3. STATION SPACING AND SITING GUIDELINES

The station spacing and siting guidelines are summarized in Table 3-1. Table 3-1 also includes benchmark information for local transit service and express bus as provided in Appendix G of the Transportation Policy Plan. These guidelines should be considered collectively when planning and designing transitway station locations.

A transitway station is a place on a transitway where scheduled vehicles stop during every trip. Guideline 3.2. Transit Station Types describes types of transitway stations. This section, as well as Chapter 4. Station and Support Facility Design Guidelines, provide guidelines for station design.

3.1. PRIMARY STATION MARKET ANALYSIS FACTORS AND METHODS

The identification of transitway station areas should be based on travel demand demonstrated through rigorous market analysis of existing and planned future conditions.

The following are primary market analysis factors to be considered in the identification of station areas on transitways and Table 3-1 identifies the appropriate factors for each transitway mode:

- **Major travel patterns (including location of major activity centers)**
- **Population and employment density**
- **Auto ownership**
- **Trip purpose (e.g., commuters, students, shoppers, other)**
- **Existing transit ridership**
- **Commuter market analysis (geographic market area, existing and future demand, and facility and service competition or reinforcement)**

The Regional Travel Demand Forecast Model incorporates the adopted comprehensive plans of local communities in the transitway corridor. Communities in transitway corridors are encouraged to complete station area plans that reflect the principles of transit-oriented development and incorporate these plans into their adopted comprehensive plans.

Station-area market analysis is a critical element of transitway planning and implementation. Proper analysis ensures the region will make wise investments by choosing station locations that provide high levels of transit service to key transit markets with high travel demand.

The Regional Travel Demand Forecast Model, maintained by the Metropolitan Council, is the preferred method for developing transitway travel demand forecasts, including the performance of market analysis (see Guideline 10.7. Transitway Travel Demand Forecasting). If a transitway station's ridership demand is primarily dependent on a park-and-ride customer market, the transitway's station market analysis should also include the commuter market analysis. Information on transit-oriented development principles is available in the Metropolitan Council's Guide for Transit-Oriented Development.

3.2. TRANSIT STATION TYPES

The station type will be dependent on the transit mode, geographic conditions, and the service plan for the transitway corridor. Types of stations include online, inline, and offline and are illustrated in Figure 3-1 – Transitway Station Types.

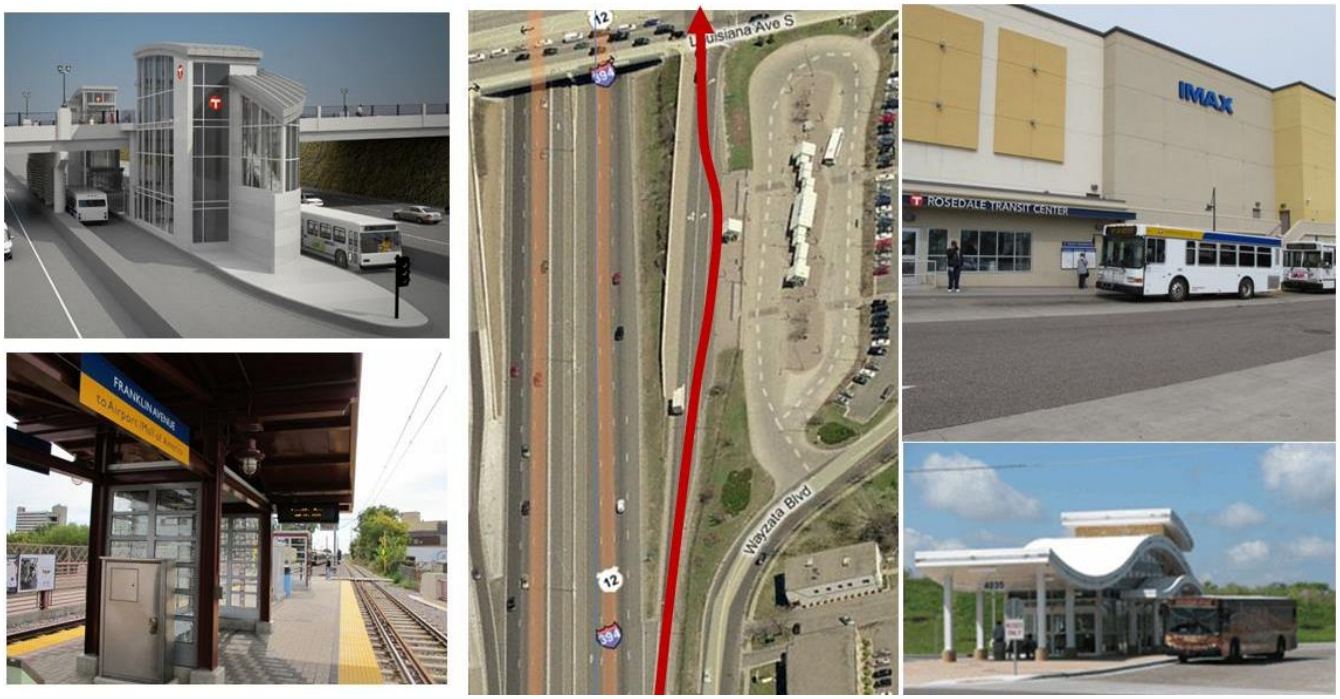
- **All rail stations should be online stations.**
- **Online or inline stations are preferred for Highway and Arterial BRT.**
- **Hybrid inline-offline stations should be implemented for Highway BRT service where online stations are not feasible, with the inline configuration provided for the inbound direction of travel.**
- **For all modes, end-of-line stations may be offline.**

