BROOKS INTERCHANGE AREA MANAGEMENT PLAN

I-5 Exit 263

November 2022

PREPARED FOR:

Oregon Department of Transportation

PREPARED BY:

David Evans and Associates, Inc.

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I-5 Exit 263

November 2022

PREPARED FOR:

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0 EXECUTIVE SUMMARY

0.1 Background

An Interchange Area Management Plan (IAMP) is an Oregon Department of Transportation (ODOT) long-term (20+ years) transportation facility plan.[1] Facility plans are one of the three levels of plans implemented by ODOT. The Oregon Transportation Plan is the highest level, providing overall goal and policy guidance for planning and development of the state's transportation system. "Mode and topic" plans, such as the Oregon Highway Plan (OHP), are the next level and provide more specific goals and policies for the entire state highway system. Facility plans apply these system policies to a specific area or segment of highway such as an interchange.

This IAMP for the Brooks Interchange Project establishes agreement between ODOT, local government, and stakeholders on the transportation solutions, policies, and actions needed to improve the interchange. This IAMP was prepared in accordance with the ODOT 2013 IAMP Guidelines and reflects close coordination between ODOT, Marion County, interchange area stakeholders, and the broader community. The IAMP identifies strategies to preserve and improve safety and capacity of the interchange.

0.2 Problem Statement

The Brooks Interchange structure was built in 1975. Since its construction, design criteria for the interstate, bridges, and entrance and exit ramps have changed with higher typical travel speeds and increased traffic volumes. In addition to its age and outdated design, the interchange's functional performance is substandard. Traffic volumes on the exit ramp from northbound Interstate 5 (I-5, Pacific Highway No. 001) to Brooklake Road exceed intersection capacity and occasionally queues back to the I-5 mainline. The grade of the Brooklake Road structure over I-5 is a potential safety concern as it restricts sight distance at both ramp terminals.

Land use in the area, including a truck stop and truck freight business, draws substantial large-truck traffic, resulting in frequent slow acceleration and turning movements that impact county roads and I-5. These congestion and safety concerns negatively impact the mobility of freight, agricultural goods, and passenger vehicles in the region.

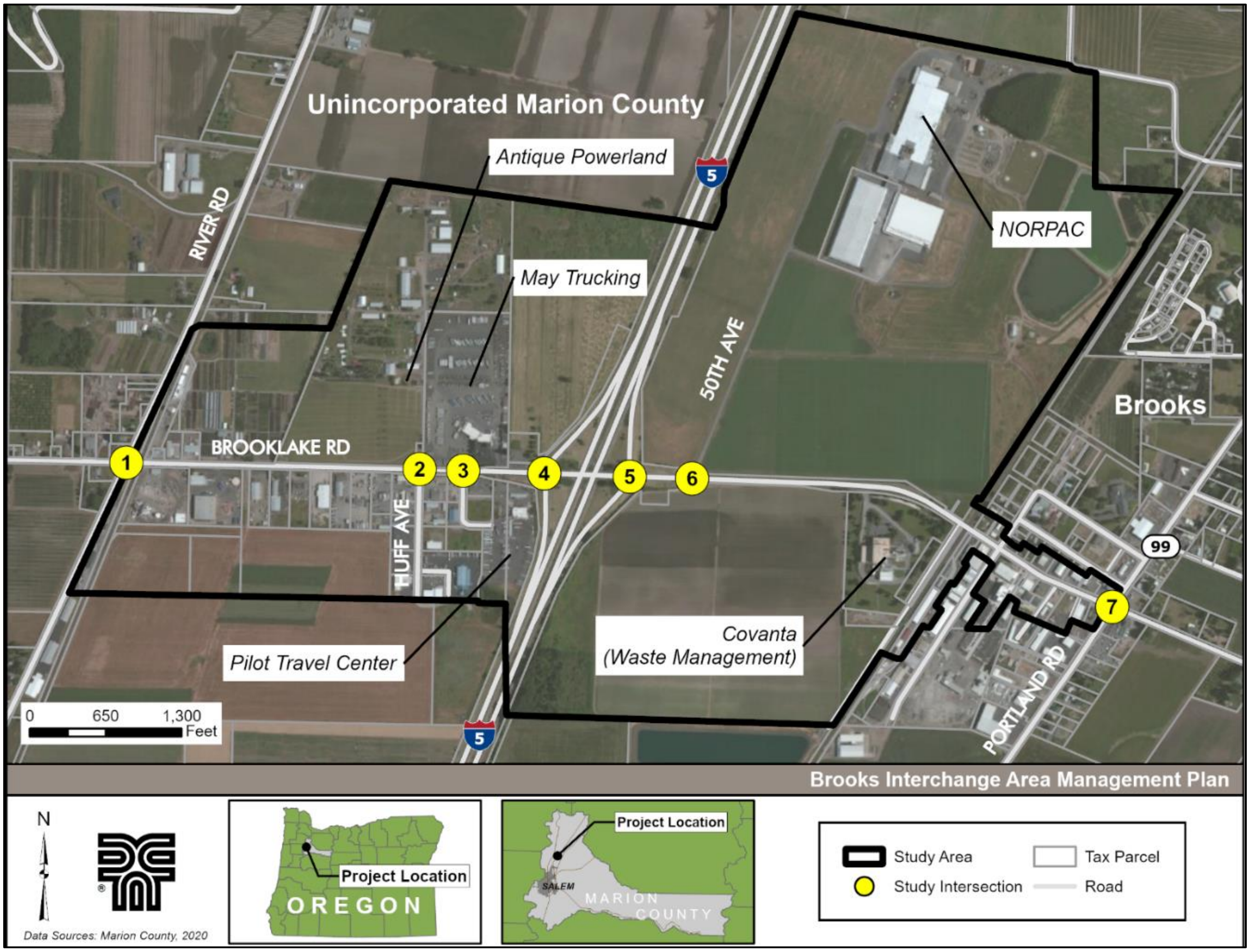
0.3 Study Area

The interchange management study area delineates the vicinity in which transportation facilities, land uses, and road approaches may affect operations at the interchange. As shown in Figure ES-0-1, the study area extends just over ½ mile west of the southbound ramp terminal to include the intersection of River Road and Brooklake Road. It also extends just over ¾ mile to the east of the northbound ramp terminal to the intersection of Portland Road (OR 99E, Pacific Highway No. 081) and Brooklake Road.

Although the boundaries of the study area concentrate around the interchange, the potential growth of adjacent communities and the metropolitan area to the south is also accounted for in future conditions. Land uses and population forecasts are based on the adopted Comprehensive Plan and Zoning for Marion County.

[1] Per Oregon Administrative Rule (OAR) 731-015

Figure ES-0-1. IAMP Study Area



0.4 Goal and Objectives

The goal of the Brooks IAMP is to develop a plan for improvements that can be implemented over time to address the safety, operational, and capacity challenges while maintaining efficient movement of passenger and freight traffic through the I-5/Brooks interchange area.

Based on this goal, and to be consistent with OHP policy[2] and the IAMP problem statement, a set of objectives were developed (right).

Objectives of the IAMP

- Protect the function of the Interchange and Brooklake Road.
- Develop concepts to improve safety and maximize operational efficiency of the freeway and interchange to address existing and future needs.
- Plan for future management of the interchange and adjacent land uses with the interchange management area.
- Develop an access management plan that provides for safe and acceptable operations on the transportation network and that moves toward meeting the access spacing standards prescribed in the OHP.
- Develop strategies that can be implemented in phases and limit "throw-away" improvements to the maximum extent feasible.

[2] Policy 3C of the OHP states, "it is the policy of the State of Oregon to plan for and manage grade-separated interchange areas to ensure safe and efficient operation between connecting roadways."

0.5 Evaluation of Interchange Options

The process of selecting a preferred design option for the Brooks Interchange started with an initial set of six different interchange design options that was reduced to two options after each concept was evaluated against the IAMP goals and objectives. After further study and review by the Consultant team and ODOT Region 2, two interchange design options emerged: a Tight Diamond Interchange and a Dogbone Interchange. This resulted in a Preferred Option and Supplemental Option.

0.5.1 Preferred Option

A Tight Diamond Interchange (TDI) was selected as the Preferred Option for the Brooks IAMP. The TDI maintains the familiar diamond shape interchange and installs coordinated traffic signals at the ramp terminals to efficiently move traffic through the interchange. As an alternate option, the ramp terminals could be connected to mimic the shape of a “dogbone” with two connected roundabouts that act as one. Both interchange options have operational and safety benefits and limit impacts to existing right of way.

