brief example, if available.

* 10. The COVID-19 pandemic did not cause any changes to the way our local government does business.

- | | |
|--|---|
| <input type="radio"/> Strongly agree | <input type="radio"/> Disagree |
| <input type="radio"/> Agree | <input type="radio"/> Strongly disagree |
| <input type="radio"/> Neither agree nor disagree | |

* 11. Because of the COVID-19 pandemic, our jurisdiction changed the planned location of some public infrastructure projects.

- | | |
|--|---|
| <input type="radio"/> Strongly agree | <input type="radio"/> Disagree |
| <input type="radio"/> Agree | <input type="radio"/> Strongly disagree |
| <input type="radio"/> Neither agree nor disagree | |

Please provide a brief example, if available.

12. Our jurisdiction did not change the planned location of any public infrastructure projects because of the COVID-19 pandemic.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

You may provide a comment, if you wish.

* 13. The COVID-19 pandemic will not have any effect on the schedule to complete public infrastructure projects in our jurisdiction.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

You may provide a comment, if you wish.

* 14. The COVID-19 pandemic, will change the time required to complete some public infrastructure projects in our jurisdiction.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please provide a brief example, if available.

* 15. The COVID-19 pandemic has significantly changed the cost of public infrastructure projects in our jurisdiction.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please provide a brief example, if available.

* 16. The COVID-19 pandemic will not have any effect on the cost of public infrastructure projects in our jurisdiction.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

You may provide a comment, if you wish.

* 17. The COVID-19 pandemic has increased the need for technology in our public schools.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please provide a brief example, if available.

* 18. The COVID-19 pandemic has not changed the need for technology in our public schools.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

You may provide a comment, if you wish.

The effects of social disruptions and economic downturns on public infrastructure needs

Opinion

This final section has 11 questions. Provide your opinion in a short answer.

19. Has the COVID-19 pandemic had any significant effect on your local economy? Explain.

20. Has the COVID-19 pandemic had any significant effect on your local employment rate? Explain.

21. Has the COVID-19 pandemic had any significant effect on your local health care system? Explain.

22. Has the COVID-19 pandemic had any significant effect on your local school system? Explain.

23. Has any specific sector of your local economy been significantly affected by the COVID-19 pandemic? Explain.

24. Has the COVID-19 pandemic affected your local government budget or operations? Explain.

25. How does the effect of the COVID-19 pandemic in your community compare to past challenges (economic, natural disasters, or other events)? Explain.

26. Is there any action that the Tennessee General Assembly could do to assist your local government or community regarding COVID-19? Explain.

27. Is there any action that the executive branch of Tennessee government could do to assist your local government or community regarding COVID-19? Explain.

28. Is there any action that the federal government could do to assist your local government or community regarding COVID-19? Explain.

29. Is there anything else that you would like to share?

The effects of social disruptions and economic downturns on public infrastructure needs

Thank you!

Thank you for taking our survey. We will share your answers with the members of the Tennessee General Assembly.

Appendix C: Summary of TACIR Survey with Local Government Officials and Interviews with Public Entities

Tennessee Advisory Commission on Intergovernmental Relations (TACIR) staff surveyed city and county mayors to determine whether local governments in Tennessee anticipate the COVID-19 pandemic affecting infrastructure needs in their communities. The survey was conducted online between November 2020 and January 2021. To supplement the online responses, additional officials were selected based on the population and geographic location of their respective jurisdictions and interviewed via telephone. Officials from 82 cities, 43 counties, and two metropolitan governments completed the survey.

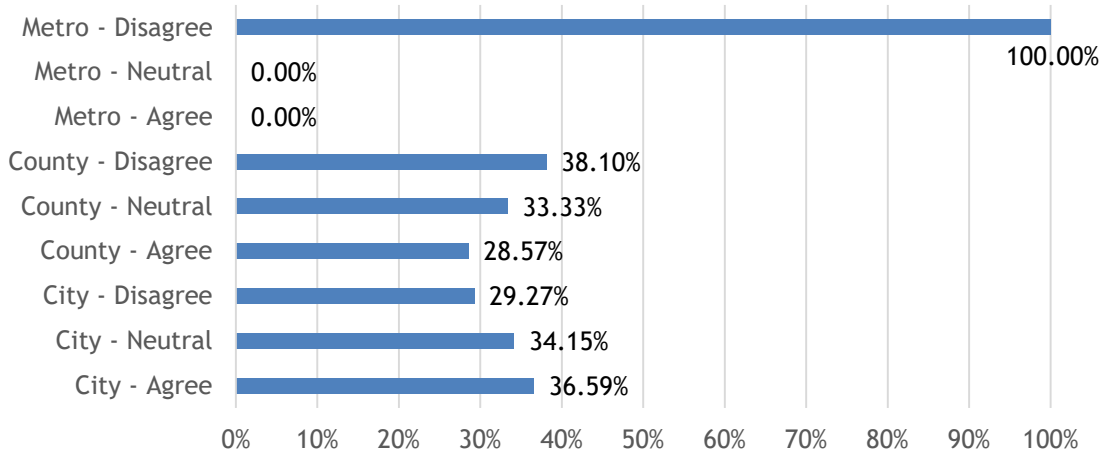
TACIR staff also interviewed representatives of state agencies, public universities and community colleges, and utility districts in February 2021 to determine whether the pandemic has affected their budgets, operations, or infrastructure needs.

