

350.01	General	350.05	Building Foundations
350.02	References	350.06	Building Utilities
350.03	Design Considerations	350.07	Building Permits
350.04	Building Structures		

350.01 General

This chapter provides guidelines for building structures at WSF terminals including the passenger and employee buildings, maintenance buildings, shelters, and toll booths. Refer to [Chapter 710](#) (Toll Plaza) for more detailed information on toll booth design. [Exhibit 350-1](#) shows an example building layout for the key buildings associated with a ferry terminal.

For additional information related to terminal buildings refer to the following chapters:

Chapter	Subject
300	Accessibility
310	Security
320	Environmental Considerations
360	Electrical
400	Passenger Buildings
430	Terminal Supervisor Buildings
440	Maintenance Buildings, Enclosures and Support Areas
450	Architecture
510	Toll Plaza
560	Site Utilities
570	Signage and Wayfinding
600	Trestle

350.02 References

Unless otherwise noted, any code, standard, or other publication referenced herein refers to the latest edition of said document.

(1) Federal/State Laws and Codes

[49 CFR Part 39](#) *Transportation for Individuals with Disabilities: Passenger Vessels*

International Building Code (IBC), [International Code Council](#)

International Fire Code (IFC)

[National Electric Code \(NEC\)](#)

International Mechanical Code (IMC)

National Fire Protection Association (NFPA), [Life Safety Cod \(NFPA-101\)](#)

[RCW 39.35D](#) *High-Performance Public Buildings*

[WAC Title 51](#) *General Administration, department of (building code council)*

[WAC 296-46B](#) *Electrical Safety Standards, Administration and Installation*

[Washington State Energy Code](#)

(2) Design Guidance

ASCE 7, *Minimum Design Loads for Buildings*

ASCE 31-03, *Seismic Evaluation of Existing Buildings*

ASCE 41-06, *Seismic Rehabilitation of Existing Buildings*

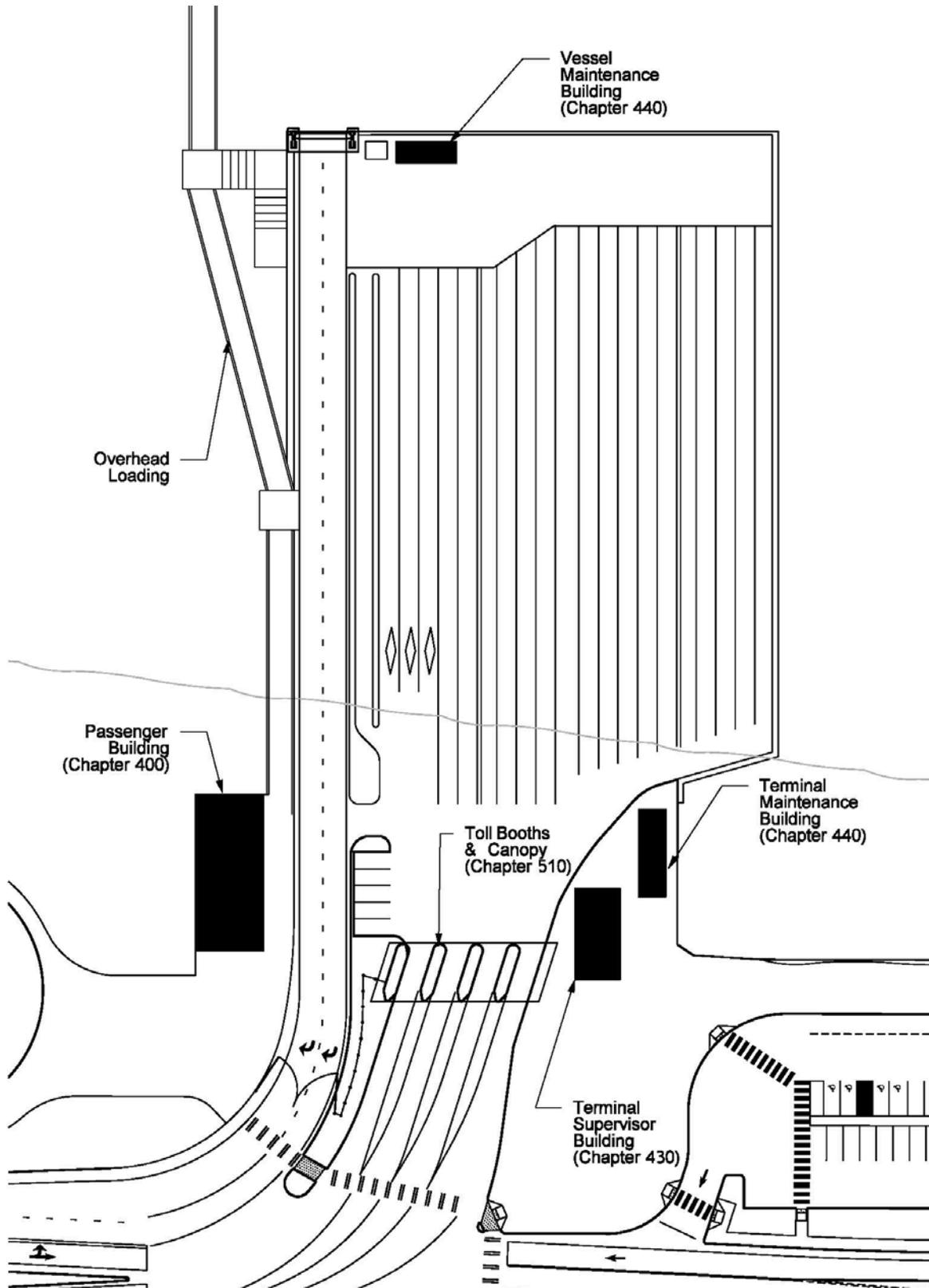
[General Special Provisions](#), Washington State Department of Transportation, Olympia, WA. www.wsdot.wa.gov/Publications/Manuals/GSP.htm