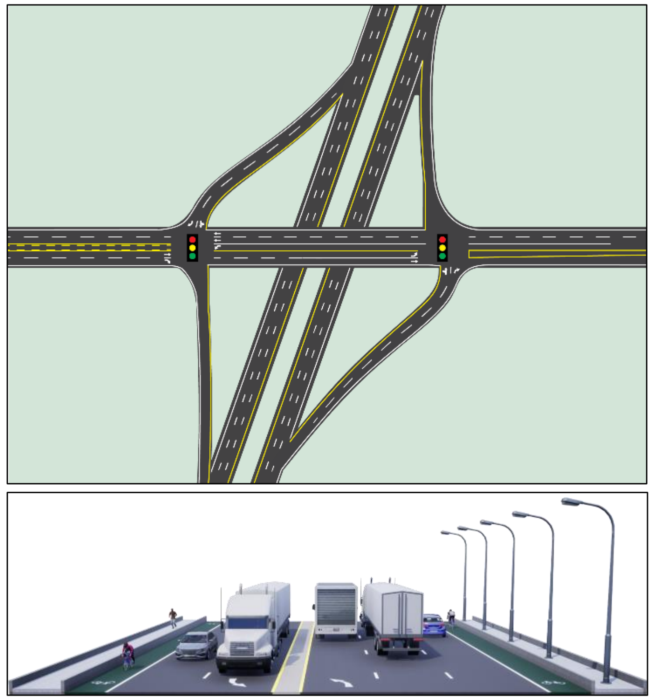


Figure ES-0-2. Preferred Option Conceptual Drawing

The Preferred Option consists of the following elements:

- Construction of a new TDI with new signalized intersections located at the northbound and southbound ramp terminals on Brooklake Road.
- Reconstruction of the I-5 ramps to match grades and add lanes for turning movement channelization at the signals. The exit ramps would be lengthened to meet Highway Design Manual (HDM) standards for deceleration, and the entrance ramps would also be lengthened to meet HDM standards for acceleration.
- Replacement of the Brooklake Road bridge over I-5 to improve the vertical grade and provide a wider cross section of Brooklake Road over I-5. The wider road would include dual westbound lanes, separate left-turn lanes (side-by-side) and a single eastbound through lane, with new bicycle and pedestrian facilities.
- Widening of Brooklake Road to five lanes between Huff Avenue and the I-5 southbound ramp intersection, including a new traffic signal at Huff Avenue. As part of preliminary engineering following the IAMP, an Intersection Control Evaluation will determine the most appropriate traffic control and will consider a traffic signal or a potential roundabout (as an alternative to a traffic signal) at the intersection of Brooklake Road and Huff Avenue.
- Widening and extension of Huff Avenue north of Brooklake Road to provide alternate access to May Trucking.
- Widening and extension of Huff Avenue south of Brooklake Road, with a new street connection between Huff Avenue (public) and Truckman Way (private) to provide alternate access to the Pilot station and parking.

The estimated construction cost is $59.8 million (assumes 2022 average bid item prices). The Preferred Option cost estimate is included in Volume 2, *Technical Memorandum #7*.

0.5.2 Supplemental Option

The Supplemental Option consists of the following elements:

- Construction of a new Dogbone interchange with teardrop roundabout intersections located at the northbound and southbound ramp terminals at Brooklake Road.
- Reconstruction of the I-5 ramps to match grades and realign lanes for turning movements to the roundabouts. The exit ramps would be lengthened to meet HDM standards for deceleration, and the entrance ramps would also be lengthened to meet HDM standards for acceleration.
- Replacement of the Brooklake Road bridge over I-5 to improve the vertical grade and provide a wider cross section of Brooklake Road over I-5. The wider road would include two lanes in each direction, with new bicycle and pedestrian facilities separated from the vehicle travel lanes.
- Widening of Brooklake Road to five lanes between Huff Avenue and the I-5 southbound ramp intersection, including a new traffic signal at Huff Avenue. As part of preliminary engineering following the IAMP, an Intersection Control Evaluation will be used to determine the most appropriate traffic control and will consider a traffic signal or a potential roundabout (as an alternative to a traffic signal) at the intersection of Brooklake Road and Huff Avenue.
- Widening and extension of Huff Avenue north of Brooklake Road to provide alternate access to May Trucking.
- Widening and extension of Huff Avenue south of Brooklake Road, with a new street connection between Huff Avenue (public) and Truckman Way (private) to provide alternate access to the Pilot station and parking.

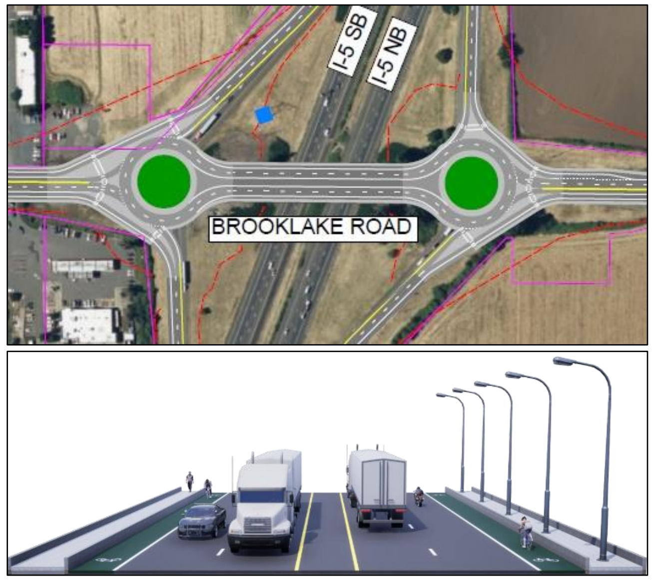


Figure ES-0-3. Supplemental Option Conceptual Drawing

The estimated construction cost is $70 million (assumes 2022 average bid item costs). There is opportunity to reduce cost during design refinement if slip lanes are not desired for all right-turns. The Supplemental Option cost estimate is included in Volume 2, *Technical Memorandum #7*.

0.5.3 Interim Improvements

As funding has not yet been identified to construct the Preferred Option of the IAMP, a phased approach is necessary to address congestion and safety concerns within the IAMP study area. A set of interim improvements were developed to be implemented in the near-term (assumed within 10 years) until funding becomes available in the future to construct the Preferred Option or Supplemental Option for the IAMP. The interim improvements are expected to improve operations at the interchange ramp terminals and improve safety by reducing the likelihood of traffic backing up onto the freeway mainline.

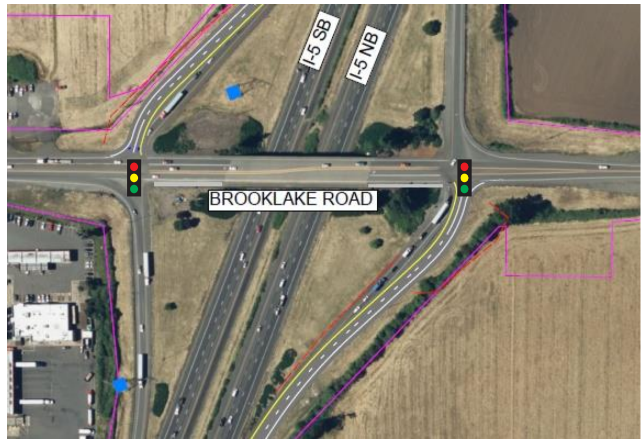


Figure ES-0-4. Interim Improvements Conceptual Drawing

The preliminary construction cost estimate for the interim interchange improvements is $7.4 million (assumes 2022 average bid item costs) and includes the following components:

- Formally stripe and provide storage for two-lanes on the southbound and northbound exit ramps.
- Grading improvements at ramp terminals and approaches to improve grade for freight turning movements.
- Signalize the northbound and southbound ramp terminals. This requires an Intersection Control Evaluation by ODOT.
- Add pedestrian pushbutton signals and ADA-compliant landing areas with the traffic signal, as well as sidewalk connections from the traffic signals to the sidewalk on the south side of the existing bridge.
- Lengthen and widen exit ramps to provide additional storage.

1 IAMP AND PROJECT DESCRIPTION

1.1 Background

The Brooks Interchange Area Management Plan (IAMP) looks at the Interstate 5 (I-5) interchange with Brooklake Road and the Brooklake Road corridor from River Road on the west to OR 99E on the east.

The corridor serves agricultural interests, freight and trucking-related businesses, small businesses and residential communities of Brooks-Hopmere, County commuter traffic accessing I-5, and regional community destinations such as Chemeketa Community College Brooks Campus and Willamette Mission State Park.

The primary objective of this plan is to assess existing and future traffic and safety conditions within the study area and identify potential solutions to these problems. The planning process involved state and local jurisdictions including Marion County, as well as community stakeholders and interchange users.

1.2 Study Area

The IAMP study area delineates the vicinity in which transportation facilities, land uses, and approaches may affect operations at the interchange. The boundaries of the management area for the IAMP extend a minimum of ½ mile in all directions and are large enough to "address both direct and indirect transportation and land uses." [3] The study area, shown in Figure 1-1, encompasses the existing interchange and the surrounding areas served by the rural interchange.

