



NCHRP 20-65 Task 71: Transit Network Balance – Efficiency and Equity

Final Report

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1 Introduction

1.1 Background

Public transportation agencies are often charged with two potentially conflicting goals: to maximize efficiency by serving the most riders for the least cost and to support social equity by providing all people—including transit-dependent, low-income, rural, and elderly and disabled populations—with basic access to destinations. Achieving both goals can be particularly challenging for small urban and rural public transportation providers. Services that produce the biggest equity benefits by providing vital mobility for low-income rural residents and the disabled often appear to perform poorly using common efficiency metrics.

Recent federal initiatives have shone a spotlight on the importance of transportation service to support social equity. The FTA Rides to Wellness initiative highlighted the importance of public transportation in helping connect people to health care via transit, which can improve health outcomes by making it easier to access preventive care. Meanwhile, the U.S. DOT Ladders of Opportunity initiative focused on providing safe, reliable, and affordable access to everyone, particularly low-income residents, to reach jobs and education opportunities, which helps to improve residents' long-term well-being.

While rural and demand responsive services typically carry fewer passengers per mile and cost more to operate per rider, their importance can become clearer when agencies set appropriate goals and objectives, measure performance, and apply performance measures in planning and programming to balance efficiency and equity. Faced with the charge to support social equity while also maximizing the effectiveness of public funding, transportation agencies, particularly state departments of transportation (DOTs), need more guidance on how to measure equity so that they can identify and strengthen the services that produce the greatest social benefit—even when these services do not appear efficient. They need guidance on how to develop and apply transit efficiency and equity goals and performance measures for small urban and rural systems. Moreover, transportation agencies need to learn about effective practices for planning, funding, and operating services that balance efficiency and equity goals and make successful tradeoffs between these sometimes competing demands.

1.2 Project Purpose and Overview

This study seeks to address these needs by 1) identifying and defining common transit efficiency and equity goals and performance measures for small urban and rural systems; 2) presenting case studies of states in which transportation agencies have attempted to balance efficiency and equity goals; and 3) identifying best practices that balance efficiency and equity goals successfully.

In the context of this research, **efficient** public transportation service generally refers to service that carries as many riders as possible at the lowest possible cost. **Equitable** transportation service can mean several different things, including:

- Service that covers all areas of a state (geographic equity)
- Service that is equitably distributed between the general population and transit-dependent or special needs riders. This is often discussed in terms of how transit agencies allocate funding between fixed-route services, which are the most efficient way to serve the general population, and demand-response services that many transit-dependent riders rely upon.
- Service where benefits and burdens are equally distributed between the general population and low-income/minority residents or other traditionally underserved communities. This is the definition of equity that is used in Title VI analyses.

The study began with a literature review, which included a review of public transportation planning, program, and evaluation documents from more than 20 states, as well as a review of nation-wide studies related to transit performance. The research team the conducted interviews with nine state DOTs. Five states were selected for case study development. All the research was used to identify summary key findings and opportunities for improvement.

Section 2 of this report briefly discusses the Federal requirements for Title VI and environmental justice and their relevance to this study. Sections 3 through 5 describe the research findings. The appendices include the interview questionnaire, a list of interviewees, and detailed literature review results.

2 Federal Requirements for Title VI and Environmental Justice

Transportation agencies are required to consider equity as part of their compliance with Title VI of the Civil Rights Act of 1964 and Executive Order 12898 (E.O. 12898), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Title VI prohibits discrimination on the basis of race, color, and national origin (in practice, persons with limited English proficiency) in programs receiving Federal assistance. Transportation agencies are legally required to comply with Title VI, and FTA and FHWA must monitor their compliance. E.O. 12898 protects minority and low-income populations, with a goal to identify and avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects on these populations.

FTA Circular 4702.1B sets specific Title VI requirements for providers of fixed route public transit service, requirements that apply to a state DOT if it operates transit service. All transit providers must set system-wide standards and policies consistent with Title VI. Larger providers (i.e., those that operate 50 or more fixed route vehicles in peak service and are located in an urbanized area with population of 200,000 or more) are required to collect and report demographic data on their customers, evaluate the impacts of changes in fares or service on the protected populations, and monitor the performance of their transit system relative to their system-wide service standards and service policies. For example, an agency must identify routes as minority or non-minority transit routes, then evaluate the differences between minority and non-minority routes in terms of service standards for vehicle loading, vehicle headway, and on-time performance.

State DOTs comply with FTA Circular 4702.1B by including the following information in their Title VI Program:

- A demographic profile of the state that includes identification of the locations of minority populations in the aggregate;
- Demographic maps that overlay the percent minority and non-minority populations at Census tract or block group level, and charts that analyze the impacts of the distribution of state and Federal funds in the aggregate for public transportation purposes;
- An analysis of impacts that identifies any disparate impacts on the basis of race, color, or national origin, and, if so, determines whether there is a substantial legitimate justification for the policy that resulted in the disparate impacts, and if there are alternatives that could be employed that would have a less discriminatory impact;
- A description of the statewide transportation planning process that identifies the transportation needs of minority populations;

- A description of the procedures the state uses to pass through FTA financial assistance to subrecipients in a non-discriminatory manner; and
- A description of the procedures the state uses to provide assistance to potential subrecipients applying for funding, including its efforts to assist applicants that would serve predominantly minority populations.

Although they are related to the general topic of equity and were reviewed by the research team, state DOT Title VI implementation plans and compliance reports were generally not directly relevant for this study for several reasons. For one, Title VI programs in transportation are primarily focused on preventing discrimination (e.g., disparate impacts), while this study considers how state DOT might proactively promote greater equity through their funding decisions. All state DOTs must show that their actions are not discriminatory, but some state DOTs have expressed interest in using their planning and funding authority to further advance social equity goals. Because most state DOTs do not operate fixed route transit service, their Title VI compliance for transit is largely satisfied through the required demographic analysis, the description of their planning process to identify minority population needs, and by demonstrating non-discrimination in their procedures to pass-through FTA funds. This study also takes a broader view of equity, considering for example geographic equity or equity for transit-dependent or special needs riders, in addition to equity for protected populations in the Title VI sense. Lastly, this study looks at balancing equity with efficiency, while state DOT Title VI programs address only one side of this balance.

3 Literature Review

The goal of the literature review was to characterize the state of the practice and identify best practices for state DOTs in balancing efficiency with equity when funding public transportation. In particular, we sought to identify:

- **Emerging practices from state DOTs** in meeting policy goals through investments, either by:
 - Establishing policy goals or guidance for recipients to adopt.
 - Evaluating the performance of recipients or projects when making funding decisions.
- Best practices in balancing efficiency and equity goals from **public transportation operators**, particularly small urban/rural operators that could inform state DOT practices.
- Examples of practices from **other public agencies** (e.g., state parks departments) of balancing the needs of the general population with the needs of specialized populations.

Since state DOTs are the target audience for this project, we focused most of our efforts on the first bullet.

We reviewed reports on performance-based planning to understand the state of the practice, identify best practices, and identify state DOTs and transportation agencies for individual review. Key resources included:

- TCRP Report 88, Guidebook for Developing a Transit Performance Measurement System
- NCHRP Research Results Digest 361, State DOT Public Transportation Performance Measures: State of the Practice and Future Needs
- NCHRP Report 666: Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies - Volume I: Research Report, and Volume II: Guide for Target Setting and Data Management
- Summaries of FTA's series of Performance Based Planning Peer Exchange Roundtables
- FHWA, Performance-Based Planning and Programming Guidebook

We then reviewed planning documents from the DOTs and other transportation agencies (MPOs, transit agencies) mentioned in these resources. Some of these agencies had conducted their own reviews of peer best practices, giving us additional agencies to follow up on. In total, we conducted in-depth reviews of 22 state DOTs, as well as a number of other transportation agencies.

State DOTs

We focused on examples of how state DOTs use performance measures in funding decisions, but state DOTs also track performance measures related to efficiency and equity in other contexts. Some DOTs provide comprehensive information on the transportation system through annual performance measurement reports or dashboards, while others use performance measures to assess baseline conditions in long-range transportation plans or statewide public transportation plans. These applications are not explicitly tied to public transportation funding, but they can indirectly influence funding decisions, and by following up with these agencies we may be able to learn which measures are most meaningful to state DOTs.

We identified 16 state DOTs that have used efficiency performance measures to assess public transportation service; common efficiency measures include:

- Total ridership
- Passengers per hour
- Cost per passenger trip
- Cost per service hour
- Cost per vehicle mile
- Farebox recovery

Current values for most of these measures can be calculated from information in the National Transit Database, but agencies will need to analyze results for new transit projects. There does not appear to be strong consensus on which of these are the “best” efficiency measures.

Equity measures are less widespread and more varied than efficiency measures. We identified eight agencies that have reported equity measures, which included:

- **Geographic equity measures.** For example, Kansas DOT tracks the number of counties served by transit; Missouri DOT measures the average days per week rural transit is available by county.
- **Social equity measures.** For example, Minnesota DOT is developing a measure for the quality of public transportation service in areas with high concentrations of low-income households, youth, older adults, zero vehicle households, people with disabilities, people with limited English proficiency, disabled people, and other transit-dependent populations.
- **Efficiency or ridership measures for specialized services.** For example, Florida DOT measures the cost of demand response trips; Oregon DOT measures the average number of special transit rides per elderly and disabled Oregonian per year.

Geographic equity measures are fairly common, but they are not as relevant to this project as the other two types of equity measures we identified. Geographic equity measures, particularly simple measures that track the number of counties with public transportation service, are useful for tracking the status of statewide public transportation service, but not as useful for making individual funding decisions, because counties without public transportation may not have a public transportation agency at all.

Not all agencies with strong performance-based funding practices have adopted corresponding policies to increase transit efficiency or provide equitable service. Efficiency policies often call for generally increasing the efficiency of the transportation system in general or of project delivery rather than focusing on public transportation service. There are a number of agencies that have strong equity policies but that do not appear to implement these policies through performance-based funding decisions. Minnesota DOT was the only example of an agency with a policy to allocate funding on a performance basis.

