Design Guidelines and Standards for Sound Transit Capital Projects: Sounder & ST Express Passeng

Final Draft

Prepared for:
Sound Transit

Prepared by:
Parsons Brinckerhoff Quade & Douglas, Inc.

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TABLE OF CONTENTS

1.0 Introduction to Design Guidelines and Standards Manual

Over the coming years, Sound Transit will be planning, designing, and constructing bus transit and commuter rail stations to connect regional employment and population centers in King, Pierce, and Snohomish counties. This manual identifies Sound Transit's policies, guidelines, and standards for passenger facilities that will be developed for the agency's Sounder commuter rail and ST Express bus services. Collectively, these facilities include Sounder stations, ST Express park-and-ride lots, transit centers, and in-line freeway stations. The manual provides an update to two manuals prepared separately for Sounder and ST Express facilities. These manuals are the *Sound Transit Station Design Manual* (December 1998) and the *Sound Transit Regional Express Transit Facility Design Guidelines and Standards* (February 2002).

The updated and consolidated manual for Sounder and ST Express passenger facilities provides project managers and consultants with technical direction on designing passenger facilities. The manual also is intended to assist the public, communities, and public officials in better understanding the various aspects of Sounder and ST Express facilities design in their communities.

The work governed by the design guidelines and standards for Community Connections projects will be performed in municipal jurisdictions, state rights-of-way, or unincorporated jurisdictions. In some cases there may be specific differences between codes and standards of jurisdictions where Community Connections projects are located.

It is the express intent of Sound Transit for these guidelines and standards to be followed in the design of Community Connections projects. Appropriate codes and standards of jurisdictions where Community Connections projects will also be considered. Whenever the phrases "local jurisdiction", "municipality", or "authority having jurisdiction" are noted, these terms shall be understood to mean the Washington State Department of Transportation (WSDOT), Snohomish County, King County, Pierce County, and cities where projects are being developed as the authority having jurisdiction.

1.1 Organization and Use of Design Guidelines and Standards

1.1.1 Organization

These guidelines consist of 13 chapters, with each chapter addressing a specific design element:

Chapter 7. Civil Engineering Elements
Chapter 8. Landscape Architectural Elements
Chapter 9. Structural Elements
Chapter 10. Architectural Elements
Chapter 11. Mechanical Elements
Chapter 12. Lighting Elements
Chapter 13. Communications and Technology

1.1.2 How to Use These Guidelines

Each chapter of these guidelines will include hyperlinks at the beginning of each chapter to enable designers to quickly navigate through that chapter. For instance, hyperlinks are provided below for Chapter 1, which consists of the following sections:

1. Organization and Use of Design Guidelines and Standards
    a. Organization
    b. How to Use These Guidelines
2. Background Information
    a. Applicable Codes and Standards
    b. Relationship of Community Connections Design Guidelines and Standards with Link Design Criteria
    c. Relationship to Guidelines of Other Agencies
3. Design Review Process
    a. Planning Horizons
    b. Public Process
    c. Agency Review Role
    d. Typical Schedule for Review
4. Facility Types
    a. Range of Facilities
    b. Integrated Programs and Initiatives
    c. Public Parking
    d. Public Areas
    e. Transit Centers at Rail and Bus Stations
    f. Multi-Modal Facilities

Where appropriate, this manual also includes hyperlinks to other chapters, websites, guidelines, or publications.

1.2 Background Information

This section provides background information for the design guidelines and standards, including applicable codes and ordinances, relationship with Sound Transit Link design criteria, guiding principles, and relationship with guidelines of other agencies.

1.2.2 Applicable Codes and Standards

The Design Guidelines and Standards Manual in intended to provide direction to Sound Transit staff and project design consultants. While the state and local codes/standards identified below can provide important guidance for design of specific projects, they will be used as references and will not supersede recognized national codes and standards.

Washington State Building Code/IBC 2003 (link)

Washington State Department of Transportation (link)

Standard Plans – for Road, Bridge, and Municipal Construction
Design Manual for Roadway Design
Standard Specifications for Road, Bridge, and Municipal Construction
Highway Runoff Manual
Pedestrian Facilities Guidebook

Local Municipalities

Energy Codes
Street Improvements Manuals
Traffic Signal Design Guides
International Fire Codes
Lighting Design Criteria
Local Amendments (IBC and WSDOT/APWA)

Other Codes and Standards

Manual of Uniform Traffic Control Devices (link)
AASHTO (latest manual) (link)

1.2.3 Relationship of Community Connections Design Guidelines and Standards with Link Design Criteria

For Sound Transit's Link light rail transit facilities, guidelines and standards have been identified in Design Criteria for North and Airport Link (Draft B – May 2005). Where appropriate, information from the Link Design Criteria have also been used for the Community Connections design guidelines and standards.

1.2.4 Guiding Principles

The Regional Transit Long-Range Plan for Sound Transit provides major guidance for service and facility development by the agency. In the 2005 update of the long-range plan, the agency identified language that helps define the design guidelines and standards for the updated manual. The following is language from Sound Transit's Long-Range Plan:

Combined, new regional high-capacity transportation corridors and services will link our economic centers and provide new connections for local communities. The long-range plan includes creating many new "gateways" from communities to the region and from the region to communities. Those gateways include, for example, transit stations, park-

and-ride lots, transit centers, and rail stations that create community connections where people can reach their destination on foot, by bicycle, or by accessing other transportation services.

New park-and-ride lot capacity improvements will be prioritized at locations where HOV direct access and regional bus service increases demand and where no surplus capacity exists. Criteria used to guide park-and-ride lot investments include: HOV direct access, adequate regional and/or local bus service levels, and achieving standards for current and projected use.

The community connections will, of course, also be readily accessible by all types of public transit. Sound Transit will work with local public transit agencies and local jurisdictions to make it easier for transit customers to reach and use the community gateways with transit speed and reliability improvements.

Sound Transit is also committed to supporting other, non-motorized means of transportation such as bicycles and foot traffic. The long-range plan provides space for bicycles on buses and trains as well as safe bicycle storage at transit stations. The plan also includes, where practical, improvements for safe bicycle travel as part of HOV improvements and within rail corridors.

Transit facility designs will be flexible, allowing each station to reflect and fit into the community it serves while providing standard features to ensure smooth and accessible transfers for transit customers from one type of public transportation to another. Standard features may include improvements to access by bus, bicycles and walking, intermodal transfer facilities and bus layover space.

Standard design features include:

- Security and safety design standards
- Consistent route and schedule information
- Easy-to-read and consistent signs
- Pedestrian-friendly design and full access for people with disabilities
- Bicycle access and secure storage
- Transit-friendly access to allow smooth transfers from one type of public transportation to another (i.e. bus to rail, or bus to bus)
- Convenient taxi access to transit facilities.

Recognizing the mutual benefits of Sound Transit's transportation investments, local public transportation agencies, communities, and local governments (Sound Transit's partners) may identify improvements that exceed standard facility designs. In such

instances, partners will work with Sound Transit and contribute toward the costs of improvements, in accordance with Sound Transit's adopted Scope Control Policy.

1.2.5 Relationship to Guidelines of Other Agencies

In addition to facilities developed by Sound Transit, Sounder and ST Express service will operate at facilities built by other agencies. In many cases Sound Transit will be one partner sharing in the funding, development, use and operation of a facility with other transit agencies. In these instances, the affected jurisdictions as well as Sound Transit will review design and construction. Authority to oversee the design process, including review by affected agencies, will typically fall to the project sponsor.

1.3 Design Review Process

This section provides an overview on how to establish the development program for the facility and how to move forward in the review and approval of a facility.
Development Program

A very important concept to understand prior to developing a transit facility is how the overall development program and ultimately the size of a facility are determined. In order for a transit facility to be truly responsive to the community it serves, it is important to establish the threshold based on not only the trains and buses that may serve the facility but also an estimate of the maximum number of patrons that may be waiting at any given time.

1.3.1 Planning Horizons

Two planning years are identified for use in developing a transit facility. The first is plan period for *Sound Move*, the initial phase of Sound Transit's Long-Range Plan implementation. For Sounder and ST Express, most of the passenger facilities identified under *Sound Move* have been built or under construction. Any design efforts for the remaining capital projects under *Sound Move* will occur through Year 2011.

The second planning horizon involves projects to be developed under *Sound Transit 2* (ST2). ST2 is the next phase of the Long-Range Plan's implementation. Determination of projects to be included in ST will be made by the Sound Transit Board by spring 2006.

1.3.2 Public Process

All Sound Transit projects include a public involvement process to solicit input from the public, to integrate facilities into neighborhoods and communities, and to identify those elements of a transit environment that are most desirable by the community. Each project will require that appropriate public involvement processes be used to obtain this input.

1.3.3 Agency Review Role

Most Sounder and ST Express facilities will be shared with local transit providers. Also, for some ST Express facilities, WSDOT has jurisdiction for freeway ramp facilities that will connect to the transit facilities. ST Express will be partnering with those local transit agencies, as well as the WSDOT, in developing facilities.

Where projects are primarily or wholly funded by Sound Transit, it will take the lead in reviewing plans and documents with the understanding that they will coordinate review of design for these facilities with other affected jurisdictions. In addition to local transit agencies and WSDOT, Sound Transit and the design team will coordinate with federal agencies including FTA and FHWA, environmental and resource agencies for permit review, the local permitting agency, and local law enforcement agencies.

1.3.4 Typical Schedule for Review

In each project and grouping of projects an independent schedule will be developed that incorporates public process, preliminary design phases, environmental documentation and review. Generally, a project can be divided into the following phases:

- Preliminary Engineering/Environmental Review
- Final Design and Specification
- Right-of-Way Acquisition and Permits
- Construction

These phases may be altered if a project is to be developed as a design build project. Often 30% design is included in preliminary engineering and environmental review. Adequate review cycles with appropriate state, local and federal agencies must be included in the schedule.

More specific information on review schedules can be provided to the designer by ST staff. This will be based in part on the agency's experience with facilities that have been completed or are currently under construction. Also, cost estimates for the facilities were based in part on estimated durations of projects.

1.4 Facility Types

This section provides an overview of the types of facilities that could be addressed by the manual. A range facilities will be addressed but the manual also is intended to address design features that address items such as integrated programs and site layout. The following further identify the facility types.

1.4.1 Range of Facilities

This manual addresses passenger facilities that are or will be served by Sound Transit's Sounder commuter rail and ST Express regional bus routes. A majority of passenger facilities that are identified in this manual are common to both Sounder and ST Express. In some cases, for example, location of mini-high loading platforms at Sounder stations, information for a particular mode is provided. However, a major goal of the manual is to have a single-point resource for design guidelines and standards affecting both Sounder and ST Express passenger facilities.

- Public parking to accommodate various modes such as
  - Park-and-ride (both surface and structured)
  - Passenger drop-offs
  - VanShare/CarShare

- Public areas, such as:
  - Commuter rail station platforms,
  - Express bus platforms
  - Pedestrian bridges
  - Canopies and windscreens
  - Bicycle storage
  - Seating and Benches
  - Customer Information

- Operation Support, such as
  - Security office
  - Janitor's room
  - Storage

- Communications and technology features, such as
  - Passenger emergency stations
  - Wireless data transmission
  - Closed circuit television cameras
  - Control center

For potential facilities that will be developed at Sounder and ST Express facilities, the manual identifies design guidelines and standards relating to site layout and facility elements, such as:

- Civil engineering
- Landscape architectural
- Architectural
- Structural
- Architectural
- Mechanical
- Lighting

1.4.2 Integrated Programs and Initiatives

Definition: These will cover overall program efforts and those design elements that are common to all facilities.

Types: Items include accessibility/ADA, signage, public art, transit-oriented development (TOD), security, technology, and sustainability.

1.4.3 Public Parking

Definition: Public parking at facilities will address a variety of auto and bicycle access that could be expected at a facility. Most of the effort will include primarily park-and-ride lots/garages but would also address passenger drop-offs and bicycle storage.

Types: Parking can include park-and-rides can be surface or structured parking. It also included facilities to accommodate passenger drop-offs, persons with disabilities, bicycles, motorcycles, VanShare/CarShare users, vanpool/carpool, and taxis.

1.4.4 Public Areas

Definition: Public areas include a range of facilities that will be used by Sounder and ST Express riders. In addition to transit facilities, public areas can include ancillary facilities.

Types: Boarding platforms at Sounder and ST Express bus facilities, pedestrian bridges, and vertical circulation.

1.4.5 Transit Centers at Rail and Bus Stations

Definition: Transit Centers are facilities that can accommodate transit service and transit transfers in a central location. While some transit centers will not necessarily have adjacent long term parking, others will. Transit centers can accommodate bus layover and driver breaks. The number of waiting patrons can vary throughout the day.

Functional Areas: Transit centers should always include a bus loading area, a passenger waiting area, an amenity core, and short term parking for passenger drop-off, bicycle accommodation, and an ancillary building or room. Transit centers may also include surface or structured parking, passenger and operator restrooms, an operator break room, a supervisor's office, a security office, and a customer service office.

1.4.6 Multi-Modal Facilities

Site Layout: All customer transfers should move safely and efficiently through the facility. A one minute travel time between buses is the goal. At a walking speed of one meter per second the maximum transfer distance is 60 meters (200 feet).

Definition: Multi-modal facilities allow for the transfer of patrons between modes. These facilities can be designed with or without adjacent long term parking and can be designed to accommodate public carriers as well as private carriers such as Greyhound, Amtrak, and airlines. The number of waiting patrons can vary throughout the day.

Types of multi-modal facilities vary greatly depending upon the transportation modes served. These can include bus/ferry terminals (Colman Dock), bus/rail connections (King Street Station), and bus/rail/ferry terminals (Mukilteo).

Functional Areas: Multi-modal centers should always include a bus loading area, a passenger waiting area, an amenity core, and short term parking for passenger drop-off, bicycle accommodation, and an ancillary building or room. Multi-modal centers may also include surface or structured parking, operator restrooms, and potentially a security office.

2.0 Integrated Programs and Initiatives

This manual provides design guidelines and standards on many distinct elements of a transit facility, such as parking facilities and structural elements. Some features, however, must be more fully integrated throughout the facility, and in some cases join elements of the facility together so they are usable for all customers. Chapter 2 provides guidelines and standards on the elements below, which are considered integrated programs and initiatives:

1. Accessibility/ADA
2. Signage
3. Public Art Program (STart)
4. Transit Oriented Development (TOD)
5. Security
6. Sustainability

2.1 Accessibility/ADA

The Sound Transit Board adopted *Sound Move*, the Ten-Year Regional Transit System Plan on May 31, 1996. *Sound Move* calls for a regional transit system that is easy to reach and use by everyone including pedestrians, bicyclists, persons with disabilities and other public transportation customers. *Sound Move* has an overall objective of improving mobility and accessibility for all. There are several means to achieve this, including, but not limited to, regional wayfinding as called for in *Sound Move*.

The Accessibility Guidelines and Standards[1] have been developed to support the designs for all three systems, Sounder, Express, and Link. Modifications and additions to these guidelines will be made from time to time, based on regulation changes, research and new technological developments. These guidelines shall be followed for all projects. [For a hard copy of Sound Transit's Accessibility Design Guidelines, send a request to accessibility@soundtransit.org.].

In keeping with this commitment, Sound Transit requires that its contractors, consultants, and staff follow the applicable Americans with Disabilities Act (ADA) regulations and related standards in designing, constructing, and operating facilities. This includes all three modes of public transportation, Sounder (commuter rail), Express (express bus) and Link (light rail); the signage program; and purchase of transit vehicles which meet the accessibility standards.

A Citizens Accessibility Advisory Committee has been created by Sound Transit to provide oversight to Sound Transit programs that affect accessibility for customers. Sound Transit staff and contractors should routinely expect to brief the Committee on accessibility issues and projects involving ADA compliance.

[1] Sound Transit Accessibility Design Guidelines, October 2004.