Local Government Survey: Likert Scale Questions

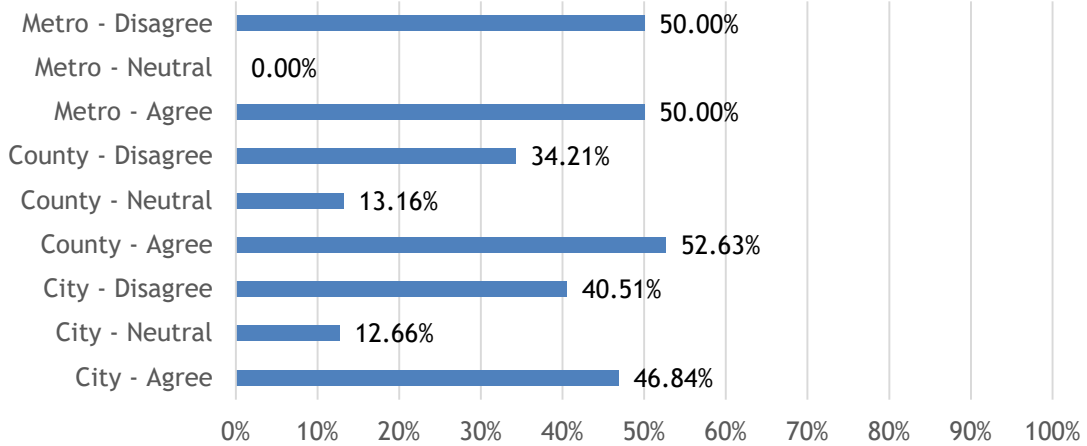
Prioritization of Projects

Both cities and counties were split in reporting whether they reprioritized public infrastructure projects because of the pandemic. Both metropolitan governments responding to the survey disagreed with the statement that their government completely re-prioritized their public infrastructure projects, but one indicated the pandemic had some effect on the prioritization of projects.

Our local government completely re-prioritized the public infrastructure projects in our jurisdiction because of the COVID-19 pandemic.

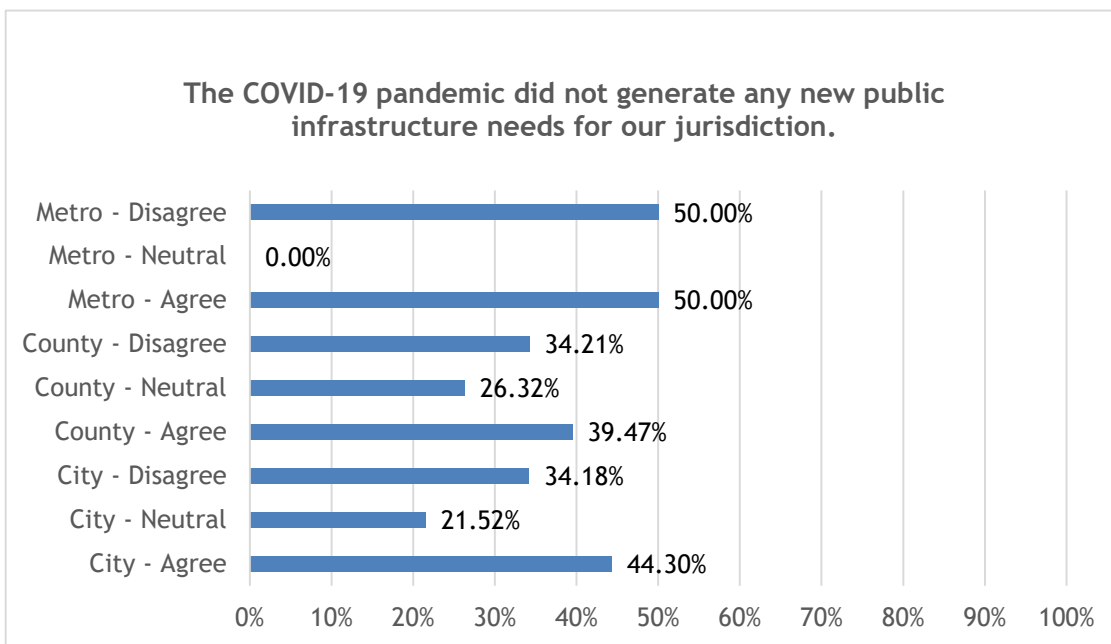
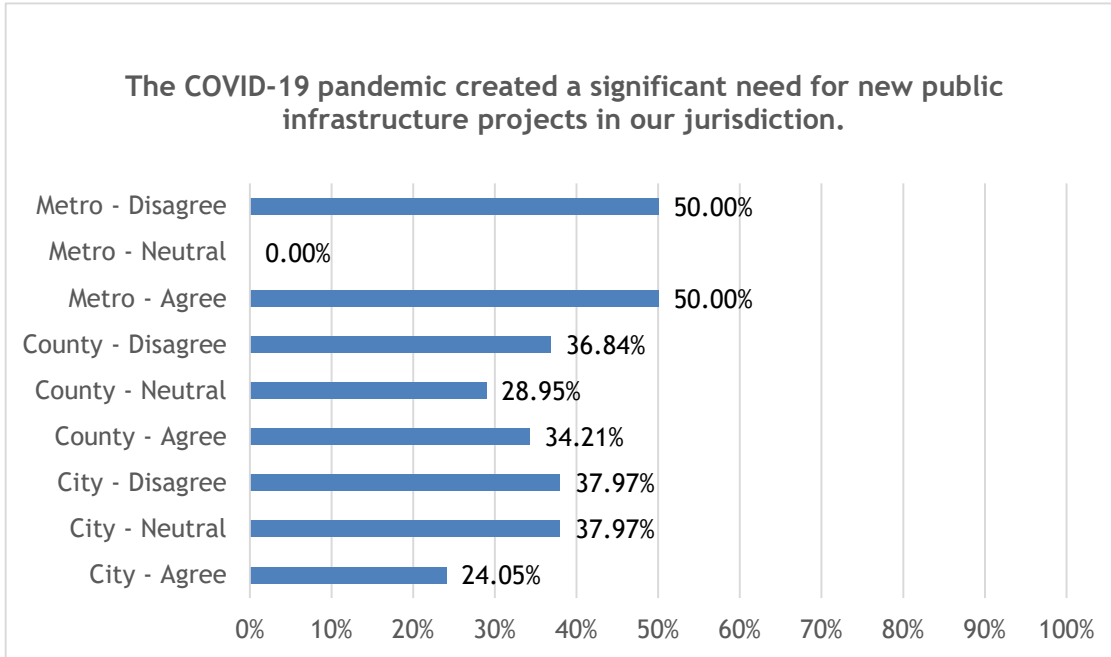


The COVID-19 pandemic did not affect the priority of any of the public infrastructure projects in our jurisdiction.