The study area extends just over ½ mile west of the southbound ramp terminal to include the intersection of River Road and Brooklake Road. It also extends just over ¾ mile to the east of the northbound ramp terminal to the intersection of Portland Road (OR 99E) and Brooklake Road. Most of the local traffic using I-5 Exit 263 passes through one of these two intersections. Understanding how these intersections operate and their relationship to the interchange traffic flow is a key part of the IAMP planning process. The seven study intersections are listed below and shown in Figure 1-1.

1. River Road at Brooklake Road
2. Huff Avenue at Brooklake Road
3. Truckman Way (Pilot Travel Center access) at Brooklake Road
4. I-5 Southbound Ramp Terminal at Brooklake Road
5. I-5 Northbound Ramp Terminal at Brooklake Road
6. 50th Avenue (NORPAC Access) at Brooklake Road
7. Portland Road (OR 99E) at Brooklake Road

The Brooks Interchange is also used for regional travel between I-5 and OR 99E and serves temporary detour routes when incidents occur on I-5. The detour routes are mapped in Marion County's Rural Transportation System Plan (TSP) (2005) and include "Primary" and "Alternate" detour routes on Brooklake Road between River Road and Portland Road (OR 99E), and on River Road and Portland Road (OR 99E) north of Brooklake Road. Portland Road (OR 99E) south of Brooklake Road is a "Primary" detour route. The adjacent interchanges on I-5 are at Exit 271 (Woodburn) nearly eight miles to the north, and at Exit 260 (Chemawa Road) approximately three miles to the south.

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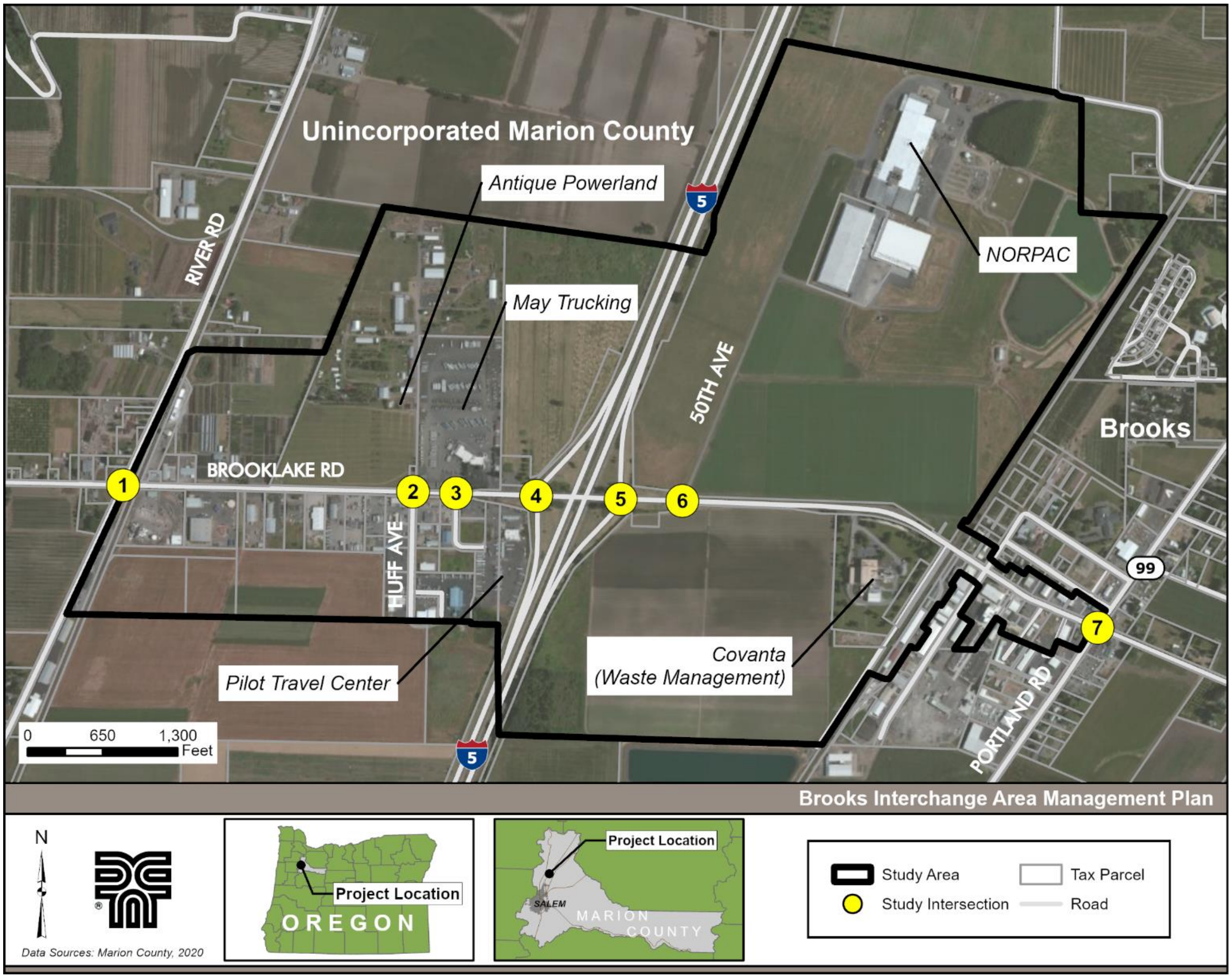
[3] Interchange Access Management Plan Guidelines, ODOT, April 2013.

Figure 1-1. IAMP Study Area



Note: Intersection numbers listed on previous page.

1.3 Purpose

This IAMP was prepared to evaluate how the existing interchange and surrounding area operate and what measures could be taken to keep it operating safely through the 20-year planning horizon. The primary objective of this project is to assess existing and future traffic and safety conditions within the study area and identify potential solutions to these problems. This plan will serve as a tool to preserve function and capacity of the interchange and ensure that the integrity of this publicly funded structure is maintained in a way that serves the public. Potential issues include business and driveway access, future development opportunities surrounding the interchange, and compatibility with a local vision for Brooks-Hopmere/Marion County residents.

The IAMP:

- Ensures the safe and efficient operation of the interchange area for all modes of travel through the 20-year planning horizon.
- Identifies transportation improvements, management strategies and land use/policy actions needed to support planned development.

1.4 Problem Statement

The Brooks Interchange structure was built in 1975. Since its construction, design criteria for the interstate, bridges, and entrance and exit ramps have changed with higher typical travel speeds and increased traffic volumes. In addition to its age and outdated design, the interchange's functional performance is substandard. Traffic volumes on the exit ramp from northbound I-5 to Brooklake Road exceed intersection capacity and occasionally queues back to the I-5 mainline. The sharp crest vertical curve on the Brooklake Road structure over I-5 restricts intersection sight distance at both ramp terminals, creating a potential safety concern. The 6% approach grades on each end of the structure also create operational issues at the freeway ramp intersections with increased stopping and acceleration distances that particularly affect freight.

Land use in the area, including a truck stop and truck freight business, draws substantial large-truck traffic, resulting in frequent slow acceleration and turning movements that impact county roads and I-5. These congestion and safety concerns negatively impact the mobility of freight, agricultural goods, and passenger vehicles in the region.

1.5 Goal and Objectives

Figure 1-2 summarizes the goal and objectives of the Brooks IAMP.

Figure 1-2. Brooks IAMP Goal and Objectives

Goal

Develop a plan for improvements that can be implemented over time to address the safety, operational, and capacity challenges while maintaining efficient movement of passenger and freight traffic through the I-5/ Brooks interchange area.

Objectives

- Protect the function of the Interchange and Brooklake Road.
- Develop concepts to improve safety and maximize operational efficiency of the freeway and interchange to address existing and future needs.
- Plan for future management of the interchange and adjacent land uses with the interchange management area.
- Develop an access management plan that provides for safe and acceptable operations on the transportation network and that moves toward meeting the access spacing standards prescribed in the OHP.
- Develop strategies that can be implemented in phases and limit "throw-away" improvements to the maximum extent feasible.

Based on these objectives, the project team applied a set of evaluation criteria to each of the study's interchange design options. The evaluation criteria are described in detail in Chapter 5 of this IAMP.

2 INVENTORY AND EXISTING CONDITIONS ANALYSIS

This chapter provides a summary of the existing land use and transportation conditions related to the Brooks Interchange. It also identifies potential constraints found within the IAMP study area as it relates to the various modes.

2.1 Land Use

The Brooks IAMP study area is within the unincorporated community of Brooks-Hopmere in Marion County. A portion of the study area is included in the Salem-Keizer Area Transportation Study (SKATS), which is the designated Metropolitan Planning Organization (MPO) for the Salem-Keizer area.