[Leadership in Energy and Environmental Design for New Construction \(LEED-NC\)](#), U.S. Green Building Council

[Plans Preparation Manual M 22-31](#), WSDOT

[Standard Plans M 21-01](#), WSDOT

[Standard Specifications M 41-10](#), WSDOT



Example Site Layout - Terminal Buildings
Exhibit 350-1

Example Site Layout - Terminal Buildings
Exhibit 350-1

350.03 Design Considerations

New terminal buildings are to adhere to the building codes of the local municipality and any other codes in place at the time of permit application. The *International Building Code* (IBC) is the primary reference for WSF terminal building design.

(1) Accessibility

Wherever pedestrian facilities are intended to be a part of a transportation facility, [28 CFR Part 35](#) requires that those pedestrian facilities meet ADA guidelines. Federal regulations require that all new construction, reconstruction, or alteration of existing transportation facilities be designed and constructed to be accessible and useable by those with disabilities and that existing facilities be retrofitted to be accessible. Design pedestrian facilities to accommodate all types of pedestrians, including children, adults, the elderly, and persons with mobility, sensory, or cognitive disabilities. Refer to [Chapter 300](#) for accessibility requirements.

(2) Security

[Chapter 310](#) includes a general discussion of the United States Coast Guard (USCG) three-tiered system of Maritime Security (MARSEC) levels, vessel security requirements, and additional information pertaining to building design. Below are links to relevant sections by topic. Coordinate with the WSF Company Security Officer (CSO) regarding design issues pertaining to security. In addition, coordinate with the USCG and Maritime Security for all terminals, the United States Customs and Border Protection (USCBP) for international terminals, and the Transportation Security Administration (TSA) for TWIC and SSI.

- MARSEC Levels: [Section 310.04](#)
- Vessel Security: [Section 310.05](#)
- Security Rooms: [Section 310.07](#)
- Signage: [Section 310.13](#)

(3) Environmental Considerations

Refer to [Chapter 320](#) for general environmental requirements and design guidance. Refer to the project NEPA/SEPA documentation for project-specific environmental impacts and mitigation.

Significant environmental considerations related to the design of WSF buildings include, but are not limited to:

- Shoreline
- Zoning (local jurisdiction)
- [Washington State Energy Code](#)

(4) Electrical

Refer to [Chapter 360](#) for general electrical design criteria pertaining to buildings. Below are links to relevant sections by topic.

- Wiring and Protection: [Section 360.04](#)
- Wiring Methods and Materials: [Section 360.05](#)
- Equipment: [Section 360.06](#)

(5) Building Signage and Wayfinding

Refer to [Chapter 570](#) for requirements.