Public transportation operators

We reviewed examples of public transportation operators that were identified in research as being particularly advanced with respect to performance-based planning or equity analysis. None of the agencies we examined had implemented a full-fledged approach to balancing equity and efficiency. However, some public transportation operators had analyzed and/or set targets for cost-efficiency of different types of services that could be relevant to state DOTs. Others had developed proactive, sophisticated approaches to analyzing equity that could serve as a model for state DOTs.

One example is TriMet in the Portland, Oregon region, which has developed a Transit Equity Index designed to help incorporate equity considerations into service planning. The measure is based on ten different factors that include both socioeconomic characteristics (e.g., race/ethnicity, income, age, disability status) as well as key destinations for disadvantaged communities (e.g., low- and medium-wage jobs; affordable housing units; key retail/human/social services). However, even agencies that use sophisticated equity performance measures to assess their overall system typically focus primarily on cost efficiency when planning new service.

Other public agencies

We reviewed multiple resources on how public agencies balance accommodating the needs of the general population with those of specialized populations, focusing on ADA accessibility. We did not find any strong examples of approaches that could apply to state DOTs looking to balance equity and efficiency. Most of the guidance and research on ADA accessibility focuses on implementing regulatory requirements rather than balancing competing objectives. Although the resources that we reviewed identified examples of agencies that were pursuing best practices in ADA accessibility, they did not discuss how these agencies fund these practices

while still serving the general population. Similarly, we also reviewed other examples of agencies incorporating equity considerations in delivering transportation services of programs (e.g., siting bike share stations, developing Safe Routes to School Programs) but these resources focused only on addressing equity, not on budgeting for equity or balancing equity with other concerns.

4 Interviews and Case Studies

As described in Section 3, we conducted a literature review of state DOT practice in balancing equity and efficiency. Based on our review, we identified nine state DOTs that were pursuing one of three elements of a successful approach to balancing equity and efficiency:

- DOTs that are using **efficiency measures or policies** as a basis for performance-based funding decisions, or have conducted analyses of public transportation efficiency
- DOTs that have developed, or are in the process of developing, **equity performance measures and/or funding criteria**
- Agencies that have collected information necessary to establish **cost-effectiveness thresholds or performance targets** for different transit services

The interviewee list and questionnaire was approved by the project panel before we began outreach to DOTs. We interviewed staff from each DOT, reviewed additional documents provided by staff, and then selected five interviewee DOTs to feature as case studies of efforts to balance efficiency and equity. Table 1 summarizes the DOTs we interviewed, why we selected each DOT for an interview, and which interviewees were selected as case studies.

Table 1: Summary of interviewees and case studies

	Efficiency measures / policies	Equity measures / policies	Performance targets	Case study
Minnesota DOT	•	•	•	•
Florida DOT	•	•		•
North Carolina DOT	•			•
Washington DOT	•	•		•
Wisconsin DOT		•		
Oregon DOT		•		•
Ohio DOT			•	
New Mexico DOT	•			
Maryland DOT	•			

The following sections contain brief case studies for each of the five selected DOTs. The appendices include the interview questions and list of people that we interviewed.

4.1 Minnesota DOT

Minnesota DOT (MnDOT) provides significant state and federal funding for public transportation services in rural areas across the state of Minnesota. Of the \$100 million in grants that MnDOT allocates toward transit each year, 80 percent comes from state sources, and the remaining 20 percent comes from federal sources. Because the state devotes so much funding to public transportation, MnDOT has long had a role in ensuring that the services it funds are both efficient and equitable. According to the statutes guiding Minnesota’s public transportation assistance efforts, originally adopted in 1977, the State’s role is both to “provide access to transit for persons who have no alternative mode of transit available” and to “increase the efficiency and productivity of public transit systems.”¹

MnDOT’s efforts to balance efficiency and equity are most visible in the performance measures for new or merged services under the Greater Minnesota Transit Grants.² The guidelines for these grants require applicants to report the following five performance measures for each new route or merged service: passengers per hour, cost per passenger trip, revenue per passenger trip, cost per revenue service hour, and revenue miles. MnDOT specifies what “good” efficiency is in terms of passengers per hour (PPH) that different services carry (e.g., three to five PPH for demand response service; five to eight for deviated rural routes); for the remaining performance measures results are compared to similar services in the same system. The guidelines recommend cutting service for services that continually fall below the “good” range; MnDOT staff say that this is less of a hard rule than “a measure that we can use to provide technical assistance... and have a conversation about cutting service” that underperforms. MnDOT expects recipients to achieve “good” levels after service has been operating for a year, and staff say that they have had to emphasize that timeline for applicants, recognizing that some systems are going to be below thresholds for some time as a new route or service is established.

MnDOT is now revising the technical brief on performance measures for the Greater Minnesota Transit Grants, taking a more detailed look at the efficiency measures and considering how to address equity in the performance measures. The DOT is in the midst what of what staff call an effort to “define transportation equity and how we need to react.” In its recent Greater Minnesota Transit Investment Plan,³ MnDOT used a Transit Dependency Index to identify areas of the state with concentrations of transit-dependent riders, taking into account the density of

¹ 2016 Minnesota Statute 174.21 <https://www.revisor.mn.gov/statutes/?id=174.21>

² Minnesota Department of Transportation, “Technical Assistance Brief: Performance Measures for New or Merged Services”, January 1, 2013.

³ Minnesota Department of Transportation, “Minnesota Go: Greater Minnesota Transit Investment Plan,” Draft, August 2016.

the general population and of youths and older adults, as well as concentrations of low-income households, zero-vehicle households, people with disabilities, and people with limited English proficiency. The Index has been valuable in supporting the Title VI analysis of the plan, but it can be difficult to interpret the results more generally. The Index was based on Census tract-level data, so it allowed MnDOT to identify communities with large concentrations of transit-dependent riders in detail. However, data on transit service in rural areas was only available by county, which made it challenging to determine whether service was adequate for concentrated pockets of transit-dependent riders in rural areas. Finer-scale data on how level of service varies in rural areas could help MnDOT assess areas that lack equitable transit service, but these data can be hard to come by, especially for rural systems that rely on demand response transit.

Although creating more equitable transit service may require a long-term plan to collect better data on rural systems, MnDOT sees a short-term opportunity to improve both equity and efficiency by shifting to a shorter capital planning cycle. Currently, all of the public transportation providers in Minnesota do 10-year capital plans; MnDOT is providing technical assistance for providers to switch to a five-year capital planning cycle. Staff believe that this will provide an opportunity to better identify key gaps in both efficient and equitable public transportation service and identify short-term strategies to address those gaps.

4.2 Washington DOT

Like many of the other agencies with which we spoke, Washington State DOT (WSDOT) distributes significant state funding for public transportation; roughly 80 percent of transit funds come from state sources and the remaining 20 percent come from FTA. WSDOT uses these state funds to match various federal sources, supporting operations, capital projects, mobility management, and planning. The DOT passes most funding through to subrecipients, but it directly operates some intercity transit through contracted service.

WSDOT has taken some steps to prioritize efficiency in funding public transportation. Staff focused on the Regional Mobility Grant⁴ (RMG) program, which funds projects to improve connections and mitigate congestion along major corridors. In its most recent two-year funding cycle, the RMG allocated \$93 million for 44 projects. Under the current RMG evaluation criteria, grantees estimate the vehicle miles traveled (VMT) and vehicle trips (VT) reduced in the first and fourth year of their projects and WSDOT's data analysis group reviews the methodology used and results; VMT/VT reductions account for a quarter of the evaluation score. Applicants' ability to leverage matching funds, readiness to proceed, reduction of delay, and improving connectivity are also considered; which staff consider a measure of operational efficiency.

⁴ See <http://www.wsdot.wa.gov/Transit/Grants/mobility.htm>

WSDOT staff continue to hone the evaluation criteria based on the data that they analyze from projects so that they can more accurately assess which projects will best support the RMG program goals.

WSDOT also reports other efficiency metrics, such as cost per hour and per passenger, for the projects that it funds, as well as a general summary of public transportation performance that includes data on these metrics, by agency, by county, and for the state as a whole.⁵ However, staff emphasized these measures are primarily to provide information to legislators. The legislature has placed a high priority on receiving this information as part of multiple annual reports. The efficiency and performance metrics are a key part of the selection process for RMG and the evaluation when a project is complete.

WSDOT also has policies in place to promote equity. Its latest public transportation plan reflects the DOT's longstanding commitment to "Provide and sustain transportation that allows people of all ages, abilities and geographic locations to access jobs, goods, services, schools and community activities."⁶ Staff mentioned the Consolidated Grants Program (CGP),⁷ which is focused on improving rural and special needs public transportation throughout Washington State, as a key mechanism for implementing this policy. WSDOT works with advocacy groups and other stakeholders to understand barriers to access in different counties, and applications are evaluated based in part on qualitative descriptions of whether these needs are addressed. The DOT does look at the efficiency of these transportation services, but staff say that for CGP maintaining a base level of service for people who have no other transportation choices is usually a higher priority than ensuring efficient service.

WSDOT collects data on the efficiency of public transportation services throughout the state, and also has a clear policy on equity in public transportation. However, the agency has not integrated efficiency and equity in its decision-making; instead it prioritizes efficiency through one grant program and equity through another program. The agency's performance-based allocation of Regional Mobility Grants based on how efficiently projects reduce vehicle miles traveled illustrates how DOTs can take a proactive approach to ensuring that the projects they fund are efficient, but the focus on maintaining continuity among providers in the equity-focused Consolidated Grants Program illustrates some of the challenges that DOTs face in prioritizing efficiency for providers that operate specialized services or serve areas that might otherwise lack public transportation.

⁵ Washington State DOT, *2013 Summary of Public Transportation*, Published December 2014.

⁶ Washington State Department of Transportation, "Washington State Public Transportation Plan 2015-2035: Executive Summary," June 2016.

