NOVEMBER 30, 2012

CASCADES CORRIDOR STATION DESIGN CRITERIA

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

JACOBS ENGINEERING

FOR MORE INFORMATION:

- Visit www.wsdot.wa.gov/rail
- Email comments to rail@wsdot.wa.gov
- Call the WSDOT State Rail and Marine Division at (360) 705-7900
- Write to the WSDOT State Rail and Marine Division at P.O. Box 47407, Olympia, WA 98504-7407
- Fax comments to (360) 705-6821

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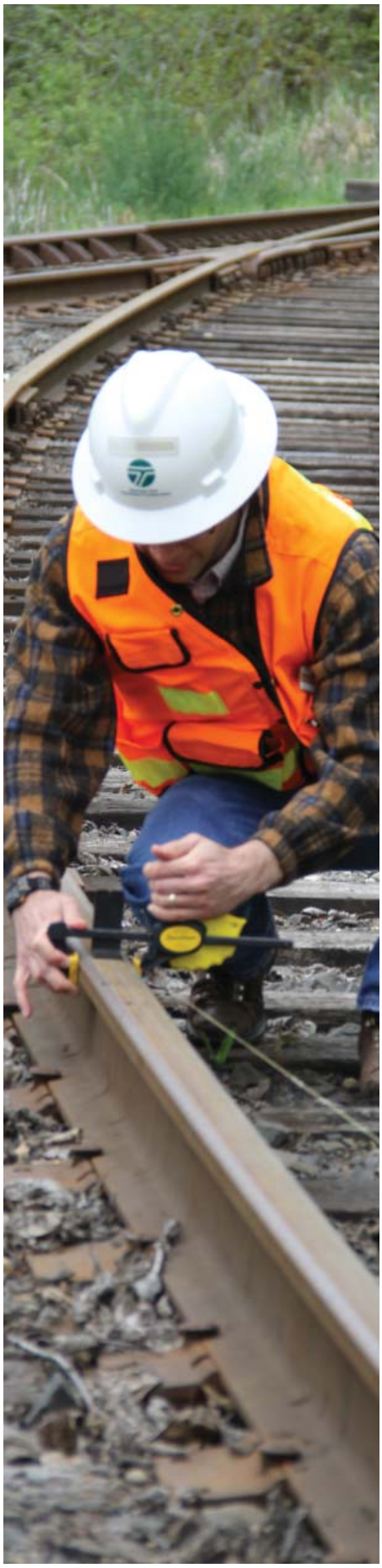
Source: WSDOT Archives



Source: WSDOT Archives

EXECUTIVE SUMMARY

This is a time of great change for Amtrak Cascades. The Washington Department of Transportation (WSDOT) is delivering a nearly $800 million, federally funded capital program to improve intercity passenger rail in the Cascades Corridor. At the same time, state revenues are in decline and operations costs are increasing. When the Passenger Rail Investment and Improvement Act of 2008 (PRIIA) takes effect in October 2013, the federal government will no longer contribute to the cost of intercity passenger rail, and individual states will be responsible for the fully allocated cost of the service. Washington and Oregon will absorb the portion of costs currently provided by Amtrak for the Cascades service, at significant additional annual subsidy. All of these changes are occurring in the context of increasing ridership and shifting demographics.

In response to these challenges, WSDOT is pursuing numerous strategies to reduce costs and increase ridership. State policy guides this approach. Governor Gregoire's Executive Order 11-04, Lean Transformation, directs state agencies to implement "Lean" methods and tools to create more value for customers with fewer resources. In addition, WSDOT's Moving Washington principles – operate efficiently, manage demand and add capacity strategically – provide a framework for making transparent, cost-effective decisions that keep people and goods moving and support a healthy economy, environment and communities. This guidance points to the need for WSDOT to focus on the specific requirements of Amtrak Cascades customers and service, to achieve the goal of faster, more frequent service with schedule reliability.

Station costs are an important part of this strategy. Amtrak Cascades currently stops at 18 stations between Vancouver, British Columbia and Eugene, Oregon. Those stations are owned by a number of different entities and support passenger rail and other transportation services. The Amtrak Cascades program contributes either in part or in full to the cost of these stations, and WSDOT has identified station costs as an opportunity to significantly reduce operating expenses.

Existing station design guidelines have been developed by Amtrak and other entities to fit a wide range of passenger rail services. They are not tailored to the specific requirements of the Amtrak Cascades service, and do not account for shifts in passenger demographics that contribute to changing attitudes towards technology and lowest-cost pricing. Consequently, existing design guidelines call for facilities that exceed the needs of WSDOT customers and, therefore, result in unnecessary additional costs for Washington taxpayers.

WSDOT enlisted Jacobs to develop station design criteria specifically for Cascades Corridor stations that provide basic functionality while controlling costs. This is particularly important for new stations and other circumstances where the State is expected to shoulder the costs of design, construction and ongoing maintenance. The design criteria establish minimum requirements to right-size the stations based on ridership, functionality and characteristics of the service; and to incorporate cost-effective and practical enhancements, such as customer service facilities and retail amenities. This guidance helps clarify which costs WSDOT will be

Source: WSDOT Archives

responsible for, and which will be funded by other entities. The design criteria presented in this document:

- Incorporate industry standards and original research to create guidelines that are specific to the needs of Cascades Corridor customers.
- Provide a range of options that can be adapted to the service needs and available budget of each station facility.
- Distinguish between "needs"- features required to provide a safe and efficient transportation option; and "enhancements"- features that may be desired to support other objectives, such as other passenger rail services and community development goals. Essential components could be supported with state funds; the extras could be implemented by WSDOT's partners if they are willing to assume the costs of construction and ongoing maintenance.

INTRODUCTION 1

1. INTRODUCTION

Background

The Amtrak Cascades passenger rail service on the Pacific Northwest Rail Corridor links Eugene and Portland, Oregon, with Tacoma and Seattle, Washington and Vancouver, British Columbia. It has been in operation since 1994 and has gradually increased its services. Currently, 11 trains use the 467-mile corridor daily. Amtrak Cascades stops at 18 stations; ridership in 2011 was nearly 850,000 passengers.

Cascades Corridor Map
Source: www.amtrakcascades.com

Amtrak Cascades trains run on a privately owned rail line. BNSF Railway owns the tracks in Washington and British Columbia. Union Pacific Railroad owns the tracks in Oregon. Canadian National provides dispatching in British Columbia. While the railroad owners do not use the existing stations and will not use any future stations, they do have special requirements for some station elements that have been addressed in the design criteria.

The Cascades Corridor service is managed jointly by Washington State Department of Transportation (WSDOT) and the Oregon Department of Transportation (ODOT) and operated by Amtrak. The program is currently funded by ticket sales and a combination of state and

federal funds. When the Passenger Rail Investment and Improvement Act of 2008 (PRIIA) takes effect in October 2013, the federal government will no longer contribute to the cost of intercity passenger rail. Washington and Oregon will absorb the portion of costs currently provided through Amtrak, at significant additional annual subsidy.

In response to funding challenges, WSDOT is pursuing numerous strategies to reduce costs and increase ridership. State policy directs the approach:

- Governor Gregoire's Executive Order 11-04, Lean Transformation, directs state agencies to implement "Lean" methods and tools to create more value for customers with fewer resources.
- WSDOT's Moving Washington principles – operate efficiently, manage demand and add capacity strategically – provide a framework for making transparent, cost-effective decisions that keep people and goods moving and support a healthy economy, environment and communities.

This guidance points to the need for WSDOT to focus on the specific requirements of Cascades Corridor customers and service to achieve the goal of faster, more frequent service with schedule reliability. Station costs are an important part of this strategy.

Need for Specific Design Guidelines

The 18 stations currently in the Amtrak Cascades Corridor are owned by a number of different entities and support passenger rail and other transportation services. The Amtrak Cascades program contributes either in part or in full to the cost of these stations, and WSDOT has identified station costs as an opportunity to significantly reduce operating expenses.

Station design guidelines that provide existing industry standards have been developed by Amtrak and other entities to fit a wide range of passenger rail services. They are not tailored to the specific requirements of the Cascades Corridor service. Many industry-standard approaches do not address demographic shifts and policy changes that affect customer preferences, such as increasing reliance on technology and restrictions on baggage and fees for checked baggage. Instead, those guidelines are based on traditional business models that emphasize on-site staffing for ticketing and baggage handling. The result is that prevailing design guidelines call for facilities that exceed the needs of WSDOT customers and, therefore, result in unnecessary additional costs for Washington taxpayers.

WSDOT enlisted Jacobs to develop station design criteria specifically for Cascades Corridor stations that provide basic functionality while controlling costs. This is particularly important for new stations and other circumstances where the State is expected to shoulder the costs of design, construction and ongoing maintenance. The design criteria establish minimum requirements to right-size the stations based on ridership, functionality and characteristics of the service; and to incorporate cost-effective and practical enhancements, such as customer service facilities and retail amenities.

Summary of Results

This report incorporates a review of industry standards and original research to create guidelines that are specific to the needs of the Cascades Corridor customers. This guidance will help clarify which costs WSDOT will be responsible for, and which will be funded by other entities. It provides a range of options to suit service needs that can be built within a given budget. The criteria differentiate between Needs that are an essential component of a station facility and Enhancements that are extras not critical for operations. These extras could be implemented by WSDOT's partners if they are willing to assume the costs of construction and ongoing maintenance.

PASSENGER RAIL INVESTMENT AND IMPROVEMENT ACT OF 2008 (PRIIA)

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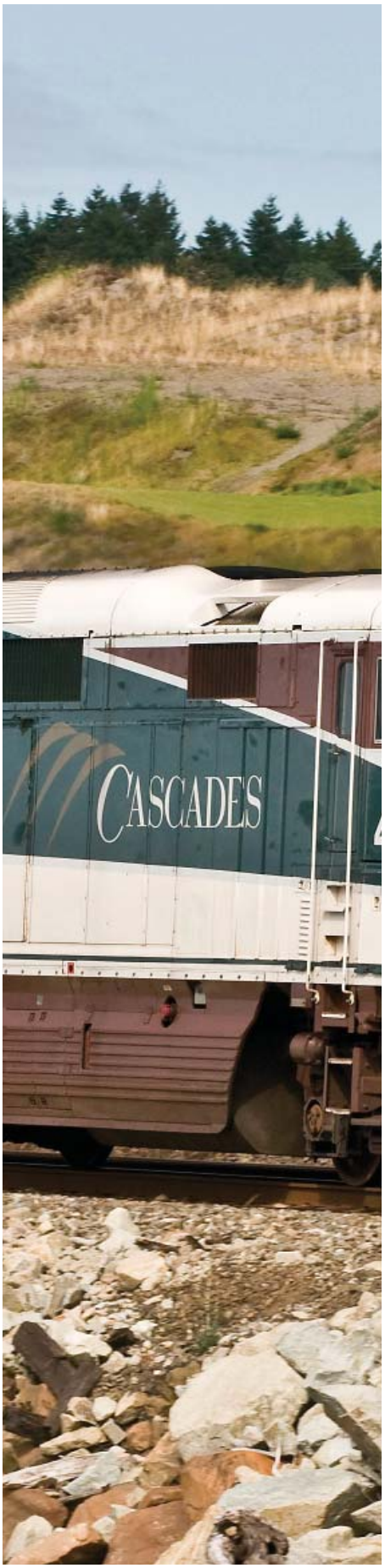


Source: WSDOT Archives

2. PASSENGER RAIL INVESTMENT AND IMPROVEMENT ACT OF 2008 (PRIIA)

The federal Passenger Rail Investment and Improvement Act of 2008 (PRIIA) calls for numerous changes in roles and responsibilities for funding passenger rail transportation. Under the provisions of PRIIA Section 209, all intercity Amtrak corridor services must become state-supported routes and states must pay the proportional costs associated with their respective corridor route. That means that starting October 1, 2013, the Washington State Department of Transportation (WSDOT) and Oregon Department of Transportation (ODOT) will absorb the federal contribution currently provided through Amtrak for Cascades service and pay 100 percent of operating costs, at significant additional annual subsidy.

The Amtrak Cascades service is funded by WSDOT and ODOT with the support of federal funding through Amtrak. Federal funds currently support one of 11 daily trips. As a result of PRIIA, there will be no federal funding contribution beginning October 1, 2013. At that time, WSDOT and ODOT will increase their combined share of subsides from the current 80 percent to 100 percent of operating costs. There will be additional costs for equipment and facilities. In total, it is anticipated that WSDOT's subsides will increase by as much as $3 million to $5 million per year. ODOT's subsidies may increase by $2 million or more per year.

This policy change represents a significant shift in approach to intercity passenger rail. While Amtrak will continue to provide its long-distance routes, including Coast Starlight and Empire Builder, WSDOT and ODOT will take a much stronger role in intercity passenger rail as sole sponsors of the Cascades service. While the long-distance and intercity passenger rail services will continue to operate on the same corridor and will share stations and other infrastructure, funding and administrative responsibility will be clearly divided.

WSDOT and ODOT are developing a plan to implement PRIIA requirements on the Cascades Corridor. The states' approach to addressing these challenges is as follows:

- Deliver consistently on customer expectations for fast, reliable, safe, and affordable high speed rail
- Build revenue to cover the cost of operations
- Provide a competitive transportation option
- Pool resources for increased efficiencies
- Reduce costs
- Ensure partners share in revenues and costs

Consistent with this approach, the states will provide service and infrastructure to a standard determined necessary to serve the state's interest and financial and operational commitments. WSDOT and ODOT will invest limited resources in high priority improvements as needed to serve the states' interests. Proponents may pursue additional enhancements to intercity passenger rail service and infrastructure provided that enhancements are consistent with intercity passenger rail program objectives. Proponents will be required to take responsibility for the cost of enhancements (design, construction, operations and maintenance) that exceed the standard needed to meet the state's interest and needs of Cascades customers.

THE PASSENGER

3

3. THE PASSENGER

This chapter summarizes passenger profiles and market research data to define the specific needs of passengers on the Cascades Corridor. It also presents original research performed by Jacobs to establish facility needs based on those specific needs.

3.1 PASSENGER PROFILE

The current Cascades Corridor passenger is typically an intercity passenger who travels mostly for leisure, as opposed to passengers on Amtrak's Northeast Corridor service, where business passengers are a very significant part of the ridership.

A comprehensive Cascades Corridor passenger profile was developed by WSDOT's "Market Overview" of 2012, as follows:

- 57 percent are over the age of 35
- 83 percent travel alone or with a significant other
- Majority travel for visit with friends and family, a getaway or business

As observed in the statistics above and current trends, the passenger profile is shifting and evolving. Passengers seek Cascades Corridor service as an environmentally friendly and enjoyable alternative to travel at a reasonable cost.

