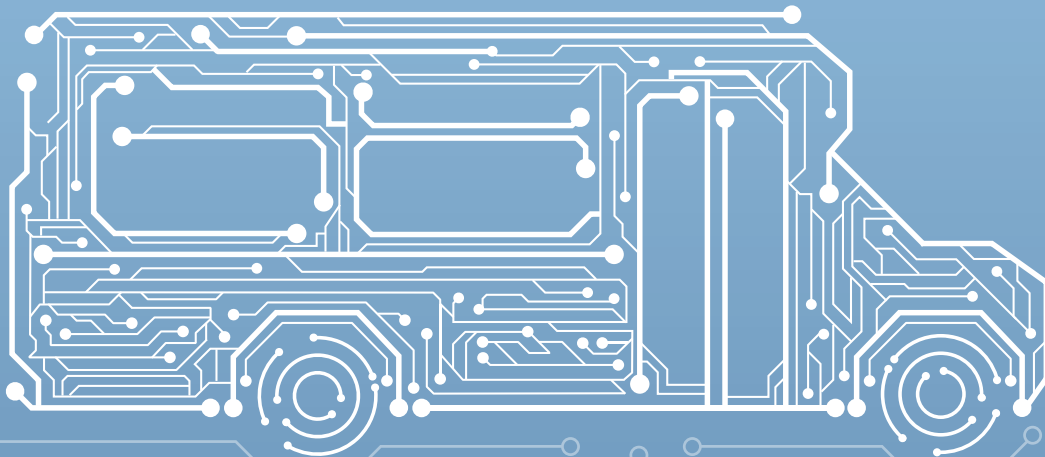# Statewide Technology Plan

for Rural Public Transit Agencies **2022**

Contributors

Steering Committee

Kevin Wassom, MDOT

Janet Geissler, MDOT

Aaron Stahl, Cadillac/Wexford Transit Authority

MDOT Project Team

Jean Ruestman, MDOT

Andy Brush, MDOT

Ellen Kent, MDOT

Project Consultants

Jeremy Papuga, HNTB

Alex Kavanaugh, HNTB

Elias Fischer, HNTB

Jeff Feeney, HNTB

Matthew Junak, HNTB

Olivia Finkelstein, HNTB

Alexandra Horst, HNTB

Donavan Snow, HNTB

Matt Webb, TransPro

Katie Jurenka, TransPro

HNTB Prepared by HNTB Corporation.

Table of Contents

List of Acronyms & Abbreviations

5310	Section 5310 Enhanced Mobility for Seniors and Individuals with Disabilities
5311	Formula Grants for Rural Areas
ADA	Americans with Disabilities Act
ADAS	Advanced Driver Assistance Systems
APC	Automatic Passenger Counter
AVL	Automatic Vehicle Location
BATA	Bay Area Transit Authority
CAD	Computer-Aided Dispatch
CAWS	Collision Avoidance Warning Systems
CNG	Compressed Natural Gas
ConOps	Concept of Operations
DATA	Delta Area Transit Authority
DDOT	Detroit Department of Transportation
DICSA	Dickinson Iron Community Services Agency
DTMB	Department of Technology, Management & Budget
EUPTA	Eastern Upper Peninsula Transportation Authority
FTA	Federal Transit Administration
GPS	Global Positioning Systems
GTFS	General Transit Feed Specification
HR	Human Resources
HTC	Huron Transit Corporation

IIJA	Infrastructure Investment and Jobs Act
IT	Information Technology
Low/No	Low- and No-Emissions
MaaS	Mobility as a Service
MASSTrans	The Michigan Association of Transportation Systems
MDOT	Michigan Department Of Transportation
MDT	Mobile Data Terminals
MM2045	Michigan Mobility 2045
MOD	Mobility On Demand
MPTA	Michigan Public Transit Association
MTA	Mass Transportation Authority
N-CATT	National Center for Applied Transit Technology
NCCIC	National Cybersecurity and Communications Integration Center
NEMT	Non-Emergency Medical Transportation
NIST	National Institute of Standards and Technology
NTD	National Transit Database
NTI	National Transit Institute
OPT	Office of Passenger Transportation
PTIMS	Public Transportation Information Management System
PTMS	Public Transportation Management System
RCTA	Roscommon County Transportation Authority
RFI	Request for Information
RFID	Radio-Frequency Identification
RFP	Request for Proposals
RTAP	National Rural Transit Assistance Program
RTTC	Rural Transit Technology Committee
SDNT	Service Development and New Technology Program
SMART	Suburban Mobility Authority for Regional Transportation
SMS	Short Message Service
TAM	Transit Asset Management
TCRP	Transit Cooperative Research Program
TNC	Transportation Network Company
TSP	Transit Signal Priority
UPCAP	Upper Peninsula Commission for Area Progress
VPI	Virtual Public Involvement
VPN	Virtual Private Networks

MDOT Michigan Department of Transportation
OFFICE OF PASSENGER TRANSPORTATION

Statewide Technology Plan
for Rural Public Transit Agencies 2022

Executive Summary

Introduction

The Michigan Department of Transportation (MDOT) Office of Passenger Transportation (OPT) *Statewide Technology Plan for Michigan Rural Public Transit Agencies* sets a shared vision and goals to guide investment in and the implementation of technologies that can improve transit service in rural areas across the state. Rural public transit agencies deliver essential services to their communities by providing access to jobs, schools, medical services, shopping, and many other destinations.

OPT administers federal and state funding programs that support public transit throughout Michigan. In addition to funding, OPT provides capital and operating technical assistance and oversight to over 135 urban and rural public transit agencies, rideshare and vanpool providers, and marine passenger service operators. OPT's role will be critical to ensuring that rural public transit agencies have the resources needed to upgrade existing technologies and deploy new ones.

This plan concludes with 37 recommended initiatives, including six priority initiatives.

AVERAGE ANNUAL TRIPS:
93,184

AVERAGE SERVICE AREA:
620 SQUARE MILES

AVERAGE FLEET SIZE:
20

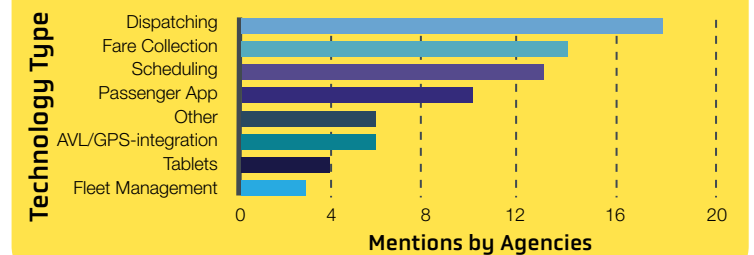Figure E-1: Michigan Rural Transit Agency Characteristics.

State of the System

Technology plays a critical role in helping public transit agencies provide efficient and effective service, and can make it easier for riders or their caregivers to plan and schedule trips. How agencies use technology and their preparedness to implement new technologies varies across each agency. In the fall of 2021, OPT conducted the *Transit Technology Assessment Survey* to gain an understanding of how rural agencies use technology, and what their technology needs are. Sixty-one agencies responded to the survey, including all 57 rural public transit agencies and four organizations that provide transportation service in rural areas.
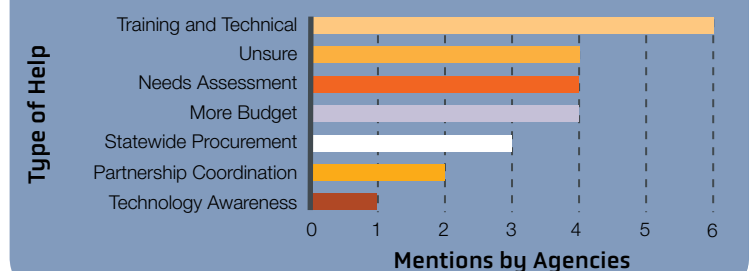
All of these agencies provide demand-response service, where riders schedule trips in advance and agencies pick up riders and drop them off at their destinations. Some agencies provide additional services, including fixed-route bus service (local bus service, shuttle service, regional and commuter service, and deviated route service), and non-emergency medical transportation (NEMT). One agency also provides ferry service.

Figure E-1 provides general Michigan rural transit agency characteristics. Figure E-2 provides a snapshot of survey responses, including technology needs and how respondents rated their comfort with technology and that of their agencies and riders. Based on responses, agencies were categorized into four technology readiness levels, which are used to guide recommendations and the level of support agencies may need to implement them.

TECHNOLOGY TYPES WITH THE GREATEST IMPACT ON OPERATIONS

Technology Type: Dispatching, Fare Collection, Scheduling, Passenger App, Other, AVL/GPS-integration, Tablets, Fleet Management

Mentions by Agencies (0, 4, 8, 12, 16, 20)

AGENCIES NEED HELP WITH....

Type of Help: Training and Technical, Unsure, Needs Assessment, More Budget, Statewide Procurement, Partnership Coordination, Technology Awareness

Mentions by Agencies (0, 1, 2, 3, 4, 5, 6)

HOW TECH-SAVVY IS THE GENERAL PUBLIC AND TRANSIT AGENCIES?
Out of a 10 point skill rating, survey results showed that on average respondents...

rated their agencies **5.4**

rated themselves **7.2**

rated their riders **4.3**

HOW AGENCIES APPROACH EMERGING TECHNOLOGIES:

31 agencies
Interested if presented with the right solution

24 agencies
Continuously evaluate ways to implement new technology

3 agencies
Other

2 agencies
Do not have the time

Figure E-2: Rural Transit Agency Needs.

Key Trends & Opportunities

Online/app-based fares, trip planning, & trip booking

Real-time travel information & updates

Low- & no-emission vehicles

Tools to track fleet & asset management

Increased need for cybersecurity

Figure E-3: Key Trends.

Trends, Opportunities, & Peer Review

Changes in technology happen quickly. As part of this plan, MDOT looked at broad technology trends in the transit industry to understand which technologies are currently being used and what changes are expected in the coming years. Not all transit technology trends are applicable to rural agencies, which typically serve lower density areas and use smaller vehicles. Key trends and opportunities are listed in Figure E-3.

Introducing new technologies, can be a challenging process. MDOT conducted a peer view to learn about challenges and lessons learned from other departments of transportation and local and national transit agencies. This review was carried out through interviews with peer agency staff and a literature review. Lessons learned informed goal and objective setting and identifying initiatives, and will also be critical to consider when deploying projects. Lessons learned include:

- Consortium approaches can help agencies pool resources to implement technology projects across regions or the state, while meeting individual agency needs.
- Training is critical. Agencies should ensure robust training and onsite vendor support are included in any technology purchases.
- Flexible and phased implementations can help agencies adapt to new technologies and build on them.
- Implementation and training strategies cannot be one-size-fits-all and should be tailored to agencies' unique needs and capabilities.
- Clear communication, marketing, and rider training are critical for outward-facing technologies to succeed and can help build rider trust in technologies and services.

As individual projects are planned, MDOT and transit agency staff should reach out to peers who have completed similar projects to gain their perspective on what worked and how the process or technology could have been improved.

Goals, Objectives, & Initiatives

MDOT's OPT and Michigan's rural transit agencies all strive toward a common mission: to help people move. In support of this mission, the project team and steering committee identified six goals, each of which includes objectives and performance indicators. Goals and objectives will guide investment and implementation of technologies that will help improve public transit and set a shared strategy for future transit technology use across rural transit agencies. Within each objective are recommended initiatives that will help OPT and transit agencies achieve these goals. Technology goals are listed in Figure E-4.

Initiatives outline key actions that MDOT and rural transit agencies can take to implement projects that will help advance goals and objectives. This plan includes 37 recommended initiatives and an overview of the next steps required to complete them. OPT, transit agencies, and industry associations should work together to implement these initiatives. Individual agencies should assess their needs and seek collaborative approaches to implementing initiatives when feasible.

Figure E-4: Technology Goals & Objectives.

1 Education
Promote uniform baseline technological literacy across transit agencies to strengthen capacity for current and future technologies.

2 Efficiency
Utilize technology solutions to optimize operations.

3 Mobility
Enhance access to mobility services for rural transit users to improve the quality of life in rural communities.

4 Safety & Security
Support the safety and security of the rural transit network for all users.

5 Partnerships
Strengthen, expand, and promote collaboration between agencies, MDOT, and vendors for the benefit of rural transit riders.

6 System Condition
Increase the resilience and reliability of the public transit system by supporting a state of good repair on transit assets.

Priority Initiatives

Given funding and capacity realities, it is unlikely that MDOT and the state's rural transit agencies will be able to carry out all, or even most of the initiatives identified in this plan. To determine which initiatives MDOT and transit agencies should prioritize, they were ranked against each other based on the following criteria: cost, the number of groups that benefit (MDOT, Transit Agencies, Riders, and the General Public), the number of readiness levels able to participate, the number of goals they address, whether or not they can be implemented immediately, and whether or not they support integration with other technologies. All of the initiatives can be found in Chapter 7. The prioritized list should be considered alongside individual agency needs.

Six initiatives are recommended as priorities based on input from MDOT and transit agencies and a ranking described later in this chapter. Five of these initiatives are the top five ranked, and one, providing information technology support to all agencies, was identified by MDOT as critical to achieving the other initiatives.

Establish a statewide Rural Transit Technology Committee

The Rural Transit Technology Committee (RTTC) would provide a forum for MDOT and agencies to stay up to date on new and trending technologies. The committee would identify technology and training needs, organize vendor presentations, attend industry conferences, discuss challenges and lessons learned, track trends, and foster peer exchanges between Michigan's transit agencies and agencies across the country. The committee would play a key role in implementing technology initiatives by selecting projects, identifying champions and opportunities for collaboration, and coordinating pilots and funding. MDOT would lead the establishment of a committee and solicit agency participation.

Develop an online resource library with information and trainings on current, new, trending, and advanced technologies

Developing resources to help agencies stay up to date on new and trending technologies will ensure agencies are able to adapt to new standards and deliver services as efficiently as possible. An awareness of new technologies will help agencies understand how technologies can be leveraged to address existing challenges and provide a high-quality rider experience. MDOT, the Michigan Public Transit Association (MPTA), or the Michigan Association of Transportation Systems (MASSTrans) would develop a webpage to host the resource library.

Ensure all transit agencies have and maintain websites with critical service and contact information

Many people rely on websites for information about transit services, including types of services, schedules and hours, service areas, fares, eligibility, how to book a trip, and contact information. Agency websites do not currently offer consistent information. Establishing standards and identifying support to meet them will help people understand what transit options are available and how to use them, potentially increasing ridership and public support for services.

MDOT would develop guidelines websites and help agencies create service area maps. The online resource library would include resources for creating websites.

Provide IT support to all rural transit agencies

Agencies without access to IT support may have challenges reacting to technical issues as they occur, but smaller agencies may not need or be able to afford full-time IT staff. Providing IT support to agencies would help agencies quickly address technology issues and decrease the amount of time that hardware, software, or systems are down. MDOT would determine the level of need for IT support at rural transit agencies, and the RTTC would explore strategies for implementing IT support.

Develop a statewide MaaS platform

A statewide MaaS platform would integrate information about all public transit services across the state in one place, increasing access to mobility information. For more advanced agencies, the platform can include additional functionality including trip planning, trip booking, fare payment, and real-time information. This platform will improve access to services and increase public awareness of services, potentially attracting new ridership.

MDOT is in the process of assessing the responses to a request for information on MaaS technologies, which will inform next steps and system requirements.

Develop a Concept of Operations to determine the best strategies for increasing the use of electronic fare collection

A Concept of Operations (ConOps) will determine the best approach or approaches for agencies to implement electronic fare collection across the state. The ConOps should explore opportunities to share costs, combine reporting, and offer riders more payment options. MDOT and RTTC would develop a steering committee to lead this project with consultant support.

1

Introduction

The Michigan Department of Transportation (MDOT) Office of Passenger Transportation (OPT) *Statewide Technology Plan for Michigan Rural Public Transit Agencies* sets a shared vision and goals to guide the implementation of technologies that can improve transit service in rural areas across the state. Rural public transit agencies deliver essential services to their communities by providing access to jobs, schools, medical services, shopping, and many other destinations. Rural areas are defined as those encompassing a population of fewer than 50,000 people that have not been designated as an "urbanized area" in the most recent decennial census.[1]

OPT administers federal and state funding programs that support public transit throughout Michigan. In addition to funding, OPT provides capital and operating technical assistance and oversight to over 135 urban and rural public transit agencies, rideshare and vanpool providers, and marine passenger service operators. OPT's role includes ensuring all federal and state funds are expended in accordance with program guidance and federal and state regulations.

Technology plays a critical role in helping OPT and public transit agencies achieve their missions. Transit technologies help agencies provide more efficient and effective service, and can make it easier for riders or their caregivers to plan and schedule trips. Across the state, agencies use transit technologies differently, have different levels of knowledge about what technologies are available and their benefits, and have a range of capacities for implementing technologies that can improve operations and rider satisfaction.

MDOT allocates Federal Transit Administration's (FTA) Section 5311 Formula Grants for Rural Areas (§5311) funding to rural transit agencies. This funding program can be used to plan and operate rural transit service, and to support capital projects. As §5311 subrecipients, rural transit agencies work closely with MDOT to ensure compliance with federal guidelines and to procure goods and services.

Though this plan focuses on rural public transit agencies, parts of it may be relevant to urban transit agencies and specialized service transportation entities, especially those that operate services in both rural and urban areas. Urban and specialized service agencies are potential partners for implementing technology projects, particularly those that can improve connections between rural and urban areas.

Through the development of this plan, OPT explored the current state of technology use among Michigan's 57 rural public transit agencies, reviewed best practices being implemented in Michigan and other states, set goals and objectives, and identified strategies for achieving these goals. Not all of Michigan's rural transit agencies are starting from the same technological baseline. This plan evaluates rural public transit agencies' current use of technology, their ability to implement additional technologies, and how they can improve at an appropriate pace over the next five years. This plan aims to help agencies keep pace with changes in technology, making it easier to adapt to future transit industry innovations and standards.

Table 1-1 and Figure 1-1 provide a list of rural transit agencies, the services they provide, and illustrates rural transit agencies' service areas.

Transit Service Types

Demand Response: Riders schedule trips in advance and agencies pick them up and drop them off at their origins and destinations.

Non-Emergency Medical Transportation (NEMT): Specialized services focused on travel to and from medical appointments and services.

Fixed Route and Shuttle: Buses operate on a predetermined route with defined stops and schedules.

Deviated Fixed Route: A fixed-route service where riders can request stops that are not on the scheduled route, but within a certain distance of it.

Commuter/Regional: Services that connect communities to regional employment centers or other destinations.

Ferries: Marine services.