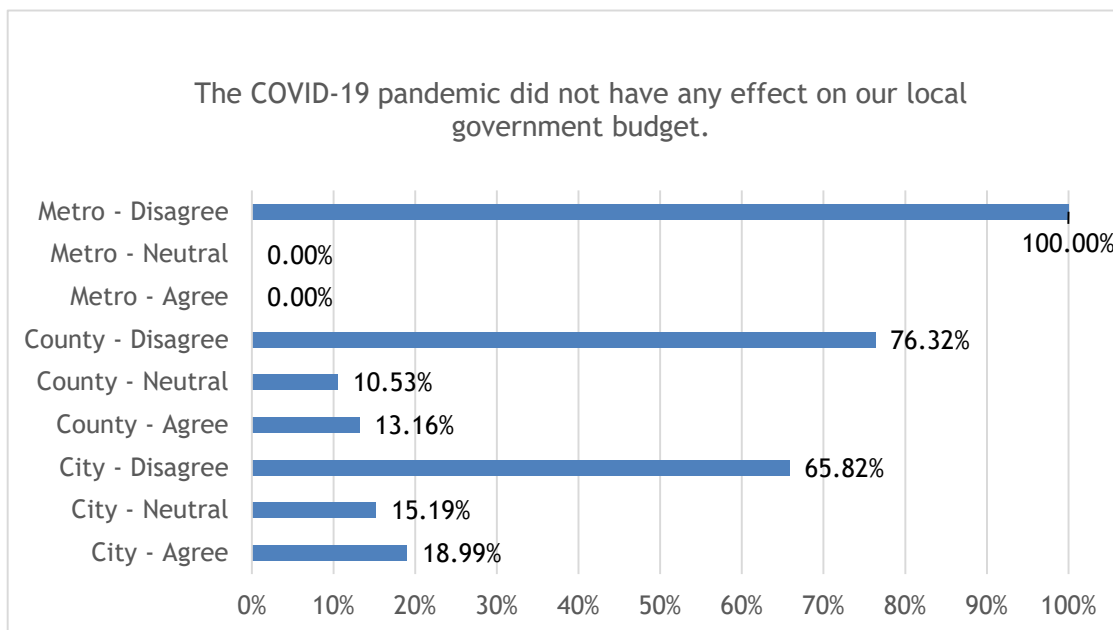
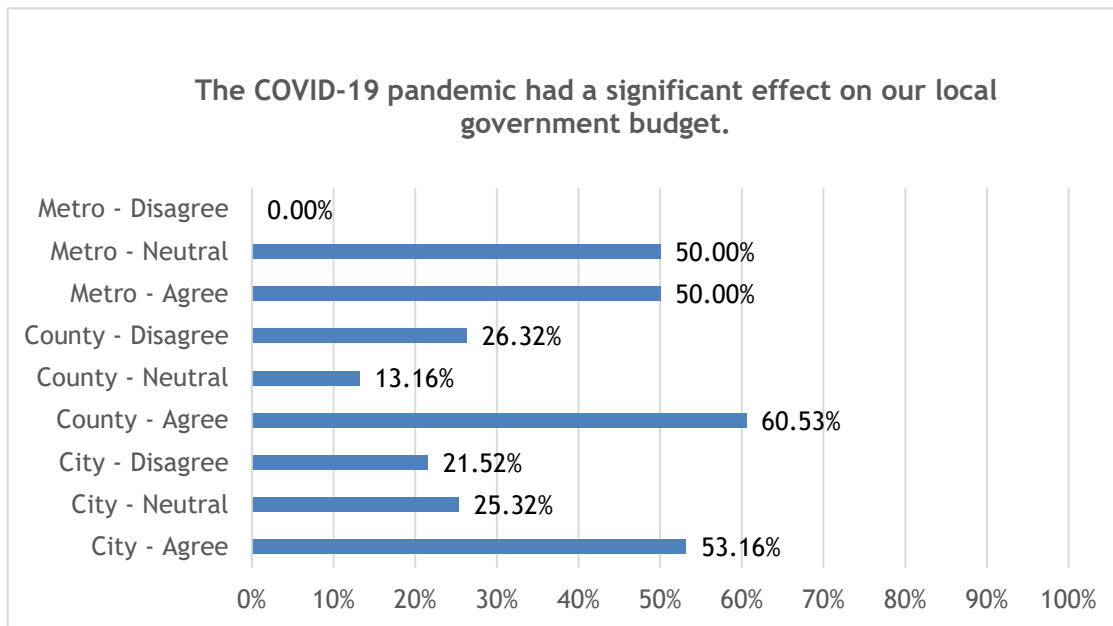
Need for New Projects

Both cities and counties were split in reporting whether the pandemic created a significant need for new infrastructure projects. Some respondents reported needing expanded broadband and new facilities designed to accommodate social distancing measures. One respondent’s jurisdiction added a pedestrian connector to accommodate an increase in the number of parents working from home who walked their children to school.