2.1.1 Existing Land Use

There are a variety of uses in the study area ranging from commercial and industrial to public. Figure 2-1 maps the key land uses within the study area. The commercial uses in the area are primarily for travelers using I-5 and include gas stations and travel stops. Additionally, Brooklake Road provides access to residential neighborhoods in Brooks and community resources such as Chemeketa Community College.

The IAMP study area is approximately 740 acres. The approximate coverage of the most prevalent current uses are as follows:

- Industrial – 320 acres
- Agriculture – 250 acres
- Commercial – 70 acres

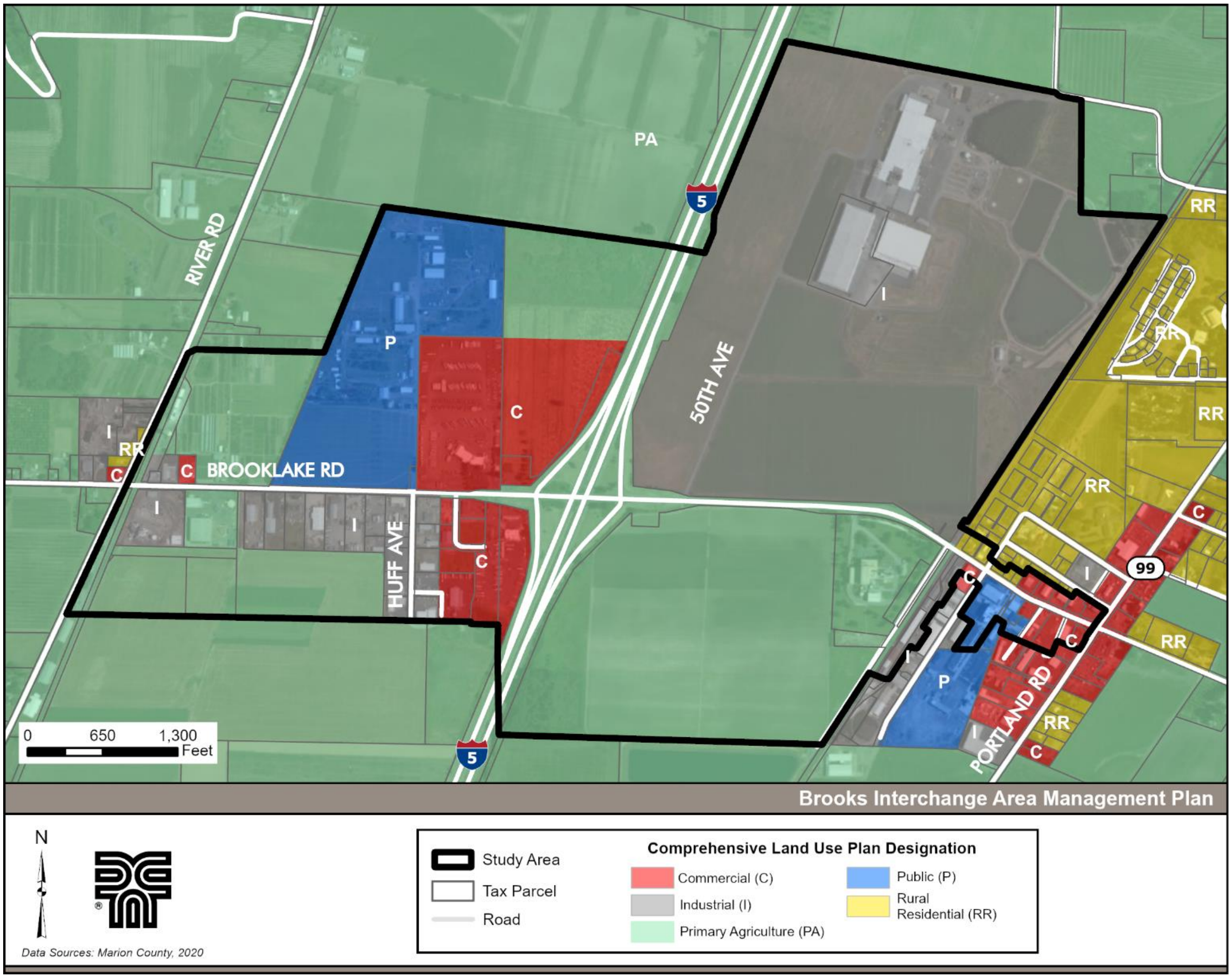
There are 75 tax lots located in the study area boundary; not all the tax lots are entirely within the boundary of the study area.

2.1.2 Comprehensive Plan

The Marion County Comprehensive Plan is the planning goal and policy guide for the County. The Marion County Code, Title 17 Rural Zoning, dictates development standards through zoning, overlay provisions, and additional development standards. The IAMP reviewed both governing land use documents, the Comprehensive Plan and Title 17 Rural Zoning, highlighting relevant standards for the Brooks IAMP.

As shown in Figure 2-1, the study area includes five comprehensive plan designations: Commercial, Industrial, Primary Agriculture, Public and Rural Residential.

Figure 2-1. Marion County Comprehensive Plan Designations



2.1.3 Rural Zoning

The County's Rural Zoning Code includes multiple zones and one overlay district that cover the IAMP study area. Figure 2-2 shows the current zoning within the study area. Descriptions of the applicable zones and overlays in the study area are detailed in Table 2-1.

2.1.3.1 Interchange District Zone

The purpose of the Interchange District (ID) Zone (MCC Chapter 17.150) is to "provide for the location of needed highway service commercial facilities at the interchanges between the controlled access highways and intersecting arterial roads." This zone generally allows commercial uses, industrial uses, and RV parks. A list of permitted uses and lot standards for the ID zone is provided in Table 2-1.

Table 2-1. Regulations of Marion County Zones in Brooks IAMP Study Area

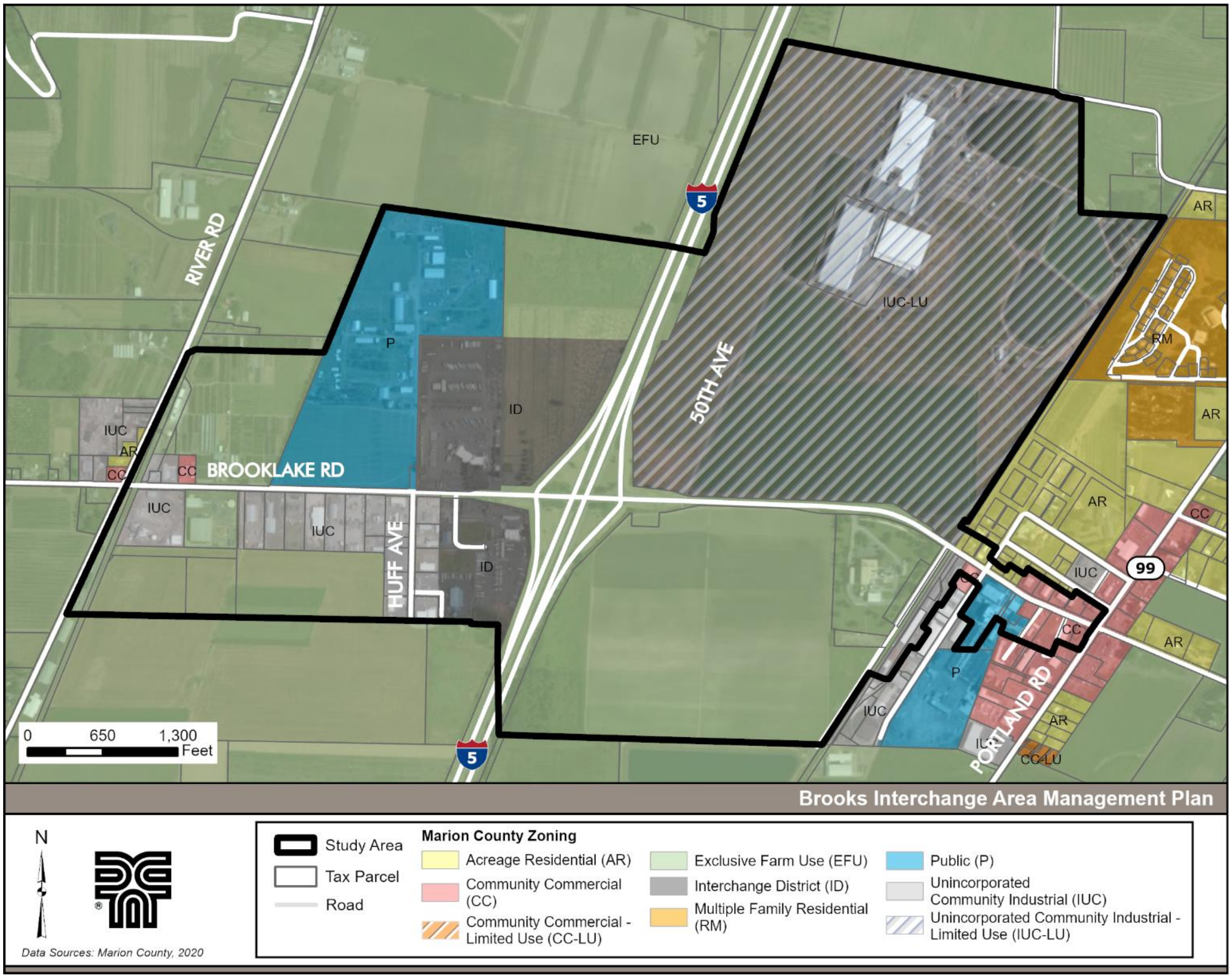
ZONE	PERMITTED USES AND LOT STANDARDS*
Acreage Residential (AR)	• Permitted uses – single family dwellings, farm uses, public facilities • Height – Maximum building height, 35 ft. • Minimum lot size – For subdivisions, partitions, or planned use developments, 2 acres.
Community Commercial (CC)	• Permitted uses – restaurant, small scale retail stores, auto repair, grocery store, and agricultural services, used car sales. • Lot area – New parcels must be a minimum of one acre • Parcel coverage – No more than 75% of a parcel shall be covered by buildings • Traffic – A traffic impact analysis is required for development in the zone.
Exclusive Farm Use (EFU)	• Permitted uses – farm uses, buildings (farm), minerals/geothermal exploration operations, widening of roads, composting, on-site filming, creation/restoration/enhancement of wetlands, single agri-tourism or other commercial event. • Lot area – New parcels must be a minimum of 80 acres • Height – Dwellings, maximum building height is 35 feet; farm-related structures, no maximum height; nonresidential and non-farm structures, maximum building height is 35 feet unless given exception.
Interchange District (ID)	• Permitted uses – service station, hotels/motels (up to 35 units), restaurants, RV park, retail, and wholesale. • Height – Industrial uses, maximum building height is 45 feet • Sewage disposal – New or expanded uses must not exceed carrying capacity of community sewage disposal or on-site disposal. • Traffic – A traffic impact analysis may be required for development in the zone.
Multifamily Residential (RM)	• Permitted uses – housing (duplexes, and single family dwellings), planned development, public facilities. • Lot area – Minimum lot area is 5,000 s.f. • Lot coverage – Main building(s) shall not occupy more than 40% of the lot area