On-time services, safety, security and comfortable rides are very important elements that encourage passengers to use trains. Other services typically offered by stations, such as a ticket booth or baggage handling, are not currently expected by passengers. Today's passenger requires less interface and assistance provided by station personnel.

Passengers are also more reliant on technology, such as smartphones for ticketing, checking schedules and other travel needs.

Cascades passengers travel an average of nine one-way trips along the Interstate 5 (I-5) corridor per year for business or leisure. Approximately 73% travel for leisure. Ridership peaks on Fridays and Saturdays. It increases seasonally in the summer months and during the winter holidays.

Ridership has grown over time, in part because of underlying demographic characteristics of potential rail passengers. Population density and proximity to the Corridor stations is important in determining ridership growth. As of 2008, an estimated 3,664,000 people reside within 10 minutes of Corridor stations in Oregon and Washington.

Based on the existing ridership information and demographics surveys, there are two well-defined groups of passengers on the Corridor:

- Leisure Passenger
- Business Passenger

Leisure Passenger

This type of passenger has the following characteristics:

- Two people or more traveling together
- Might travel with kids and a stroller
- High use of station amenities and retail if available
- Arrives at the station at least 1 hour prior to the train departure
- Finds friendly station signage a key element of the travel experience, since the passenger does not use the train station on a regular basis

Business Passenger

This type of passenger has the following characteristics:

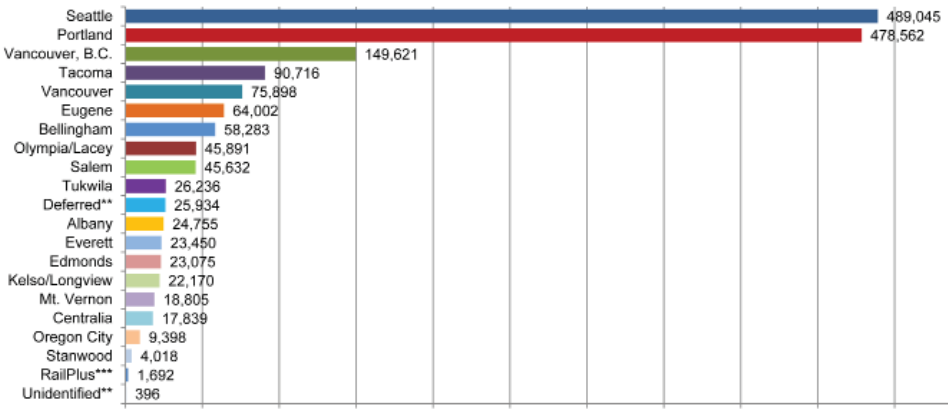
- A repeat customer and who is familiar with the train station operations
- Carries less baggage and carry-on items than the Leisure Passengers
- Wants to minimize waiting time
- Heavy use of wireless devices
- Arrives at the station at least 15-30 minutes prior to the train departure

3.2 STATION TYPE CLASSIFICATION

This report establishes a new station type classification for the Cascades Corridor determined by the number of annual passengers using the stations. The classification is not related to the station's location or its surroundings. This new station type classification is strictly related to ridership and helps to define various levels of passenger service and a baseline for the station design criteria.

The Amtrak and South Florida Department of Transportation standards estimate that a standing passenger will occupy between 10-14 square feet in the station. This determines the amount of space needed for the station and its amenities. It is expected that stations with higher levels of ridership would provide a higher level of amenities and services.

The Cascades Corridor ridership in 2011 was nearly 850,000 passengers and continues to exhibit sustainable growth. The 2011 ridership ranges from 4,018 (Stanwood, Washington) to 489,045 passengers (Seattle, Washington).



*Station On/Offs are used to record how many passengers got on the train or got off the train at each station.

**Unidentified/Deferred are riders who get off and on at unidentified destinations. Deferred riders are those who purchase their tickets and then "defer" their trip to a future date. Unidentified riders are not identified in Amtrak's system.

***RailPlus are passengers transferring to or from Sound Transit to Amtrak Cascades.

2011 Station On/Offs
Source: WSDOT Data 2012

Based on the expected annual Cascades Corridor ridership, this report identifies three station types to assist in establishing the minimum requirements, Needs and Enhancements for the stations.

- Level 1 (25,000 annual riders or less)
- Level 2 (between 25,000 and 75,000 annual riders)
- Level 3 (more than 75,000 annual riders)

2011 Station On/Offs
Source: WSDOT Data 2012

Level 1 Station (Oregon City, Oregon)
Source: WSDOT Archives

Level 2 Station (Salem, Oregon)
Source: WSDOT Archives

Level 3 Station (Portland, Oregon)
Source: WSDOT Archives

Level 1 Stations

Level 1 Stations have the lowest passenger volume. Level 1 Stations do not require personnel and may provide waiting areas, ticket vending machines and restrooms. Although unstaffed, volunteers or tourist/destination agents employed by a third party might be present at the station.

Level 1 Stations on the Cascades Corridor are located at:

- Mount Vernon, Washington
- Stanwood, Washington
- Everett, Washington
- Edmonds, Washington
- Centralia, Washington
- Kelso, Washington
- Oregon City, Oregon
- Albany, Oregon

Level 2 Stations

Level 2 Stations have moderate levels of passenger volume. These stations do not require personnel and, at a minimum, have waiting areas, ticket vending machines and restrooms. Third-party employees or volunteers might be present at the station, similar to those at Level 1 Stations. However, because of the larger passenger volume, Level 2 Stations require a larger amount of amenities and spatial provisions than those at Level 1 Stations.

Level 2 Stations on the Cascades Corridor are located at:

- Bellingham, Washington
- Tukwila, Washington
- Olympia, Washington
- Salem, Oregon
- Eugene, Oregon

Level 3 Stations

These are intermodal stations with high ridership volumes that connect to various modes of travel, such as bus, car or taxi. Intermodal stations are likely to experience congestion due to pedestrians and vehicular traffic. To create a safe environment, it is of utmost priority to separate pedestrians and vehicular traffic.

Station personnel, volunteers or third-party employees might have specific operational roles, such as attending tickets booths, baggage services or retail or tourist destinations informational services.

Level 3 Stations on the Cascades Corridor are located at:

- Vancouver, British Columbia
- Seattle, Washington
- Tacoma, Washington
- Vancouver, Washington
- Portland, Oregon

3.3 PASSENGER SEQUENCING MATRIX, NEEDS VS. ENHANCEMENTS

Passenger sequencing is a methodology of understanding the behavior of passengers and the sequencing of events that may occur during the entire travel experience. A Needs vs. Enhancements matrix illustrates the flow of passenger travel for each type of passenger. It helps to establish minimum design criteria in alignment with WSDOT's goals, which are to:

- Implement state law directing public investments in transportation to support economic vitality, preservation, safety, mobility, the environment and system stewardship (RCW 47.04.280).
- Provide more efficient, predictable, reliable, and cost-effective movement of people and goods.
- Provide faster, more frequent Cascades Corridor service with schedule reliability along the I-5 Corridor (WSDOT's "Long-Range Plan for Amtrak Cascades," 2006).
- Implement "Lean" methods and tools to create more value for customers with fewer resources.
- Employ WSDOT's Moving Washington principles: Operate efficiently, manage demand and add capacity strategically.
- Achieve service outcome commitments associated with federal grants.
- Decrease the annual per capita vehicle miles traveled consistent with the Executive Order on climate change.

Three passenger sequencing matrices presented and described on the following pages are:

- Leisure Passenger (73% approximately)
- Business Passenger (27% approximately)
- Cascades Corridor Passenger

The characteristics of Business and Leisure Passengers are similar, except that the Leisure Passenger handles more baggage than a Business Passenger who tends to travel light and for shorter periods of time. The Cascades Corridor Passenger is a combination of the characteristics of the Leisure and Business Passengers.

The Travel Experience for each type of passenger is divided into different steps from the passenger's point of view. It describes the travel experience and the elements that translate to a successful travel or journey. The travel sequence consists of the ticketing, arrival, baggage checking, the waiting time at the station, boarding, riding the train and deboarding. The passenger's perception on the safety and reliability of the system is when they first step into the system. It is essential that passengers can readily identify the station components and be able to navigate the system on their own.

The Needs and Enhancements of the station relate to the level of quality and comfort for the passenger during the Travel Experience and are defined as follows.

Needs. Needs are related to the basic conditions and elements required to meet building codes and regulations. Needs are aligned with the intercity rail program's goals and requirements. The Needs are in alignment with the requirements of the Federal Railroad Administration (FRA)Service Outcome Agreement - growth of revenues to minimize taxpayers' subsidies and to decrease annual per capita vehicle miles traveled.

Enhancements. Enhancements are services and design elements that exceed the standards needed to meet WSDOT's interest, building codes and regulations. Enhancements provide a higher level of comfort associated with an added cost.

Passenger Sequence Matrices, Needs vs. Enhancements (next 3 sheets)

Leisure Passenger Matrix

Business Passenger Matrix

Cascades Corridor Passenger Matrix

"LEISURE" PASSENGER PROFILE:

- TWO PEOPLE OR MORE TRAVELING TOGETHER
- MIGHT TRAVEL WITH KIDS
- HIGH USE OF STATION AMENITIES AND RETAIL IF AVAILABLE
- ARRIVES TO THE STATION AT LEAST 1 HOUR PRIOR TO THE TRAIN DEPARTURE
- FINDS FRIENDLY STATION SIGNAGE A KEY ELEMENT OF THE TRAVEL EXPERIENCE, SINCE THE PASSENGER DOES NOT USE THE TRAIN STATION ON A REGULAR BASIS

1 HOW DOES CASCADES CORRIDOR REACH TO POTENTIAL PASSENGERS?

NEEDS:

- TRANSIT AGENCY'S WEBSITE
- GENERAL PUBLIC KNOWLEDGE
- PRINTED SCHEDULES AND BROCHURES

ENHANCEMENTS:

- PAID MEDIA ADVERTISEMENT (TV, RADIO, INTERNET, DIRECT MAIL, PUBLIC EVENTS, ETC)
- SPECIAL OFFERS

2 BUYING THE TICKET(S)

NEEDS:

- TRANSIT AGENCY'S WEBSITE
- TRANSIT AGENCY'S PHONE ASSISTANCE

ENHANCEMENTS:

- TICKETS DELIVERY VIA MAIL

3 ON THE WAY TO THE TRAIN STATION FACILITY

NEEDS:

- SERVICE ALERTS AVAILABLE ON TRANSIT AGENCY'S WEBSITE
- ONLINE DIRECTION OF HOW TO GET TO THE STATION FROM MAIN ROADS
- WAYFINDING ROADWAY SIGNS

ENHANCEMENTS:

- INFORMATION ON INTERCONNECTING MODES OF TRANSPORTATION
- CUSTOMIZE TEXT MESSAGES ALERTS VIA PHONE, TWITTER OR OTHER MEDIA

4 ARRIVAL

NEEDS:

- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- BY BUS: / BY TAXI: / BY CAR: "DESIGNATED DROP-OFF/ PICK-UP AREA"
- IDENTIFIABLE MAIN ENTRANCE DOOR
- WAYFINDING
- ACCESSIBLE ROUTES AND AMPLE WALKWAY TO MANEUVER BAGGAGE

ENHANCEMENTS:

- PARKING: LONG-TERM PARKING LOT
- BY BUS: / BY TAXI: / BY CAR: "BAGGAGE CARRIER PERSONNEL & WAITING SHELTERS"
- OWNED CAR: DIFFERENTIATE LONG-SHORT TERM PARKING
- WEATHER PROTECTED WALKWAYS
- LANDSCAPE FEATURES

5 TICKETING AND CHECKING BAGGAGE

NEEDS:

- TICKETING: USE TICKET VENDING MACHINE
- BAGGAGE: TAGS AVAILABLE

ENHANCEMENTS:

- WELCOMING CUSTOMER SERVICE PERSONNEL
- TICKETING: TICKET OFFICE
- BAGGAGE: BAGGAGE SERVICE

6 WAITING ROOM/ SHELTER

NEEDS:

WAITING ROOM:

- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- INDOOR ENVIRONMENTAL QUALITY
- ACCESSIBLE UNISEX RESTROOM
- AMPLE SPACE TO MANEUVER BAGGAGE AND CARRY-ON ITEMS
- DRINKING FOUNTAIN
- SITTING AREA
- TRASH RECEPTACLE
- TRAIN VISIBILITY FROM WAITING ROOM OR SHELTER
- SPEAKER ANNUNCIATORS
- VISUAL PANEL BOARDS

SHELTER:

- WEATHER PROTECTION
- SITTING AREA

ENHANCEMENTS:

WAITING ROOM:

- ABLE TO CHARGE WIRELESS DEVICE
- WI-FI INTERNET ACCESS
- SEPARATE ACCESSIBLE MEN'S AND WOMEN'S RESTROOM
- INFORMATION ABOUT DESTINATIONS, HISTORIC ASPECTS OR OTHER EXHIBITS
- AMPLE SPACE TO MANEUVER BAGGAGE
- CUSTOMIZE TEXT MESSAGES ALERTS VIA PHONE, TWITTER OR OTHER MEDIA
- VENDING MACHINES, ATMS
- RETAIL

SHELTER:

- HEATING DEVICES

7 BOARDING

NEEDS:

- ACCESSIBLE ROUTE AND ACCESS
- EASY ACCESS CARRYING BAGGAGE FROM THE WAITING ROOM OR SHELTER TO THE PLATFORM
- APPROPRIATELY ILLUMINATED PLATFORM

ENHANCEMENTS:

- WEATHER PROTECTED PLATFORM

8 TRAIN RIDE

NEEDS:

- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- OVERHEAD BINS, BAGGAGE RACK, BICYCLE AND STROLLER STORAGE
- ACCESSIBLE ROUTES WITHIN THE TRAIN CAR

ENHANCEMENTS:

- LOUNGE CARS
- WI-FI INTERNET ACCESS
- CONVENIENCE OUTLETS
- SURFACE TO USE WIRELESS DEVICES OR EATING

9 DEBOARDING

NEEDS:

- WAYFINDING
- ACCESSIBLE ROUTES
- AMPLE ROOM TO MANEUVER BAGGAGE
- APPROPRIATELY ILLUMINATED PLATFORM

ENHANCEMENTS:

- WELCOMING CUSTOMER SERVICE PERSONNEL
- WEATHER PROTECTED PLATFORM

10 LEAVING THE TRAIN FACILITY

NEEDS:

- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- BY BUS: / BY TAXI: / BY CAR: "DESIGNATED DROP-OFF/ PICK-UP AREA"
- ACCESSIBLE ROUTE TO ALL MODES OF TRANSPORTATION
- IDENTIFIABLE EXIT ROUTE
- WAYFINDING
- ACCESSIBLE ROUTES AND AMPLE WALKWAY TO MANEUVER BAGGAGE
- TRASH RECEPTACLES
- BUY ADDITIONAL TICKETS

ENHANCEMENTS:

- BAGGAGE PICK-UP AT WAITING ROOM
- RENTAL CAR: PICK UP AREA
- RETAIL (CONVENIENCE STORE)
- BUY TICKETS VIA TICKET BOOTH
- WELCOMING CUSTOMER SERVICE PERSONNEL.
- WEATHER PROTECTED PLATFORM

END OF THE TRAVEL EXPERIENCE

LEGEND:

- ACTIVITY OR SERVICE THAT REQUIRE THE PRESENCE OF CORRIDOR PERSONNEL OR THIRD PARTY EMPLOYEE.
- ACTIVITY OR SERVICE DRIVEN BY THE TYPICAL BEHAVIOR OF CORRIDOR PASSENGER
- ACTIVITY OR SERVICE MOSTLY DRIVEN BY THE TYPICAL BEHAVIOR OF "GETAWAY, LONG VACATION, VISIT/FAMILY" PASSENGER
- ACTIVITY OR SERVICE MOSTLY DRIVEN BY THE TYPICAL BEHAVIOR OF "BUSINESS, STUDENT AND COMMUTER" PASSENGER

"LEISURE" PASSENGER NEEDS VS. ENHANCEMENTS MATRIX

"BUSINESS" PASSENGER PROFILE:

- A REPEAT CUSTOMER AND WHO IS FAMILIAR WITH THE TRAIN STATION OPERATIONS
- CARRIES LESS BAGGAGE AND CARRY-ON ITEMS THAN THE
- LEISURE PASSENGERS
- WANTS TO MINIMIZE WAITING TIME
- HEAVY USE OF WIRELESS DEVICES
- ARRIVES AT THE STATION AT LEAST 15-30 MINUTES PRIOR TO THE TRAIN DEPARTURE

1 HOW DOES CASCADES CORRIDOR REACH TO POTENTIAL PASSENGERS?

NEEDS:

- TRANSIT AGENCY'S WEBSITE
- GENERAL PUBLIC KNOWLEDGE
- PRINTED SCHEDULES AND BROCHURES

ENHANCEMENTS:

- PAID MEDIA ADVERTISEMENT (TV, RADIO, INTERNET, DIRECT MAIL, PUBLIC EVENTS, ETC)
- BUSINESS/CORPORATE SPECIAL OFFERS

2 BUYING THE TICKET(S)

NEEDS:

- TRANSIT AGENCY'S WEBSITE
- TRANSIT AGENCY'S PHONE ASSISTANCE
- INFORMATION ON INTERCONNECTING MODES OF TRANSPORTATION

ENHANCEMENTS:

- CUSTOMIZE TEXT MESSAGES ALERTS VIA PHONE, TWITTER OR OTHER MEDIA
- CORPORATE DISCOUNTS
- FREQUENT CLIENT REWARDS
- 1-800-USA-RAIL

3 ARRIVAL

NEEDS:

- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- BY BUS: / BY TAXI: / BY CAR: "DESIGNATED DROP-OFF/ PICK-UP AREA"
- PARKING:
- ACCESSIBLE ROUTE FOR ALL MODES OF TRANSPORTATION
- IDENTIFIABLE MAIN DOOR ENTRANCE
- WAYFINDING

ENHANCEMENTS:

- BY BUS: / BY TAXI: / BY CAR: "BAGGAGE CARRIER PERSONNEL & WAITING SHELTERS"
- PARKING: SHORT TERM PARKING LOT IN PROXIMITY TO THE PLATFORMS
- WEATHER PROTECTED WALKWAYS
- LANDSCAPE FEATURES
- STATION PROXIMITY TO BUSINESS DISTRICTS

4 TICKETING AND CHECKING BAGGAGE

NEEDS:

- TICKETING: USE TICKET VENDING MACHINE
- BAGGAGE: TAGS AVAILABLE

ENHANCEMENTS:

- WELCOMING CUSTOMER SERVICE PERSONNEL
- TICKETING: TICKET OFFICE
- BAGGAGE: BAGGAGE SERVICE

5 WAITING ROOM/ SHELTER/ PLATFORM

NEEDS:

WAITING ROOM:
- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- INDOOR ENVIRONMENTAL QUALITY
- ACCESSIBLE UNISEX RESTROOM
- DRINKING FOUNTAIN
- SITTING AREA
- TRASH RECEPTACLE
- TRAIN VISIBILITY
- SPEAKER ANNUNCIATORS
- VISUAL PANEL BOARDS

SHELTER/PLATFORM:
- WEATHER PROTECTION
- SITTING AREA
- APPROPRIATELY ILLUMINATED AREAS
- ACCESSIBLE ROUTE AND ACCESS

ENHANCEMENTS:

WAITING ROOM:
- ABLE TO CHARGE WIRELESS DEVICE
- WI-FI INTERNET ACCESS
- SEPARATED ACCESSIBLE MEN'S AND WOMEN'S RESTROOM
- INFORMATION ABOUT DESTINATIONS
- CUSTOMIZE TEXT MESSAGES ALERTS VIA PHONE, TWITTER OR OTHER MEDIA
- VENDING MACHINES, ATMS
- RETAIL
- WAITING LOUNGE

SHELTER:
- HEATING DEVICES

6 TRAIN RIDE

NEEDS:

- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- OVERHEAD BINS, BAGGAGE RACK, BICYCLE AND STROLLER STORAGE
- ACCESSIBLE ROUTES WITHIN THE TRAIN CAR

ENHANCEMENTS:

- LOUNGE CARS
- WI-FI INTERNET ACCESS
- CONVENIENCE OUTLETS WORK SURFACE FOR USE OF WIRELESS DEVICES, LAPTOPS, ETC

7 DEBOARDING

NEEDS:

- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- BY BUS: / BY TAXI: / BY CAR: "DESIGNATED PICK-UP AREA"
- ACCESSIBLE ROUTE TO ALL MODES OF TRANSPORTATION
- IDENTIFIABLE EXIT ROUTE
- WAYFINDING
- BUY ADDITIONAL TICKETS

ENHANCEMENTS:

- BAGGAGE PICK-UP AT WAITING ROOM
- RENTAL CAR: PICK UP AREA
- RETAIL (CONVENIENCE STORE)
- BUY TICKETS VIA TICKET BOOTH
- WELCOMING CUSTOMER SERVICE PERSONNEL.
- WEATHER PROTECTED EXIT ROUTE

END OF THE TRAVEL EXPERIENCE

LEGEND:

- ACTIVITY OR SERVICE THAT REQUIRE THE PRESENCE OF CORRIDOR PERSONNEL OR THIRD PARTY EMPLOYEE.
- ACTIVITY OR SERVICE DRIVEN BY THE TYPICAL BEHAVIOR OF CORRIDOR PASSENGER
- ACTIVITY OR SERVICE MOSTLY DRIVEN BY THE TYPICAL BEHAVIOR OF "GETAWAY, LONG VACATION, VISIT/FAMILY" PASSENGER
- ACTIVITY OR SERVICE MOSTLY DRIVEN BY THE TYPICAL BEHAVIOR OF "BUSINESS, STUDENT AND COMMUTER" PASSENGER

"BUSINESS" PASSENGER NEEDS VS. ENHANCEMENTS MATRIX

"CASCADES CORRIDOR" PASSENGER PROFILE:

- CARRYING BAGGAGE AND CARRY-ON ITEMS
- MIGHT HAVE A STROLLER OR BICYCLE
- FINDS FRIENDLY SIGNAGE A KEY ELEMENT OF THE TRAVEL EXPERIENCE, SINCE THE PASSENGER DOES NOT USE THE TRAIN STATION ON A REGULAR BASIS
- LOOKING FOR LOW FARES, PACKAGES AND DISCOUNTS
- HIGH USE OF STATION AMENITIES AND RETAIL IF AVAILABLE
- ARRIVES AT THE STATION A MINIMUM OF 30 MINUTES PRIOR TO DEPARTURE
- HIGH USE OF LONG-TERM PARKING

1 HOW DOES CASCADES CORRIDOR REACH TO POTENTIAL PASSENGERS?

NEEDS:
- WWW.AMTRAKCASCADES.COM
- GENERAL PUBLIC KNOWLEDGE
- PRINTED SCHEDULES AND BROCHURES

ENHANCEMENTS:
- PAID MEDIA ADVERTISEMENT (TV, RADIO, INTERNET,
- DIRECT MAIL, PUBLIC EVENTS, ETC)
- SPECIAL OFFERS
- CORPORATE DISCOUNTS
- FREQUENT CLIENT REWARDS

2 BUYING THE TICKET(S)

NEEDS:
- WWW.AMTRAKCASCADES.COM
- 1-800-USA-RAIL

ENHANCEMENTS:
- TICKETS DELIVERY VIA MAIL

3 ON THE WAY TO THE TRAIN STATION FACILITY

NEEDS:
- SERVICE ALERTS AVAILABLE ON AMTRAKCASCADES.COM
- ONLINE DIRECTION OF HOW TO GET TO THE STATION FROM MAIN ROADS
- WAYFINDING ROADWAY SIGNS

ENHANCEMENTS:
- INFORMATION ON INTERCONNECTING MODES OF TRANSPORTATION
- CUSTOMIZE TEXT MESSAGES ALERTS VIA PHONE, TWITTER OR OTHER MEDIA

4 ARRIVAL

NEEDS:
- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- BY BUS: / BY TAXI: / BY CAR: "DESIGNATED DROP-OFF/ PICK-UP AREA"
- PARKING: PARKING LOT
- IDENTIFIABLE MAIN ENTRANCE DOOR
- WAYFINDING
- ACCESSIBLE ROUTES AND AMPLE WALKWAY TO MANEUVER BAGGAGE

ENHANCEMENTS:
- BY BUS: / BY TAXI: / BY CAR: "BAGGAGE CARRIER PERSONNEL & WAITING SHELTERS"
- RENTAL CAR: DROP OFF AREA
- OWNED CAR: DIFFERENTIATE LONG-SHORT TERM PARKING
- WEATHER PROTECTED WALKWAYS
- LANDSCAPE FEATURES

5 TICKETING AND CHECKING BAGGAGE

NEEDS:
- TICKETING: USE QUICK-TRACK
- BAGGAGE: TAGS AVAILABLE

ENHANCEMENTS:
- WELCOMING CUSTOMER SERVICE PERSONNEL
- TICKETING: TICKET OFFICE
- BAGGAGE: BAGGAGE SERVICE

6 WAITING ROOM/ SHELTER

NEEDS:

WAITING ROOM:
- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- INDOOR ENVIRONMENTAL QUALITY
- ACCESSIBLE UNISEX RESTROOM
- AMPLE SPACE TO MANEUVER BAGGAGE AND CARRY-ON ITEMS
- DRINKING FOUNTAIN
- SITTING AREA
- TRASH RECEPTACLE
- TRAIN VISIBILITY FROM WAITING ROOM OR SHELTER
- SPEAKER ANNUNCIATORS
- VISUAL PANEL BOARDS

SHELTER:
- WEATHER PROTECTION
- SITTING AREA

ENHANCEMENTS:

WAITING ROOM:
- ABLE TO CHARGE WIRELESS DEVICE
- WI-FI INTERNET ACCESS
- SEPARATE ACCESSIBLE MEN'S AND WOMEN'S RESTROOM
- INFORMATION ABOUT DESTINATIONS, HISTORIC ASPECTS OR OTHER EXHIBITS AMPLE SPACE TO MANEUVER BAGGAGE
- CUSTOMIZE TEXT MESSAGES ALERTS VIA PHONE, TWITTER OR OTHER MEDIA
- VENDING MACHINES, ATMS
- RETAIL
- WAITING LOUNGE

SHELTER:
- HEATING DEVICES

7 BOARDING

NEEDS:
- ACCESSIBLE ROUTE AND ACCESS
- EASY ACCESS CARRYING BAGGAGE FROM THE WAITING ROOM OR SHELTER TO THE PLATFORM
- APPROPRIATELY LIT PLATFORM

ENHANCEMENTS:
- WEATHER PROTECTED PLATFORM

8 TRAIN RIDE

NEEDS:
- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- OVERHEAD BINS, BAGGAGE RACK, BICYCLE AND STROLLER STORAGE
- ACCESSIBLE ROUTES WITHIN THE TRAIN CAR

ENHANCEMENTS:
- LOUNGE CARS
- WI-FI INTERNET ACCESS
- CONVENIENCE OUTLETS
- SURFACE TO USE WIRELESS DEVICES OR EATING

9 DEBOARDING

NEEDS:
- WAYFINDING
- ACCESSIBLE ROUTES
- AMPLE ROOM TO MANEUVER BAGGAGE
- APPROPRIATELY LIT PLATFORM

ENHANCEMENTS:
- WELCOMING CUSTOMER SERVICE PERSONNEL
- WEATHER PROTECTED PLATFORM

10 LEAVING THE TRAIN FACILITY

NEEDS:
- COMFORTABLE, CLEAN AND SAFE ENVIRONMENT
- BY BUS: / BY TAXI: / BY CAR: "DESIGNATED DROP-OFF/ PICK-UP AREA"
- ACCESSIBLE ROUTE TO ALL MODES OF TRANSPORTATION
- IDENTIFIABLE EXIT ROUTE.
- WAYFINDING
- ACCESSIBLE ROUTES AND AMPLE WALKWAY TO MANEUVER BAGGAGE
- BUY ADDITIONAL TICKETS (QUIK-TRAK)

ENHANCEMENTS:
- BAGGAGE PICK-UP AT WAITING ROOM
- RENTAL CAR: PICK UP AREA
- RETAIL (CONVENIENCE STORE)
- BUY TICKETS VIA TICKET BOOTH
- WELCOMING CUSTOMER SERVICE PERSONNEL
- WEATHER PROTECTED PLATFORM

END OF THE TRAVEL EXPERIENCE

LEGEND:
- ACTIVITY OR SERVICE THAT REQUIRE THE PRESENCE OF CORRIDOR PERSONNEL OR THIRD PARTY EMPLOYEE.
- ACTIVITY OR SERVICE DRIVEN BY THE TYPICAL BEHAVIOR OF CORRIDOR PASSENGER
- ACTIVITY OR SERVICE MOSTLY DRIVEN BY THE TYPICAL BEHAVIOR OF "GETAWAY, LONG VACATION, VISIT/FAMILY" PASSENGER
- ACTIVITY OR SERVICE MOSTLY DRIVEN BY THE TYPICAL BEHAVIOR OF "BUSINESS, STUDENT AND COMMUTER" PASSENGER

"CASCADES CORRIDOR" PASSENGER NEEDS VS. ENHANCEMENTS MATRIX

STATION FACILITY PROGRAMMING

4

4. STATION FACILITY PROGRAMMING

This chapter combines industry standards and original research to translate Cascades Passenger Needs into appropriate station criteria.