Focus groups and design charettes will be continued as a means to resolve Sound Transit and contractor design issues.

The accessibility design review checklists are vital tools for project managers and contractors to insure that design includes evaluation for accessibility and compliance with the ADA and related standards. Using the checklists throughout the design process will eliminate the need for major revisions at the end of the design process.

2.2 Signage

Sound Transit envisions a regional transportation network of facilities and services that by design brings architecture, landscape, art and signs together to form a natural "wayfinding" path for all users of various transportation services. The wayfinding objective envisions the use of facilities, objects, materials, surfaces, color, and graphics to aid persons of all abilities in successfully finding their way to convenient use of Sound Transit's transportation services. Designers will be challenged to find the balance of visual, tactile, and audio treatments to achieve this objective.

In 2000, Sound Transit developed a System-Wide Signage Design Manual that covers many types of standardized signs. Designers shall follow Sound Transit's Design Manual. That manual shall also be referenced and supplemented by signage covered in this manual. [Hyperlink to ST signage manual.]

Unique to the Central Puget Sound Region is the challenge of coordinating a wayfinding program that involves not only Sound transit, but incorporates other transportation providers who either share space with Sound Transit or are adjacent to Sound Transit facilities. Therefore, Sound Transit's program will be sensitive to these other needs while focusing on the importance of providing a seamless and therefore familiar wayfinding program for the regional transportation network. Core to achieving this objective is using the uniformity provided by the guidelines and standards within this manual.

The signage design goals are first defined around a *customer-focused* approach:

- Give people the information that they need when and where they need it (informational).
- Make transit facilities easy to identify and to navigate system-wide (directional/wayfinding).
- Use language that people understand (readability/nomenclature).
- Use the best organizational techniques (hierarchy).
- Provide a seamless experience throughout their journey in the Central Puget Sound – downplaying differences between the various transit agencies' information systems – while striving for convenience, integration, and good service (consistency).
- Comply with accessibility guidelines – Americans with Disabilities Act (ADAAG) and acknowledge needs of multi-lingual customers (legibility).

Other important goals from Sound Transit's perspective include:

- On-site identification of Sound transit at all of the new transportation facilities and at the Transit Partners' facilities.
- Easy long-term maintenance of the system – a modular (kit-of-parts) design, that is efficient in production and flexible for future expansion, while also being economical in materials and repair.

More specific guidance includes:

- Insofar as possible, architectural elements, landscaping, and other design features shall identify entrances, exits, traffic routes, etc. without signs.
- The number of signs shall be kept to the minimum necessary for passenger guidance.
- Signs shall be located for maximum visibility at or before all decision points within facilities.
- Signs shall be placed at frequent enough intervals so that the infrequent or new user can readily find his or her way without assistance.
- Safety signs/safety lines all standardized colors
- Way finding signage will be available at the following locations:
    - Along streets serving the facility, with entrances clearly indicated
    - Within the facility to indicate direction to boarding platform and to provide both motorists and pedestrians with information on nearest exits from the facility.
- Informational/education signage on items of public interest. Examples include information on environmental treatments such as treatment of runoff and use of sustainable materials at the site.
- Informational signage can also identify the effects of public transit service and on the region's mobility and economy
- Any informational signing should be developed in a manner that will not require updating.
- Signage will include items relating to regulatory enforcement (e.g. no skateboarding, no smoking, no parking here, etc).
- Space for a transit map shall be provided immediately adjacent to fare collection equipment and at other customer decision points such as platform areas.
- Walls at ends of passageways, opposite major entrances, or leading to exits, shall be kept free of miscellaneous doors and advertisements so that they may be used for information graphics.
- Station name signs shall be located so they may be easily seen by passengers in transit cars, both sitting and standing.
- Relate outbound passengers to the surrounding community with appropriate signage.

2.3 Public Art Program (STart)

Sound Transit has established an art program, entitled "*STart*", which is aimed at incorporating works of art within its passenger facilities and their surrounding sites. The *STart* program takes into consideration that ST facilities will be designed as functional facilities organized on established principles of pedestrian movement. Refer to *STart*, Sound Transit Art Program [hyperlink to STArt Program Information], for the guiding

principles and goals for the Sound Transit art program. Basic guidelines related to incorporating art in the Express and Sounder passenger facilities are included herein:

2.3.1 Architectural Integration

Given the potential variety of character and size, art shall be compatible with the volumes of the interior or exterior spaces (where applicable) in which the artwork is located,. Artists should be included in transit facility design process at a relatively early stage (i.e., around the 30 percent design level) to ensure aesthetic compatibility, ease of maintenance, and provision of infrastructure.

2.3.2 Location Criteria

- The placement of art shall recognize the primary importance of functional clarity in design.
- The location of art shall not impede patron circulation in passageways, circulation areas, surge areas, and platform areas, nor shall it pose a safety hazard.
- Art may support, but not obscure or compete with, essential system signage and information.
- The location of art will take precedence over any advertising program, should Sound Transit pursue such a program. A balance of all elements will be required, with priority given to art over advertising.

2.3.3 Maintenance and Performance Criteria

- All materials used in the fabrication of artworks shall support the architectural concept developed for the transit facility
- Materials, fabrication methods, and installation methods will be appropriate for the life-cycle of the facility in which it is installed.
- Maintenance needs of artworks shall, in general, be consistent with the maintenance needs of the particular transit facility and site.
- Transit facility artwork shall work with the existing ambient lighting of the facility wherever possible. Special lighting requirements shall be identified on a site-specific basis and shall be accommodated within the site planning as early as possible.
- Other special needs shall be assessed on a site-specific basis and shall be identified within the site planning as early as possible.

2.4 Transit Oriented Development (TOD)

In April 1998 the Sound Transit Board adopted Motion No. M98-25 outlining a set of general policies that allows for the use of Sound Transit resources to encourage development on and around Sound Transit station areas, transit centers, and park-and-rides.

This action was followed by adoption in 1999 of criteria for evaluating potential development projects that could be either solicited or proposed on/or surrounding Sound Transit facilities. These evaluation criteria, based upon the policies already adopted, lead to identifying the various roles Sound Transit could play in providing resources towards potential developments.

The policies and evaluation criteria adopted by the Sound Transit Board are described below. These policies and criteria should be used in evaluating the potential for TOD at each new transit facility. The review of potential development proposals involves a series of four steps.

2.4.1 Policy Review

Review the adopted policies to determine what types of options might be appropriate for site consideration. Policy review components include:

- Preserve TOD development opportunities
- Promote TOD on surplus properties
- Preserve options to address Local Plans
- Assist others pursuing TOD programs
- Address legal issues that prevent the development of transit supportive projects
- Develop incentive programs.

2.4.2 Existing Influences

In order to meet the policy goals above, staff must evaluate how to balance the project needs outlined in Sound Move with the benefits of extending project resources to achieve TOD goals. Some of those influences include:

- Project objectives, timelines, and budgets
- Agency resources and obligations
- Existing Memorandums of Understanding (MOUs) between Sound Transit and other jurisdictions
- Research on appropriate types of development and costs
- Other TOD or economic development programs that might be available

2.4.3 Evaluation Criteria

The following criteria are divided into two components. The first should be used to identify what types of projects would be appropriate for the facility being constructed. The second set will help evaluate development proposals once the project is identified. It is important to note that not all the criteria need to be met in order to proceed with a development project. The criteria should help staff identify viable Sound Transit roles that could be pursued and help inform the Board of what opportunities may exist.

2.4.3.1 Primary Criteria

This criteria is used to assess the potential development opportunities for a given project area. Very close attention is paid at this point to determine the surrounding land uses, space necessary for the facility, and design requirements of the project and the potential to pursue development opportunities within the project's objectives, timelines, and budget. It can be determined at this point to revise the project objectives, timelines, and/or budget if an opportunity appears to have a greater transit benefit. A development may or may not be identified at this stage.

- The potential development must be supported by Growth Management Act goals as articulated in local comprehensive plans.
- The potential development must be supported with a market and financial feasibility study.

- The potential development must increase the effectiveness of the transit system and increase transit ridership.
- The potential development must represent the highest and best transit use when such use is not identical to the highest and best market use.
- The potential development must be consistent with Sound Transit's project development, timing, and budget.
- The potential development must demonstrate a physical and functional link with the transit system.

2.4.3.2 Secondary Criteria

The secondary criteria are used to evaluate an actual development proposal and/or would be used to develop what essential elements are necessary for Sound Transit to consider involvement in a development proposal.

- The proposed development identifies joint public or private development partnerships.
- The proposed development has an ownership and a real estate development and management plan.
- The proposed development generates revenues to offset costs of construction and/or operation of the transit investment.
- The proposed development incorporates Sound Transit's relocation and neighborhood mitigation objectives.
- The proposed development's infrastructure needs are programmed or existing.
- The proposed development preserves future TOD opportunities through site planning and design.
- The proposed development reflects the values of the community and encourages community participation.
- The proposed development's design is pedestrian, bicycle, and transit friendly.

2.4.3.3 Roles

The final step of this evaluation is to determine the possible roles Sound Transit could play given the results of the evaluation above. There are many ways that Sound Transit can be involved, some more intensive than others and requiring different levels of financial participation. Some potential roles could include, but are not limited to:

- Acquisition/assemblage of property
- Property ownership
- Partnerships
- Sale/Leaseback of properties
- Technical support
- Financial support
- Community involvement

2.5 Security

[Note: this section is a preliminary version that is pending review by Sound Transit security staff.]

Security and safety concerns are being addressed in design guidelines and standards throughout this manual. For example, in Chapter 3, Section 3.7 identifies application of Crime Prevention through Environmental Design principals to enhance site security. Also, Section 13.7 of the Chapter 13 identifies guidelines relating to closed circuit television at selected facilities. This equipment will provide visual monitoring of facilities through a central location.

In addition to security-related section of this manual, the designer can identify other approaches that can enhance security at a site and elements at the site. These approaches will be discussed with Sound Transit staff before any detailed design effort is carried out.

2.6 Sustainability

Adopted Sound Transit Environmental Policy:

Sound Transit is committed to the protection of the environment for present and future generations as we provide high capacity transit to the Puget Sound Region. Sound Transit has been a catalyst and model for engaging federal and state partners to resolve environmental issues that apply to our program. We will continue to be an environmental leader in the State of Washington through the integration of the following principles into our daily business practices:

- We will be in full compliance with all environmental laws and regulations. We will strive to exceed compliance by the continual improvement of our environmental performance through cost-effective innovation and self-assessment.

- We will restore the environment by providing mitigation and corrective action, and will monitor to ensure that environmental commitments are implemented. We will improve our ability to manage and account for environmental risk.

- We will avoid environmental degradation by minimizing releases to air, water, and land. We will prevent pollution and conserve resources by reducing waste, reusing materials, recycling, and preferentially purchasing materials with recycled content.

- We will increase the awareness of environmental issues among agency employees through education and training. We will continue to educate the public about the environmental benefits of our transit system. We will build relationships with our contractors, vendors, consultants, and transit partners during planning, design, construction, and operation to protect and enhance the environment.

- In order to implement this Policy, Sound Transit will establish and maintain an Environmental Management System (EMS) with environmental objectives and targets that are measurable, meaningful and understandable. The goals and progress of this Policy and the EMS will be communicated to agency board members, officers, employees and the public.

3.0 Site Layout

A functional site layout is critical to the successful operation of a transit center. In particular, the transit facility must be located so that it is accessible to the community, and it must be designed so that transit vehicles and customers can easily access it. This chapter presents guidelines and standards for the following layout-related elements:

1. Connection to the Community
2. Access
3. Location of Boarding Platforms and Bus Loading Zones
4. Location of Bus Loading Zones at In-Line Stations
5. Location of Park-and-Ride Lot and/or Structure
6. Location of Communications and Electrical Rooms/Buildings
7. Applying Security/Safety Principles

3.1 Connection to the Community

Sound Transit works with local public transportation agencies, communities, and local governments to place and design transit facilities that fit within local communities. The design of the transit facilities shall provide a permanent civic architecture that contributes their context. Each facility's design should not only be a component of the transit system, but of the neighborhoods and community of which it is a part. Within this framework, the development of a family of parts for the facilities that are interchangeable and allow for the individual character of each neighborhood or community is an acceptable standardization practice.

Following are overall guidelines to connect the transit facility to the community it serves:

- Acknowledge the importance of context in the approach to facility design.
    - Represent system virtually/experientially.
    - Identify means of access and off-site improvements.
    - Within overall facility design, provide a context that recognizes nearby developments.
- Provide direct paths between the boarding area and adjacent streets (with characteristics such as well-lit paths and pathfinder signs directing the public to boarding areas and to areas of interest outside the station).
- Identify planned and existing pedestrian and bicycle routes within one-quarter mile of the station and consider providing connections to those routes.

3.2 Access

A variety of access modes are anticipated for each Sounder and ST Express facility. This section describes direction regarding design features for these modes.

3.2.1 Pedestrian Access

- Pedestrian access is given highest priority in design and operation of facilities.
- Walkways shall be provided to accommodate normal paths of pedestrian travel through the station. Pedestrian circulation routes shall provide direct and convenient approaches to station entrances from off the site and from individual sections of park-and-ride lots.
- Planned and existing pedestrian and bicycle routes within one-quarter mile of the station will be identified; providing connections to those routes will also be considered.
- The site layout will be developed in a manner that eases wayfinding within the site as well as between the site and adjacent areas.
- Pedestrian access will address actual and perceptual safety concerns and comfort/convenience.
- Sidewalks shall be provided connecting the station building, platforms, elevators, egress/access points, drop-off/pick-up areas, parking areas and bus stops and local/municipal sidewalks/walkways surrounding the general station area.
- Parking aisles in park-and-ride lots shall be oriented to consider pedestrian needs and safety, as well as lot capacity. Pedestrian movements within park-and-ride areas will normally occur within the drive aisles. However, pedestrian walkways may be required to minimize vehicular interference, to reduce the number of points where pedestrians cross aisles, and/or to shorten irregular routes through successive aisles.
- Sidewalks next to the platforms shall be provided when parking is adjacent to the platform and a sidewalk is required to provide the separation of pedestrians from the auto traffic and provide a means of protecting the platforms from automobile damage.
- Pedestrian walkways shall be adequately lighted for safety. See Chapter 12, Lighting Elements.
- All sidewalks and curb cuts must conform to ADA Guidelines.
- The recommended width of pedestrian walkways shall be as follows:
- Walkways shall be at least 5 feet - 0 inches wide.
    - Walkways through bus stop areas. Preferred: 12 feet; Minimum: 7 feet - 2 inches
    - Walkways adjacent to long term parallel parking. Preferred: 8 feet; Minimum: 6 feet
    - Walkways adjacent to short term parallel parking. Preferred: 10 feet; Minimum: 7 feet - 2 inches
    - Crosswalk width. Preferred: 12 feet; Minimum: 10 feet
- The following additional design guidelines shall be adhered to:
    - Steps or abrupt changes in level in walkways shall be avoided (as required by ADA).
    - Layout of walkways shall provide maximum visibility of and by oncoming rail and vehicular traffic.
    - Crosswalks shall be marked and be clearly visible to motorists.
    - Crosswalk materials shall be noticeably different color or texture to clearly indicate where crossing should occur.

Facility design should also accommodate bicycle access. Section 4.5 of Chapter 4 – Parking provides information on bicycle parking at Sounder and ST Express facilities.

3.2.2 Vehicle Access Hierarchy

As noted above pedestrian access will be given the highest priority in terms of design. In addition to walking, Sound Transit customers could arrive at or depart from typical transit facilities by the modes of travel listed below. The modes are listed in order of priority for providing convenience and directness of routing.

