REVISED CLIMATE CHANGE SUPPLEMENTAL TECHNICAL REPORT

Oregon Department of Transportation

December 5, 2023

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Executive Summary

This Climate Change Supplemental Technical Report provides updated analysis to document the changes to the I-5 Rose Quarter Improvement Project and its effects on climate change since publication of the 2019 Climate Change Technical Report. This supplement provides updates to climate change policies and greenhouse gas (GHG) emissions analyses for the existing conditions (2017), No-Build Alternative (2045), and Revised Build Alternatives (2045) using updated emissions models. **New text inserted since the 2022 Land Use Supplemental Technical Report is shown in bold text.**

Global climate change is the cumulative result of numerous emissions sources contributing to global atmospheric GHG concentrations. There is presently no recognized scientific methodology for attributing specific climatological changes to the emissions resulting from a particular transportation project. The possible climate change impacts that could result from the Revised Build Alternative are described in terms of potential increases in GHG emissions relative to existing conditions (2017) and the No-Build Alternative (2045).

In general, decreases in annual project GHG emissions are predicted over time (an approximate 20 percent decrease relative to the existing conditions) because of changes in vehicle technology over time. The Revised Build Alternative **design options** would have a slightly **lower** level of emissions (1 **to 3** percent) in 2045 relative to the No-Build Alternative in 2045. Compared to the Build Alternative 2045 emissions presented in the 2019 Climate Change Technical Report, emissions under the Revised Build Alternative **design options** 2045 conditions would **range from 0.**3 **percent lower under the 2-Way Ramsay Design Option to 1.4** percent higher **under the 2-Way Wheeler Design Option**. Part of **these differences are** a result of the emissions model update that affects how GHG emissions are calculated. Based on model runs of the No-Build Alternative, approximately 2.4 percent of the emissions **differences** may be attributed to the emissions model updates. The remaining difference can be attributed to changes in traffic flow between the **Build Alternative and the two Revised Build Alternative design options.**

The large decreases predicted in annual project emissions from existing to future year is because of federal, state, and local efforts to develop more stringent fuel economy standards, and transition to cleaner, low-carbon fuels for motor vehicles. These programmatic reductions far outweigh differences attributable to the Revised Build Alternative relative to the No-Build Alternative.

1.0 INTRODUCTION

The I-5 Rose Quarter Improvement Project (Project) Environmental Assessment (EA) was released in February 2019. The Federal Highway Administration (FHWA) published a Finding of No Significant Impact (FONSI) and Revised EA (REA) for the Build Alternative on November 6, 2020. Since the issuance of the FONSI, the Oregon Department of Transportation (ODOT) has made changes to the design of the proposed Build Alternative to create a Revised Build Alternative and re-evaluated the changes in the context of the FONSI/REA. At the conclusion of the re-evaluation, FHWA and ODOT agreed that the design changes require additional analyses beyond what was presented in the REA, and FHWA rescinded the FONSI on January 18, 2022. **ODOT prepared a Transportation Safety Supplemental Technical Report, which was published with the I-5 Rose Quarter Improvement Project Supplemental Environmental Assessment (SEA) on November 15, 2022. In response to public comments received on the SEA, ODOT refined the design of the Revised Build Alternative. This Revised Transportation Safety Supplemental Technical Report reflects changes to the evaluation of the Transportation Safety impacts based on those design refinements, which are described below in Section 2.0. All updated information is shown in bold text.**

2.0 BUILD ALTERNATIVE DESIGN CHANGES

Changes to the Build Alternative include modification to the highway cover design and changes associated with advancements in other elements of the project design, some of which require expansion of the Project Area. This section describes the highway cover design changes and design changes that resulted from advancements in project engineering **and comments on the SEA**. The evaluation of these changes is presented in Section 6.2 of this supplemental technical report.

2.1 DESIGN PROCESS

Through 2021, ODOT facilitated an Independent Highway Cover Assessment, as directed by the Oregon Transportation Commission, that engaged the Project's advisory committees and community members in a series of collaborative workshops to explore the design opportunities for the highway cover. The purpose of the Independent Highway Cover Assessment was to understand **partner** goals and objectives within the Project Area, generate potential highway cover scenarios, and assess the impacts and benefits of these scenarios. The Independent Highway Cover Assessment team worked directly with local community members from the historic Albina neighborhood to understand how the highway cover design concepts might best serve the historic Albina community. The Project's Historic Albina Advisory Board (HAAB), Executive Steering Committee (ESC) and the Community Oversight Advisory Board (COAC) also provided input as part of the Independent Highway Cover Assessment process. These sessions explored potential opportunities for economic development in the Albina community and the highway cover design concepts.

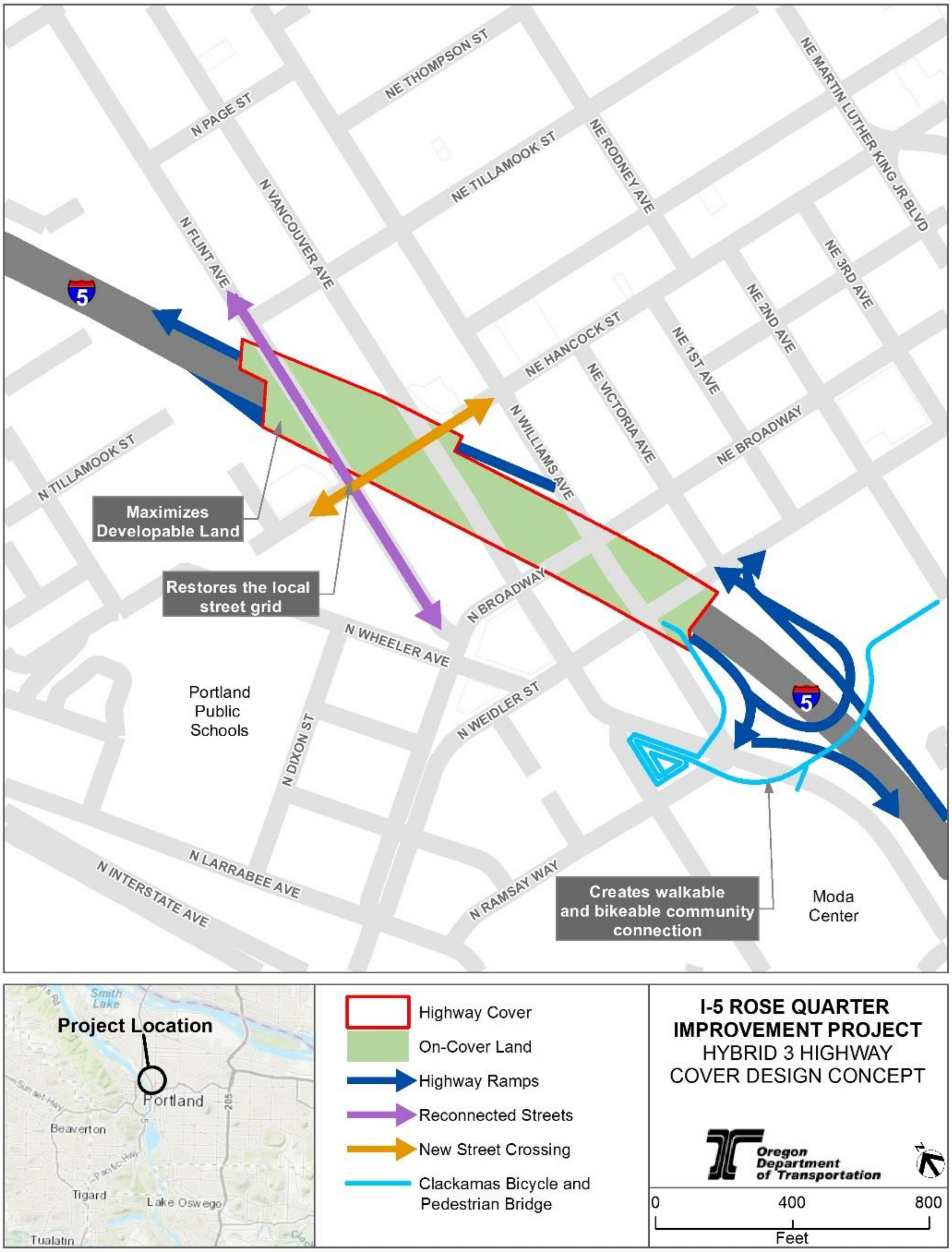
In July 2021, Oregon Governor Brown convened a series of meetings with Project **partners** and community organizations to discuss the design concepts developed in the Independent Highway Cover Assessment. In August 2021, the HAAB—as supported by the ESC and the COAC, and through the Governor-led process—recommended "Hybrid 3" as the preferred highway cover design concept (Figure 1). The Hybrid 3 highway cover design concept represents a proposed community solution to maximize developable space on a single highway cover. The Hybrid 3 highway cover design concept maintains the commitment for the Project to create opportunities for the local community to grow wealth through business ownership and long-term career prospects through the Project's Disadvantaged Business Enterprise and workforce program. Following the community and **partner** recommendations, in September 2021, the Oregon Transportation Commission directed ODOT to advance further evaluation of the Hybrid 3 highway cover design concept, with conditions related to the Project's funding process and other technical analyses.