(6) Building Architecture

Refer to [Chapter 450](#) for requirements.

(7) Design Life

Base design lives on the current *Life Cycle Cost Model* (LCCM) as required by the Washington State Office of Financial Management (OFM). Confirm design lives given below are consistent with the current LCCM. Refer to [Appendix E](#) of the 2007 Life Cycle Cost Model Update (2007 LCCM) for information on when existing structures and their systems are due for replacement. Replacement life may be reduced due to functional obsolescence.

- New Terminal Buildings: 50 years
- New Toll Booths and Storage Buildings: 30 years
- Retrofitted Terminal Buildings: The preferred life is 50 years similar to new terminal buildings. Retrofitted terminal buildings may be less as a result of a Business Case Analysis and acceptance of the local building code officials.
- Retrofitted toll booths and storage buildings: The preferred life is 30 years similar to New Toll Booth and Storage Buildings. Retrofitted toll booths and storage buildings may be less as a result of a Business Case analyses and acceptance of the local building code officials.

(8) Materials Specification

Utilize materials that are in accordance with the requirements of the WSDOT *Standard Specifications* and WSF *General Structural Notes* and *Regional General Special Provisions*. Consider the material requirements of federally funded projects including the requirement for American-made steel. Make use of WSF stockpiles of materials where possible.

(9) Proprietary Items

WSF uses competitively acquired products to fulfill the requirements of a contract wherever feasible to help achieve the lowest price, the best quality, and the most efficient use of resources. There are instances in which competitive bidding may not or cannot be provided and a specific proprietary product is allowed. Refer to [Section 220.07\(2\)](#) for limitations on the use of proprietary items.

(10) Operations and Maintenance

Involve WSF Operations and Maintenance staff throughout the design process and provide opportunities for review of the project drawings and specifications. Ensure that required maintenance activities can be performed in compliance with OSHA/WISHA guidelines.

Below are some operations and maintenance issues to consider:

- Minimize repair and maintenance required during the design life.
- Confirm location of existing utilities within the project limits and take appropriate measures to keep existing utilities operational, as required. Refer to [Chapter 200](#) for some major utilities at various terminals which warrant special note.
- Address traffic control, construction staging, and phasing issues during design to minimize impact on existing operations.

(11) Building Seismic Design

Design WSF terminal buildings for “no collapse”. WSF terminal buildings are not considered essential public facilities with regard to seismic codes.

Coordinate design of a building supported on a trestle with the local building department to determine a design approach that will conform to the intent of the building code. Based on past project experience, the following items may be pertinent to design of a building supported on a trestle:

- a. Create a seismic analysis model that consists of the combined trestle and building structures to account for the total structure response.
- b. Evaluate the design response spectrum for both the 1,000-year AASHTO event and the local building code-specified event. In some cases the difference between the spectra may be minor.
- c. Evaluate building story drift limitations for a building structure supported on a relatively flexible non-building structure. Story drift limitations may apply to only the building structure.

350.04 Building Structures

(1) New Buildings

Design the structural system of new buildings based on building function and dimensions. Consider the applicable building codes, zoning restrictions, material use, and material cost during initial design of the structural system. Use uniform layout of structural members to facilitate repetitive member sizes.

Consider the type of floor system desired when designing the floor height. Provide adequate space for the structure to accommodate raised floors, utilities, suspended ceilings and other internal components.

(a) Building Location

The location of terminal buildings is determined on a site specific basis. Consider the following items when determining where to locate buildings.

1. Terminal Buildings Located On Land**a. Pros:**

- Reduced overwater footprint
- Passenger drop-off/pick-up near terminal building

b. Cons:

- View blockage
- Aging population walking long distances to/from the building
- Elevated walkway cost

2. Terminal Buildings Located Overwater**a. Pros:**

- Passengers located near vessel interface reduces load time

b. Cons:

- Elevator on trestle (shaft depth and hydraulics over water)
- Increased overwater footprint
- Larger trestle area

(b) Design Codes

Washington State has adopted the *International Building Code* (IBC) under [WAC Title 51](#). Design new structures in accordance with the IBC, [WAC Title 51](#), and as amended by the local municipal codes. Note that Seattle has adopted its own modified building code, the Seattle Building Code (SBC).