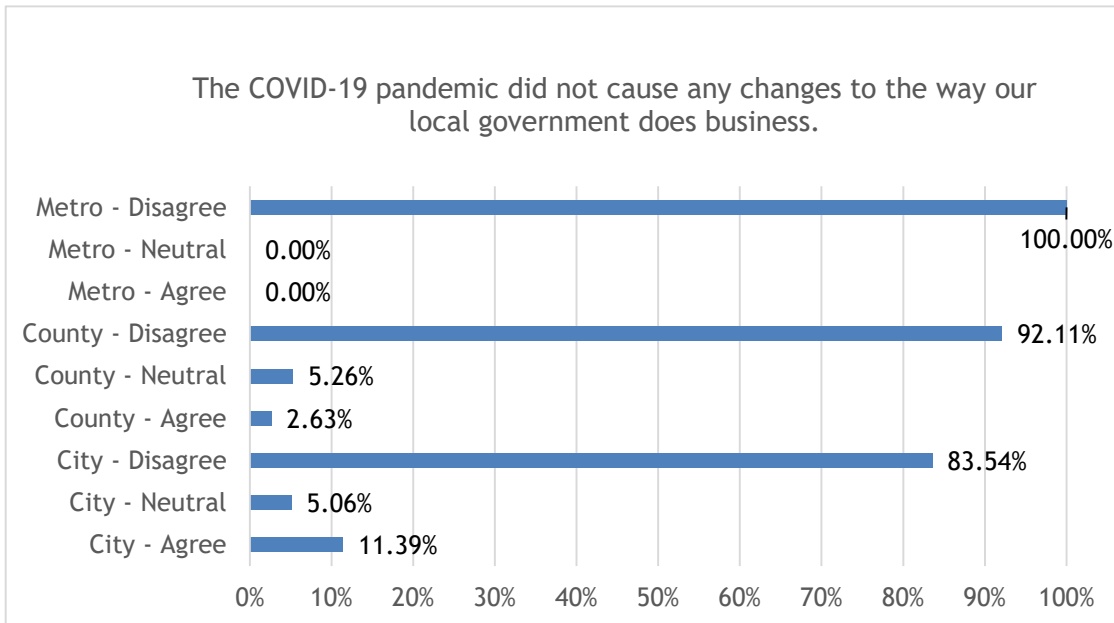
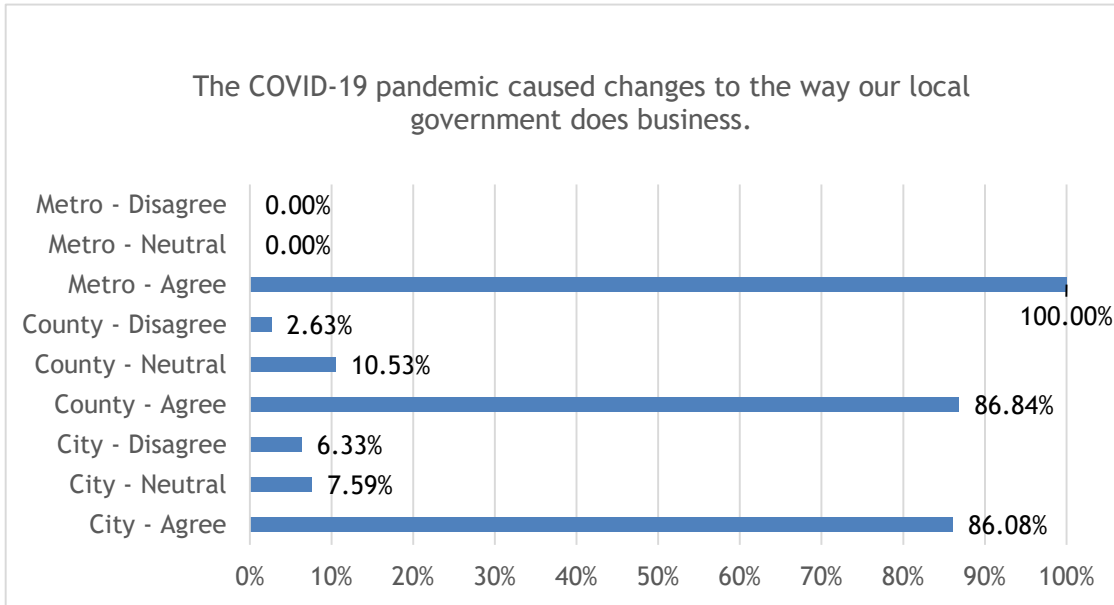
Local Government Budget Effects

A slight majority of cities (53.16%) and most counties (60.53%) agreed that the pandemic had a significant effect on their local government budgets. In the open-ended questions, respondents noted that some revenues are down (e.g., gas tax, payments for housing state prisoners, court fines, and fees) while other revenue sources, such as sales tax collected from online sales, were up. Respondents also said they experienced increased expenses to acquire personal protective equipment (PPE) and cleaning supplies and to transition to virtual work.