1. Link light rail and/or Sounder commuter rail
2. ST Express and Transit Partner bus, including paratransit services;
3. Accessible Parking
4. Bicycle
5. Passenger Drop-off
6. CarShare / VanShare
7. Carpool / Vanpool
8. Motorcycle /Scooter
9. Private shuttle/Taxi
10. Auto park-and-ride

The layout of transit facility sites, as well as associated access roadways, must ensure that provisions are made for access by patrons in all the above classifications where applicable. Where applicable, fixed guideway transit (i.e., Link light rail, Sounder commuter rail) should be located with the most direct access to the rest of the facility. For vehicle (including bicycle) parking design guidelines, see Chapter 4.

3.2.3 Vehicular Access to Park-and-Rides

The design of vehicular access points at park-and-rides should take into consideration adjacent land uses and avoid large unplanted or paved areas that are out of scale with those uses. Curb cuts should be minimized, while fulfilling the following requirements:

- Emphasize customer wayfinding both through signage and through design response to the facility's context.
- Vehicular access directly from major highways or streets into a park-and-ride should be minimized. Streets designated for service and minor non-residential streets should be utilized.
- Site design features should allow for potential management of access, including distinguishing between carpools/vanpools that bring riders to Sound Transit and Transit Partner services and those that meet at the facility and drive to another location. The former will have priority access while the latter could use the facility on a space-available basis only.
- Vehicular access from local residential streets should be minimized.
- Access roadways to transit facility sites should be designed to contain sufficient traffic storage capacity to meet expected transit patronage at peak times and to prevent traffic backing up onto public streets.
- Conflicts should be avoided between access roadways, bicycle access, and pedestrian access points.

3.2.4 Design of Internal Circulation Routes

- Roadways intended to provide access to bus zones, park-and-ride stalls, and passenger drop-off areas should be designed in accordance with local codes and the "AASHTO Policy on Geometric Design of Highways and Streets," as supplemented and modified in these criteria.
- One-way traffic operation on such roadways is preferred.
- Provisions for passing a stalled vehicle should be made along roadways exiting from public streets.
- Bus movements should be separated from automobiles access as much as possible.
- Major pedestrian movements should be separated from bicycle and motor vehicle circulation to the greatest extent possible.

3.2.5 Emergency Access

Provide access for emergency response by Fire Department and paramedic equipment and personnel, consistent with local codes.

3.3 Location of Boarding Platforms and Bus Loading Zones

This section identifies guidance relating to locating Sounder and ST Express boarding platforms.

3.3.1 Sounder Station Platforms

Sounder station platforms must be located immediately adjacent to the railroad tracks, so there is minimal leeway allowed in their location on the site. Sounder station platforms should be located with easy access by walking, bicycling and bus transfer modes. As much as feasible, platforms should be visible from arterial streets and nearby activity areas to increase the visibility and personal security of waiting patrons.

3.3.2 Express Bus Zones

- Bus zones should provide a safe and accessible place for patrons to board and disembark buses, as well as a place where buses can efficiently operate.
- Bus loading zones should be located with easy access from freeway and arterial bus routes to minimize out-of-direction travel.
- Typically, street curb service is preferred over on-site access, especially for "through" buses. Where buses will circulate within the site, curb radii, etc., shall conform to the bus operators design criteria.
- Bus zones shall be placed to minimize patron travel time (bus and walk time).
- Bus zones should be visible from arterial streets and nearby activity areas to increase the visibility and personal security of waiting patrons.
- Bus loading zones should be flexible and designed to accommodate potential future growth.
- Bus loading zones should reinforce safe pedestrian movements and easy vehicle operation.
- All loading zones should be located in a common area within the facility.

3.4 Location of Bus Loading Zones at In-Line Stations

Bus loading zones at freeway in-line stations are located adjacent to highway ramps to minimize out-of-direction travel. Several considerations need to be kept in mind in locating bus loading zones at in-line stations. These considerations include:

- Bus zones should be visible from arterial streets and nearby activity areas where possible to increase the visibility and personal security of waiting patrons.
- Pedestrian circulation routes shall provide direct and convenient approaches to in-line station loading zones from adjacent streets, local bus zones, and park-and-ride lots. Where feasible, these pedestrian routes should be as short as possible and should be covered to provide weather protection.
- Potential configurations for in-line stations can be considered as part of initial design efforts. These configurations include:

    - Right side of roadway using available right-of-way
    - Median stop with side platforms (would require reverse access – English style at the station or alternative technology buses with doors on the left side)
    - Median stop with central platform

If a median platform with side platforms is provided, consideration should be given to pedestrians crossing the bus travel lanes. This crossing opportunity could be provided by a surface crossing instead of vertical access connecting the platforms. If a surface level crossing is allowed, safety features such as flashing lights imbedded in the roadway and traffic controls for buses entering the station areas should be provided.

In-line station design should consider passenger comfort and security, including efforts to reduce nearby freeway noise. Also shielding features should be provided to protect riders from debris coming from the freeway as well as wind and rain.

The roofs of pedestrian bridges connecting the in-line station with park-and-ride lots or other facilities should be designed in a manner to drain away from the roadways. These bridges should include continuous kick plates to prevent debris from being kicked on the roadway.

3.5 Location of Park-and-Ride Lot and/or Structure

Park-and-ride facilities should be located as close as possible to major streets and freeways serving a site. Connections between the park-and-ride area and station boarding areas should be as direct as possible and include walking paths connecting to the boarding areas. To provide higher perceptions of customer safety, these paths should be lit at a higher foot-candle level than surrounding parking area. Maximum distance between the farthest stall of the park-and-ride lot and the boarding area should be ¼ mile. The design should provide unobstructed sight lines between all areas of park-and-ride lots and the boarding areas wherever possible.

3.6 Location of Communications and Electrical Rooms/Buildings

Communication and electrical buildings should be located near designated parking for service vehicles. The buildings should be either located away from bus zones (to avoid collisions) or be protected by bollards if a remote location is infeasible.

As a security measure, non-public facilities such as the communications and electrical room/building should be located away from passenger areas (where feasible) and not identified with signage.

3.7 Applying Security/Safety Principles

Several security/safety principals can be applied to a facility's design. Crime Prevention through Environmental Design (CPTED) principles can be used as one aspect of design that can enhance site security. The central principle of CPTED is *natural surveillance*, addressed in the planning and design of a facility that creates an active and therefore safer, public realm. Other principles include *natural access control* and *territorial reinforcement*.

Through natural surveillance, passengers, staff, and other legitimate users of the facility can easily observe all areas. For example, station boarding platforms could be located to be within eyesight of nearby businesses that are operating during transit service hours. Also, legitimate users of the facility can be seen by potential criminals as being *in control*. Some flexibility should be allowed as to how CPTED will be applied to specific design elements of a project.

Natural access control is a design strategy that is directed at decreasing crime opportunity. The key goal of an access control strategy is to deny access to a crime target and to create a perception of risk by potential offenders.

Territorial reinforcement is a design strategy that recognizes how physical design can create or extend a sphere of influence so that users of a property develop a sense of proprietorship over it. Territorial strategies will often include natural surveillance and natural access control strategies.

The facility design should avoid location of sensitive facilities (e.g. major communications equipment) near public areas. Also, visual clutter and blocked sightlines on boarding platforms.

Provide highest level of lighting in structural parking consistent with energy code. Lighting standardized – avoid night sky pollution, levels of illumination, while meeting minimums of applicable codes;

Garage/fire/security doors should lock from inside and outside.

4.0 Parking

5.0 Public Areas

Because nearly all of a transit facility is used by the public, designing the facility to be customer-friendly is essential. This chapter presents guidelines and standards for the design of the following types of platforms and customer amenities:

1. Platform: Sounder Commuter Rail Stations
2. Platforms: ST Express Facilities
3. Pedestrian Bridges
4. Vertical Circulation
5. Canopies and Windscreens
6. Restrooms for Passengers
7. Drinking Fountains
8. Seating and Benches
9. Static and Real-Time Customer Information
10. Waste and Recycling Receptacles
11. Ash Receptacles
12. Advertising
13. Concessions

5.1 Platform: Sounder Commuter Rail Stations

This section provides direction for public areas at Sounder facilities. Focus is placed on applicable platform clearances with respect to existing tracks.

5.1.1 Applicable Clearances

All station designs must comply with BNSF/UP, WUTC, and Sound Transit clearance standards. Sound Transit clearance requirements, as described in Sound Transit's Track & Signal Design Criteria, are noted below. (Hyperlink to these criteria)

> Minimum of 5'-4" between centerline of track to platform edge.
>
> A minimum of 15 feet from track centerline to any fixed obstruction other than platform.
>
> A minimum of 14 feet from track centerline to track centerline (double tracks) for existing tracks without signals; 15 feet between track centerlines for new tracks without signals; 21 feet between track centerlines with a full signal and associated walkway.
>
> A minimum of 23'-6" overhead clearances above top of rail

BNSF requires a clearance envelope which must be cleared of all posts, canopies, signs, handrails, or other physical obstacles. Lateral clearances are wider on curved track.

The station designer shall calculate the clearance based on the curvature and super elevation of the track. Platforms which are 8"above top of rail are considered to be in compliance with BNSF Standards. (Hyperlinks to BNSF standards on platform clearances)

The designer shall also recognize and address requirements included in Sound Transit's Accessibility guidelines, particularly Sections 6.1 through 6.6.

5.1.2 Sounder Platform Surface and Edge

The platform surface should be compatible with architectural features of the facility while also being economical to obtain, and safe for passengers. No double-pour (concrete), or topping slabs, shall be permitted for architectural/art features.

All platforms must have 24" band of tactile warning tile located along the track-side edge. Durable slip-resistant material having a surface texture comprising raised, truncated domes in staggered positions with the following dimensions:

A diameter of nominal 0.9 inch at the base
Tapering to 0.45 at the top,
A height of nominal 0.2 inch, and
A center-to-center spacing of nominal 2.35 inches.

Nominal here shall be in compliance with ADA.

5.1.3 Sounder Platform Geometrics

Dimensional requirements for station platforms are established by either the fire/life safety (FLS) requirements, wayfinding provisions (e.g. paths located between the platform and other locations at the facility), or by the day-to-day patron requirements as established in this chapter. Where calculations under the two methods lead to different numbers, the more stringent shall control (most often, the larger dimensions).

For day-to-day operations, the platform shall be sized to accommodate the expected patrons on the platform comfortably under normal operating conditions. Missed and/or delayed headways need not be considered. For FLS requirements, missed headways and NFPA peak factors must be considered. Under severe site constraints, day-to-day patronage requirements can be reduced, as approved by Sound Transit, but FLS safety requirements must be met. [Hyperlink to FLS source]

5.1.3.1 Configuration and Access
Station platforms can either be of center or side platform type depending on station functional requirements, site constraints or traffic conditions.

The design approach to the functional configuration of stations should be "operational" in bias in that there will be a need to link patronage forecasts and system characteristics to achieve maximum system efficiency. As the capacity of the system increases, so does the importance of the interrelationship between stations. The objective is to achieve balanced

vehicle loading by balancing platform access points within the whole system. Balanced vehicle loading also has benefits in terms of patron comfort.

Freestanding columns that are within 10 feet of a platform edge shall be located so as not to coincide with the locations of vehicle doors during station stops to minimize congestion. Columns beyond 10 feet shall have no restrictions in their placement.

Stair surge zones shall be free of any and all obstructions. The elevator surge zone is defined as a 10 feet by 10 feet area in front of the elevator door. Stair surge zones shall be 15 feet long (measured from end of handrail) and, where conditions permit, five feet wider in each direction than the stair and/or escalator.

Obstructions of passenger and CCTV camera sight lines shall be minimized.

5.1.3.2 Platform Length
The platform length available for boarding and alighting shall be at least 600 feet (1,000 feet for stations that also serve Amtrak Cascades).

5.1.3.3 Platform Width
Platform widths will vary based on patronage, wayfinding provisions, the configuration of vertical circulation elements (for below-grade, center platform, and aerial stations) and station site considerations. For center platforms at-grade, the minimum platform width shall be 30 feet. For side platforms, the minimum width shall be 16 feet from edge of platform to the face of station wall or parapet railing.

5.1.3.4 Travel Lanes/Exit Lanes
To allow a patron to enter or exit a station within a reasonable amount of time, the minimum number of travel lanes for day-to-day operations shall be the total necessary to allow patrons, having already detrained, to be able to reach and descend (or ascend) the vertical circulation, or platform entry point, within 30 seconds of the time required to make the same journey if no other patrons were present.

There shall be a minimum of two travel lanes (each a minimum of 10 feet in width) located between the platform edge detectable warning surface and walls, station furnishings and the balustrade or railing of the vertical elements in an aerial station. There shall be a minimum of three travel lanes along the total length of an at-grade center and side platform.

The minimum exit provisions shall be as required by NFPA 130 [hyperlink to latest version of NEPA 130]. The factors indicated together with ADA requirements, shall be the basis for calculating normal patron travel and exiting requirements.

Language on mini-highs and why it is appropriate to locate consistent with other station.

5.2 Platforms: ST Express Facilities

The following describe design guidelines for boarding platforms at ST Express facilities. These include freeway stations and transit centers.

5.2.1 Freeway Stations

Freeway stations are similar to bus stops except they are typically located adjacent to freeways and within the freeway right-of-way. Typically, there is a minimal physical separation between the bus loading area and the freeway lanes. The freeway stations have acceleration and deceleration lanes designed for safe transition at higher freeway speeds.

The stations accommodate buses traveling the freeway providing minimum travel impedance for the bus but potentially longer walk times for patrons coming from adjacent parking facilities or local bus stops outside the freeway right of way. The number of waiting patrons can vary and may be higher than most bus stops due to desirable service on the freeway.

Freeway stations can be located at the same grade as the main roadway (on either the right side or in the median) or on a ramp. Stations can also be located on an arterial. These are distinguished from regular bus stops by the need for a bus turnout lane that is physically separated from the travel lanes.

Median freeway stations can include either side platforms or center platforms. Stations with side platforms generally should include a median barrier between lanes in opposing directions. Stations with a center platform require either a cross-over for bus doors to properly align with the platform, or use of special vehicles with left-side doors. All station types should include a bypass lane for buses to pass broken down or delayed vehicles. If sufficient right-of-way is not available for bypass lanes in both directions, consideration should be given to inclusion of a wide buffer in lieu of a median barrier to allow buses to pass each other in case of a breakdown..

<POTENTIAL INSERT FIGURES SHOWING EXAMPLE CROSS SECTIONS OF RIGHT-SIDE AND MEDIAN STATIONS WITH SIDE AND CENTER PLATFORM DESIGNS>

Freeway stations should always include a bus loading area, a sheltered passenger waiting area with amenities, and will likely need to consider short term parking (passenger drop-off) nearby. They may also include restrooms, bicycle accommodation, an ancillary building or room, and a pedestrian overpass if required.

5.2.2 Transit Centers

Transit Centers are facilities that accommodate transit service and transit transfers in a central location with or without adjacent long term parking. Northgate and Bellevue transit centers are two local examples of transit centers in Puget Sound, one with adjacent parking, one without. Transit centers can accommodate bus layover and driver breaks. The number of waiting patrons can vary throughout the day.

At transit centers, buses should take no more than 10 seconds to leave the adjacent surface street and reach the boarding location. Buses should be able to rejoin adjacent streets within one minute of leaving boarding location. Signal and signal priority may be required at busier streets or intersections.

All patron transfers should move safely and efficiently through the facility. A minimum one minute travel time between buses is the goal. At a walking speed of one meter per second the maximum transfer distance is 60 meters (200 feet).

Transit centers should always include a bus loading area, a passenger waiting area, an amenity core, and bicycle accommodation. In some cases, transit centers may also include surface or structured parking, ancillary buildings, and operator restrooms. Rarely, they may also include an operator break room, a supervisor's office, a security office, and a customer service office. In general, board policy does not provide for the inclusion of passenger restrooms, but exceptions may occasionally be possible at high-use stations or multi-modal facilities.