Image 1-2: A Cadillac/Wexford Transit Authority driver assists a rider alighting the bus. Image courtesy of Cadillac Wexford Transit Authority

Table 1–1: Michigan's Rural Public Transit Agencies & Services

No.	Agency	Services
1	Adrian Dial-A-Ride	•Demand Response
2	Alger County Transit	•Demand Response •Regional Deviated Fixed Route
3	Allegan County Transportation	•Demand Response
4	Alma Transit Center	•Demand Response
5	Antrim County Transportation	•Demand Response
6	Arenac Public Transit Authority	•Demand Response •NEMT
7	Barry County Transit	•Demand Response •NEMT
8	Bay Area Transportation Authority	•Demand Response •Fixed Route •NEMT
9	Belding Dial-A-Ride	•Demand Response
10	Benzie Transportation Authority	•Demand Response •NEMT
11	Berrien County	•Demand Response
12	City of Big Rapids Dial-a-Ride	•Demand Response •Fixed Route
13	Branch Area Transit Authority	•Demand Response •Fixed Route
14	Cadillac/Wexford Transit Authority	•Demand Response •Commuter/ Regional Services •NEMT
15	Caro Transit Authority	•Demand Response •NEMT
16	Cass County Transportation Authority	•Demand Response
17	Charlevoix County Transit	•Demand Response •NEMT

No.	Agency	Services
18	Clare County Transit	•Demand Response •NEMT
19	Clinton Area Transit System	•Demand Response
20	Crawford County Transportation Authority	•Demand Response
21	Delta Area Transit Authority	•Demand Response •Fixed Route •Shuttle •NEMT
22	Dowagiac Dial-a-Ride Transit	•Demand Response
23	Eastern Upper Peninsula Transportation Authority	•Demand Response •Fixed Route •Ferry Service
24	Eaton County Transportation Authority	•Demand Response •Commuter Express Route •Shuttle •NEMT
25	Gladwin City/ County Transit	•Demand Response •NEMT
26	Gogebic County Transit	•Demand Response •Deviated Fixed Route
27	Greater Lapeer Transportation Authority	•Demand Response
28	Greenville Transit	•Demand Response
29	City of Hancock Public Transit	•Demand Response
30	City of Hillsdale Dial-a-Ride	•Demand Response
31	Houghton Motor Transit Line	•Demand Response •Fixed Route
32	Huron Transit Corporation	•Demand Response •NEMT

Figure 1–1: Michigan's Rural Public Transit Agency Service Areas
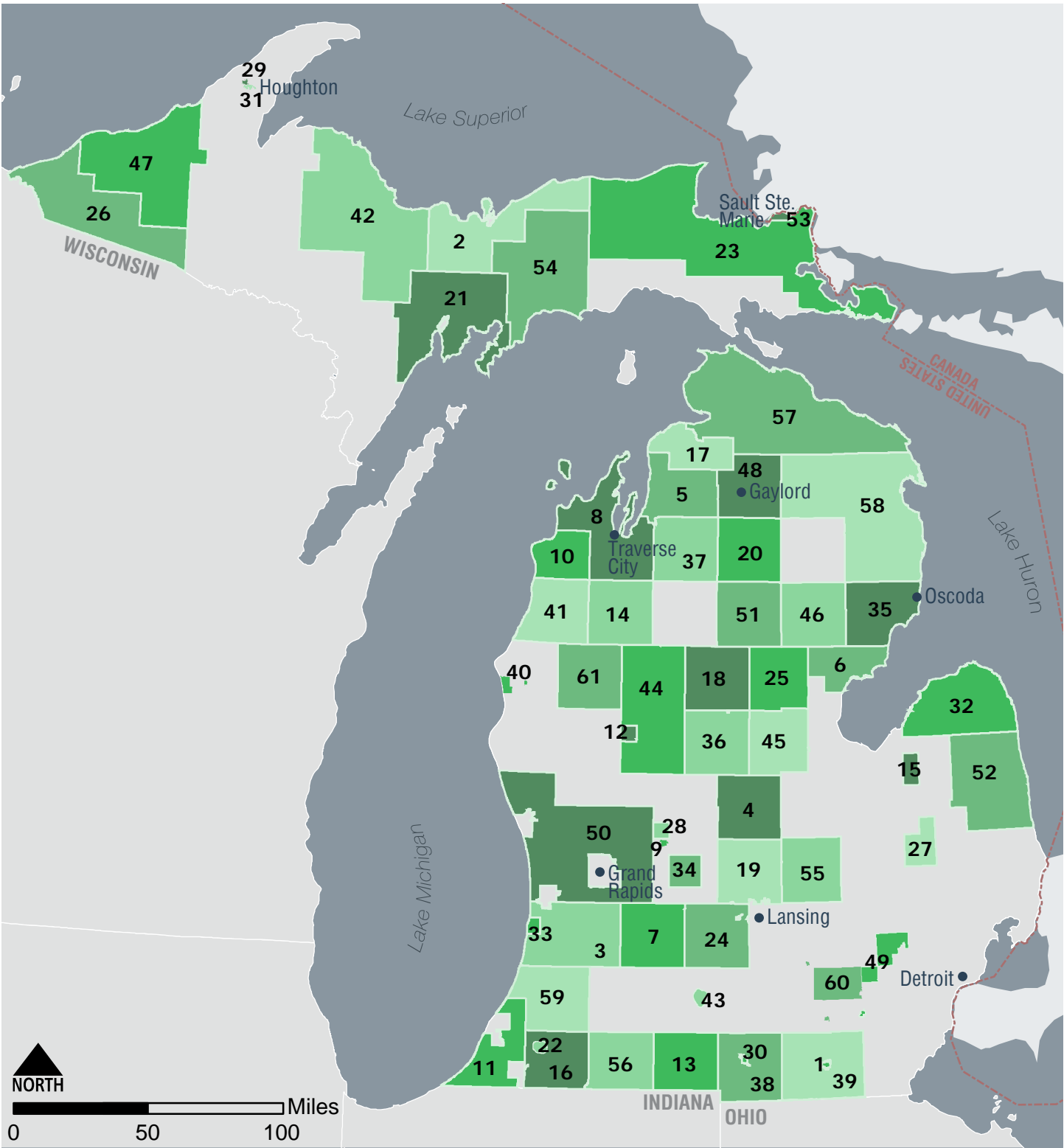
Table 1–1: Michigan's Rural Public Transit Agencies & Service (continued)

No.	Agency	Services
33	Interurban Transit Authority	▪Demand Response
34	Ionia Dial-A-Ride	▪Demand Response
35	Iosco Transit Corporation	▪Demand Response
36	Isabella County Transportation Commission	▪Demand Response ▪Shuttle
37	Kalkaska Public Transit Authority	▪Demand Response ▪Deviated Fixed Route ▪Regional Fixed Route ▪NEMT
38	Key Opportunities, Inc*	▪Demand Response
39	Lenawee Transportation	▪Demand Response ▪Deviated Fixed Route
40	Ludington Mass Transit	▪Demand Response
41	Manistee County Transportation	▪Demand Response
42	Marquette County Transit Authority	▪Demand Response ▪Fixed Route
43	City of Marshall Dial-a-Ride	▪Demand Response
44	Mecosta Osceola Transit Authority	▪Demand Response
45	Midland County Board of Commissioners	▪Demand Response
46	Ogemaw County Public Transit	▪Demand Response
47	Ontonagon Public Transit	▪Demand Response
48	Otsego County Bus System	▪Demand Response

No.	Agency	Services
49	People's Express*	▪Demand Response ▪Commuter Fixed Route
50	Pioneer Resources*	▪Demand Response
51	Roscommon County Transportation Authority	▪Demand Response
52	Sanilac Transportation	▪Demand Response ▪NEMT
53	City of Sault Ste. Marie	▪Demand Response ▪Fixed Route
54	Schoolcraft County Transit Authority	▪Demand Response ▪NEMT
55	Shiawassee Area Transportation Agency	▪Demand Response
56	St. Joseph County Transportation Authority	▪Demand Response ▪Deviated Fixed Route
57	Straits Regional Ride	▪Demand Response ▪Deviated Fixed Route
58	Thunder Bay Transportation	▪Demand Response
59	Van Buren Public Transit	▪Demand Response Deviated Fixed Route
60	Western-Washtenaw Area Value Express*	▪Demand Response ▪Fixed Route
61	Yates Township Dial-A-Ride	▪Demand Response

*Denotes §5310 agencies that also receive §5311 funding.

Figure 1–1: Michigan's Rural Public Transit Agency Service Areas
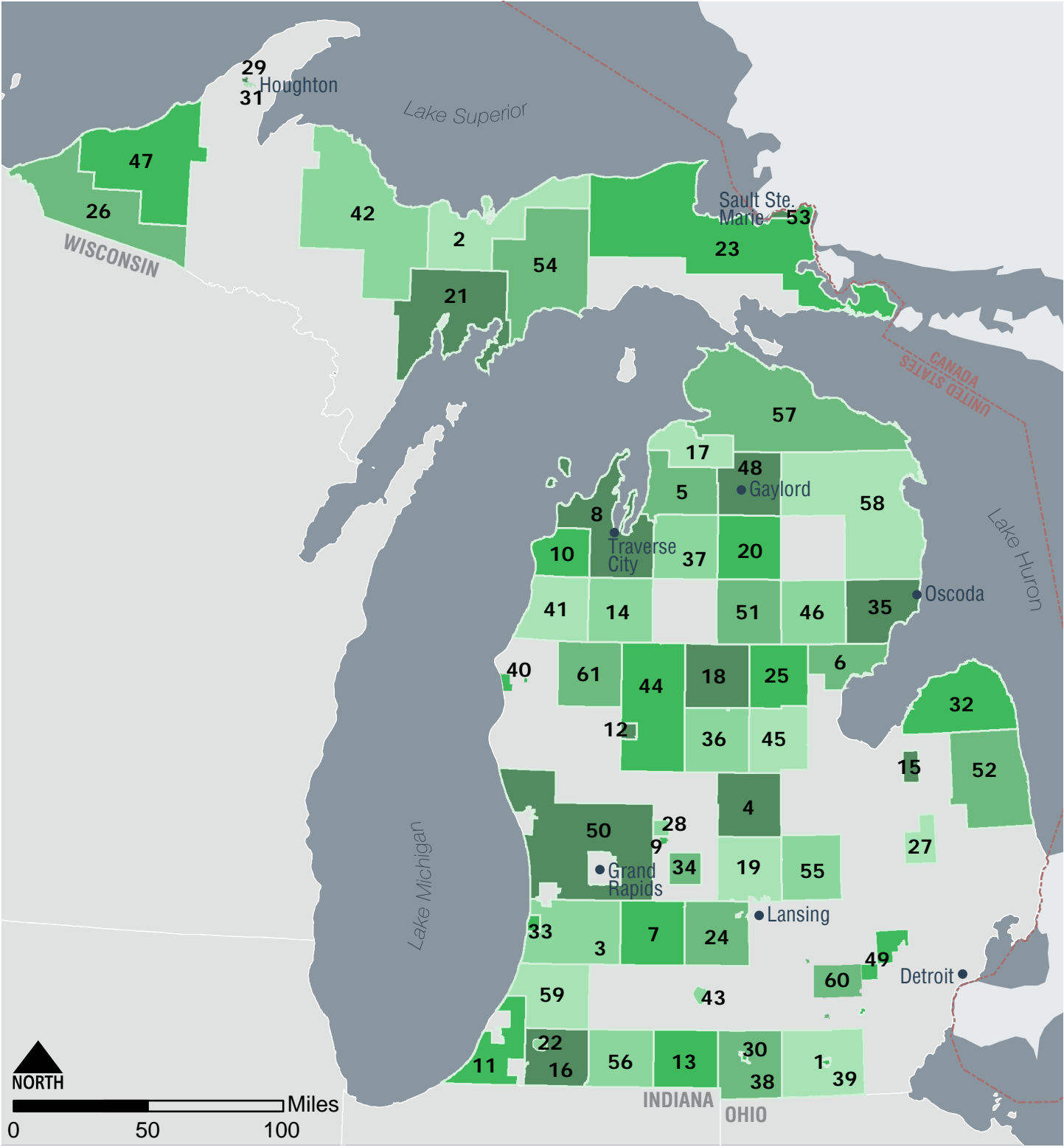
2

State of the System

Michigan's rural transit agencies provide an estimated 5.6 million trips a year, helping residents of communities across the state travel to work, schools, social gatherings, and essential services. Transit services vary by agency and include demand-response services, fixed-route bus service, regional and commuter services, and ferry service.

The use of technology to operate transit services and the preparedness to implement new technologies varies across each agency. In the fall of 2021, OPT conducted the *Transit Technology Assessment Survey* to gain an understanding of how rural agencies use technology, and what their technology needs are. Respondents were asked 28 questions about their current and potential technology use. Sixty-one agencies responded to the survey, including all 57 rural public transit agencies and four organizations that provide transportation service in rural areas.[a]

This chapter provides an overview of all respondents, their characteristics, current technology tools, and opinions regarding technology use and improvements. The survey was also used to categorize the 57 public transit agencies' readiness for new technologies. This chapter outlines key findings from the survey.

---

a   There are 60, not 61, survey responses because Adrian Dial-a-Ride and Lenawee Transportation were submitted as a single response due to shared management.

57
RURAL PUBLIC TRANSIT AGENCIES

37,000
SQUARE MILES

5.6M
ANNUAL RIDES

Figure 2-1: Michigan Rural Transit Service Overview.

Rural Transit Agencies & Services

Together, the surveyed agencies provide transit service across over 37,000 square miles, approximately 63% of the total area of the state. Service areas generally have low population densities and low-density development patterns. Some agencies operate in small towns, while others serve entire counties or multiple counties.

All agencies provide demand-response service, where riders schedule trips in advance and agencies pick up riders and drop them off at their destinations, and over two-thirds focus solely on this type of service. Eighteen agencies (30%) also provide fixed-route bus service, including local bus service, shuttle service, regional and commuter service, and deviated route service. Six agencies operate deviated or "flex" fixed-route services, which allow riders to request stops that are not on the scheduled route, but within a certain distance of it. This allows agencies to accommodate riders while generally adhering to the route's timetable. The Eastern Upper Peninsula Transportation Authority (EUPTA) also operates ferry service to islands in their service area.

Rural transit agencies vary in size and capacity. Annual ridership estimates range from 1,500 (Key Opportunities, Inc. in Hillsdale County) to over 400,000 trips (Bay Area Transportation Authority [BATA] and Isabella County Transportation Commission), with an average of about 93,000 annual trips. Service areas range in size from fewer than three square miles (Hancock Public Transit) to over 2,500 square miles (EUPTA). The average service area is 620 square miles. About 80% of agencies coordinate with transit providers in adjacent areas to accommodate riders traveling to and from destinations outside of their service areas.

On average, agencies have 20 vehicles and about 28 staff members. Fleet sizes range from three vehicles (Dowagiac Dial-a-Ride) to 85 (BATA). Staff size ranges from one to 120, also at the Dowagiac Dial-a-Ride and BATA, respectively.
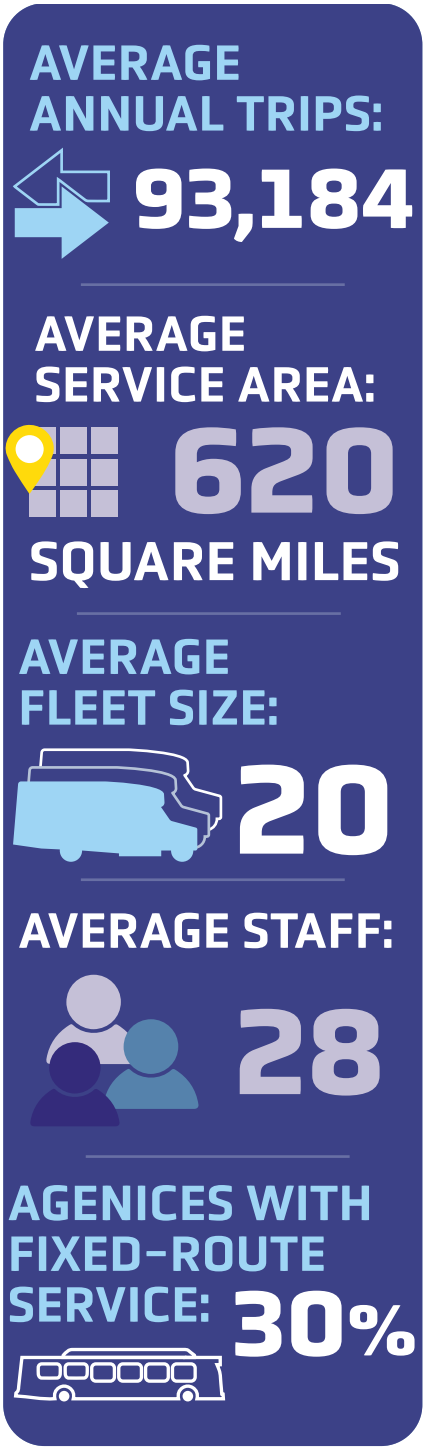
AVERAGE ANNUAL TRIPS:
93,184

AVERAGE SERVICE AREA:
620
SQUARE MILES

AVERAGE FLEET SIZE:
20

AVERAGE STAFF:
28

AGENICES WITH FIXED-ROUTE SERVICE: 30%

Figure 2-2: Michigan Rural Transit Service Overview.

rated their agencies

5.4

rated themselves

7.2

rated their riders

4.3

Figure 2-3: Rural Transit Agency and Rider Technology Savviness.

Technology at Rural Transit Agencies

The *Transit Technology Assessment Survey* confirmed differences in the technological skill levels of respondents and provided insights into the current use of technologies and the needs that could be satisfied with new technologies. Figures 2-3, 2-4, and 2-5 provide an overview of survey findings.

Technological Skill Assessment

Survey respondents were asked to rate the comfort with technologies of their agencies, themselves, and their riders on a scale from one to 10, where one was "avoiding technology," and 10 was "cutting edge, using the latest and greatest." On average, respondents rated themselves 7.2, their agencies a 5.4, and their riders a 4.3. This indicates that respondents are generally comfortable using technology, but thought they were more tech-savvy than their colleagues and their riders. This might indicate that any technology projects should include staff and rider training. Comfort with technology does vary by agency, which will impact the level of support they will need to implement and adapt to new technologies.

Technologies in Use & Identified Needs

Technology can be applied to nearly all aspects of transit agency management and operations. The survey asked respondents from transit agencies what types of technology they currently use to operate services. All except two agencies reported that they rely on some form of technology. Agencies were also asked to identify their technology needs and what areas of their operations could be improved with technology. This section provides an overview of types of technologies agencies reported using and the gaps they feel exist. Agencies may be using additional technologies and may have needs they did not specify in the survey. Notably, the technology industry changes frequently, with new companies starting up and companies merging and being bought out. Vendors and products may change after this report is completed.

Scheduling and Dispatching

Computer-Aided Dispatch (CAD) and Automatic Vehicle Location (AVL) technology helps agencies efficiently schedule and dispatch

trips and keep track of vehicles in real time. Thirty-eight agencies (63%) reported using CAD software. Of these agencies, 24 solely provide demand-response service and 14 provide demand-response and a fixed-route service. Lenawee Transportation/Adrian Dial-A-Ride noted they do not use CAD, but use boards and note cards for dispatching. Agencies use a number of different CAD platforms, including Clever Devices, Easy Rides, Ecolane, Flexiroute, PCTrans, RoutingBox, RouteMatch, Samsara, and TransLoc. Of the agencies using CAD, 57% use PCTrans.

Agencies most frequently cited dispatching as their most time-consuming activity. Dispatching was also considered to be the technology that could have the greatest impact on agency operations, even by agencies currently using CAD. Agencies expressed interest in onboard tablets to provide dispatching information to drivers. Of the 22 agencies that do not currently use CAD, over 75% are considering a future investment in it. Nine of these agencies are unsure of whether CAD would benefit their operations. Five respondents indicated no interest in deploying CAD.

AVL systems use Global Positioning Systems (GPS) to track real-time vehicle locations, helping dispatchers monitor service. Location information can also be shared with riders, allowing them to see how far away their vehicle is from them. Most CAD programs include vehicle tracking in the scheduling and dispatching process. Thirty-eight agencies (63%) reported using AVL, though these are not all the same agencies using CAD. Just under half of agencies have AVL on their entire fleet, while nine respondents (15%) have AVL on part of their fleet.

Several respondents believe AVL integration would have a major impact on operations. About a quarter of respondents indicated they do not use AVL but are considering it. Eight agencies were unsure whether AVL would benefit their agency, one of which was unsure what AVL is. Two agencies did not believe AVL would benefit their agencies. Generally, these 10 agencies are small with 10 or fewer vehicles. Overall, there is interest in AVL, and some agencies might benefit from informational trainings on the technology. One agency noted that AVL does not work well in their rural county and that they are researching satellite-based options.
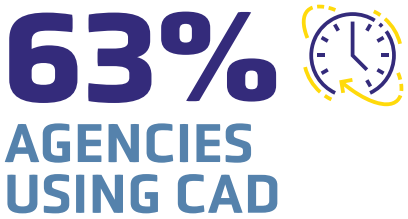
63%
AGENCIES USING AVL

63%
AGENCIES USING CAD

Figure 2-4: Rural Transit Agency AVL and CAD use.
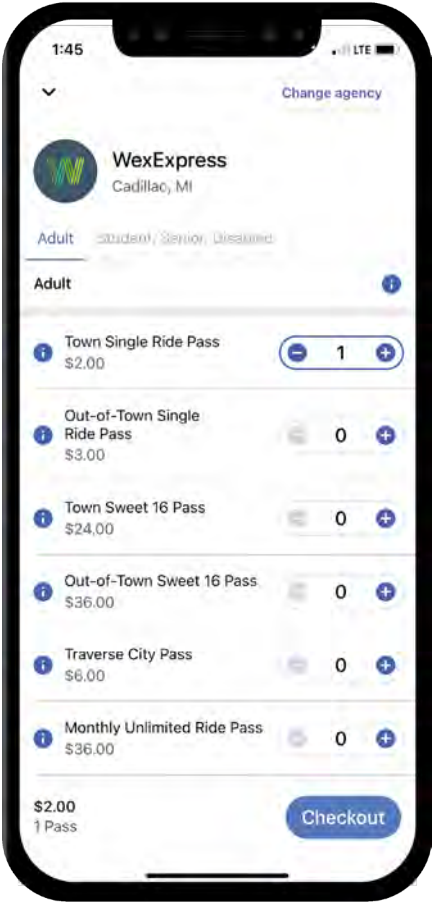
Rider Scheduling and Information

Isabella County Transportation Commission and BATA provide their routes, stops, and schedules to Google Transit, which allows riders to access real-time travel updates about vehicle locations, delays, and other changes, as well as service alerts through Google Maps. Though it was not reported in the survey, some agencies allow riders to book trips online or through smartphone apps.