Public (P)	• Permitted uses – public uses such as schools, cemeteries, religious organizations, and public service buildings.
	• Height – Maximum building height, 70 feet
	• Lot coverage –
	  o No main building shall occupy more than 30% of the lot
	  o Commercial uses must be limited to 3,500 s.f.
	• Sewage disposal – New or expanded uses must not exceed carrying capacity of community sewage disposal or on-site disposal
	• Traffic – A traffic impact analysis may be required for development in the zone.

Unincorporated Community Industrial (IUC)	• Permitted uses – offices, agricultural services, manufacturing and processing, trucking, wholesale distribution. • Parcel Coverage – No more than 40% of a lot or parcel shall be covered by buildings • Sewage disposal – New or expanded uses must not exceed carrying capacity of community sewage disposal or on-site disposal • Traffic – A traffic impact analysis may be required, is required for buildings over 60,000 s.f.
Limited Use Overlay (-LU)	• Applies to three properties in the community. • Is used to implement requirements associated with goal exceptions for the properties and to ensure properties do not exceed the capacity of local sewer and water systems. • Limits permitted uses on the site • For the NORPAC (now Oregon Potato) site, establishes specific performance metrics for the sewage disposal and transportation facility requirements.

*Note: In addition to the zone standards described in the MCC, state regulations for Urban Unincorporated Communities also apply to the parcels in the Brooks-Hopmere Community boundary.

Figure 2-2. Marion County Zoning



2.1.4 Growth and Demographics

The Brooks interchange serves the unincorporated community of Brooks-Hopmere, which expects a relatively modest residential growth and more significant growth in employment lands (commercial, industrial, institutional uses).

As of year 2020, there were approximately 543 residents and 1,567 employees in the Brooks-Hopmere community and Table 2-2 summarizes the future population and employment estimates. This estimate reflects employment projections for the region, as well as short and potential longer-term expansion plans of several key businesses in the interchange area, further described below. The estimate does not preclude other existing or new businesses from further developing or expanding in the community.

Potential for Growth in IAMP study area:

- May Trucking – The freight company has space available for growth on its site and neighboring parcels.
- NORPAC/Oregon Potato – The site known as NORPAC was purchased by Oregon Potato, and they plan to continue to operate and expand the facility's workforce.
- Chemeketa Community College – The community college has seen continued success with its various programs and has opportunities with local businesses and public entities to continue to operate and enhance existing programs and to establish new programs. The site includes several acres of land that can serve potential future expansion needs.
- Curry and Company – The company exports agricultural products internationally and intends to continue to use their 6-acre facility for its highest and best use.
- Pilot Travel Center – The facility provides services for freight and I-5 travelers, serving approximately 35,000 customers a week.

The City of Keizer also uses the interchange as a "backdoor" to their community. The city is considering an expansion of their Urban Growth Boundary (UGB), north of their city limits. If the UGB expansion occurs, traffic generated would have an impact on the Brooks Interchange and surrounding roadways. Specifically, the interchange ramp terminals, the intersection of River Road at Brooklake Road, and Brooklake Road between River Road and the interchange.[4]

Table 2-2. Brooks-Hopmere Unincorporated Community Population and Employment Forecast

DESCRIPTION	YEAR 2020	YEAR 2040[1]
Population	543	595 - 650
Employment	1,567	1,870 – 2,420

Source: *Draft Brooks-Hopmere Community Plan*, May 2020
Note: 1. Future 2040 estimates reflect rounded numbers

2.2 Transportation Facilities

2.2.1 Road Facilities

The jurisdiction, functional classification, other special designations, number of lanes and posted speeds of study area roadways are listed in Table 2-3.

The major roadways in the study area are classified as arterial roadways, which suggest the primary objective of these routes is to efficiently move high volumes of traffic over long distances. The Federal and State designations of I-5 as a truck/freight route highlight the national and local importance of accommodating the movement of large vehicles, which is consistent with many of the land uses present in the interchange area.

[4] Keizer Growth Transportation Impacts Study, October 2020.

Table 2-3. Roadway Jurisdiction and Functional Classification

ROADWAY/ HIGHWAY NAME	JURISDICTION	OHP HIGHWAY CLASSIFICATION (OTHER DESIGNATIONS)	ODOT FUNCTIONAL CLASSIFICATION	COUNTY FUNCTIONAL CLASSIFICATION (OTHER DESIGNATIONS)	NO. OF LANES	POSTED SPEED
I-5	ODOT	Interstate (NHS, FR, TR, HCR, RRR, SP1, NN)	Interstate Hwy	Principal Arterial	6	65 mph
I-5 Ramps	ODOT	Interstate (NHS, FR, TR, HCR, RRR)	Interstate Hwy	-	1	45 mph[1]
Brooklake Road	Marion County/ ODOT[2]	-	Minor Arterial[3]	Arterial (Detour Route: Primary & Alternate [River Rd to Portland Rd])	2-3[4]	45 mph
River Road	Marion County	-	Minor Arterial	Arterial (Detour Route: Primary & Alternate [north of Brooklake Rd], Primary [south of Brooklake Rd])	2	55 mph
Huff Avenue	Marion County	-	Local	Local	2	25 mph[5]
Truckman Way	Marion County	-	-	Private	2	25 mph[5]
50th Avenue	Private	-	-	Private	2	45 mph[6]
Portland Road (OR 99E)	ODOT	Regional (RRR, SP3, NN)	Minor Arterial	Arterial (Primary & Alternate Detour Route [north of Brooklake Rd])	2	40 mph

Sources: ODOT TransGIS and *Marion County Rural TSP*

Acronyms: NHS: National Highway System; FR: Freight Route; TR: Truck Route; HCR: High Clearance Route; RRR: Reduction Review Route; SP#: Seismic Program Highway (1-4); NN: National Network

1. Advisory speed.
2. Brooklake Road is under ODOT jurisdiction from approximately 125 feet west of the southbound ramp terminal to approximately 325 feet east of the northbound ramp terminal.
3. Brooklake Road becomes a Major Collector west of River Road and east of Portland Road (OR 99E).
4. Brooklake Road includes short sections of two-way left-turn lanes and designated left-turn pockets.
5. No posted speed; assumed 25 mph.
6. No posted speed; assumed 45 mph.

2.2.1.1 Interchange and Geometric Characteristics

The interchange itself has a standard diamond layout and both the northbound and southbound ramp terminals are STOP-controlled. The structure over I-5 is three lanes wide with a single sidewalk on the south side and no bicycle lanes. The existing pavement widths and condition of study area roads are summarized in Table 2-4.

