

Appendix F.

Summary of Mitigation Measures

Summary of Proposed Mitigation Measures

Table F-1 summarizes the mitigation measures that would be implemented to ensure that construction and operation of the Build Alternative would not result in substantial impacts to the natural and human environment.

Table F-1. Summary of Proposed Mitigation Measures

Environmental Resource	Mitigation Measures
Air Quality	<p>Potential short-term impacts to air quality during the construction phase of the Build Alternative would be addressed by requiring construction contractors to implement the following mitigation measures to control dust and exhaust emissions from construction equipment and vehicles, consistent with OAR 340-208-0210, <i>Requirements for Fugitive Emissions</i>:</p> <ul style="list-style-type: none"> • Use of water or chemicals, where possible, for dust control during demolition of existing buildings or structure, construction operations, grading of roads, or clearing of land. • Application of asphalt, oil, water, or other suitable chemicals on unpaved roads, material stockpiles, and other surfaces that can create airborne dust. • Full or partial enclosure of materials stockpiles in cases where application of oil, water, or chemicals is not sufficient to prevent particulate matter from becoming airborne. • Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. • Adequate containment during sandblasting or similar operations. • Using covers on open-bodied trucks during transport of materials that are likely to become airborne. • Prompt removal of soil, dust, or other airborne-prone material from paved streets. <p>ODOT would also require construction contractors to comply with ODOT standard specifications Section 290, <i>Environmental Protection</i>, which includes the following:</p> <ul style="list-style-type: none"> • Limits the idling time of trucks and other diesel-powered equipment to 5 minutes when not in use or in motion • Requires truck staging areas to be located in areas where emissions would have a minimum impact on sensitive populations (such as schools and residences) • Requires the removal of all loose dirt and debris from trucks prior to leaving the construction areas. <p>In addition, road or lane closures would be restricted to non-peak traffic periods, when possible, to reduce the impact of construction delays on traffic flow and resultant vehicle emissions.</p>

Environmental Resource	Mitigation Measures
Aquatic Biology	<p>Potential impacts to water quality during construction that could potentially harm aquatic species would be avoided by requiring contractors to follow standard best management and erosion control practices in the ODOT Erosion Control Manual (2005), ODOT Standard Specifications (2018a), ODOT Boilerplate Special Provisions (2018b), and City of Portland stormwater requirements.</p> <p>Additional special provisions to protect sensitive species in and around areas of proposed in-water work areas are described in Appendix B (as an appendix to the <i>Water Resources Technical Report</i> (ODOT 2019c). These provisions are consistent with requirements in the FHWA FAHP PBO that would apply to construction and operation of the Build Alternative.</p> <p>ODOT would implement the following additional measures to protect fish and marine mammals:</p> <ul style="list-style-type: none"> • The Project would first avoid species presence by shortening the published in-water work window (i.e., July 1–October 31) by 25-days. • Minimization via BMPs would comply with the FAHP through use of a “bubble curtain” to reduce sound levels generated by in-water work. • Marine mammal observers would be used beginning in September and the Project would employ shutdowns if sea lions are observed in close proximity to in-water work areas. <p>The installation of approximately eleven 6-foot diameter piers would increase artificial fill within the functional floodplain or general scour defined within the FAHP and the ODOT FAHP User’s Guide. Per the FAHP, the Project must mitigate the artificial fill by removing an equivalent amount from the Project Area or an approved off-site location. To comply with this requirement, ODOT would remove, at minimum, an equivalent amount of fill from an off-site location within the lower Willamette River. Initial investigations demonstrate likely opportunities existing within that portion of the Willamette River that includes the Multnomah Channel. Otherwise ODOT would identify and seek approval from FHWA and NMFS for an off-site restoration project that would provide ecological function that meets or exceeds impacts to critical habitat, including its primary constituent elements, as defined by NMFS under ESA critical habitat designations.</p>
Archaeology	<p>If impacts to archaeological resources discovered during construction of the Build Alternative are unavoidable and would diminish integrity of a site that is eligible for the NRHP, the impacts would be resolved through implementation of an Inadvertent Discovery Plan and a Project-specific PA between FHWA, Oregon SHPO, and ODOT that outlines protocol for identifying, evaluating, and resolving impacts pursuant to 36 CFR 800.13 and 36 CFR 800.14.</p> <p>ODOT’s standard protocol in the event of an inadvertent discovery is as follows:</p> <ul style="list-style-type: none"> • All work would stop immediately in the vicinity of the find. • The area would be secured. • The project inspector, project manager, and ODOT archaeologist would be notified. • No work would resume until ODOT archaeology staff were on-site and able to assess the situation. • The ODOT archaeologist would consult with SHPO and appropriate tribal governments and determine an appropriate course of action. • Any specified areas for close monitoring or “no work” would be identified and shared with the project inspector, project manager, and appropriate contractor personnel. • In coordination with the ODOT archaeologist, the construction inspector would verify these identified areas (by engineer’s station if available), mark them on-site if appropriate, and communicate the location to the contractor in a written memo. • The contractor would follow ODOT Specification 290.51 and Special Provision 170.51 throughout the duration of construction.
Climate Change	<p>Large reductions in greenhouse gas emissions are required to mitigate global climate change. The continued emphasis on increasingly stringent fuel economy standards, vehicle inspection and maintenance programs, and the continued transition to cleaner low-carbon fuels for motor vehicles will contribute to a reduction in vehicle greenhouse gas emissions over the life of the Build Alternative. No additional mitigation is proposed.</p>