⁷ See <http://www.wsdot.wa.gov/Transit/Grants/competitive.htm>

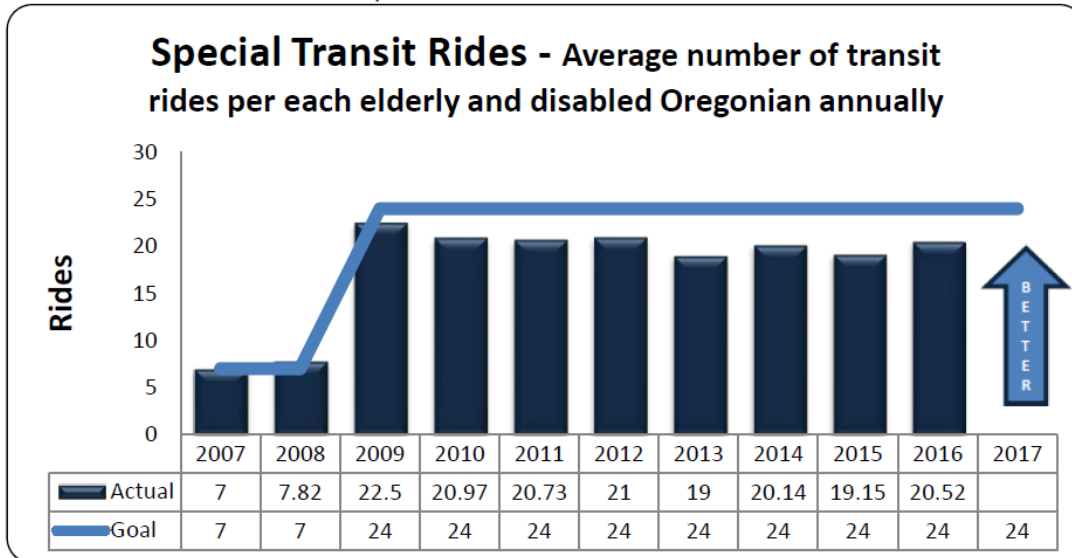
4.3 Oregon DOT

Oregon DOT (ODOT) distributes state and federal funding for public transportation; the state share accounts for roughly 70 percent of the funding that ODOT allocates and is used to provide a match for FTA formula grants. Most of the funding that ODOT allocates goes toward operating assistance, but the DOT also provides some capital funding, and also operates three intercity services directly.

ODOT is in the midst of a developing new equity and efficiency policies as it develops a new long-range transportation plan, and is focusing on redefining its approach to equity. Historically, ODOT has focused on providing service to older and disabled people through demand response service, but the DOT is re-evaluating that approach, and has hired a consultant to research how other DOTs define equity. Staff anticipate that the DOT will arrive at a broader definition of equity that may consider the needs of low-income riders and other disadvantaged or a wider range of service types, for example high-frequency fixed-route service that connects disadvantaged communities to destinations. Because of state laws requiring local transportation plans to be consistent with ODOT's long-term plan, these changes may affect how transportation agencies within Oregon address equity and efficiency. A number of smaller operators are exempt from these requirements, but ODOT is also developing a new funding program to support these agencies in creating transportation development plans that address efficiency, access, and equity.

ODOT reports Key Performance Measures annually, including measures of public transportation efficiency (number of rail service passengers) and equity (average number of annual transit rides each elderly and Oregonian with a disability take).⁸ Staff say that the legislature is very interested in these measures, and that ODOT's unique equity measure has been a particular focus, both for the state and advocates for the disabled. Staff note that ridership among elderly and disabled people is directly related to the funding available for special-needs services. Based on a study of the unmet public transportation needs among seniors, ODOT set a goal of 24 trips per elderly/disabled resident; the result has been closer to 20 during the past several years (see figure below). ODOT staff mentioned potentially refining its Key Performance Measures in the coming years to reflect the policies that it is developing in its long range transportation plan, particularly to include a more performance-based assessment of intercity rail services.

⁸ See <http://www.oregon.gov/ODOT/PerformMang/pages/index.aspx>



Source: Oregon Department of Transportation

Though ODOT continues to focus on refining the Key Performance Measures, staff suggested that the DOT was unlikely to take a performance-based approach to allocating public transportation funds, either on the basis of equity or efficiency. With only 56 public transportation operators in the state representing a wide variety of communities, from major cities to sparsely-populated rural areas, “any performance measure comparison breaks down quickly.” Instead, ODOT uses the measures as a basis for providing technical assistance to underperforming providers, and is considering requiring agencies to define and report their own performance measures. Some ODOT stakeholders already have robust policies and performance measures related to equity and efficiency. Staff mentioned TriMet, which serves the Portland metropolitan area, and has developed a Transit Equity Index to evaluate the equity impacts of different projects.⁹ The Index evaluates potential investments across the following ten measures related to a route’s service area:

- | | |
|--|-----------------------------------|
| Minority population | People with disabilities |
| Low-income population | Limited vehicle access households |
| Limited English Proficiency population | Low and medium wage jobs |
| Senior population | Affordable housing units |
| Youth population | Key retail/human/social services |

⁹ Transform, “Transit Equity Index Summary,” Available at: <http://www.transformca.org/sites/default/files/Equity%20Index%20Summary.pdf>.

With ODOT adopting clear equity policies that can shape stakeholders' efforts to address equity, as well as potentially offering planning assistance, it could help to spread best practices like TriMet's equity index throughout the state.

ODOT represents a different model for integrating equity and efficiency into decision-making than the other DOTs interviewed. Instead of developing quantitative performance metrics to guide specific funding decisions, ODOT is relying on policy guidance and technical assistance to help public transportation providers within Oregon define and measure equity and efficiency on their own terms.

4.4 Florida DOT

In addition to allocating FTA formula funds, Florida DOT (FDOT) allocates state funding for public transportation. State public transportation funding is divided among several different programs that offer matching support. These programs include the New Starts Transit Program, which funds up to 50 percent of the non-federal share of capital costs for fixed-guideway transit in growing urban areas; the Public Transit Block Grant Program, which funds up to 50 percent of the non-federal share of capital or operating costs; and the Public Transit Service Development Program, which funds up to 50 percent of short-term (three years or less) projects that pilot new or innovative approaches to expand or improve public transportation service.¹⁰ Though these programs amount to a significant share of public transportation funding in Florida, FDOT's headquarters has limited discretion over how they are spent. Many of them are allocated by formula, such as the Block Grant Program, which uses a formula that gives equal weight to population, ridership, and revenue miles. In addition, much of the decision-making authority for these programs lies with FDOT's seven district offices, each of which coordinates with local agencies to identify and execute projects.

FDOT has an extensive data collection program to assess the performance of public transportation. The DOT requires that each agency update and publish all information required for the National Transit Database annually as a condition of receiving Block Grant funding. FDOT established the Florida Transit Information System (FTIS), a web-based platform for cataloguing this data that provides access to performance measures as well as the ability to analyze trends.¹¹ Staff say that FTIS supports the formula-based allocations of state funding sources, and note that this information could be used to conduct a detailed assessment of public transportation efficiency. However, FDOT staff were not aware of any efforts among FDOT or

¹⁰ Florida Department of Transportation, "Resource Guide for Transit and Transit-Related Programs," October 2011.

¹¹ See <http://www.ftis.org/>

stakeholders to take a performance-based approach to integrating efficiency into funding or service decisions, as political factors can also influence decisions regarding service provision.

Florida is unique in that it has a separate state agency, the Commission for the Transportation Disadvantaged (CTD), dedicated to addressing special-needs public transportation. CTD oversees a trust fund, partially funded by FDOT, that supports public transportation service trips for disadvantaged riders that are not covered by FTA formula grants. CTD funds are distributed to counties by a formula that gives equal weight to four factors: the number of coordinated trips provided, service vehicle miles, total land area, and total population. Counties are required to develop Transportation Disadvantaged Service Plans, five-year plans to identify and address the needs of elderly, disabled, and/or economically disadvantaged people.

Like FDOT, CTD uses the information compiled through FTIS to support the formula allocation, and it also collects detailed performance measures on the services that it funds and publishes the results in an Annual Performance Report.¹² The report includes detailed information on the efficiency (e.g., cost per trip, per driver hour, and per mile) of different service providers, and constitutes one of the more detailed examinations of the efficiency of special-needs transportation services that we came across in our review. In addition, CTD staff report taking more detailed looks at trips by specific purposes—for example, employment and medical trips—to see how riders are utilizing special-needs transportation and look for ways to meet legislative priorities. These analyses inform CTD’s overall planning and reporting, but they could in theory be used to prioritize efficiency in funding decisions for services designed to promote transportation equity.

In a sense, CTD represents a step away from the integrated approach toward addressing equity and efficiency that is the focus of this research project, because rather than considering equity and efficiency side-by-side Florida has created a special-purpose agency for dealing with equity. On the other hand, this approach, coupled with FDOT’s extensive data collection efforts, allowed for a more detailed look at how special-needs public transportation services are performing. And by having CTD focus on paratransit coordination, FDOT staff resources can focus on other aspects of Florida’s transportation system.

4.5 North Carolina DOT

North Carolina DOT (NCDOT) manages a significant amount of state funding, roughly \$94 million per year, for public transportation. With the state highway division now allocating flexible funds to support public transportation projects that mitigate congestion, that amount continues to grow. NCDOT uses state funds both to fully fund required matches for federal

¹² Florida Commission for the Transportation Disadvantaged, “2016 Annual Performance Report,” January 2017.

grants and to create independent funding streams, particularly the State Maintenance Assistance Program (SMAP), which funds operating costs for urban, small urban and regional fixed-route transit.¹³

NCDOT takes a performance-based approach to allocating many of the funding sources that it manages. SMAP funds are allocated by formula, but the unlike the formulas that state DOTs typically use, which focus on the amount of service operated and the population of the area served, the SMAP formula prioritizes efficiency. Currently, 30 percent of the SMAP formula is based on the average number of passenger trips per revenue hour and 30 percent is based on the average cost per trip, while 30 percent is based on each system's share of total transit revenues and 10 percent of the funding is distributed on an equal-shares basis. The latter two factors ensure that each of the state's transit providers get some funding and that the larger providers receive more, but the former two factors mean that efficiency is the primary factor in allocating SMAP funding. Under changes that NCDOT is making to the formula, 10 percent of the formula will be based on compliance, connectivity and coordination. Connectivity is intended to account for how well operators interface with other public transit providers through actions such as coordinating schedules and providing General Transit Feed Specification data, which allows riders to plan trips using online mapping services such as Google Maps. We consider this connectivity criterion to be efficiency-related insofar as it is designed to ensure that the transportation system as a whole functions efficiently for riders. This 10 percent tier is also important for equity, as North Carolina's minority populations are distributed throughout the state and this formula assists in making sure the Title VI requirements are met.