(c) Interior

Provide interiors with natural ventilation in accordance with the IBC or mechanical ventilation in accordance with the *Uniform Mechanical Code* (UMC).

Provide ceiling heights in compliance with the IBC.

Design interior finishes in compliance with IBC and WSF standards.

(d) Exterior

Design the exterior envelope for all structures to ensure weather tightness, minimize maintenance, maximize building longevity, and be architecturally compatible with the surrounding environment. Minimize bird perch area and provide bird deterrence as necessary. Refer to [Chapter 450](#) for additional guidance.

Design exterior walls to withstand all loads, including but not limited to gravity loads, lateral loads (i.e., wind and seismic forces) and thermal induced loads, in accordance with WAC 51 (Washington State Building Code). Design envelope construction in compliance with the *Washington State Energy Code*.

(e) LEED® Certification

All public buildings having an area greater than 5,000 square feet are required to be designed, constructed and certified to at least the LEED® Silver standard. Refer to [Chapter 450](#) for additional information.

(2) Retrofitted Buildings

Modifications to existing buildings such as changing the type of roof or roofing material, adding new equipment, and removing load-bearing walls are common examples of renovation measures that require structural design.

(a) Design Codes

Design any addition or alteration to existing buildings to comply with the applicable requirements for new construction or IBC as agreed upon with the local building official. Areas of the structure that are not altered as part of the new construction are not required to comply with the code requirements of the new structure.

(b) Seismic Retrofit

Design additions and alterations to comply with the requirements of IBC Chapter 34. Additional requirements are as follows:

- Approval of the local building department may be required depending on the retrofit scheme.
- Seismic retrofit of interior fixtures and equipment will be required as part of any seismic retrofit.

(c) Historic Buildings

The National Historic Preservation Act regulates historic sites. Through Section 106 of the Act, any project that has a federal nexus (involves federal funding, federal permits or is on federal lands) is required to consider the effects of the project on historic or cultural resources. Section 4(f) of the National Department of Transportation Act also affords protection to historic sites. In Washington State, [WAC 25-12](#), [RCW 27.34.200](#) and Executive Order 05-05 provide protection to historic sites. WSDOT completed an inventory of all WSF terminal buildings, and found none eligible for inclusion on the National Register of Historic Places under [Section 106](#) of the National Historic Preservation Act of 1966.

350.05 Building Foundations

This section provides guidelines for building foundation systems in areas not subject to scour or water pressure by wind and wave action.

Conduct foundation and soil investigations conforming to the IBC. Soil investigations are required when the classification, strength or compressibility of the soil are suspect or where a load-bearing value superior to that specified in the applicable code is specified. Soil tests are required in locations of expansive soil and in locations where the groundwater is within 5 feet of the lowest floor level. Design footings and foundations to be built on undisturbed soil, compacted fill material, or controlled low-strength material (CLSM).

Place all load-bearing walls on continuous concrete footing bonded integrally with the exterior wall footings.

Design pier and pile foundations to support building structures if the soils are not strong enough to support the loads. A foundation investigation is required to determine the basis of design and installation of pier and pile foundations. Include in the investigation and report:

- Pile types, bearing capacity, and lateral resistance
- On-center spacing
- Driving criteria
- Installation procedures
- Field inspection and reporting procedures
- Pile load test requirements
- Durability of materials
- Designation of bearing stratum
- Reduction for group action, where necessary.

For additional information regarding foundations refer to the IBC and the WSDOT Geotechnical Department.

350.06 Building Utilities

This section provides guidance and design requirements for building utilities specific to WSF projects. For information regarding trestle and site utilities, refer to Chapters 600 and 560.

Building Utility	International Building Code	WSDOT Utilities Manual	WSDOT Standard Specifications	Uniform Plumbing Code	International Fire Code	Local Gas Standards	WSF Electrical Design Standards
Potable Water	X	X	X	X			
Fire Protection ^[1]	X		X	X	X		
Sewer	X	X	X				
Natural Gas	X	X	X			X	
Mechanical ^[1]	X	X	X	X	X		
Electrical	X						X

^[1] Coordinate fire protection and fire protection equipment with local Fire District and Fire Chief as early as possible in the design phase.