Environmental Resource	Mitigation Measures
Environmental Justice	<p>Potential impacts to minority or low-income populations, would be addressed by the following mitigation measures:</p> <ul style="list-style-type: none"> • ODOT would require construction contractors to follow ODOT standard construction specifications that limit vehicle and equipment idling time, prevent dirt and other materials from being tracked out of construction zones on vehicle tires, and minimizes the release of fugitive dust to address the potential for short-term exposure of EJ populations to noise, exhaust, and dust emissions during construction of the Build Alternative. • ODOT would coordinate with the City of Portland and TriMet to monitor the effects of relocated bus routes on EJ populations during the anticipated 4-year construction period. If it is determined that EJ populations are experiencing disproportionate impacts, ODOT, the City, and TriMet would coordinate with the community to identify alternative bus routes to better serve EJ populations, possibly including an increase in the frequency of service on those routes. • ODOT would coordinate with the City of Portland and members of the community to identify alternative routes for pedestrians and bicyclists to use during periods when key walking and biking routes are closed during construction. • ODOT would monitor the effects the temporary closure of key walking and biking routes may have on EJ populations. If it is determined that disproportionate impacts to EJ populations are occurring, ODOT would identify additional reasonable measures to reduce those impacts, including providing free shuttle service through areas of construction. • ODOT would provide substantial opportunities for participation in design and construction of the Build Alternative to qualified DBEs, including local small and minority-owned businesses.
Historic Resources	<p>ODOT construction specifications and best management practices would be followed to help minimize high noise levels during construction. Effect avoidance and minimization measures for potential construction-related vibration would include pre- and post-construction assessments, on-site monitoring during construction, and stop work authorization. If a resource is anticipated to be affected by vibration, a treatment plan consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, and thus consistent with the requirements of 36 CFR 800.5 (b), would be prepared to make the applicable repairs.</p> <p>ODOT and FHWA have developed a PA in consultation with the Oregon SHPO and other consulting parties to avoid and/or minimize the potential for Project-related vibration to seven historic properties as the extent of these potential effects would not be known prior to the implementation of the Project. With the execution of the PA, and the avoidance and effect minimization measures contained therein, the Project would result in no adverse effects to the characteristics that make historic properties within the API eligible for the NRHP.</p>
Land Use	<p>Because the Build Alternative complies with the City of Portland comprehensive plan, the Regional Transportation Plan, and applicable state land use laws, plans, and policies, no additional avoidance, minimization, or mitigation measures are proposed.</p> <p>If the Build Alternative is determined to be subject to the design overlay zone requirements of the Lloyd Subdistrict of the Central City Plan District or require review under the Willamette River Greenway provisions of the City of Portland zoning code, adjustments to its design may be necessary. Such design adjustments would be intended to help the Project comply with land use regulations, thus revisions to do so would not be expected to have adverse impacts on land use.</p> <p>All Project-related property acquisition and business relocation activities would be conducted in accordance with the Uniform and Real Property Act (49 CFR 24), ORS 35, and the ODOT Right of Way Manual (2016) to ensure fair and equitable treatment of all persons affected by the Build Alternative.</p>