In January 2022, Governor Brown entered into a Letter of Agreement with the City of Portland, Metro, and Multnomah County that demonstrated their shared understanding and collective support for the Hybrid 3 concept as part of the Project. The Letter of Agreement specifically highlights the desire to connect the Lower Albina neighborhood, create buildable space, and enhance wealth-generating opportunities for the community, while simultaneously addressing the area's transportation needs. Additionally, the Letter of Agreement supports the development of a process to define the future development vision for what could ultimately be built on top of the highway cover upon Project completion – this process is referred to as a Community Framework Agreement. The Letter of Agreement states that the City of Portland will lead a Community Framework Agreement process and that it should be between the City of Portland, ODOT, other state agencies and local jurisdictions as necessary, with the participation of organizations that represent the Albina community and Black residents. Any future real estate or open space development on top of the cover would require executing long-term air rights and lease agreements, and that any such actions or decisions are subject at all times to applicable local, state, and federal laws including but not limited to land use and NEPA processes.

In June 2022, ODOT and the City of Portland executed an Intergovernmental Agreement (IGA), building upon the January 2022 Letter of Agreement. The IGA further states that the City will lead the future highway cover land use, programming and development processes and development of a Community Framework Agreement, in consultation with the ODOT to ensure the highway, local streets and resulting land parcels within the Project are coordinated. As such, ODOT would construct the highway cover as part of the Project and the City of Portland would lead the process to define what is ultimately built on the new land created by the Project's highway cover. In the IGA, both ODOT and the City agreed that ODOT will retain ownership of the highway cover structure and the new developable area created on the highway cover structure upon Project completion.

FHWA and ODOT released the I-5 Rose Quarter Improvement SEA on November 15, 2022. In response to comments on the SEA, ODOT refined the design of the Revised Build Alternative. The sections below describe the highway cover design changes and the design changes that resulted from advancements in project engineering and **comments on the SEA and** are incorporated into the Revised Build Alternative.

Figure 1 Hybrid 3 Highway Cover Design Concept **with Ramp Reconfiguration**

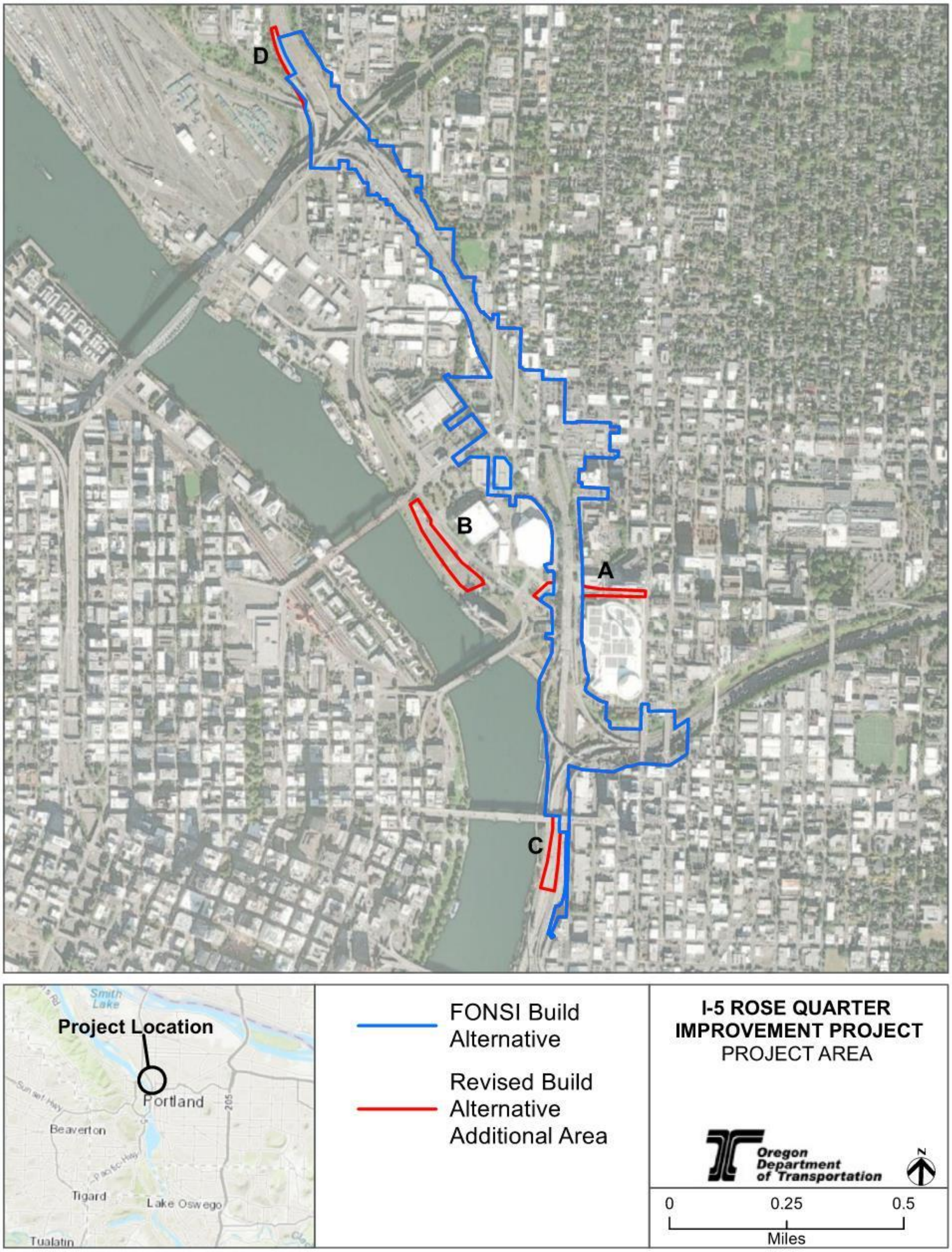


2.2 PROJECT AREA

The Project Area is defined as the area within which improvements are proposed, including where permanent modifications to adjacent parcels may occur and where potential temporary impacts from construction activities could result. As Project design information advanced, some changes required expansion of the Project Area presented in the REA and FONSI. In total, approximately 8.7 acres would be added to the Project Area. The changes are as follows, with letter references to the areas shown in Figure 2:

- A: Utility conflicts with Light Rail Transit (LRT) along NE Holladay Street between N Interstate Avenue and NE Martin Luther King Jr. Boulevard required expanding the Project Area by 1.9 acres to include additional overhead utility relocations (label A in Figure 2).
- B: An existing parking lot (known as Aegean Lot) south of N Interstate Avenue and the Broadway Bridge may be used for contractor staging during construction and is added to the Project Area (label B, Figure 2). ODOT identified this 4.3-acre construction staging area for contractor use based on its location, size, and suitability recognizing that, because of the urban setting and high-density land development in the construction area, it would be difficult for a construction contractor to find the space needed near or next to the project work areas for equipment staging, material storage, and the required co-location space for the contractor/construction personnel. This location meets all of the Project requirements: large level open space, proximity to the project work areas, and access for staging/storage of materials and equipment. Any materials stored in the area and site runoff would be subject to the same regulations as required throughout the project site.
- C: The southern end of the Project Area is expanded by 2.4 acres to include the portion of I-5 south of the Burnside Bridge proposed for a retrofit of the existing bridge rail, restriping the existing freeway, and installation of new guide signs (label C, Figure 2).
- D: At the northernmost end of the Project Area, a 1.1-acre area of ODOT right of way along the I-5 shoulders is now included in the Project Area for fiber optic conduit (label D, Figure 2).

Figure 2 Previous and Current Project Area.