Station design will vary considerably depending on the transit mode and the location of the station. Stations are generally categorized into three types, based on their impacts to service operations. These three categories are shown in Figure 3-1 and include:

- Online – Online stations are located within the vehicle runningway and the transitway vehicle can access the station without leaving the runningway. Examples of online stations in the region include all LRT and Commuter Rail stations, the I-35W & 46th Street BRT station, and the Apple Valley Transit Station on Cedar Avenue.
- Inline - Inline stations are located adjacent to the vehicle runningway, typically along freeway interchange ramps. Although they require the transitway vehicle to exit the primary runningway, they provide easy access to a station and immediately return to the runningway. Few or no turns are required. Examples include the I-35W BRT stations at 66th Street and future stations at 82nd Street and 98th Street.
- Offline - Offline stations require transitway vehicles to exit the runningway and require several turning movements resulting in potential traffic delays that impact transitway service speed and reliability, especially during peak travel times. Examples of current offline transitway stations are Cedar Grove Transit Station and Burnsville Transit Station.

Figure 3-1 – Transitway Station Types

Online **Inline** **Offline**



3.3. TRANSPORTATION SITE LOCATION FACTORS

Transitway stations should be sited to maximize convenience and minimize travel times for transitway passengers and vehicles under existing and planned future conditions.

The following are factors to be considered in the identification of station site location on transitways and Table 3-1 identifies the primary and secondary factors for each transitway mode:

- **Access to the station**
- **Impacts on the existing road and bicycle/pedestrian network**
- **Park-and-ride lot need**
- **Railroad trackway operational impact**

Siting an individual transitway station is of paramount importance. If a station is poorly sited, it will not generate high travel demand, even if market analysis forecasts high demand levels.

The Transitway Guidelines identify four key transportation-related site location factors: access to the station for transit vehicles and customers, impacts on existing road network, inclusion in the Park-and-Ride Plan, and railroad trackway operational impacts. The factors are identified as primary or secondary factors for each mode in Table 3-1. In addition to considering these factors, the lead agency is responsible for coordinating with all affected transportation authorities, as identified in Guideline 10.3. Lead Agency Candidates and Responsibilities.

Access to the Station

For all transitway modes, access to the station for transit vehicles and customers is a primary factor in siting an individual station. It is critical to ensure that customers and transit vehicles, including those specific to the mode and those connecting for transfers, have safe and convenient access to the station. Convenient access will ensure efficient transit operations for all modes, and is critical in providing fast, reliable service on the transitway. Types of access that should be considered when siting a station and selecting the station type include transitway, connecting roadways that support transit transfers or customer access, sidewalks, and trails. Some types of access are considered primary for one mode and secondary for another depending on the market the transitway is intended to serve. See Table 3-1 for details.

Impacts on the Existing Road and Bicycle/Pedestrian Network

The siting of transitway stations should include analysis of traffic impacts on the existing road and bicycle/pedestrian network to understand the ease of access and safety of transit customers and other travelers. Results should include level of service, average delay per vehicle, and crash information for all modes on key roadways and intersections (including bicycle/pedestrian crossings) used by the transitway vehicle and customers.