5.3 Pedestrian Bridges

In general, pedestrian bridges will only be located at Sounder stations and at freeway in-line stations. At Sounder stations, a pedestrian bridge will be required when passengers must cross existing or planned railroad tracks to access platforms. Examples include but are not limited to:

- Station with two platforms (separated by tracks)
- Station with park-and-ride lot located on one side of track and a platform on the other side
- Station with transit center located on one side of track and a platform on the other side
- Freeway bus station located in the freeway median

Pedestrian bridges should have a minimum width of eight feet. Greater widths may be needed where exceptionally high pedestrian volumes are anticipated, such as in urban areas or near sports stadiums.

Pedestrian bridges should be designed to prevent objects from falling from the bridge onto the roadway or railroad tracks below, either intentionally or accidentally. If a roof is provided, the design should consider the potential for snow or ice to accumulate and fall onto the roadway or railroad tracks below. Also, protective screens should be used to prevent vandals from dropping objects from the bridge. Since small objects can be dropped through mesh, a solid screen made from plastic or other translucent materials is preferable. Finally, continuous kick plates along the length of the bridge should be considered to prevent objects from being accidentally kicked onto the roadway.

5.4 Vertical Circulation

Elevators and stairways will be provided in multi-level parking garages at Sounder and ST Express station. Also, elevators will be required to connect pedestrian bridges with platforms or other components of the stations.

Elevator cab equipment shall be designed for use by individuals with disabilities. Elevator machine rooms shall be located as near as possible to hoist ways, but clear of public walking and landing areas.

Specific elevators in each station will be designated for use by patrons with bicycles. Elevators intended for use in moving equipment to and from equipment rooms shall be sized to accommodate the intended equipment.

All elevator installations shall comply with UBC, NFPA, UFC, ADA, and Washington State Accessibility Standards. All metal cladding, floors, wall railings, and trim shall be stainless steel. Elevator pit walls shall be lined with a non-porous material and shall have a sump pump, if gravity drains are not available. All elevator-operating software shall allow non-proprietary maintenance and control.

The minimum cab size allowed shall allow a 27-inch by 42-inch wheelchair to execute a 150 degree turn within the cab or accommodate a standard 30-inch by 72-inch hospital rolling stretcher plus attendant, or whichever is greatest.

Both elevator cab and hoist way enclosure shall be constructed of glass to the maximum extent possible in above-grade stations in order to enhance both actual and perceived security of the elevator and passengers.

5.5 Canopies and Windscreens

Though the Puget Sound region's climate is relatively benign and allows for open stations, patron protection from the sun and rain warrant special consideration. At a minimum, protection from the rain shall be provided for the following:

- Public stairs and approaches to same within 5 feet of termination of hand rails.
- Escalators and approaches to same within 5 feet of termination of hand rails.
- Fare vending equipment including, at a minimum, a four-foot by four-foot area in front of the equipment.
- System map viewing areas and other patron facilities such as public and emergency telephones, etc.

In general, canopy and rain screen design shall assume that rain is falling at a 10-degree angle from vertical. However, the orientation of a station's platform areas will affect the effectiveness of canopies in providing shade and rain protection. Station orientation shall be considered in developing canopy and wind/rain screen designs on a station-specific basis. Drip lines or gutters shall not be over travel pathways or platform edges.

To protect patrons from strong wind-blown rain, transparent windscreens shall be provided on the platforms for a minimum of approximately one-third of canopy coverage. At stand-alone windscreens, provide a minimum 6 foot gap at the bottom of framing for ease of cleaning and visibility.

5.6 Restrooms for Passengers

ST does not typically install passenger restrooms at transit facilities, although exceptions are sometimes made at high-use stations or multi-modal facilities. Installation of public restrooms at Sounder and ST Express facilities will be governed by Sound Transit Board Motions #M98-67. If restrooms are installed their characteristics will be based on the following:

- Size of restrooms should be consistent with the number of customers expected to be present during peak commuting hours, to minimize restroom queues,
- Location should maximize observability and minimize nearby hiding places.
- Facilities must be accessible in compliance with ADA and state building code requirements.
- Restroom finishes, fixtures, and equipment shall meet standards and maintenance requirements set forth by the organization responsible for facility maintenance.

For Sounder stations, there may still be a need for restroom facilities since not all riders using the facility will have access to restrooms on trains (e.g. ST Express patrons and those using Transit Partner services).

Restrooms usually include at least one toilet and sink. Restrooms can be segregated by sex, or have no specific designation. In public facilities, restrooms should be located in a highly visible location so that criminal activity can be minimized. All facilities must be fully accessible, and shall also include fold-down diaper-changing facilities, in at least one restroom if unisex, or one men's and one women's if segregated.

Each service shall have a main shut-off valve and backflow preventer of a double-check type immediately inside the structure wall accessible by access panel or pipe alley. Hot water shall be supplied to all toilet rooms. Hot water shall be supplied by on-demand electric heaters.

Relief valves will be provided in accordance with code requirements. Relief valve shall be piped to indirect waste. Hot water heaters shall be set to deliver 105° F water. Thermostatically controlled electric heaters shall be provided to maintain an internal temperature of 55°F minimum.

Discharge a minimum of two cfm per square feet of air to an area such that patrons, nearby residents, and pedestrians will not be offended by odors.

Use stainless steel materials and the latest automatic control technologies on fixtures. Stainless steel will resist breaking and denting; it is fireproof and heatproof; it is unmarred by strong solvents; and can be easily cleaned [graffiti].
Therefore, it is the preferred material for fixtures.

5.7 Drinking Fountains

Drinking fountains are only required where water and sewer utilities are available (see Board Motion M98-67). The peak number of patrons at the facility will determine the number of fountains. Any fountains shall be located in the passenger amenity core and shall meet all accessibility requirements.

Water supply lines should be made of copper, protected from freezing with resistance trace wrap when above ground and outside a tempered building envelope, and should be one size larger than the minimum required by applicable codes. Underground lines below pavements will be sleeved and located at least two feet below the ground surface. Winter drainage of exterior drinking fountains' supply lines is required.

Finishes, fixtures, and equipment shall be specified and selected assuming the following maintenance program: Daily sponge and mildly abrasive pad cleaning using cleansing and disinfectant chemicals as anticipated. All surfaces within possible public contact should be readily accessible for cleaning and disinfectant. Graffiti-removing chemicals will also be used.

Drinking fountains should last at least 10 years. Surface texture and treatments shall minimize the potential for applied and etched graffiti. If vandalized, damaged drinking fountains will need to be quickly removed, repaired and replaced, or easily repaired on-site. Non-ferrous metals, porcelain, or heavy-duty coated metals and concrete are acceptable. Heavy gauge metal and/or sheet metal using stout backer boards are desirable.

5.8 Seating and Benches

Design and seating placement must follow ST's Accessibility Guidelines. At bus stops, ST's standard passenger shelter can serve as the design basis. This shelter has the following characteristics: (from ST – specifications for standard passenger shelter). Bus stops at Sounder and ST Express stations shall have a minimum of six lineal feet of seating per bus bay.

The minimum lineal feet of seating at platform level shall be provided a ratio of 1:15 of platform length and shall be distributed to two or more locations along platform areas. One bench shall be located near each public entry point to the station and arranged so that they do not interfere with patron circulation or emergency exiting. When practical, seating areas shall be protected from weather by location within areas covered by a

canopy. Some portion of the platform seating shall be designed with backs and full-length armrests to facilitate use by persons with disabilities.

At Sounder and ST Express stations, benches and/or seating units shall have design features that will prevent individuals from lying down and/or sleeping. Benches and/or seating units shall conform to ADA requirements.

5.9 Static and Real-Time Customer Information

All signage at ST facilities will follow ST's System-Wide Signage Design Manual (see Section 2.2). The signage should allow updates of system maps and other information as ST develops its system.

The manual should also recognize communications elements described in Chapter 13 – Communications and Technology. This chapter addresses real-time information consistent with design guidelines and standards developed for ST's Technology Plan.

5.10 Waste and Recycling Receptacles

Waste receptacles will be installed near passenger boarding areas, but not on platforms. Recycling containers will be located adjacent to waste receptacles.

5.11 Ash Receptacles

Ash receptacles will not be provided on Sound Transit property. If any receptacles are provided outside of Sound Transit ROW, they should be 25 feet or more from walking paths.

5.12 Advertising

Sound Transit is determining specific policies with respect to advertising in stations. Station design shall identify locations appropriate for advertising based on the following guidelines. Advertising shall conform to local jurisdictional restrictions.

- Advertising shall not conflict by placement or treatment with, or take priority over, system signing and information.
- Any advertising shall be carefully located so as not to obstruct, cause distraction or retard patron movement.
- Advertising shall be located so as not to conflict with legibility of emergency exits or equipment, particularly at platform level.
- Advertising shall be placed so that it cannot be easily defaced or damaged.
- Advertising shall be carefully controlled on all electronic message units that are used for system signing and information.
- Advertising shall be used as a design elements, avoiding haphazard displays.

- The format and size of advertising shall be compatible with the volumes of the interior or exterior spaces in which they are located, and shall in all cases be compatible with the architectural expression of the stations.

Location-related guidelines for any advertising are as follows:

- Entry/Ticket Concourse: Station entrances are suitable for advertising as this location is usually free of safety concerns related to trains or vertical circulation. The placement of advertising in the concourse shall not conflict with ticketing and signing functions, basic patron movement patterns, or sightlines that enhance security.

- Vertical Circulation Spaces (elevators and stairways): The placement of advertising in vertical circulation spaces could constitute a distraction for the patron. Advertising shall not be located at the top and bottom landings of escalators and stairs.

- Platform Level: Two-dimensional advertising would be appropriate in across-track locations. It shall not conflict with system signing and information.

Maintenance and Performance Criteria

- All materials used in the fabrication of advertising panels shall be of a durable and vandal-resistant nature.

- Advertising panels shall exhibit low maintenance characteristics.

- Advertising shall be in conformance with all applicable codes.

- In general, where advertising panels are provided, their framework shall be standardized for ease of maintenance and replacement of advertising media.

5.13 Concessions

Concessions can be provided at kiosks, via temporary carts or at other permanent structures where people vend food, drinks, and other retail items. Key considerations for any concession facility are as follows:

- The operation of concessions must not interfere with transit operations or pedestrian flows. Concession facilities should be maintained by the concessionaire.

- Concessions should be located in the amenity core.

- The number of concessions should be a function of the peak number of patrons using the facility.

Concessions include movable vending carts, semi-permanent vending stands, and permanent structures built into the facility. Space within the concession area includes space for the cart or stand, a location for the vendor to sit, a buffer zone surrounding the entire cart and stand for the operator to circulate around for access to compartments within the cart or stand, and a queuing zone for patrons waiting to be served.
At facilities where bicycle accommodations are emphasized, consideration could be given to providing bicycle-related concession, such as bicycle rental and repair.

Permanent concessions and/or structures to contain concessions, where deemed appropriate, should be procured as part of each transit facility. The type and number of concessions will be determined by facility planners. The facility designers will then locate the permanent concessions, if appropriate, and/or space for outside concessions in the facility.

Finishes, fixtures and equipment shall be selected and specified assuming an aggressive maintenance regimen as follows: All concessions should be maintained by private parties. Routine maintenance should involve weekly cleaning to maintain an attractive appearance. More substantial maintenance should occur whenever a problem surfaces. The transit agency should form maintenance agreements with operators before allowing concessions placement. A maintenance agreement would let the operators know that they are responsible for maintaining the pleasant appearance of their concessions.

Concession areas should be designed for a life-cycle of at least ten years. Concessions will be less subject to vandalism because a human attendant will be present during all hours of operation. In the case of outside concessions or stands, a secure storage location should be found to inhibit vandalism attempts during non-business hours.

Semi-permanent concessions should be built using durable lightweight materials. By constructing semi-permanent concessions with lightweight materials, the concession can be moved and expanded easily. Permanent concessions should be constructed using heavy-duty building stock materials such as brick, wood or steel. For non-permanent concessions (i.e. carts) the most important design features will be the materials under the cart and the queuing zone. Base materials should be able to support the weight of the cart. In addition, the materials should be slip resistant when wet, as shall be paving in the area where they are located for business.

6.0 Operational Support

Customers are not the only people who need a functional and user-friendly transit facility. Because transit operators and support staff also have important needs, Chapter 6 presents standards and guidelines for the following transit center elements that support operations:

1. Operators' Restroom
2. Security Office
3. Customer Service Office and Window
4. Janitor's/Storage Room
5. Staff Parking

6.1 Operators' Restroom

Operators' restrooms are located at transit centers throughout the region. All operators' restrooms are accessed using a universal key. Police officers and other staff also have keys to the operators' restrooms. Stub-in services for public restrooms will be provided where service is provided for drivers.

The number of operators' restroom will depend upon the number of buses laying over and/or stopping at the facility at a time. Operators should not be delayed having to wait to use the restroom. Costs are expected to be high if restroom facilities need expansion. Therefore, sizing the operators' restroom large to begin with or big enough to potentially accommodate an additional operator or passenger restroom in the future, would reduce the likelihood of a costly expansion.

All operators' restrooms will be unisex restrooms, and shall be equipped with one toilet, one sink and one urinal. Often two unisex restrooms are provided at transit facilities where restroom use is limited to one person and demand suggests a second restroom. This is done so that two drivers can use restrooms at the same time regardless of gender.

Requirements: Materials, finishes and fixtures shall be those required for any public restrooms. Finishes, fixtures and equipment shall be selected and specified assuming an aggressive maintenance regimen

The structure containing the operators' restrooms should last at the entire life of the facility. Individual fixture should have a life span of twenty-five years. Vandalism potential will likely be less than that expected for public restrooms shall be considered by the designer.

6.2 Security Office

In general, offices for security personnel will not be provided at Sounder Stations or ST Express facilities, except possibly at larger transit facilities Security personnel should be able to monitor public space from the office. Security offices have many functions. First, it gives the security officer a place to rest during their shift without having to leave the

facility. Second, the office gives a "secure" feeling to the facility. Third, security offices are the place where equipment, such as CCTV viewers and intercoms, can be located.

The initial size of the office will be based upon the number of security personnel needed on site at one time. The number of personnel on site is likely to remain fairly constant over time; however, if more are need on site, expansion of the existing structure could be costly. If a facility is expected to require additional personnel in the future, it is recommended that the extra space be included in planned buildings. The additional space could be used as storage until the space is need for personnel.

Designers should reference the IES Lighting Handbook for specifics on lighting levels. Finishes, fixtures and equipment shall be selected and specified assuming an aggressive maintenance regimen.

6.3 Customer Service Office and Window

These are small offices, including adjoining window and queuing areas, for customer service agents to serve patrons. These facilities are likely to be required only at a few larger transit facilities in the region, and, as such, will be designed on a cases-by-case basis.

Customer service booths should be provided only at major transit transfer facilities or destination locations with significant numbers of passengers who need questions answered. The number of booths should be determined by the amount of travel modes and the extent of services provided. The extent of customer service hours will depend on service provided and staffing availability. Customer service booths should be located in close proximity to areas where passengers wait and visible from major points of arrival to the transit center..

6.4 Janitor's/Storage Room

A room should be provided for janitor's supplies and equipment. Items to be stored include mops, brooms, and cleaning supplies. The room should be adjacent to other support facilities served with utilities (water, waste drainage, electrical power). A minimum of eight feet by ten feet clear floor area should be provided.

For lighting, designers should reference the IES Lighting Handbook for specifics on lighting levels. The structure containing the janitor's room should last the entire life of the facility.

6.5 Staff Parking

At Sounder and ST Express stations, one standard size parking space will be provided for use by agency staff. The space should be located conveniently near the passenger boarding area. The space will be used by Sound Transit and Transit Partner staff that may need convenient and accessible parking at station facilities.

Surface parking should conform to the standards of the agency responsible for maintenance and operations of the facility or Sound Transit standards absent other

direction. Staff parking areas should accommodate a wide range of vehicle types and operations, including standard automobile, compact automobile, van, or pickup truck.

Section 6.5 of Chapter 6 included further guidance on staff parking.