4.1 FACTORS FOR STATION PROGRAMMING

The "passenger sequence," "passenger profile" and "ridership data" included in Chapter 3 were evaluated to develop a methodology for the right-sizing of a station that takes into consideration WSDOT's Moving Washington strategy and transportation goals.

On page 14, the Station Space Program Matrix is presented as a summary of the evaluation by WSDOT and Jacobs on the space needs for new and existing stations along the Cascades Corridor. The spaces listed on the matrix reference the types of spaces needed for Level 1, 2 and 3 Stations.

It is important to mention that some factors, such as location and local economy, would have an impact on the matrix; however, any deviation from the matrix would need to be further discussed with and approved by WSDOT. It is easily identifiable that Level 1, 2 and 3 Stations are similar and that there are just a few differences between the station types, such as:

Parking Areas. Parking areas shall be the minimum required and shall comply with Americans with Disabilities Act (ADA) Standards and municipal regulations. It is expected that Level 3 Stations would have a higher number of car users. Drop-off/Pick-up areas shall be provided to facilitate access to the station based on the large volume of passengers expected and the location of the station. Level 3 Stations are mostly located in dense urban zones with easy access to public transportation.

Baggage Services. Passenger assistance and baggage service rooms are considered Enhancements to new Level 1, 2 and 3 Stations. It is expected that the typical Cascades Corridor Passenger would have luggage, which should be considered in the sizing of the Waiting Room. Proper clearances and corridor widths should be provided to accommodate baggage handling and maneuvering.

Restrooms. A Unisex Restroom shall be provided for Level 1 Stations. Male and Female Restrooms shall be provided for Level 2 and 3 Stations because of the high volume of users and to comply with the building codes. The number of restrooms and plumbing fixtures should be designed according to occupancy load requirements.

Ticket Office/Booths. These facilities are considered Enhancements for Level 1 and 2 Stations. Provisions for one ticket booth (one sales person) shall be considered for Level 3 Stations because of the high volume of passengers. The appropriate number of ticket vending machines should be provided to minimize waiting time for transactions. When there are no ticket booths, staff or volunteers might assist travelers with the ticket vending machines, although ticket vending machines are typically user friendly and in compliance with federal ADA Standards.

Advancements in technology and the changes in the future demographic of the passengers will continue to diminish the need for a traditional ticket booth. The current trend in rail operations is to make the purchasing and printing of tickets easier with smartphone technology and the Internet. Amtrak has recently introduced new technologies that eliminate the use of paper and ticket vending machines, allowing passengers to purchase electronic tickets that can be displayed directly on their smartphone.

Station amenities contribute to the quality of the travel experience. Bike racks and trash receptacles should be provided in proportion to the annual ridership at each station. Signage is a key element to any station, regardless of size or category.

STATION SPACE PROGRAM MATRIX

Arrival / Departure Area Spaces	Level 1 Station	Level 2 Station	Level 3 Station
ADA parking	N	N	N
Long-term and short-term parking	E	E	E
Parking provisions to meet local codes	N	N	N
Buses drop-off/pick-up	N	N	N
Taxis drop-off/pick-up	N	N	N
Kiss & Ride	N	N	N
Vehicular emergency access	N	N	N
Access route to station building and platforms	N	N	N

Station Building Spaces		Level 1 Station	Level 2 Station	Level 3 Station
Core/ Passenger Access Spaces	Entry vestibule	●	N	N
	Waiting room	N	N	N
	Unixsex restroom	N	●	●
	Men's restroom	●	N	N
	Women's restroom	●	N	N
	Accessible vertical circulation	N	N	N
Passenger Services	Retail	●	E	E
	Ticket office/booth	E	E	N
	Baggage room	E	E	E
Maintenance and Operations	Cash accounting & secure storage	●	E	E
	Lead clerk/supervisor	●	●	E
	Employee break room/staff	●	E	E
	Janitor closet	N	N	N
	Utility/mechanical room	N	N	N
	IT room	N	N	N
	Storage	N	N	N

Platform Spaces	Level 1 Station	Level 2 Station	Level 3 Station
Shelter	N	N	N
Accessible track crossing (at-grade or grade-separated pedestrian crossing (if applicable)	N	N	N
ADA route throughout the platform	N	N	N

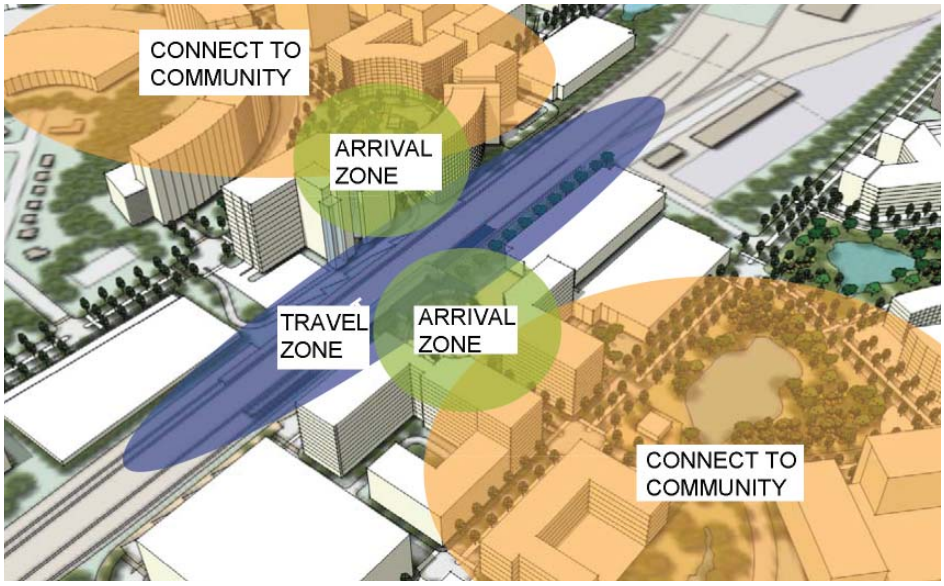
Legend: N - Need E - Enhancement ● - Non-Applicable

** Refer to page 11 for "Needs" and "Enhancements" definitions.*

4.2 STATION PROGRAM

Stations are usually divided in two major elements:

- Arrival Zone
- Travel Zone



Station Access
Source: Adapted from California High-Speed Rail Authority "Urban Design Guidelines"

ARRIVAL ZONE

The Arrival Zone is defined as the area outside the station accessed by travelers arriving by different modes such as by car, bus, taxi or on foot.

Providing access at the Arrival Zone imposes a number of design challenges, particularly related to existing street network systems. Parking should be controlled and not allowed to be a dominant feature of the station. With regard to safety, it is important to prioritize and balance the various modes of access to the station.

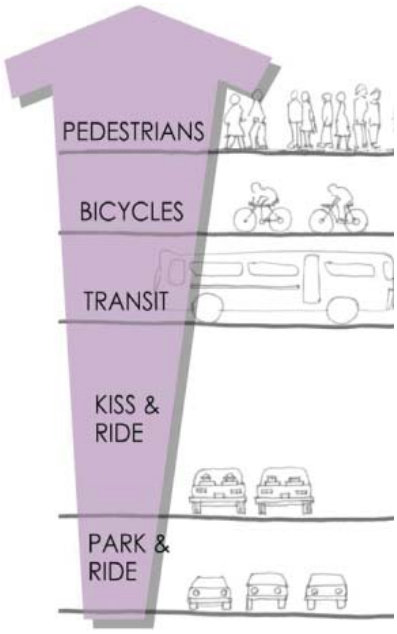
The key to making this area successful is to understand the hierarchy of access, prioritize the station environment for each access mode, and maintain the scale proportionally within the station environment.

Pedestrian Access (Needs)

The pedestrian is the primary user of the Arrival Zone. ADA access should be universal and be given the highest priority.

Sidewalks should have a minimum width of 6 feet, with a preferred width of 8 feet. Pedestrian ways should be well-integrated into the layout of the station and not as an afterthought because they direct the passenger to the station building or other outdoor areas. A plaza is an example of an outdoor space where passengers converge to connect with all modes of access.

All sidewalks and curbs must conform to current ADA Standards.



Station Access Hierarchy
Source: California High-Speed Rail Authority "Urban Design Guidelines"

Bicycle Racks (Needs)

Promoting the use of bicycles can be achieved by providing a clear and convenient access to the area for parking and access to the station.

In consideration for passengers who bring bikes on the train, wider walkways to the platform area should be provided. It should be made clear that only six bicycles are allowed on the train. Any additional bicycles must be boxed.

Bus Drop-Off (Needs)

The Bus Drop-Off areas should be sized according to the type of buses servicing the station. It is important to distinguish between the Kiss & Ride area and the Bus Drop-Off areas to avoid circulation conflicts. Here are some examples:

- One-way counter clockwise bus loop is preferred.
- Lanes for bus storage should be located in proximity to and within view of the bus bays to that layover buses can move to their assigned locations.
- When possible, bus platforms should be covered with a continuous canopy to the station entrance.
- Connecting walkways should comply with ADA Standards.
- Pedestrian crossings at bus lanes should be avoided.

Vehicular Drop-Off/Kiss & Ride (Needs)

This function requires proximity to the station building and the platform. The Kiss & Ride area consists of taxis, automobiles and private shuttle buses. The station area should not be in conflict with parking and pedestrian circulation.

Emergency Access (Needs)

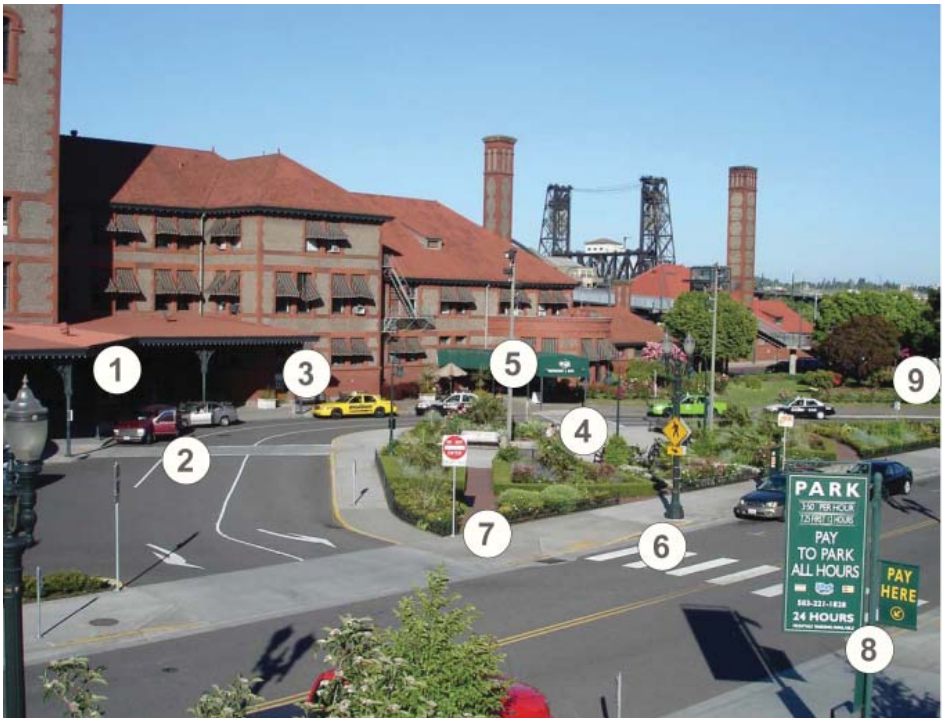
Emergency access is critical and must be provided at every station. The access for emergency vehicles should be in compliance with the requirements of the Fire Department, paramedics and local codes.

Roadway circulation within the parking lot configuration must have ample turning clearances (typically between a 45-50-foot radius) for a fire truck with ladder to accommodate fire truck access to the station. A vertical clearance of 14 feet-6 inches shall be provided at a minimum.

ADA Parking (Needs)

The Park and Ride facility should be in compliance with municipal/agency ordinances. It should comply with ADA Standards for transportation projects and federal regulations. The accessible route should be separated from vehicular traffic whenever possible. Accessible parking should be as close as possible to the station platform entrance. Preferred parking could be offered to carpool and vanpool users to encourage sustainable vehicular use.

1. Station entry and drop-off defined and protected by canopy (Enhancements).
2. Convenient passenger pick-up and drop-off designed as an urban street (Needs).
3. Taxis accommodated along the street curb (Needs).
4. Combination of landscaping architecture and open space define the "place" (Enhancements).
5. Retail provides additional station area activity (Enhancements).
6. Clearly defined pedestrian routes (Needs).
7. Decorative paving (Enhancements).
8. Parking located nearby, but not immediately in front of entry (Enhancements).
9. Bus transit located nearby, but not immediately in front of entry (Needs).



Arrival Zone Details
(Portland Station, Oregon)
Source: Adapted from California High-Speed Rail Authority "Urban Design Guidelines"

TRAVEL ZONE

This is the area beyond the Arrival Zone where the passenger enters the station, either into the Waiting Room and Ticketing area or directly into the platform area. The Travel Zone is where the passenger spends the most time at the stations waiting for a train.

Pedestrian connections into the station should be as direct as possible within the building and platform. Pedestrian crossings shall be made safe by using design elements at intersections to control pedestrian rights-of-way.

CORE/PASSENGER ACCESS SPACES

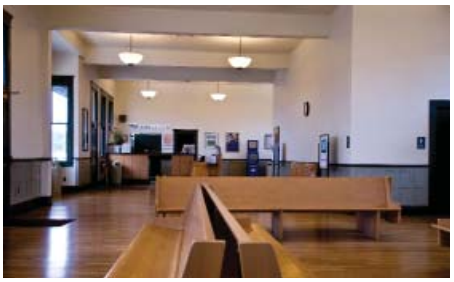
The Entry/Vestibule (Needs)

Main Entrances should be clearly identifiable and visible from the street to enhance safety and ease of orientation.

Vestibules are transitional areas between the street and the station building. Vestibules are needed to protect the Waiting Room from exterior elements, such as wind and cold. In addition, they are to be used to comply with sustainable design guidelines and energy conservation.