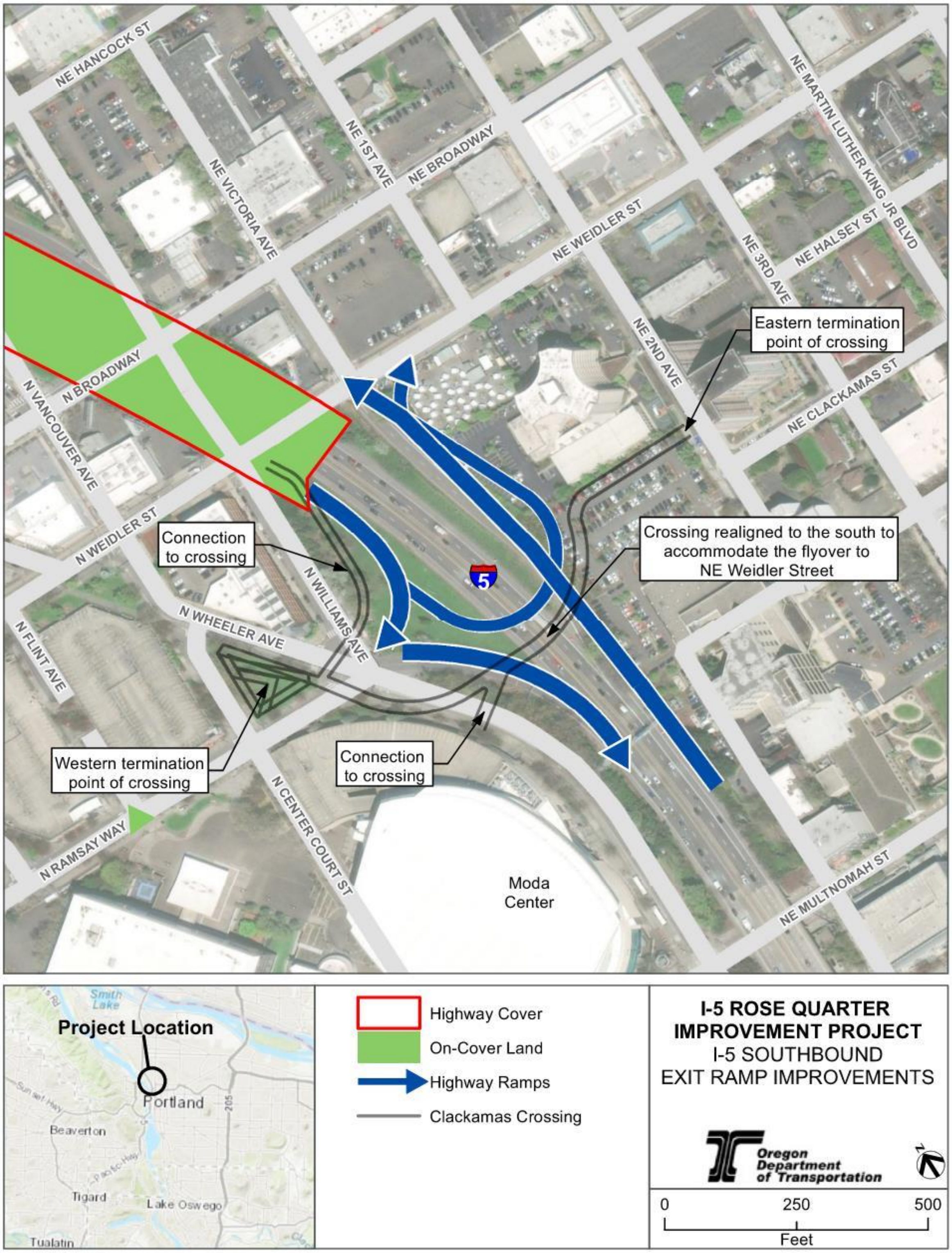


2.3 I-5 MAINLINE IMPROVEMENTS CHANGES

The Build Alternative included relocation of the I-5 southbound **entrance** ramp at N Wheeler Avenue to N/NE Weidler Street at N Williams Avenue via the new Weidler/Broadway/Ramsay highway cover, construction of auxiliary lanes and full shoulders (12 feet in width) on I-5 between I-405 and I-84 in both directions, and associated improvements to I-5 through the Project Area. The Revised Build Alternative includes the following changes to those elements of the Build Alternative:

- Move the I-5 southbound exit ramp termini from N Broadway to N Wheeler Avenue/ N Williams Avenue/N Ramsay Way (westbound) **and NE Weidler Street (eastbound). The exit ramp would divide westbound traffic from eastbound traffic as seen in Figure 3, with a single lane connection at N Wheeler Avenue/ N Williams Avenue/ N Ramsay Way and single lane bridge (flyover) over I-5 to connect with NE Weidler Street.**
- Reduce the freeway median shoulder through the entire Project Area, from 12 feet to 8 feet (4 to 5 feet within highway cover). The outside shoulder width of 12 feet remains unchanged.
- Relocate Noise Wall 24 from N Commercial Avenue near Harriet Tubman Middle School to attach to Walls 1 and 2 along the east edge of I-5.
- Keep the I-5 southbound entrance ramp from **N** Wheeler Avenue/ N Williams Avenue/ N Ramsay Way on the existing alignment rather than relocate it to parallel N Williams Avenue.
- On I-5 south of the Burnside Bridge: retrofit existing bridge rail, restripe freeway in both the northbound and southbound directions, and install new guide signs on an existing sign structure in the southbound direction.

Figure 3 I-5 SB Exit Ramp: Traffic Splitting Eastbound from Westbound Traffic

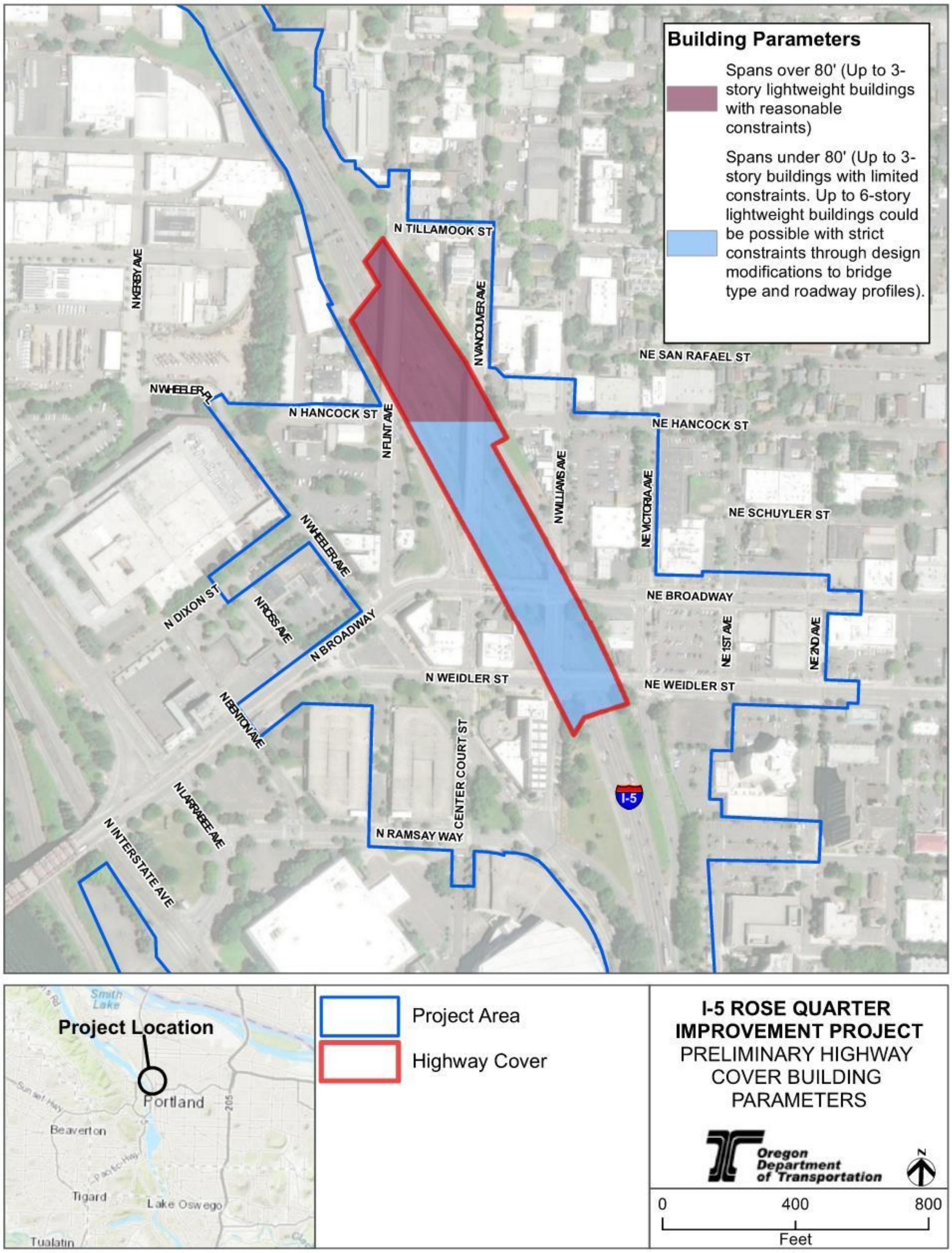


2.4 HIGHWAY COVER CHANGES

The Build Alternative included the construction of two highway cover structures over I-5 for roadway crossings and other purposes. The Revised Build Alternative, based on Hybrid 3 (see Figure 1), includes the following changes to the highway covers:

- Provide one continuous highway cover over I-5 rather than separate covers at the existing N Flint Avenue, NE Weidler Street, NE Broadway, N Williams Avenue, and the N Vancouver Avenue overcrossings.
- Expand the limits of the highway cover by approximately 35 feet to the west and approximately 400 feet to the north.
- Design and construct the highway cover to accommodate multi-story buildings. Due to span length and site constraints, design would constrain building size, location, type, and use on portions of the cover (Figure 4). Generally, buildings up to three stories could be accommodated throughout the highway cover. Buildings of up to six stories could be accommodated where span lengths are shorter than 80 feet with strict design constraints.

Figure 4 Building Parameters on the Cover



Future development on the highway cover would follow a community process according to the City-led Community Framework Agreement, as described in Section 2.1. ODOT anticipates this process could continue past completion of cover construction.

As part of the Project, ODOT anticipates programming interim uses on the highway cover for the time period between Project completion and when the City-led development process would be implemented. Upon Project completion, the added surface space created by the highway cover over I-5 could provide an opportunity for new and modern bicycle facilities, making the area more connected, walkable and bike friendly. It could also provide opportunity for various potential types of public spaces, to be precisely determined during the Project's final design phase and through robust community engagement, consisting of one or more of the following types of uses:

- Landscaped areas for **accessible,** active, and passi**ve** recreation and/or to provide a buffer, backdrop and visual comfort, such as gardens, lawns or planter beds.
- **Accessible** plazas and hardscaped open space for active and passive recreation, such as courts, plazas, splash pads, picnic areas, and community gathering spaces.
- **Accessible** interpretive signage, historical markers, landmarks and other areas of historical recognition and narrative such as art pieces and other historical signage/kiosks and pavement focused on the historic Albina community.
- Temporary and lightweight vertical features to support episodic, mobile commercial activities such as **accessible** food market shed, eating pavilion, food carts, or picnic venues.