7.0 Civil Engineering Elements

Civil engineering elements of a transit facility are critical, and some can be extremely costly and complicated to modify if not designed and constructed properly. For example, proper drainage helps to ensure that storm runoff will not damage either Sound Transit facilities or nearby property.

Chapter 7 provides standards and guidelines for the following civil engineering elements of a transit facility [Hyperlinks to each]: [additional text for sections 7.2 through 7.6 to come…]

1. Drainage
2. Site Preparation and Construction
3. Water Supply Line
4. Sanitary Sewer Line
5. Pavements and Striping
6. Fencing

7.1 Drainage

The intent is to provide some standardization of storm water management systems to simplify maintenance and improve performance. Standardization will also reduce the per-unit cost of parts and equipment during the life-cycle of the installation. As-built plans for storm water drainage systems will be retained both on-site and in central files for use by maintenance staff.

7.1.1 Key Goals of Drainage Guidelines

The design of drainage systems using the guidelines contained in this section is intended to achieve the following goals:

- To protect the roadway/track way and facilities from storm-runoff damage,
- To protect Sound Transit from liability for damage to property from resulting storm-runoff either passing through or caused by Sounder and ST Express construction, and
- To reduce environmental impacts of storm water management.

7.1.2 Requirement of other Agencies

The design of Sound Transit drainage treatments for facilities such as parking lots within Sound Transit right-of-way shall be in accordance with the criteria listed in the WSDOT Hydraulics Manual or the appropriate local jurisdiction.

Design of drainage facilities belonging to another agency, which are relocated or modified because of Sound Transit construction, and which do not cross or parallel rail system facilities or track beds, shall conform to the design criteria and standards of that agency. In general, required relocation of existing drainage facilities shall be

"replacement-in-kind" or "equal construction." Outside of Sound Transit right-of-way design of drainage facilities shall conform to the requirement of the local jurisdiction.

Any facility drainage requiring review and approval by jurisdictional agencies shall be submitted in accordance with the procedures established by the respective agency. The designer will be responsible for identifying the agency(s) having jurisdiction. All construction, relocation and restoration of storm sewers, drainage facilities, and maintenance of existing facilities during construction shall conform to the design standards of those agencies.

7.1.3 Drainage at Sounder and ST Express Facilities

Sounder and ST Express drainage criteria apply only to design of drainage facilities under the jurisdiction of Sound Transit. Drainage of other facilities and connections to other drainage systems shall be designed in accordance with the criteria of the respective agency having jurisdiction. Invert elevations and location of drainage facilities at the ends of contract design segments shall be coordinated with adjacent segments.

All drainage shall be by gravity flow, unless demonstrated to be infeasible. Where sections are below discharge points or in a tunnel where gravity outfalls cannot be provided, pumping stations shall be installed. No sanitary sewer discharge shall be permitted to enter the stormwater drainage system at Sounder and ST Express facilities.

7.1.4 Hydrology and Hydraulics

The following procedures will be used in preparing hydrologic computations:

- Hydrologic and hydraulic design will be in accordance with Washington State Department of Ecology, the WSDOT Hydraulics Manual, the AREMA Manual for Railway Engineering and the applicable local jurisdiction procedures.

- The hydraulic capacity of open channels, swales, gutters, storm sewer pipe systems, and culverts shall be determined using the Manning equation. Pipe flow velocities shall range from 3 to 10 feet per second where possible.

- Storm Frequency: the following facilities shall be designed/protected by accommodating the storm frequency listed:

    - All culverts and drainage facilities crossing the Sounder and ST Express system: (100 year)

    - Track roadbed (to top of sub ballast for Sounder stations): (25 year)

    - Longitudinal storm drains in roadways: (25 year)

    - Parking lot storm sewer systems: (25 year)

All longitudinal drains or sub-drains at low points that could flood roadways or track roadbed in a 25-year event.

The above frequencies shall be modified if the local jurisdictional agency has a more conservative standard. Wherever feasible, the top of rail elevation shall be a minimum of one foot above the 100 year flood elevation.

7.1.5 Selection of Drainage Structures

Sound Transit maintained drainage structures within the track way shall be in accordance with the Standard Drawings. Drainage structures located within parking lots shall be selected from WSDOT standard plans or the local jurisdiction's standard plans. When conditions occur for which the standard drainage structures are not suitable, the engineer will be required to modify these structures or to design special structures which satisfy the conditions.

7.1.6 Pipe Materials

All underground storm drains maintained by Sound Transit shall be HDPE, reinforced concrete pipe, minimum class V, Wall B, with gasketed joints, or ductile iron pipe. Underdrains may be PVC, HDPE or non-reinforced concrete pipe. All pipe materials designed for other facilities shall conform to the requirements of the local jurisdiction.

7.1.7 Parking Lots

Parking lots shall be designed so that storm water is removed by overland flow, to a catch basin, gutter, or curb and gutter to an inlet where the water will enter either a closed drainage system or an open ditch. Overland flow should be on at least a 2.0% grade wherever possible; one exception is along pathways used by customers; in these cases the slope cannot exceed ¼ inch to one foot slope. The maximum permissible spread for gutter flow shall be 6 feet.

7.1.8 Stormwater Management Facilities

Design shall be prepared in accordance with the standards and specifications of the local jurisdiction and the Washington State Department of Ecology.

The designer shall provide alternative approaches for incorporating sustainability into storm water management, such as by re-using storm water for irrigation, exterior cleaning/maintenance, etc. Storm water should be managed on-site wherever possible. Infiltration systems should employ low technology where feasible (e.g., bio-filtration water garden).

7.1.9 Construction within the Flood Plain

Design of facilities to be constructed within the 100-year flood plain will conform to the agencies having jurisdiction, including the Corps of Engineers, the Federal Emergency Management Administrator, and the Department of Ecology and the local jurisdiction.

7.1.10 Temporary Erosion and Sedimentation Control

All areas disturbed by construction shall have temporary erosion and sedimentation control (TESC) plans. The TESC plans shall be approved by Sound Transit prior to initiation of site construction activities.

Permanent erosion control plans will govern site maintenance after construction is finished. These plans must be approved by the appropriate local jurisdiction or be in accordance with Sound Transit's EMS work instructions. Erosion control methods will include Best Management Practices established by Washington State Department of Ecology and local jurisdictions.

7.1.11 Temporary Erosion and Sedimentation Control

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Permanent erosion control plans will govern site maintenance after construction is finished. These plans must be approved by the appropriate local jurisdiction or be in accordance with Sound Transit's EMS work instructions.

Erosion control methods will include Best Management Practices established by Washington State Department of Ecology and local jurisdictions.

(Next sections will be prepared in early 2006 update of design guidelines and standards)

8.0 Landscape Architectural Elements

This chapter provides objectives and design parameters for the landscaping of Sounder and ST Express facilities, including stations, park-ride lots, drop-off areas, communications/signal facilities, and right-of-way (ROW) line sections. Landscaping and grading perform many functions at Sound Transit facilities, including:

- Encompassing and containing embankments and earthworks that shape the site and its drainage
- Preserving a view corridor and sight line
- Creating boundaries
- Enhancing or screening of stations and ROW alignment
- Conserving the indigenous flora and fauna and wetlands
- Serving as ballast work
- Facilitating pedestrian access through footpaths.

Chapter 8 Landscape Architectural Elements includes the following sections:

8.1 Overall Responsibilities of Landscape Architect

Landscape final designers shall be responsible for preparing construction documents for the landscaping and irrigation, if any, of these facilities. Designs shall be consistent with the guidance provided in this design guidelines and standards manual, in the preliminary design drawings, and in standard detail drawings for Sounder and ST Express stations.

In addition, landscaping design around stations and parking lots shall be coordinated with the communications systems designers to maintain sight lines of surveillance cameras, especially with respect to anticipated growth. See [hyperlink to chapter 13 section 7 on surveillance]. Exceptions may be desirable in some specific cases, and recommendations or discussions of deviations are encouraged where this might result in improved design.

Deviations from the standards provided in these documents, however, must be approved in writing by the design consultant and Sound Transit.

Landscape final design shall also be designed taking into consideration the principles of Crime Prevention through Environmental Design (CPTED).

8.2 Objectives of Landscape Architectural Elements

The following are key objectives of landscape architectural elements at Sounder and ST Express facilities. The attainment of these objectives must not reduce the sight distance of train operators, bus drivers, and the public with respect to Sound Transit Sounder/ST Express or other vehicular traffic.

1. Provide a landscape design responsive to and compatible with standards for Sounder and ST Express operations, station architecture, graphics, furniture, art, and lighting design.

2. Provide a safe, secure, comfortable, and attractive environment throughout the transit system, particularly at and along approaches to station entrances.

3. Control access to the system by reinforcing designated pedestrian and vehicular circulation system movement and creating barriers to unsafe pedestrian movements elsewhere along the ROW as required.

4. Provide a landscape design that is compatible with local climatic conditions and conserving of water resources, preferably requiring no irrigation other than establishment watering.

5. Achieve a landscape design that is compatible with the regional aesthetic character and with the character of existing neighborhoods adjacent to ST passenger facilities.

6. Design a landscape that will require low maintenance in the short- and long- term, and consider the long-term growth and health of the plantings when selecting plant materials.

7. Establish a recognizable visual character of the landscape design for all Sounder/ST Express stations through the use of paving, wayfinding, site amenities and planting styles, while also maintaining compatibility with adjacent areas by adjusting precedents set by previous designs to fit each station.

8. Provide visual screening where necessary to buffer incompatible adjacent uses.

9. Protect, frame and enhance existing views and vistas.

10. Plant materials installed around any historic building(s) shall be used in a manner that enhances the historic setting and character of the building.

11. Protect significant existing plant material to the greatest extent possible and appropriate, so as to preserve a sense of scale and the site's history.

12. Create a site grading plan that acknowledges and complements existing use patterns of the site and coordinates with proposed site elements.

13. Incorporate significant existing site features that complement the overall site design concept.

14. Design planting areas and select plant materials to prevent the accumulation of grass, leaves or other plant materials on the track, guideway, or loading zone.

At park-and-ride lots, the following standards shall be met:

- Provide planting islands in parking lots to create visual interest and shade in large paved areas. Planting should maximize up to 30 percent of planting to paving.

- Enhance pedestrian safety and security by providing clear sight lines for both vehicles and pedestrians between parking areas and transit platforms.

- Provide attractive approaches to stations.

- Establish visual screening of parking areas from adjacent properties while allowing for surveillance of public areas and secure operation of the facility.

- Integrate design elements with adjacent areas.
- Design plantings to reinforce vehicular and pedestrian movement paths.

- Landscaping in parking areas shall consider local jurisdictional codes.

8.3 Codes and Standards

Local codes relating to landscape elements will be considered to help ensure acceptance of designs during jurisdictional design reviews. The designer will consult with local authorities having jurisdiction to conform to policies and plans that are in existence.

In addition, the following standards and guidelines should be referenced:

1. American Standard for Nursery Stock ANSI Z60.1, 1996 or later, as adopted by the American Association of Nurserymen, Inc.

2. Bailey's Standard Encyclopedia of Horticulture.

3. Standard Plant Names, American Joint Committee on Horticulture Nomenclature (AJCHN).

8.4 Site Preparation

The designer will need to keep in mind two major considerations relating to site preparation – finish grading and slope stabilization. These items are further discussed below.

8.4.1 Finish Grading

Finish grading should meet existing grades of adjacent areas where possible to avoid need for retaining structures. Minimum depth of topsoil shall be four inches. Topsoil should be placed in a uniform depth to prevent uneven settlement. Coordinate topsoil requirements with the plant material to be installed.

Rock, including shale, in cut areas that are to be seeded or sodded shall be covered with 12 inches of topsoil. Finished settled grade of topsoil in lawn areas shall be one to one and a half inches below adjacent hardscape. Topsoil shall not be stripped, placed or worked while frozen or wet. Topsoil shall not be placed on untilled or un-scarified surfaces.

All surfaces, including planting areas, walks and paving shall be graded to provide positive drainage. Water shall not drain across walkways. Walks or paving must drain to adjacent planted areas.

Swales for surface drainage in lawn or planted areas shall have a shallow dished cross-section with a uniform longitudinal fall of two percent (minimum) to six percent (maximum).

Seeded or sodded areas shall have a minimum slope of two percent (two feet fall per 100 feet) and maximum slope of one to three (one foot vertical change of grade per three feet of horizontal distance).

8.4.2 Slope Stabilization

Skillful grading and the incorporation of mounds and depressed areas shall be used where appropriate to control pedestrian movements, obscure objectionable views, and reduce objectionable noise.

- All slopes shall be stabilized to prevent physical failure, erosion, and maintenance problems.

- Slopes that are to receive aggregate mulches or to be planted to mowed turf shall not exceed one foot (vertical) to three foot (horizontal), (1 foot vertical to 4 foot horizontal on Seattle Parks property)

- Slopes that are to receive non-mowed grass or ground covers shall not exceed one foot (vertical) to three foot (horizontal). Straw shall be used to stabilize seeded slope areas and all newly seeded grass areas. (Straw not to be used on Seattle Parks property).

- Open anchored matting shall be used to stabilize sodded or seeded slopes and swales (surface flow lines) exceeding six percent gradient.

- Stable rock cut faces shall be left exposed.

- Vertical transition curves, 6 feet to 20 feet in radius as appropriate to scale of slope, shall be provided at top and bottom of slopes or mounds.

The following plants or materials are suitable for slope stabilization and erosion control:

Material	Slope (Maximum) – Vertical to Horizontal
Turf, mowed	1 to 3
Grass	1 to 2
Myrtle, pachysandra, etc.	1 to 2
Stone, rip-rap	1 to 1.5
Cut Stone	1 to 1
Brick Paving	1 to 1
Concrete block paving	1 to 1

If new grading is properly blended with the existing grades, any need for retaining walls should be minimal. Where they are used, retaining walls shall be treated as an architectural element with consideration being given to scale, color, texture, contrast, and materials appropriate in relationship to both the transit facilities and adjacent neighborhoods.

8.5 Plant Materials

Plantings shall be used to enhance the environment of the station areas and to integrate them with their surrounding context, taking into consideration CPTED principles. Planting design should emphasize utilization of hardy, drought tolerant, low maintenance plant material that can exist without supplemental water in the local climate after a 3-year establishment period.

In planting areas without irrigation systems, plant material shall be able to survive with natural rainfall. Planting areas which contain less hardy plants shall be used sparingly and shall be irrigated with establishment systems. All landscaping in the vicinity of historic buildings shall conform to the requirements of the Standards for Rehabilitation of the US Department of the Interior, latest edition.

Plant material shall all be rated “hardy” for use in US Department of Agriculture Climate Zone 8, with the exception of seasonal ornamental planting areas.

8.5.1 Landscaping Considerations

Any selection of plant material will emphasize native species and will avoid invasive species. Other considerations, in order of importance, for the selection of plant material include the following:

1 Appearance and seasonal form and color
2 Hardiness
3 Disease and pest resistance
4 Tolerance to water/lack of water
5 Tolerance to wind, pollutants, and salt
6 Availability
7 Initial cost
8 Maintenance requirements
9 Seed/fruit/bloom toxicity
10 Mature height and spread
11 Growth rate
12 Sun/shade preferences
13 Deciduous/Evergreen
14 Leaf size (smaller leaf size is preferred)
15 Soil and drainage conditions requirements
16 Transplant tolerance

8.5.2 Irrigation Requirements

Provide an "establishment irrigation system" for all planting areas at stations and station areas. Plantings with different water requirements shall be zoned separately to insure adequate water supply to each plant type. The system shall be Weathermatic RM series with the number of stations identified on the landscape drawings.

The controller shall allow timed watering schedules, have the ability to alter the watering schedule seasonally, and have the capability to manually interrupt the schedule in times of unpredictable weather inconsistencies. The irrigation system shall be designed to address slope conditions and prevent run-off of irrigation water.