Park-and-Ride Lot Need

Highway BRT express and Commuter Rail customers and some Highway BRT station-to-station and LRT customers access stations using park-and-ride lots. Local transfer connections are often fewer at Highway BRT express or Commuter Rail stations, with the customer base instead driving a personal vehicle to access the transitway. Personal vehicles need to be accommodated at stations to encourage transitway ridership, which is usually done through a park-and-ride lot.

Park-and-ride demand for a station should be analyzed. According to Guideline 10.7. Transitway Travel Demand Forecasting, the regional travel demand forecast model is the preferred method for developing transitway travel demand forecasts; however, the methodology outlined in Section 5.3 of the Park-and-Ride Plan may be appropriate, especially for estimating park-and-ride demand at Highway BRT express or Commuter Rail stations. Use of this method for estimating park-and-ride demand should be vetted through Metropolitan Council travel demand forecasting staff. Additionally, the reasons for using this kind of rule-based method should be documented. In general, the amount of parking provided is inverse to the density of surrounding land uses; i.e., less parking is provided in areas with higher population and employment densities.

Trackway Operation Impacts

For LRT and Commuter Rail, it is important to consider trackway operation impacts at proposed stations. Potential trackway operation considerations at stations include the number of tracks available and their ability to provide access to station platforms, the presence or absence of track signal sightlines, the location of adjacent roadway crossings, and the location of adjacent track crossovers as needed to manage two-way train operations, including freight traffic sharing railroad track use with Commuter Rail, among others.

3.4. LAND USE SITE LOCATION FACTORS

Transitway stations should be sited to fit with and enhance the neighborhoods surrounding them today and in the future.

Land use significantly contributes to the success of station siting and generating high travel demand. Both existing and planned land uses should be considered when siting a station with priority for implementation on those stations serving existing uses. Land use factors that should be considered include, but are not limited to, the following:

- **Land availability**
- **Land type and costs (e.g., public right-of-way, joint-use, private, etc.)**
- **Mix of land uses and compatibility with transportation functions**
- **Development plans including comprehensive and station-area plans**
- **Available infrastructure and the cost of providing additional infrastructure including bicycle and pedestrian infrastructure (e.g., sidewalks, bicycle-pedestrian overpass/underpass, etc.)**
- **Proximity to affordable housing**
- **Proximity to employment**
- **Size of and proximity to transit-dependent, low-income, and minority populations**

The relative importance of each of these factors may vary depending on the transit mode and the geographic location. Both existing and planned land uses should be considered in the planning and siting of transit stations in a transitway corridor. However, priority for implementation should be given to those stations supporting existing conditions because future conditions are speculative. Future conditions are reflected in the travel demand forecasts but the implementation of future conditions is dependent on the real estate market, local financial incentives, local land use guidance, and local/regional infrastructure improvements. Communities are encouraged to complete station area plans that can be incorporated into local adopted comprehensive plans and will then be reflected in the forecasts for the transitway corridor. Local land use authorities need to be involved in station planning and siting. The staged implementation of stations is discussed in Guideline 3.9. Staged Development of Stations.

This guideline supports the vision and principles of the Corridors of Opportunity initiative currently underway in the region. The Corridors of Opportunity vision is to develop transitway corridors that will guide the region's growth, vitality, and competitiveness by creating distinctive places and strengthening local assets. This will, in turn, increase transit ridership and expand access to jobs, affordable housing, and essential services for residents of all incomes and backgrounds.

Implementation of the Regional Transitway Guidelines should support these policies. More information about the Corridors of Opportunity initiative is available at: http://www.metrocouncil.org/planning/COO/index.htm/. The Regional Transitway Guidelines also support the U.S. Department of Housing and Urban Development's (HUD) six Livability Principles

established through the Partnership for Sustainable Communities. More information about the Partnership for Sustainable Communities is available at: http://www.sustainablecommunities.gov/.

In addition to considering these factors, the lead agency is responsible for coordinating with all affected land use authorities, per Guideline 10.2. Coordination of Agencies and Stakeholders. Information on transit-oriented development is available in the Metropolitan Council's Guide for Transit-Oriented Development.

3.5. MINIMUM DAILY BOARDINGS FOR TRANSITWAY STATION OPENING YEAR FORECAST

Travel demand at each station should be substantial in the station's projected year of opening. The recommended minimum daily boardings for each mode are identified in Table 3-1. Since transit travel speed, travel time reliability, and access are foundational characteristics of transitways, it is important to seek a balance between the number of stations and the transit travel time in the transitway corridor.