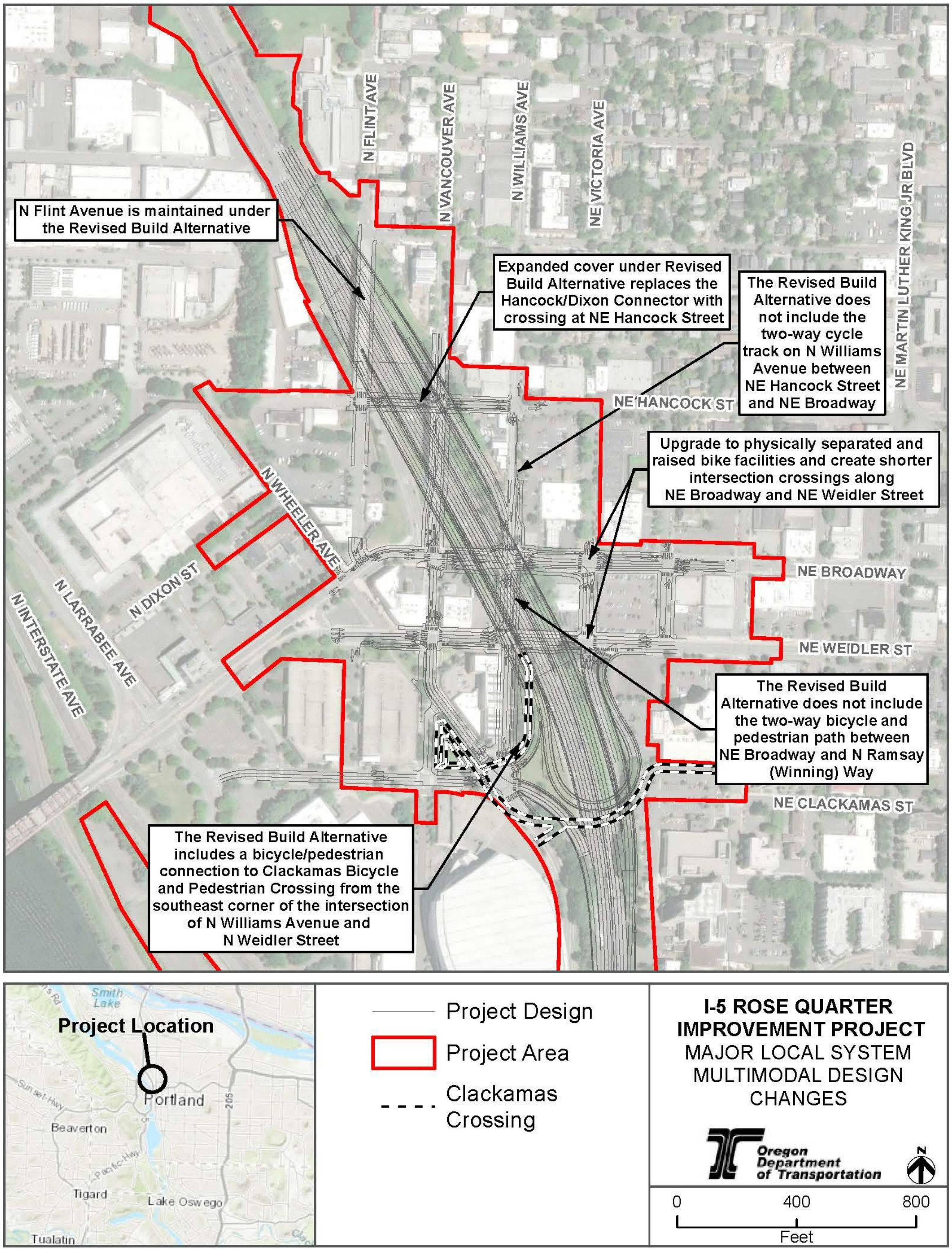
These features may be removed upon implementation of the development determined by the community process or may be incorporated into that development.

2.5 RELATED LOCAL SYSTEM MULTIMODAL IMPROVEMENTS CHANGES

The Revised Build Alternative includes the following changes to local system multimodal improvements to accommodate the Hybrid 3 design concept and subsequent design refinements (see Figure 5 below):

- **Construct** the **accessible** Clackamas Bicycle and Pedestrian Crossing **(a.k.a. Clackamas Crossing):**
  - **Realign the crossing to the south to accommodate the flyover to NE Weidler Street**
  - **Relocate the western termination point of the crossing to the triangle of land framed by N Center Court Street, NE Wheeler Avenue, and N Ramsay Way.**
  - **Provide the following connections to the crossing (to be confirmed in the final design phase):**
    - **From the southeast corner of the intersection of N Williams Avenue and N Weidler Street that spans over N Wheeler Avenue and connects to the crossing, and**
    - **From the Garden Garage, which is attached to the Moda Center**
  - Construct wider sidewalks and bike lanes at sidewalk level and physically separated from the roadway with a curb and provide protected bike signal phases at multiple intersections along NE Broadway and NE Weidler Street.
- Connect N Flint Avenue across I-5 from NE Tillamook Street to N Hancock Street and terminate it at N Broadway.
- Remove the NE Hancock Street overcrossing of I-5 from N Williams Avenue to N Dixon Street as proposed in the Build Alternative. NE Hancock Street would be extended across I-5 and reconnect to NE Hancock Street west of N Flint Avenue as part of the expanded highway cover. **Permitted traffic modes and roadway profile to be determined during design.**
- Remove the two-way cycle track on N Williams Avenue between NE Hancock Street and NE Broadway and a two-way bicycle and pedestrian path between NE Broadway and N Ramsay Way from the design and instead convert the on-road bike lane to a protected bike lane, with a transition to the existing on-road bike lane at or near NE Hancock Street (to be confirmed in the final design phase).

Figure 5 Major Local System Multimodal Design Changes

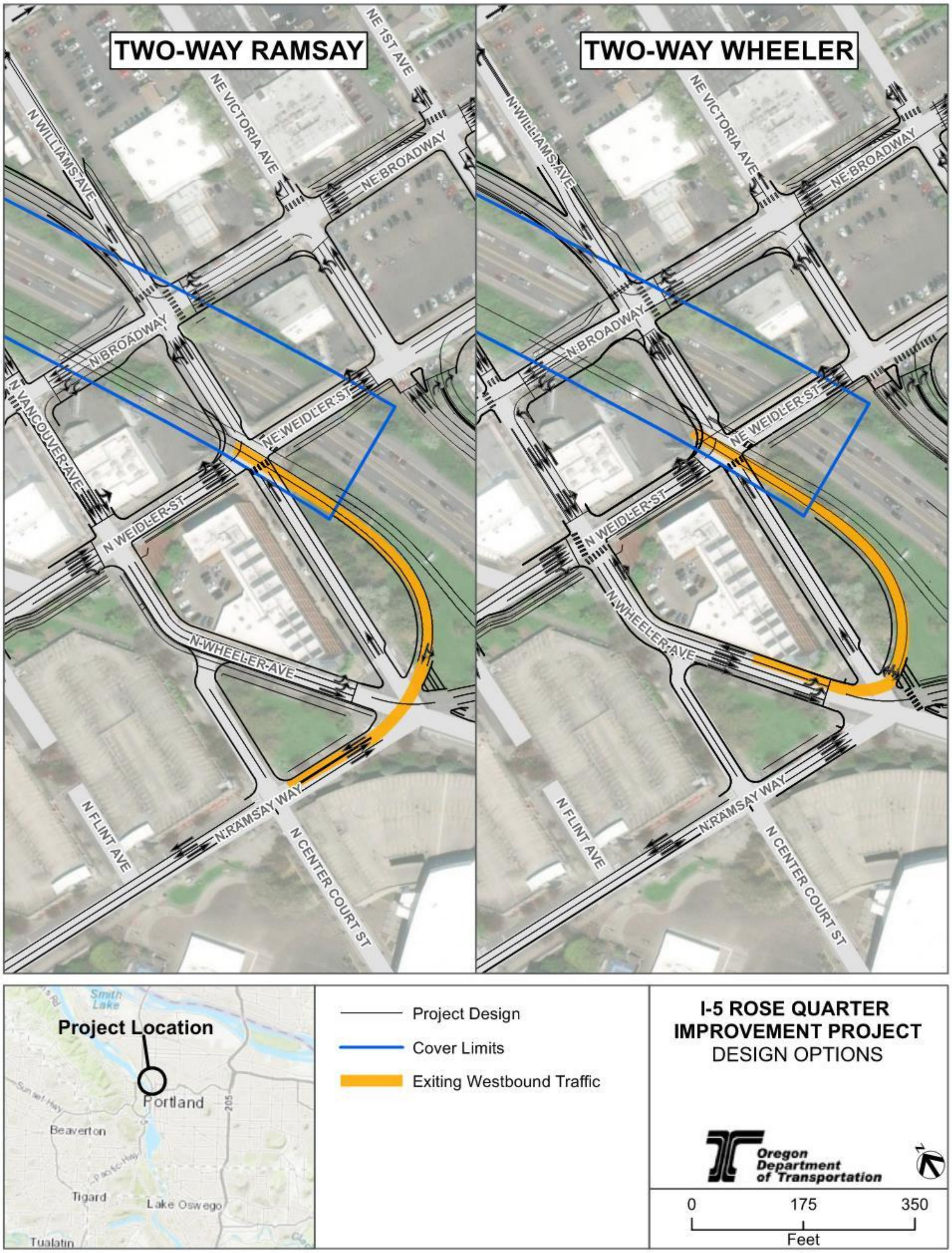


To accommodate I-5 southbound traffic exiting at N Wheeler Avenue/ N Williams Avenue/ N Ramsay Way, ODOT is considering two design options, both of which are evaluated in this report (Figure 6):