Yard hydrants shall be provided at station sites and in park-and-ride lots for general maintenance and for emergency and back-up irrigation. The locations shall be coordinated to permit site coverage with a 100-foot hose, except as approved by in writing by Sound Transit.

Irrigation system shall provide ability for remote control access and system wide compatibility. Temporary irrigation designed to accommodate a 3-5 year life for

specified areas where supplemental water is not needed after initial establishment shall be used wherever possible.

8.5.3 Trees, Shrubs, and Ground Covers

Mature, healthy existing trees of appropriate species shall be preserved where possible and shall be indicated in the contract documents with appropriate protection against damage from construction activities specified.

Trees proposed along public right-of-way shall enhance an existing street tree pattern, if any, or shall be a part of a street tree pattern established by the local governmental authority for adjoining areas. Where no pattern exists, an orderly pattern shall be established.

Minimum caliper of trees located in paved pedestrian areas shall be 2.5 inches. Minimum caliper of trees in unpaved areas shall be 2.0 inches. Trees shall be spaced an appropriate distance apart depending on the species and design intent.

Tree location shall be adjusted to accommodate subsurface conditions such as utilities and vaults, as well as special conditions such as existing or proposed sidewalk canopies, awnings, and shelters.

Excavation for tree root balls shall be minimally 2 times wider and six inches deeper than the size of the ball. A tree grate with minimum area of 24 square feet shall be provided to prevent compaction of the soil surface (5'x.5' or 4'x 6' typical). Coordination with the municipality having jurisdiction is required to determine local requirements. Tree grates shall be designed to support the weight of one wheel of a service vehicle. Steel tree guards shall be considered only where necessary at locations where tree trunks are likely to receive abuse from service vehicles, snow removal equipment, or pedestrians.

Trees in pedestrian areas shall be staked, using a standard staking detail or as approved by the design consultant and Sound Transit. For non- pedestrian areas, trees shall be staked or guyed. Trees shall be guyed only where necessary. No underground staking shall be allowed without prior approval.

Where shrubs are used, they shall be selected and grouped in a manner to minimize maintenance. Ground cover shall be used in landscaped areas and slopes where pedestrian activity is to be discouraged. Vines should be used selectively to landscape and soften vertical surfaces, keeping requirements for pruning and other maintenance to a minimum.

8.5.4 Herbicides/Fertilizers

To help minimize use of herbicides and fertilizers the landscape features will include ground cover and other planting strategies. Plant material shall be fertilized at the time of installation and a fertilization schedule shown in the maintenance schedule, broken down by plant type and species.

Pre-emergent weed treatments shall be applied with other said amendments and fertilizers per ST standard specification or as approved by Sound Transit specifications. Hand weeding is the preferred method of weed removal. Products used shall be organic, when available, or a product that is proven to be non-persistent and non-damaging to the environment.

9.0 Structural Elements

One critical task of the transit facility designer is to ensure that the facility is structurally sound. The structural integrity of the facility is a function of a number of elements, such as characteristics of the soil and building materials. Chapter 9 presents an overview of relevant codes, guidelines, and standards as follows:

9.1 Overall Responsibilities of Structural Engineer

The structural design for the transit facility shall meet all applicable State of Washington general laws and regulations and the current editions of the codes, manuals, or specifications identified in this section. Where the requirements stipulated in any such document or by these criteria are in conflict, the stricter shall govern.

Unless specifically noted otherwise in these standards, the latest edition of the code, regulation and standard that is applicable at the time the design is initiated shall be used. If a new edition or amendment to a code, regulation or standard is adopted before the design is completed, the design shall conform to the new requirement(s), as required by the authority having jurisdiction.

For buildings and stations, the design shall meet all Occupational Safety and Health Act (OSHA) standards, the Americans with Disabilities Act (ADA), the Washington State Accessibility Standards, the *International Building Code* (IBC), and local codes.

9.2 Building Codes

Building codes to be followed by the designer include both international and other codes, manuals, and specifications. These are further described in this section.

9.2.1 International Building Code

In all areas, the design for the construction of Sound Transit facilities shall be in accordance with the *International Building Code* (IBC) of the International Conference of Building Officials, as adopted and amended by the State of Washington.

9.2.2 Other Codes, Manuals, and Specifications

Other codes, manuals, and specifications that will need to be recognized by the designer include the following:

- For Sounder stations, the *Manual for Railway Engineering* of the American Railway Engineering Association (AREA) shall be used.
- For concrete, reinforced concrete, precast concrete and prestressed concrete structures subject to railroad or highway loading, the American Concrete Institute *Standard Building Code Requirements for Reinforced Concrete*, hereinafter referred to as ACI 318, shall be used.
- For reinforced concrete retaining walls, the AREA manual for railroad loading, AASHTO 13DS for highway loading, and ACI 318 for other loading shall be used.
- For structural steel structures — other than bridges subject to railroad or highway loading — *Specifications of the Design, Fabrication and Erection of Structural Steel for Buildings* of the American Institute of Steel Construction, hereinafter referred to as the MSC Specifications, shall be used.
- For timber structures, the *National Design Specification for Stress-Grade Lumber and its Fastenings*, as recommended by the National Forest Products Association, shall apply.
- For welded structures, *Structural Welding Code – Steel,* of the American Welding Society, Inc., hereinafter referred to as AWS DI.1, shall be used to design welded structures not covered by the above specifications and codes.
- For cast-iron structures, the *Gray Iron Casting Handbook*, of the Gray Iron Founders Society shall be used.
- For structural steel bridge structures subject to railroad or highway loading, [add relevant guidelines or standards].
- For drilled piers and caissons, the *ACI Suggested Design and Construction Procedures for Pier Foundations*, hereinafter referred to as 336.3R, shall be used. .
- For signs and poles, the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals* shall be used.
- For structural steel members, American Society for Testing and Materials (ASTM) Standard for Structural Steel, hereinafter referred to as ASTM 36, shall be specified.
- For uses requiring higher-strength structural steels, or where economically justifiable: ASTM A242, A441 I A514, A572, A588.
- For high strength bolts, the ASTM *Standard Specification for High-Strength Bolts for Structural Steel*, hereinafter referred to as ASTM A325, shall be used.

9.3 Soils and Geologic Data

The following are guidelines to be used by the designer for soils and geological design.

- At the outset of the project, the designer will review any geotechnical analysis that has been carried out for the project.
- Earth, rock, and water pressures on the structures may vary considerably with geographic location. These pressures and other geotechnical parameters affecting the design shall be determined by the designers through reference to the geotechnical reports and by consultation with the geotechnical consultant.

- Design bearing and frictional values for foundations shall be determined by the designer through reference to the geotechnical reports and by consultation with the geotechnical consultant.
- The designer shall identify and recommend for further investigation all known or suspected areas of the site and immediately surrounding areas where unusual soils or geologic conditions exist. This identification and recommendations will be based upon available existing soils and geologic data, on data obtained from any additional geotechnical investigation, and on the professional judgment of the designer,
- The design bearing and frictional values for foundations shall not exceed the limits given by the State of Washington building code, except for deviations as provided for in the code.

9.4 Reinforced and Prestressed Concrete

The following identify guidelines to be used by the designer with regard to reinforced and prestressed concrete.

9.4.1 Parking Structures

- Concrete utilized for structural parking shall be dense, low water to concrete ratio and shall have low permeability of a mix design appropriate to this use.
- Concrete slabs shall receive waterproofing or sealing as per industry standards and specific project requirements, as appropriate for weather exposure.
- The underside of deck slabs shall remain bare concrete.
- Graffiti and scratch protection shall be provided for all exterior surfaces on ground level and within 12 feet of accessible reach and for all interior surfaces except floors.
- Top floors of structures shall be designed to prevent the seepage of water through to lower levels of the structure.

9.4.2 Minimum Concrete Design Strengths

- For all underground reinforced concrete cast-in-place structures, including abutments, retaining walls, spread footings, piles, drilled-in caissons, and basement walls, the design compressive strength shall be $f'_c = 4{,}000$ psi.
- For all above ground reinforced concrete cast-in-place structures, including columns, beams, slabs, foundations, and walls for buildings, design compressive strength shall be $f'_c = 4{,}000$ psi.
- For prestressed concrete, design compressive strength shall be $f'_c = 5{,}000$ psi.
- For precast prestressed members, design compressive strength shall be $f'_c = 5{,}000$ psi.
- For all miscellaneous foundations other than those specified, and for station platform foundations, design compressive strength shall be $f'_c = 3{,}000$ psi.
- In certain cases, strengths of concrete other than those specified above may be required. Sound Transit will rely upon the advice of the design consultant in giving direction in these cases.

9.4.3 Reinforcing and Prestressing Steel

- Reinforcement resisting earthquake-induced flexural and axial forces in frame members and in wall boundary members shall comply with ASTM A706 A615, with Grades 60 and 40 specified for primary and secondary reinforcement respectively.
- Prestressing steel shall conform to the following requirements:
    - Stress relieved steel wire ASTM A421 Grade 240
    - Stress relieved steel strand ASTM A416 Grade 270
    - High tensile steel bar ASTM A722 Grade 150
- To the extent possible, main reinforcing bars shall be spaced at 6", 9", or 12" on center in elements of tunnels, retaining walls, and bridge structures. Exceptions to this rule include columns, stairways, and thin slabs.
- Standardization of spacing is intended to simplify design details, checking of bar placement, and field inspection. Spacing specification should also take into account ease of concrete placement, room for embedded items, decrease in concrete coverage due to lapped splices, and the blockages that might occur by crossings of closely spaced reinforcement. Bar sizes should be selected to avoid crowding, particularly where larger size rebar is used.
- When bars are lap spliced, the spacing of the rebar must be such that a clear space of at least three inches is maintained between the lapped pairs to permit entry of vibrator.

9.4.4 Methods of Design

- For all structures, the design shall be by strength design method or load factor design method.
- Prestressed concrete design shall be designed by both allowable stress and load factor design in accordance with AASHTO.

9.4.5 Architectural Considerations

In order to ensure uniformity of structural concrete color in public areas of the facilities, it will be necessary to standardize concrete mix and strength designs, the aggregate source, and the brand of cement to be used in any given area. This standardization will apply to all concrete exposed to public view within the facilities or to the concrete exposed to view from outside the facilities.

Cast-in-place concrete (CIP) could be considered for a facility. However, the designer will provide Sound Transit specifications for any cast-in-place (CIP) architectural concrete prior to initiation of any design effort.

9.5 Masonry

The designer should include the following with regard to masonry features:

(1) Cover masonry veneer over steel studs and venting/drainage of space between structure and veneer.
(2) Cover use of single and finish system/drainage at top of curbs. Also provide insulation of cells and reinforcement of steel.
(3) and vapor barrier/infiltration barriers.

9.6 Structural Steel

Consideration shall be limited to the following types of structural steel. Other types may be used only with the approval of Sound Transit.

9.6.1 Structural Steel

- For normal use – ASTM A36.

9.6.2 High-Strength Structural Steel

- For uses requiring higher-strength steels or where economically justifiable – ASTM A242, A441 I A514, A572, A588.

9.6.3 Connections

- Shop connections as detailed by the designer shall be shop-welded whenever possible and unless otherwise approved. Welding shall be in accordance with the current code or specifications of the American Welding Society, Inc., D1.l Series, as applicable.
- Field connections shall be designed for high-strength bolts, or for welding if bolting is impractical. High-strength bolts shall be ASTM A325 unless otherwise approved by Sound Transit.

9.7 Foundations

Foundations for girder spans up to 150’ in length shall not have total settlements greater than 1” nor differential settlements greater than ¼”. For spans over 150’ in length, the Designer shall develop settlement values that meet the approval of Sound Transit. Any proposed deviation shall be submitted to Sound Transit for prior approval.

9.7.1 Spread Footings

- The design shall keep the maximum soil pressure for the various loading combinations within the allowable bearing value and soil pressures as nearly uniform as practicable. Spread footings shall be considered to be shallow foundations.

9.7.2 Pile Substructures

- Pile substructures shall be designed so that the load on any pile does not exceed its allowable load, which shall conform with allowable percentage of basic unit stress for various loading combinations given in AASHTO/BDS. Design should allow for an accidental misplacement of the center of gravity of the substructure, 6” in any direction. Pile substructures shall be considered to be deep foundations.
- For Group I loading, the uplift force on any friction pile shall not exceed 5% of its design capacity. For other group loadings, the uplift on any pile shall not exceed 25% of its design capacity. Any proposed deviations shall be submitted to Sound Transit for prior approval.
- Uplift shall not be permitted for bearing piles or combination bearing and friction piles.

9.7.3 Drilled-in Caissons

The design shall keep the maximum soil pressure at base of caisson within the allowable soil-bearing value. Design should allow for an accidental misplacement of the center of gravity of the substructure, 6" in any direction. The design of drilled piers or drilled caissons shall be in accordance with ACI 336.3R, *ACI Suggested Design and Construction Procedures for Pier Foundations*. Drilled-in caissons shall be considered to be deep foundations.

9.7.4 Lateral Resistance

Consideration shall be given to the ability of piles or drilled caissons to resist lateral loads. When the lateral resistance of the soil surrounding piles is inadequate to counteract the horizontal forces transmitted to the foundation or when increased rigidity of the entire structure is required, battered piles shall be used in a pile foundation. Battered piles shall have a slope not greater than one horizontal to three vertical. Where battered piles are to be used, such battered piles shall not encroach on property outside the right-of-way lines unless written permission for such encroachments has been obtained by Sound Transit from such property owner(s).

The axial loads on piles and caissons shall be determined by static analysis of the moment resistant group, by the method of elastic center, or by any other satisfactory method. Each member, vertical or battered, in a pile or drilled caisson groups are assumed to have lateral resistance capacity, in addition to the horizontal component of the axial load on the battered members, equal to the least of the following values:

- That of the pile or caisson as a structural member.
- 10% of the member's design compressive capacity perpendicular to the strong axis only.
- 6,000 lb. for piles, perpendicular to the strong axis only, and 10,000 lb. for caissons.

Unless a pile or caisson is installed to a sufficient depth in competent material to develop fixity, it shall be assumed to have no capacity to resist lateral loads in bending.

9.7.5 Selection of Foundation Types

A deep foundation shall be used when a shallow foundation cannot be designed to carry the applied loads safely and economically. Deep foundations shall also be used where scour, erosion or settlement might occur, and the soil conditions permit its use, even though the bearing capacity of the soil is sufficient to make practical the use of shallow foundations.

It is the Designer's responsibility to select a foundation type or types. Such selection shall be based upon several factors, including but not limited to:

- conditions prevailing at the site,
- cost of design and construction,
- availability of materials and installation craftsmen, and
- the desire to stimulate competition among the suppliers of alternate materials.

10.0 Architectural Elements

Sound Transit works with local public transportation agencies, communities, and local governments to site and design transit facilities that complement and improve local community plans. The architectural design of the transit facility must be functional while fitting comfortably in the community in which it is located.

Chapter 10 presents guidelines and standards for architectural elements of a transit facility, organized as follows:

1. Overall Responsibilities of Architect

2. Common Design Features

3. Criteria for Selection of Materials
    a. General Criteria
    b. Safety
    c. Sustainability Criteria
    d. Durability
    e. Ease of Maintenance
    f. Resistance to Vandalism
    g. Color
    h. Non-Proprietary Materials
    i. Unit Size
    j. Installation Standards

4. List of Finish Materials
    a. Exterior Materials
    b. Paving Materials
    c. Open Wall Elements
    d. Canopy Materials
    e. Metallic Surfaces and Fixtures
    f. Required Materials and Families of Materials
    g. Finishes
    h. Furnishings

10.1 Overall Responsibilities of Architect

The design of the transit facilities shall result in a permanent civic architecture that contributes to its context. Each facility's design shall not only be a recognizable element of the transit system, but also shall be clearly an integral part of the neighborhoods and community. Within this framework, a standardization practice to be actively pursued in design is as follows: development of a family of elements and parts for transit facilities that are interchangeable and recognizable but that also allow for the individual character of each neighborhood or community to find expression.