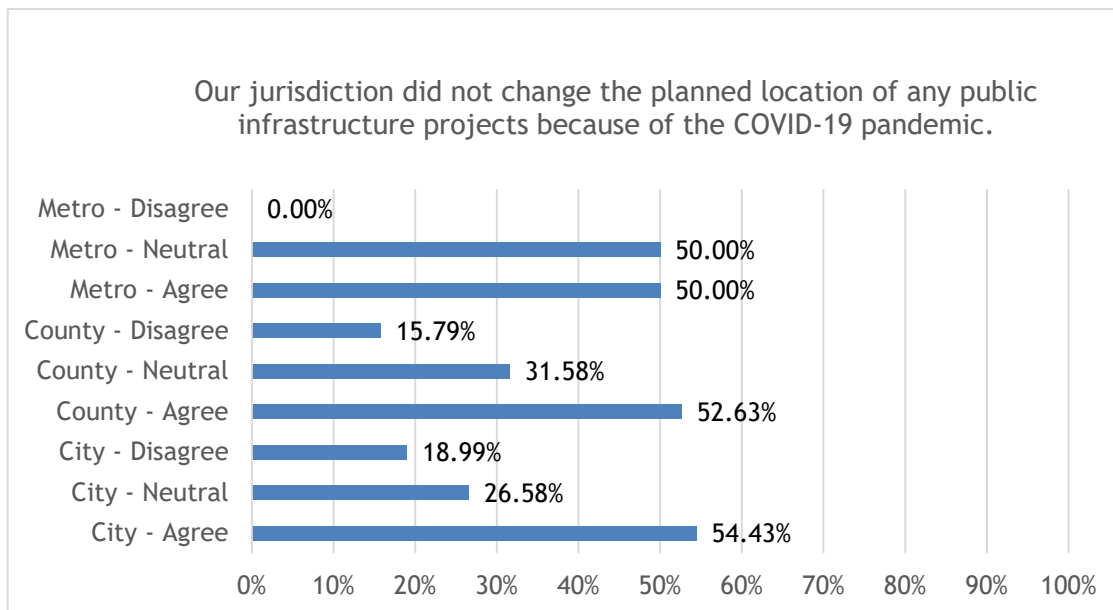
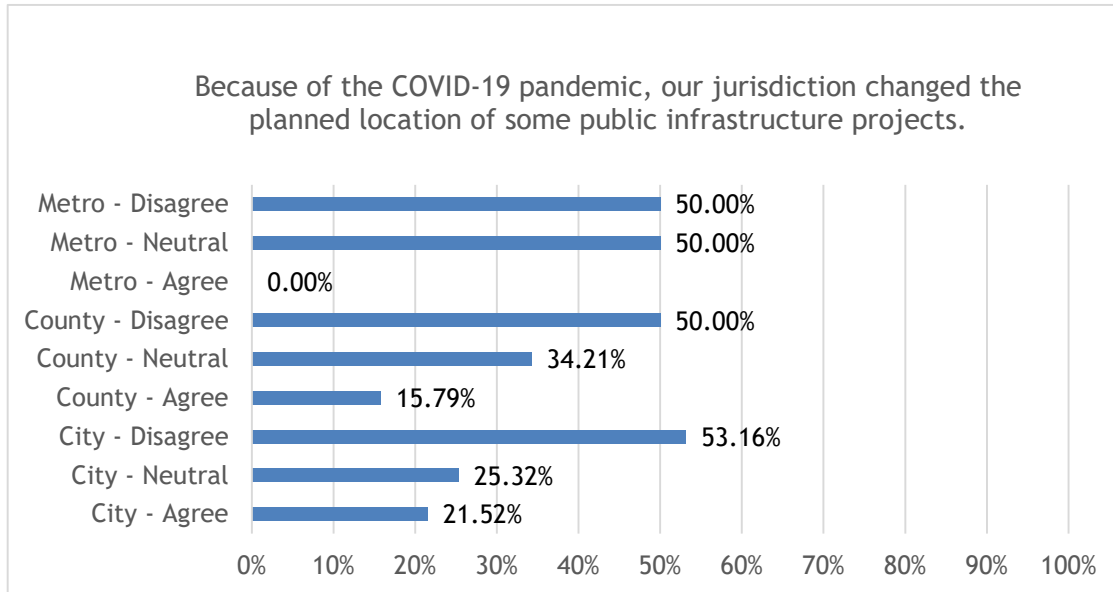
Operational Changes

Most cities (86.08%) and counties (86.84) agreed that the pandemic caused changes in how their local government does business. Respondents identified changes in operations such as holding virtual meetings, limiting access to public facilities, increasing the use of online and drive-through services, and implementing other modifications that allow for social distancing.



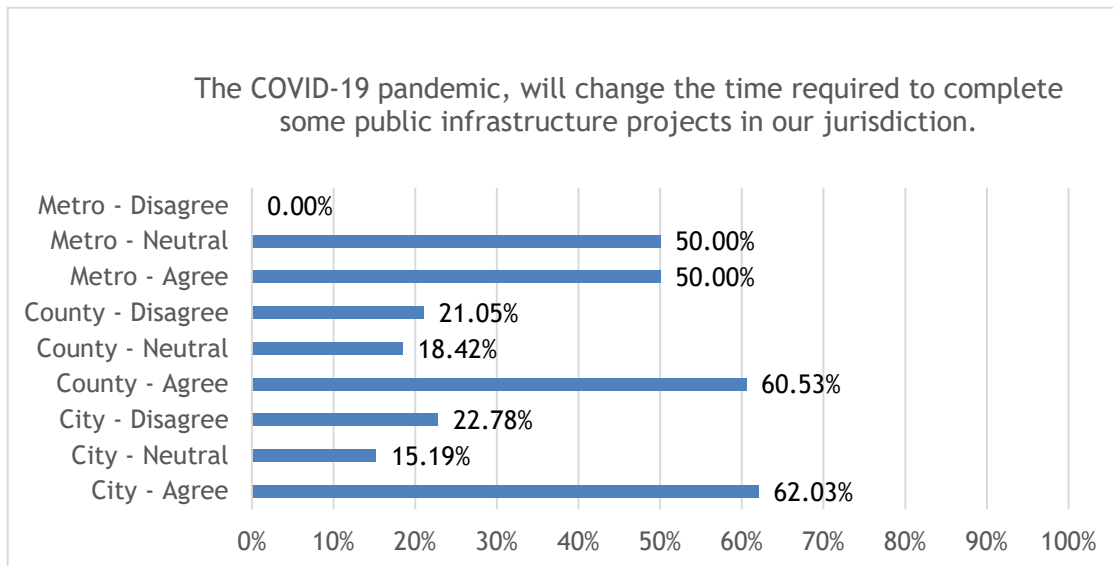
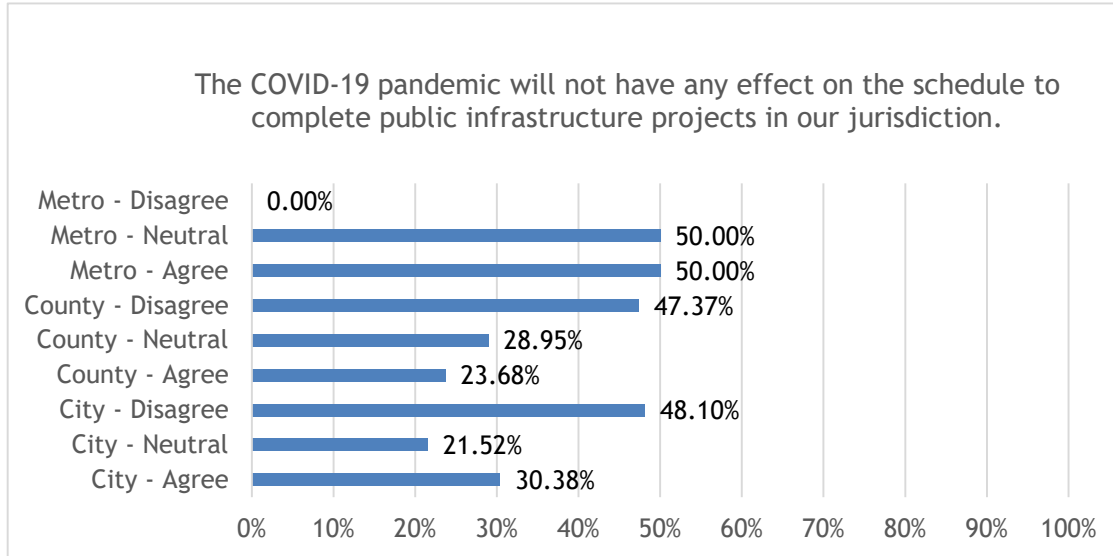
Planned Location of Infrastructure Projects