Environmental Resource	Mitigation Measures
Noise	<p>ODOT would require the construction contractor to implement the following noise abatement measures to minimize the adverse effects of construction activity on the local community:</p> <ul style="list-style-type: none"> • No construction would be performed within 1,000 feet of an occupied dwelling unit on Sundays, legal holidays, or between the hours of 10:00 PM and 6:00 AM on other days, without the approval of the ODOT construction project manager. • All equipment used would have sound-control devices no less effective than those provided on the original equipment. No equipment shall have unmuffled exhaust. • All equipment would comply with pertinent equipment noise standards of the U.S. Environmental Protection Agency. • If a specific noise impact complaint occurs during the construction of the Build Alternative, one or more of the following noise mitigation measures may be required at the construction contractor's expense as directed by the ODOT construction project manager: • Stationary construction equipment would be located as far from nearby noise-sensitive properties as feasible. • Idling equipment would be shut off when not in use. • Construction operations would be rescheduled to avoid periods of noise annoyance identified in the complaint. • Nearby residents would be notified whenever extremely noisy work would be occurring. • Temporary or portable acoustic barriers would be installed around stationary construction noise sources. <p>Long-term traffic noise impacts from I-5 could be addressed by installing noise walls in the following locations:</p> <ul style="list-style-type: none"> • A 22-foot-high and approximately 1,101-foot-long noise wall extending along the eastern edge of I-5 ROW from approximately N Russell to N Flint to shield Lillis-Albina Park, Harriet Tubman Middle School, and a single-family residence (and historic building) near the intersection of N Tillamook and N Vancouver from highway noise. • A 23-foot-high and approximately 1,715-foot-long noise wall along the eastern edge of the I-5 ROW between NE Weidler and a point approximately 265 feet south of NE Holladay to shield an outdoor recreational area (a basketball court) at the Crown Plaza hotel; outdoor and indoor use areas at a medical facility; 104 residential balconies at the Calaroga Terrace building; 12 residential balconies at a new mixed-use building on the northeast corner of the intersection of NE Wasco Street and NE 2nd Avenue; and 5 residential balconies at the Milano Apartment Building. <p>Further evaluation of feasibility and reasonableness of these two noise walls will be made during final design, including a more detailed analysis of constructability, as well as the potential visual impacts of these walls on affected property owners and residents.</p>