Ten agencies noted mobility apps that allow riders to schedule trips themselves would have the greatest impact on operations. Agencies also expressed interest in Short Message Service (SMS, i.e., text messaging) communication systems to provide information to riders.

Fare Collection

Fare collection systems help transit agencies to securely collect, manage, and track fares. Using electronic fare collection systems can help reduce dwell times by speeding up payment, allow riders to pay in advance, and allow operators to focus on driving and assisting riders. Modern fare collection systems allow for fare capping, an equity tool where regardless of how many individual trips a rider takes, they would never have to pay more than the cost of a monthly pass.

BATA, Cadillac/Wexford Transit Authority, and Roscommon County Transportation Authority (RCTA) use Passage Transit Ticketing (Passage), a mobile fare collection app. Since the agencies use Passage instead of their own agency-branded "white-label" apps, riders can use the same app to purchase fares in all three systems. BATA also uses Genfare fareboxes to collect fares electronically.

Most agencies do not use electronic fare collection and rely on cash fares or prepaid tickets or tokens.

Fare collection was identified by 67% of respondents as the area with the greatest potential to be made easier with technology. Desired technologies in this category included accounting systems, electronic fare cards, contactless and mobile payment options, and the ability to accept debit and credit cards.

Image 2-1: The Passage Transit Ticketing App interface, which is used by BATA, Cadillac/Wexford Transit Authority, and RCTA.

Business Management

The most-used business management software is Microsoft 365, which is common to workplaces in nearly all industries. Isabella County Transportation Commission also uses Microsoft Dynamics 365, a customer relationship management system.

Human resources platforms help agencies and staff track work hours and payroll. One agency mentioned using TimeClock Plus for timekeeping, employee scheduling, and payroll software. When I Work, another employee scheduling software, is used by three agencies.

Three agencies reported using Intuit QuickBooks for accounting, and others mentioned AccountMate Software Corporation, BS&A Software, and Sage accounting software.

Approximately one-third of respondents believe that payroll could be made easier with technology. One agency specified that technology could make reporting easier.

Asset Management

Asset management technologies help transit agencies track the condition and maintenance of capital assets, including vehicles and facilities. Clare County Transit and Isabella County Transportation Commission reported using FleetSoft for fleet maintenance and parts inventory management.

Three agencies specified asset management or maintenance as an area that could be improved with technology. Other agencies expressed an interest in vehicle scanning tools and a vehicle replacement plan to reduce maintenance downtime and costs.

Safety and Surveillance

Cass County Transportation Authority reported using Safe Fleet and the City of Marshall Dial-a-Ride noted it uses AngelTrax for video surveillance. Though not specified, other agencies do have surveillance and security systems at facilities and on vehicles. Onboard video surveillance is included as option on statewide bus contracts.
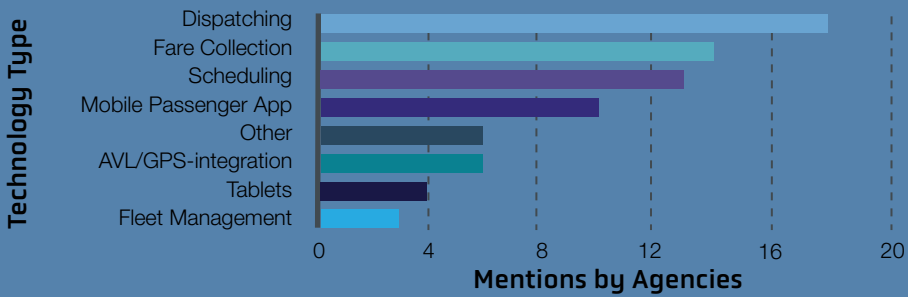
Recent parts thefts have increased consideration for facility security systems. Wireless systems that can be accessed on smartphones and tablets are a current trend.
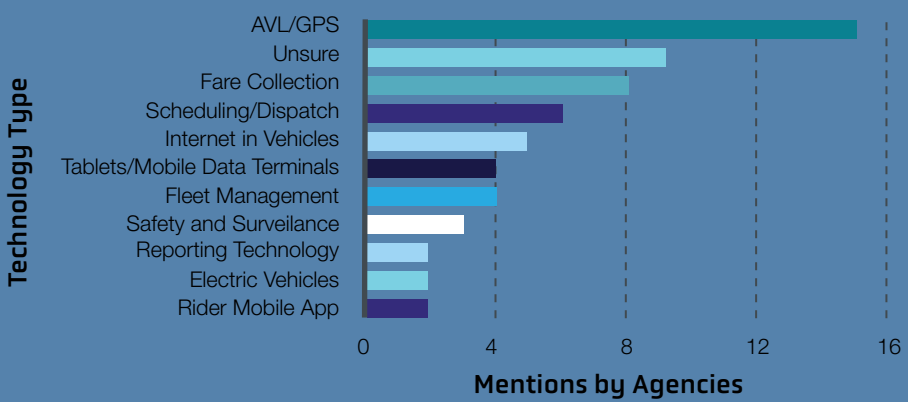
Figure 2-5: Rural Public Transit Agency Characteristics

TECHNOLOGY TYPES WITH THE GREATEST IMPACT ON OPERATIONS

Technology Type (y-axis):
- Dispatching
- Fare Collection
- Scheduling
- Mobile Passenger App
- Other
- AVL/GPS-integration
- Tablets
- Fleet Management

Mentions by Agencies (x-axis): 0, 4, 8, 12, 16, 20

VEHICLE TECHNOLOGY TYPES WITH THE GREATEST IMPACT ON OPERATIONS

Technology Type (y-axis):
- AVL/GPS
- Unsure
- Fare Collection
- Scheduling/Dispatch
- Internet in Vehicles
- Tablets/Mobile Data Terminals
- Fleet Management
- Safety and Surveillance
- Reporting Technology
- Electric Vehicles
- Rider Mobile App

Mentions by Agencies (x-axis): 0, 4, 8, 12, 16

HOW WOULD RIDERSHIP BE IMPACTED IF YOU DEPLOYED MORE TECHNOLOGY?

- No Impact, 35%
- Decrease, 7%
- Increase, 58%

MOST TIME-CONSUMING OR DIFFICULT TASKS

These areas of work, especially dispatching and scheduling, were surveyed areas that could be made easier with technology.
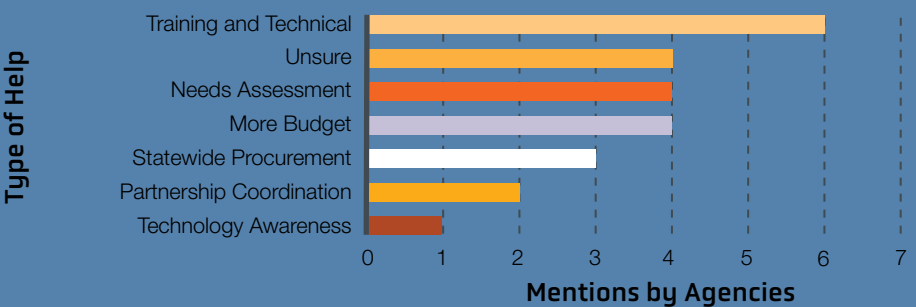
01 Dispatching

02 Scheduling

03 HR Management

04 Fare Collection

05 Payroll

AGENCIES NEED HELP WITH....

Type of Help (y-axis):
- Training and Technical
- Unsure
- Needs Assessment
- More Budget
- Statewide Procurement
- Partnership Coordination
- Technology Awareness

Mentions by Agencies (x-axis): 0, 1, 2, 3, 4, 5, 6, 7

TECHNOLOGIES THAT AGENCIES WANT ARE...

Technologies (y-axis):
- Fare Collection
- Scheduling/Dispatching Software
- Rider-Scheduling App
- Driver Tablets
- Rider Vehicle Tracking
- Rider Database
- Rider/Agency Communication
- Automatic Passenger Counters

Mentions by Agencies (x-axis): 0, 1, 2, 3, 4, 5, 6, 7
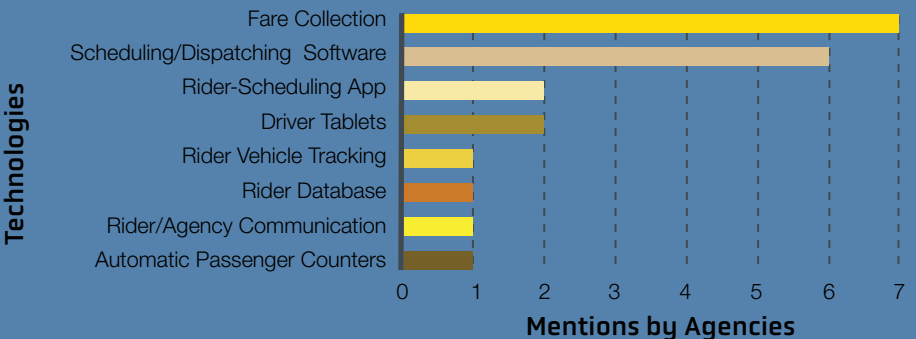
HOW DOES YOUR AGENCY APPROACH EMERGING TECHNOLOGY TO IMPROVE OPERATIONS?

31 agencies – Interested if presented with the right solution

24 agencies – Continuously evaluate ways to implement new technology

3 agencies – Other

2 agencies – Do not have the time

TOP REASONS AGENCIES WOULD AVOID TECHNOLOGY:

01 Funding Limitations

02 Shortstaffed

03 Learning Curve

04 Limited Time

05 Customers do not want it

MOST IMPORTANT TECHNOLOGY QUALITIES...

- Cost-Effective Training
- Easy-to-Use Training
- Time-Effective Tech.
- Integrative Solutions
- Rural-Compatible
- Reliable Tech. Solutions
- Top of the Line Tech.

As a priority, agencies responded that they need training and technical assistance, fare collection, and cost-effective technology from a technology plan.

$8 Million Michigan Mobility Challenge

In 2018, the State of Michigan launched the $8 Million Michigan Mobility Challenge to support public-private partnerships piloting technologies to improve mobility for seniors, people with disabilities, and veterans. Thirteen projects were awarded funding, including four with rural transit agency project partners. These rural agencies demonstrated a readiness and willingness to pilot innovative technologies.

Huron Mobility Initiative

The Huron Transit Corporation (HTC) and technology partner RouteMatch launched the Huron Mobility Initiative, a smartphone app that provides information on mobility options and allows riders to book and pay for trips. When RouteMatch was acquired by Uber in 2020, HTC began offering on-demand ride scheduling through the Uber app.[2]

MUVE U.P.

MUVE U.P. was a partnership between Delta Area Transit Authority (DATA), Schoolcraft County Transit, Dickinson Iron Community Services Agency, Upper Peninsula Commission for Area Progress, and vendors MUVE and Umlaut. They sought to create a ridesharing app and a vehicle sharing platform to improve the operations of NEMT. The providers decided the software did not suit their needs; however, the pilot is continuing at Western-Washtenaw Area Value Express as a ride-hailing and dispatching platform.[3]

Rides A-GoGo

BATA, Benzie Transportation Authority, and Allegan County partnered with Bosch_SPLT to develop a rider booking app that was integrated with the agencies' dispatching systems, which ran on different platforms. The project also included a volunteer driver dispatching portal, and a third-party portal so caregivers or medical offices could schedule and track trips for a rider. This was intended to reduce the number of no-show trips, which create challenges for agencies. The app did not work effectively, and after Bosch_SPLT decided to cease operations and to terminate software support, the agencies decided not to proceed with the project.[4]

Vets to Wellness

Greater Lapeer Transportation Authority and Shiawassee Area Transportation Agency partnered with Flint's Mass Transportation Authority (MTA) and Kevadiya to improve access to mobility for veterans in the agencies' service areas by implementing a web- and app-based platform that allowed riders to schedule, pay for, and receive real-time updates on trips. The project was operational for eight months through February 2020 and provided 6,202 rides.[5]

Implementation Challenges

Through the survey, transit agencies were asked how they approach emerging technologies to improve operations. While 40% indicated that they continuously evaluate ways to implement new technology, 53% responded that they are interested in emerging technologies if they are presented with the right solutions, and two agencies responded that they did not have time to implement new technologies. These responses indicate that agencies may need help determining what new technologies can streamline their operations, and may also need support deploying technology projects.

Agencies were also asked why they were most likely to avoid technology. Funding limitations was cited as the primary reason for avoiding technology, and was indicated by 58% of respondents. Agencies are also limited by a lack of staff capacity and time, and a lack of training resources required for new technologies. Four agencies (7%) indicated they avoid technology because their riders are not interested in it. Many agencies also mentioned needing state support with procurements.

Another challenge agencies indicated was poor cellular service in some parts of the state. Agencies are hesitant to use technologies that might not work for operators or riders.

? What does your agency need most from a technology plan?

"Something that actually works in our rural area."

"A technology expert who would understand transit and what we do."

"A way to obtain and implement [technology] that is cost and time effective."

Image 2-2: Vets to Wellness, a partnership between rural and urban transit agencies, used online and app-based trip booking tools to make it easier for veterans to plan their trips. Image courtesy of the Flint MTA.

Technology Readiness

How agencies use and approach technology, and how ready they are to respond to new technologies varies widely across Michigan. Based on the survey results, Michigan's 57 rural public transit agencies were placed into four technology readiness levels, with Level 4 already implementing more advanced technologies, and Level 1 using fewer technologies and being less comfortable with them. These levels are used to set an existing technology baseline and to identify opportunities that meet agencies where they are while helping them advance. Readiness levels are based on survey responses, and may not fully reflect the technological readiness of all agency staff.

Level 1 agencies generally do not currently use CAD, but are largely interested in considering it. Some use AVL, but these agencies are generally not using and not interested in using it.

Level 2 agencies generally use either CAD or AVL but may not be using additional technologies.

Level 3 agencies are using CAD and AVL. These agencies are ready to explore advanced technology solutions.

Level 4 agencies are already implementing more innovative transit technologies, such as app-based trip booking, though some may need support in finding a best fit, developing partnerships, and exploring new opportunities for further advancement.

Agencies are listed by their technology readiness level in Figure 2-6.

Image 2-3: HTC, also known as Thumb Area Transit, offers a number of options for trip reservations including calling, texting, emailing, an online portal, and the Uber app. Image taken from HTC's website.
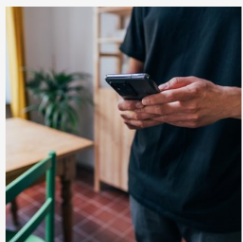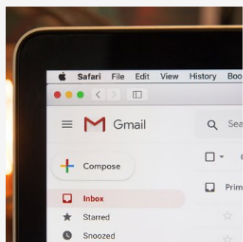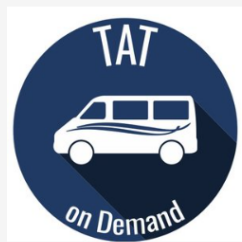

CALL OR TEXT	EMAIL	BOOK ONLINE	POWERED BY UBER
+1 (989) 269-2121	tatdispatch@gmail.com	Click The Link Below For The Web Portal	Service Hours Monday-Friday 9AM-2PM | Bad Axe Only
		Book Here	Book Here

Figure 2-6: Rural Transit Agency Technology Readiness Levels

LEVEL

1
- ▷ Adrian Dial-a-Ride
- ▷ Arenac Public Transit Authority
- ▷ Belding Dial-a-Ride
- ▷ Big Rapids Dial-a-Ride
- ▷ Caro Transit Authority
- ▷ Eastern Upper Peninsula Transportation Authority
- ▷ Hillsdale Dial-a-Ride
- ▷ Hancock Dial-a-Ride
- ▷ Houghton Motor Transit Line
- ▷ Interurban Transit Authority
- ▷ Iosco Transit Corporation
- ▷ Kalkaska Public Transit Authority
- ▷ Lenawee Transportation
- ▷ Ontonagon Public Transit
- ▷ Shiawassee Area Transportation Agency
- ▷ Straits Regional Ride

2
- ▷ Alger County Transit
- ▷ Alma Transit Center
- ▷ Antrim County Transportation
- ▷ Barry County Transportation
- ▷ Berrien County
- ▷ Branch Area Transit Authority
- ▷ Cass County Transportation Auth.
- ▷ Clare County Transit
- ▷ Dowagiac Dial-a-Ride
- ▷ Gladwin City County Transit
- ▷ Gogebic County Transit
- ▷ Greenville Transit
- ▷ Ionia Dial-a-Ride
- ▷ Ludington Mass Transportation Auth.
- ▷ Manistee County Transportation
- ▷ Marquette County Transit Authority
- ▷ Marshall Dial-a-Ride
- ▷ Ogemaw County Public Transit
- ▷ Sault Ste. Marie
- ▷ St. Joseph County Transportation Auth.
- ▷ Van Buren Public Transit
- ▷ Yates Township Dial-a-Ride

3
- ▷ Allegan County Transportation
- ▷ Cadillac/Wexford Transit Authority
- ▷ Clinton Area Transit System
- ▷ Crawford County Transportation Auth.
- ▷ Delta Area Transit Authority
- ▷ Eaton County Transportation Auth.
- ▷ Greater Lapeer Transportation Auth.
- ▷ Mecosta Osceola Transit Authority
- ▷ Midland County Board of Commissioners
- ▷ Otsego County Bus System
- ▷ Roscommon County Transportation Auth.
- ▷ Sanilac Transportation
- ▷ Schoolcraft County Transit Authority
- ▷ Thunder Bay Transportation Auth.

4
- ▷ Bay Area Transportation Authority
- ▷ Benzie Transportation Authority
- ▷ Charlevoix County Transit
- ▷ Huron Transit Corporartion (Thumb Area Transit)
- ▷ Isabella County Transportation Commission

3

Trends and Opportunities

Broad technology trends in the transit industry can be useful for identifying opportunities for investment and to prepare for anticipated changes in the coming years. Not all transit technology trends are applicable to rural agencies – for example, transit signal prioritization (TSP) is a tool for helping fixed-route systems maintain headways in congested areas, but given the low densities in rural areas, TSP is unlikely to be a cost-effective technology. This chapter provides an overview of transit technologies that are applicable to Michigan's rural public transit agencies, highlights recent trends in those technologies, and considers potential opportunities that correspond to the needs identified in the *Transit Technology Assessment Survey*.

Automatic Vehicle Location (AVL)

AVL allows transit agencies to track vehicles in real-time, which helps them monitor service, respond to changing conditions and delays, update schedules, and provider riders with vehicle arrival information. AVL uses Global Positioning System (GPS) satellite-based radio navigation systems to communicate location information. More recently, some transit agencies are using mobile phones or tablets as onboard AVL units. These mobile data terminals (MDT) can also provide vehicle operators with route, schedule, and other information. Onboard mobile devices may be a challenge in parts of the state with unreliable cellular service.

Some technologies rely on AVL systems to collect location-based data for on-time performance, boarding and alighting (automated passenger counters [APCs]), fare usage, security, and crashes, or to provide location-based announcements and real-time information to riders. Real-time information has become more common, making it an expectation for many riders. Location-based data can be useful for service planning and reporting, as well as investigating incidents.

AVL Opportunities

- Increase the number of transit agencies using AVL (63% have AVL on at least part of their fleet).
- Provide real-time information to riders.
- Integrate CAD and AVL technologies to improve scheduling and dispatching.

Computer-Aided Dispatch (CAD)

CAD allows dispatchers to plan and schedule routes, detours, and work assignments. When paired with AVL (commonly referred to as CAD/AVL), it can help agencies monitor performance in real-time and react to on-the-ground conditions, such as traffic or trip cancellations, to maintain schedules. CAD can help optimize routes and schedules, allowing agencies to be more efficient, and potentially operate more service. Additionally, CAD/AVL can track trips and generate performance metric reports.

Online and app-based rider booking platforms are increasing in popularity and can reduce the amount of time riders and agency staff spend on the phone scheduling trips. These apps can be integrated with CAD/AVL to automatically populate trip information. Some options are not integrated and require staff to manually input trips into CAD. On-demand booking, where riders can book a trip at the time they need it rather than in advance, is also becoming more popular as a way for riders to book trips.

Some CAD systems include staffing modules that allow agencies to manage shift schedules and attendance. There are also CAD products that can be integrated with payroll systems through application programming interfaces (APIs), though these are generally geared toward larger transit systems.