Salem Station, Oregon - Waiting Room
Source: Google Images

Eugene Station, Oregon - Waiting Room
Source: Google Images



Vancouver Station, Washington - Waiting Room
Source: WSDOT Archives

Tukwila Station, Washington
Source: WSDOT Archives

Waiting Room (Needs)

Waiting Rooms provide protection from the elements while waiting for the arriving train. To ease anxiety and provide a level of comfort and safety for the traveler, Waiting Rooms should have direct views of the platform. Having visibility to the platform reduces the amount of decision-making by the traveler when leaving the Waiting Room to walk toward the platform areas.

Seating areas should recognize the needs of semi-ambulatory passengers, such as those who use walkers or crutches, as well as those in wheelchairs. Accessible seating must be provided along the accessible route and must be integrated with the seating arrangements. WSDOT's goal is to provide efficient space utilization for the Waiting Room rather than apply existing conservative guidelines used for intercity passenger rail service.

Generally Leisure Passengers arrive at the station at least 1 hour before their scheduled departure; Business Passengers arrive 15-30 minutes before their scheduled departure. Some travelers have guests to send them off, and a few arriving travelers have guests to meet them at the station. It is this one-hour duration prior to the arrival of the train that determines the capacity of the Waiting Room.

In developing the program requirements for the Waiting Room, the designer should evaluate the projected one-way peak-hour ridership traffic for that particular station and have a good understanding of the station's profile – station usage and functionality as described in this report. It needs to be verified whether the projected peak-hour ridership is a result of seasonal travel or events that would drive up the volume of passenger traffic.

Typically, the sizing of the Waiting Room is a direct correlation of the peak-hour ridership, and it is a conservative approach for programming the capacity requirements. This method, however, often results in a Waiting Room size that is underutilized for most of the year, but fulfills the capacity requirements during seasonal events. Therefore, as a general approach, Level 3 Stations should use the highest ridership volume since these stations are likely to experience high volumes of traffic based on their environment. Level 1 and 2 Stations, regarded as low- to medium-volume stations, should compare the annual peak-hour ridership with the daily average and determine whether it is prudent to use the maximum ridership or use an average between the daily peak-hour and the maximum peak-hour volume.

Every station has unique or special operating conditions. Therefore, the programming of the station's Waiting Room must be reviewed with WSDOT for acceptance. It is impractical to accommodate the entire volume of the peak-hour ridership in the Waiting Room. It is also assumed that some passengers are waiting at the platform area or at some outdoor location.

The formula table on the next page for calculating daily and peak-hour ridership was conceptualized from the current Amtrak design guidelines. However, further capacity reductions have been applied to seating and standing areas within the Waiting Room to maximize space utilization while decreasing overall costs. The capacity of the Waiting Room for the Cascades Corridor stations should be about 40% for seating, 40% for standing, and 20% for waiting elsewhere.

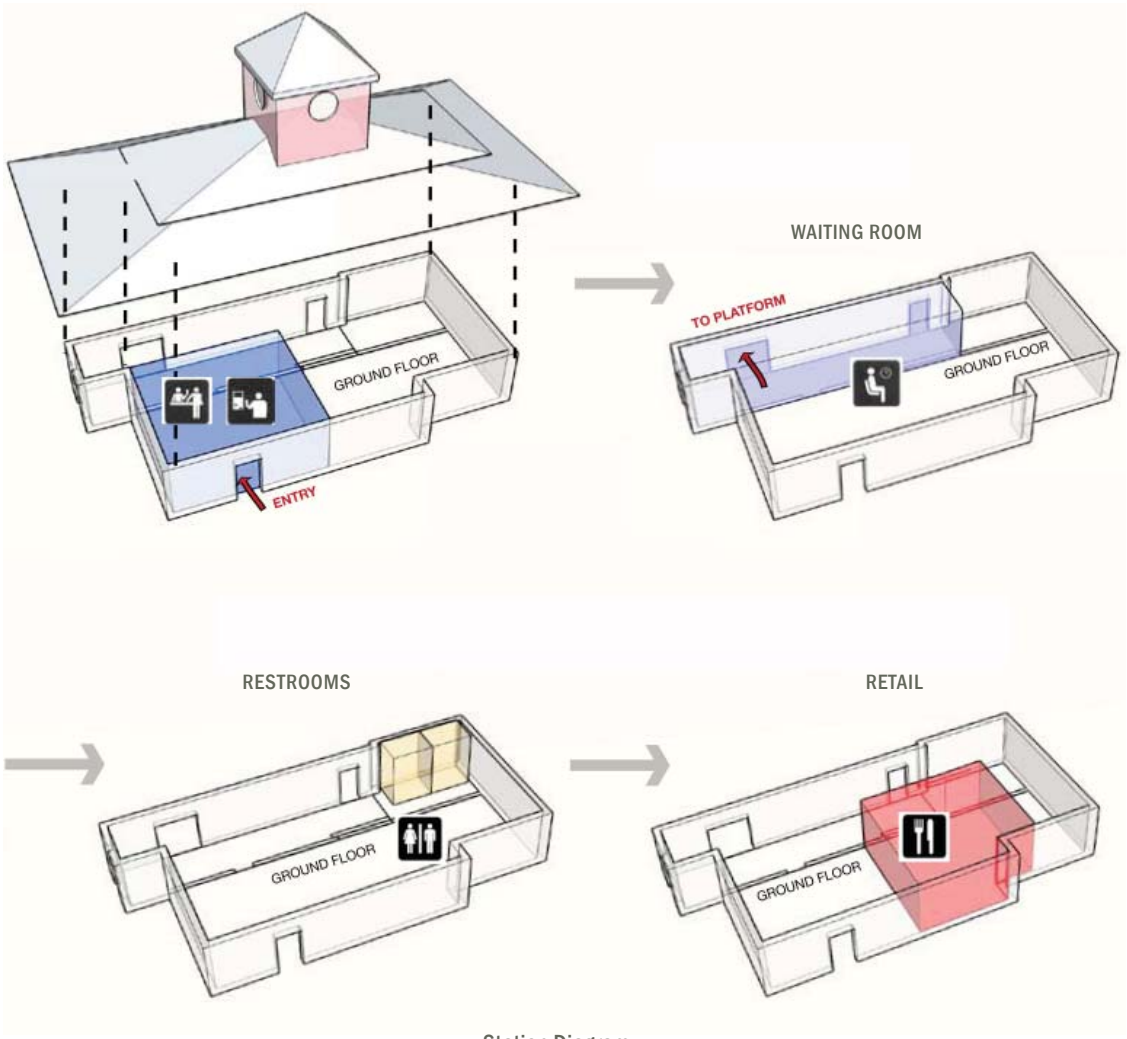
In comparison with Amtrak design guidelines, the Waiting Room would be only 80% the size and cost of a typical station designed under the Amtrak design guidelines.

Intercity passengers such as the Cascades Corridor passengers carry fewer pieces of luggage than long distance travelers. Therefore, it is practical to reduce the capacity requirements of the Waiting Rooms to conform to the projected use of the Cascades Corridor stations.

Formula Table

- Daily Ridership = Annual Ridership (On/Offs)/270. The Cascades Corridor's 2011 On/Offs ridership is presented on page 11 for reference; WSDOT will provide current ridership data for each specific project.
- Peak-hour two-way traffic = (.15) x daily ridership.
- Peak-hour one-way traffic = (.65) x peak-hour two-way traffic.
- 20 square feet are allocated for each seated passenger and 10 square feet for each standing passenger for the Waiting Room.

The final sizing of the Waiting Room should also include the area requirements for general circulation and egress in accordance with the building code requirements of jurisdictional authorities.

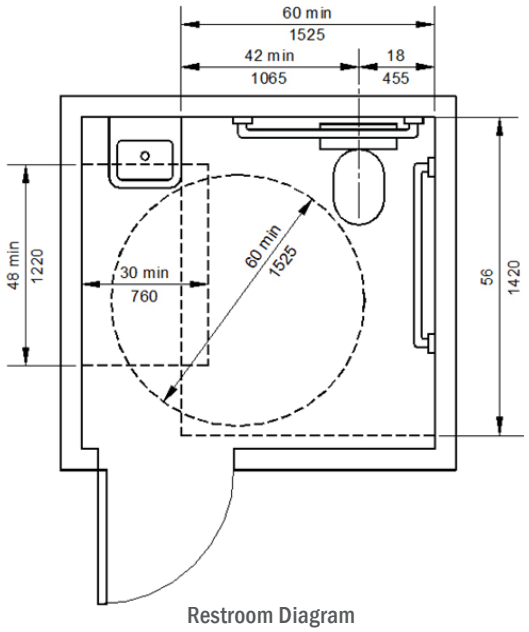


Station Diagram

Source: Adapted from "Station Design Guidelines South Florida East Coast Corridor (SFECC) Transit Analysis"

Restrooms (Needs)

Passenger Restrooms shall be fully accessible and meet all ADA Standards and building codes related to size and fixture requirements. However, additional fixtures may be required based upon WSDOT's recommendations.



Restroom Diagram
Source: www.fairfaxcounty.gov

PASSENGER SERVICES

Retail (Enhancements)

Retail might be desirable as a service to passengers and as a potential source of income to reduce public subsidies. Approval from WSDOT is required. Railroad operators, such as New Jersey Transit or the South Florida Department of Transportation, suggest areas between 250-400 square feet for retail space in rail facilities; however, the size of retail depends on the project.

Ticket Office/Booth (Enhancements, Level 1 and 2 Stations; Need, Level 3 Station)

Ticket Office/Booth staffing should be determined for specific sites. However, a minimum of one Ticket Office/Booth service (one sales person) shall be provided for Level 3 Stations. Ticket Office/Booths should be designed and located to allow for unimpeded views of the Waiting Room, platforms areas and access ways.

MAINTENANCE AND OPERATIONS

Cash Accounting and Secure Storage (Enhancements)

The Cash Accounting area should be located out of the public view, and the space should be only accessible from the Ticket Office/Booth. The space should 48 square feet minimum (6 feet x 8 feet). An additional 40 square feet will be required for each user above 2 employees.

Secure Storage should be accessed only from the Cash Accounting room to maximize security and privacy. The space is mainly used for the storage of money and tickets, and it should be 20-35 square feet.

Lead Clerk/Supervisor (Enhancements)

This space should be located adjacent to the Ticket Office/Booth and Baggage Rooms and with direct access to the exterior for maximized control of daily operations. The space should be 80-120 square feet depending on specific project needs. A separate Station Manager Office could be considered based on ridership conditions and classification of the station.

Employee Break Room/Staff (Enhancements)

This space has multiple uses. It should be accessible from the Waiting Room, but direct access to the Ticketing Office/Booth area is not desired. The space shall have a minimum of 100 square feet; however, an additional 10 square feet should be added based on the number of employees using the room during a shift.

Janitor Closet (Needs)

Janitor Rooms shall be located adjacent to Restrooms. A 12-square-foot room shall be provided, at minimum, to house a janitor's sink, mop storage and shelving for cleaning supplies.

Vertical Circulation

Each station should have specific circulation requirements based on the station's configuration and site layout. Included are general standards used to arrange vertical circulation in a station under standard peak period operational conditions and under emergency conditions.

Stairs and Ramps. The quantity, width and location of platform stairs and ramps shall be in compliance with NFPA 130 and building codes.

Elevators. The use of elevators shall meet the current International Building Code and state and local jurisdiction codes.

Escalators (Enhancements). The use of escalators is not anticipated; however, the need for escalators should be evaluated and determined based on the station size, ridership data and WSDOT's requirements for a specific project.

4.3 DESIGN CRITERIA SOURCES

Space facility programming considerations listed in this chapter are based on current standards, building codes , design guidelines and original research. The resources used for each space program are in the table below. Full citations are provided in the bibliography.

Arrival / Departure Area Spaces	Design Criteria Sources
Pedestrian access	*Building Type Basic For Transit Facilities* *Design Guidelines and Standards for Sound Transit Capital Project* *Urban Design Guidelines*
Bicycle racks	Bicycling In Washington (WSDOT) *Metro-North Railroad Station Standards and Guidelines* www.amtrakcascades.com
Bus drop-off/pick-up	*Station Design Guidelines South Florida East Coast Corridor* *Commuter Rail Design Criteria* *Urban Design Guidelines*
Vehicular drop-off/Kiss & Ride	*Station Design Guidelines South Florida East Coast Corridor* *Urban Design Guidelines*
ADA parking	*2010 ADA Standards for Accessible Design* *Urban Design Guidelines*

Station Building Spaces		Design Criteria Sources
Core/ Passenger Access Spaces	Entry vestibule	*Transit Friendly Design Guidelines* *Urban Design Guidelines* *Station Design Guidelines South Florida East Coast Corridor*
	Waiting room	*2009 International Building Code* (Washington and Oregon editions) *Building Type Basic for Transit Facilities* *Station Design Guidelines South Florida East Coast Corridor* *Urban Design Guidelines*
	Restrooms	*2009 International Building Code* (Washington and Oregon editions) *Building Type Basic for Transit Facilities* *Station Design Guidelines South Florida East Coast Corridor* *Urban Design Guidelines*
Passenger Services	Retail	*Commuter Rail Stations Guidelines and Standards Manual* *Station Design Guidelines South Florida East Coast Corridor*
	Ticket office/booth	*Station Program and Planning* *Building Type Basic Transit Facilities* *Commuter Rail Stations Guidelines and Standards Manual*
Maintenance and Operations	Cash accounting & secure storage	*Station Program and Planning* *Building Type Basics for Transit Facilities*
	Lead clerk/supervisor	*Station Design & Construction Guidelines, Project Control and Quality Assurance & Control Engineering, Maintenance and Construction*
	Employee break room/ staff	
	Janitor closet	*2009 International Building Code* (Washington and Oregon editions) *Building Type Basic Transit Facilities* *Commuter Rail Stations Guidelines and Standards Manual* *Station Design & Construction Guidelines, Project Control and Quality Assurance & Control Engineering, Maintenance and Construction*
	Utility/electrical/ mechanical room	
	IT room	
	Storage	

Platform Spaces	Design Criteria Sources
Shelter	*Metro-North Railroad Station Standards and Guidelines*
Accessible track crossing (at grade or grade separated pedestrian crossing (if applicable)	*2010 ADA Standards for Accessible Design* *Building Type Basics for Transit Facilities* *Station Design Guidelines South Florida East Coast Corridor*
ADA route throughout the platform	*2010 ADA Standards for Accessible Design* *Station Design Guidelines South Florida East Coast Corridor*

ELEMENTS OF DESIGN

5

5. ELEMENTS OF DESIGN

This section addresses a broad range of station design elements and provides guidance based on the specific needs of the Cascades Passenger. It focuses on station components, such as platforms, canopies and site furnishings.