Stations provide the important function of giving travelers access to and from a transitway. Each station also increases travel time, risk of travel time variability, and operational costs due to the slowing, stopping, and restarting required for a transit vehicle to serve a station. Because travel speed, travel time reliability, and access are foundational characteristics of transitways, the Transitway Guidelines seek to strike a balance among them.

The guidelines in Table 3-1 recommend minimum daily boardings per station for the forecast year of transitway opening that range from 50 or more for Arterial BRT to 300 or more for LRT. The guidelines include a minimum of 200 for Highway BRT express and Commuter Rail, which is consistent with current requirements for an express bus stop as stated in Chapter 5 of the Park-and-Ride Plan.

Highway BRT stations may serve more than one transitway mode, including station-to-station and express BRT. If service for multiple modes is planned, the minimum daily boardings for the station's opening year forecast should be the total for the two or more modes (e.g., Highway BRT station-to-station minimum is 100 or more, Highway BRT express is 200, minimum for a station serving both modes with both modes opening at the same time would be 300 or more boardings).

3.6. AVERAGE STATION SPACING FOR THE LINE (OUTSIDE THE MINNEAPOLIS/ST. PAUL CENTRAL BUSINESS DISTRICTS)

Transitway access should be balanced over the length of a line to ensure the line delivers the speed and travel-time reliability that drives the line's market competitiveness. The average station spacing for each mode is identified in Table 3-1.

Average station spacing is defined as the average distance between stations when considering all stations on a transitway. Some stations may be closer together and some may be further apart than the average spacing. The length of a line is defined by the line's service operating plan in the year of opening; the length of the line and station spacing to be averaged should include all through-routed

services outside the Minneapolis and St. Paul central business districts (CBDs). This guideline is based on consideration of station spacing in this region and in other regions and acknowledgment of the effect the number of stations has on transitway travel-time competitiveness. This guideline seeks to support balanced levels of access and mobility on transitways.

3.7. MINIMUM SPACING BETWEEN TWO STATIONS (OUTSIDE THE MINNEAPOLIS/ST. PAUL CENTRAL BUSINESS DISTRICTS)

Transitway access should be balanced within a line to ensure each line is accessible to key transitway markets and delivers the speed and reliability that drives the line's market competitiveness. The minimum station spacing for each mode is identified in Table 3-1.

Minimum station spacing is defined as the minimum distance between any two stations. All stations, in combination, along a particular corridor should meet or exceed the average spacing guideline; however, individual stations along a particular corridor could meet only the minimum station spacing guideline. The recommended Transitway Guidelines do not address station spacing within CBDs where station design is project specific and based on street network capacity and land use. This guideline allows closer station spacing to provide more frequent transitway access where demand warrants and is paired with average station spacing for the overall transitway to support balanced levels of access and mobility on transitways.

3.8. MINIMUM DISTANCE BETWEEN MINNEAPOLIS/ST. PAUL CENTRAL BUSINESS DISTRICTS AND NEXT STATION

Highway BRT and Commuter Rail stations should be sited to complement the transit system already serving the Minneapolis and St. Paul central business districts. The minimum distance between Minneapolis/St. Paul CBD and next station for each mode are identified in Table 3-1.

Three modes are intended to serve markets with trip origins outside the Minneapolis and St. Paul CBDs. The modes are Highway BRT station-to-station, Highway BRT express, and Commuter Rail. To support these modes and minimize competition with other transit services, transitway stations should be located between one (Highway BRT station-to-station) and seven miles or more (Commuter Rail) from the Minneapolis or St. Paul CBDs. This guideline is based on consideration of station spacing in the region, acknowledgment of the effect the number of stations has on transitway travel-time competitiveness, and acknowledgement that the existing transit system generally provides competitive travel times within five miles of the Minneapolis and St. Paul CBDs (15- to 30-minute travel times). This guideline seeks to support balanced levels of access and mobility on transitways.

3.9. STAGED DEVELOPMENT OF STATIONS

Some stations should be planned for but built after initial construction of the larger transitway.

To be included in initial planning/alternatives analysis, a station should be supported by land use densities that are included in the city's comprehensive plan as evidenced by the station's forecast travel demand meeting the minimum ridership threshold for the planning horizon year.