NCDOT is also working to prioritize efficiency in funding rural transit. Thirty percent of the new funding formula will be based on efficiency. NCDOT is in the process of defining how it will evaluate efficiency for rural systems, but staff say that it will likely focus on more than service delivery and capture the transit provider's ability to act like a business. Some public transit providers in the state have not spent state grants that they were awarded, and NCDOT's goal in focusing on grantees' business practices is to ensure that public transit operators will be able to implement projects for which they receive funding. The state also has a Rural Operating Assistance Program, which is broken into three categories (Elderly and Disabled, Rural General Public, Employment) and has disbursements based on populations served by category.¹⁴

NCDOT has not taken as many steps to formally integrate equity into its funding decisions. Staff noted that NCDOT ensures geographic equity in the funding formulas that it uses by ensuring

¹³ North Carolina Department of Transportation, Public Transportation Division, "Programs and Funding," undated.

¹⁴ North Carolina Department of Transportation, Program Administration Guide Rural Operating Assistance Program (ROAP), effective July 2017.

that each county receives a base share for each source that is independent of its size or performance.

The innovative approaches that NCDOT has taken to ensure that its formulas could serve as a model for other State DOTs. Over half of the SMAP program formula is based on quantitative efficiency-related criteria, which is one of the most rigorous approaches to prioritizing funding for efficient service we heard about during our review. In addition, NCDOT's efforts to factor in connectivity to other transit systems and business practices in its funding formulas could serve as a model for DOTs in other states where a more quantitative approach is not politically feasible, but where there is still a desire to make sure that DOTs get the best return possible on their transit investments.

5 Key Findings

This research considers how state DOTs can balance equity and efficiency when making decisions to fund public transportation. Section 5.1 summarizes the challenges and current state of practice related to achieving this balance. Section 5.2 describes some opportunities to improve the state of practice, illustrated with examples of programs and procedures that could be considered as best practice models for state DOTs interested in a more systematic approach to balancing equity and efficiency.

5.1 Challenges and State of the Practice

Based on the literature review and interviews with state DOTs, the following is a summary of the current challenges and state of practice among state DOTs that have attempted to incorporate efficiency and/or equity into public transportation funding decisions.

State DOTs that distribute significant state funding for public transportation are much more likely to adopt a performance-based approach.

State funding gives DOTs flexibility to help providers of services that meet state goals meet the matching requirements of FTA transit funding sources, and in states that provide public transportation funding decision-makers are more likely to take an interest in how transit dollars are spent and demand accountability. FTA grants are purpose-specific and have high matching requirements, and state DOTs that distribute only federal grants may feel like they lack either the flexibility to allocate these funds toward more efficient or equitable services or the authority to withhold funds for services that do not meet goals when they are not providing any matching funds. Therefore, the results of this research project are likely to be most relevant to the limited number of DOTs operating in states where state funding accounts for the majority of public transportation dollars.

DOTs typically prioritize equity and efficiency within different funding programs.

The DOTs we interviewed were most likely to prioritize efficiency for funding streams that provide general capital or operating support for public transportation. Instead of also integrating equity into the distribution process for these funding streams, many of these DOTs said that they addressed equity through separate programs, particularly those funded by FTA Section 5310 (Enhanced Mobility of Seniors & Individuals with Disabilities) or 5311 (Formula Grants for Rural Areas). In our review, we never encountered a situation where DOTs consider equity and efficiency side-by-side within the same funding program.

State DOTs face significant challenges defining and measuring equity.

Several of the DOT staff that we interviewed were in the process of reassessing their definition of equity and their approach to achieving it, and none had found a good quantitative measure of equity to use in funding decisions. DOTs that traditionally have thought in terms of

geographic equity (providing equitable support to rural vs. urban areas) are also starting to consider how to better support service that benefits communities of concern (e.g., low-income households, disabled people). Some state DOTs use data from the American Community Survey to identify at a fine scale areas where these communities are concentrated in their Title VI/environmental justice analyses, as do other public transportation operators that receive FTA funds, but they have struggled to apply these data in funding decisions because they lack fine-scale data on transit service. State DOTs typically only collect county-scale data on the level of transit service, particularly for rural and demand response service. This makes it challenging to identify specific areas where transit-dependent riders need more service and prioritize equitable service in these areas.

DOTs do not take a “hard line” about enforcing efficiency-based standards for public transportation service.

Staff from DOTs that collect data on how efficient different providers or services named instances of services that cost much more to operate than comparable services operating in the same area, but none of these interviewees said that they would consider withdrawing funds from inefficient services. Instead, DOT staff said that they would use this data as the basis for a conversation with these providers about how they might offer more efficient service. Several interviewees mentioned that they were particularly reluctant to defund inefficient demand response services that served transit-dependent residents, because they recognized that these services were by nature less efficient and because it was challenging to place a value on serving people that lack other ways of getting around. States also identified the challenges in establishing appropriate targets or benchmarks for efficiency-based metrics, noting for example that there is no standard or other basis for comparison for the efficiency of demand-responsive service.

5.2 Opportunities for Improvement

This research suggests that a comprehensive and ideal approach for state DOTs to incorporate efficiency and equity considerations when funding public transportation would involve:

- **Adopting a performance-based approach to public transportation planning and programming.** A performance-based approach involves setting goals, identifying performance measures and targets related to each goal, and prioritizing the projects and strategies that produce the best outcomes.
- **Requiring applicants to report quantitative performance measures of both efficiency and equity** when applying for public transportation funds. Efficiency measures can include measures of utilization (e.g., passengers per hour) or cost efficiency (e.g., cost per passenger-trip, cost per mile). Equity measures can report the number of transit-dependent riders or members of other traditionally underrepresented groups served by the provider.

- **Setting targets or thresholds** for performance measures. State DOTs and stakeholders often have the information to measures and set targets for efficiency measures through the data that transit agencies collect and report to the National Transit Database. For equity measures, rather than setting blanket targets, state DOTs could adjust targets to account for equity benefits, e.g., setting lower efficiency targets for a demand response service that primarily serves disabled residents rather than for urban fixed-route service.

The research did not find a single example of a state DOT or another transportation agency that has implemented such a comprehensive and ideal approach. Some have implement portions of this approach; however, as noted above, many state DOTs are significantly constrained in their ability to adopt a performance-based approach to transit programming.

Because of the challenges discussed above, only the limited number of state DOTs that allocate significant state transit funding are likely to feel they have the authority to prioritize equity and efficiency in funding decisions, and even these DOTs face significant barriers to balancing these two factors. However, our research revealed six proactive actions that state DOTs can take to better integrate equity and efficiency, namely:

1. Improve data collection programs
2. Carefully consider performance targets
3. Factor equity into standards for efficiency
4. Integrate efficiency and equity into funding formulas instead of individual funding decisions
5. Broaden the definition of “efficiency”
6. Offer planning assistance grants

Each of these proactive actions is described below.

Improve data collection programs

All of the state DOTs we spoke with that had taken steps to prioritize efficient public transportation service devoted significant effort to data collection, including centralizing collection of National Transit Database data or collecting performance data on the projects that they fund. Our research suggests that developing more fine-scale data on transit service, particularly for the areas that are served by rural or demand response service, is important to integrating equity into decision-making, because it enables DOTs to assess whether communities with transit-dependent riders receive adequate service.

FDOT’s Florida Transit Information System is one example of centralized, web-based system for collecting and reporting information required for the National Transit Database. The system supports allocation of transit funding, and could also be used to analyze trends and transit

efficiency. WSDOT's *Summary of Public Transportation* report is another good example. Published annually, the report summarizes the status of public transportation in Washington State and includes a large number of operational and financial metrics by agency, by county, and for the entire state.

Ideally, state DOT data should enable comparison of transit needs on the same scale as transit service. MnDOT's Transit Dependency Index illustrates an approach to identify in detail areas of the state with concentrations of transit-dependent residents. The Index is based on Census tract-level demographic data, including populations of youth and elderly, low-income households, zero-vehicle households, disabled residents, and those with limited English proficiency. However, it can be difficult to assess transit service at this same level of geographic detail, since rural system metrics are often reported at the county scale.

In Vermont, Vermont Agency of Transportation (VTrans) collects route-level information, which is used in the agency's annual performance report (discussed below). For non-metropolitan services, VTrans collects route-level performance data using the Section 5311 Monthly Service Indicator Reports (SIRs). For urban areas of the state, route- and system-level statistics are provided directly by the operating agency.

Carefully consider performance targets

Some DOTs that require recipients to report data on the efficiency of their projects have set targets for efficiency measures, which helps to set expectations with grantees about how efficiently services should perform. These targets should to be set considering the time that it takes for new services to be established as well as other factors that can affect efficiency but are outside the control of the provider.

One example is MnDOT, which rates the efficiency of new rural transit services based on how many passengers per hour they carry relative to comparable services. MnDOT found it useful to clarify that these targets applied one year into the operation of a new service to allow some time for residents to learn about the service. WSDOT evaluates the effectiveness of one grant program in part by estimating the VMT reduced; estimates are made for the first and fourth year of the project, recognizing potential for delayed accrual of benefits.

Factor equity into standards for efficiency

States that establish standards or targets for transit efficiency can partially incorporate equity issues through use of targets that vary by geographic area, service type, or other factors. This approach balances equity and efficiency by acknowledging that the types of services that typically focus on equity are not meant to be as efficient as others, but could allow the DOT to sidestep the challenges associated with quantifying equity measures.