CAD Opportunities

- Increase the number of transit agencies using CAD (63% use CAD).
- Integrate CAD and AVL technologies to improve scheduling and dispatching.
- Integrate CAD with staffing functions.
- Implement app-based and online rider booking platforms.
- Explore opportunities to implement on-demand booking.

> "AVL would decrease our calls to dispatch and would also help alleviate customers' anxiety about where the bus is and if they missed it."
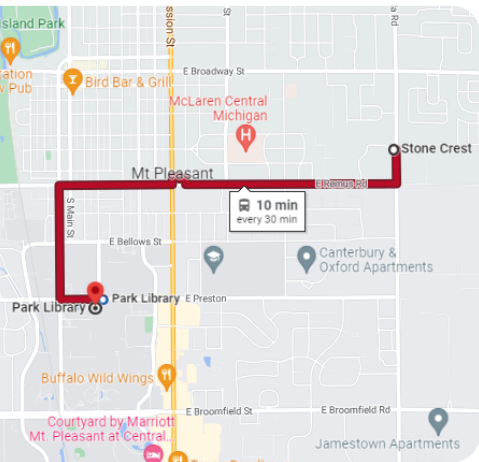>
> —Survey Respondent

Rider Communication, Information, & Scheduling

Digital forms of communication have become the norm for many transit agencies and riders, especially in response to the COVID-19 pandemic. Virtual Public Involvement (VPI) has become an increasingly popular way to solicit input from riders and provide information. VPI can be a useful tool in rural areas where it may be challenging for people across a large service area to attend in-person meetings. VPI mediums can include online public meetings, telephone town halls, surveys, social media, and public access television. In 2021, MDOT developed *Virtual Public Involvement Benefits and Barriers: A Practical Guide to VPI Tools*, which outlines how to successfully conduct virtual public engagement that is accessible to all users. In the same year, the National Center for Applied Transit Technology (N-CATT) published its *Virtual Engagement Guidebook*.

Social media outlets can be used to communicate service changes, detours, and delayed and canceled trips. Communication through social media is a tool commonly used by fixed-route systems, but agencies focused on demand-response service have rider contact information for scheduling purposes, and their passengers would benefit more from a Short Message Service (SMS) for real-time information. SMS is a means of sending text messages to mobile phones. A benefit of SMS is that riders do not need a smartphone or an app to receive them.

Websites are a common way agencies can share information on services, routes, hours, fares, and contact information. Many riders and potential riders expect entities to provide information online. Almost all of Michigan's rural public transit agencies have websites or webpages, but not all of them provide information on available services.

Online and app-based trip planning and booking tools are a large trend that many agencies and third parties are providing. On fixed-route services, agencies can publish their General Transit Feed Specification (GTFS) data or share it with third parties to allow riders to plan trips through apps and websites, including agency platforms, Google Maps, and Mobility as a Service (MaaS) Platforms. GTFS data contains schedule, route, and stop information, and can also include real-time information if agencies utilize AVL.

Image 3-1: Agencies can publish GTFS data for fixed-route services to help riders plan trips. Image source: Google Maps.

For demand-response services, app- and web-based platforms can allow riders or their caretakers to book trips without calling the agency or waiting on hold. SMS can also be used to book trips. GTFS-flex is a developing technology that would allow riders to see demand-response services in MaaS and trip-planning platforms, helping people understand what services are available in their area. It can also provide real-time service information, letting riders know where their vehicle is.

Globally, agencies are developing and partnering with MaaS platforms where riders can find local transit options, plan trips, receive real-time updates, and pay fares online or via mobile apps (see page 29 for more information on MaaS).

Trip-planning tools can also include dynamic bus stop signage, real-time information signage, and wayfinding kiosks, though these are generally more useful for larger fixed-route agencies.

With digital forms of communication, it is critical to consider accessibility for people of all abilities and for people who may not have access to or know how to use certain technologies. More traditional forms of communication should be paired with digital media.

Rider Communication Opportunities

- Incorporate VPI tools into communication and outreach strategies.
- Integrate CAD/AVL and SMS to provide riders with real-time travel updates and service changes.
- Improve agency websites by including information on services, fares, and how to ride.
- Develop and publish GTFS information on fixed-route services.
- Use AVL to publish GTFS-realtime information on fixed-route services.
- Stay up to date on GTFS-flex technology and pilot it when it is more advanced.
- Develop and/or provide information to online and app-based planning and booking platforms.
- Develop a statewide MaaS application that provides a single interface for the public to access transit information across Michigan.

Fare Collection

Image 3-2: Fare validators can be used to scan fare payment apps, smart cards, and credit and debit cards.

In recent years, smartphone app-based and credit and debit card payments have been increasing in popularity. Traditionally, transit agencies have operated closed-loop systems where riders pay fares with cash or agency-issued fare media, which can include magnetic cards, smart cards, or white-label apps. Alternatively, open-loop payments allow riders to choose the payment option that is most convenient to them. In addition to traditional fare media, these systems can accept contactless credit and debit cards, third party apps, and digital wallets (e.g., Apple Pay and Google Pay). App-based payments are a trend in both types of system, as are MaaS platforms, where riders can pay for multiple services (transit, bike and scooter share, transportation network company [TNC, e.g., Lyft and Uber]) in the same place. Three rural transit agencies in Michigan are already using fare payment apps.

Account-based systems are also becoming more popular. In these systems, the fare media does not have a value associated with it, but is linked with a back-end account where riders can add value. This allows riders to easily manage fares and prevents losses from lost or stolen cards. Account-based systems also allow for fare capping.

Open architecture, another trend, allows transit agencies to alter a fare system with components from different vendors. This allows agencies to adapt to new technologies without being locked in to those available through its current vendor(s).

While fare collection technology is changing, many rural transit agencies and demand-response services still rely on cash fares, tokens, and paper tickets. For these agencies, implementing modern fare systems can have high costs and high barriers to entry. Joint fare systems (see EZfare in Chapter 4) and third-party apps can help simplify this process. Fare-payment apps have become more mainstream and there are "off-the-shelf" options available. Online ride booking and payments can allow riders to pre-pay for trips, which can be particularly beneficial for riders with cognitive disabilities, because it eliminates the need for handling cash or fare cards. Online accounts can also be managed by caregivers.

Fare Collection Opportunities

- Reduce reliance on cash fares.
- Offer riders additional payment options.
- Create or join multi-agency fare partnerships.
- Include fare collection in the future statewide MaaS application.

Mobility on Demand (MOD) & Mobility as a Service (MaaS)

MOD is a concept that allows users to access multiple types of mobility services based on their immediate needs. Modes can include public transportation, microtransit, bike shares, scooter shares, car shares, TNCs, and ridesharing. The concept allows users to make choices based on wait and travel time, cost, proximity, and convenience.

MaaS is a tool that aggregates different mobility services in one passenger-facing platform and allows users to plan, book, and pay for their trip. These platforms allow mobility providers to give riders real-time information updates, including delays and service changes, and can facilitate opportunities for engagement, such as online surveys. Additionally, MaaS can be used to collect data that can help transit agencies plan new and updated services.

Currently, private MaaS apps are available in some parts of Michigan. Transit agencies that make their GTFS data public enable MaaS providers to integrate their information into their platforms. These apps offer users transit information at no cost to agencies. Agencies can also develop customized MaaS platforms.

MOD & MaaS Opportunities

- Share information with private MaaS platforms.
- Develop a statewide MaaS platform.
- Provide on-demand booking apps.
- Partner with taxis, TNC, and other transportation providers to deliver additional service.
- Explore shared-use mobility options in denser areas.

Michigan Statewide MaaS

MDOT is in the process of developing a statewide MaaS platform. In fall 2020, MDOT released a Request for Information (RFI) to hear from vendors on the current state of MaaS technology, and received responses from 19 companies. These responses will inform the development of the platform, which will allow riders across Michigan to see what mobility options are available, plan trips, and eventually, book trips and pay fares.

Business Administration

The COVID-19 pandemic increased remote work and the use of videoconferencing, electronic signatures, and virtual private networks (VPNs). Transit agency administrative staff has had to adapt to new technologies and ways of working, and some agencies are more or less comfortable and proficient with technology than others. Some agencies lack information technology (IT) support to quickly address issues as they arise.

In the *Transit Technology Assessment Survey*, human resource management was ranked as the third most time consuming or difficult part of transit agencies' work, and respondents from nine transits agencies identified that collecting data and/or reporting could be made easier with technology. CAD/AVL can be integrated with daily management systems to organize agency staffing needs and timekeeping, streamlining staff scheduling and payroll processes. Transit agencies also use CAD/AVL to automatically collect data and generate reports to provide information for management, MDOT, or the National Transit Database (NTD).

Administration Opportunities

- Training courses to ensure all agencies are proficient in essential business administration technologies, including but not limited to email, word processing, data management, videoconferencing, electronic signatures, and VPNs.
- Increase access to IT support.
- Integrate staffing and CAD platforms.
- Automatic data collection and reporting.

Image 3-3: IT support, whether on site or through remote access, can help agencies ensure technical issues are addressed quickly, and systems remain operational.

Maintenance & Asset Management

Maintenance and asset management technologies enable transit agencies to schedule and track maintenance activities, document repairs, inventory parts, monitor asset condition, and develop reports.

Maintenance staff can use laptops and tablets to create work orders, reference checklists, document repairs as they work, and RFID tags and scanners to keep track of inventory. This can help transit agencies generate reports on assets and document compliance with federal mandates and asset management plans. Data can also be used to inform the development of capital, fleet, and asset management plans.

Vehicles increasingly rely on electronic and computer components, and this will increase as agencies adopt electric or alternative-fuel vehicles. New tools and training will be required to keep these vehicles in working order. Vehicle health monitoring systems can automatically diagnose fleet issues and notify staff about required repairs, or even alert staff to potential issues before a breakdown.

Maintenance and Asset Management Opportunities

- Expand the use of maintenance and asset management systems.
- Implement vehicle health diagnostic systems.
- Track statewide asset conditions.
- Coordinate TAM plans and capital plans.

Facility Condition Assessment

After reviewing transit agency transportation asset management (TAM) plans, MDOT found that agencies were not consistently assessing the condition of their facilities. To address this and gain a better understanding of statewide assets, MDOT hired a firm to conduct uniform inspections of all rural transit agency facilities in the state. An apples to apples comparison will help MDOT set an accurate baseline, and identify and capture future funding priorities.

Image 3-4: Transit vehicles are critical assets for public transit agencies. Maintenance and asset management tools can help ensure they are maintained and replaced as needed. Image courtesy of Cadillac/Wexford Transit Authority.

Low- & No-Emission Vehicles in Michigan

Funding for FTA's Low and No-Emission Vehicle Program (Section 5339(c)) has been increasing as the federal government has been encouraging and prioritizing the transition to these types of vehicles. Since 2017, urban and rural Michigan public transit agencies have been successful at pursuing Section 5339(c) funding. In 2020, MDOT was awarded $6.4 million on behalf of Benzie Transportation Authority, Clare County Transit, Delta Area Transit Authority, HTC, and urban agencies Capital Area Transportation Authority and Macatawa Area Express. In 2021, MDOT, on behalf of HTC, was awarded $5.2 million to construct a replacement maintenance, operations, and administration facility that will include electric bus charging equipment.

Low- and No-Emission Vehicles

A growing trend for transit and private vehicles is the transition to low- and no-emission (low/no) vehicles. There are different low/no options available to transit agencies depending on their operating characteristics and budgets, which include battery electric, hydrogen fuel cell, compressed natural gas (CNG), biodiesel, and hybrid-electric vehicles. The types of fuel and fueling infrastructure vary depending on the type, as do the amount of time and frequency of refueling.

Costs for low/no vehicles can be up to double the cost of traditional vehicles, but these costs are expected to equalize as low/no technology advances and becomes more popular. Federal funding for low/no vehicles has also been increasing. The Infrastructure, Investment and Jobs Act (IIJA) provides record amounts of funding for low/no vehicles, but some programs require transit agencies to develop fleet transition plans to be eligible to compete for discretionary funding.

Some of Michigan's rural transit agencies are currently using propane and CNG to fuel their buses. MDOT is developing a statewide contract that agencies can use to purchase electric vehicles. Some agencies are currently in the process of, or seeking funding for, electrification. MDOT has partnered with CALSTART, a nonprofit focused on advancing electrification, to help agencies transition to low/no vehicles, including supporting the development of zero emission transition plans.

Low/No Opportunities:

- Develop zero-emission transition plans.
- Pursue federal funding for low/no vehicles and infrastructure.
- Pilot low/no technologies and share best practices and lessons learned.
- Statewide procurement contracts for low/no vehicles and charging/refueling infrastructure.

Safety and Security Systems

Related to technology, safety and security can cover a broad range of areas, from cybersecurity to onboard and facility security and surveillance systems, advanced driver assistance systems (ADAS), driver training simulators, and COVID-19 cleaning technologies.

Cybersecurity is a critical consideration for most technologies. As agencies move to cloud-based technologies and increase remote work, additional protections may need to be put in place. Additionally, agencies that collect rider data, whether for ADA eligibility or through fare account systems and trip planning apps, need to consider how to protect this data. Federal agencies offer cybersecurity toolkits and vulnerability assessments, though these are typically geared toward larger urban agencies.

Security cameras can help agencies monitor transit facilities and vehicles to ensure the safety and security of riders and staff. Cameras can also be used to investigate incidents and crashes and can be integrated with AVL. Video from onboard cameras can be automatically downloaded through a Wi-Fi connection when a vehicle returns to the terminal. Wireless cameras and security systems are becoming more popular and are easy to install, but do require periodic charging.

Though fully autonomous vehicles are not yet ready for passenger service implementation, ADAS are becoming more popular. This technology can help reduce collisions, increasing safety for riders, operators, pedestrians, cyclists, and other motorists. ADAS can include features like backup cameras, cruise control, crash and lane departure warnings, and blind spot detection. Collision Avoidance Warning Systems (CAWS) use exterior cameras and sensors to warn transit operators of potential collisions by providing real-time audio, visual, or tactile warnings. These technologies also collect data that can be used to identify locations where incidents are common, and to provide pre- and post-accident training for drivers.

Driver training simulators virtually replicate driving conditions to

BATA CAWS Pilot

In February 2021, BATA began a CAWS pilot on 25 of its cutaway vehicles. The pilot tested the applicability of this technology in a rural setting. There were initially some challenges with calibrating sensors on the vehicles and with getting drivers adjusted to the new system. The results are inconclusive at this point, but the CAWS has reduced the severity of at least one crash, while increasing drivers' awareness of safety concerns. The pilot is being extended to determine whether the agency will continue to use the technology, and whether or not MDOT will pursue a statewide contract for additional agencies to purchase from.

BATA has shared its experience with this technology to other agencies through an MDOT Tech Talk in February 2022, and through a report that was completed in August of 2022.

Image 3-5: CAWS monitors installed in one of BATA's vehicles. Image courtesy of BATA.

allow operators to experience potentially hazardous events in a safe environment. Simulators are a tool for training new drivers, or providing refresher or post-crash training for seasoned drivers.

Automated wheelchair securement systems allow people who use wheelchairs or mobility devices to press a button that automatically secures their mobility device, reducing their reliance on the driver. These securements are currently only available on large vehicles, but MDOT and rural transit agencies should stay up to date on future products that can be used in smaller vehicles.

During the COVID-19 pandemic, cleaning technologies, such as ultra-violet light systems and electrostatic foggers, have become more popular.

Safety and Security Opportunities:

- Conduct cybersecurity assessments and develop policies, protocols, and trainings.
- Assess the number of agencies with security and surveillance system needs.
- Continue to evaluate CAWS, and include low-level ADAS specifications, such as back up and blindspot cameras, on vehicles contracts.
- Create a statewide operator training center with bus driver training simulators.
- Monitor the need for COVID-19 cleaning technologies.

Impact/Implementation Matrix

Opportunities are not equally beneficial and can range in time, level of effort, and cost to implement. Considering needs and opportunities in broad categories, the Impact/Implementation Matrix (Figure 3-1) demonstrates which opportunities are the most impactful and the easiest to implement.

Figure 3–1: Opportunity Impact/Implementation Matrix

	High Impact	Low Impact
Quick to Implement	■ Develop system standards and specifications. ■ Increase agency comfort with technology. ■ Increase access to IT support. ■ Improve transit agency websites. ■ Implement fare payment apps. ■ Implement payroll programs.	■ Increase use of GTFS. ■ Increase use of VPI tools. ■ Update security systems at facilities and on vehicles. ■ Explore COVID-19 cleaning technologies. ■ Coordinate TAM and capital plans.
Slow to Implement	■ Increase AVL use. ■ Increase CAD use. ■ Integrate CAD and AVL. ■ Provide real-time travel information. ■ Provide app-based online rider booking. ■ Implement MOD service for same day trips. ■ Implement electronic fare systems. ■ Implement a statewide MaaS platform. ■ Conduct cybersecurity assessments and develop policies, protocols, and trainings. ■ Expand the use of maintenance and asset management systems. ■ Implement vehicle health diagnostic systems.	■ Monitor asset condition on a statewide basis. ■ Deploy smart and sustainable building technologies. ■ Deploy ADAS. ■ Explore shared-use mobility options in denser areas. ■ Integrate CAD and staffing platforms. ■ Transition to low/no fleets.

4

Peer Review

Introducing new technologies, whether for an individual or an organization, can be a challenging process. Rural and urban transit agencies and state departments of transportation (DOTs) across the United States are seeking to enhance their operations and service delivery through technology implementations and face similar challenges. Understanding how peer agencies are deploying technologies will help identify statewide strategies that address rural transit agencies' challenges and needs. Lessons learned will be incorporated into future projects to improve implementation processes. This chapter provides an overview of some local and national peer projects.

Transit Agency Technology Deployments

As demonstrated in Chapter 2, rural transit agencies vary in terms of size, services, technology use, and capabilities. However, agencies generally indicated similar challenges that can be addressed by introducing or updating technologies. This section highlights transit agency technology projects and lessons learned that can be applied to future projects in Michigan. Information in this section was obtained through a combination of survey responses, interviews with key staff, and a literature review.

Link On-Demand, Bay Area Transportation Authority, Michigan

BATA, one of Michigan's Level 4 rural transit agencies, operates Link On-Demand, a ride hailing service in the Traverse City area. The service launched in August 2021 after a six-month pilot in 2019, replacing BATA's dial-a-ride service. BATA operates Link On-Demand with TransLoc, an on-demand microtransit software that allows riders to book trips on a mobile app, online, or by phone. Trips can be booked in real-time or up to a day in advance. With the previous service, rides had to be booked in advance by phone or email. The pilot resulted in decreased cancellation and no-show rates, which dropped from 30% to 3%. BATA was also able to increase the daily number of rides it can provide. According to BATA, deploying TransLoc was one of the most transformational technology upgrades for the agency and its riders.

BATA funded the pilot with local funds and used an FTA Integrated Mobility Innovation Mobility on Demand Grant to launch the permanent service.

Lessons Learned

- Technology solutions can help agencies deliver more service with existing staff and vehicle resources.
- Advertisements and online engagement were critical to promote the service during the COVID-19 pandemic, when BATA was not able to conduct in-person rider outreach and training.
- A customer-centered mindset was critical to helping riders navigating the technology for the first time.
- Conducting a pilot provided an opportunity to practice using the technology while evaluating how well it worked for the agency.
- Full-time agency IT staff trained in transit technology understood agency needs, which aided in the implementation process.
- Engaging with consultants helped the agency develop a five-year technology roadmap and identify projects.
- Engaging with peer agencies provided insight to actual experiences, leading to a stronger procurement process.
- Begin by identifying overall criteria for new technology systems. BATA prioritized technology that would make using its system easier for riders and easier for staff to operate.

Traverse City, MI

Image 4-1: Link On-Demand is a ride-hailing service that provides trips as requested within a defined service area. Image courtesy of BATA.

EZfare, NEORide, Ohio

EZfare is an account-based mobile ticketing platform currently used by 14 transit agencies in three states: Ohio, Michigan, and Kentucky. Participating agencies vary in size, and include both rural and urban agencies. The system is designed so that additional agencies can be quickly added to the platform. With EZfare, smartphone users can purchase transit fares at multiple agencies through the app and can use it to transfer to other participating systems. The fare payment system is also integrated with Transit App, Moovit, and Uber, so riders can plan and pay for trips using these tools.

The fare system is currently operated through a contract with Masabi, a fare collection technology vendor. Each agency is able to maintain its autonomy over branding and fare structures, while using one platform and sharing marketing resources. Agencies can also move at their own pace. For example, agencies can have operators visually validate fares, requiring no capital investment. Agencies can choose to invest in electronic fare validators when they join, or at a later point. The platform collects data and creates reports that agencies can use to assess fare usage and for accounting purposes.