Environmental Resource	Mitigation Measures
Right of Way	<p>Measures that would be considered by ODOT during ROW acquisition include the following:</p> <ul style="list-style-type: none"> • Ensure fair and equitable treatment of all persons affected by the Build Alternative by performing all ROW acquisition and relocation activities in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (49 CFR 24), ORS 35, and the ODOT Right of Way Manual (2016). • Conduct relocation interviews early in the ROW acquisition process to identify and address any special needs. • Provide interpreter and translation services for owners and tenants, as needed. • Work with design and construction to identify ways to minimize or mitigate impacts to individual properties through design and/or construction staging, such as through best management practices, temporary traffic control plans, and temporary access plans. • Explore the use of alternative acquisition methods such as early or advance acquisition for full site acquisitions where design cannot be changed. • Phase any work adjacent to schools, such as retaining wall and column work, to occur during summer months to avoid disruptions. • When the design level is more advanced, revisit whether construction activities would have an effect on adjacent properties and businesses with sensitive patients, medical equipment, or machinery. • Conduct early discussions with Oregon Department of State Lands and Union Pacific Railroad Company regarding ROW needs and processes for work near their lands, including new and existing structures over or adjacent to the Portland Harbor Superfund Site and the Union Pacific Rail Corridor.
Section 4(f)	<p>Measures that would be considered by ODOT to minimize impacts to Section 4(f) resources include the following:</p> <ul style="list-style-type: none"> • ODOT would require construction contractors to follow ODOT specifications and best management practices to minimize high noise levels in the vicinity of Section 4(f) properties during construction (ODOT 2019f). • ODOT would coordinate with FHWA and the Oregon SHPO to implement the avoidance and minimization conditions contained in the <i>Historic Resources Technical Report</i> (ODOT 2019i) and the PA described in Section 3.8.2.3 to avoid and/or minimize the potential for Project-related vibration impacts to the Travelodge at the Coliseum. • ODOT would execute an intergovernmental agreement between ODOT and the City of Portland to minimize impacts to the Eastlake Esplanade and Willamette River Greenway Trail from temporary closures during construction and the acquisition of the permanent surface easements. The public would have an opportunity to review and comment on the agreement, as well as the written concurrence received from the officials with jurisdiction over the property eligible for Section 4(f) protection (i.e., City of Portland Parks and Recreation). • ODOT would consider and further evaluate during final design the recommendations in the ODOT Noise Technical Report (ODOT 2019g) that noise walls be considered in two locations along the eastern edge of the I-5 that would shield Lillis-Albina Park and the Travelodge at the Coliseum from traffic noise.

Environmental Resource	Mitigation Measures
Socioeconomics	<p>The following best management practices would be implemented to reduce the potential for adverse socio-economic impacts during the construction phase of the Project:</p> <ul style="list-style-type: none"> • Temporary traffic management plans would be prepared to minimize construction impacts on I-5 operations and traffic delays on local streets. These plans would address all modes of transportation, including bicycles, pedestrians, and public transit. The plans would be prepared by the construction contractor(s), approved by ODOT and the City of Portland, and implemented by the construction contractor(s). • ODOT would require contractors to follow construction best management practices such as the Oregon Standard Specifications for Construction to minimize impacts to neighborhoods, businesses, schools, emergency responders, and utilities and public service providers located or operating in the API. • ODOT would coordinate with TriMet and Portland Streetcar to follow standard procedures regarding temporary impacts to transit services. This coordination would follow standard communication procedures for temporary transit stop closures or relocations, schedule changes, and route diversions that would be required during construction. • Construction activities near Harriet Tubman Middle School would be scheduled for summer months to avoid potential disruptions during the school year. <p>Public outreach to residents and businesses in the API conducted by ODOT and the City of Portland would continue throughout final design and construction.</p>
Transportation - Transit	<p>The Build Alternative is anticipated to increase bus travel times for some routes during the morning peak period. Implementing the relevant elements of TriMet’s Enhanced Transit Corridors Plan could reduce bus and streetcar travel times. The Enhanced Transit Corridors Plan projects include a range of capital and operational treatments throughout the system to improve transit capacity, reliability, and travel time. Within the API, these treatments include business access transit lanes, far-side bus stops, street/traffic modifications, curb extensions, and transit signal priority.</p> <p>To address short-term impacts during construction, TriMet has indicated that it may consider implementing bus route detours around the impacted area for the duration of the construction period to avoid multiple temporary changes for a single bus route. Discussion and negotiations would determine accommodations needed for streetcar service and comparable transit connections.</p>