Only 21.52% of cities and 15.79% of counties said their jurisdiction changed the planned location of infrastructure projects because of the pandemic.



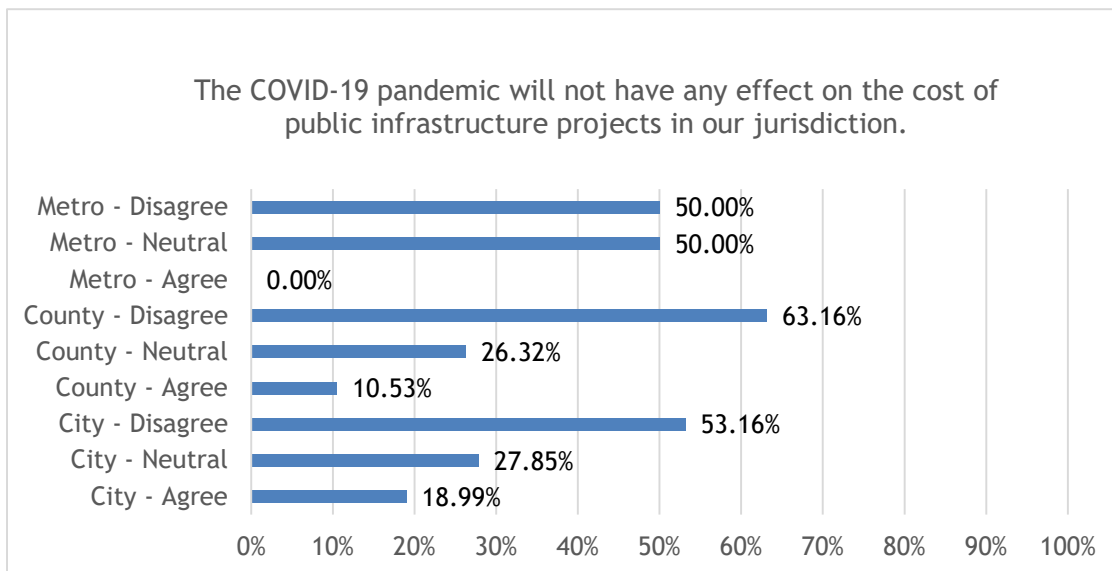
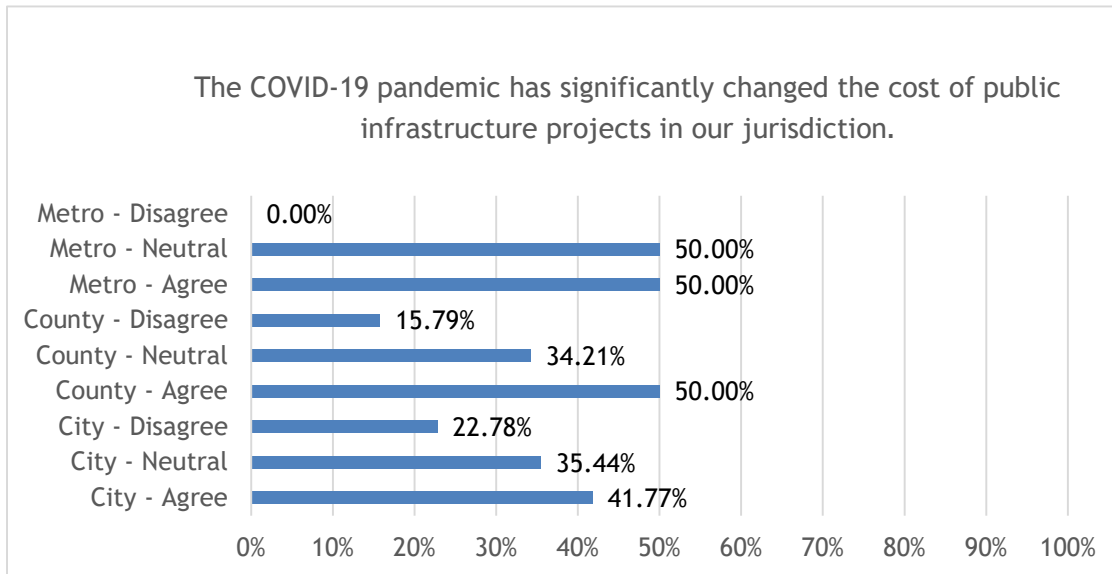
Schedule to Complete Infrastructure Projects

Most cities (62.03%) and counties (60.53%) agreed that the pandemic will change the time required to complete some infrastructure projects. Numerous respondents said some projects were delayed because of supply chain issues and because of new safety and quarantine protocols for staff and contractors. For example, one mayor said a new facility took three months longer to complete than projected because only one contractor was allowed in the facility at a time.