5.1 CONSIDERATIONS FOR DESIGN ELEMENTS

A typical station consists of platforms, canopies, and an enclosed Waiting Room either in a standalone building or part of another establishment. Its components should be readily identifiable and compatible in style with its surroundings.

The entrance to the station area, whether by car, bus or on foot, should be easily identified as the passenger approaches the station. The station's overall design and planning should take in consideration the neighboring surroundings and the vernacular style.

The overall design of the train station should take into consideration the following:

Scale the building in proportion to human activities: At street level, the building's scale shall encourage pedestrian interaction and provide a safe environment. This can be done through window patterns, roof lines, materials and colors. Modulations and bays can articulate the façade and break up the building's mass as viewed from the street.

Activate facades and avoid blank walls: Windows, different textures on solid walls (murals, brickwork patterns, mosaics), setbacks and indentations shall create a visual interest and discourage graffiti and other undesirable activities.

Emphasize the Main Entrance as a welcoming space: The Main Entrance shall be clearly identifiable and visible from the street. It shall appear inviting and safe and not constrained by closely spread partitions or other wall elements. There shall be no areas around the entrance that could be used for hiding.

Provide adequate lighting: Lighting provides a sense of safety and security. Specific strategies to illuminate the distinct features of the building shall be used. Attention shall be given to the illumination of entrances, signs, display windows, etc.

Provide adequate station signage and wayfinding design: These elements convey critical information needed by the passengers to successfully comprehend and use the system. The station signage shall consist of directional wayfinding and identification signs.

As previously mentioned in this report, some factors, such as project location and economy, may have an impact on the matrices. Any changes or deviation for facilities to be constructed and/or maintained by WSDOT shall be further discussed with and approved by WSDOT.

Arrival / Departure Area Components	Level 1 Station	Level 2 Station	Level 3 Station
Bicycle racks	N	N	N
Trash receptacles	N	N	N
Bollards	E	E	N
Planter/flower pots	E	E	E
Flagpoles/banners / plaques	E	E	E
Tree grates	E	E	E
Station signage and wayfinding	N	N	N
Supplemental signage	E	E	E
Public phones	E	E	E
Ticket vending machines within building exterior	E	E	E
Exterior drinking fountain	E	E	E
Beverages / snack vending machines	E	E	E
Landscape	E	E	E

Station Building Components	Level 1 Station	Level 2 Station	Level 3 Station
Ticket vending machine	N	N	N
Drinking fountains	N	N	N
Seating	E	N	N
Beverages / snack vending machine	E	E	E
Wi-Fi Internet access	E	E	E
Public phones	E	E	E
Car rental direct phone lines	E	E	E
Informational panels boards	E	E	E
Station signage and wayfinding	N	N	N
Supplemental signage	E	E	E
Trash receptacles at waiting room	N	N	N

Platform Components	Level 1 Station	Level 2 Station	Level 3 Station
Wind screens	E	E	E
Shelter seating	E	E	E
Platform seating	E	E	E
Platform canopy	E	N	N
Platform edge -detectable warning surface	N	N	N
Station signage and wayfinding	N	N	N
Supplemental signage	E	E	E
Trash receptacles	N	N	N
Beverages/snack vending machine	E	E	E
Ticket vending machine	E	E	E

Legend: N - Need E - Enhancement ● - Non-Aplicable

Station Amenities
Source: City of Seattle "Transit-Friendly Design Guidelines"

5.2 SITE FURNISHINGS

Furnishings shall be functional, attractive, compatible with the station architecture and vandal-resistant at a reasonable cost. The typical furnishings provided at a station are:

- Seating
- Bike racks
- Trash receptacles
- Bollards
- Planters/flower pots

Railings and Fencing

Railings and fencing are safety elements and shall be in compliance with the most stringent applicable codes, including the ADA Standards. In addition, the Railings and Fencing shall comply with the following:

- Material shall be durable and low maintenance; material selection shall be discussed during the design phase to assure they meet specific project goals.
- The placement of supplemental guardrail or fencing shall be carefully selected, and hazardous conditions shall be avoided.
- Railings and Fencing overall design shall compatible with the existing architectural features of the station, adjacent buildings and community aesthetics; and shall consider project funding and safety concerns.
- Railings and Fencing shall be grounded for safety.
- Upgrades, repairs, minor modifications or replacement of existing Railings shall meet code requirements. Every condition is unique, and it shall be discussed during the design phase.
- All public stairs and ramps shall be considered as a means of egress or part of the access route and shall have handrails and guardrails that meet code.

Landscape/Hardscape

The design criteria include provisions for both landscaping and hardscaping. Landscape and hardscape shall be consistent with WSDOT and ODOT standards. Landscaping shall be well-integrated with the design of the station.

The design criteria for landscaping shall consider the following:

- Provide aesthetic plantings for all seasons of the year by using various textures and colors of foliage.
- Provide buffers and/or definition of parking areas, pedestrian travel ways and drop-off areas or sitting areas.
- Minimize impact of salts and chemicals applied in winter by proper choice of vegetation and/or raised or protected planting areas.
- Minimize maintenance requirements, such as pruning, leaf collection and clogging of stormwater catch basins from seeds or leaves.
- Encourage longevity of vegetation – plantings should meet or exceed their expected life span with normal maintenance.
- Avoid disturbance to potential wetland areas.
- Consider safety issues, including vehicular and pedestrian sight lines.

5.3 LEVEL BOARDING

The USDOT states that the boarding of trains shall be from a platform that is at the same height as the floor level of the rail car, in other words, level boarding. Level boarding is defined as a horizontal gap of no more than 3 inches and a vertical gap of no more than 5/8 inch.

The railroad must provide equal access to the trains for all passengers. A wheelchair-bound passenger should be able to board a train without special assistance. When it is physically and economically impractical to achieve level boarding, an alternative means of access, such as wheelchair lifts and bridge plates, should be used.

The USDOT requires passenger railroads to minimize the platform gap to the maximum extent possible by using gap-filling technologies, such us bridge plates. The slope of bridge plates is prescribed by 49 CFR 38.95 as ranging from 1:4 maximum slope for a vertical difference of 3 feet or less to 1:12.

Level boarding requirements are established so that full-height platforms match the height of a passenger car. However, those clearance requirements are not compatible with freight operations. The final configuration and clearances for the Cascades Corridor stations must be negotiated between the railroad and freight companies. Further discussions with WSDOT shall take place for each specific project location and each station platform design to comply with Federal Railroad Administration (FRA) regulations.

Dallas Area Rapid Transit (DART) St. Paul Station-ADA Compliant Level Boarding
source www.dart.org

5.4 CLEARANCES AND OTHER SPECIAL REQUIREMENTS

There are specific clearance requirements for freight and passenger rail operations set by WSDOT, the freight and rail operators and regulatory agencies. These agencies must review and agree to these clearances prior to the design of the station.

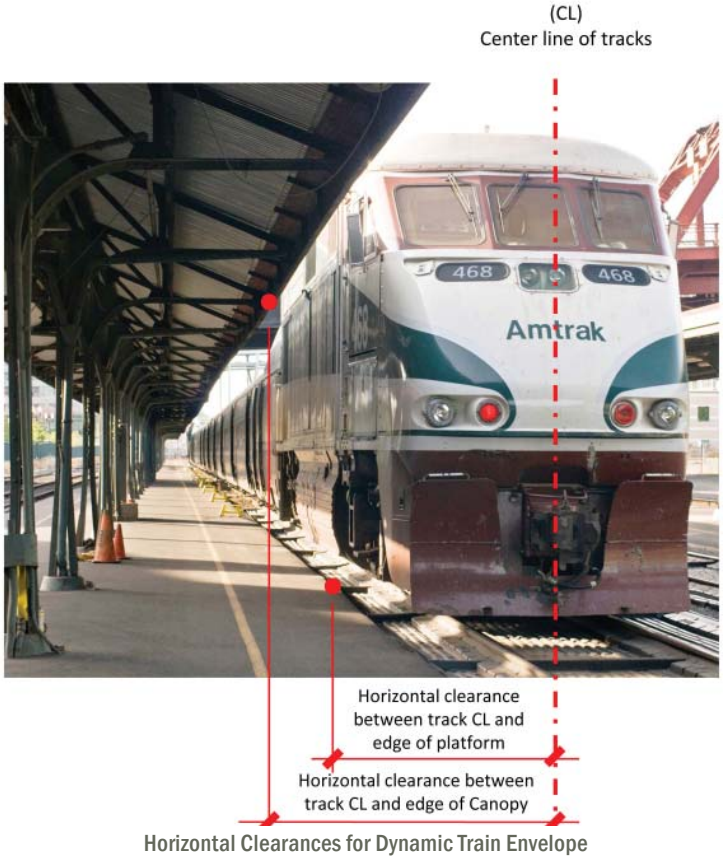
Dynamic Train Envelope

The American Society of Civil Engineers defines the Dynamic Train Envelope as follows:

> *"The vehicle dynamic envelope is defined as the space occupied by the dynamic outline of the transit vehicle under normal operating conditions and probable combinations of vehicle failures. The dynamic envelope shall also consider the effect of manufacturing, construction, installation and maintenance tolerances, and the effects of normal wear of wheels or tires and other components, the dynamic envelope shall include, but not be limited to, the overhang on curves, effects of chording, vehicle speed, suspension characteristics and failure, and applicable external forces, such as wind, acting upon the vehicle or other system equipment."*

The Dynamic Train Envelope is unique to each rail system and vehicle design, and it is usually provided by the vehicle manufacturer. It represents the worst case scenario, taking into account all construction tolerances and failure conditions.

The Dynamic Train Envelope is a critical factor in locating the platform, platform canopies, signage, signal equipment and switch machines, among other features. Designers must have complete familiarity and understanding of the clearance requirements as dictated by the system technology and the operating conditions. Issues, such as combined freight and passenger operations along the same tracks, will introduce specific requirements for station design and platform clearances.



Horizontal Clearances for Dynamic Train Envelope

Platform Without Canopies at
Salem Station,Oregon
Source: WSDOT Archives

Platform with Partial Canopies
at Stanwood Station, Washington
Source: WSDOT Archives

Platform Canopy Length

The length of a platform and canopy can conservatively be determined by the annual ridership volumes, which can vary between stations. It follows that stations with a heavy ridership volume and major destination and departure operations are to have full-length platforms and canopies, and low-volume stations are to have shorter platforms and canopies.

The length of the platform and canopy shall be determined for each specific project in discussions with WSDOT and other involved parties.

Shelters

Shelters provide protection from the external elements, such as snow, rain, wind and sun. In addition to weather, shelter design shall also take into consideration the following:

- Use of the station design to identify the station and the surrounding area
- Security and unimpeded surveillance

The minimum length of the Shelter shall be 20 feet; and the width of the Shelter shall not infringe on the Dynamic Train Envelope.

Windscreens

Criteria for Windscreens include the following:

- Minimum height of 6 feet-8 inches
- 75% of the area must be translucent or transparent
- Overall length and configuration shall be compatible with passenger flow analysis
- Place where most effective in blocking prevailing winds
- Provide a minimum of one bench on the leeward side of the Windscreen
- Comply with ADA for access and circulation around the Windscreen

Baggage Handling

Baggage Handling services are considered Enhancements to Level 1, 2 and 3 Stations due to low anticipated usage and high operating costs.

The anticipated operating costs are:

- Additional personnel or third party employees
- Additional spatial requirements (i.e., baggage storage room with baggage drop-off/pick up area for customers)
- Additional equipment (i.e., baggage racks for storage, motorized baggage carts)
- Potential need for additional security measures within the baggage room

The current Amtrak baggage policy is as follows:

- Carry-On Baggage: Two items per passenger only, each of which may not exceed 50 pounds. Purses, briefcases, laptop, diaper bags, strollers, car seats, cosmetic cases, or equipment required for a medical condition do not count toward this limit.
- Checked Baggage: Three items per passenger only, each of which may not exceed 50 pounds. A maximum of three additional items are permitted. Amtrak currently charges

passengers fees for additional items. Passengers are requested to check baggage 30 minutes prior to scheduled train departure. This service is not available at every station.

It is anticipated that requirements for checked baggage on Amtrak Cascades will become increasing restrictive over time, and fees will be extended to all checked baggage on the service.

Amtrak checked baggage services are mostly oriented for long distance passengers. Cascades Corridor passengers' demand for checked baggage services is low because they typically travel with fewer pieces of luggage and for a shorter period of time than long distance travelers. They are more likely to carry only essential needs associated with short term leisure or business travel.

It is expected that the typical Cascades Corridor Passenger would have carry-on baggage, which shall be considered in the sizing of the Waiting Room. Proper clearances and corridor widths shall be provided to accommodate carry-on baggage handling and maneuvering.

5.5 LIGHTING

Lighting has a significant role in station safety and security and the passenger's visual perception of the overall station environment.

Lighting shall consider the following guidelines:

- Illumination levels and uniformity shall be in accordance with current building codes, municipal codes, the Illuminating Engineering Society of North America and National Fire Protection Association (NFPA) requirements. NFPA 130 defines requirements for emergency lighting for the platform, exit stairs and exit ramps.
- Appropriate lighting levels shall be provided in all intermodal areas and all horizontal and vertical components, especially along the access routes. Lighting shall be provided specifically at platforms, accessible routes from the station, parking and public rights-of-way. Lighting shall be provided by means of lights mounted on pole fixtures, canopy structures and building-mounted lights.
- Lighting along the rights-of-way shall not interfere with railroad operations.
- Site lighting shall be sensitive to the surrounding neighborhood. Care must be taken to avoid higher levels of light pollution and the direct view of the floodlighting luminaires from adjacent developments.
- Lighting could be integrated into the landscape to accent landscaping and to provide general illumination for pedestrian walkways. Lighting strategies, material selection and lighting levels shall be carefully selected for all station areas to ensure passenger safety.
- The lighting strategy and selection shall consider the role of life-cycle, maintenance and operations.
- To facilitate building operations and maintenance, the number of types of lighting fixtures should be minimized.
- All specified fixtures are to be low-maintenance, energy-efficient and vandal-resistant.

Recommended lighting levels from "Building Type Basics for Transit Facilities" by Kenneth W. Griffin are presented on the next page as a general reference. However, the designer shall define illumination levels for each station that address the station's unique design challenges and context and obtain WSDOT's approval during the design phase.