Environmental Resource	Mitigation Measures
<p>Transportation - Active Transportation</p>	<p>Intersection design is a critical component of enhancing pedestrian and bicycle safety in the Build Alternative, and the designs for the impacted intersections in the API would strive for low stress levels for bicycle and pedestrian traffic. The intersection designs should consider the following, where applicable:</p> <ul style="list-style-type: none"> • Address potential bicycle/motor vehicle conflicts through proactive signing, striping, and signal phasing. Provide physical and temporal separation between modes at higher risk intersections (i.e., ramp locations, double turn lanes, weaving bus, and bike lanes). • Review, and remove if necessary, adjacent on-street parking to improve stopping and intersection sight distance. Follow the City of Portland’s Vision Clearance Guidelines for uncontrolled intersections. • Verify that intersection turning radii are consistent with desired interactions between motorists, pedestrians, and bicyclists. The turn radii and corresponding design speed should be consistent with the appropriate design vehicle. • Verify signal timing provides sufficient crossing time. • Provide two-stage bicycle turn boxes for left-turn movements at locations where bicycle routes intersect. • Provide protection and warning for bicycle and pedestrian movements during contraflow operations. <p>A Temporary Traffic Control Plan would be developed to minimize construction phase impacts to people who walk and ride bicycles by addressing the following priorities:</p> <ul style="list-style-type: none"> • Design detour routes for walking and biking that minimize out-of-direction travel • Design temporary detour facilities to provide separation from traffic and meet City of Portland standards • Where detour routes for bikeways would also carry detouring vehicular traffic, identify locations for traffic calming measures to ensure the speed and volumes of traffic do not exceed the Neighborhood Greenway thresholds

Environmental Resource	Mitigation Measures
Transportation - Safety	<p>Safety must be a consideration both during construction and for the long-term operation of the Project. Best practices can maximize both short-term and long-term safety are discussed below:</p> <ul style="list-style-type: none"> • Apply best practice design treatments on the local road system to integrate transit vehicles, separated bicycle lanes, pedestrians and motorists – specifically as this relates to the potential risks associated with right turn movements or other potential conflict points between modes. • The Oregon Bicycle and Pedestrian Plan and the City of Portland Portland Bicycle Plan for 2030, provide example best practices for transportation facility design that should be considered for this Project. <ul style="list-style-type: none"> ○ Oregon Bicycle and Pedestrian Plan https://www.oregon.gov/ODOT/Planning/Pages/Plans.aspx#accordion-collapse-ctl00_ctl00_ctl22_g_85545598_99ee_4a1b_acd0_f0bee524051a_ctl03 ○ Portland Bicycle Plan for 2030 https://www.portlandoregon.gov/transportation/article/289122 • Construction and traffic management plans should consider best practices and opportunities to reduce risk to construction workers and the traveling public. In Oregon between 2011 and 2015, there were an average of 488 work zone related crashes per year. The distribution of crash severity in work zones vs. non work-zones is very similar; however, there are slightly more fatal crashes in a work zone. • ODOT provides a variety of resources that describe best practices for work zone safety, including the following: <ul style="list-style-type: none"> ○ Traffic Control Plan Design Manual ○ Oregon Temporary Traffic Control Handbook ○ Work Zone Traffic Analysis Handbook ○ Transportation Management Plan Guidance Manual • These ODOT work zone safety documents are available at: https://www.oregon.gov/ODOT/Engineering/pages/index.aspx
Transportation – Traffic Operations	<p>The following mitigation strategies would be considered to avoid, minimize, and/or mitigate short-term construction impacts to highway drivers and local street road users in all modes of travel:</p> <ul style="list-style-type: none"> • Development of a comprehensive transportation management plan that documents construction staging and schedule, alternate routes for all modes of travel during road closure, and lane closure restrictions as well as TMOS. Specific TMOS elements may include public information and outreach to encourage changes in travel behavior, provision of real-time information to road users through the use of Intelligent Transportation System, and incident/emergency management to detect and remove incidents and restore traffic quickly. • In the Broadway/Weidler interchange area, streetcar operations during construction could be accommodated by including streetcar tracks in temporary structures that would be constructed to carry the east/west bicycle, pedestrian, and motor vehicle trips through the Broadway/Weidler corridor. To maintain streetcar connectivity, there would be a temporary "bus bridge" established during the construction of the temporary structure. Extensive TMOS strategies would be developed to minimize traffic disruption to other streets beyond the API. In addition, TriMet has indicated that it may consider longer-term temporary bus routes around the impacted area to avoid multiple route changes during a short period of time. Discussion and negotiations with TriMet and Portland Streetcar would determine accommodations needed for streetcar service and comparable bus routes. • Event access would be maintained with enhanced TMOS strategies before and after events. The Project would coordinate with the Moda Center, City of Portland, and Oregon Convention Center to avoid traffic disruptions during major events to the extent practicable. <p>The Build Alternative would affect event access. Several post-event circulation options were presented to the Moda Center and City of Portland (owners of the Veterans Memorial Coliseum) as potential mitigation for post-event operations. ODOT will coordinate with the Moda Center and the City to develop appropriate post-event mitigation measures.</p>