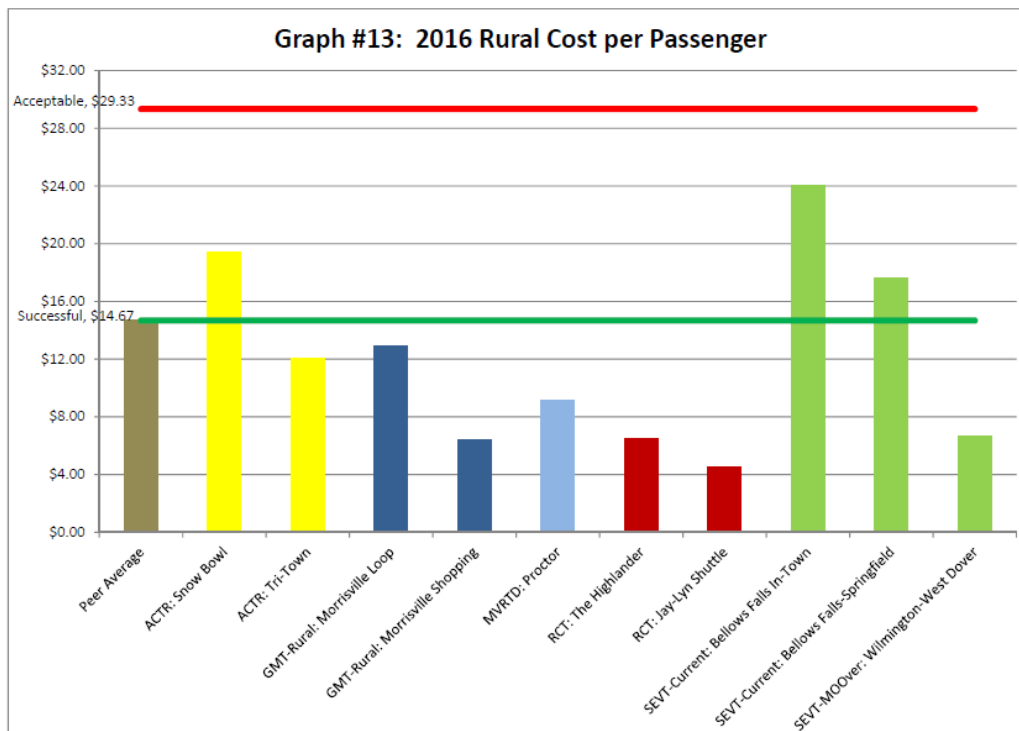
The MnDOT program discussed above illustrates this approach, in that MnDOT sets different efficiency targets for different service types. For example, MnDOT identifies a desired level of transit efficiency in terms of passengers per hour, but uses targets for demand response service are lower than they are for deviated rural routes.

VTrans offers a good example of how efficiency standards can incorporate equity issues. For its annual transit performance evaluation, VTrans groups transit routes and services throughout the state in nine categories: Urban, Small Town, Demand Response, Rural, Rural Commuter, Express Commuter, Tourism, Volunteer Driver, and Intercity. Peer-based performance measures for each category are applied to assess the productivity of the services in terms of ridership and the cost-effectiveness in terms of cost per ride provided.

VTrans sets two levels of standards for evaluation:

- The “Successful” standard for most service categories was the peer average.
- The “Acceptable” standard was set at half the Successful threshold in measuring productivity, and twice the Successful threshold in measuring cost-effectiveness.

The standards are adjusted each time the state develops a new transit performance evaluation report. The figure below shows an example result from this evaluation for the Rural service category.



Source: VTrans, *Public Transit Route Performance Reviews, Annual Report for State Fiscal Year (SFY) 2016*, Prepared by KFH Group, March 2017.

Integrate efficiency and equity into funding formulas instead of individual funding decisions

If state DOTs lack the data or the authority to prioritize equity and efficiency in individual funding decisions, they can instead integrate these factors into the formulas that they use to distribute funding among public transportation providers.

This is the approach that NCDOT uses in distributing its State Maintenance Assistance Program funds, for which 60 percent of the funding formula are based on efficiency-related criteria. Although this approach does not necessarily maximize efficiency or equity for newly-funded services—providers that generally operate efficient or equitable public transportation sometimes still operate individual services that are inefficient or inequitable—it sends a message to public transportation operators about the importance of efficiency and equity and lays the foundation for data-driven decision-making.

Broaden the definition of “efficiency”

State DOTs typically measure efficiency in terms of the operating efficiency of public transportation. These measures can be challenging to interpret for rural or demand response services that are focused on equity, because these services are inefficient by nature—vehicles travel farther carrying fewer riders. DOTs can use other approaches to define transit efficiency to achieve desired results without penalizing rural or demand response service.

One example is NCDOT, which is developing measures that focus on efficient business practices rather than operating efficiency, capturing whether providers deliver funded projects on schedule, whether they provide data to help users plan trips, and the extent to which they coordinate with other public transportation operators. Though these measures do not capture efficiency in the sense that most state DOTs use it, they are related to how efficiently service operates, and can be more relevant to rural and demand response service.

New Mexico DOT (NMDOT) take a different approach. In 2009, the NMDOT Transit Bureau developed performance measures and a Section 5311 Funding Distribution Index to support the administration of the Section 5311 program. The goal was to maximize operational funds without penalizing smaller systems that inherently require a higher fraction of administration expenses. NMDOT uses the following performance measure to develop the funding index:

- FFY §5311 Ridership
- Total Administration/Operations (A/O) Ratio Based on FFY Award
- Cost Per Passenger Trip Based on FFY Ridership and FFY Expended Total A/O Budget
- FFY Total A/O Cost Per Vehicle Mile
- FFY Regional Transportation Planning Organization Prioritization

- Percent FFY A/O Federal Award Expended
- Percent of Total State §5311 Ridership FFY; Percent of State Total FFY; Federal §5311 A/O Award Ratio

In addition, NMDOT sets a maximum target for the A/O ratio, which varies by operator fleet size. As shown below, NMDOT has recommended a significant reduction in the targets for FY2018, reflecting the performance of the state’s transit providers.

Number of transit vehicles	Maximum A/O Ratio	
	FY 2017	FY 2018
5 or fewer	0.80	0.55
6 to 10	0.75	0.50
11 to 20	0.70	0.45
21 to 30	0.65	0.40
31 or more	0.60	0.35

Offer planning assistance grants

State DOTs can use performance measures as a basis for providing technical assistance to providers with underperforming services. This could take the form of a formal planning assistance program, which can provide additional opportunities for DOT staff to help providers better address equity and efficiency.

One example is MnDOT, which is exploring offering assistance in the context of helping providers shorten capital planning cycles, which staff believe could provide additional opportunities to prioritize key strategies to improve efficiency. Oregon DOT is another example. ODOT uses the state’s key performance measures as a basis for directing technical assistance toward underperforming providers. ODOT also sees an opportunity to help public transportation providers develop equity and efficiency policies and performance targets that are consistent with those that ODOT plans to include in its newly-updated long-range plan.

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Appendix A – Interview Questions

Introduction

ICF is supporting the National Cooperative Highway Research Program (NCHRP) to produce guidance for state DOTs on balancing efficient and equitable public transportation service. Efficient public transportation service is service that carries as many riders as possible at the lowest possible cost. Equitable transportation service can mean service that covers all areas of a state or service that is equitably distributed between the general population and disadvantaged communities, including either low-income/minority communities or transit-dependent riders. It can be hard to balance efficiency and equity because the fixed-route service in densely-populated is typically the most efficient type of transit, whereas agencies often rely on expensive demand response service or less-utilized rural service to meet transit-dependent or underserved populations' needs. We have reviewed the state of the practice and are now interviewing DOTs that have taken steps to integrate efficiency and equity into their decision-making processes to better understand the opportunities and challenges they face in doing so.

Background questions

- What is your DOT's role with respect to public transportation? Does the state own/operate public transportation service or just allocate funding to public transportation agencies within your state?
- Does your DOT provide any state funding to urban and/or rural public transportation operators?
- If so, is it capital assistance, operating assistance or both? Are there different requirements for how state funding sources are spent than for Federal funding sources?
- How do public transportation agencies in your state address efficiency and equity? How does the DOT influence these decisions, if at all?

Efficiency policies and performance measures

- Has your DOT adopted policies to prioritize funding for more efficient public transportation service? Where are these policies contained (e.g., LRTP, public transportation master plan, criteria for individual funding sources)? If applicable, how do these policies balance with equity?
- Does your DOT use performance measures to evaluate the efficiency of public transportation? If so, in what context (e.g., performance measure dashboard, LRTP, TIP, guidelines for individual funding sources)? What type of public transportation services do you evaluate?

- Which efficiency measures does your DOT use to assess public transportation measures (e.g., total ridership, passengers per hour, cost per passenger trip, cost per service hour, cost per vehicle mile, farebox recovery)? Why do you use these measures?
- Do you report any of these measures to the state legislature? If so, which ones and why?
- Have you collected data or set guidance on what constitutes efficient public transportation service?
- How did your DOT adopt policies or performance measures specifically relating to efficiency? What outcomes have you seen as a result? Overall, do these results seem to balance efficiency and equity? If so, how?

Equity policies and performance measures

- What does “equity” mean to your DOT?
- Has your DOT adopted policies to address or prioritize equity? Are these agency-wide policies, or do they focus on public transportation service? Where are these policies contained (e.g., LRTP, public transportation master plan, criteria for individual funding sources)? If applicable, how do these policies balance with efficiency?
- Does your DOT use performance measures to evaluate equity in public transportation? If so, what measures do you use, and in what context (e.g., performance measure dashboard, LRTP, TIP, guidelines for individual funding sources)? What type of public transportation services do you evaluate?
- How did your DOT adopt equity policies or performance measures? What outcomes have you seen as a result? Overall, do the results seem to balance equity and efficiency?
- Do you have thoughts about the role that your DOT might play in promoting transportation equity in the future?