The scope of architectural enhancements shall be governed by ST's Scope Control Policy (Motion No. M2002-121), adopted by Sound Transit in 2002 to help guide Sound Transit staff in responding to local partners' requests for enhancement to projects. It is the policy of the Sound Transit Board to develop cost-effective transportation projects that maximize transit benefits, minimize costs, and encourage prudent management of resources in developing a project. This policy includes the following general principles for staff to use to control the scope of projects:

- Initial Scope Definition
- Project Development
- Mitigation
- Baseline Scope
- Requests for Enlarged Scope

Recognizing the mutual benefits of Sound Transit's transportation investments, local public transportation agencies, communities, and local governments (Sound Transit's partners) may identify improvements that exceed standard facility designs. In such instances, partners will work with Sound Transit and contribute toward the costs of improvements, in accordance with Sound Transit's adopted Scope Control Policy.

10.2 Common Design Features

Customization of architectural design at each site results in different maintenance task lists at each site as well as resulting higher costs, potential customer confusion, and reduction of agency identity. The designer should instead concentrate on common design features. Use of common design features in Sound Transit facilities will achieve the following:

- Contribute to an agency brand identity that is embodied in the facilities;
- Simplify customer wayfinding
- Help reduce costs for parts through bulk purchases and simplified maintenance procedures.

10.3 Criteria for Selection of Materials

The following basic requirements and criteria have been established for finish materials used in public and ancillary areas within the transit facilities. While convenience, comfort and attractiveness shall be considered in the selection and application of finishes. Essential attributes that must be satisfied include: safety, durability, and economy.

10.3.1 General Criteria

Finish materials shall:

- Be visually and tactilely pleasing.
- Be easily maintainable and repairable.
- Facilitate passenger guidance, information, safety, and security in a pleasing manner that contributes to overall design excellence.

- For floors, walls, and ceilings should be considered with respect to the total acoustic environment, so as to minimize reverberation while meeting other design and performance criteria.
- Be supportive of an efficient lighting system.
- Be fire resistant materials that produce minimal debris or fumes and smoke in a fire - avoid combustibles.
- Be of high quality and able to be installed at high levels of workmanship.
- Balance initial material costs against long-term maintenance costs.
- Not pose safety hazards to patrons using the system (by virtue of texture, composition, or application).
- Accommodate the specific needs of the mobility disadvantaged and the requirements of the Americans with Disabilities Act (ADA).
- Not create floor patterns that are disorienting to patron movement due to high contrast or distracting patterning.
- Have a wear surface separate from the structural slab to facilitate replacement when a floor is in a heavy wear area
- Where appropriate, wall finishes should be chosen with reference to the potential need for access to service ducts, etc., as applicable.
- Not pose safety hazards to patrons; for example, wall finish materials adjacent to escalators should not have perforations capable of catching fingers.

For ceiling and canopy finishes/systems and their application shall allow for commissioning, adjustment, and future retrofitting of subsystems such as CCTV and public address systems.

When the zone from floor level to eight feet on vertical surfaces, called a contact zone, is subject to abuse and willful damage, finish materials in this area must be especially resistant and capable of repair in a cost-effective manner.

10.3.2 Safety

Materials shall be selected so as to reduce risk of hazard to patrons and maintenance staff as follows:

- Fire resistance and smoke generation hazard from fire shall be reduced by using finish materials with minimum burning rates, smoke generation and toxicity characteristics consistent with Code requirements as noted in UBC and NFPA 101, Life Safety Code.
- Proper fasteners and adequate bond strength shall be used to minimize hazards from dislodgment due to temperature change, vibration, wind, seismic forces, aging, or other causes, such as vandalism.
- Floor materials with non-slip qualities shall be utilized to increase pedestrian safety and accommodate the needs of individuals with disabilities. Stairways, walkways, platform edge strips and areas around equipment shall have high non-slip properties. Areas of less use or hazard may have lower coefficients of friction.

10.3.3 Sustainability

Designers shall consider sustainability factors, such as those listed below, when selecting materials:

- Life-cycle energy needs of each material to extract, process, fabricate, transport, market, decommission, and eventually return it again to a state that is readily usable.
- Construction waste management for reduced environmental impact and reduced costs.
- Maximize use of recycled content in materials, where doing so is consistent with requirements for quality and durability.
- Long useful life.
- Materials that can be cleaned with non-toxic and environmentally friendly cleaning products and processes.
- Exterior materials that reduce heat island effects (i.e., light colored concrete in lieu of asphalted paving where appropriate and feasible).

10.3.4 Durability

Durability and graceful aging are of paramount importance in selection of materials.

- Materials with excellent wear, strength and weathering qualities shall be used with due regard to both initial and replacement costs.
- Materials must be colorfast and maintain their good appearance throughout their useful life.
- Design and specify clips on appropriate surfaces to deter damage from skateboard; clips should be unobtrusive as possible, consistent with their purpose.

10.3.5 Ease of Maintenance

Finishes shall be selected for ease of cleaning, repair, or replacement. The following provides further direction regarding maintenance of materials.

10.3.5.1 Cleaning

Facilitate cleaning and reduce cleaning costs by specifying materials that do not soil or stain easily, that have surfaces that are easy to clean in a single operation using standard equipment and benign cleaning agents, and on which minor soiling is not apparent.

Materials shall be cleanable with commonly used equipment and environmentally benign cleaning agents. Platform walking surfaces shall utilize materials that are not damaged by pressure washing. Station elements shall be detailed to discourage birds from roosting on them.

10.3.5.2 Repair or Replacement

To reduce inventory and maintenance costs, materials shall be specified that are readily available and can be easily repaired or replaced without undue cost or interference with facility operations. For example, hose bibs, electrical outlets, lighting fixtures and lamps, glass or plastic lights, etc., shall be standardized on commonly available sizes and finishes to ease inventory stocking or direct purchase. Spare quantities shall be provided for tile and other applied-unit materials in an amount equal to approximately two percent of the total material used.

10.3.6 Resistance to Vandalism

Finishes selected should be resistant to vandalism though the following:

- Provide materials and details that do not encourage vandalism and that are difficult to deface, damage, or remove.
- All surfaces exposed to the public shall be finished in such a manner that the results of casual vandalism can be readily removed with common maintenance techniques and cleaners.

10.3.7 Color

Material colors shall be consistent with system-wide identity colors, compatible with the facility's surroundings and of sufficient contrast and accent to provide visual interest, warmth, and concealment of minor soiling.

10.3.8 Non-Proprietary Materials

Non-proprietary items shall be specified for designs of system facilities in order to obtain competitive bids and comply with Federal regulations. Proprietary items will be considered by Sound Transit only where it is established that no other materials exist which would meet the particular design requirements. Such items shall be specified on a "performance specification" basis only with written permission of Sound Transit's project manager; Sound Transit may direct specification of proprietary items if determines this to be in its best interest.

10.3.9 Unit Size

Units shall be large enough to reduce the number of joints yet small enough to facilitate replacement if damaged. Monolithic materials may be used if they can be easily repaired without the repair inhibiting function or being noticeable.

10.3.10 Installation Standards

Materials shall be detailed and specified to be installed in accordance with industry standards and manufacturers printed directions for long life, low maintenance, and compliance with warranty requirements.

10.4 List of Finish Materials

The list of materials that follows is preliminary in nature and applies to all areas of public use and contact. Exceptions to the list must be reviewed and approved by Sound Transit prior to use in design. The use of items listed as "acceptable" is subject to location and environmental considerations.

10.4.1 Exterior Materials

Exterior materials generally refer to materials used to finish surfaces of a transit facility that are directly exposed to the climatic environment including sun, wind, and rain. Materials should be selected that are highly resistant to vandalism, and retain their original appearance with a minimum amount of maintenance and repair.

10.4.2 Paving Materials

General site paving refers to the finish of areas exterior to the station proper and used as walking surfaces. A preliminary list of generic materials meeting these criteria is:

Acceptable

Granite (trim)
Quarry tile (trim)
Brick pavers (trim)
Concrete pavers
Poured-in-Place concrete -textured/sandblasted and sealed

Not Recommended

Bituminous toppings
Synthetic resin toppings
Terrazzo
Marble

10.4.3 Open Wall Elements:

Open wall elements refer to the finish of vertical wall surfaces that provide enclosure while permitting ventilation and/or views into and out of station areas.

Acceptable

Expanded metal, 16 gauge or heavier
Perforated metal, 112 gauge or heavier
Stainless steel railing system, including cable stays
Metal louver
Not recommended: Welded-wire mesh chain-link fabric

10.4.4 Canopy Materials

Acceptable

Baked/coated steel roofing
Aluminum roofing
Structural steel
Laminated tempered glass
Low transmission “Lexan” or similar impact resistant plastic, with UV protection
Translucent panels such as Kalwall
Acceptable steel deck, factory finished baked enamel

Not Recommended

Tile roofing
Built-up roofing

10.4.5 Metallic Surfaces and Fixtures:

Wall panels, railings, posts, columns, fences, trash containers, bench supports, miscellaneous metal

Acceptable

Stainless steel (Areas of high pedestrian use)
Painted galvanized steel

Porcelain enamel on steel
Factory applied hard-baked enamel on steel or tempered aluminum plate
Factory applied powder coating on steel
Polyurethane (3 coat system)

Not Acceptable
1. Job site-painted metals

10.4.6 Required Materials and Families of Materials

The list of required materials that follows applies to all areas of the facilities. Public use and contact areas shall use the most durable materials. Exceptions to the list must be reviewed and approved in writing by Sound Transit prior to use in the design.

10.4.6.1 Standardized Structural Grid
Use of a basic grid of 4 feet will accommodate standardized glazing. Spacing of 16 feet – 0 inches will accommodate the standard platform edge light at stations. Use of a 2-foot grid will accommodate standardized glazing for windscreens and vertical elements of shelters.

10.4.6.2 Family of Pavers
For stations use 24 inches x 24 inches nominal concrete pavers. Wausau Tile "Terra-Pavers" Type 3 Cotillio FDX or Abbotsford Concrete Products Ltd. "HydraPressed Paving Slabs" for smooth and train-waiting pavers. Maximum of 3 colors to be used selected from the following approved colors:
FDX 2008 Wausau Light Gray
FDX 3008 Wausau Dark Gray
FDX 4008 Wausau Dark Red
FDX 5008 Wausau Dark Tan

2 foot – 0 inches wide system-wide Platform Edge Detectable Warning Pavers to be used at all stations and bus zones. Domes shall be spaced in an orthogonal pattern. Standard color to be muted yellow to match all stations.

10.4.6.3 Standardized Glazing Type and Sizes
Glazing for windscreens and passenger shelter canopies shall be specified and sized in accordance with Sound Transit's Standard Bus Passenger Shelter. (Hyperlink to this – ST document)

Elevator glazing shall work with the standards whenever possible. Atypical glazing sizes may be used at elevator shafts to meet the dimensional criteria of the elevator.

10.4.7 Finishes

Finishing of steel shall be completed with Satin Finish, High Performance Coatings wherever possible. Finishing of steel in the field shall be kept to a minimum by designing structures that can be shop fabricated in sections, primed and finished in the shop and

bolted together on site. Minimize field welding and touch up galvanizing painting wherever possible.

10.4.8 Furnishings

10.4.8.1 Benches

Designer to choose from the following approved benches:

- "RS Public Seating" by Forms and Surfaces. Aluminum modular bench system with intermediate arm rests, with and without backs, in manufacturer's standard "stone".
- "Petosky" by Landscape Forms. Removable perforated metal bench with powdercoat finish in manufacturer's standard "stone".
- 35-Series "Stay" by Landscape Forms. Modular steel bench system with intermediate arm rests and powdercoat finish in manufacturer's standard "stone". Backless seat preferred.

10.4.8.2 Trash Receptacles and Ash Urns

- "Petosky" trash receptacle by Landscape Forms or similar approved. Ground mounted with hinged lid. Perforated metal with powdercoat finish in manufacturer's standard "stone"; 30 gallon capacity liner.
- Ash urns will not be provided at Sound Transit facilities.

10.4.8.3 Modular newspaper vending racks

Newspaper racks will not be provided at Sound Transit facilities.

10.4.8.4 Bike racks and lockers

- Cora Bike Rack Model Expo "W" Series or similar approved. Standard size to accommodate 10 bikes.
- Cycle-safe Bike Lockers Model M/#DFR ProPark or similar approved. 2 bikes per locker unit.

11.0 Mechanical Elements

This chapter describes the functional and design requirements for the environmental control systems (ECS). These systems will provide heating, ventilating, and air conditioning (HVAC) for Sounder and ST Express facilities. It is intended to promote uniformity in design and to standardize the type and location of ECS equipment.

The mechanical elements will be focused on Sounder and ST Express stations. HVAC systems shall be provided for any ancillary rooms and concession areas. ECS will not be provided for patron areas unless the ECS is part of a joint development project or is specifically directed by Sound Transit.

12.0 Lighting Elements

The lighting standards contained in this chapter are intended to provide the functional and aesthetic guidelines necessary to design lighting for: site areas, passenger stations, and transit-related parking facilities. Conformance with these standards is necessary to ensure adequate lighting levels for the system facilities, efficient maintenance of lighting and electrical systems, and provide a high quality, convenient, safe, and efficient transit system for Sound Transit's riders.

Lighting of public streets and highways adjacent ST facilities shall conform to the criteria and standards of the appropriate agency or jurisdiction.

General objectives for transit facility lighting are as follows:

- Promote safety by identifying and properly illuminating areas and elements of potential hazard. Of special concern are potential tripping hazards such as at entry to vertical circulation elements and at platform edges where crowding and rapid transfer to and from trains or vehicles can be anticipated.

- Enhance the system's visual and functional clarity by differentiating between site circulation networks such as drop-off zones and parking areas, station entrances, stairways, or elevators/escalators, fare vending areas, platforms, tunnels, maintenance shops and storage yards. Adequate lighting is particularly important to partially sighted individuals, who frequently depend on public transit for transportation.

- Maximize legibility of signs and self-illuminating message displays, which will require quite different approaches to lighting them and the surrounding area.

In Chapter 12, codes and standards for electrical elements are divided into the following sections:

12.1 Requirements for All Facilities

The following requirements apply to all facilities:

- The lighting system shall provide the intended quality and quantity of light for individual areas and be free from glare. Avoid using luminaires that emit light above the horizontal plane, except when "up-down" luminaries are used to light both floor and ceiling planes . Minimize light directly onto nearby windows and avoid any illumination onto adjacent properties.

- The lighting system shall be energy-efficient, using high-efficiency ballasts, lamps, and auxiliary equipment. Luminaires shall have integral ballasts and fuses unless special considerations dictate otherwise. Such considerations shall be brought to the attention of the Sound Transit project manager.

- Lighting equipment shall be vandal-resistant in spaces accessible to patrons or the public.

- The lighting system shall be designed to minimize life-cycle costs, taking into consideration capital costs.

- Luminaire locations shall permit ready accessibility for re-lamping and periodic cleaning. "Basis for Design" documentation shall describe how relamping will be accomplished and any special equipment needed for access to luminaires.

- Luminaires shall not be placed over escalators or stairwells without provision for maintenance access being designed and incorporated in the project.

- Lighting shall be designed to satisfy security requirements and to produce a pleasant environment.

- Lighting system shall be designed so that the failure of any single lamp, or an entire luminaire, does not leave an area in total darkness or an unsafe level of illumination.