Table 2-4. Typical Roadway Characteristics

ROADWAY SEGMENT	LANE WIDTHS (FT)		SHOULDER WIDTHS (FT)		PAVEMENT WIDTH (FT)[1]	PAVEMENT CONDITION
	SB/WB	NB/EB	SB/WB	NB/EB		
I-5 Southbound Mainline (3 travel lanes)	12	12	10	10	56	Very Good
I-5 Northbound Mainline (3 travel lanes)	12	12	10	10	56	Very Good
I-5 Southbound Exit Ramp[2]	16	N/A	3	6	25	Very Good
I-5 Southbound Entrance Ramp	16	N/A	3	8	27	Very Good
I-5 Northbound Exit Ramp[2]	N/A	16	6	4	26	Very Good
I-5 Northbound Entrance Ramp	N/A	16	5	4	25	Very Good
Brooklake Road (Marion County) *West of Interchange*						
River Rd – Huff Ave	12	12	2	2	28	Very Good
Huff Ave – ODOT ROW	12	12	3-6	3-6	30-48[3]	Very Good
Brooklake Road (ODOT) – West to East						
MP 263.39 – MP 263.41	12	16	6	12	58[3]	Good
MP 263.41 – MP 263.52	12	16	6	6	46[3]	Good
MP 263.52 – MP 263.56	12	16	6	6	40	Good
MP 263.56 – MP 263.61	16	16	6	6	56[3]	Good
MP 263.61 – MP 263.63	16	16	3	8	43	Good
Brooklake Road (Marion County) *East of interchange*						
ODOT ROW (east) – SPRR Xing	12	12	5	5	34	Good
SPRR Xing – Portland Rd (OR 99E)	12	12	5	5	34	Good
River Road						
Buena Crest School – Brooklake Rd	12	12	6	4	34	Good
Brooklake Rd – Waconda Rd	11	11	5	5	22	Very Good
Huff Avenue						
South to dead end – Brooklake Rd	N/A	N/A	N/A	N/A	34	Good
Brooklake Rd – North to gate	N/A	N/A	N/A	N/A	22	Good
Truckman Way	N/A	N/A	N/A	N/A	34	Good
50th Avenue	12	12	N/A	N/A	24	Good
Portland Road (OR 99E)						
MP 41.21 – MP 41.24 (north leg)	12	12	N/A	N/A	51[4]	Fair
MP 41.24 – MP 41.34 (south leg)	17	17	N/A	N/A	47-48[4]	Fair

Sources: ODOT TransGIS, ODOT Highway Inventory Detail Report and *Marion County Rural TSP, Appendix B (2012)*
Acronyms: SB = Southbound; NB = Northbound; WB = Westbound; EB = Eastbound; MP = Mile Point

1. Pavement width is listed for ODOT facilities while right-of-way (ROW) width is listed for Marion County facilities.
2. Presence of right-turn flares.
3. Median present
4. Turn lane(s) present

The existing geometric design of the interchange does not meet some of the current design guidelines, which raises potential safety and operational concerns at the interchange as summarized by ODOT in the *I-5 State of the Interstate Report*. The geometric deficiency assessment, conducted in 2000, reached the following conclusions:

- The sight distance is limited at both the northbound and southbound ramp terminals.
- The deceleration lane length is too short on both the northbound and southbound exit ramps.
- The acceleration length of the southbound entrance ramp is substandard.
- Adjacent public road accesses on the west side are too close to the ramp terminals.
- The sight distance of crossroad is substandard for the operating speed.

2.2.1.2 Traffic Control

All the study area intersections (see Figure 1-1) are STOP-controlled in 2022, except for the signalized intersection of Brooklake Road at OR 99E (Portland Road).

2.2.1.3 Access

Access inventory data was obtained from aerial photography and Marion County tax parcel data for Brooklake Road from River Road to Portland Road (OR 99E). This data includes public street intersections and public/private approaches to Brooklake Road. A total of 74 accesses were identified: 34 on the north side, 40 on the south side of Brooklake Road, as summarized in Table 2-5.

When compared to the applicable OHP spacing standards, few of the driveway accesses meet current spacing standards based on roadway jurisdiction. There are twelve access points within a quarter mile of the northbound and southbound ramp terminals. None of these access points meet the 1,320 feet (1/4 mile) spacing standard set forth by ODOT.

Table 2-5. Brooklake Road Access Inventory

ID	PUBLIC VS. PRIVATE	SITE USE	TAX LOT NUMBER	DISTANCE TO NEXT ACCESS (FT.)	ACCESS ROAD WIDTH (FT.)
Access Points on the North Side of Brooklake Road					
1	Private	Center Market Hopmere	062W18BC00800	60	83
2	Public	River Rd (north)	--	75	30
4	Private	Railroad	--	23	43
6	Private	A G Marion Services	062W18BC00701	32	31
8	Private	Contractor Sales & Services	062W18BC00600	27	94
10	Private	3655 Brooklake Rd	062W18BC00500	0	130
11	Private	De Laval	062W18BC00400	274	129
13	Private	Van's Nursery	062W180000800	62	38
14	Private	Van's Nursery	062W180000800	296	14
16	Private	3775 Brooklake Rd	062W180000200	568	11
22	Private	3775 Brooklake Rd	062W180000200	239	59
24	Private	3775 Brooklake Rd	062W180000200	293	27
25	Public	**Huff Ave (north)**	--	639	35
29	Private	**May Trucking Facility**	062W180000900	338	75
31	Public	**I-5 SB Exit Ramp**	--	677	36
33	Public	**I-5 NB Entrance Ramp**	--	255	42
35	Public	**Informal Park & Ride**	--	31	220
37	Private	**50th Ave (north)**	062W170000600	1586	36
43	Public	Weigh Station Exit	--	215	110
44	Public	Weigh Station Entrance	--	347	100
45	Private	Richland Ave (north)	--	8	11
47	Private	Railroad	--	70	74
50	Private	4875 Brooklake Rd	062W17CA00500	40	13
51	Private	4875 Brooklake Rd	062W17CA00500	136	11
53	Public	Pueblo Ave (north)	--	155	35
55	Private	4945 Brooklake Rd	062W17DB02700	101	10
56	Private	4965 Brooklake Rd	062W17DB02600	105	15
59	Private	Brooks Automotive	062W17DB02500	40	29
61	Private	Valley Spa Covers	062W17DB02501	196	34
64	Private	Ninth Inning Corporation	062W17DB01800	121	30
67	Private	Stop-N-Save #2	062W17DB01700	65	39
69	Private	Route 99 Bar and Grill	062W17DB01400	69	35
70	Public	Portland Rd (north)	--	167	68
73	Private	Low Price Auto & Truck Sales LLC	062W17D000300	n/a	24

Source: Marion County GIS

Access locations within 1,320 feet of a ramp terminal are **bold and shaded.**

Table 2-5. Brooklake Road Access Inventory (continued)

ID	PUBLIC VS. PRIVATE	SITE USE	TAX LOT NUMBER	DISTANCE TO NEXT ACCESS (FT.)	ACCESS ROAD WIDTH (FT.)
Access Points on the South Side of Brooklake Road					
3	Public	River Rd (south)	--	80	28
5	Private	Railroad	--	40	38
7	Private	Nutrien Ag Solutions	062W18C001000	107	26
9	Private	Nutrien Ag Solutions	062W18C001000	424	28
12	Private	Marion Resource Recovery Facility	062W18C000900	212	49
15	Private	Hicks Striping & Curbing	062W18C001800	247	44
17	Private	The Greenhouse Catalog	062W18C000600	80	21
18	Private	Leupitz Contractors Inc	062W18C000500	128	19
19	Private	Leupitz Contractors Inc	062W18C000500	80	22
20	Private	Versalift Northwest Service Center	062W18C000400	67	29
21	Private	Shrock Trucking	062W18C000300	69	47
23	Private	Shrock Trucking	062W18C000300	572	51
26	Public	**Huff Ave NE (south)**	--	263	35
27	Private	**La Korita Food Cart**	062W18D000600	52	20
28	Private	**Truckman Way NE**	062W18D000609	263	38
30	Private	**Service Driveway**	062W18D000601	376	32
32	Public	**I-5 SB Entrance Ramp**	--	700	26
34	Public	**I-5 NB Exit Ramp**	--	280	42
36	Public	**Informal Park & Ride**	--	0	210
38	Private	**South of 50th Ave NE**	062W17C000500	213	12
39	Private	**South of 50th Ave NE**	062W17C000500	91	12
40	Private	**Weigh Station Entrance**	062W17C000500	483	88
41	Private	Weigh Station Exit	062W17C000500	465	101
42	Private	Covanta Marion	062W17CA02800	837	55
46	Public	Richland Dr (south)	--	33	29
48	Private	Railroad	--	12	47
49	Private	Front St NE	062W17CA00700	111	24
52	Private	Reid's Tire & Automotive	062W17CA00800	101	32
54	Public	Pueblo Ave NE (south)	--	282	32
57	Private	Monterey Ave NE	062W17DB03301	10	31
58	Private	Marion Co. Fire District #1 Station 5	062W17DB03300	32	75
60	Private	U.S. Postal Service Entrance	062W17DB03400	66	24
62	Private	U.S. Postal Service Exit	062W17DB03400	5	29
63	Private	Udder Way	062W17DB03500	191	28
65	Private	Stair Way	062W17DB03603	55	35
66	Private	Brooks True Value Hardware	062W17DB03600	14	18
68	Private	Platinum Trade	062W17DB03602	121	30
71	Public	Portland Rd NE (south)	--	63	55
72	Private	Oregon Auto Sales	062W17D001100	76	43
74	Private	Oregon Auto Sales	062W17D001100	n/a	22