Building Utility Design Specifications Matrix Exhibit 350-2

(1) Potable Water

Supply domestic water to the passenger building and the terminal supervisor building. Design all materials to meet the requirements of the WSDOT *Standard Specifications* and the local water district standards, or whichever is more stringent and more appropriate.

Design the plumbing and drainage systems for terminal buildings to include water service, domestic hot and cold water, sanitary and storm drainage as necessary. Connect the water service to an approved municipal water main. Size the connecting pipe based on the peak water demand of the plumbing system. Provide water meters and/or reduced pressure backflow preventers as required.

Size the domestic water service connection to each facility for the total peak demand. Provide each service with a main shutoff valve and backflow preventer immediately inside the structural wall of the building and a pressure-reducing valve when city pressure at the lowest point of use inside the structure is higher than 60 pounds per square inch (psi). Provide water hammer arresters for long pipe runs and branches with flush valves.

Include water heaters or tankless water heaters for facilities having lavatories, showers, and service sinks. Size all hot water pipes serving more than a single fixture for the simultaneous fixture demand with a minimum pipe size of 3/4 inch. Arrange all pipes in a systematic manner and provide for thermal expansion and drainage. Insulate all hot water pipes. To facilitate maintenance, provide isolation valves for all branches.

(2) Fire Protection

Design the fire protection system in accordance with the IFC and the NFPA. Provide fire water service for building fire protection including fire hydrants and building sprinkler systems. Provide the following fire water services:

- Fire water service to the passenger building sprinkler system
- Fire water service to the terminal supervisors building sprinkler system
- Fire water service to maintenance buildings located on the trestle

Consult the local water district for available water pressure information and fire flow requirements.

Design all materials to meet the requirements of the WSDOT *Standard Specifications* and the local water district standards.

(3) Sewer

Provide service lines from the passenger building and terminal supervisor building to the site sewer system. Consult the local sewer district for additional development standards that apply to sanitary sewer improvements outside the WSF project site.

Run gravity lines from all drains in mop sinks, lavatories, water closets, and other miscellaneous drains/sanitary waste to existing public sanitary sewers. If gravity runs cannot be accomplished, provide sewage ejector pits for drains/sanitary waste lines.

(4) Plumbing

Design plumbing equipment and systems in accordance with the provisions of the IBC and the International Plumbing Code. The number of required plumbing fixtures is based on building classification and occupancy. Separate facilities for each gender are not required in structures with a total occupant load of 15 or less. Refer to the IBC for additional requirements.

Design all water closets, urinals, and lavatories to be wall-hung and supported by standard chair supports. Service sinks are to be of stainless steel or monolithic precast terrazzo equipped with a stainless steel rim guard. Water coolers are to be wall mounted and have a bubbler of vandal-proof design. Design fixtures for persons with disabilities per [Chapter 300](#) and as follows:

- In facilities having more than one toilet (for each gender), install plumbing fixtures in one toilet for each gender to accommodate persons with disabilities in wheelchairs where required.
- In facilities having only one toilet, install plumbing fixtures to accommodate persons with disabilities in wheelchairs in accordance with ANSI codes and the applicable provisions of the IBC.

(5) Mechanical

Design mechanical appliances, equipment and systems in accordance with the International Mechanical Code and the International Fuel Gas Code. Provide all HVAC systems with digital controls.

Design elevators and their components in accordance with ASME A17.1. Design elevators for a harsh waterfront environment. Specify elevators that are ADA accessible and have ability to accept a gurney. Provide stainless steel finishes in public areas. Dual elevators are strongly advised in high traffic areas.

(6) Natural Gas

Provide natural gas service based on mechanical design requirements. Consider gas service to the terminal supervisor office and the passenger building for heating. Stub-outs for future concessions may be provided as needed. Design parameters are set forth by Puget Sound Energy (PSE). Refer to [Chapter 560](#) for additional information.

350.07 Building Permits

Building permits are required for the main terminal buildings including passenger buildings, maintenance buildings, toll booths, and the terminal supervisor building. Building permits are not required for the overhead loading structure.

The Structure and Mechanical Design of Overhead Loading Structures shall be per AASHTO design criteria. Egress and accessibility issues shall be designed per the IBC and the requirements of [Chapter 300](#). Permitting limits shall be coordinated with the local Building Official.