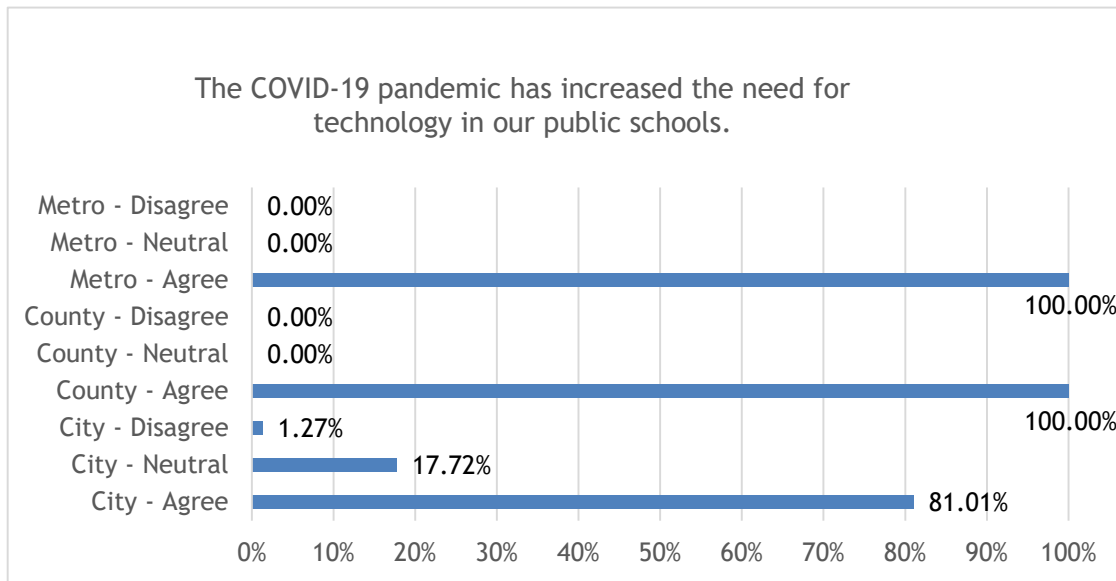
Cost to Complete Infrastructure Projects

Most cities (53.16%) and counties (63.16%) disagreed with the statement that the pandemic will not have any effect on the costs of public infrastructure projects in their jurisdictions, but a lower percentage of cities (41.77%) and counties (50%) agreed that the pandemic has significantly changed the costs of projects. Nearly every official choosing to elaborate on their response noted that the price of building materials increased for some public infrastructure projects.



Public School Technology Needs

Every official surveyed whose city or county operates a school system indicated that the pandemic has increased the need for technology for public schools, such as computers and other electronic devices. The officials who responded to this question with “neither agree or disagree” or with “disagree” do not represent a jurisdiction that operates a school system.



Local Government Survey: Open-ended Questions

Has the COVID-19 pandemic had any significant effect on your local economy? Explain.

Theme Tag	Percentage
Economic Downturn	20.19%
Economy Improved	14.42%
Economy Stable	25.96%
Social/Operational Disruptions	2.88%
Specific Economy Sectors Affected	36.54%

36.54% of officials surveyed identified specific sectors of their local economies that were affected by the pandemic. Respondents said restaurants and other hospitality businesses were primarily affected, but some other small businesses had to close. 20.19% of respondents indicated a downturn in their local economy from slightly decreased sales tax revenue, increased unemployment, and increased expenses to procure personal protective equipment and cleaning supplies. 14.42% of respondents indicated that their local economy improved. Of the 25.96% respondents indicating that the economy was stable, some noted that decreases in other areas of the economy were offset by increases in sales tax revenue from local shopping and online sales. Other respondents said the effects of social and operational disruptions were not as bad for their local economies as anticipated and that they are recovering from initial shutdowns.

Has the COVID-19 pandemic had any significant effect on your local employment rate? Explain.

Theme Tag	Percentage
No - stable	33.33%
Yes - moderate	20.00%
Yes - negative	37.14%
Yes - specific sectors	9.52%

Most local officials surveyed agreed that the pandemic has had a significant effect on their local employment rate. 37.14% of respondents said the pandemic has negatively affected employment, noting that their unemployment rates have not fully recovered in part because of business closures. 20% of respondents indicated that the pandemic moderately affected employment. These respondents said their jurisdictions experienced a significant effect on employment initially, but unemployment rates have recovered to varying degrees with help from federal aid. 9.52% of respondents highlighted specific sectors of the economy for which employment was affected. 33.33% of officials surveyed – primarily representing small cities – indicated either that they were unsure of the pandemic’s effect on their jurisdiction’s employment or that the effect was minimal.

Has the COVID-19 pandemic had any significant effect on your local health care system? Explain.

Theme Tag	Percentage
No -health care stable	16.67%
Yes - health care affected	83.33%

Most officials surveyed (83.33%) said the pandemic significantly affected their local health care systems. These respondents highlighted the strain put on their health care systems, especially on hospitals and local health departments. They said the pandemic has created employee burnout and medical supply shortages. 16.67% of respondents did not indicate that the pandemic significantly affected their local health care system, and some of these respondents said their systems were maintaining well despite some staffing issues.

Has the COVID-19 pandemic had any significant effect on your local school system? Explain.

Theme Tag	Percentage
No - school system stable	4.21%
Yes - school system affected	95.79%

95.79% of local officials surveyed indicated that the pandemic significantly affected their school system. Respondents identified several factors that affected schools, including hybrid and remote learning, implementing contact tracing and quarantine protocols, increased demand for technology, and meeting the needs of students remotely. Only 4.21% of local officials indicated that the pandemic has not significantly

affected their school system, noting that hybrid models allowed their schools to continue with in-person learning for some students.

Has any specific sector of your local economy been significantly affected by the COVID-19 pandemic? Explain.

Most local officials surveyed said the service sector of their economies was significantly affected by the pandemic. Respondents specifically identified the following industries and within the service sector: hospitality, tourism, entertainment, beauty and wellness, and healthcare.

Has the COVID-19 pandemic affected your local government budget or operations? Explain.