Best practices

- How might your agency decide between allocating funding to projects that provide different benefits—for example, funding a very cost-effective transit service vs. funding a service that is not as cost-effective, but serves a greater number of transit-dependent riders?
- Are there other state DOTs that you consider to be leaders in addressing efficiency and/or equity through public transportation funding decisions?
- Are there public transportation agencies that are implementing best practices in addressing efficiency and/or equity that you think might provide a model for state DOTs?

Appendix B – List of Interviewees

Agency	Name	Title
Minnesota DOT	Tom Gottfried	Program Director, Transit Programs
	Michael Schadauer	Office Director, Administration
Florida DOT	Ed Coven	State Transit Manager
Florida CTD	Steven Holmes	Executive Director
North Carolina DOT	Debra Collins	Director, Public Transportation
Washington DOT	Nicole Patrick	Grant Programs, Public Transportation
	Robert Gibson	Grant Programs, Public Transportation
Wisconsin DOT	Ian Ritz	Chief, Transit Section
Oregon DOT	Jean Palmateer	Rail and Public Transit Planner
Ohio DOT	Chuck Dyer	Administrator, Office of Transit
New Mexico DOT	David Harris	Director, Transit and Rail
Maryland DOT	Holly Arnold	Deputy Director
	James Raszewski	Program Manager/Compliance
	Heather Murphy	Director, Office of Planning and Capital Programming

Appendix C – Literature Review Detailed Findings

This appendix includes notes from the literature review. The research team reviewed planning and policy documents from state DOTs as a preliminary step in identifying policies and performance measures related to transit efficiency and transit equity. The results helped to identify states selected for interviews and case studies. The notes in this appendix have not been edited to reflect subsequent information collected through the interviews and case studies.

Arizona DOT (AZDOT)

Resources reviewed

- What Moves You Arizona, Long-Range Transportation Plan 2010-2035, November 2011 www.azdot.gov/docs/default-source/planning/lrtp-2011-1129.pdf?sfvrsn=4
- AZDOT, Rural Transit Needs Study, Executive Summary, 2008 https://www.azta.org/images/uploads/transit-studies/Rural_Transit_Needs_Study_Final_Report_Executive_Summary_May_2008.pdf

Policies

Efficiency-related

- Improve Mobility and Accessibility (congestion, speed, travel delay)

Equity-related

- In the 2008 Rural transit Needs Study it is recommended that ADOT’s rural transit service coordination via councils of government can be achieved by identifying “public transportation services within the region that promote the efficiency of general public, elderly, and disabled service by supporting the streamlining and coordination of existing public transportation programs”.
- It also states that “collect ridership and cost data for Section 5310 and other social service agency operations”.

Performance measures

Efficiency-related:

- none

Equity-related:

- Percent of rural transit preservation needs met – Provides an output-based assessment of how future spending will meet estimated needs

Colorado DOT (CDOT)

Resources reviewed

- Felsburg Holt & Ullevig, Establishing Framework for Transit and Rail Performance Measures, December 2012, <https://www.codot.gov/programs/transitandrail/resource-materials-new/fhu-s-performance-measures-report>
- CDOT, Title VI Program, November 2016, <https://www.codot.gov/about/transportation-commission/documents/2016-archive-of-supporting-documents/november-2016/fta-title-vi-plan-2016-final.pdf>

Policies

- Some of the goals and objectives defined under mobility and accessibility that highlight transit efficiency broadly include:
 - “provide transit opportunities for all populations (ease of access)”
 - integrating “regional connectivity in all transportation projects”
 - “travel-time, cost, frequency, competitiveness, and reliability”
 - “community access (local) improvement: connection to regional systems from the start/end point”.

Performance measures

In the Framework for Transit Performance Measures report the following measures relate to efficiency:

- Total ridership - urban and rural
- Passenger miles for bus transit
- Passenger miles for rail

Equity-related:

- None.

Florida DOT (FDOT)

Resources reviewed

- FDOT, Best practices in Evaluation Transit Performance, July 2014, <http://www.fdot.gov/transit/Pages/BestPracticesinEvaluatingTransitPerformanceFinalReport.pdf>
- FDOT, Long Range Program Plan, 2016, <http://floridafiscalportal.state.fl.us/Document.aspx?ID=14609&DocType=PDF>
- FDOT, Lee County Transportation Disadvantaged Service Plan, May 2012, <http://www.fdot.gov/ctd/docs/TDSP/Lee%20Minor%20TDSP%202012%20Final%20Adopted.pdf>

- FDOT, Commission for the Transportation Disadvantaged, Annual Performance Report, 2016, <http://www.fdot.gov/ctd/docs/AORAPRDocs/AOR2015-16Final20161221.pdf>

Policies

Efficiency-related

- FDOT's Long Range Program Plan includes the following goal related to provision of efficient transit service:
 - Goal area: Provide transportation solutions that support quality places to live, learn, work, and play
 - Objective that supports this goal includes: "Increase the availability of public transportation with a measure that tracks transit ridership growth comparable to average rate of population growth."

Equity-related

- The Annual Performance Report of the Commission for the Transportation Disadvantaged "ensures the availability of efficient, cost-effective, and quality transportation services for transportation disadvantaged persons".
- FDOT serves as a primary recipient of the Transportation Disadvantaged Service Plan (TDSP) that addresses fixed route and evaluation of paratransit services from various transit agencies across the state. This plan covers core goals and strategies within equitable transit service. As an example, the Lee County Transportation Disadvantaged Service Plan includes the following:
 - Goal - Provision of Service
 - Strategy to support this goal includes: "Provide a comfortable, cost-efficient and cost-effective coordinated transportation service that meets the needs of the transportation disadvantaged within funding limitations".

Performance measures

In its Best Practices in Evaluation of Transit Performance Report, FDOT utilizes and evaluates the following performance measures under effectiveness and efficiency:

- Effectiveness measures
 - Passenger trips per capita
 - Passenger trips per mile
 - Passengers per revenue hour
 - Average trip length
 - Revenue miles per route miles
 - Weekday span of service
 - Route miles per square mile of service area
- Efficiency measures include the following under *Cost Efficiency and Operating Ratios*:

- Operating expenses per capita
- Operating expenses per passenger trip
- Operating expenses per passenger mile
- Maintenance expenses per revenue mile and per operating expense
- Farebox recovery
- Local revenue per operating expense
- Operating revenue per operating expense

FDOT'S Long Range Program Plan includes the following equity related performance measures under the "Transportation Disadvantaged" program:

- Equity measures
 - Average cost per one-way trip provided
 - Number of one-way trips provided (It is noted that this measure only includes "CTD trips, not Medicaid trips")

The Annual Performance Report for the Commission for the Transportation Disadvantaged tracks and measures the following performance measures statewide under both service efficiency and effectiveness. Passenger trips are reported by a. type of service; b. funding source and c. trip purpose.

- Average Trips per Paratransit Passenger
- Average Trips per Driver Hour
- Cost Efficiency measures:
 - Cost Per Trip/Operating Expense per Total Passenger Trip
 - Cost per Paratransit Trip/Operating Expense per Paratransit Passenger Trip
 - Cost per Driver Hour/Operating Expense per Driver Hour
 - Cost per Total Mile
- In addition to these, accidents per 100,000 miles and miles between roadcalls are also reported and measured.

Kansas DOT (KSDOT)

Resources reviewed

- KDOT, Performance Measures Dashboard, Webpage,
<https://kdotapp.ksdot.org/perfmeasures/>
- KSDOT, Long Range Transportation Plan, 2008,
<http://www.ksdot.org/lrtp2008/>
- KSDOT, Long Range Transportation Plan, Chapter 4, Multimodal Transportation, 2008,
www.ksdot.org/Assets/wwwksdotorg/LRTP2008/pdf/KS_LRTPFinal.Chapter_4.pdf

Policies

KDOT's 2008 Long Range Transportation Plan (chapter 4) defines transit needs as "Capital and operating costs for all public transportation needs statewide, including traditional fixed-route service in urban areas, on-demand and scheduled services in rural areas, intercity bus routes and intercity passenger rail service."

KDOT's transportation planning focus is targeted towards "meeting rural public transportation needs". (Grant, M. et al, 2011).

Performance measures

Efficiency-related:

- KDOT's performance measures dashboard includes measures for safety, bridges, program delivery among others and only "number of counties with public transit" under public transportation.

Equity-related: None

Maryland DOT (MDOT)

Resources reviewed

- MDOT, 2016 Annual Attainment Report on Transportation System Performance, http://www.mdot.maryland.gov/newMDOT/Planning/CTP/Final_CTP_16_21/Documents/Attainment_2016_1_18_Single_LR.pdf

Policies

Efficiency-related: Two goals address transit efficiency as stated in the Annual Attainment Report-

- "Community Vitality: Provide options for the movement of people and goods that support communities and quality of life"
- "Quality of service: Maintain and enhance the quality of service experienced by users of Maryland's transportation system"

Equity-related:

- None.

Performance measures

In its Annual Attainment Report, MDOT includes the following efficiency-related measures:

- Operating cost per passenger trip
- Operating cost per revenue vehicle mile (includes local bus, light rail, Baltimore metro, paratransit)
- Light rail cost per trip
- Ridership with MARC and commuter bus
- Average weekday transit ridership

Equity-related:

- Operating cost per revenue vehicle mile (Paratransit)

Mississippi DOT (MSDOT)

Resources reviewed

- MSDOT, 2017-2020 Statewide transportation improvement program
<http://mdot.ms.gov/FiveYearPlanData/Current%20STIP/2017-2020%20STIP%20Final.pdf>
- MSDOT, MULTIPLAN 2035, Appendix A, Goals, May 2011,
<http://mdot.ms.gov/documents/planning/Programs/MULTIPLAN/MULTIPLAN%202035/Appendix%20A%20Multiplan%202035%20Goals.pdf>
- MSDOT, MULTIPLAN, Appendix F: Transit Needs Assessment, May 2011,
<http://mdot.ms.gov/documents/planning/Programs/MULTIPLAN/MULTIPLAN%202035/Appendix%20F%20Transit%20Needs%20Assessment.pdf>

Policies

MSDOT's Long Range Transportation Plan, Multiplan 2035, states this goal "Accessibility and Mobility: Improve Accessibility and Mobility for Mississippi's People, Commerce and Industry" that addresses transit efficiency and equity and the strategies that support this goal include- "establish coordinated regional public transportation processes that consider community needs"; "improve accessibility/mobility for non-highway modes"; "promote increased use of the state's freight and passenger rail system"

The following action steps relates to efficiency and equity:

- "Continue to work with service providers and others to ensure that Mississippi's citizens with disabilities have equal access to public transportation services"
- "promote and support the development of regional, full service transit systems that have the ability to meet a variety of customer needs within and across urban and rural areas"
- "encourage more widespread use of intercity rail service"

MDOT's Section 5310 objective states "to increase the mobility of elderly and disabled persons, especially those persons not served by a specific program or agency".