- **2-way Ramsay Design Option - Convert N Ramsay Way between N Center Court Street and NE Wheeler Avenue from an eastbound one-way facility to a two-way facility.**
- **2-way Wheeler Design Option - Construct a new northbound travel lane on NE Wheeler Avenue between N Broadway and N Ramsay Way and maintain the three existing southbound travel lanes between N Weidler Street and N Ramsay Way.**

Both design options also include a left turn movement from the I-5 southbound exit ramp to southbound N Williams Avenue. This movement was previously accommodated via N Wheeler Avenue/ N Vancouver Avenue between N Broadway and N Ramsay Way.

Figure 6 Design Options for I-5 SB Exit Ramp: Traffic Heading West



3.0 REGULATORY FRAMEWORK

The regulatory framework for assessing potential climate change impacts has changed since the publication of the 2019 Climate Change Technical Report. Changes to federal and state regulations addressing climate change are summarized in the subsections that follow.

3.1 FEDERAL

As noted in the 2019 Climate Change Technical Report, efforts to affect climate change typically occur programmatically at national, state, or regional levels as opposed to the project level. As was the case then, there are currently no federal laws or regulations specifically addressing climate change or GHG emissions controls for transportation projects at the project level. Additionally, no national standards have been established for nationwide mobile-source GHG reduction targets, nor has the United States Environmental Protection Agency (EPA) established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for carbon dioxide (CO_2) under the Clean Air Act (42 United States Code [USC] 7401 et seq.).

3.1.1 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) (42 USC Part 4332) requires federal agencies to assess the environmental effects of their proposed actions prior to deciding on the action. According to the Council on Environmental Quality (CEQ), climate change is a fundamental environmental issue, and its effects fall squarely within NEPA's purview. In addition, Federal courts consistently have held that NEPA requires agencies to disclose and consider climate impacts in their reviews.

CEQ guidance regarding NEPA and climate change has shifted relatively frequently in recent years:

- August 1, 2016 - The CEQ issued the Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews (2016 CEQ Guidance) to assist Federal agencies in their consideration of the effects of GHG emissions and climate change pursuant to NEPA.
- April 5, 2017 - The CEQ withdrew the 2016 CEQ Guidance.
- June 26, 2019 - The CEQ issued Draft National Environmental Policy Act (NEPA) Guidance on Consideration of Greenhouse Gas Emissions (GHG) (2019 Draft CEQ Guidance).
- February 19, 2021 - The CEQ rescinded the 2019 Draft CEQ Guidance and is reviewing, for revision and update, the 2016 CEQ Guidance.

As of **August 2023**, the FHWA has not issued final guidance addressing climate change or GHG emissions in NEPA reviews. In the interim, **while the CEQ reviews the interim National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change from February 2023**[1], agencies are **still** directed by the CEQ notice of rescission (February 2021) to "consider all available tools and resources in assessing GHG emissions and climate change effects of their proposed actions, including, as appropriate and relevant, the 2016 GHG Guidance".

3.2 STATE

The following state directives, polices, plans, and guidance support ODOT's role in addressing climate change:

- Oregon Department of Transportation Air Quality Manual (ODOT 2018)

  The ODOT Air Quality Manual provides guidance for calculating GHG emissions associated with ODOT projects.

- Executive Order 20-04 Directing State Agencies to Take Actions to Reduce and Regulate Greenhouse Gas Emissions (State of Oregon 2020)

  EO 20-04 directs state agencies to take actions to reduce and regulate greenhouse gas emissions and establishes new science-based emissions reduction goals for Oregon. The goals include reducing pollution to at least 45 percent below 1990 emissions levels by 2035 and to at least 80 percent below 1990 emissions by 2050. This is a change from Oregon's previous emission reduction goals of reducing emissions 10 percent below 1990 levels by 2020 and 75 percent by 2050.

- 2021 – 2023 Strategic Action Plan (SAP) (ODOT 2021)

  The SAP identifies 3 strategic priorities of Equity, Modern Transportation and Sufficient and Reliable Funding to inform ODOT's work, guide decision-making, and act as objectives against which the agency holds itself accountable. These priorities are interrelated, overlapping, and intended to identify specific actions that lead to concrete, tangible outcomes. Climate Equity and Climate Change are two of the goals associated with these priorities and reducing ODOT's carbon footprint is one of the 10 outcomes associated with the goals and priorities.

- ODOT Climate Action Plan 2021 - 2026 (ODOT 2021)

  The Climate Action Plan is ODOT's 5-year plan to address the impacts of climate change and extreme weather on the transportation system. The plan includes actions ODOT is taking between 2021 and 2026 to reduce greenhouse gas emissions from transportation,

[1] *https://www.energy.gov/nepa/articles/ceq-interim-guidance-greenhouse-gas-emissions-and-climate-change-january-9-2023*

address climate justice and make the transportation system more resilient to extreme weather events.

- State Agency Climate Change Adaptation Framework (Oregon Department of Land Conservation and Development 2021)

  The 2021 Oregon Climate Adaption Framework explores the impacts of climate change in Oregon and identifies how state agencies can effectively respond to them. The Framework was prepared by a work group of 24 state agencies, coordinated by the Department of Land Conservation and Development. Framework recommendations are designed to strengthen interagency coordination and consideration of equity, diversity, and inclusion in program planning and delivery.

- Oregon Climate Equity Blueprint (State of Oregon 2021)

  The Oregon Climate Equity Blueprint provides a set of best practices to guide government decisions and tools for application of an "equity lens" during the design of state agency policies, processes, and programs to address climate change. The Blueprint was developed as part of the 2020 Climate Change Adaptation Framework update and can also serve as a stand-alone document to support agency staff in applying climate equity tools in their everyday work.

- **Statewide Transportation Strategy (State of Oregon 2013)**

  The Statewide Transportation Strategy (STS) is Oregon's roadmap to reduce emissions from the transportation sector. The STS examines all aspects of the transportation system, including the movement of people and goods, and identifies a variety of effective GHG emissions reduction strategies in transportation systems, vehicle and fuel technologies, and urban land use patterns. In 2018 the STS was adopted into ODOT policy by the Oregon Transportation Commission.

- **Climate Adaptation and Resilience Roadmap (State of Oregon 2022)**

  Policy and strategies to help ODOT institutionalize adaptation and resilience practices. Outlines a path forward for integrating climate change considerations into ways the agency plans for, invests in, builds, manages, maintains, and supports the multi-modal transportation system.[2]

[2] ***https://www.oregon.gov/odot/climate/pages/adaptation-and-resilience.aspx***

4.0 METHODOLOGY AND DATA SOURCES

The methodology and data sources are the same as those described in the 2019 Climate Change Technical Report with the following exceptions. First, the analysis used traffic data that was developed for the Revised Build Alternative **(both design options)** using the same methods described in the 2019 Climate Change Technical Report. Specifically, the roadway links, creation of speed data and Vehicle Miles Traveled (VMT) inputs were developed for the Revised Build Alternative and used in the GHG predictions. For additional detail on how traffic under the Revised Build Alternative would change relative to the Build Alternative through the region, refer to the Traffic Analysis Supplemental Technical Report (ODOT 2022). Second, the emission models were updated from MOVES2014a to MOVES3 (version 3.**0.3**) since the analysis conducted for the 2019 Climate Change Technical Report. Third, the Infrastructure Carbon Estimator (ICE) tool was updated (version 2.1.3) and adjusted to account for changes associated with the Revised Build Alternative. The analysis years are the same as those for the 2019 Climate Change Technical Report, specifically 2017 for the existing conditions and 2045 for the No-Build Alternative and Revised Build Alternative. Table 1 summarizes the MOVES county data manager inputs.