Source: Marion County GIS

Access locations within 1,320 feet of a ramp terminal are **bold and shaded.**

2.2.2 Pedestrian and Bicycle Facilities

The existing bicycle and pedestrian facilities in the study area are limited. On Brooklake Road, there are striped bike lanes just east of the Union Pacific Railroad (UP) line between Front Street and Portland Road (OR 99E). On other segments of the study area, bicyclists are expected to share the road with vehicle traffic.

There is sidewalk across the I-5 overpass on the south side of Brooklake Road. The functional condition of the two sidewalk ramps on either side of the overpass are considered poor and are not ADA compliant[5]. Between Pueblo Avenue and Portland Road, sidewalk is partially provided on both the north and south side.

2.2.3 Public Transportation Services

Several transit providers travel through the study area on the I-5 mainline (Groome Transportation, South Metro Area Regional Transit, Greyhound, City2City, Cherriots Regional, FlixBus and Cascades POINT) but none regularly travel through the interchange ramp terminals or on Brooklake Road. Cherriots Regional Route 10X regional bus travels on Portland Road (OR 99E) along the eastern edge of the study area with service between Woodburn and Salem. It has a stop north of Brooklake Road on Portland Road (OR 99E) near Riverton Street.

An informal park and ride on Brooklake Road between the northbound ramp terminal and 50th Avenue was closed in the spring of 2022. This interchange area was also identified by Marion County as a possible future site for a park and ride.[6]

2.3 Existing Transportation Deficiencies

The existing deficiencies are summarized in Table 2-6.

[5] TransGIS, 2020.

[6] Marion County Rural TSP, 2005 https://www.co.marion.or.us/PW/Engineering/rtsp/Documents/chapter13longrange1204boc.pdf

Table 2-6. Summary of Existing Deficiencies

DEFICIENCIES	LOCATION
Geometry	
Interchange	• The deceleration lane length is too short on both the northbound and southbound exit ramps. • High skew on both exit ramp terminal intersections with inadequate width for turn channelization. • The acceleration length of the southbound entrance ramp is substandard. • Steep 6% approach grades on each end of the structure create operational issues at the freeway ramp intersections with increased stopping and acceleration distances.
Access Spacing	• Adjacent public road accesses on the west side are too close to the ramp terminals. • There are twelve access points within a ¼-mile (1,320 feet) of the northbound and southbound ramp terminals.
Sight Distance	• The sight distance is limited at both the northbound and southbound ramp terminals. • The sight distance of crossroad is substandard for the operating speed.
Multimodal	
Pedestrian	• Only sidewalk across the I-5 overpass is on the south side. • The functional condition of the two sidewalk ramps on either side of the overpass are considered poor and are not ADA compliant. • Intermittent sidewalk between Pueblo Avenue and Portland Road on north and south side.
Bicycle	• No bicycle lanes on Brooklake Road between River Road and Front Street (east of UPRR) • Bicycles expected to utilize the paved shoulder, which varies in width between 2 and 6 feet on Brooklake Road within the study area.
Transit	
Service	There is no regular public transportation/transit available through the interchange ramp terminals or Brooklake Road
Traffic	
Traffic Operations	The following intersections exceed applicable mobility targets: • River Road at Brooklake Road (v/c >1.0) – southbound and westbound approaches are the critical movements. • I-5 Northbound Ramp Terminal at Brooklake Road (v/c > 1.0) – northbound approach is the critical movement.
Queuing	• The southbound and northbound exit ramp 95th percentile queues extend back into the deceleration zone. • At Portland Road (OR 99E), the southbound right-turn movement exceeds the available storage and spills into the adjacent through lane, which backs up to block access to Riverton Street and Rockdale Street. • Queues on the westbound approach of Brooklake Road at River Road extend back across the PNWR railroad tracks, creating a potential safety concern, and may block driveway access. • The westbound left-turn at the I-5 southbound ramp terminal extends to the available storage capacity and may impact westbound through traffic.
Safety	
Crash History	• Both ramp terminals exceed the statewide 90th percentile crash rate. • Northbound ramp terminal is a top 10% SPIS location. • One sideswipe-overtaking fatality on I-5 southbound in 2017 approximately ¼-mile north of Brooks exit ramp.

3 ENVIRONMENTAL SCAN

Research and mapping of environmental features and community resources within the IAMP study area were used to identify known issues and those that may pose potential challenges or barriers to transportation improvements. The information gathered was taken primarily from published documents and maps, GIS data, and conversations with appropriate professional contacts. The analysis is limited to "visual windshield validation."

Further resources may exist within the study area that are not yet documented or are not visually apparent. For more detailed information regarding this research, refer to ***Technical Memorandum #5*** in Volume 2 of this IAMP.

3.1 Natural Resources

This section documents three categories of regulated environmental conditions: 1) jurisdictional waters including ditches, 2) wetlands, and 3) federally listed threatened and endangered species at the site. This section also includes a general discussion of relevant environmental regulatory requirements. Information on biological resources in the study area was gathered from existing documentation and references. No field surveys were conducted.

3.1.1 Physical Setting

The site is situated within the broad, flat plain of the mid-Willamette Valley. Although the landscape in the vicinity is generally flat, the site sits on a drainage divide between the mainstem Willamette River and the Pudding River sub basin, which is a tributary to the Willamette. The study area is generally centered on I-5 at the Brooklake Road overpass and includes a truck stop, trucking-related businesses, light industrial, public, and agricultural fields, commercial, public, and residential land uses.

3.1.2 Floodplains

The Federal Emergency Management Agency (FEMA), acting through local planning authority, regulates development within floodplains. The entire study area is identified as an Area of Minimal Flood Hazard within the FEMA flood map, as depicted in Figure 3-1.

3.1.3 Surface Waters and Wetlands

Both the National Wetlands Inventory (NWI), and the Local Wetland Inventories (LWI) were examined. The LWI is presented in Figure 3-1 along with the FEMA floodplain data, and the NWI is presented in Figure 3-2 with the soil survey data. An LWI is a more refined wetland inventory than the NWI, therefore the discussion focuses on the LWI.

The LWI shows one creek and multiple wetlands within the study area. The uppermost headwater of Fitzpatrick Creek is shown originating in the far northeast portion of the site and flowing east to the Pudding River basin. This creek is mapped as year-round use for coastal cutthroat trout.

The LWI also shows a wetland along the eastern side of I-5 in the northern quadrant of the study area, a wetland in the southeast quadrant, and a series of ponds in the northeast corner which are associated with Norpac Foods. Color signatures on aerial photos suggest these wetlands are present, but in the southeastern quadrant of the study area, wetlands in the agricultural field appear to be more extensive than is shown on the LWI.

Two additional potential wetlands that are not shown on the LWI or NWI are located on either side of I-5 at the southern portion of the study area. On the east side of I-5 lies what appears to be a cottonwood-forested wetland, and on the west side lies what appears to be a stormwater pond associated with the adjacent trucking facilities. Roadside ditches which may be regulated as wetlands or waters depending on specific site conditions are also present throughout the study area.

This should be considered a preliminary estimate of potential streams, ditches, and wetland areas, and a formal wetland delineation would be required to obtain development permits. Much of the site lies in an agricultural setting, which has undergone ongoing agricultural activity including plowing, and possibly tiling, and irrigation. These activities may obscure or otherwise alter field indicators of hydric soils and hydrology; therefore, the site may be difficult to evaluate for wetland presence. Because of the highly altered agricultural conditions on the site, we recommend that a wetland delineation of the site should be scheduled for the wet part of the growing season (mid-March through mid-April), when wetland hydrology can be more accurately determined. That delineation would be reviewed and verified or adjusted by Oregon Department of State Lands (DSL). A DSL-approved delineation would be valid for up to five years.