Performance measures

Efficiency-related:

- Ridership
- Average # of vehicles operated
- Revenue hours
- Revenue Miles
- Operating cost/Cost per mile, cost per pass and pass per hour

Equity-related:

- None.

Missouri DOT (MoDOT)

Resources reviewed

- MoDOT, Long Range Transportation Planning, 2007,
- http://www.modot.org/plansandprojects/documents/Map_000.pdf
- MoDOT, *Tracker: Measures of Departmental Performance*, January 2017.
http://www.modot.org/about/documents/Tracker_Jan17/Jan2017FinalDraft.pdf
- MoDOT, *Easily accessible Modal Choices*, July 2008,
http://www.modot.org/about/documents/Tracker_PDF_Jan08/Easily12.pdf

Policies

- Efficiency-related:
 - For MoDOT's Passenger Rail Service a goal "to improve passenger rail service with public investments in infrastructure and equipment to either eliminate or minimize public operating subsidies" exists as stated in the Long Range Transportation Plan.
 - Intelligent transportation systems (ITS) are utilized by MoDOT for cost-effective transit routes.
- Equity-related:
 - ITS is used to also expand transit service to rural Missourian areas. A specific goal is not stated in these reports.

Performance measures

- In MoDOT's Tracker Report, the following efficiency-related performance measures are reported:
 - Ridership measures:
 - Public transportation passenger ridership
 - Rail ridership- Amtrak
 - "Use of non-highway modes of transportation"
- Equity-related:
 - Availability measure: MoDOT tracks the average days per week rural transit ridership is available
 - Number of intercity bus stops

New Mexico DOT (NMDOT)

Resources reviewed

- NMDOT, The New Mexico 2040 Plan, NMDOT's Long Range, Multi-Modal Transportation Plan, September 2015, http://dot.state.nm.us/content/dam/nmdot/planning/NM_2040_Plan.pdf
- NMDOT, Statewide Public Transportation Plan, November 2010, http://dot.state.nm.us/content/dam/nmdot/Transit_Rail/NMStatewidePublicTransPlan_FINAL.pdf
- NMDOT, FY 2017 Statewide Transit Application/RPO Prioritization and Budget Award Recommendation Meeting, April 2016, http://www.dot.state.nm.us/content/dam/nmdot/Transit_Rail/FY17AWARDPACKET.pdf
- NMDOT, State Management Plan For The Administration of Federal Transit Grants, May 2015, http://dot.state.nm.us/content/dam/nmdot/Transit_Rail/SMP_FINAL_MAY2015.pdf

Policies

NMDOT's long range transportation plan identifies a goal that addresses efficiency and equity. This goal states, "Provide Multimodal Access & Connectivity for Community Prosperity ". Three objectives that support this goal including:

- efficient investment in the transportation system
- making efficient use of transportation resources "to reduce costs and improve mobility of residents"
- make the system more accessible to all New Mexicans "regardless of age or ability"

NMDOT "focuses primarily on rural and intercity public transportation service, identifying usage, demand, and needs as well as performance measures to identify and prioritize projects across the state." (New Mexico Statewide Public Transportation Plan). And the MPO/RTPO Coordinated Public Transit -Human Services Transportation Plans covers projects under the Enhanced Mobility for Seniors and individuals with Disabilities Section 5310 program.

Performance measures

The New Mexico 2040 Plan includes:

Efficiency-related measures:

- Annual ridership of rail runner express (New Mexico's only commuter rail service)
- Annual ridership of park-and-ride
- Cost per rider
- Cost per vehicle mile

Equity-related measures:

- NMDOT’s Statewide Public Transportation Plan lists performance measures under 3 different modes with cost per rider and cost per vehicle mile measured across all modes
 - Rural public transportation
 - Total ridership
 - Percent of residents in rural areas with access to public transportation service
 - Number and percent of rural counties with public transportation service
 - Human Services transportation
 - Percent of elderly, disabled and low-income populations with available on-demand public transportation service
 - Intercity bus/rail
 - Percent of population living in cities with intercity bus or rail service within 20 miles
- “Percent of adults over age 60 who report that they have transportation options sufficient to maintain an independent lifestyle” is also listed as a measure in the NMDOT 2040 Plan.

North Carolina DOT (NCDOT)

Resources reviewed

- FHWA, Case Study, NCDOT Development of a Performance Management System, October 2013, https://www.fhwa.dot.gov/tpm/resources/docs/nc_casestudy.pdf
- NCDOT, 2040 Transportation Plan, August 2012, https://www.ncdot.gov/download/performance/NCDOT_2040TransportationPlan.pdf
- NCDOT, Performance Dashboard Documentation, 2010, <https://www.ncdot.gov/download/performance/dashboarddetails.pdf>
- FHWA, North Carolina Refining a Performance Management System <https://www.fhwa.dot.gov/tpm/noteworthy/hif13012.pdf>

Policies

NCDOT states “make our transportation network move people and goods more efficiently” as a goal in the 2040 Transportation Plan. A guiding principle that support this goal include: “Recognize the growing diversity and mobility needs of the state’s population by continuously improving the mobility options that are available”.

Performance measures

Broadly, NCDOT’s transportation performance measurement uses a Performance Dashboard that displays results of different ranked transit agencies on performance measures- It is also noted that public transportation performance (one efficiency related measure included is ridership) are scored at a certain level of service C (“LOS C”).

Efficiency-related:

- Average Ridership
- Average number of passenger trips per revenue hour
- Average cost per trip

Equity-related:

- None.

Ohio DOT (ODOT)

Resources reviewed

- ODOT, Performance Metrics and Guidelines, Draft, Ohio Statewide Transit Needs Study, <https://www.dot.state.oh.us/Divisions/Planning/Transit/TransitNeedsStudy/Documents/InitiativePaper-PerformanceMetricsAndGuidelines.pdf>
- ODOT, Access 2040, 2014, <http://www.dot.state.oh.us/Divisions/Planning/SPR/StatewidePlanning/access.ohio/Documents/ODOTAccessOhio2014.pdf>

Policies

Efficiency-related – the following goals are identified in the Ohio Transit Needs Study:

- “Mobility and Efficiency – Reduce congestion and increase travel reliability”
- “Accessibility and Connectivity – Increase customer access to Ohio’s multimodal transportation system and improve linkages between modes”

Equity-related:

- No goal exclusively stated

Performance measures

The main strategy under Ohio’s transit performance measurement system is classifying services and developing measures within the set goals and performance benchmarks. Services are classified by fixed route and demand response.

The performance measures include three related to efficiency:

- service effectiveness- passengers per hour
- cost efficiency- cost per hour
- cost effectiveness- cost per passenger

Equity-related:

- ODOT includes customer satisfaction- satisfaction level among riders; for demand response services that provide service to disadvantaged communities. It states that “the

goal of providing a mobility option, or serving older adults or people with disabilities, may mean that some systems balance goals of being efficiency and effectiveness with other objectives of customer satisfaction”.

Oregon DOT (ODOT)

Resources reviewed

- ODOT, Annual Performance Progress Report, September 2015, <http://www.oregon.gov/ODOT/CS/PERFORMANCE/docs/ODOT%202015%20Annual%20Performance%20Progress%20Report.pdf>
- ODOT, Key Performance Measures <http://www.oregon.gov/ODOT/CS/PERFORMANCE/OnePagers/KPM%20Rollup.pdf>
- ODOT, Special Transit Rides, 2008, <http://www.oregon.gov/ODOT/CS/PERFORMANCE/OnePagers/Special%20Transit%20Rides%20One%20pager.pdf>
- ODOT, State Management Plan, July 2015, <http://www.oregon.gov/ODOT/PT/resources/guidance-library/state-management-plan.pdf>

Policies

ODOT promotes efficiency and equity under the Mobility/Economic Vitality- “Keep people and the economy moving” goal.

Efficiency-related:

- The strategy under this goal includes “Promoting transportation options: ODOT seeks to promote the use of transportation modes other than Single Occupant Vehicles by improving existing facilities and creating new transportation options. Alternative modes of transportation help reduce travel delay and stress on the highway system and ensure multimodal options for Oregonians”.

Equity-related:

- The strategy under this goal includes “Transportation mobility is important to Oregonians. We invest in and promote the use of accessible transportation services for seniors and individuals with disabilities. State and federal programs have been developed to provide access for those with mobility needs.”
- ODOT’s Special Transit Rides report identifies a Portland State University needs study (2008) which “determined that individuals need an average of 26 percent more transit trips than are available today. This assisted ODOT to set a new target and supported a change in methodology to include fixed route transit trips as well as demand response trips for older adults and people with disabilities”.

- Under this new methodology, “a new goal of 29 annual trips (a 26 percent increase) per Oregon’s population of older adults and individuals with disability by 2022 was set”.