EZfare is managed by NEORide, an Ohio-based council of governments that was established in 2015 to help agencies improve transportation options and remove barriers to mobility. Member agencies work as a committee to manage projects and contracts. NEORide manages procurements and contracts and submits joint grant applications on behalf of its members. NEORide is working to implement additional features including fare capping and integration with other modes, and new payment options including smart cards and contactless credit cards.

In a recent NEORide survey, 98% of EZfare users stated they are satisfied with the app and 93% said boarding takes less time with the app.

TheRide, an urban transit agency in Ann Arbor, MI joined EZFare in 2020 to quickly provide a contactless fare solution during the COVID-19 pandemic.

In additional to EZfare, NEORide is working to implement other transit technology projects, including a paratransit and microtransit call center, CAWS, and digital signage.

Lessons Learned

- Collaborative multiagency projects take longer to implement and can be more challenging to coordinate, but can help lower barriers to entry and reduce costs. They can also benefit transit riders by reducing confusion and creating stronger regional operations.
- Systems should be flexible so that agencies can participate in ways that work for their operations, such as maintaining their own fare structures or choosing whether or not to install validators.
- Transit agencies are not app developers. Using a third-party to develop and manage the mobile app ensures the system is well-maintained.
- Marketing is critical to rider adoption.
- Not all riders will use new technologies, and that is okay. New platforms can help create options for people who want them, and create foundations for more advanced future systems.
- A consortium approach can be used to implement multiple types of technology projects beyond fare systems.
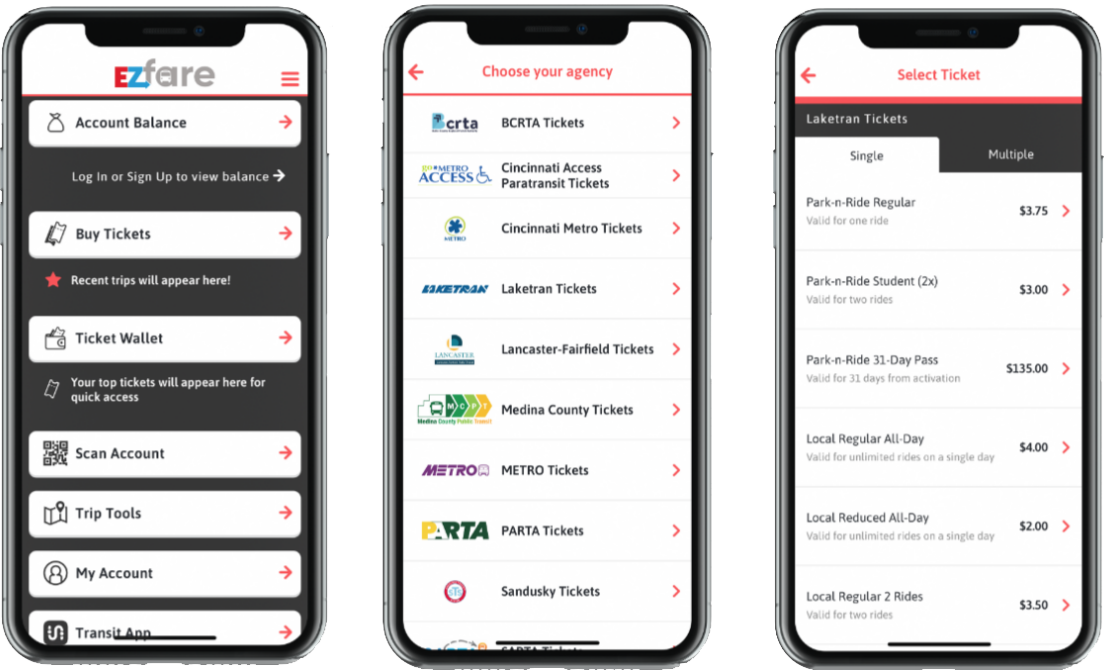

Image 4-2: EZfare allows riders to purchase fares at a number of agencies in one app. Users can also access agency websites and information, and connect with customer service. Image courtesy of NEORide.

CAD Implementation, Charlevoix County Transit (CC Transit), Michigan

Charlevoix County, MI

CC Transit, a Level 4 rural agency in Michigan, replaced their previous CAD system with RouteMatch. While RouteMatch helped improve CC Transit's on-time performance and efficiency in scheduling and dispatching, the launch was challenging because dispatchers were still learning the software as calls to schedule trips were coming in, making it difficult to keep up. The agency required more on-site support than was originally scoped in the contract, which increased costs. A more structured training approach and practice with incoming calls would have improved the launch.

CC Transit also experienced issues with the automated scheduling tool, which would dispatch multiple vehicles to the same area and travel past rider destinations to pick up other passengers without dropping the first passenger off. The vendor eventually worked out these glitches, but it required significant attention from agency staff, and was frustrating for vehicle operators and riders. In hindsight, a more robust communications plan would have helped operators and riders understand how the implementation might initially affect trips.

CC Transit also implemented RouteMatch's online fare collection platform. Overall, the agency found the app easy to implement and riders were pleased with the ability to purchase passes online, rather than having to go to the CC Transit's office. However, some riders experienced internet connectivity issues in more rural areas.

After RouteMatch was acquired by Uber in 2020 and subsequently by TripSpark in 2022, CC Transit experienced customer service issues, including unanswered support requests. However, lessons learned from the initial deployment can inform CC Transit's next procurement process.

Lessons Learned

- Training dispatchers is key.
- Include options for additional training and on-site support in project scopes and contracts.
- Develop a communication strategy for both riders and staff so they are aware or potential issues during a launch.
- Consider how apps might function in areas with poor cellular service and offer alternative options.
- When vendors are bought out by other companies, business models may change and products may no longer suit agencies.

MaaS, Tompkins County, New York

Tompkins County, NY

Supported by the Shared-Use Mobility Center and FTA's Mobility On Demand On-Ramp Program, Tompkins County, NY is developing a MaaS pilot. The County is partnered with transit agencies and other service providers, human service agencies, and mobility managers to increase equitable access to transportation and reduce single occupancy vehicle trips. Tompkins County is largely rural and includes the city of Ithaca.

The ultimate goal of the MaaS platform is to enable riders to plan, book, and complete trips on multiple modes. While developing the concept for the platform, a phased approach was determined to be the best path forward. The first phase will include multi-modal trip planning, a customer service call center, and additional rural mobility services. Phase two will incorporate payment and subscription options, and add additional ways to contact customer service.

While developing the MaaS platform, Tompkins Consolidated Area Transit (TCAT), the county's transit agency, piloted Tconnect, a microtransit service that replaced a rural fixed route that had limited service. Riders were able to request rides as needed through an app. This pilot was originally meant to expand service to an area without fixed routes, but was adapted in response to the COVID-19 pandemic. While the Tconnect pilot is no longer operating, TCAT is considering how this model can be used to better serve rural communities in the future.[6]

Lessons Learned

- Identify a lead agency early in the process.
- Take a phased approach to implementing MaaS, implementing trip planning, customer service, and expanded mobility services before adding more advanced components.
- Setting clear expectations with riders and providing support for trip failures will help build trust in the MaaS platform and the agencies.
- In addition to increasing access to booking through MaaS, agencies should increase the supply of mobility services and the types of services available .[7]

State DOT–Led Technology Initiatives

This section provides an overview of how two state DOTs are supporting technology projects at rural transit agencies. Data and information in this analysis was obtained by conducting surveys and interviews with officials from the DOTs discussed in this section.

Ohio Department of Transportation (ODOT)

Between 2016 and 2021, ODOT used a USDOT Transportation Investment Generating Economic Recovery (TIGER) VII grant to plan and deploy scheduling and dispatching technology at rural transit agencies in the state. Using ODOT staff and consultant support, the department managed the development of specifications, the procurement process, and the implementation phase of the project. CTS Software and Ecolane were selected for the statewide deployment of demand-response systems and DoubleMap was chosen for fixed-route systems.

Because every transit system operates differently, there were different implementation strategies to accommodate each transit system, and both ODOT staff and consultant support was used to deploy hardware and software. Agencies were provided with a month of training, which was enough in most instances. Rural transit agencies reported varied experiences with the vendors during the implementation phase, but found the project improved local service by providing a consistent platform for agencies to obtain planning data and support service decisions. One of the challenges in this implementation was the different levels of technology readiness, making it difficult for some transit agencies to transition to the new systems.

Lessons Learned

- State support can help agencies implement technology solutions that improve service.
- One-size-fits-all implementation strategies may not work when agencies are at different technology starting points.
- Set aside time for discovery to ensure that vendors understand agency operations and can tailor implementation and training.

Minnesota Department of Transportation (MnDOT)

MnDOT completed the Greater Minnesota Public Transit Technology Plan in June 2021 and has since been in the process of addressing recommendations from the plan, and developing policies and investment decisions. Minnesota oversees 30 rural systems with various levels of technology use, needs, and available resources. Additionally, smaller systems may not need as sophisticated technology as larger ones. To address different needs, MnDOT is requiring transit agencies develop their own growth plans that will identify their existing baseline conditions and areas to invest in technology. MnDOT is also updating its process for accepting and reviewing transit agency technology requests and funding allocations.

Lessons Learned

- Technology is always changing, making it necessary to continuously reassess needs and solutions.
- Transit agencies are experts on their operations and are best able to identify needs and challenges, but may need support implementing projects.
- For smaller agencies, transit technology may not be incorporated into their daily tasks and management. Building capacity and adapting to new processes may take some time.

Key Takeaways for Michigan

The peer examples outlined in this chapter illustrate that transit technology implementations can lead to operational and service improvements, but that planning and training are critical. As technologies evolve, MDOT and Michigan's rural transit agencies should continue to stay up to date on how peer agencies are leveraging technology. Agencies should also reach out to peers to hear about actual experiences and challenges with technology deployments.

Key takeaways for MDOT and Michigan's rural transit agencies include:

- Identify project champions and lead agencies.
- A consortium approach can be used to implement multiple types of technology projects beyond fare systems. They can take longer, but have greater benefits.
- Some agencies might need financial and technical support to procure and implement technology projects.
- Engaging with peer agencies who have implemented technologies is an effective way of gathering information before pursuing a procurement.
- Implementation and training strategies should be tailored to agencies' unique needs and capabilities.
- Include options for additional training and on-site support during implementation.
- Pilots can help agencies test technologies and address challenges before fully investing in products.
- Flexible and phased implementations can help agencies adapt to new technologies and build on them.
- Clear communication, marketing, and rider training are critical for outward-facing technologies to succeed and can help build rider trust in technologies and services.

Image courtesy of the City of Hillsdale Dial-a-Ride.

5

Goals & Objectives

MDOT's OPT and Michigan's rural transit agencies all strive toward a common mission: to help people move. OPT identified goals and objectives that will guide investment and implementation of technologies that will help move Michiganders and set a shared strategy for future transit technology use across rural transit agencies.

In November 2021, MDOT adopted *Michigan Mobility 2045* (*MM2045*), its state long-range plan, which sets a vision, goals, and objectives for the state's multimodal transportation system. These goals were used as a guide while developing technology goals for rural transit agencies to ensure alignment.

In addition, the needs expressed by rural transit agencies in MDOT's *Transit Technology Assessment Survey*, industry trends, and case studies were used to

Figure 5-1: *MM2045* sets an aspirational long-term multimodal vision for transportation and mobility in Michigan. The plan can be accessed at michiganmobility.org.

MDOT's *MM2045* Vision

In 2045, Michigan's mobility network is **safe**, **efficient**, **future-driven**, and **adaptable**. This interconnected multimodal system is **people-focused**, **equitable**, **reliable**, **convenient** for all users, and enriches Michigan's **economic** and **societal vitality**.

Through collaboration and innovation, Michigan will deliver a **well-maintained** and **sustainably funded** network where strategic investments are made in mobility options that improve **quality of life**, support **public health**, and promote **resiliency**.

MM2045 Goals

Quality of Life:
Enhance quality of life for all communities and users of the transportation network.

Mobility:
Enhance mobility choices for all users of the transportation network through efficient and effective operations and reliable multimodal opportunities.

Safety and Security:
Enhance the safety and ensure the security of the transportation network for all users and workers.

Network Condition:
Through investment strategies and innovation, preserve and improve the condition of Michigan's transportation network so that all modes are reliable, resilient, and adaptable.

Economy and Stewardship:
Improve the movement of people and goods to attract and sustain diverse economic opportunities while investing resources responsibly.

Partnership:
Strengthen, expand, and promote collaboration with all users through effective public and private partnerships.

develop goals and objectives.

Goal & Objective Setting Process

In February 2022, the Statewide Technology Plan for Michigan Rural Public Transit Agencies Steering Committee and the project team participated in a workshop to build consensus, refine, and prioritize the statewide technology plan's goals and objectives. The project team presented the steering committee with an initial set of draft goals to consider. During the workshop, the steering committee revised the goals to reflect OPT and agency priorities for the plan.

The steering committee then ranked the goals in terms of importance. Though OPT and the steering committee consider all of these goals to be important, they were prioritized based on how they can either improve the efficiency of technology or be addressed with technology. Education was determined to the most important goal, because OPT, rural transit agencies, and riders will require training to better use current technologies and to learn about and implement new technologies. In order to advance the other goals, all rural transit agencies will need to achieve a technology literacy baseline.

Objectives outline the actions that will need to be taken to achieve these goals. After prioritizing the goals, the steering committee identified and refined technology-based objectives. The objectives include an indicator to help OPT measure progress toward realizing them, as well as an estimate of the amount of time it will take to accomplish the objective. In Chapter 6, projects and initiatives that will support these objectives are identified and prioritized.

Technology Goals

1 Education

Promote uniform baseline technological literacy across transit agencies to strengthen capacity for current and future technologies.

2 Efficiency

Utilize technology solutions to optimize operations.

3 Mobility

Enhance access to mobility services for rural transit users to improve the quality of life in rural communities.

4 Safety & Security

Support the safety and security of the rural transit network for all users.

5 Partnerships

Strengthen, expand, and promote collaboration between agencies, MDOT, and vendors for the benefit of rural transit riders.

6 System Condition

Increase the resilience and reliability of the public transit system by supporting a state of good repair on transit assets.

Goals & Objectives

Goal 1: EDUCATION

Objective 1.1:

Establish and maintain a forum for learning about new and trending sustainable technologies and identifying best practices and lessons learned.

Indicators:
- Establishment of a technology committee.
- Annual number of technology workshops.
- Attendee satisfaction with trainings.

Objective 1.2:

Implement trainings to ensure transit agencies are proficient in standard technologies that are required to conduct business and prepare agencies to implement new and trending technologies.

Indicators:
- Number of trainings available to agencies.
- Attendee satisfaction with trainings.

Objective 1.3:

Educate the public on existing transit services and develop outreach strategies to ensure that riders are comfortable using public-facing technologies.

Indicators:
- Development of a public education strategy.
- Percent of agencies with websites that include service, fare, and booking information.

Goal 2: EFFICIENCY

Objective 2.1:

Ensure all transit agencies have access to IT support so they are able to quickly resolve technical issues.

Indicators:
- Percent of transit agencies with internal or contracted IT support.

Objective 2.2:

Develop a strategy for ensuring that new technologies incorporate opportunities for interoperability between platforms and agencies to streamline operations, data collection, and integration.

Indicators:
- Development of technology interoperability policies and standards.

Objective 2.3:

Expand the use of CAD/AVL to all agencies to more efficiently provide transit service.

Indicators:
- Percent of rural agencies using AVL.
- Percent of rural transit vehicles with AVL.
- Percent of rural transit agencies using CAD.
- Annual number of trips.

Objective 2.4:

Implement staffing and payroll software platforms to reduce the challenges agencies experience in these areas.

Indicators:
- Percent of agencies using staffing and payroll platforms.

Objective 2.5:

Implement VPI tools to increase engagement with riders and better understand their needs.

Indicators:
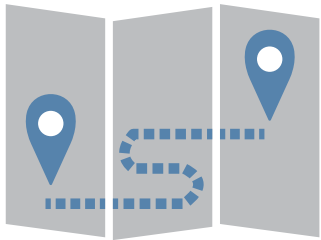- Percent of agencies using VPI tools to engage with the public.

Objective 2.6:

Implement low- and no-emission vehicle technologies to promote sustainability and reduce operating costs.

Indicators:
- Percent of agencies with adopted zero-emission transition plans.
- Statewide percent of low- or no-emission vehicles.

Goal 3: MOBILITY

Objective 3.1:

Improve trip planning and booking for riders and increase access to real time travel information through the implementation of MOD, MaaS, and/or app-based and online tools.

Indicators:

- Percent of agencies offering real-time travel information.
- Percent of agencies with app-based or online booking tools.
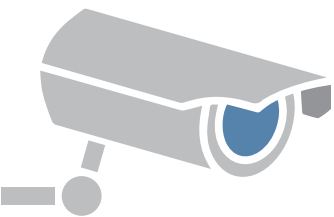- Percent of agencies on MaaS platforms.

Objective 3.2:

Increase fare payment options, such as fare payment apps, to reduce agencies' reliance on cash-based payments.

Indicators:

- Percent of agencies using fare payment apps.
- Percent of agencies with payment options through MaaS platforms.
- Rider adoption of payment apps.

Goal 4: SAFETY & SECURITY

Objective 4.1:

Expand the use of ADAS to improve safety for all road users.

Indicators:

- Annual number of transit crashes per 100,000 miles.

Objective 4.2:

Implement security and surveillance cameras at transit agency facilities and infrastructure, including onboard revenue and nonrevenue vehicles.

Indicators:

- Completed security evaluations and deployments.

Objective 4.3:

Develop and implement cybersecurity standards and policies to ensure that all transit agencies are employing best practices and protecting assets and sensitive data.

Indicators:

- Average threat level determined through cybersecurity assessments.

Goal 5: PARTNERSHIPS

Objective 5.1:

Develop and maintain integrated reporting and data collection systems for MDOT and transit agencies.

Indicators:

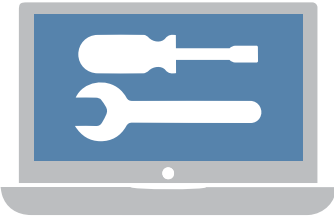- Development of a statewide data plan.

Objective 5.2:

Create regional and statewide partnerships to identify opportunities to fund, develop, procure, and pilot technology projects.

Indicators:

- Number of projects involving partnerships or joint procurements.

Goal 6: SYSTEM CONDITION

Objective 6.1:

Implement asset management tools, such as fleet management software and digital spare parts inventories, to increase the efficiency of maintenance staff and accuracy of reporting.

Indicators:
- Percent of agencies using asset and fleet management software and tools.
- Development of condition assessment standards.

Objective 6.2:

Coordinate asset management and capital planning across all agencies to help identify technology projects, and prioritize funding and resources.

Indicators:
- Percent of agencies with capital, fleet management, and/or TAM plans.
- Completion of statewide capital and fleet management plans.

Objective 6.3:

Improve the energy efficiency of transit facilities by incorporating smart and energy efficient systems including solar panels, LED lighting, and app-controlled systems.

Indicators:
- Percent of agencies leveraging smart and energy-efficient technologies.

Image courtesy of the Huron Transit Corporation.

6

Baseline Assessment & Technology Standards

Goals and objectives help outline a future state of technology that MDOT and Michigan's rural transit agencies can strive toward. Achieving goals and objectives will take time, funding, and continuous effort on the part of MDOT and agency staff. Additionally, agencies are not all starting from the same place and will need to work toward goals at their own pace. Technology readiness levels (see Chapter 2) are not a judgment of agencies' tech savviness, but an acknowledgment they will have different timelines and paths toward the goals and objectives outlined in the previous chapter.

This chapter recommends technology standards agencies should strive to achieve in the next five years to move rural public transit in Michigan forward. Agencies should consider their individual needs and resources when deciding which standards to prioritize.

Technology Readiness Level Gaps & Capabilities

Technology readiness levels are based on an assessment of responses to MDOT's *Transit Technology Assessment Survey* that was conducted in the fall of 2021. Agencies in each readiness level share general characteristics, but these are not uniformly representative of all agencies in each category. This section outlines the general technology uses and gaps in each readiness level.

Technology Readiness Level 1

In general, Level 1 agencies are currently using some technologies and are interested in incorporating additional ones into their operations. These agencies need support from MDOT and more advanced agencies to help them identify needs, learn about available technologies, and implement projects. Agencies in Level 1 are more likely to avoid technology due to the learning curve involved with new technologies, as well as a lack of funding.