RECOMMENDED ILLUMINATION LEVELS (MAINTAINED, AVERAGE FC)	
Passenger Stations	
Platform, subway	10–20
Platform, under canopy, surface and aerial	10–15
Uncovered platform ends, surface	5
Mezzanine	20
Ticketing area—turnstiles	30
Passages	15–20
Stairs and escalators	20–25
Fare collection kiosk	80
Concessions and vending machine areas	30
Elevator (interior)	20
Aboveground entry to subway (day/night)	5/30
Washrooms	10
Service and utility rooms	10–20
Electrical, mechanical, and train control	15–30
Storage areas	10
Bus loading platforms	5
Streetcar loading platforms	5
Bus and streetcar loops	2
Kiss-and-ride areas	5
Parking Areas	
Self-parking	2
Pedestrian walkways	3
Entrance and exit roadways	2
Passenger Vehicles	
Interiors (i.e., train cars)	30

TYPICAL ILLUMINATION LEVELS (FC)	
Street entrances	5–20
Stairs and escalators	10–40
Control areas	20–40
Platforms	10–30
Nonpublic areas	15–30
Crew quarters	15–35
Utility spaces	15–35

Illumination Levels

Source: Griffin, Kenneth W., "Building Type Basics for Transit Facilities"

5.6 SECURITY

Crime Prevention Through Environmental Design (CPTED) is a design methodology to deter criminal behavior through the built environment. It focuses on reducing opportunities for crime and mitigating the fear of crime. Through the design and management of the physical environment and education about public safety, CPTED programs have increased community security. The four basic principles of CPTED should be considered during site planning and design of new and existing facilities in the Cascades Corridor:

Territoriality: Design physical attributes that express ownership, such as fencing, signage, landscaping and pavement areas.

Natural Surveillance: Design the layout of physical features, activities and circulation to maximize visibility. Open, visible areas with easy access and good pedestrian circulation provide a sense of security. A potential criminal is less likely to attempt a crime if there is a risk of being seen.

Improved Sightlines: Incorporate clear views of surrounding areas. Design permeable barriers that do not restrict vision. Avoid features that block sightlines and major access points, such as tall vegetation, fences, etc.

Access Control: Reduce the opportunity and accessibility for crime. The physical control of people coming and going from a space with the appropriate placement of entrances, exits, fencing, landscaping and lighting denies a criminal access to potential victims.

Platform Security Features
Source: "Station Design Guidelines South Florida East Coast Corridor (SFECC) Transit Analysis"

5.7 TECHNOLOGICAL ADVANCEMENTS

Technology is rapidly evolving around the world and providing better and faster ways to do things. Railway-technology.com is an organization dedicated to the sharing of information technology in the railway industry. Railway-technology.com has recently published top trends in railway station design. These trends may be considered as possible Enhancements for the Cascades Corridor service, as follows:

Ticket Vending Machines (Needs)

With all of the e-ticketing technological advancements mentioned above and WSDOT's policy of implementing "Lean" methods and tools to create more value for their customers with fewer resources, it is expected that ticket vending machines will be more broadly used and will replace staffed ticket booths.

Real-time Information Updates (Enhancements)

Most of the busiest railroad operators are starting to communicate in real-time via e-mail or text message to their customers regarding the train schedule. This enhanced service has been welcomed by the technology-savvy user.

State-of-the-art systems allow passengers to subscribe via e-mail and text message to receive live updates directly to a desktop or wireless device. The service is personalized so that subscribers receive only the information they have requested.

Wireless Internet Technology Access (Enhancements)

Wireless Internet access (Wi-Fi) should be provided at selected high-volume stations. Wi-Fi access must be managed, phased and updated regularly to maintain efficiency and applicability to the system users.

Ticketless Systems and Near Field Communication (Enhancements)

The way rail passengers purchase tickets is already changing dramatically. Paper-based ticketing is slowly being set aside in favor of ticketless systems using smart cards and contactless technology.

Near-Field Communication (NFC) chips are the next step in ticketless technology. These chips are placed inside credit cards and smartphones to make fare payments.

Highly developed Asian countries like Japan and South Korea have been leading the world for years in using smartphone technology to purchase tickets. In a recent Accenture survey, 69% of Asian respondents said they prefer to make payments using NFC-enabled phones, a significant leap over Europe and the United States, where only 26% of those surveyed said the same. In Japan, several software applications have been launched since 2004 that have allowed rail travelers to pass through ticket barriers with the swipe of a smartphone.

NFC technology is already available in the United States. In October 2011, NJ TRANSIT announced its partnership with Google Wallet, a 'tap and pay' transaction card with NFC chips. The wireless data transmission occurs between the device and the ticket windows and is now in service at the New York Penn Station. The public-private partnership with Google was developed at no cost to NJ TRANSIT.

Future Security (Enhancements)

Railroad agencies across the globe have been implementing closed circuit television (CCTV), emergency help points and well-designed lighting systems. Bosch Security Systems developed Aegis UFLED, a white light illuminator that can help reduce station vandalism and cable theft. This intelligent system can issue voice warning to intruders, capture images and automatically send alerts to security staff via text message and e-mail.

Green Energy for Railway Stations (Enhancements)

Even though electric rail travel is considered a sustainable form of public transportation, the energy demands are high, resulting in high carbon footprints. To mitigate the high energy requirements, National Rail in the United Kingdom has decided to install 4,400 solar panels on the roof of the Blackfriars Railway Station in London.

5.8 WAYFINDING

Wayfinding is defined as the process of using spatial and environmental information to improve the user flow and activities of any built environment.

An effective wayfiding design in train stations provides the following:

- The ability to effectively determine current location and orient oneself within an specific environment
- The ability to determine possible destinations
- The ability to confidently establish a plan of action and a route to a desired location

Signage is one of the most utilized components of the wayfinding design, and this report classifies signage as follows:

Station Signage (Needs)

Station Signage is anticipated for Level 1, 2 and 3 Stations. It is considered a very important design element that provides proper guidance to passengers. Station signage shall take in consideration ADA Standards and guidelines. Station signage consists of the following:

- Directional Signs: Use to define locations routes or exit
- Identification Signs: Use to define rooms or spaces
- Dynamic Signs: Also called Digital Signs, provide real-time information using video or multimedia content. A dynamic sign consists of a computer or playback device connected to a digital screen.

Supplemental Signage (Enhancements)

Supplemental signage enhances the travel experience, providing real-time information or aesthetic improvements. Supplemental signage consists of the following:

- Artistic/Historic Signs: Used to enhance aesthetics of the train stations. This type of sign is mostly initiated by the communities and local artists.
- Advertising Signs: Used to create revenue opportunities to offset public subsidies while displaying information associated with third parties.

5.9 DESIGN CRITERIA SOURCES

The Considerations of Design Elements in this chapter are based on current standards, building codes, design guidelines and original research. The resources used for each design element are in the table below. Full citations are provided in the appendix.

Elements of Design	Design Criteria Sources
Site furnishings	*Transit Friendly Design Guidelines* *Metro-North Railroad Station Standards and Guidelines*
Railings and fencing	*Commuter Rail Stations Guidelines and Standards Manual* *Station Design & Construction Guidelines, Project Control and Quality Assurance & Control Engineering, Maintenance and Construction*
Landscape/hardscape	*High Speed Rail Program Design Criteria Manual* *Station Design Guidelines South Florida East Coast Corridor*
Level boarding	*2010 ADA Standards for Accessible Design* *www.dot.gov*
Clearances and other special requirements	*2010 ADA Standards for Accessible Design* *Automated People Mover Standards: Vehicles, Propulsion and Braking*
Shelters and windscreens	*Metro-North Railroad Station Standards and Guidelines* *Station Design & Construction Guidelines, Project Control and Quality Assurance & Control Engineering, Maintenance and Construction*
Baggage access considerations	*Station Program and Planning* *Building Type Basics for Transit Facilities*
Lighting	*Building Type Basics for Transit Facilities* *NFPA 130, Standard for Fixed Guideway for Transit and Passenger Rail System, 2012 Version*
Security	*Crime Prevention Through Environmental Design*
Technological advancements	*railway-technology.com*
Wayfinding	*Building Type Basics for Transit Facilities*

6 ADDITIONAL DESIGN CONSIDERATIONS

"The Washington State Department of Transportation is committed to providing equal access in tis program, services, and activities for persons with disabilities."
Source: WSDOT ADA Brochure

6. ADDITIONAL DESIGN CONSIDERATIONS

The intent of the design criteria in this report is to provide design guidelines and direction on how to approach specific challenges associated with the Cascades Corridor service.

To meet FRA requirements, WSDOT shall address the requirements of accessibility and life safety described in the following pages. Also in this chapter, design considerations for sustainable design and renovation of existing facilities are presented as additional considerations for station design.

6.1 ADA/ACCESSIBILITY

Accessibility to a wide range of users is a key factor in station design. Accessibility is defined by the use or approach to a specific space or area by persons with physical disabilities.

All station areas shall comply with the current version of the Americans with Disabilities Act (ADA) Standards for Transportation Facilities adopted by the USDOT and the FRA. These requirements outline the basic criteria for barrier-free and accessible design for passengers with special needs. It is also important to note that items procured, such as ticket vending machines, must be compliant with ADA/Americans with Disabilities Act Accessibility Guidelines (ADAAG).

It is WSDOT's policy that pedestrian facilities are an integral part of the transportation system and must be designed in accordance with 29 CFR Part 35 and federal regulations for accessibility. All new construction and alterations of existing transportation facilities must be constructed to be accessible. The Federal Highway Administration is one of the agencies designated by the Department of Justice to ensure compliance with the ADA/ADAAG for transportation projects.

New Construction Projects: The requirements of ADAAG must be fully satisfied throughout the project.

Alteration Projects: Any Project that has the potential to modify an existing structure, its pedestrian access or circulation shall be classified as an alteration project. The definition of "alteration" should be reviewed and understood based on the local codes. Alteration projects include:

- Renovations
- Rehabilitation
- Reconstruction
- Historic restoration
- Structural parts and elements of a facility

Where existing elements or spaces are altered, each altered element or space within the limits of the project shall comply with the applicable requirements for new construction to the maximum extent feasible.

Current ADA/ADAAG guidelines and the WSDOT design manual for pedestrian facilities shall be reviewed for further information. ADA Standards for a rail station require the following:

- An accessible route to parking areas and accessible parking
- An accessible route to all public areas, including train platforms via elevators and/or ramps
- Signage meeting ADA/ADAAG requirements, including tactile signage with Braille type
- Station buildings must have accessible entrance(s), restrooms and ticket window
- Accessible public pay telephones equipped with volume controls (TTY)
- Tactile warning strips along platform edges
- Cane protection, where required
- Audio-visual information systems or equivalent

6.2 EMERGENCY / EGRESS (NFPA 130)

Exiting from Rail Car Egress Experiment
Source: fra.dot.gov

Station design shall be in conformance with NFPA 130 with regard to life safety for fire and emergency evacuation systems.

Evacuation and means of egress routes shall be located and sized in accordance with specific formulas and procedures. These emergency routes are usually located at the ends of a station and shall be well-defined and have the required communication systems to support emergency operators.

In the early phases of the project, the following NFPA 130 requirements shall be incorporated:

- Egress and emergency procedures
- Fire protection and fire department equipment location
- Emergency ventilation system

NFPA 130 shall be reviewed for further information.

Xeriscaping
Source: California High-Speed Rail Authority "Urban Design Guidelines"

6.3 SUSTAINABLE DESIGN

It is highly recommended that the Cascades Corridor stations take advantage of sustainable design measures, such as water conservation, reduction of energy consumption and other current industry standards.

If a station project is federally funded or receives capital funding, it shall comply with State Executive Orders related to sustainable design and achievement of Leadership of Energy and Environmental Design (LEED) Certification. The LEED certification level shall be established by state laws.

The sustainable strategies described in this chapter are based on the requirements of the State of Washington's RCW 39.35D for high performance buildings. Pursuing LEED certification may be considered by the various stakeholders.

Best practices in station design incorporate the principles of sustainability. Sustainable Design, also known as Green Design, promotes the following energy conservation objectives:

- Efficient use of energy
- Reduction of waste
- Pollution prevention

Possible sustainable strategies from the LEED Certification Program are listed below.

Solar Power Generation
Source: California High-Speed Rail Authority "Urban Design Guidelines"

Sustainable Sites

- Discourage and minimize the use of automobiles at metropolitan and suburban station locations
- Provide bike racks
- Prevent pollution and erosion during construction
- Use permeable pavers to reduce stormwater runoff
- Use native and regional species for landscaping that require minimum irrigation
- Promote infill development
- Use light color material to reduce heat island effect
- Shade hardscapes, such as walkways, platforms and parking stalls to reduce the heat island effect

Water Efficiency

- Minimize the use potable water on irrigation systems
- Encourage the harvesting of rainwater for irrigation purposes

Energy and Atmosphere

- Maximize the use of daylighting
- Maximize the visual comfort using shading devices and/or glass film
- Maximize window areas along south-facing walls
- Use Energy Star-rated products
- Monitor the building's energy performance one year after construction
- Promote good indoor air quality
- Encourage the use of daylight

Materials and Resources

- Provide storage and collection of recyclables to reduce waste
- Use materials with high recycled content
- Maximize the use of modular construction to facilitate deconstruction at the end of the system's usable life
- Use nontoxic material to reduce allergens and promote clear air
- Employ construction waste management during construction
- Choose a high percentage of materials manufactured locally or regionally, as defined per Washington and Oregon State Legislatures

Indoor Environmental Quality

- Implement indoor air quality management during construction
- Meet or exceed ventilation requirements based on American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Standard 62.1
- Use low-volatile organic compound (VOC), bio-based finish materials wherever possible
- Prohibit smoking within 25 feet of the station's entrance
- Select materials that do not generate chemical off-gases

Temporary Erosion and Sediment Control
Source: WSDOT Archives

6.4 RENOVATION OF EXISTING STATION FACILITIES

Many stations in the Cascades Corridor are rich in culture and history. When renovations are considered for historic features, issues must be evaluated in detail and coordinated with the State Historic Preservation Office (SHPO).

SHPO is mandated by the National Historic Preservation Act of 1966 (NHPA) to represent the interests of the state when consulting with federal agencies under Section 106 of the NHPA and to maintain a database of historic properties. According to the Section 106, there are four major categories for work on historic properties: Preservation, Rehabilitation, Restoration, and Reconstruction.

Preservation. Is defined as the act or process of applying measures necessary to sustain the existing form, integrity and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction.

Rehabilitation. The process of making possible the compatible repairs, alteration and additions while preserving those portions or features that convey historic, cultural and architectural value.

Restoration. The act or process of accurately depicting the original form, features and character of a historic property. Upgrading of mechanical, electrical, and plumbing systems and other code-related work shall be sensitive to the original character and features of the station.

Reconstruction. Is defined as the act or process of depicting, by means of new construction, the form, features and detailing of a non-surviving site, landscape, building, structure or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

The designers shall identify the scope of work under the four categories mentioned above and delineate the design strategies in alignment with SHPO guidelines, especially on federally funded projects.