Performance measures

In its Key Performance Measures report, ODOT includes both efficiency- and equity-related measures for the 2014-2015 fiscal year

Efficiency measures:

- Passenger rail ridership: Number of state-supported rail service passengers

Equity-related:

- Average number of special transit rides per each elderly and disabled Oregonian annually
 - includes fixed route and demand response services
- Intercity passenger service- percent of communities of 2500+ with intercity bus or rail passenger service

Pennsylvania DOT (PennDOT)

Resources reviewed

- PennDOT, 2015 Transportation Performance Report, <http://talkpatransportation.com/docs/TPR%202015--2-24-15.pdf>
- PennDOT, PA on Track, Long Range Transportation Plan, 2016, <http://www.penndot.gov/ProjectAndPrograms/Planning/Documents/PennDOT-LRTP%20-%20FINAL%20August%202016.pdf>

Policies

Efficiency-related:

- Under the broad goal of “PERSONAL AND FREIGHT MOBILITY: Expand and improve system mobility and integrate modal connections”, the objectives that support this goal are “Provide multimodal infrastructure and technology advancements to eliminate bottlenecks and **improve system efficiency and trip predictability**”, “**Increase access to jobs, labor, and transportation choices** in urban, suburban, and rural communities”; “Support communities through appropriate and equitable transportation modal options and investments” and “Improve first and last mile intermodal access and connections”

Equity-related:

- Not specified

Performance measures

In its long range transportation plan, PennDOT includes the following efficiency-related measures:

- Annual transit ridership (e.g., fixed route, shared ride service, etc.)

The following measures are identified in the Grant, M. et al. (2011) study

- Cost per rider
- Cost per service hour
- Total operating cost per passenger

Equity-related:

- None.

Virginia DOT (VDOT)

Resources reviewed

- Vtrans Action Plan, 2013, www.vtrans.org/resources/VTrans_Action_Plan_-_Final_for_Web_2013.pdf
- Vtrans 2035 Update, Statewide Multimodal Long-Range Transportation Policy Plan, 2013, www.vtrans.org/resources/VTrans2035Update_Final_Draft_with_Appendices.pdf
- Virginia Performs, Transportation, Webpage, www.vaperforms.virginia.gov/
- VDRPT, 2014-16 Strategic Plan, https://solutions.virginia.gov/pbreports/rdPage.aspx?rdReport=vp_StratPlan102&selAgency=505&selVersion=2014-16&run=Run
- VDRPT, Strategic Planning Measure Details https://solutions.virginia.gov/pbreports/rdPage.aspx?rdReport=vp_MeasureDetails132&ShowInput=DontShow&ShowToggle=Show&Submitted=Show&selAgency=505&selVersion=&selBiennium=&rdShowModes=Show
- VDRPT, Virginia Transit Performance Report, 2007 http://www.virginiadot.org/ctb/resources/cm_5_12.07.pdf
- VDRPT, Virginia Transportation Improvement Program FY2015-2018, January 2017, <http://drpt.virginia.gov/media/1983/transit-stip-fy15-fy18-approved-january-3-2017-amendment.pdf>

Policies

Efficiency-related:

- In the Vtrans 2035 Update, Statewide Multimodal Long-Range Transportation Policy Plan under the overarching goal of Mobility, Connectivity and Accessibility, the strategy that supports this goal is “facilitate the easy movement of people and goods, improve

connectivity of regions and activity center, and provide access to different modes of transportation”.

Equity-related: There appears to be no goal that directly addresses equity.

Performance measures

Efficiency-related measures:

- Ridership on transit systems in Virginia
- Ridership on state-sponsored passenger rail service
- System Efficiency (operating cost per passenger trip)
- System Effectiveness (passenger trips per vehicle revenue hour)
- Total Transit Miles operated
- Farebox Recovery

Equity-related:

- Passenger trips *taken* by elderly, disabled and low-income people
- Number of passenger trips *provided* for transit dependent Virginians.
 - Notes: Number of passenger trips provided for transit dependent Virginians includes human services transportation ridership data

Washington State DOT (WSDOT)

Resources reviewed

- WSDOT, Washington State Public Transportation Plan, 2016, http://www.wsdot.wa.gov/NR/rdonlyres/EF00F16E-472D-43FE-AFF6-935DF809274B/0/WashingtonStatePublicTransportationPlan_Section50871816optimize.d.pdf
- WSDOT, Performance Measurement Library, <http://www.wsdot.wa.gov/Accountability/Publications/Library.htm>
- WSDOT, Gray Notebook <http://www.wsdot.wa.gov/Accountability/GrayNotebook/navigateGNB.htm>
- WSDOT, Statewide Transportation Goals, September 2016, http://wsdot.wa.gov/publications/fulltext/graynotebook/DB_Sep16.pdf
- WSDOT, Washington Transportation Plan, January 2015, https://wtp2035.files.wordpress.com/2015/01/wtp2035_final_21-jan-2015.pdf

Policies

Of the five goals set forth by WSDOT in the 2016 State Public Transportation Plan, the following goals address efficiency and equity-

- **Goal 2: Access**

- It states, “Provide and sustain transportation that allows people of all ages, abilities and geographic locations to access jobs, goods, services, schools and community activities”
- The strategies that support this goal include:
 - “**Remove barriers, such as conditions on special needs funding** and other policy restrictions, and incentivize collaboration and integration between service providers (and develop cost-effective transportation choices for disadvantaged groups)
 - “Work with a broad range of partners to plan and invest based on system-wide needs, priorities and performance” , as an example: maximizing effectiveness of park and ride lots that addresses access to special needs population
- **Goal 3: Adaptive Transportation Capacity**
 - It states, “Use new technologies and partnerships to make better use of existing transportation assets and meet changing customer needs”
 - The strategies that support this goal include:
 - “Use technology to improve access for people with special transportation needs and maximize efficiency and effectiveness, (e.g., develop systems to help providers better coordinate service delivery)”
 - “Develop and implement integrated, multimodal system improvements that move more people in fewer vehicles and at least cost”
 - “Foster innovation to respond to emerging market opportunities and other system changes through public-private partnerships and agency coordination”

Performance measures

WSDOT operates a performance measurement library dedicated to transportation performance measures.

Efficiency-related:

- In the 2016 State Public Transportation Plan the following measures are listed as currently available under *Goal 2: Access*
 - Transit ridership
 - Ridership and percentage of trips on time for Washington State Ferries and Washington sponsored Amtrak train service
 - Quality first mile/last mile transit access

Equity-related:

- Under the same Goal 2: Access, “Special Needs Access” is listed as measure that is to be developed. In addition access to public transportation by race, disability and income and access to human services and schools are also measures that are planned to be developed by WSDOT to evaluate the performance of this goal.

West Virginia DOT (WVDOT)

Resources reviewed

- WVDOT, Multi-modal Statewide Transportation Plan
http://www.transportation.wv.gov/highways/programplanning/planning/statewide/Documents/West_Virginia_Long_Range_Multi-modal_Transportation_Plan.pdf
- WVDOT, Public Transit Systems, Webpage,
<http://www.transportation.wv.gov/publictransit/transitsystems/Pages/default.aspx>
- West Virginia Region I Coordinated Public Transit-Human Services Transportation Plan Update,
http://www.transportation.wv.gov/publictransit/Documents/Region%201%20Final_Plan%20101515ra%20Small.pdf

Policies

Equity-related: On the WVDOT website, it is stated that “Buses are a vital form of transportation in West Virginia, especially in rural areas and for special population groups such as the elderly and disabled. West Virginia’s Division of Public Transit (DPT) strives to ensure the best possible experience for passengers on buses and vans, and to meet the service needs of West Virginia residents.”

The WV Region I Human Services Transportation Plan report identifies the following goal and supporting objectives related to provision of equitable transit service:

- “Goal #2: Sustain and Improve Transportation for Older Adults, Individuals with Disabilities, and People with Low Incomes.” Objectives under this goal include
 - “Provide solutions to communication system challenges experienced by transportation providers”
 - “Provide the region with more specialized ADA-accessible vehicles to accommodate changes to mobility devices”
 - “Provide replacement and expansion vehicles for programs serving older adults, individuals with disabilities, people with low-incomes, and the general public”
- “Goal # 3: Continue to Control Operating and Capital Costs and Address Lack of Funding. Objectives under this goal include:
 - “Address poor efficiency and low productivity in providing transit service”
 - “Provide service for residents under age 55 in hard to serve rural parts of McDowell County”
 - “ Provide new funding sources”

Performance measures

- Transit Efficiency related measures are not specifically listed in the WVDOT’s multi-modal statewide transportation plan other than ridership.

- Measures including percent increase of ridership, trips per hour, cost per trip are listed under *Goal 3* in the WV Region I Human Services Transportation Plan.
- Equity-related:
 - Percent increase in rural ridership
 - The following measures/data is compiled on the WVDOT website
 - Elderly One Way Passenger Trips
 - Persons with Disabilities One way Passenger Trips
 - Total Vehicle Miles
 - Total one way passenger trips
 - Measures including number of trips provided for medical appointments, number of trips and trips per hour for transit service provided to outlying areas (McDowell County), increased funding and also number of trips provided to veterans* are broadly equity measures under *Goal 3* in the WV Region I Human Services Transportation Plan.

Notes: Page 70-71 of the WV Region I Human Services Transportation Plan lists action steps under the goal relating to equity. These steps include corresponding outcomes or performance measures such as securing grant funding for action item “resources for vehicle purchases”.

Wisconsin DOT (WisDOT)

Resources reviewed

- WisDOT, MAPSS Performance Improvement Report, October 2016, <http://wisconsin.gov/Documents/about-wisdot/performance/mapss/perf-report.pdf>
- WisDOT, Better Faster Lower Cost, An efficiency report, December 2016, <http://wisconsin.gov/Documents/about-wisdot/performance/mapss/efficiency-report-2016.pdf>

Policies

MAPSS Performance Improvement Report

- “Mobility: Delivering transportation choices that result in efficient trips and no unexpected delays”
- Equity-related strategy includes increased access in several counties

Performance measures

The WisDOT Performance Scorecard lists the following performance measures:

- Efficiency-related:
 - Cost per trip
 - Cost per service hour
- Equity-related:
 - Percent of population served by transit,
 - Ratio of revenue hours to service area population