Some Level 1 agencies are currently using CAD but the majority are not using CAD or AVL. Many of these agencies are not interested in deploying AVL, but did express interest in CAD. Agencies also expressed interest in fare collection, payroll, and reporting technologies.

Level 1 agencies are generally smaller and rated themselves lower in terms of personal comfort and technological savviness. They also were more likely to think technology would have no impact or would negatively impact ridership.

Technology Readiness Level 2

Level 2 agencies generally use CAD and most agencies have AVL on at least part of their fleet. Those without CAD and AVL are interested in implementing these technologies. Some agencies with CAD appear to be dissatisfied with current CAD platforms. Agencies are interested in fare collection technology and believe it would make work easier.

In general, Level 2 agencies are interested in new technologies but are not seeking them out themselves. They are more likely to avoid technology due to a lack of funding rather than a lack of technical capacity or comfort with technology. Level 2 agencies may need MDOT support with procuring and implementaing technology projects.

Technology Readiness Level 3

Level 3 agencies are generally ready to explore advanced technology solutions and evaluate new technology opportunities without much support from MDOT. All of these agencies use CAD but some are dissatisfied with their current platform. Agencies

generally also have AVL on their entire fleet, but CAD and AVL are not integrated. Agencies are also beginning to explore rider-facing technologies. Agencies are interested in fare collection solutions, and some have deployed app-based fare systems. Agencies are also interested in how technology solutions can improve their maintenance activities.

Technology Readiness Level 4

Level 4 agencies are already implementing innovative transit technologies, though some may need support in finding a best fit, developing partnerships, and exploring new opportunities for further advancement. These agencies are most likely to avoid technology projects due to a lack of funding or staff resources. Three of five agencies participated in the Michigan Mobility Challenge, demonstrating initiative in implementing new technologies.

All of these agencies use CAD and have full fleet AVL coverage. However, three of the five agencies in this group noted that they are dissatisfied with their current scheduling platforms and indicated that an alternative system would have the greatest impact on their operations. Some Level 4 agencies have also implemented either app-based or online fare payment options, and all offer either app-based or online trip booking. Agencies are exploring rider technology amenities including MOD and real-time travel information.

Technology Baseline & Five-Year Standards

Five-year standards (Table 6-1) are intended to guide agencies in each readiness level toward implementing technologies that can help improve service and streamline operations, maintenance, and administration. These standards are not representative of all of the technology opportunities agencies can or should pursue, but are areas that address the needs expressed by agencies and are generally used in the transit industry.

MDOT's expectation is that within the next five years, agencies will achieve, or be on a path to achieve these standards, which will ready them for additional technology improvements.

Table 6-1: General Baseline and Year-Five Technology Standards

Technology	Level1		Level 2		Level 3		Level 4	
	Baseline	Year 5	Baseline	Year 5	Baseline	Year 5	Baseline	Year 5
AVL	○	●	◐	●	◐	●	●	●
CAD	○	●	◐	●	◐	●	●	●
CAD/AVL Integration	○	●	○	●	◐	●	◐	●
GTFS	○	○	○	○	○	◐	◐	◐
Real-Time Travel Info.	○	○	○	◐	◐	●	◐	●
Online/App Ride Booking	○	○	○	○	○	◐	●	●
MaaS	○	●	○	●	○	●	○	●
Advanced MaaS Modules	○	○	○	○	○	◐	○	●
Electronic Fare Collection	○	○	○	◐	○	◐	◐	●
Fare Payment Apps/Online Payment	○	○	○	◐	◐	●	◐	●
On Demand Service	○	○	○	○	○	○	◐	●
VPI	○	●	◐	●	◐	●	◐	●
Comfort with Standard Office Tech.	○	●	◐	●	●	●	●	●
Access to IT Support	◐	●	◐	●	◐	●	◐	●
Asset/Fleet Mgmt. Software	○	○	◐	●	◐	●	◐	●
Vehicle Health Diagnostic Tools	◐	◐	◐	◐	◐	◐	◐	●
TAM, Capital, and Fleet Plans	○	●	◐	●	◐	●	◐	●
Zero-Emissions Transition Plans	○	○	○	●	○	●	◐	●
Low/No Fleets	◐	○	◐	○	◐	●	◐	●
Cybersecurity Policies & Standards	◐	●	◐	●	◐	●	◐	●
New Tech. Pilots	○	○	○	○	○	◐	●	●

○ Few to None   ◐ Some to Most   ● All

7

Initiatives

Initiatives outline key actions that MDOT and rural transit agencies can take to implement projects that will help advance goals and objectives. This chapter identifies initiatives that MDOT and Michigan's rural transit agencies can implement to help achieve the goals, objectives, and technology standards outlined in previous chapters.

Initiatives are grouped by the primary goal and objective they advance, though they may impact multiple goals and objectives. Figure 7-1 lists the goals alongside the icon representing them. Timelines are the period to complete an individual initiate and assume any prerequisites are completed. Relative costs are program-level assumptions to implement the project at participating agencies. These costs will need to be assessed in detail as initiatives are pursued, and will vary depending on how many agencies participate and the final project scope. Costs categories are:

- $: Up to $250,000
- $$: $250,000 to $1M
- $$$: $1M to $5M
- $$$$: Over $5M

Figure 7-1: Goal Icons

1 EDUCATION

2 EFFICIENCY

3 MOBILITY

4 SAFETY & SECURITY

5 PARTNERSHIPS

6 SYSTEM CONDITION

List of Initiatives

Goal 1: EDUCATION

Objective 1.1: Establish and maintain a forum for learning about new and trending sustainable technologies and identifying best practices and lessons learned.

1.1.1	Establish a statewide Rural Transit Technology Committee (RTTC).		
Description & Benefits	Expanding on MDOT's Tech Talk series, the RTTC would provide a forum for MDOT and agencies to stay up to date on new and trending technologies. The committee would identify technology and training needs, organize vendor presentations, attend industry conferences, discuss challenges and lessons learned, and foster peer exchanges between Michigan's transit agencies as well as agencies across the country. The RTTC would track trends, such as GTFS-flex and automated wheelchair securement systems. The committee would also play a key role in implementing technology strategies by selecting projects, identifying champions and opportunities for collaboration, and coordinating pilots and funding. At times, the committee may rely on MDOT, MPTA, MASSTrans, or individual agencies to procure services or provide support.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	< 1 Year	Relative Costs	$
Prerequisites	None		
Next Steps	1. MDOT, in partnership with MPTA and MASSTrans, would establish the committee and solicit a call for membership to all agencies. The committee should be composed of representatives from MDOT and agencies in each readiness level. 2. Once established, the committee would elect leadership positions and determine roles, meeting schedules, and agendas. 3. The committee would explore opportunities to support the implementation of the priorities identified in this plan.		
Goals Addressed			

Goal 1: EDUCATION

Objective 1.2: Implement trainings to ensure transit agencies are proficient in standard technologies that are required to conduct business and prepare agencies to implement new and trending technologies.

1.2.1 Identify and implement trainings on standard business technologies that are required to conduct business.

Description & Benefits	Trainings will be focused on standard business programs, such as e-signing documents, data management, and virtual conferencing to help improve staff proficiency with these tools. This will also help MDOT reduce the time it spends providing technical assistance.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1 Year	Relative Costs	$
Prerequisites	1.1.1: Establish a statewide RTTC		
Next Steps	1. The RTTC would identify standard technology categories that all agencies should be proficient in and would help identify trainings and resources for agencies to utilize, including MDOT, the National Rural Transit Assistance Program (RTAP), Community Transportation Association of America (CTAA), National Transit Institute (NTI), the National Center for Applied Transit Technology (N-CATT), the Michigan Department of Labor and Economic Opportunity, and private vendors. 2. The RTTC would review and update the list of standard technologies on an annual basis.		
Goals Addressed			

1.2.2 Develop an online resource library with information and trainings on current, new, trending, and advanced technologies.

Description & Benefits	Developing resources to help agencies stay up to date on new and trending technologies will ensure agencies are able to adapt to new standards and deliver services as efficiently as possible. An awareness of new technologies will help agencies understand how technologies can be leveraged to address existing challenges and provide a high-quality rider experience.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1-2 Years	Relative Costs	$
Prerequisites	1.1.1: Establish a statewide RTTC		
Next Steps	1. MDOT, MPTA, or MASSTrans would develop a webpage to host the resource library. 2. The RTTC would track technology trends and identify relevant resources to include in an online library. 3. Agencies would reference resources as needed to research technologies and select trainings. 4. Agencies would recommend new resources to be added to the library.		
Goals Addressed			

Goal 1: EDUCATION

Objective 1.3: Educate the public on existing transit services and develop outreach strategies to ensure that riders are comfortable using public-facing technologies.

1.3.1 Ensure all transit agencies have and maintain websites with critical service and contact information.

Description & Benefits	Many people rely on websites for information about transit services, including types of services, schedules and hours, service areas, fares, eligibility, how to book a trip, and contact information. More tech-savvy riders might also seek to schedule and pay for trips through an agency website. Establishing a baseline for all transit agencies to have a public facing website with important information for current or potential riders will provide consistency and help people understand what options are available, how to use them, and what they cost, and can potentially increase ridership and public support for services.		
Benefiting Groups	Transit Agencies, Riders, General Public	Readiness Levels	1, 2, 3, 4
Timeline	1-2 Years	Relative Costs	$-$$
Prerequisites	None		
Next Steps	1. MDOT would support agencies by developing guidelines for information that is required on websites and generating service area maps. 2. MDOT or the RTTC would provide support and resources for creating websites including tools like National RTAP's Website Builder. 3. Agencies that are part of county or city governments may have to work with those entities to update their websites or create separate ones.		
Goals Addressed			

1.3.2 Develop a public education and training toolkit for public-facing technologies.

Description & Benefits	As new public-facing technologies are deployed, such as web- and app-based booking or fare payment tools, agencies will need to make sure that current and potential riders are aware of the technology and how to use it. OPT is currently developing a guide to help agencies budget for marketing and education to implement new technologies. As a next step, a public education and training toolkit will help agencies effectively communicate and educate people on how to use new technologies. This will encourage public adoption of new technologies, and therefore, the success of projects.		
Benefiting Groups	Transit Agencies, Riders, General Public	Readiness Levels	1, 2, 3, 4
Timeline	1-2 Years	Relative Costs	$
Prerequisites	None		
Next Steps	1. MDOT or the RTTC would develop a toolkit of potential strategies for future technology projects with rider-facing components.		
Goals Addressed			

1.3.3 Expand on MDOT's existing public transit virtual marketing strategy to develop agency-specific marketing strategies.

Description & Benefits	MDOT has developed virtual marketing tools to promote public transit across the state that can be adapted to promote rural agencies in smaller markets to raise awareness of existing services.		
Benefiting Groups	MDOT, Transit Agencies, Riders, General Public	Readiness Levels	1, 2, 3, 4
Timeline	1-2 Years	Relative Costs	$$
Prerequisites	None		
Next Steps	1. MDOT would update its virtual marketing toolkit and make it available for agencies to implement to promote local services.		
Goals Addressed			

Goal 2: EFFICIENCY

Objective 2.1: Ensure all transit agencies have access to IT support so they are able to quickly resolve technical issues.

2.1.1   Provide IT support to all rural transit agencies.

Description & Benefits	Agencies without access to IT support may have challenges reacting to technical issues as they occur, but smaller agencies may not need or be able to afford full-time IT staff. Providing IT support to agencies would help agencies quickly address technology issues and decrease the amount of time that hardware, software, or systems are down.		
Benefiting Groups	Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1 Years	Relative Costs	$$
Prerequisites	None		
Next Steps	1. MDOT would determine the level of need for IT support at rural transit agencies. 2. RTTC would explore strategies for implementing IT support at agencies that lack it or need additional support.		
Goals Addressed			

Goal 2: EFFICIENCY

Objective 2.2: Develop a strategy for ensuring that new technologies incorporate opportunities for interoperability between platforms and agencies to streamline operations, data collection, and integration.

2.2.1   Develop technology interoperability policies and standards for future technology projects.

Description & Benefits	Some technologies need to connect and communicate with one another in order to function effectively. It is common for products that need to work together to be made by different vendors. When seeking to create multiagency platforms, such as MaaS or joint fare collection systems, agencies might use different vendors whose systems need to integrate. Interoperability standards help ensure these different products are able to communicate though industry standard protocols, and that systems operate at their highest levels of efficiency.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1-2 Years	Relative Costs	$
Prerequisites	1.1.1: Establish a statewide RTTC		
Next Steps	1. MDOT, the RTTC and rural transit agencies would identify current industry standards and best practices for interoperability with transit technology systems. 2. MDOT and rural transit agencies would include industry standards and best practices into future procurements.		
Goals Addressed			

Goal 2: EFFICIENCY

Objective 2.3: Expand the use of CAD/AVL to all agencies to more efficiently provide transit service.

2.3.1   Inventory CAD and AVL technologies currently in use in Michigan.

Description & Benefits	The *Transit Technology Assessment Survey* provided information on the number of agencies using CAD and AVL, but additional information about the types of technologies in use, integration with other platforms, and agencies' level of satisfaction with their current hardware and software would help MDOT and agencies understand needs and required levels of funding to develop specifications and to fully implement these technologies.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	< 1 Year	Relative Costs	$
Prerequisites	None		
Next Steps	1. MDOT staff would survey all rural transit agencies to catalog the number of vehicles currently equipped with AVL, the types of technologies in use, and how they integrate with other technologies. The survey would include more detailed questions on CAD use, integration, satisfaction with current platforms, and needs.		
Goals Addressed			

2.3.2   Deploy AVL on all rural public transit vehicles in Michigan.

Description & Benefits	AVL allows transit agencies to monitor vehicle locations in real-time, helping them adapt schedules and routes, which can improve efficiency. AVL can also be used to provide real-time information to riders through various media including, SMS, mobile apps, websites, and MaaS platforms.		
Benefiting Groups	Transit Agencies, Riders	Readiness Levels	1, 2, 3, 4
Timeline	1-5 Years	Relative Costs	$$-$$$
Prerequisites	2.2.1: Develop technology interoperability policies and standards for future technology projects 2.3.1: Inventory CAD and AVL technologies currently in use in Michigan		
Next Steps	1. MDOT, in partnership with the RTTC and transit agencies, would develop baseline AVL specifications. 2. Using jointly developed specifications, MDOT would establish contracts for AVL equipment that agencies can use to make purchases. Additionally, AVL specifications would be included in all RFPs for vehicle contracts ensuring agencies have the option to have new vehicles delivered equipped with the technology. MDOT should consider AVL procurements in conjunction with a CAD procurement. Depending on the types of AVL and vehicle replacement schedules, some agencies may choose to delay implementation to align with new vehicle purchases.		
Goals Addressed			

2.3.3 — Deploy CAD hardware and software at all public transit agencies in Michigan.

Description & Benefits	CAD can help agencies efficiently schedule trips and adapt to on-the-ground changes. Greater efficiency allows agencies to provide more service with the same resources, and help agencies track performance and generate reports. CAD can also be integrated with booking platforms that reduce the time it takes riders and call center staff to schedule trips.		
Benefiting Groups	Transit Agencies, Riders	Readiness Levels	1, 2, 3, 4
Timeline	1-5 Years	Relative Costs	$$$
Prerequisites	2.2.1: Develop technology interoperability policies and standards for future technology projects 2.3.1: Inventory CAD and AVL technologies currently in use in Michigan		
Next Steps	1. In consultation with the RTTC and agencies, MDOT would develop specifications for CAD. 2. MDOT would conduct a statewide procurement to generate a contract, or contracts, with CAD vendors. Agencies would then be able to purchase systems that meet their needs. MDOT should consider procuring CAD and AVL together and should consider interoperability requirements for future rider booking websites and apps, and MaaS.		
Goals Addressed			

Goal 2: EFFICIENCY

Objective 2.4: Implement staffing and payroll software platforms to reduce the challenges agencies experience in these areas.

2.4.1 — Explore opportunities to implement HR, payroll, and employee scheduling technologies, and for integrations with CAD platforms.

Description & Benefits	Staffing and payroll platforms can help reduce the time staff spend on scheduling employees and tracking hours. At larger rural agencies, staff management can be incorporated into CAD programs, tying trip schedules and staff needs.		
Benefiting Groups	Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1 - 2 Years	Relative Costs	$$$
Prerequisites	None		
Next Steps	1. MDOT would release an RFI to better understand current staff management technology platforms that can reduce the burden agencies experience. The RFI should be broad to capture possibilities for CAD integration at larger agencies, as well as more basic needs at smaller ones. 2. Based on RFI responses, MDOT should utilize the RTTC to determine the best course of action.		
Goals Addressed			

Goal 2: EFFICIENCY

Objective 2.5: Implement VPI tools to increase engagement with riders and better understand their needs.

2.5.1   Support expanded use of VPI techniques at rural transit agencies.

Description & Benefits	VPI tools can help agencies communicate with riders and the general public, increasing public engagement and awareness. VPI can be a useful tool in rural areas where it may be challenging for people across a large service area to attend in-person meetings and can also allow people who might not be available during meetings to stay engaged and provide feedback. MDOT's *Virtual Public Involvement Benefits and Barriers: A Practical Guide to VPI Tools*, a June 2022 Tech Talk, and N-CATT's *Virtual Public Engagement Guidebook* are resources agencies can use to learn about tools and techniques for successful virtual public engagement.		
Benefiting Groups	Transit Agencies, Riders, General Public	Readiness Levels	1, 2, 3, 4
Timeline	2 - 3 Years	Relative Costs	$-$$
Prerequisites	None		
Next Steps	1. MDOT would provide technical assistance to help agencies seeking to implement VPI tools. This would include helping agencies identify needs. 2. As required, MDOT would provide funding and procurement support to agencies seeking to implement technologies that foster VPI best practices.		
Goals Addressed			

Goal 2: EFFICIENCY

Objective 2.6: Implement low- and no-emission vehicle technologies to promote sustainability and reduce operating costs.

2.6.1   Develop rural transit agency zero-emission transition plans.

Description & Benefits	Zero-emission transition plans prepare agencies to convert to greener fleets and ensure they are eligible to apply for FTA Section 5339(c) Low or No Emission Vehicle Program funds. A combined statewide rural transit agency-specific vehicle transition plan would help MDOT set statewide goals, track progress, and prioritize funding for low/no vehicles and infrastructure. Developing these plans is also an opportunity to educate agencies on the benefits and challenges associated with different propulsions systems. Zero-emissions transition plans should consider strategies for addressing challenges related to higher capital costs for vehicles and infrastructure, and for purchasing and installing charging and fueling infrastructure.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	2 - 5 Years	Relative Costs	$$
Prerequisites	None		
Next Steps	1. Leveraging partnerships, such as MDOT's with CALSTART, transit agencies would develop zero-emission vehicle transition plans and submit them to MDOT. 2. MDOT would combine agency transition plans into a statewide plan, set and monitor statewide goals, and consider strategies for funding.		
Goals Addressed			

2.6.2 Integrate low- and no-emission vehicles into rural agency fleets.

Description & Benefits	Low/no vehicles can reduce tailpipe emissions, reducing air pollution in the communities transit agencies serve. These vehicles can also help agencies reduce fuel and maintenance costs over the course of their life cycles.		
Benefiting Groups	Transit Agencies, Riders, General Public	Readiness Levels	3, 4
Timeline	2 - 5 Years	Relative Costs	$$$$
Prerequisites	Initiative 2.6.1: Develop rural transit agency zero-emission transition plans and incorporate them into a statewide document.		
Next Steps	1. On behalf of transit agencies, MDOT would apply for discretionary grant funding programs, such as FTA's Section 5339(c), to pilot low/no technologies and begin to transition fleets.		
	2. MDOT is developing statewide low/no vehicle contracts that agencies can use to procure vehicles. MDOT would continue to provide agencies with procurement support.		
	3. As the cost of low/no vehicles decreases, agencies may be able to use Section 5311 funding to support additional vehicles.		
Goals Addressed			

Goal 3: MOBILITY

Objective 3.1: Improve trip planning and booking for riders and increase access to real time travel information through the implementation of MOD, MaaS, and/or app-based and online tools.