SHPO has identified a series of general guidelines that are applicable to historic rehabilitation projects, as follows:

- A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
- The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.
- Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding features or elements from other historic properties, will not be undertaken.
- Changes to a property that have acquired historic significance in their own right will be retained and preserved.
- Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.

- Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials.
- New additions, exterior alterations or related new construction will not destroy historic materials, features and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion and massing to protect the integrity of the property and its environment.
- New additions and adjacent or related new construction will be undertaken in a such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

These guidelines are just a reference. The State Department of Archaeology and SHPO shall be contacted to determine further compliance.

The designers shall explore possible solutions for providing ADA compliance. Any alterations to historic elements that are designed to allow a building to operate in its originally intended purpose may be allowed. The design solution shall be discussed and presented to SHPO and WSDOT for further approval.

It is important to mention that repairs shall not reduce the level of accessibility to a facility or the level of code compliance. The designer shall reference the current building codes for further information.

As mentioned throughout this report, all work shall be ADA compliant unless it is technically infeasible, in which case it shall be presented to WSDOT for further evaluation.

6.5 MATERIALS-DURABILITY AND MAINTAINABILITY

Durable, quality of appearance and cost-effective materials shall be used. Materials should be appealing in context with the station surroundings and have the ability to sustain their appearance over their useful life.

- Materials that do not soil nor stain easily shall be used and shall have surfaces that are easily cleaned in a single operation. Minor soiling should not be apparent. All porous finishes subject to public contact shall be treated or finished in a manner that allows easy removal of graffiti.
- Non-slip finishes. Entrances, stairways, platforms, platform edge strips, and areas around equipment shall be nonslip. Floor finishes shall be nonslip even when wet. This is particularly important at stairs, elevators and other areas near station entrances, as well as platform areas.
- Grounding and bonding shall be provided as required to allow for future potential electrification.
- Corrosion Resistance. Because of moisture and the electrical currents involved in railroad operation, special consideration must be given to the prevention of corrosion. Non-corrosive metals shall be utilized when possible or required.
- Fire Resistance. “Flame spread” ratings shall conform to the applicable building code definition for the material being used.
- Finish Materials. Dense, hard, nonporous materials shall be used in all applications. Finish materials shall be resistant to corrosion, acid, and alkali and shall be compatible with chemical compounds required for maintenance.
- Detailing of finishes shall avoid unnecessary surfaces that may collect dirt and complicate cleaning. Wall surfaces shall be vertical and flush allowing for texture. All edge and finish materials shall be detailed, incorporating joints and textures that reduce the requirements for true, visually perfect installation over long distances.
- Texture. Materials within reach of passengers shall be easily cleaned, with a finish to prevent or conceal scratching, soiling, and to maintain desired illumination levels.
- Materials with integral colors shall be used as much as possible.
- Graffiti-resistant products shall be used to protect surfaces susceptible to vandalism.

6.6 SEISMIC DESIGN APPROACH

Current building codes have seismic provisions that are specific to the region's characteristics to ensure the health, welfare and safety of the general public. The station design shall include all requirements related to seismic design.

6.7 DESIGN CRITERIA SOURCES

The Additional Design Considerations listed in this chapter are based on current standards, building codes, design guidelines and original research. The resources used for each design element are in the table below. Full citations are provided in the bibliography.

Elements of Design	Design Criteria Sources
ADA/Accessibility	*2009 International Building Code* (Washington and Oregon editions) *2010 ADA Standards for Accessible Design* *Building Type for Basic Transit Facilities*
Emergency/Egress (NFPA 130)	*Building Type Basics for Transit Facilities* *NFPA 130, Standard for Fixed Guideway for Transit and Passenger Rail*
Sustainability	*LEED 2009 for New Construction Rating System* *Station Design Guidelines South Florida East Coast Corridor* *www.usgbc.org*
Renovation of Existing Station Facilities	National Historic Preservation Act of 1966 Washington State Department of Archaeology and Historic Preservation
Materials-Durability and Maintainability	*Building Type Basics for Transit Facilities* *Station Design Guidelines South Florida East Coast Corridor* *Station Design & Construction Guidelines, Project Control and Quality Assurance & Control Engineering, Maintenance and Construction*
Seismic	*2009 International Building Code* (Washington and Oregon editions)

REFERENCES

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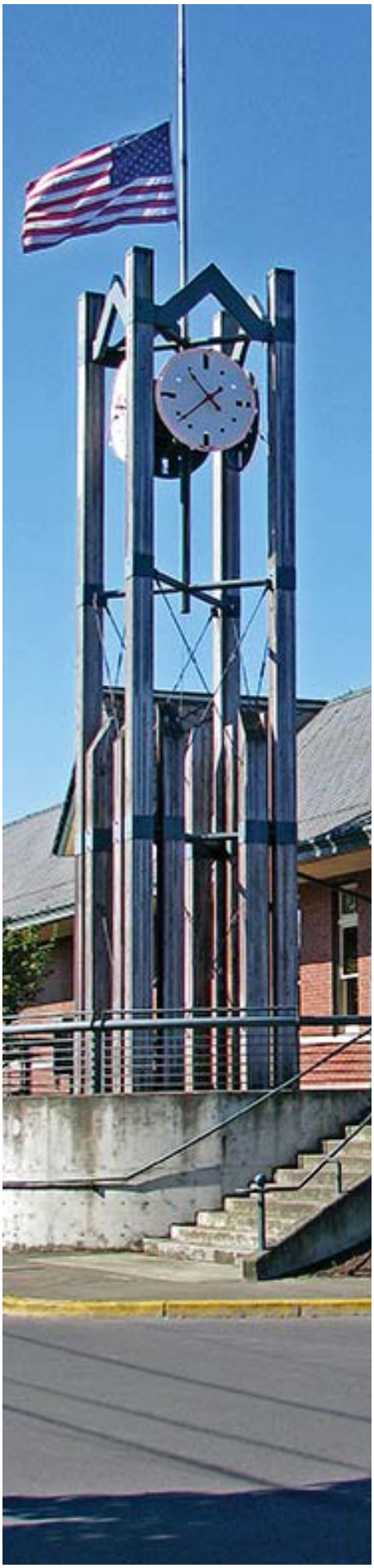


REFERENCES

DEFINITIONS AND ABBREVIATIONS

The following abbreviations, acronyms and terminologies are used in this report.

29 CFR Part 35. Code of Federal Regulations - Nondiscrimination on the Basis of Disability in State and Local Government Services.

49 CFR 38.95. Code of Federal Regulations - Mobility Aid Accessibility.

ADA. Americans with Disabilities Act.

ADAAG. Americans with Disabilities Act Accessibility Guidelines.

ASHRAE 62.1. American Society of Heating, Refrigeration, and Air-Conditioning Engineers Standard for Ventilation for Acceptable Indoor Air Quality.

BNSF Railway. Freight railway company of nearly 400 different railroad lines that merged or were acquired over the last 160 years. The company operates over 32,000 route miles within the United States and two Canadian provinces.

CASCADES CORRIDOR. Intercity passenger rail service between Eugene, Oregon, and Vancouver, British Columbia.

CCTV. Closed-Circuit Television.

CPTED. Crime Prevention Though Environmental Design.

DYNAMIC TRAIN ENVELOPE. The vehicle dynamic envelope is defined by the American Society Civil Engineers of as the space occupied by the dynamic outline of the transit vehicle under normal operating conditions and probable combinations of vehicle failures.

ELEMENTS OF DESIGN. Building components that comply with specific building codes or standards.

FAM. Family.

FRA. Federal Railroad Administration.

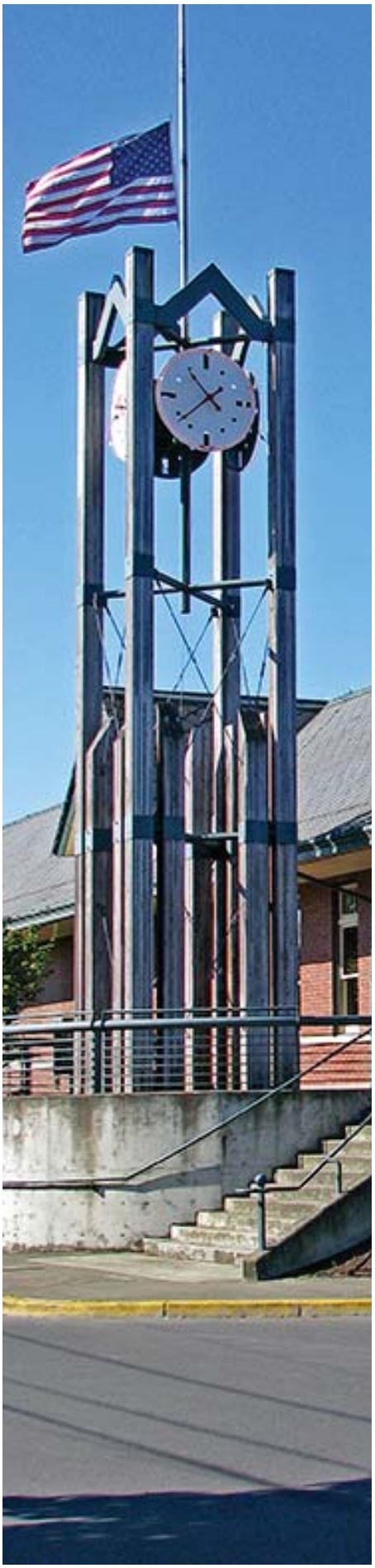
HARDSCAPE. In the practice of landscaping, refers to the paved areas like streets and sidewalks or other areas where the upper soil profile is no longer exposed.

INTERCITY PASSENGER RAIL. Service between major and moderate population centers 100-500 miles apart, with some intermediate stops.

INTERMODAL. Transport system combining different modes of conveyance.

I-5. Major north-south route of the interstate highway system that connect Oregon, Washington and British Columbia.

LEED. Leadership in Energy and Environmental Design. Rating system for the design, construction and operation of high performance buildings developed by the U.S. Green Building Council.



LEVEL BOARDING. Defined by the U.S. Department of Transportation as having a horizontal gap of no more that 3 inches and a vertical gap of no more than 5/8 inch. Level boarding shall be provided by passenger platform that is at the same elevation of the floor of the rail car.

NEC. Amtrak's Northeast Corridor service.

NFC. Near-field Communication.

NFPA 130. National Fire Protection Association Standard for Fixed Guideway for Transit and Passenger Rail Systems.

NHPA. National Historic Preservation Act of 1966.

ODOT. Oregon Department of Transportation.

PACIFIC NORTHWEST CORRIDOR. High-speed rail corridor. This 466-mile route houses the Cascades Corridor and long-distance trains, Sounder commuter services in the Seattle region, and the freight trains of the owning railroad companies (Union Pacific and BNSF).

PRIIA. Passenger Rail Investment and Improvement Act of 2008.

RCW 47.04.280. The Washington State Legislature's transportation system policy goals for planning, operation, performance of, and investments in Washington's transportation system.

RCW 39.35D. The Washington State Legislature's transportation system policy goals for high-performance buildings.

SEPTA. Southeastern Pennsylvania Transportation Authority.

SHPO. State Historic Preservation Office.

SIGNAGE. Visual graphic created to display information to a particular user.

STATION PROGRAMMING. Process that establishes the scope, spaces, functionality and relationship between spaces and activities that support the facility's operation.

TTY. Text telephone, also sometimes called a TDD, or Telecommunication device for the deaf.

Union Pacific Railroad. Railroad franchise owed by Union Pacific Corporation that covers 23 states across the western two-thirds of the United States.

USDOT. United States Department of Transportation.

VOC. Volatile Organic Compound.

WAYFINDING. Inclusive process of organizing spatial and environmental information to assist users to orient and navigate through places.

WSDOT. Washington State Department of Transportation.

Standwood Station, Washington
Source: WSDOT Archives

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Railway Technology, www.railway-technology.com/

Taglo America Amtrak Cascades Services, www.talgoamerica.com/series6-amtracCascades.aspx

United States Department of Transportation, www.dot.gov/

United States Green Building Council, www.usgbc.org/

Washington State Department of Transportation, www.wsdot.wa.gov/

Dallas Area Rapid Transit, www.dart.org/

APPENDIX A:

STATION ENHANCEMENTS - OPPORTUNITIES FOR THIRD-PARTY INVESTMENT IN THE CASCADES CORRIDOR

King County Bike Locker
Source: metrokingcounty.gov

Anacortes Roundabout, Washington
Source: WSDOT Archives

Artwork Planned for
Avenue 20 Roundabout
Source: www.anacortescomission.com

Everett Station, Washington
Source: flickr.com

Visitor Station at Skagit Station
Source: www.araijackson.com

APPENDIX A

STATION ENHANCEMENTS - OPPORTUNITIES FOR THIRD-PARTY INVESTMENT IN THE CASCADES CORRIDOR

When planning service and infrastructure improvements, WSDOT and ODOT must make trade-off decisions that balance competing considerations. Planned improvements to service and infrastructure must be consistent with program goals and be designed and prioritized in light of finite transportation funding.

While WSDOT and ODOT must invest their limited resources in high-priority improvements that serve their respective states' interests, third-party entities could develop and implement additional Enhancements to the Cascades Corridor and related infrastructure provided that:

- Enhancements are consistent with intercity passenger rail program objectives.
- Changes that are in conflict with the goal of providing faster, more frequent, reliable passenger rail service will not be considered.
- Proponents take responsibility for the cost of Enhancements (design, construction, operations and maintenance) that exceed the standard needed to meet the states' interests.

This is a positive way for communities to support local and regional economic development goals and potentially even generate revenue. The following are several examples where third parties have supported development at Cascades Corridor stations.

Enhancement	Example
Vehicle parking	City of Seattle maintains metered parking near King Street Station. Private companies offer paid parking adjacent to Union Station in Seattle.
Bicycle storage lockers	King County Metro partners with Bicycle Alliance of Washington to provide bicycle lockers at many Park and Rides and transit centers.
Landscaping/public art	City of Anacortes, Washington, provides landscaping and public art in the center of a highway roundabout through an agreement with WSDOT.
Tourist information	Volunteers meet trains at Centennial Station in Olympia and provide resources needed to stock visitor information in the station.
Retail and other customer services	The Everett Station is a multimodal, multiuse building that serves as a transportation hub, a career development center and a gathering place for community events. Everett Station is home to the Everett Transit Customer Service Center, as well as WorkSource, WorkForce and Espresso Americano. Inside Skagit Station are the Transit's Customer Service counter, Greyhound's Customer Service counter and an Amtrak ticket machine. The station also houses the Mount Vernon Chamber of Commerce and Visitors Center, and includes a community room that provides local clubs and organizations a central place to meet.