12.2 Codes and Standards

The following codes and standards shall be consulted and referenced by the designers, as applicable:

- Illuminating Engineering Society Lighting Handbook (purchase at www.iesna.org)
- Americans with Disabilities Act
- Underwriters' Laboratories, Inc.
- Standard for Fixed Guideway Transit Systems (NFPA 130) (purchase at www.nfpa.org)
- Life Safety Code (NFPA 101) (purchase at www.nfpa.org)
- National Electrical Code (NFPA 70) (purchase at www.nfpa.org)
- Washington Utilities and Transportation Commission (WUTC)

- Washington State Energy Code

12.3 Standard Equipment

Consistent appearance of facilities and their lighting levels can best be achieved with a high degree of standardization of the Sound Transit lighting system components. To that end, all luminaires and lamp types shall be standardized system-wide to unify the design of facilities, patrons perceptions of them, and to simplify maintenance requirements. A system-wide approach to lighting design will allow cost-effective procurement of lamps, luminaires and auxiliary equipment, as well as standardized installation, repair, maintenance, and eventual replacement.

12.4 Lamps

The following lamp types have been identified as standard for all facilities. Use of other lamp types will be permitted only with written permission of Sound Transit.

Watts	Lamp Description	Length	Initial Lumens	Rated Life	Color Temp	CRI
18	F18DTT	6”	1,200	10,000	5000	82
32	F32TRT	5 ¾”	2,200	12,000	5000	82
32	F32T8/835	48”	2,950	24,000	5000	86
35	MH35PAR30/FL	4 7/8”	2,400	10,000	3000	81
38	F40TT	22 ½ “	3,150	20,000	5000	82
54	F54T5/835/HO	46”	5,000	20,000	5000	85
70	MH70/ED17	5 7/16”	6,200	15,000	3000	80
70	MH70/T6	4 ½”	6,200	15,000	3000	83
100	MH100/PAR38 FL	5 7/16th”	6,500	12,500	3000	83
100	HPS100/ED17	5 7/16th”	9,500	24,000	2000	21
175	MH175/ED17	5 7/16th”	17,500	15,000	4000	75
250	MH250/ED28	8 1/4th”	23,000	15,000	4000	65
400	MH400/ED37	11 ½”	44,000	20,000	4000	65

Lamps used for illumination of passenger stations and ancillary areas including parking lots and pedestrian walkways in the vicinity of transit stations shall be fluorescent or high-intensity discharge type and have a minimum color rendering index of 65.

Metal halide lamps and auxiliaries shall be pulsed-start. In areas not generally accessible to transit patrons, lamps with a lower color rendering index such as high pressure sodium may be employed, but visibility needs should be carefully evaluated.

In all applications, energy efficiency shall be considered, and lower color rendering indices may be preferred if significant life-cycle savings can be demonstrated.

Innovative lighting systems incorporating new technology light sources such as sulfur lamps should be evaluated on a life cycle cost basis to determine advisability of application for Sound Transit facilities.

12.5 Illumination Levels

Luminance levels shall define and differentiate task areas, decision and transition points, and areas of potential hazard from background spaces. In addition to quantity of light, it is essential that illumination be designed to provide uniform distribution consistent with the design intention. Luminaires shall be selected, located, and/or aimed to accomplish their primary purpose while producing a minimum of objectionable glare and/or interference with task accuracy and vehicular traffic. There shall be no light spill onto adjacent properties.

llluminance and luminance levels shall meet the recommendations of the Illuminating Engineering Society of North America except as specifically noted below: Unless otherwise indicated, use a maximum uniformity ratio of 3:1.

Interior Locations	**Illuminance/Average Horizontal Foot-candles**
Station Platforms	20
Concessions	20
Staff Rooms	20
Stairs, Elevators, Escalators	15
Mechanical Rooms, Toilets	15
Storage/Custodial Rooms	15

Exterior Locations	**Illuminance/Average Horizontal Foot-candles**
Station Platforms – Covered	5
Station Platforms – Uncovered	5
Fare Vending Area	10
Parking Lots, Parking Structures, and Access ways	IESNA RP-20-98* Enhanced Security
Load, Unload, Passenger Drop-off, Bicycle Stands	5

Pedestrian Walkways (adjacent to roadways)	5
Outdoor Plazas	5
Bus-Loading Zones	5
Outdoor Entrances to Elevators & Stairways	10
Bus Roadways	5

* - Where security is a special concern or local law enforcement agencies feel that greater lighting levels are required. Lighting design shall comply with IESNA G-1-03.

12.6 Site and Plaza Lighting at Stations

Site lighting at stations includes internal site circulation and access to the station. The placement of luminaires shall not obstruct the movement of vehicles. Luminaire placement shall be coordinated with the landscape and site plans to provide protection for light standards that are located adjacent to roadways, and to ensure that plantings will not obscure the lighting distribution pattern.

Lighting of outdoor plazas, station sites, pedestrian walkways, and similar areas shall be accomplished by utilizing luminaires on low poles. Illuminated bollards and other low-mounted luminaires shall not be used. Security lighting (minimum lighting level after station shutdown) shall be provided using the same pole-mounted luminaires fed from a separate security lighting circuit with photocontrol or control by astronomical clock only.

In Ticket Vending Machine (TVM) areas, lighting design shall ensure that luminaires do not obscure visibility of touch-screen displays by glare or reflectance from screen surface.

12.7 Vehicular Access Lighting

Vehicular access lighting shall guide drivers naturally and intuitively to the bus areas and passenger drop-off zones. The illuminance on all access and egress roads shall be graduated up or down to the illuminance level of the adjacent street or highway.

12.8 Pedestrian Access Lighting

Pedestrian access lighting shall define pedestrian walkways, crosswalks, ramps, stairs and bridges, highlighting decision and transition points, and areas of potential hazard.

12 .9 Station Platform and Public Area Lighting

Platform area lighting shall be provided in both waiting and loading areas. The lighting system shall extend the entire length of the platform and shall demarcate the platform and emphasize the platform edge, vertical vehicle surfaces, and landings associated with

elevators and stairs. Care shall be taken to avoid blinding Sounder and ST Express operators or other vehicle drivers with excessive or misdirected lighting. Refer to ST Track and Signal Standards [hyperlink].

Luminaires and lamps to accentuate specific architectural features or artistic works shall be selected by the designer from the standard luminaire/lamp palette, or may be designed or specified by the project designer, if approved by Sound Transit.

12.10 Control of Lighting Systems

The lighting control system shall be designed to use energy efficiently. Automatic and manual control arrangements shall ensure efficient utilization of energy and simplify maintenance procedures. All exterior site areas shall be artificially illuminated when ambient illuminance drops below 10 foot-candles at the ground plane.

During night-time/non-revenue hours, provide security lighting as required to deter crime and vandalism. (Non-revenue hours shall be considered as the period from 30 minutes after service stops to 30 minutes before service starts). Provision shall be made for photo-control with astronomical/time clock and manual override. Ancillary areas shall be individually switched.

For energy conservation, the use of daylighting is encouraged. Where daylight is used to supplement electric lighting, evaluate lighting zones, which can be effectively illuminated using daylight and design the lighting control system using appropriate photoelectric/electric controls.

12.11 Emergency Power and Lighting

Emergency lighting in enclosed indoor and underground transit facilities shall consist of appropriately located luminaires that will provide adequate lighting for the orderly egress of patrons and employees during a power failure. The lighting and wiring system shall meet applicable requirements of NFPA 130, NFPA 101, and the National Electrical Code. The luminaires and all exit, egress, and essential directional signage shall be powered by an emergency power source as described below.

Emergency lighting for stairs shall be designed to emphasize the top and bottom steps or landings.

For an Operations and Control Center (OCC), a separate on-site emergency power system shall be provided for the OCC so that the loss of utility electrical power shall not impair any of the OCC function.

Emergency power requirements for elevators are included in Sound Transit's Link Light Rail guidelines.

13.0 Communications and Technology

Chapter 13 presents guidelines and standards for the inter-related topics of communications and technology. Many of the communications and technology elements discussed below support passenger information, passenger convenience, safety and security considerations at transit and commuter rail facilities. This section of the new manual will provide an organized and coordinated description of communications and technology requirements.

Several principals shall govern the design of communications and technology facilities at Sounder and ST Express facilities. These are:

- There shall be consistency of passenger information, passenger convenience, safety, and security devices with Sound Transit's Technology Plan.
- Static and variable message signage related to passenger information, passenger convenience, safety and security shall be provided maintained at all ST passenger facilities.
- To accommodate potential technology requirements, the designer should provide excess capacity in the conduit system.

Chapter 13 is divided into the following sections:

13.1 Process for Technology Infrastructure

Technology planning and implementation monitoring that ensures that future physical space and connections for communications and technology are anticipated and included in final designs. ST's technology, customer service, operations, safety and security staff must be consulted to understand their technology needs so that the appropriate conduit infrastructure can be designed. Comments regarding previous projects indicate that conduit has been removed or reduced in size from the design during value engineering because its importance had not been clearly emphasized.

While the technologies listed below are commonly used today, additional technologies may be used for passenger information, safety and security in the future. In order to accommodate those additional technologies, the power and communications ductbank must include empty conduits with innerduct so that additional cables can be pulled.

Additionally, all shelters and light standards shall have conduit stub ups from the mainline ductbank. Often, shelters and light standards are used to mount passenger information, safety and security devices. Installation costs for those devices can be dramatically reduced if the power and communications infrastructure is installed nearby (and saw cutting and pavement restoration is minimized or eliminated).

This section does not provide specific guidelines about the number and size of conduits. Rather, it section seeks to provide the designer a flavor of the variety of devices that will require power and communications conduits and cabling; therefore, enabling the designer to fully understand (and plan for) ST's technology needs.

13.2 Wireless Data Infrastructure

For customer convenience, Sound Transit could consider providing wireless Internet access (WiFi) at stations. Wireless transmitting and receiving devices (access points) require a power source and communications backbone. Accordingly, conduits to provide power and communications to wireless access points should be included in the facility design.

13.3 Closed Circuit Television (CCTV) Cameras

CCTV's are being installed at Sounder stations with central monitoring provided at Sound Transit headquarters. The designer should review the latest standards governing location and other requirements relating to CCTV. In addition to other CCTV camera information included in existing manuals, the camera's field of view must cover passenger emergency station locations, platforms, tracks, restrooms, and elevators.

CCTV cameras may be installed in parking garages that support the ST Express and Sounder facilities. The number of cameras in garages far outnumbers the cameras at the transit and commuter rail facilities. As video images require a fair amount of bandwidth to transmit and the number of garage cameras is large, it is most likely that the parking garage cameras will be monitored locally.

The facility cameras may be monitored locally or remotely (at a central facility). Therefore, for garage infrastructure planning, space for a security office/monitoring facility should be included in the design. The security office/monitoring facility may be located within the garage or at the transit/commuter rail facility. The security office should not be located in the communications room/building, but should be connected to the communications room/building via the power and communications ductbank.

13.4 Customer Emergency Stations

Customer emergency stations (CES) are used by patrons to alert security personnel of possible emergencies. The CES will include a speaker and microphone so that patrons can speak to security personnel. A pan-tilt-zoom (PTZ) or fixed closed circuit television (CCTV) camera shall be mounted near the CES so that when the CES is activated, the PTZ camera swings to a preset location (or the fixed camera continues to view the CES) so that the security officer can see the person who activated the CES. Other cameras at the facility may be used to view the incident.

The following are key considerations relating to CESs:

- The number and location of CESs should be verified by ST's safety and security staff.
- They shall emit an audible alarm and flashing light and alert security personnel. The audible alarm and flashing light should be independently wired and alarmed so that individual activated CES can be identified by the security personnel. The audible alarm and flashing light shall be strong enough to command the attention of people within 200 feet.
- They shall be located such that they are accessible to all users, including those in wheelchairs.
- Every CES shall be located within the view of a PTZ or fixed camera.
- Each CES shall be well maintained and tested. Response to CES buttons should be swift.
- CESs should not be connected directly to the 911 system as false alarms occur. ST should plan to staff or outsource CES monitoring.

13.5 Public Telephones

Phones provide a customer amenity while also serving as an added security feature. Pay phones will be installed and maintained by the local telephone company. Public payphones will be provided on all boarding platforms at Sounder stations and ST Express facilities. ST should install an extra, dedicated communications conduit in the ductbank for the payphone.

Finishes, fixtures and equipment shall be selected and specified assuming the following maintenance regimen: Weekly sponge and mildly abrasive pad cleaning of the phone surfaces using cleaning and disinfectant chemicals is anticipated. All surrounding surfaces within possible public contact should be readily accessible for cleaning and disinfectant. Graffiti removing chemicals will be used.

Pay phones and accompanying fixtures should last at least ten years. Surface texture and treatments shall minimize the potential for applied and etched graffiti. Phones will need to be quickly removed, repaired and replaced if subject to vandalism, or easily repaired on-site.

Accompanying fixtures, if required, will use non-ferrous metals, porcelain or heavy duty coated metals, stout plastics, concrete and/or hot dipped galvanized steel materials. Heavy gauge metal and/or sheet metal using stout backer boards are desired.

Accompanying fixtures using wood, light weight plastics without backing boards, sheet metal skins without backing boards, and other materials that are easily subject to vandalism are not acceptable.

13.6 Staff Telephones

Customer service personnel will require voice communications. For facilities with dedicated customer service personnel, voice communications should be part of the design. Generally speaking, security personnel use radio communications (walkie-talkies and mobile telephones) for voice communications.

13.7 Variable Message Signs (VMS)/Passenger Information Systems

Design for VMS and passenger information systems will be reflect the most direction from Sound Transit Technology projects. The intent is to include direction relating to VMS information as standards, but to also recognize that technology needs change rapidly so some flexibility is needed.

The designer shall also address the following under VMS/Passenger Information systems:

- Provide initial and future monitor locations and conduit needs.
- Real-time information shall be provided consistent with design guidelines and standards developed for ST Technology Plan.
- Explore audio for visually impaired as part of VMS system.

13.8 Public Address (PA) System

Public address (PA) systems are a series of speakers located throughout public areas which can carry recorded and real-time announcements produced on site or at a central location. PA systems should have the capability to be activated from a central office or controlled by on-site personnel. The systems should be heard throughout the entire waiting area.

Security personnel can also use the PA system to deter persons from committing a crime. Employees, both on site and at a remote location, should be able to make announcements over the public address system. Provision should be made for speakers to announce train/bus arrival information, emergency information, etc.

Public address systems will be provided at Sounder stations. For ST Express facilities the designer will provide sufficient conduit capacity to allow a series of speakers located throughout public areas which can carry recorded and real-time announcements produced on site or at a central location.

The PA system requires a dedicated communications conduit system as the speakers are driven by a 70 volt system. PA communications cables cannot coexist with other low-voltage communications cables (e.g. Category 5, Category 5e, Category 6, or coaxial cable).

13.9 Ticket Vending Machines (TVM)

Existing information on TVMs will be included from the Sounder Station Design Manual. This information will be specific to stations providing TVMs.

Information will be included to ensure that TVMs are compatible with Smart Card technology.

Each project will need to identify potential future needs for TVM locations and conduit needs. The process for technology planning (see Section 13.1) should be used to ensure that future TVM needs are included in the final project design.

13.10 SmartCard Readers

Information will be included on requirements for the SmartCard system. As the SmartCard project is developed, information will be included in the existing design manuals.

13.11 Static Signage

While not critical to communications and technology infrastructure planning, each facility must install static signage to inform patrons that they are under video and audio surveillance and may be recorded. Examples of that text can be seen on King County Metro coaches and at Sounder commuter rail stations.

13.12 Local and Central Control Centers

This section will include existing information from the ST Express Design Guidelines section on a local "Supervisor's Office/Security Office". Additional requirements will be developed for a central control center. More specific design criteria are needed to clarify monitoring locations for the various ST facilities.

The manual will specify that Sounder facilities must be monitored from Union Station. As determined by the partners for each ST Express facility project, that facility will be monitored from Union Station or from other sites, such as local police stations.

The design should allow for emergency responders to access the video feed when necessary.

13.13 Communications and Electrical Room/Building

The size of the room/building should be sufficient to accommodate connections for passenger information, passenger convenience, safety and security systems. The room/building must be a minimum 10 foot by 12 foot (preferably 15 foot by 20 foot).