Environmental Resource	Mitigation Measures
Transportation - Access	<p>ODOT would work closely with businesses in the Project Area to implement strategies to limit disruption to business access. ODOT would use temporary signage as needed and attempt to maintain access to businesses during construction.</p> <p>Event access would be maintained during construction and may require an increased level of active traffic management before and after events. ODOT would coordinate closely with the Moda Center, City of Portland, and Oregon Convention Center to coordinate major traffic disruptions to avoid major events to the extent practicable.</p>
Utilities	<p>Proactively addressing special constraints or design considerations to avoid or minimize impacts to major utilities would occur during final design. In particular, impacts to the BES 264-inch sewer, sanitary pump station, and pump station piping would need to be avoided. Additionally, direct impact to the BES 56-inch sewer line that crosses I-5 at NE Hancock would be avoided or minimized. Although a cost has been included for impacts to these BES facilities, relocation of these utilities would not be a viable option. ODOT standard process in these instances is to prepare a "Design Acceptance Package" report in the initial stages of design for Project-critical success factors. Obtaining vertical and horizontal limits of these key underground utilities would occur in subsequent phases of the design process for the Build Alternative, and recommended actions to minimize utility conflicts would be included as part of the design acceptance package.</p> <p>Proper coordination and the use of standard construction procedures and techniques would minimize disturbance to system users and avoid damage or impacts to existing facilities that are deemed, during final design, to not require relocation or upgrades. Typically, new facilities such as poles or ducts are installed, and then service is switched over to the new facilities, thereby minimizing any disruption of service to the utility users.</p> <p>Utility coordination would occur in accordance with the ODOT Right of Way Manual, Chapter 10 (ODOT 2016) and is expected to occur early enough in the development of the Build Alternative to allow new or relocated utilities to be brought on-line prior any major disruptions from the Build Alternative. Compliance with ODOT guidance should minimize or avoid disruption in service to the utility providers or users. Relocation plans would be prepared, and service disruptions approved by affected utility providers before construction begins. Coordination would occur with utility owners to ensure that contingency plans for management of potential utility service disruptions during construction are accommodated.</p>
Water Resources	<p>Potential impacts to water quality during construction would be avoided by requiring contractors to follow standard best management and erosion control practices in the ODOT Erosion Control Manual (2005), ODOT Standard Specifications (2018o), ODOT Boilerplate Special Provisions (2018p), and City of Portland stormwater requirements.</p>

Notes: API = Area of Potential Impact; BES = Portland Bureau of Environmental Services; CFR = Code of Federal Regulations; DBE = Disadvantaged Business Enterprise; EJ = Environmental Justice; FAHP = Federal-Aid Highway Program; FHWA = Federal Highway Administration; NB = northbound; NRHP = National Register of Historic Places; OAR = Oregon Administration Rules; ODOT = Oregon Department of Transportation; ORS = Oregon Revised Statutes; PA = Programmatic Agreement; PCB = polychlorinated biphenyl; PBO = Programmatic Biological Opinion; ROW = right of way; SB = southbound; SHPO = State Historic Preservation Office; TMOS = transportation management and operation strategies.