3.1.1 Implement SMS systems

Description & Benefits	SMS, or text messaging, can be used to provide riders with real-time travel information and service updates. Text messages can be read on cellphones and do not require smartphones, internet access, or apps.		
Benefiting Groups	Transit Agencies, Riders	Readiness Levels	1, 2, 3, 4
Timeline	2 - 3 Years	Relative Costs	$$
Prerequisites	None would be required for general messages, such as notices about weather delays, route changes, or mask updates. For vehicle location information agencies should consider the following:		
	2.2.1: Develop technology interoperability policies and standards for future technology projects.		
	2.3.2: Deploy AVL on all rural public transit vehicles in Michigan.		
Next Steps	1. The RTTC would gauge interest in SMS systems.		
	2. If there is a broad need, MDOT would consider developing statewide contracts that agencies can use, and adding specifications to CAD contracts. Alternatively, transit agencies may procure SMS systems individually or jointly, depending on needs.		
Goals Addressed			

3.1.2   Pilot online and app–based rider booking tools.

Description & Benefits	Online and app-based rider booking would allow riders or caregivers to quickly schedule trips during and outside of call center business hours. It would also reduce the time callers spend on hold, and the amount of time staff spend on the phone. A multi-agency rider booking platform would allow riders who transfer between services to schedule trips at once, though the RTTC should consider reviewing data to determine the level of need for multi-agency services. These options may also be integrated with CAD systems, automating part of the scheduling process. Additionally, this type of tool can be integrated with a MaaS platform.		
Benefiting Groups	Transit Agencies, Riders,	Readiness Levels	3, 4
Timeline	1 - 2 Years	Relative Costs	$$
Prerequisites	2.2.1: Develop technology interoperability policies and standards for future technology projects.		
Next Steps	1. MDOT and the RTTC would further explore the number of agencies currently using web portals or apps to schedule rides and get an understanding of successes and lessons learned. 2. Level 3 and 4 transit agencies would seek MDOT funding to implement online and app-based booking tools for riders. Leveraging the RTTC, agencies should determine whether it is beneficial to partner on joint platforms that are integrated with each of their CAD systems. 3. Early in the development of the platform, leading agencies should consider future MaaS integration.		
Goals Addressed			

3.1.3   Develop a statewide MaaS platform.

Description & Benefits	A statewide MaaS platform would integrate information about all public transit services across the state in one place, increasing access to mobility information. For more advanced agencies, the platform can include additional functionality including trip planning, trip booking, fare payment, and real-time information. As applicable, the platform can also include other mobility services, including bike share, scooter share, car share, taxis, TNCs, and intercity services. This platform will improve access to services, and increase public awareness of services, potentially attracting new ridership.		
Benefiting Groups	MDOT, Transit Agencies, Riders, General Public	Readiness Levels	1, 2, 3, 4
Timeline	2 Years	Relative Costs	$$$
Prerequisites	1.3.1: Ensure all transit agencies have websites or webpages with critical service and contact information. 2.2.1: Develop technology interoperability policies and standards for future technology projects.		
Next Steps	1. MDOT is in the process of assessing the responses from its MaaS RFI and will determine how MaaS can be implemented in Michigan. This assessment may result in developing specifications and an RFP for a MaaS implementation. 2. In its initial phase, the MaaS platform should be scaled to the readiness level of each agency. For Level 1 agencies, the platform might include a static list of services and contact information, and map service areas. For Level 2 and 3 agencies, the platform might include additional features, such as real-time information on fixed-routes service. For Level 4 agencies, the application might include trip planning, booking, and/or fare payment.		
Goals Addressed			

3.1.4   Expand the functionality of the MaaS platform to include rider booking and fare collection.

Description & Benefits	After the initial launch of statewide MaaS, additional features would be added to improve the functionality of the platform. Level 3 and 4 agencies, particularly those operating fixed-route services can add trip planning, booking, and payment components to the platform, and can also add other mobility services, such as TNCs. This would increase accessibility and connectivity for riders and potential riders, create a seamless system where riders can book trips and track their transportation. These features would also reduce staff hours on trip scheduling and provide data that can be used in service development for local and regional services.

Benefiting Groups	MDOT, Transit Agencies, Riders, General Public	Readiness Levels	3, 4
Timeline	1 - 2 Years	Relative Costs	$$$

Prerequisites	3.1.2: Pilot online and app-based rider booking tools.
	3.1.3: Develop a statewide MaaS platform.
	3.2.2: Develop a ConOps to determine the best strategies for increasing the use of electronic fare collection.
Next Steps	1. MDOT and the MaaS platform provider would work directly with transit agencies to add trip scheduling, booking, and fare payment tools to the platform. These partners would explore integrating these components with existing systems to streamline processes. The focus of this effort would be on Level 3 and 4 agencies with consideration for further expansion as Level 1 and 2 agencies deploy CAD/AVL and electronic fare collection.
	2. MDOT would also explore opportunities to integrate these functions with proprietary MaaS platforms, such as Transit App and Moovit.
Goals Addressed	

3.1.5   Expand the use of publicly available General Transit Feed Specification (GTFS) data.

Description & Benefits	GTFS is a standardized data format that allows public and private software to read data and publish data on fixed-route transit services. GTFS is available in static and real-time formats, though agencies would need AVL on vehicles in order to publish real-time vehicle arrivals.
	GTFS can help agencies monitor fixed-route service and allows riders to plan trips. It also makes it easier for potential riders to understand services that are available. GTFS is a critical component of trip-planning tools and MaaS integration.
	Agencies need to have websites with routing and scheduling information and host GTFS data for some private trip-planning tools to work.

Benefiting Groups	Transit Agencies, Riders, General Public	Readiness Levels	2, 3, 4
Timeline	1-4 Years	Relative Costs	$$

Prerequisites	1.3.1: Ensure all transit agencies have and maintain websites with critical service and contact information.
	2.3.2: Deploy AVL on all rural public transit vehicles in Michigan.
Next Steps	1. Agencies will attend trainings on developing GTFS and system maps.
	2. Agencies providing fixed-route services will develop and publish GTFS feeds on their websites. National RTAP's GTFS Builder can be utilized to develop feeds. MDOT would provide additional support as needed.
Goals Addressed	

3.1.6   Pilot GTFS–flex.

Description & Benefits	GTFS-flex has the potential to allow riders to see demand-response services in trip-planning tools. There have been a few GTFS-flex pilots. The technology is not ready for large-scale use but is new technology that might benefit riders and potential riders in the future. It may also be a valuable tool for agencies to communicate service options.		
Benefiting Groups	Transit Agencies, Riders, General Public	Readiness Levels	4
Timeline	1 - 2 Years	Relative Costs	$$
Prerequisites	None		
Next Steps	1. Through the RTTC, MDOT and transit agencies will stay up to date on GTFS-flex. 2. RTTC would set up or attend presentations by transit agencies that have piloted GTFS-flex. 3. When the technology is more mature, the committee would identify champions at Level 4 agencies to implement a demonstration project or projects.		
Goals Addressed			

3.1.7   Provide on–demand services to supplement demand–response services.

Description & Benefits	Many services require advanced booking and cannot accommodate immediate transportation needs that may arise. Decreasing booking windows and providing same-day or on-demand services would increase mobility and improve the quality of life of people in rural areas.		
Benefiting Groups	Riders	Readiness Levels	3, 4
Timeline	1 - 2 Years	Relative Costs	$$$
Prerequisites	None		
Next Steps	1. Agencies would explore opportunities to implement on-demand services. The RTTC would be one potential forum for identifying possible technologies, vendors, and/or partnerships transit agencies can use to provide on-demand service. 2. MDOT and transit agencies would put data sharing agreements in place with vendors to ensure that they have access to trip and performance information (Initiative 5.1.1). 3. MDOT and the RTTC would explore opportunities to incorporate on-demand services in the statewide MaaS platform (Initiative 3.1.3).		
Goals Addressed			

Goal 3: MOBILITY

Objective 3.2: Increase fare payment options, such as fare-payment apps, to reduce agencies' reliance on cash-based payments.

3.2.1 Develop a Concept of Operations (ConOps) to determine the best strategies for increasing the use of electronic fare collection.

Description & Benefits	A ConOps will determine the best approach or approaches for agencies to implement electronic fare collection across the state. The ConOps should explore opportunities to share costs, combine reporting, and offer riders more payment options.		
Benefiting Groups	MDOT, Transit Agencies, Riders	Readiness Levels	1, 2, 3, 4
Timeline	1 - 2 Years	Relative Costs	$$
Prerequisites	None		
Next Steps	1. MDOT, with a steering committee composed of RTTC members and consultant support, would create a ConOps to determine the best approach to increasing the use of electronic fare collection and payment across the state. This study would inventory the current fare collection methods agencies are using. Options explored should include a variety of fare media and the development of a statewide fare system or joining an existing fare consortium, as well as smaller scale options. The assessment would result in the creation of specifications that can be used to procure hardware, software, equipment, and any additional planning services. 2. Depending on the identified solution(s), a pilot with Level 3 and 4 agencies may help address challenges before expanding to other agencies.		
Goals Addressed			

3.2.2 Expand the use of fare payment apps.

Description & Benefits	Fare payment apps can be quickly implemented, have low startup costs, and can add payment options for riders. Agencies can install validators or choose to have operators visually validate fares. Visual validation reduces the implementation burden because it does not require additional equipment. Installing validators requires procuring onboard and back-office equipment and software. Agencies opting to install validators would need to identify funding and allot additional time to implement the project. Validators can also be added on in a later phase.		
Benefiting Groups	Transit Agencies, Riders	Readiness Levels	2, 3, 4
Timeline	1 Year	Relative Costs	$-$$
Prerequisites	2.2.1: Develop technology interoperability policies and standards for future technology projects. 4.3.2: Develop cybersecurity standards, protocols, and trainings.		
Next Steps	1. MDOT can review existing specifications that agencies have used to implement fare apps, and revise them based on lessons learned. These can then be used to develop a contract or contracts that transit agencies can use to deploy fare payment apps. 2. MDOT may also consider adding fare payment as an optional component in a CAD procurement. 3. In partnership with the RTTC, MDOT would consider developing specifications and contracts for validators that agencies can purchase from.		
Goals Addressed			

Goal 4: SAFETY & SECURITY

Objective 4.1: Expand the use of ADAS to improve safety for all road users.

4.1.1 Install ADAS on rural transit agency vehicles.

Description & Benefits	ADAS can improve safety on transit agency vehicles by providing operators warnings about potential crashes. Improved safety can reduce crashes keeping staff, riders, and other road users safer. Reducing crashes can also help keep vehicles in a state of good repair.		
Benefiting Groups	Transit Agencies, Riders, General Public	Readiness Levels	3, 4
Timeline	1 - 3 Years	Relative Costs	$$$
Prerequisites	None		
Next Steps	1. Using lessons learned from BATA's CAWS pilot, the RTTC would identify opportunities to expand ADAS to additional rural transit agencies, as well as funding resources. 2. MDOT would include ADAS specifications in future vehicle contracts.		
Goals Addressed			

Goal 4: SAFETY & SECURITY

Objective 4.2: Implement security and surveillance cameras at transit agency facilities and infrastructure, including on board revenue and nonrevenue vehicles.

4.2.1 Assess transit facility and infrastructure security needs and implement security solutions.

Description & Benefits	Onboard cameras can be used to surveil vehicles and investigate incidents or crashes. Facility security and surveillance systems can help agencies protect assets from theft and vandalism. In addition to cameras, agencies would need software and monitors or video walls to view camera feeds, as well as a communications medium to send and receive video feeds.		
Benefiting Groups	Transit Agencies, Riders	Readiness Levels	1, 2, 3, 4
Timeline	1 - 2 Years	Relative Costs	$$
Prerequisites	None		
Next Steps	1. Transit agencies with security and surveillance needs should partner to research and explore options and develop specifications. 2. The RTTC might serve as an opportunity to explore options and determine how many agencies have security and surveillance needs.		
Goals Addressed			

Goal 4: SAFETY & SECURITY

Objective 4.3: Develop and implement cybersecurity standards and policies to ensure that all transit agencies are employing best practices and protecting assets and sensitive data.

4.3.1 Conduct cybersecurity threat assessments.

Description & Benefits	As technologies become a more integral part of daily operations, cybersecurity risks will increase. Determining gaps in cybersecurity can help transit agencies determine the best approaches to mitigate risk and keep rider and agency information and systems secure. Risk assessments can also help agencies learn about cybersecurity threats and best practices for addressing them.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1 Year	Relative Costs	$$
Prerequisites	None		
Next Steps	1. Agencies would apply for funding (such as MDOT's SDNT program) to hire consultant support to conduct a cybersecurity assessments that are applicable to rural transit agencies.		
Goals Addressed			

4.3.2 Develop cybersecurity standards, protocols, and trainings.

Description & Benefits	Cybersecurity standards and protocols can help ensure all agencies are employing best practices and are prepared to respond to potential breaches. Basic elements might include developing familiarity with the National Institute of Standards and Technology (NIST) framework, implementing unique password change policies, understanding phishing attempts, differentiating access control, and reporting cybersecurity incidents to the National Cybersecurity and Communications Integration Center (NCCIC).		
Benefiting Groups	Transit Agencies, Riders	Readiness Levels	1, 2, 3, 4
Timeline	1 - 2 Years	Relative Costs	$$
Prerequisites	4.3.1: Conduct cybersecurity threat assessments.		
Next Steps	1. Using recommendations from the cybersecurity threat assessments (Initiative 4.3.1), MDOT would develop cybersecurity standards, protocols, and training resources for agencies to follow and reference.		
	2. Cybersecurity resources would be updated annually with consideration to findings in cybersecurity threat assessments, and federal, state, and local guidance.		
	3. Transit agencies that are part of a county or municipal government would ensure they are also following local standards and protocols.		
	4. MDOT and transit agencies would require cybersecurity expectations and specifications in all software procurements.		
Goals Addressed			

Goal 5: PARTNERSHIPS

Objective 5.1: Develop and maintain integrated reporting and data collection systems for MDOT and transit agencies.

5.1.1 Develop a data management plan addressing data quality, data stewardship, data flow, and data sharing agreements.

Description & Benefits	Developing data governance standards can help make sure that future projects that involve multiple stakeholders, whether MDOT, agencies, nonprofit organizations, or private companies, have clear processes, procedures, and data ownership. This can ensure that required data is timely, accurate, and protected.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1 - 2 Years	Relative Costs	$
Prerequisites	None		
Next Steps	1. MDOT, with a steering committee composed of RTTC members, would develop a statewide data plan to guide the implementation of future projects. MDOT's Office of Enterprise Information Management would be a partner in this effort and may have strategies that can be adapted to rural transit agencies. 2. MDOT and transit agencies would include data expectations and requirements into future procurements to ensure the ease of data sharing.		
Goals Addressed			

Goal 5: PARTNERSHIPS

Objective 5.2: Create partnerships to develop and/or procure technologies.

5.2.1 Develop a strategy document to identify opportunities for collaboration between MDOT, transit agencies, nonprofit organizations, and other entities.

Description & Benefits	Project partnerships can help MDOT and transit agencies reduce costs by realizing economies of scale and share roles that a single agency may not have the capacity for. Partnerships can also promote peer-to-peer learning and collaborative approaches to address challenges.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1 Year	Relative Costs	$
Prerequisites	None		
Next Steps	1. The RTTC would develop a strategy for identifying opportunities for joint procurements and MDOT-led procurements, and approaches for developing project partnerships. 2. MDOT and the RTTC would evaluate all technology procurements to determine the best procurement approach, whether led by MDOT, an individual agency, or a joint procurement. 3. RTTC would conduct an annual review of upcoming projects and funding opportunities to ensure that partnerships are identified early.		
Goals Addressed			

Goal 6: SYSTEM CONDITION

Objective 6.1: Increase the use of asset management tools to increase the efficiency of maintenance staff and accuracy of reporting.

6.1.1 Deploy asset management hardware and software.

Description & Benefits	Asset management software allows agencies to inventory and track the condition of vehicles, equipment, and facilities. Programs can also be used to schedule and document maintenance activities, create checklists and workorders, and generate reports on asset performance and compliance. Asset management software can also help agencies use standardized condition metrics.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	2, 3, 4
Timeline	2 - 3 Years	Relative Costs	$$$
Prerequisites	None		
Next Steps	1. MDOT, in partnership with transit agencies, would lead a procurement to develop a contract, or contracts, to purchase transit asset management hardware and software. 2. Agencies would purchase and utilize asset management tools.		
Goals Addressed			

6.1.2 Increase the use of vehicle diagnostics tools.

Description & Benefits	Vehicle diagnostic tools enable rural transit agencies to diagnose issues quickly so they can focus time on repairs. These tools can also help identify problems before they occur and document issues.		
Benefiting Groups	Transit Agencies, Riders, General Public	Readiness Levels	1, 2, 3, 4
Timeline	1-2 Years	Relative Costs	$
Prerequisites	None		
Next Steps	1. MDOT, in partnership with transit agencies, would lead a procurement to develop a contract, or contracts, to purchase vehicle diagnostic tools. MDOT should consider including these tools in future vehicle contracts. 2. Agencies would purchase and utilize vehicle diagnostic tools.		
Goals Addressed			

6.1.3 Utilize radio frequency identification (RFID) tags and scanners to maintain inventories.

Description & Benefits	RFID tags and scanners can be used to track parts inventories and automatically reorder parts when stock goes below a predefined level. This can help ensure that parts are always available, and reduces staff time required for inventory reconciliation.		
Benefiting Groups	Transit Agencies	Readiness Levels	2, 3, 4
Timeline	1-2 Years	Relative Costs	$$
Prerequisites	None		
Next Steps	1. Transit agencies would partner to procure inventory systems that rely on RFID tags, or similar technologies.		
Goals Addressed			

Goal 6: SYSTEM CONDITION

Objective 6.2: Coordinate asset management and capital planning across all agencies

6.2.1 Establish statewide performance indicators and benchmarks to measure agency performance consistently.

Description & Benefits	Statewide condition assessment standards help ensure that agencies are consistently measuring asset conditions. This will help MDOT monitor and report on asset condition and prioritize funding.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1 - 3 Years	Relative Costs	$
Prerequisites	None		
Next Steps	1. MDOT is currently conducting a facilities condition assessment of all rural transit agency facilities and creating standard metrics. 2. Going forward, agencies will be able to use these metrics to uniformly assess asset condition. 3. This process can be replicated as needed to ensure other assets are also being consistently assessed.		
Goals Addressed			

6.2.2 Develop statewide and agency fleet management plans.

Description & Benefits	Fleet management plans help agencies schedule vehicle maintenance, replacement, and expansion, and coordinate funding to ensure they can keep fleets in a state of good repair. Zero-emission transition plans can supplement fleet management plans to align these vehicles with replacement and expansion plans.		
Benefiting Groups	MDOT, Transit Agencies	Readiness Levels	1, 2, 3, 4
Timeline	1-2 Years	Relative Costs	$
Prerequisites	2.6.1: Develop rural transit agency zero-emission transition plans and incorporate them into a statewide document.		
Next Steps	1. MDOT would start requiring fleet management plans as part of its annual application process. 2. MDOT would combine fleet management plans into a statewide document, which would be used to prioritize funding and grant applications, and to track progress. 3. Transit agencies can develop plans in-house, or partner with MDOT or other agencies to procure consultant support.		
Goals Addressed			

6.2.3 Develop a statewide rural transit capital plan.

Description & Benefits	A capital plan will allow MDOT to coordinate and prioritize investments, procurements, and grant applications, helping ensure that statewide assets are in a state of good repair. Capital plans should be updated every two years.		
Benefiting Groups	MDOT, Transit Agencies, Riders	Readiness Levels	1, 2, 3, 4
Timeline	1 - 2 Years	Relative Costs	$$
Prerequisites	6.2.3: Develop statewide and agency fleet management plans.		
Next Steps	1. MDOT would develop fleet management plan spreadsheet and document templates for agencies to use. 2. MDOT would require capital plans as part of its annual application process. 3. Transit agencies can develop plans in-house, or partner with MDOT or other agencies to procure consultant support. 4. MDOT would combine capital plans into a statewide document, which would be used to prioritize investments, procurements, and grant applications, and to track progress.		
Goals Addressed			

Goal 6: SYSTEM CONDITION

Objective 6.3: Improve the energy efficiency of transit facilities.

6.3.1 Implement smart and energy–efficient systems.

Description & Benefits	Bringing smart and energy-efficient systems to rural transportation agencies could decrease energy costs and CO2 emissions.		
Benefiting Groups	Transit Agencies	Readiness Levels	2, 3, 4
Timeline	< 1 - 5 Years	Relative Costs	$$$
Prerequisites	None		
Next Steps	1. Transit agencies would use the RTTC to identify best practices for energy-efficiency including smaller initiatives, such as switching to LED light bulbs, to larger projects, like installing solar panels or rainwater collection.		
Goals Addressed			

Ranking Initiatives

Given funding and capacity realities, it is unlikely that MDOT and the state's rural transit agencies will be able to carry out all, or even most of the initiatives identified in the previous section. To determine which initiatives MDOT and transit agencies should prioritize, they were ranked against each other based on the following criteria:

Cost
Project costs are an important factor in considering if a project is feasible and whether it is worth the investment. Based on the initiatives' relative costs, they were given 0, 0.33, 0.66, or 1 point based on their relative costs, with 0 points for the most expensive and 1 point for the least expensive initiatives.