The model run specifications (runspecs) for each analysis year are as follows:

- Existing Conditions (2017)
  - I-5RQ_DPM_2017_All_Rds.mrs
  - I-5RQ_STD_2017_All_Rds.mrs
  - I-5RQ_ZEV_2017_All_Rds.mrs
- No-Build Alternative (2045)
  - I-5RQ_DPM_2045NB_All_Rds.mrs
  - I-5RQ_STD_2045NB_All_Rds.mrs
  - I-5RQ_ZEV_2045NB_All_Rds.mrs
- Revised Build Alternative (2045) **2-Way Ramsay Design Option**
  - I-5RQ_DPM_2045BD_2**Ramsay_All_Rds.mrs**
  - I-5RQ_STD_2045BD_**2Ramsay_All_Rds.mrs**
  - I-5RQ_ZEV_2045BD_2**Ramsay_All_Rds.mrs**
- **Revised Build Alternative (2045) 2-Way Wheeler Design Option**
  - **I-5RQ_DPM_2045BD_2Wheeler_All_Rds.mrs**

- **I-5RQ_STD_2045BD_2Wheeler_All_Rds.mrs**
- **I-5RQ_ZEV_2045BD_2Wheeler_All_Rds.mrs**

Appendix A provides the runspec settings for MOVES3.

Table 1 MOVES County Data Manager Inputs

Input Database Type	Data Source	Zip File Folder	Source File Name
Vehicle Type VMT	Input files provided by Metro, except VMT file was developed for the project for each year and case analyzed	2017 Rev 2045 NB Rev 2045 BD **Opt2-Way Ramsay** **2045 BD Opt2-Way Wheeler**	VMT
I/M Program	MOVES3 default	2017 Rev 2045 NB Rev 2045 BD **Opt2-Way Ramsay** **2045 BD Opt2-Way Wheeler**	IM_Prog_ Defaults.xls
Road Type Distribution	Input files provided by Metro	2017 Rev 2045 NB Rev 2045 BD **Opt2-Way Ramsay** **2045 BD Opt2-Way Wheeler**	RdTypeDist. xls
Source Type Distribution	Input files provided by Metro	2017 Rev 2045 NB Rev 2045 BD **Opt2-Way Ramsay** **2045 BD Opt2-Way Wheeler**	SrcTypeAge Dist.xls
Average Speed Distribution	Developed for Project by year, road type and vehicle type for four daily periods for each case	2017 Rev 2045 NB Rev 2045 BD **Opt2-Way Ramsay** **2045 BD Opt2-Way Wheeler**	AveSpdDist. xls
Fuel	MOVES3 Defaults adjusted for Biodiesel, existing 2017 Fuel Type 9 added, 2045 Fuel Types 3 and 9 added	2017 Rev 2045 NB Rev 2045 BD **Opt2-Way Ramsay** **2045 BD Opt2-Way Wheeler**	Fuel.xls Fuel_ZEV.xls (for ZEV runs only)
Meteorological Data	MOVES3 default	2017 Rev 2045 NB Rev 2045 BD **Opt2-Way Ramsay** **2045 BD Opt2-Way Wheeler**	Met.xls

Notes: I/M = inspection and maintenance; HPMS = High Performance Monitoring System
All input data remain unchanged relative to what was used in the 2019 Air Quality Technical Report except for the HPMS and speed data that are specific to the Revised Build Alternative. Files provided by Metro were for MOVES2014a/b and were updated using MOVES3 conversion tool. ZEV data is based on EPA defaults.

4.1 AREA OF POTENTIAL IMPACT

The area of potential impact (API) for climate change cannot be limited to the Project Area or its surroundings since atmospheric GHG concentrations result in climate change effects that manifest at global, regional, and local scales. Calculations of GHGs attributable to the Project are based on the roadway links that experience changes in average annual daily traffic, travel time, or delay by plus or minus five percent. This is the same API as used in the Air Quality Supplemental Technical Report.

4.2 RESOURCE IDENTIFICATION AND EVALUATION

The resource identification and evaluation for this supplemental analysis are the same as those included in the 2019 Climate Change Technical Report.

4.3 ASSESSMENT OF IMPACTS

The methodology for the assessment of impacts is the same as what was described in the 2019 Climate Change Technical Report; however, the models used in the assessment have been updated.

- Operational (tailpipe): The EPA-approved Motor Vehicle Emissions Simulator (MOVES) has been updated to MOVES3. One of the differences between the calculation methods in previous versions of MOVES compared to MOVES3 is that it accounts for higher emissions from methane (CH4) while also accounting for slight reductions in CO_2 associated with updated vehicle emissions data (EPA 2020). Emissions for the existing conditions (2017), the No-Build Alternative (2045), and the Revised Build Alternative (2045) were calculated using this model.
- Construction and Maintenance Activities: As with the 2019 Climate Change Technical Report, emissions were quantified using the FHWA ICE tool. Since the 2019 Climate Change Technical Report, the ICE tool has been updated from version 1 to 2.1.3. Appendix B includes data sources used for construction and maintenance emission estimates, which are the same as those used in the 2019 Climate Change Technical Report, other than the VMT used for construction delay.

Emissions of GHGs are reported as Metric Tons (MT) CO_2e per year.

4.4 CUMULATIVE IMPACTS

All GHG emissions contribute to climate change; however, GHG emissions cannot be directly linked to specific climate change effects at geographic locations. Instead, GHG emissions from individual sources around the globe contribute to global GHG concentrations in the atmosphere. Atmospheric GHG concentrations result in climate change effects that manifest at global, regional, and local scales. Climate change effects, therefore, cannot be attributed to any single project or action, but must be considered as an ongoing cumulative effect exacerbated by the GHG emissions from a large number of actions. To address this, the project-level GHG emissions, **including those from fuel cycle emissions and the emissions from construction and maintenance**, are addressed as a contribution to a cumulative impact and the GHG emissions associated with the Revised Build Alternative are compared to the No-Build Alternative to contextualize the difference of that contribution.

5.0 AFFECTED ENVIRONMENT

The affected environment is the same as was evaluated in the 2019 Climate Change Technical Report with the following updates. In 2021, the Intergovernmental Panel on Climate Change (IPCC) issued its updated report, Sixth Assessment Report (IPCC 2022). The general findings of this report as they apply to the Project are the same as those in the 2019 Climate Change Technical Report. Similarly, the State of Oregon issued the Fifth Oregon Climate Assessment Report (Oregon Climate Change Research Institute 2021) that also does not change the general discussion provided in the 2019 Climate Change Technical Report. Table 2 provides the summary of the calculated operational GHG emissions for the Existing Conditions (2017), comparing the results from the previous and updated emissions models.

Table 2 Operational GHG Emissions (MT CO_2e per year) for the Existing Conditions (2017)

Source	Existing Conditions 2017 (Using MOVES2014a)	Existing Conditions 2017 (using MOVES3)	% Change
Tailpipe	417,156	417,814	0.2%
Fuel Cycle	112,632	112,810	0.2%
Total	529,788	530,624	0.2%

Source: HMMH 2022
Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons

6.0 ENVIRONMENTAL CONSEQUENCES

6.1 NO-BUILD ALTERNATIVE

6.1.1 Direct Impacts

The description of the No-Build Alternative remains unchanged relative to what was discussed in the 2019 Climate Change Technical Report; however, the calculated GHG emissions changed as a result of using the EPA approved model, MOVES3. The estimate of GHG tailpipe emissions from the updated model are provided in Table 3. The GHG emissions from the 2019 Climate Change Technical Report are also provided in Table 3 to demonstrate how the model influences results. Updating the analysis with MOVES3 shows a slight increase in emissions for the existing conditions and No-Build Alternative relative to what was analyzed in the 2019 Climate Change Technical Report.

Table 4 shows the GHG emissions by roadway type (highway or surface streets) for the No-Build Alternative. Maintenance emissions, updated with the latest version of ICE, are provided in Table 5. Compared to the 2019 Climate Change Technical Report, the emissions are slightly lower.

Table 3 Operational GHG Emissions (Metric Tons [MT] CO_2e per year) for the Existing Conditions (2017) and No-Build Alternative (2045)

Source	REA Existing Conditions 2017 (Using MOVES2014a)	Existing Conditions 2017 (Using MOVES3)	% Change	2045 No-Build (Using MOVES2014a)	2045 No-Build (Using MOVES3)	% Change
Tailpipe	417,156	417,814	0.2%	326,762	334,718	2.4%
Fuel Cycle	112,632	112,810	0.2%	88,226	90,374	2.4%
Total	529,788	530,624	0.2%	414,988	425,092	2.4%

Source: HMMH 2022
Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons

Table 4 No-Build Alternative (2045) Operational GHG Emissions (MT CO_2e per year)

	Highway	Surface Streets	Total
Source	2045 No-Build	2045 No-Build	2045 No-Build
Tailpipe	170,831	163,886	334,718
Fuel Cycle	46,124	44,249	90,374
Total	216,955	208,135	425,092

Source: HMMH 2022
Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons

Table 5 No-Build Alternative (2045) Maintenance Generated Annual GHG Emissions (MT CO_2e per year)

Source	Total
Materials	0
Transportation	0
Construction	0
Maintenance	122
Total	122

Source: HMMH 2022
Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons

6.1.2 Indirect Impacts

The indirect impacts for the No-Build Alternative are the same as those evaluated in the 2019 Climate Change Technical Report.

6.2 REVISED BUILD ALTERNATIVE

This section describes the effects of the Revised Build Alternative **design options** on climate change based on the operational GHG emissions analysis.

6.2.1 Direct Impacts

GHG emissions for the Revised Build Alternative are summarized in Table 6, Table 7, and Table 8. Table 6 compares the 2019 Climate Change Technical Report Build Alternative (2045) to the Revised Build Alternative **design options (**2045). The changes in emissions are attributed to the model update to MOVES3 and different traffic patterns that would be present under the Revised Build Alternative **design options** (2045).