To be included in the Draft Environmental Impact Statement (DEIS)/preliminary/final design, a station should be included in an approved station-area master plan, which should be adopted as part of the city's comprehensive plan and zoning ordinance, and the station's forecast travel demand should meet the minimum daily boardings threshold for the planning horizon year. The DEIS should distinguish between those stations that are expected to meet ridership thresholds by opening year and those expected to meet ridership thresholds by the planning horizon year. The latter should be identified as potential future stations.

To be included in construction, there should be:

- **Progress toward realizing the planned land development for the station area as evidenced by activities such as land assembly, developer interest, development agreements, and/or construction of municipal infrastructure;**
- **Evidence that enough development will be in place within five years of opening to achieve the minimum daily boardings threshold at the station; and**
- **Evidence that cost savings are significant when the station is constructed concurrently with the runningway.**

A station may also be included in construction when there is a significant low-income and/or transit-dependent population within ½ mile of the station and a master station-area plan has been approved (i.e., adopted as part of the city's comprehensive plan and zoning ordinance) even though development has not yet occurred.

Stations included in the final design may be added as infill stations after construction of the line when the above conditions for construction are met without meeting the evaluation criteria in Table 3-1. Proposed infill stations that are not included in the final design will be evaluated based on the evaluation criteria shown in Table 3-1.

Local communities along transitways are strongly encouraged to complete station area land use plans that reflect best practices in transit-oriented development planning and design. These plans are important for achieving increased ridership and improved access to jobs, affordable housing and essential services for residents of all incomes and backgrounds. However, the actual timing of development is influenced by many economic factors. This guideline provides direction for deciding which stations should be included in initial transitway construction and which should be phased in at a later date as development occurs.

Staging the development of transitway stations provides communities, corridors, and the region with opportunities to ensure appropriate access is provided and protect mobility and the significant investment required to implement transitways while proving travel demand is imminent. It should be

noted that environmental documentation would need to be revisited for stations added three or more years after the transitway's opening.

There are several conditions that may occur in the future that are not addressed by these guidelines including stations that outgrow their planned design, stations that do not perform well, the need for multiple infill stations, joint use facilities, and intermodal hubs. It is recognized that planning is based on professional due diligence and adaptations may need to be made in the future as changes occur or unique circumstances arise.

3.10.ADDITION OF NEW STATIONS

Justification for stations not included in the final design for a transitway should consider the guidelines above to protect the balance between access and mobility and the substantial investment required to implement transitways. Other considerations may vary based on the transitway, but should include the following:

- **Inter-station competition on the transitway**
- **Market-area overlap with other transit services including express bus**
- **Impacts on transitway travel time and service reliability**
- **Capital and operating costs**

As noted previously, local communities are encouraged to develop land use plans for future stations areas and incorporate these plans into their comprehensive plan. Station area plans are important for achieving increased ridership and improved access to jobs, affordable housing and essential services for residents of all incomes and backgrounds. However, it is recognized that development will occur over time and will be affected by many economic factors. The intent of this guideline is to provide direction for those circumstances where development may occur at a different time of different location than initially anticipated in the city's comprehensive planning process.

Table 3-2 presents an example of the additional analysis done for a Commuter Rail station; relevant analysis factors may vary by station and transitway mode.

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Table 3-1 – Station Spacing and Siting Guidelines Summary