Theme Tag	Percentage
No - stable	37.50%
Yes - negative	45.19%
Yes operational	10.58%
Yes - positive	6.73%

Most local officials surveyed indicated that the pandemic has affected their local government or operations. 45.19% of respondents indicated the pandemic has negatively affected their budget or operations, particularly regarding decreased revenue from gas tax collections, court fines and fees, and compensation for housing state prisoners. However, 6.73% of respondents indicated that the pandemic has positively affected their budget or operations, noting growth in sales tax revenue. Changes to local government operations, such as expanding online services and creating alternative work schedules for employees, were identified in responses from 10.58% of officials surveyed. 37.5% of local officials indicated that their budgets and operations were not affected by the pandemic at the time of the survey. Some of these respondents highlighted the uncertainty of revenue projections but said federal relief funding has helped to offset budget effects caused by the pandemic.

How does the effect of the COVID-19 pandemic in your community compare to past challenges (economic, natural disasters, or other events)? Explain.

Many local officials surveyed said the pandemic’s reach is unprecedented in terms of location and duration. One respondent said, “natural disasters have boundaries and typically are isolated to a portion of the impacted community,” and another respondent

noted that “most natural disasters are relatively short-lived.” Officials also explained that the pandemic differs from past challenges in terms of the types of effects experienced: “In addition to the loss of life, the stress on the health care system, and the intangible impact on things like mental health, it has caused considerable economic distress which we expect to continue.”

Officials surveyed indicated that they know how to prepare for and respond to natural disasters, but “guidance on proper steps to take [to respond to the pandemic are] constantly changing.” Furthermore, respondents noted that the pandemic differs from past challenges because of the politicization of the pandemic.

Is there any action that the Tennessee General Assembly could do to assist your local government or community regarding COVID-19? Explain.

Local government officials suggested actions that the Tennessee General Assembly could take to assist their communities regarding the pandemic. These actions include, but are not limited to, providing financial assistance to businesses affected by the pandemic, providing financial assistance to local governments to offset costs associated with responding to the pandemic, providing additional funding for public schools, increasing investments in broadband, and allowing for the continued use of virtual meetings to conduct government business. However, some responses were mixed. For example, some respondents expressed interest in continuity across the state for some policies, such as those relating to masks and those applicable to health departments, whereas other respondents expressed interest in ensuring local control over responses to pandemic-related issues. Along those lines, one official suggested reviewing and clarifying the statutes regarding local government authority to respond to a pandemic.

Is there any action that the executive branch of the Tennessee government could do to assist your local government or community regarding COVID-19? Explain.

Local officials’ responses regarding actions the executive branch of the Tennessee government mirrored those provided for the legislative branch. Respondents’ suggestions primarily concerned the provision of additional financial assistance, guidance concerning masking policies, and the availability of vaccines.

Is there any action that the federal government could do to assist your local government or community regarding COVID-19? Explain.

Respondents to the survey indicated that additional federal funding for broadband, road improvements and other infrastructure, and small businesses would be helpful. Local officials also highlighted the need to make vaccines and personal protective equipment widely available.

Interviews with Tennessee Public Entities

We interviewed representatives for state agencies (TDEC, TDOT, TDTD, F&A, DGS), public universities and colleges (APSU, UT, TTU, ETSU, MTSU, TSU, CSCC, NSCC), and utility districts (TAUD and COT) that are captured in PINI to determine if the pandemic has affected their operations, budgets, or infrastructure needs and projects.

Did the COVID-19 pandemic cause operational changes in the way your organization does business?

Employees and students who could work remotely generally did so with continued productivity. Some processes slowed down but most were able to adapt using technology alternatives. For those whose jobs did not allow for remote work, there has been an emphasis on enhanced cleaning, personal protective equipment, and measures to keep staff groups small and socially distanced. Community colleges noted that screening visitors and conducting contact tracing requires a lot of manpower. Water and sewer utilities took more drastic steps to keep mission-critical employees safe, such as having employees live in RVs on-site or having employees work two-week shifts. Productivity continued under new safety protocols but was negatively affected when staff were required to quarantine.

Has the COVID-19 pandemic affected the public demand or use for your organization's services or facilities?

Almost all respondents reported some shift in services or facility use. Universities and colleges reported a reduction in facility use because of classes being held online and events being canceled but also noted a greater need for larger lecture halls, auditoriums, and outdoor facilities for social distancing purposes. One college noted that its facilities are being used by the county health department for COVID-19 screening and vaccinations and by non-governmental organizations for food distribution. TDEC reported an increase in public park use, TDOT reported a reduction in traffic volume that is beginning to return, TAUD reported an increase in utility use for systems with a large residential base and a decrease for systems with large commercial and industrial bases, F&A reported increased demand for STS services to support remote work and increased coordination among state agencies and numerous F&A divisions to facilitate the appropriate use and accounting of federal resources, and DGS reported a sharp increase in the demand for janitorial services and PPE and has begun working with state agencies to plan for a reduction in their real estate needs.

Did the COVID-19 pandemic affect your organization's budget?

Almost everyone interviewed reported the pandemic affecting their organization's budget. Responses included reduced budgets to conserve funds, fee waivers reducing revenue, and increased costs for pandemic response measures. However, respondents

also noted revenue increases in some cases and the use of reserves or federal funding to make up for lost revenue in other cases.

Has your organization re-prioritized its public infrastructure projects because of the COVID-19 pandemic?

Most respondents said that the prioritization of their infrastructure projects did not change. The remaining respondents said changes were minor due to uncertainty at the beginning of the pandemic.

Did the COVID-19 pandemic affect the cost or schedule of your organization's public infrastructure projects?

Responses were mixed, but many respondents indicated that the cost of materials has risen and that it is taking longer to receive materials.

Did the COVID-19 pandemic create a need for new public infrastructure projects or technology needs at your organization?

State agencies and higher education respondents emphasized the technology infrastructure needs created by the pandemic. Universities and colleges identified additional needs for creating research lab spaces that conform to COVID safety protocols and for improved HVAC systems for better air quality. Utility districts did not identify any new infrastructure or technology needs resulting from the pandemic.