Table 7 provides the emissions by roadway type from MOVES3 (highway or surface streets) and compares the Revised Build Alternative **design options** to the No-Build Alternative. Table 8 provides the emissions for existing conditions (2017), No-Build Alternative (2045), and Revised Build Alternative **design options** (2045) with the percent change between each. The total 2045 Revised Build Alternative **design options** operational emissions are projected to result in a 1 **to 3** percent **de**crease when compared to the 2045 No-Build Alternative.

Overall, GHG emissions would **de**crease under the Revised Build Alternative **design options** slightly, and **these decreases are** associated with **moving** along I-5 more efficiently.

Table 6 Operational GHG Emissions (Metric Tons [MT] CO_2e per year) Revised Build Alternative (2045)

Source	2045 Build (Using MOVES2014a)	**2045 Revised Build 2-Way Ramsay (Using MOVES3)**	**% Change**	2045 Revised Build **2-Way Wheeler** (Using MOVES3)	% Change
Tailpipe	326,762	**325,688**	**-0.3%**	**331,438**	**1.4%**
Fuel Cycle	88,226	**87,936**	**-0.3%**	**89,488**	**1.4%**
Total	414,988	**413,624**	**-0.3%**	**420,926**	**1.4%**

Source: HMMH 2022
Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons

Table 7 Existing (2017), No-Build Alternative and Revised Build Alternative Operational GHG Emissions (MT CO_2e per year)

Condition/ Alternative	Road Type	VMT	CO2e (Metric Tons)
Existing 2017 (Using MOVES3)	Urban Unrestricted	114,458,250	225,203
	Urban Restricted	92,094,773	192,611
No-Build Alternative 2045 (Using MOVES3)	Urban Unrestricted	128,530,975	163,886
	Urban Restricted	95,261,267	170,831

Condition/ Alternative	Road Type	VMT	CO2e (Metric Tons)
Revised Build Alternative **2-Way Ramsay Design Option** (Using MOVES3)	Urban Unrestricted	**126,891,168**	**163,573**
	Urban Restricted	101,**102,035**	162,**115**
Revised Build Alternative 2-Way Wheeler Design Option (Using MOVES3)	**Urban Unrestricted**	**126,590,714**	**169,426**
	Urban Restricted	**101,175,300**	**162,012**

Source: HMMH 2022

Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons

Table 8 presents the estimated 2045 annual operational emissions of the Revised Build Alternative **design options** in comparison to the No-Build Alternative and existing conditions. The future condition (2045) under the No-Build Alternative and the Revised Build Alternative **design options** would have lower operational GHG emissions by approximately 20 percent **for the No-Build Alternative and 21-22** percent relative to the existing conditions (2017). **The difference between the annual GHG emissions in 2045 under the Revised Build and No-Build alternatives is small and within the level of variability of modeling results.**

Table 8 Total Operational GHG Emissions Comparison for Existing Conditions, No-Build and Revised Build Alternatives (MT CO_2e per year)

Source	Total GHG Emissions				**Percent Change (%)**				
	2017 Existing	2045 No-Build	**2045 Revised Build 2-Way Ramsay**	2045 Revised Build **2-Way Wheeler**	2017 to 2045 No-Build	2017 to 2045 Revised Build **2-Way Ramsay**	**2017 to 2045 Revised Build 2-Way Wheeler**	**2045 No-Build to 2045 Revised Build 2-Way Ramsay**	2045 No-Build to 2045 Revised Build **2-Way Wheeler**
Tailpipe	417,814	334,718	**325,688**	**331,438**	-20%	**-22%**	**-21%**	**-3%**	**-1%**
Fuel Cycle	112,810	90,374	**87,936**	**89,488**	-20%	**-22%**	**-21%**	**-3%**	**-1%**
Total	530,624	425,092	**413,624**	**420,926**	-20%	**-22%**	**-21%**	**-3%**	**-1%**

Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons. The slight difference between the Build and No-Build Alternatives is masked by rounding.

6.2.2 Construction and Maintenance Emissions

Construction and maintenance emissions for the Revised Build Alternative **design options** were calculated using the latest version of ICE. The construction emissions include an estimation of GHGs from traffic delays (usage) that are predicted to result from construction of the Revised Build Alternative. The delay emissions ("usage" in Table 9) were not evaluated in the 2019 Climate Change Technical Report and represent delays associated with the construction effort on I-5. Table 9 summarizes the results of the ICE calculations. Comparisons to the 2019 Climate Change Technical Report Build Alternative are not possible by source because the latest version of ICE aggregates emissions differently from the version of the model used in the 2019 Climate Change Technical Report analysis. Total construction and maintenance GHG emissions for the Build Alternative reported in the 2019 Climate Change Technical Report were 175 MT CO_2e per year, compared to **683** MT CO_2e per year for the Revised Build Alternative **design options** using the updated model. The delay emissions account for 378 MT CO_2e of the **683** total MT CO_2e, which were not included in the 2019 Climate Change Technical Report construction emissions analysis. If these emissions are excluded, the total for the Revised Build Alternative **design options are** reduced to 30**5** MT CO_2e, which would be **130** MT CO_2e greater than emissions of the Build Alternative described in the 2019 Climate Change Technical Report. This larger amount can be attributed to the change in inputs (i.e., larger highway cap) and updated calculation methods imbedded in the ICE calculation model. The inputs to the model are summarized in Appendix B.

Table 9 Revised Build Alternatives Construction and Maintenance Generated Annual GHG Emissions (MT CO_2e per year)

Source	Total
Materials	**89**
Transportation	6
Construction	**40**
Maintenance	170
Usage	378
Total	**683***

Source: HMMH 2022
Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons; Total non-annualized GHG construction emissions are estimated at 20,371 MT CO_2e

6.2.3 Indirect Impacts

The indirect impacts for the Revised Build Alternative are the same as was evaluated in the 2019 Climate Change Technical Report.

6.3 CUMULATIVE EFFECTS

The GHG emissions for the Revised Build Alternative **design options**, along with the incremental addition of GHG emissions from other past, present, and reasonably foreseeable future actions, contribute to the ongoing effect of climate change occurring on a global (rather than a local) scale. The total estimated GHG annual emissions for the Revised Build Alternative are **0.8 to 2.6** percent **less** than GHG emissions of the No-Build Alternative (see Table 10). **These emissions are slightly less for the 2-Way Ramsay Design Option** and slightly higher **for the 2-Way Wheeler Design Option** than what was evaluated for the Build Alternative in the 2019 Climate Change Technical Report. **The decrease relative to the No-Build Alternative** is attributed **to** traffic **under** the Revised Build Alternative **moving more efficiently along I-5**.

Table 10 Estimated Annual (2045) GHG Emissions (MT CO_2e per year)

Source	No-Build Alternative	**Revised Build Alternative 2-Way Ramsay**	Revised Build Alternative **2-Way Wheeler**
Operation	425,092	**413,624**	**420,926**
Construction and Maintenance	122	**683**	**683**
Total	425,214	**414,307**	**421,609**

Source: HMMH 2022
Notes: CO2e = carbon dioxide equivalent, GHG = greenhouse gas; MT = metric tons

Relative to global GHG emissions, this **de**crease in the GHG emissions for the Revised Build Alternative could be characterized as minor; however, transportation sources statewide were Oregon's largest GHG source in 20**2**1, representing approximately 3**5 percent** of the State's total GHG emissions (ODEQ 20**2**1). The second highest GHG source in 20**2**1 was from energy use by residential and commercial land uses **at 34 percent of the inventory**, with industry and agriculture accounting for **20 percent** and 11 **percent** of the State GHG emissions, respectively. Therefore, contributions of GHGs from transportation sources are currently a major component of statewide emissions and will remain so with or without implementation of the Revised Build Alternative.

As discussed in the 2019 Climate Change Technical Report, large reductions in GHG emissions would be required to mitigate global climate change. As such, project-level GHG emissions should be considered in the context of overall emission reduction goals. Oregon and ODOT are implementing programmatic strategies to reduce GHG emissions, including those discussed under the Regulatory Framework sections (Section 3) in this supplemental report and in the 2019 Climate Change Technical Report. These include Federal, State, and local strategies expected to reduce transportation sector GHG emissions through fuel economy standards, inspection and maintenance programs, and transition to cleaner, low-carbon fuels for motor vehicles. Large decreases in predicted GHG emissions from existing conditions to future conditions (2045) for both No-Build and the Revised Build Alternative are predicted as a result of these regulatory efforts (see Table 8).

6.3.1 Adaptation and Resilience

The State of Oregon and its government agencies, including ODOT, are committed to prioritizing activities that reduce emissions over the long term and provide opportunities to aid in climate adaptation and resilience (see policies in Section 3.2). Greenhouse gas emissions would be reduced under the Revised Build Alternative design options relative to the No-Build Alternative which would help to achieve the goals of these policies. Additionally, the use of low carbon materials and low carbon fuels represent additional approaches to reduce emissions in the long-term. Nevertheless, to reduce risk and address ongoing changes, ODOT will consider climate change in design, operations, maintenance, and project planning. Failure to adapt could lead to increased damage to the State's transportation systems, affecting people and the economy.