The number of groups that benefit
Initiatives that benefit more parties are more desirable because they will have a larger impact. Initiatives were given 0, 0.33, 0.66, or 1 point based on how many groups (MDOT, Transit Agencies, Riders, and the General Public) they benefit, with 0 points for initiatives only benefiting one group, and 1 point for those benefiting all four.

The number of readiness levels able to participate
Initiatives that can improve the readiness of all agencies are more desirable than those that only impact one or some. Initiatives were given 0, 0.33, 0.66, or 1 point based on how many readiness levels (Level 1, 2, 3 and 4) the initiative is focused on, with 0 points for initiatives only one readiness level would participate in, and 1 point for those that include all four.

The number of goals they address
Initiatives are listed under their primary goal but may help MDOT and transit agencies advance multiple goals. Initiatives that support all six goals were given 1 point, and those that only support one goal were given 0 points. Each additional goal was scored an additional 0.2 points.

Whether or not the initiative can be implemented immediately
Some initiatives may not be able to be carried out until other initiatives are completed, technologies are more mature, or other projects or coordination is completed. If an initiative can be started immediately, it was given 1 point. Projects with critical initiative prerequisites or other delaying factors were given 0 points.

Whether or not the initiative supports integration with other technologies
Projects that can support the implementation of other initiatives or can be integrated with other initiatives will help to create efficiencies. Initiatives that support integration were given 1 point and those that do not were given no points.

Final Scores

The scores were added up, and those with the highest scores are considered priorities. Some priorities may have prerequisites that should be executed as a part of their implementation. The initiatives in order of priority are listed in Table 7-1. This prioritized list is for rural agency consideration. Each agency should review this list and develop specific priorities that are applicable to them and their riders.

Table 7-1: Ranked Technology Initiatives

Rank	No.	Initiative	Cost	Benefiting Groups	Readiness Levels	Number of Goals	Quick Start	Supports Integration	Total Score
1	1.1.1	Establish a statewide RTTC	1.0	0.3	1.0	1.0	1.0	1.0	5.3
2	1.2.2	Online resource library	1.0	0.3	1.0	1.0	1.0	1.0	5.3
3	1.3.1	Updated agency websites	0.7	1.0	1.0	0.4	1.0	1.0	5.1
4	3.1.3	Statewide MaaS platform	0.3	1.0	1.0	0.6	1.0	1.0	4.9
5	3.2.1	Fare collection system ConOps	0.7	0.7	1.0	0.6	1.0	1.0	4.9
6	1.3.2	Public education and training toolkit	1.0	0.7	1.0	0.2	1.0	1.0	4.9
7	2.2.1	Interoperability policies and standards	1.0	0.3	1.0	0.4	1.0	1.0	4.7
8	2.3.1	Inventory CAD and AVL use	1.0	0.3	1.0	0.4	1.0	1.0	4.7
9	5.1.1	Data management plan	1.0	0.3	1.0	0.4	1.0	1.0	4.7
10	5.2.1	Collaboration strategy document	1.0	0.3	1.0	0.2	1.0	1.0	4.5
11	2.3.2	AVL on all rural public transit vehicles	0.7	0.3	1.0	0.4	1.0	1.0	4.4
12	3.1.5	Expand GTFS data	0.7	0.7	0.7	0.4	1.0	1.0	4.4
13	4.3.1	Cybersecurity threat assessments	0.7	0.3	1.0	0.2	1.0	1.0	4.2
14	4.3.2	Cybersecurity standards, protocols, and trainings	0.7	0.3	1.0	0.2	1.0	1.0	4.2
15	2.1.1	Centralized IT support	0.7	0.0	1.0	0.4	1.0	1.0	4.1
16	2.3.3	CAD at all public transit agencies	0.3	0.3	1.0	0.4	1.0	1.0	4.1
17	3.2.2	Fare payment apps	0.7	0.3	0.7	0.4	1.0	1.0	4.1
18	2.5.1	Expanded use of VPI	0.7	1.0	1.0	0.2	1.0	0.0	3.9
19	1.3.2	Virtual marketing strategy for agencies	0.7	1.0	1.0	0.2	1.0	0.0	3.9
20	3.1.2	Online and app-based rider booking tools	0.7	0.3	0.3	0.4	1.0	1.0	3.7
21	1.2.1	Standard business technology trainings	1.0	0.3	0.0	0.2	1.0	1.0	3.5
22	3.1.7	On Demand Services	0.3	0.7	0.3	0.2	1.0	1.0	3.5
23	6.1.1	Asset management hardware and software	0.3	0.3	0.7	0.2	1.0	1.0	3.5
24	6.1.3	Utilize RFID tags and scanners	0.7	0.0	0.7	0.2	1.0	1.0	3.5
25	6.2.2	Statewide and agency fleet management plans	0.7	0.3	1.0	0.4	1.0	0.0	3.4
26	6.2.3	Statewide rural transit capital plan	0.7	0.3	1.0	0.4	1.0	0.0	3.4
27	3.1.4	MaaS platforms with booking and fare modules	0.3	1.0	0.3	0.6	0.0	1.0	3.3
28	3.1.1	Implement SMS systems	0.7	0.3	1.0	0.2	1.0	0.0	3.2
29	2.6.1	Zero-emission transition plans	0.7	0.3	1.0	0.2	1.0	0.0	3.2
30	6.1.2	Vehicle diagnostics tools	0.7	0.0	0.3	0.2	1.0	1.0	3.2
31	4.2.1	Assess security needs and implement solutions	0.7	0.3	1.0	0.0	1.0	0.0	3.0
32	6.2.1	Statewide performance indicators and benchmarks	1.0	0.3	1.0	0.4	0.0	0.0	2.7
33	3.1.6	Pilot GTFS-flex	0.7	0.7	0.0	0.4	0.0	1.0	2.7
34	4.1.1	ADAS	0.3	0.7	0.3	0.2	1.0	0.0	2.5
35	2.4.1	Explore HR, payroll, and employee scheduling tech.	0.3	0.0	1.0	0.0	1.0	0.0	2.3
36	6.3.1	Smart and energy-efficient systems	0.3	0.0	0.7	0.2	1.0	0.0	2.2
37	2.6.2	Low/No vehicles	0.0	0.7	0.3	0.0	1.0	0.0	2.0

8

Implementation Priorities

Given the realities of cost and staff capacity constraints, not all of the initiatives outlined in Chapter 7 will be carried out within the next five years. Six initiatives are recommended as priorities based on input from MDOT and transit agencies and a ranking described later in this chapter. These implementation priorities will help guide the decision making process for implementing additional initiatives within the next five years and beyond.

MDOT should partner with transit agencies to begin moving forward priority initiatives, which are:

- Establish a statewide RTTC.
- Develop an online resource library with information and trainings on current, new, trending, and advanced technologies.
- Ensure all transit agencies have and maintain websites with critical service and contact information.
- Develop a statewide MaaS Platform.
- Conduct a ConOps study to determine the best strategies for increasing the use of electronic fare collection.
- Provide IT support for all Michigan rural transit agencies to utilize.

Establish a statewide RTTC.

Expanding on MDOT's Tech Talk series, the RTTC would provide a forum for MDOT and agencies to stay up to date on new and trending technologies. The committee would identify technology and training needs, organize vendor presentations, attend industry conferences, track technology trends, discuss challenges and lessons learned, and foster peer exchanges between Michigan's transit agencies as well as agencies across the country. The committee would also play a key role in implementing technology strategies by selecting projects, identifying champions and opportunities for collaboration, and coordinating pilots and funding. At times, the committee may rely on MDOT, the Michigan Public Transit Association (MPTA), the Michigan Association of Transportation Systems (MASSTrans) or individual agencies to procure services or provide support.

Implementation Steps

- MDOT would partner with MPTA and MASSTrans to establish the RTTC, either as an MDOT, MPTA, or MASSTrans committee. MDOT would reach out to all rural transit agencies to promote the committee and invite agencies to participate. The committee would be comprised of MDOT and transit agency staff, and should have equal representation for all four readiness levels, and diversity in term of agency sizes, services, and geography, but the committee should be a manageable size. Members must be able to commit time to attend RTTC meetings and support RTTC initiatives on a regular basis.
- Once established, the committee members would define structure, roles, terms, schedules, communications, and procedures. Subcommittees may be established to focus on certain areas, such as training, interoperability, cybersecurity, etc.
- In the RTTC's first meeting, it would discuss the initiatives in this plan and determine how it can support the implementation of these initiatives, particularly the top priorities. The RTTC would develop a framework and milestones for implementing these initiatives and would track progress.

Timeline:
Less than 1 year

Relative Cost:
$

Readiness Levels:
1, 2, 3, 4

Benefiting Groups:
MDOT, Transit Agencies

Prerequisite Initiatives:
None

Develop an online resource library with information and trainings on current, new, trending, and advanced technologies.

Developing resources so that agencies can stay up to date on new and trending technologies will ensure that Michigan's rural agencies are able to adapt to new standards and deliver services as efficiently as possible. An awareness of new technologies will help agencies understand how technologies can be leveraged to provide a high-quality rider experience, and to ensure systems are operating at maximum efficiency.

Implementation Steps

- MDOT would begin this initiative by establishing the RTTC.
- After the establishment of the RTTC, the committee would establish a subcommittee responsible for identifying topics and developing a list of resources.
- MDOT, MPTA, or MASSTrans would create a webpage to host the online resource library. Resources should include documents and links, and contact information for agencies with expertise in topic areas. Examples include:
  - How-to guides, best practices, and checklists.
  - Trainings, webinars, and conferences.
  - National organizations.
  - Transit Cooperative Research Program (TCRP) reports and other studies.
  - Vendor lists.
  - Previously used or developed specifications and RFP documents.
  - Case studies.
- Agencies would reference resources as needed to research technologies and select trainings.
- The resources library should be reviewed and updated on an ongoing basis.
- As agencies implement projects, they should contribute materials that can help other agencies with similar projects.

Timeline:
1 year

Relative Cost:
$

Readiness Levels:
1, 2, 3, 4

Benefiting Groups:
MDOT, Transit Agencies

Prerequisite Initiatives:
Establish a statewide RTTC

Ensure all transit agencies have and maintain websites with critical service and contact information.

Many people rely on websites for information about transit services, including types of services, schedules and hours, service areas, fares, eligibility, how to book a trip, and contact information. More tech savvy riders might also seek to schedule and pay for trips through an agency website.

Not all of Michigan's rural transit agencies currently have websites, and many do not list important information for current or potential riders. Increasing access to information about transportation services will help people understand what options are available, how to use them, and what they cost, and can potentially increase ridership and public support for services.

Implementation Steps

- MDOT would develop guidelines on information and accessibility requirements for transit agency websites.
- MDOT and the RTTC would develop a toolkit of resources and trainings that can help transit agencies develop websites, including National RTAP's Website Builder.
- If more advanced websites are desired, or required, agencies would partner to procure website design, development, and maintenance services.
- MDOT can provide support to agencies that need assistance developing service area and route maps that can be posted on websites with staff or consultant resources, or can work with local and regional governments to coordinate support.
- MDOT will update links on its website to ensure that new websites are accessible from MDOT's site.
- Agencies that are part of county or city governments may have to work with those entities to update their websites or to create separate sites.
- As agencies add functionality to their websites, such as real-time travel information, trip planning and booking, or payment platforms, agencies should coordinate to make sure platforms are similar, easy to use, provide consistent information, and are accessible.

Timeline:
1–2 years

Relative Cost:
$$

Readiness Levels:
1, 2, 3, 4

Benefiting Groups:
MDOT, Transit Agencies, Riders, General Public

Prerequisite Initiatives:
None

Provide IT support to all rural transit agencies.

Agencies without access to IT support may have challenges adressing technical issues as they occur, but smaller agencies may not need or be able to afford full-time IT staff. Providing IT support to agencies would help agencies quickly address technology issues and decrease the amount of time that hardware, software, or systems are down.

Implementation Steps

- MDOT would first survey agencies to see how many have sufficient IT support available, and which agencies need additional support. The survey might also explore how often agencies have IT issues, and what the most common and most disruptive issues are.
- RTTC would take an active role in determining the best strategies for implementing IT support for agencies that lack it, or need additional support. This can include:
  - Developing job descriptions for IT staff, or scopes of service for on-call IT support contracts.
  - Reviewing the VPN and access requirements that IT staff might need to provide support remotely.
- MDOT might consider developing regional contracts that interested agencies can purchase services through.

Timeline:
1 year

Relative Cost:
$$

Readiness Levels:
1, 2, 3, 4

Benefiting Groups:
Transit Agencies

Prerequisite Initiatives:
None

Develop a statewide MaaS platform.

A statewide MaaS platform would integrate information about all public transit services across the state in one place, increasing access to mobility information. Agencies would have the opportunity to add advanced functionality such as trip planning, trip booking, fare payment, and real-time information. With additional funding, the platform might also include other mobility services, including bike, scooter, and car share, taxis, TNCs, and intercity services.

A MaaS platform would improve access to and awareness of services, and potentially attract new ridership. Agencies using trip-booking and fare-payment tools may also be able to increase efficiency.

Implementation Steps

- In fall 2020, MDOT released an RFI to gain an understanding of the current state of MaaS technology.
- MDOT is currently in the process of developing specifications for a future MaaS procurement. Procurement steps include:
  - Assess RFI responses to determine the state of MaaS technology.
  - Based on RFI responses, use the MaaS Steering Committee to refine project goals and objectives, user needs, required functions, and integration needs and expectations.
  - Review and engage with peer MaaS systems to understand challenges and lessons learned.
  - Develop a ConOps and cost estimate based on the identified goals, objectives, and needs of the platform.
  - Develop system specifications and requirements.
  - Develop procurement documents including system specifications and requirements, and evaluation criteria.
- While the specifications and procurement documents are being developed, MDOT would support agencies in completing *Initiative 1.3.1: Ensure all transit agencies have and maintain websites with critical service and contact information*. This will allow the MaaS platform to link agency websites, which may be an important first phase for less technologically advanced agencies.
- After a vendor is selected, MDOT will work with them to develop an implementation plan and begin the development.
- After the platform launches, MDOT will continue to assess the platform and make updates and improvements as necessary.

Timeline:
2 years

Relative Cost:
$$$

Readiness Levels:
1, 2, 3, 4

Benefiting Groups:
MDOT, Transit Agencies, Riders, General Public

Prerequisite Initiatives:
Ensure all transit agencies have websites with critical service and contact information.

Develop a ConOps to determine the best strategies for increasing the use of electronic fare collection.

A ConOps would determine the best approach or approaches for agencies across the state. The ConOps will explore opportunities to share costs, combine reporting, and offer riders more payment options.

Implementation Steps

- MDOT will create a project steering committee, ideally composed of RTTC members, to define project goals and guide the development of the ConOps. The committee might include representatives from urban transit systems, as this may strengthen future regional or statewide projects.
- The steering committee would develop a scope of work for the ConOps, and MDOT would lead the procurement process to hire consultant support to create the document. MDOT would determine the best funding source for the ConOps, whether using existing MDOT resources or competitive grants.
- The ConOps at a minimum should include:
  - An inventory of current fare collection methods, products, and technologies in use by Michigan's rural transit agencies.
  - A review of current fare technologies and case studies.
  - An assessment of multiple concepts, including at a minimum: developing a statewide fare system, joining an existing fare consortium, such as EZfare, regional fare systems, maintaining individual fare systems.
  - An assessment of multiple fare technologies, including at a minimum: account-based systems and fare capping, open and closed loop systems, open architecture, online and mobile app-based payments, MaaS Integration, a diverse range of payment media and fare equipment.
  - A recommended approach and implementation strategy.
  - Specifications for the preferred system or systems that can be used to develop procurement documents.
  - Support with assessing vendor responses to an RFP.
- Depending on the identified solution(s), the RTTC may select a pilot or pilots before expanding to additional agencies. Level 3 and 4 agencies may be the most appropriate to complete pilots for more advance technologies.

Timeline:
1–2 years

Relative Cost:
$$

Readiness Levels:
1, 2, 3, 4

Benefiting Groups:
MDOT, Transit Agencies, Riders

Prerequisite Initiatives:
None

Image courtesy of Benzie Transportation Authority.

Notes

1   Federal Transit Administration, "Circular FTA C 9040.1G: Formula Grants for Rural Areas: Program Guidance and Application Instructions," (November 24, 2014), https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Circular_9040_1Gwith_index_-_Final_Revised_-_vm_10-15-14%281%29.pdf.

2   "Huron Mobility Initiative," MDOT, https://www.michigan.gov/mdot/Travel/Mobility/Initiatives/mobility-challenge/huron-mobility-initiative.

3   "MUVE U.P.," MDOT, https://www.michigan.gov/mdot/travel/mobility/initiatives/mobility-challenge/muve-u-p-; MDOT MUVE WAVE. https://www.michigan.gov/mdot/travel/mobility/initiatives/mobility-challenge/muve-wave.

4   "Rides A-GoGo Mobility Coordination," MDOT, https://www.michigan.gov/mdot/travel/mobility/initiatives/mobility-challenge/rides-a-gogo-mobility-coordination; Bosch. "MMC SPLT Rides - Lessons Learned." (May 8, 2020). https://www.michigan.gov/-/media/Project/Websites/MDOT/Travel/Mobility/Public-Transportation/Passenger-Transportation/PTD1/MMC_Lessons_Learned_SPLT_Bosch_v3.pdf?rev=451b631ae3804c2c9d50825725207792.

5   Mass Transportation Authority. "Michigan Mobility Challenge Final Report." (2020). https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/SaraK/SaraK3/Vets_to_Wellness_Mobility_Challenge_Grant_Final_Report.pdf?rev=abe87e2d3db9402194b07934b162b2dd&hash=F5A4C87D0E19F5B48983B5504BE17D31.

6   "MOD On-Ramp Program Lesson Learned Webinars," Shared Use Mobility Center , July 1, 2020, https://learn.sharedusemobilitycenter.org/multimedia/mod-on-ramp-program-lesson-learned-webinars/; "Tconnect," Tompkins Consolidated Area Transit, Inc., https://tcatbus.com/tconnect/.

7   "MOD On-Ramp Program Lesson Learned Webinars," Shared Use Mobility Center , July 1, 2020, https://learn.sharedusemobilitycenter.org/multimedia/mod-on-ramp-program-lesson-learned-webinars/; "Mobility as a Service," N-CATT, 2020, https://n-catt.org/wp-content/uploads/2020/07/MaaS-Factsheet.pdf.

Additional References

Bay Area Transportation Authority, Vehicle Collision Avoidance System Pilot Report, (forthcoming).

"GTFS Builder," Rural Transit Assistance Program, https://www.nationalrtap.org/Technology-Tools/GTFS-Builder.

"ITS Professional Capacity Building Program: ITS Transit Technology Fact Sheets," Intelligent Transportation Systems Joint Program Office, United States Department of Transportation, https://www.pcb.its.dot.gov/factSheets/default.aspx.

Michigan Department of Transportation, Michigan Mobility 2045 A transportation plan for a connected future, (November 4, 2021), http://www.michiganmobility.org/pdfs/mm2045_plan/MM2045_Plan_FINAL_2021_11_03_remediated.pdf

Michigan Department of Transportation, Virtual Public Involvement Benefits and Barriers: A Practical Guide to VPI Tools, (2021), https://www.michigan.gov/-/media/Project/Websites/MDOT/About-Us/Commissions/FHWA-Partnership/STIC/VPI-Guidebook.pdf?rev=14552f8fe84e45fe9cce15313230cb88.

Minnesota Department of Transportation, Greater Minnesota Public Transit Technology Plan (June 30, 2021), http://www.dot.state.mn.us/transit/reports/transittechplan.html.

National Center for Applied Transit Technology, Virtual Engagement Guidebook, (March 2021), https://n-catt.org/wp-content/uploads/2021/08/Virtual_Engagement_Guidebook_Final.pdf

"Website Builder," Rural Transit Assistance Program, https://www.nationalrtap.org/Technology-Tools/Website-Builder.

michigan.gov/mdot
michiganpublictransit.com
@MichiganDOT

MDOT
Michigan Department of Transportation
OFFICE OF
PASSENGER
TRANSPORTATION