

Exhibit C-25: Expansion Module Components: Limitations and Enhancements

Component	Modeling Limitations	Potential Future Enhancements
Service Coverage	<p>Data Limitations: Many UZAs with fixed-route transit service, especially smaller UZAs, either do not publish GTFS data or have GTFS feeds that are broken or have some other defect. 162 of 486 UZAs were either entirely missing GTFS at the time of analysis or had GTFS that could not be processed.</p> <p>Vehicle Revenue Miles Calculation Methodology: The service coverage methodology assumed the existing transit service density of each UZA would be applied to all desert block groups to determine the needed vehicle revenue miles (VRM) to serve transit deserts, based on the area of each desert block group. However, this methodology does not take into account the distance of each desert block group from the existing service area. Desert block groups farther from the urban core would need more fixed-route VRM to provide regular service, which the current methodology does not account for.</p>	<p>Data Sources for GTFS: The ongoing development of the National Transit Map by the Bureau of Transportation Statistics (BTS) provides a potential opportunity to provide a more reliable source for sourcing GTFS feeds from agencies across the country, not just agencies that have previously chosen to make their feeds available. However, this effort is still underway as of Spring 2022.</p> <p>Methodology Changes: Alternate methods of calculating the VRM necessary to serve transit deserts. The most complex potential methodology would be to determine the closest transit route to each desert and adjust the path of the route so that it serves the desert, calculating the mileage difference. However, that process would be laden with assumptions. A simpler potential method is to use a factor that adjusts VRM based on the distance of each desert block group from the center of the UZA service area.</p>
Service Frequency	<p>Data Limitations: Many UZAs with fixed-route transit service, especially smaller UZAs, either do not publish GTFS data or have GTFS feeds that are broken or have some other defect. 162 of 486 UZAs were either entirely missing GTFS at the time of analysis or had GTFS that could not be processed.</p> <p>Frequency Thresholds: The service frequency methodology used thresholds for "Minimum Headway Supported by Density Levels" to determine which block groups were in need of more frequent transit service. These thresholds were sourced from the Transit Capacity and Quality of Service Manual, 3rd edition, but the original research behind these estimates is originally from research conducted in 1977, 45 years prior to the analysis conducted for this component.</p>	<p>Data Sources for GTFS: The ongoing development of the National Transit Map by the Bureau of Transportation Statistics (BTS) provides a potential opportunity to provide a more reliable source for sourcing GTFS feeds from agencies across the country, not just agencies that have previously chosen to make their feeds available. However, this effort is still underway as of Spring 2022.</p> <p>Update Frequency Thresholds: Find more up-to-date analysis of residential or population density thresholds for different levels of transit service frequency, or alternatively, determine a novel method for creating frequency thresholds either based on population densities or dwelling unit densities.</p>
New Starts Pipeline	<p>Data Limitations: The number of projects documented in FTA's New Starts pipeline listing drops off to zero roughly 8 to 12 years into the future, which poses limitations when forecasting 20-year needs. Listing also excludes projects (e.g., P3 projects) not seeking federal funding assistance.</p>	<p>Potential Enhancements: Conduct survey of local MPO and larger transit operators to develop more thorough listing of long-term rail and BRT expansion plans (regardless of funding source). Additionally, FTA could request that agencies submitting requests for New or Small Starts funding assistance provide a more consistent reporting of key project parameters (alignment lengths and grades, fleet size, station counts, traction power stations, ROW acquisition costs, etc.). More detailed and consistent project parameter data reporting would facilitate more accurate modeling of project asset life cycle costs.</p>
Average Speed	<p>Service Standard Definition: The minimum average transit speed standard used by this component is defined based on the current national average as determined by NTD data, and hence is subject to change over time (i.e., it is a variable and not a fixed standard). Moreover, average UZA transit operating speeds have tended to decline over time, resulting in a continual lowering of this standard.</p> <p>Approach Limitation: The modeling approach is based on agency-mode level service data reported to FTA and hence does not address operating speeds at the more detailed geographic / block levels considered by the Service Coverage and Frequency components.</p>	<p>Service Standard Definition: Define a fixed minimum speed service standard (i.e., that is not determined based on current NTD or other data and hence which does not vary over time). Consider setting minimum service standards by mode type and/or service area type (e.g., CBD vs suburb).</p> <p>Approach: Identify options to migrate this Average Speed component to an approach based on GTFS and other data sources that permit a more location-specific assessment of service speed improvement needs.</p>
Vehicle Occupancy	<p>Service Standard Definition: As with the Average Speed component, the maximum vehicle occupancy standard used by this component is defined based on the current national average as determined by NTD data, and hence is subject to change over time (i.e., it is a variable and not a fixed standard).</p> <p>Approach Limitation: The modeling approach is based on agency-mode level service data reported to FTA and hence does not address vehicle at the more detailed geographic / block levels considered by the Service Coverage and Frequency components (high occupancy is really a corridor issue, not an "agency-mode" issue).</p>	<p>Service Standard Definition: Define a fixed maximum vehicle occupancy service standard (i.e., that is not determined based on current NTD or other data and hence which does not vary over time). Consider setting occupancy standards by mode type and/or service area type (e.g., CBD vs suburb).</p> <p>Approach: Identify options to migrate this Vehicle Occupancy component to an approach based on GTFS and other data sources that permit a more location-specific assessment of service speed improvement needs.</p>
Ridership Growth	<p>Trend Rate of Growth: A key issue in using this approach has been concerns regarding selection of a historical trend period (currently 15 years) most likely to best predict future ridership growth, or whether use of a trend rate in general (i.e., rather than an actual forecast) is the best possible option. Here, longer historical trend periods have generally been considered preferable, but this choice may not address short-term issues (e.g., ridership impacts of the COVID-19 pandemic).</p>	<p>Potential Enhancement: Consider options to develop forecast models to predict future ridership based on projected changes in population, employment, costs of travel alternatives, teleworking trends, and other relevant variables. Consider developing forecasts at the UZA level as supported by input data. Note development of this type of approach may require FTA to purchase commercial forecast data for some input variables.</p>