ODOT's Climate Adaptation and Resilience Roadmap (ODOT 2022) provides strategies on how the ODOT addresses increasing risks, such as very hot days, daily freeze/thaw cycles, very heavy precipitation, snow days and inland flooding that are associated with extreme weather and climate change. Projections indicate that temperatures will increase substantially by the 2050s and 2080s, leading to more frequent and intense extreme heat events, drier conditions, and more severe floods. Winter weather conditions causing transportation delays and closures are also expected to become more intense and unpredictable. The roadmap includes a statewide climate hazard risk assessment that identifies vulnerabilities and risks to the state's highway system. By 2050, 72 percent of Oregon's roadways are expected to be at high risk of inland flooding.

To improve climate resilience, many of the strategies in the roadmap would be applied to the Project including maintenance and operations, delivery, design and engineering, policy, and programs. Additionally, the roadmap aims to leverage funding opportunities, take advantage of new data and technological advancements, and learn from ongoing work to adjust plans. ODOT's "all-hands-on deck" approach involves internal and external engagement, including

discussions with Area Commissions on Transportation (ACTs) to incorporate local transportation context. Overall, the Project would be part of ODOT's roadmap which lays out a five-year plan to enhance its resilience to climate change, protect communities and infrastructure, and improve the state's transportation system in the face of climate-related challenges.

6.4 CONCLUSION

The 2045 GHG emissions from the Revised Build Alternative are estimated to be slightly **lower** (1 **percent to 3 percent**) than the No-Build Alternative. Large decreases in predicted GHG emissions from existing conditions to future conditions (2045) are the result of changes in vehicle emissions due to federal, state, and local efforts to develop more stringent fuel economy standards, inspection and maintenance programs, and transition to cleaner, low-carbon fuels for motor vehicles.

7.0 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

The State of Oregon is taking multiple steps to reduce GHGs statewide via various programs and initiatives. These programs and initiatives act to reduce transportation sources by encouraging electric vehicle use, shift from single passenger commuting to carpooling, mode shift from passenger vehicles to public transport and bicycles and/or pedestrian facilities, to name a few. Cumulatively these act to reduce GHG emissions statewide.

8.0 PREPARERS

NAME	DISCIPLINE	EDUCATION	YEARS OF EXPERIENCE
Scott Noel	Air Quality and Climate Change	• B.A. Geography and Environmental Planning	**23**
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Natalie Liljenwall	Air Quality and Climate Change	• B.S. Civil and Environmental Engineering • M.S. Civil and Environmental Engineering	**27**
Melanie Ware	Climate Change	• B.A. English	**16**

9.0 REFERENCES

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Appendix A MOVES Runspec Selections

Table 11 MOVES Runspec Selections

Input Name	Selection
Scale	• County
Calculation Type	• Inventory
Time Spans	• Analysis Years: 2017-existing, 2045-design year • Time Aggregation: All hours, weekdays
Months of Analysis	• January, April, July, October
Region	• County
Geographic Bounds	• Oregon, Multnomah County
Vehicles/Equipment	• Diesel Fuel: combination long-haul truck, combination short-haul truck, light commercial truck, passenger car, passenger truck, single unit long-haul truck, single unit short-haul truck • Ethanol (E-85): light commercial truck, passenger car, passenger truck • Gasoline: combination short-haul truck, light commercial truck, passenger car, passenger truck, single unit long-haul truck, single unit-short-haul truck • Electric vehicles
Road Types	• Urban restricted (highway), urban unrestricted (surface streets) • Rural restricted, rural unrestricted, and off-network inputs were excluded.
Processes	• running exhaust, crankcase running exhaust, evaporative permeation, and evaporative fuel leaks.
Pollutants	• Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O)
Input Data Sets	• Oregon Low Emitting Vehicles
Output	• Units: grams, million Btu, miles • Activity: distance traveled • By: day, county, pollutant and road type

Notes: Btu = British thermal unit; DPM = diesel particulate matter; FHWA = Federal Highway Administration; MOVES = Mobile Vehicle Emission Simulator; PM10 = coarse particulate matter; POM = polycyclic organic matter

Appendix B ICE Input

Table 12 ICE Inputs

Parameter	Revised Build Alternative	No-Build Alternative
Roadways		
Total Existing Centerline Miles	4.31	4.31
Total Newly Constructed Centerline Miles	**5.07**	0
Existing Roadway (Lane Miles)	12.6	12.6
Construct Additional Lane Interstates (Lane Miles)	4.3	0
Construct Additional Lane Principal Arterials (Lane Miles)	0.64	0
Bridges		
Number of Bridges/Overpasses (2-Span)	**1**	
Average Number of Lanes per Structure (2-Span)	**1**	
Number of Bridges/Overpasses **(Multi-Span)**	1	0
Average Number of Spans per Bridge **(Multi-Span)**	3	0
Average Number of Lanes per Structure **(Multi-Span)**	8	0
Construction Delay		
Preconstruction Baseline Year	2017	N/A
Construction Start Year	2024	N/A
2017 Average VMT	358,257	N/A
2024 Average VMT	362,640	N/A
2017 Average Daily Congested Speed (mph)	37	N/A
2024 Average Daily Congested Speed (mph)	32	N/A

Notes: Btu = British thermal unit; DPM = diesel particulate matter; FHWA = Federal Highway Administration; MOVES = Mobile Vehicle Emission Simulator; PM10 = coarse particulate matter; POM = polycyclic organic matter

ICE inputs were developed as part of the 2019 Climate Change Technical Report other than the highway cap geometry**, anchor flyover,** and construction delay data. The dimensions of the highway cap were provided by project engineers via the project description and the design itself. Average delay was previously excluded from consideration in the 2019 Climate Change Technical Report. The VMT was developed by using the average annual daily traffic presented in the 2019 Climate Change Technical report and by using the length of the project on I-5 where delays would mostly occur. The 2017 average speed was obtained from the traffic inputs to the GHG analysis for the existing conditions. Traffic engineers estimate that, on average, daily traffic speeds during congested periods would be 5 mph less than existing congested speeds during construction.

Project Inputs

Display result in 508 compliant format:	Yes
Tool Use	Planning

Hide Instructions	Yes
Infrastructure location (state)	OR
The lifetime of your plan or project (years)	30
Use custom electric emission profile (RPS)?	No

Bridges & Overpasses (On) | Culverts (Off) | Lighting (Off) | Parking (Off) | Roadways (On) | Vehicle Operations (On) | Roadway Rehabilitation (Off)

BRT (Off) | Light Rail (Off) | Heavy Rail (Off) | Pathways (Off) | Signage (Off) | Custom Pavement (Off)

Enter comments and comment titles. These will be displayed on the Summary Results worksheet.	Title: I5RQ Build Alternative	Title:	Title:
	Based on 2-Way Ramsay and 2-Way Wheeler Design (same for this purpose)		

Planning Summary of Inputs - See Individual Tabs for Details

Bridges & Overpasses

Bridge/Overpass Structure	Construct New Bridge/Overpass				Reconstruct Bridge/Overpass				Add Lane to Bridge/Overpass			
	Number of bridges & overpasses	Average number of spans per structure	Average number of lanes per structure	Total number of lane-spans	Number of bridges & overpasses	Average number of spans per structure	Average number of lanes recon-structed per structure	Total number of lane-spans	Number of bridges & overpasses	Average number of spans per structure	Average number of lanes per structure added	Total number of lane-spans
Single-Span		1		**0**		1		**0**		1		**0**
Two-Span	1	2	1	**2**		2		**0**		2		**0**
Multi-Span (over land)	1	3	8	**24**				**0**				**0**
Multi-Span (over water)				**0**				**0**				**0**

Specification
Baseline Energy Use and GHG Emissions
Mitigated Results
Results - Charts

Roadways

Roadway System	
Total existing centerline miles	4.31
Total newly constructed centerline miles	5.07

Roadway Projects

Facility type	Roadway System	Roadway Construction				
	Existing Roadway (lane miles)	New Roadway (lane miles)	Construct Additional Lane (lane miles)	Realignment (lane miles)	Lane Widening (lane miles)	Shoulder Improvement (centerline miles)
Rural Interstates						
Rural Principal Arterials						
Rural Minor Arterials						
Rural Collectors						
Urban Interstates / Expressways	12.6		4.3			
Urban Principal Arterials			0.64			
Urban Minor Arterials / Collectors						

Include roadway rehabilitation activities (reconstruct and resurface)	Yes
% roadway construction on rocky / mountainous terrain	0%

Specification
Baseline Energy Use and GHG Emissions
Mitigated Results
Results - Charts

Vehicle_Ops

Vehicle Operating Emissions

	Year		Avg Daily VMT on project	Average Daily (Congested) Speed (mph) (or NA)
	Default	Custom		
Project Opening Year	2024			
Project Interim Year	2029			
Project Design/Horizon Year	2054			

Construction Delay, Additional Emissions

	Year		Avg Daily VMT impacted by project	Average Daily (Congested) Speed (mph) (or NA)
	Default	Custom		
Construction start year	2024	2024	362640.6	32
Pre-construction (baseline) year	2023	2017	358257.0428	37
Project Opening Year	2024	2027		

Specification
Baseline Energy Use and GHG Emissions
Mitigated Results
Results - Charts