	Local Service (Benchmark)	All-Day Frequent Service			Express Service (Benchmark)	Commuter Express Service	
	Local Bus/Limited Stop	Arterial Bus-Rapid Transit (BRT)	Highway Bus-Rapid Transit (BRT) Station-to-Station	Light Rail Transit (LRT)	Express Bus	Highway Bus-Rapid Transit (BRT) Express	Commuter Rail
3.1 Primary Station Market Analysis Factors and Methods **For all types of transitway service, communities are encourages to complete station area plans that reflect the principles of transit-oriented development and incorporate these plans into their adopted comprehensive plans.*	Population and employment density	Major travel patterns (including location of major activity centers), population and employment density, auto ownership, and trip purpose (e.g., commuters, students, shoppers, other), existing transit ridership; regional travel demand forecast model or similar resource	Major travel patterns (including location of major activity centers), population and employment density, auto ownership, and trip purpose (e.g., commuters, students, shoppers, other), existing transit ridership; regional travel demand forecast model or similar resource for stations without a park-and-ride; Commuter Market Analysis: Park-and-ride Plan Chapter 5 for park-and-ride-based stations	Major travel patterns (including location of major activity centers), population and employment density, auto ownership, and trip purpose (e.g., commuters, students, shoppers, other), existing transit ridership; regional travel demand forecast model or similar resource for stations without a park-and-ride; Commuter Market Analysis: Park-and-ride Plan Chapter 5 for park-and-ride-based stations	Commuter Market Analysis: Park-and-ride Plan Chapter 5	Commuter Market Analysis: Park-and-ride Plan Chapter 5; or Regional Travel Demand Forecast Model if part of corridor wide analysis	Commuter Market Analysis: Park-and-ride Plan Chapter 5; and/or Regional Travel Demand Forecast Model
3.3 Transportation Site Location Factors	<u>Primary</u>: Access to, and visibility of, stop for transit vehicle and customers via existing walk, trail, and transit transfer connections	Online or inline stations preferred. <u>Primary</u>: Access to, and visibility of, station/stop for transit vehicle and customers via existing walk, trail, and transit transfer connections	Online or inline stations preferred. <u>Primary</u>: Maximize operational speed, access, and visibility of station for transit vehicle on BRT runningway (online, inline or offline station) and customer access via existing walk, trail, and transit transfer connections, and existing highways <u>Secondary</u>: Park-and-ride lot need based on commuter market analysis (e.g., Park-and-ride Plan Chapter 5)	Stations should be online. <u>Primary</u>: Access to, and visibility of ,station for customers via existing walk, trail, and transit transfer connections and impacts on existing road network <u>Secondary</u>: Park-and-ride lot need based on commuter market analysis (e.g., Park-and-ride Plan Chapter 5)	Online or inline stations preferred. <u>Primary</u>: Park-and-ride lot need based on commuter market analysis (e.g., Park-and-ride Plan Chapter 5); Access to and visibility of station for transit vehicle and customers via existing highways; presence of a major travel corridor serving a major regional activity center <u>Secondary</u>: Access to station for customers via existing walk, trail, and transit transfer connections	Online or inline stations preferred. <u>Primary</u>: Park-and-ride lot need based on commuter market analysis (e.g., Park-and-ride Plan Chapter 5); Access to and visibility of station for transit vehicle via BRT runningway (on-line vs. off-line station) and customers via existing highways <u>Secondary</u>: Access to station for customers via existing walk, trail, and transit transfer connections	Stations should be online. <u>Primary</u>: Park-and-ride lot need based on commuter market analysis (e.g., Park-and-ride Plan Chapter 5); Access to and visibility of station for customers via existing highways; Trackway operational impacts <u>Secondary</u>: Access to station for customers via existing walk and transit transfer connections
3.5 Minimum Daily Boardings for Transitway Opening Year Forecast	N/A	50 or more boardings per station	100 or more boardings per station	300 or more boardings per station	200 or more boardings per station	200 or more boardings per station	200 or more boardings per station
3.6 Average Station Spacing for the Line (outside Minneapolis/St. Paul Central Business Districts)	1/4 to 1/8 mile	1/4 mile to 1/2 mile	2 miles	1 mile	5 miles/market specific	5 miles/market specific	7 miles or longer
3.7 Minimum Spacing between Two Stations (Outside Minneapolis/St. Paul Central Business Districts)	1/8 mile or longer	1/8 mile or longer	1/2 mile or longer	1/2 mile or longer	4 miles or longer/market specific	4 miles or longer/market specific	5 miles or longer
3.8 Minimum Distance between Minneapolis/St. Paul Central Business Districts and Next Station	N/A	N/A	1 mile or longer	N/A	5 miles or longer/market specific	5 miles or longer/market specific	7 miles or longer/market competitiveness analysis

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Table 3-2 – Example Infill Station Impact Analysis for Commuter Rail Station

Infill Commuter Rail Station Screening Criteria	
Service Reliability	Pass/Fail: Delay impact of platform design/access, signal placement of track alignment required
New Market Attractiveness	-1 pt/minute schedule delay impacting new market attractiveness
New Rail Customers	+10% = 5 pts percentage growth of overall ridership
Existing Customer Impact	Each 10% of existing customers = -1 pts/3 min added per trip
Service Consolidation	1 pt/10% of existing transit service replaced; adjacent transit options; travel time; location; & fare
Other Criteria (to be determined)	
Scoring	0 or more = Pass -1 or lower = Fail
Cost and Funding Considerations	
Frequency/Capacity/Span of Service	Yes/No: Service level to meet demand
Regional Operating Cost	Service cost to meet demand (crews and maintenance)
Capital Cost	Construction and easements
Regional Funding Opportunity Cost	Other projects advancement impacted