Figure 3-1. FEMA Floodplains and Goal 5

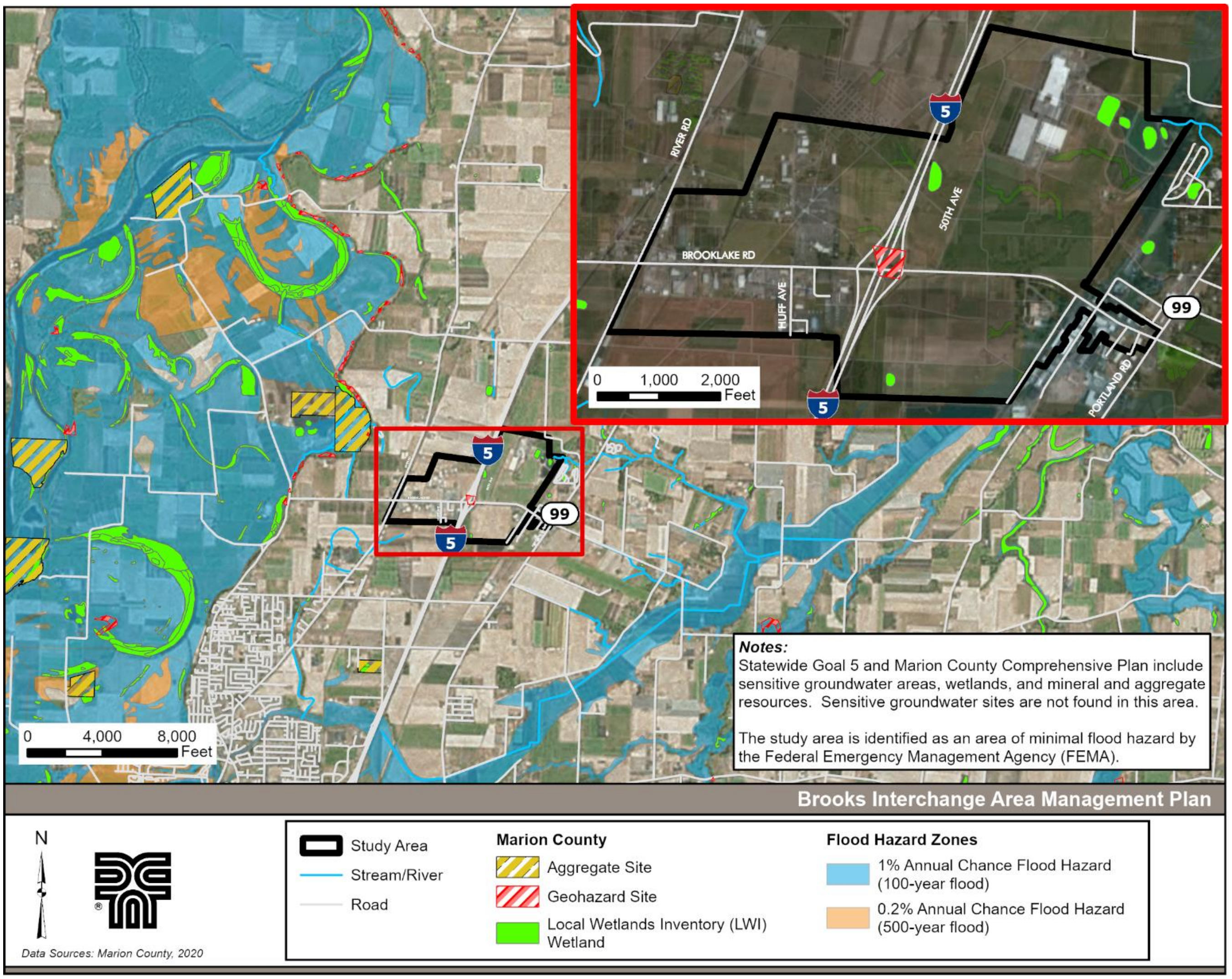
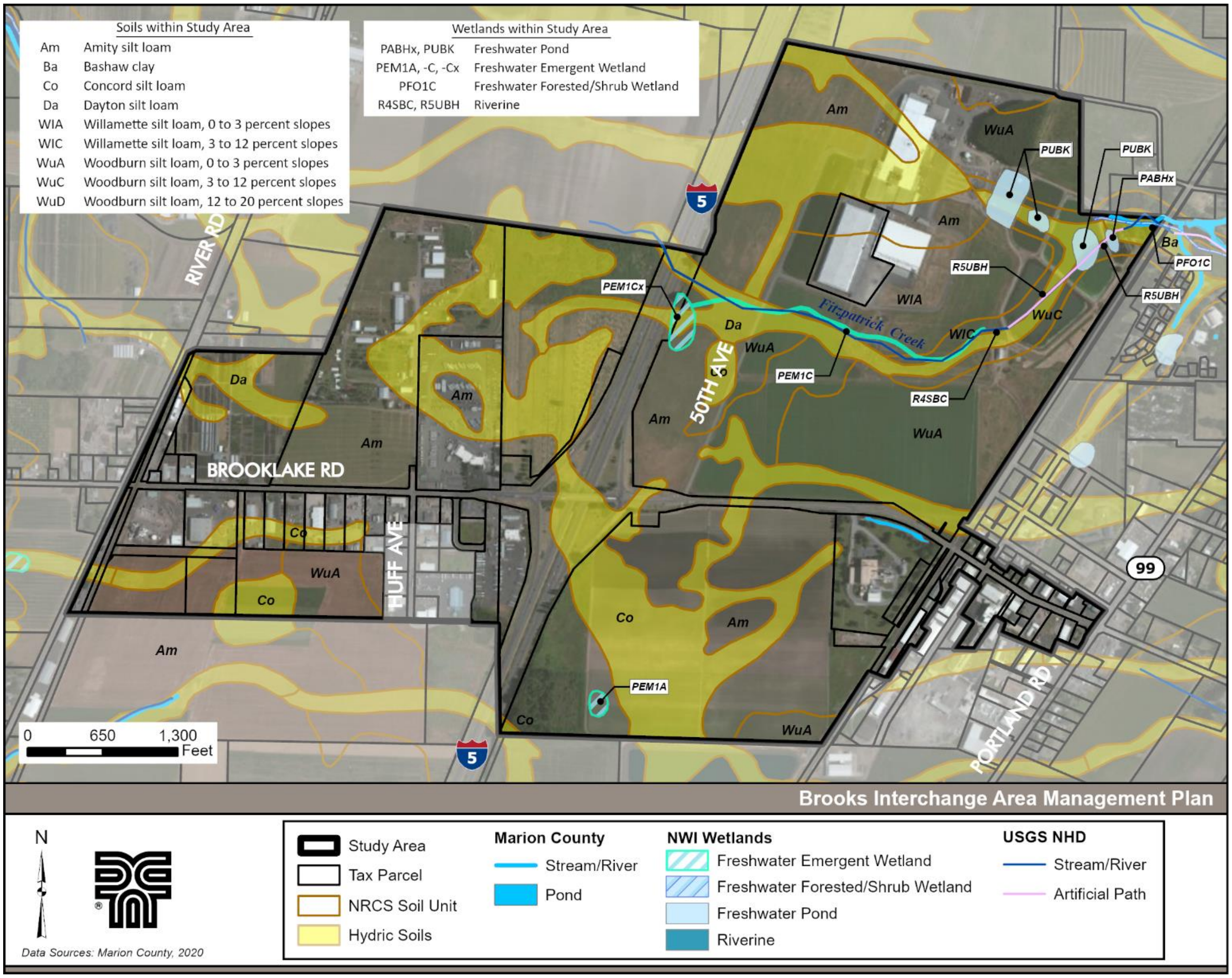


Figure 3-2. Soils, Wetlands, and Streams



3.1.4 Biological Resources and Habitat

Table 3-1 displays federally listed or proposed threatened or endangered species that are shown to potentially occur at this location according to USFWS Information, Planning, and Conservation System database, and any reported occurrence in the vicinity according to ORBIC database and ODFW fish habitat distribution maps (USFWS 2021c; ORBIC 2020; ODFW 2021).

One Endangered Species Act (ESA)-listed bird species, the streaked horned lark, has the potential to be present in the study area, although there are no current reports of its presence. Potential nesting habitats include fallow and active agricultural fields, sparsely vegetated edges of grass fields, row crop fields, heavily grazed pasture, and airports. In the Willamette Valley, breeding habitat characteristics include large expanses (300 acres or more) of herbaceous dominated habitat dominated by short grass (less than 6 inches) with relatively high percentage of bare ground (Pearson and Altman 2005).

Three listed plant species (Kincaid’s lupine, Nelson’s checkermallow, and Willamette daisy) are unlikely to occur due to extensive disturbance but cannot be ruled out from presence in the study area based on habitat.

There is no potential habitat for fish in the study area, however federally listed Upper Willamette chinook salmon and steelhead trout are present several miles downstream to the east in the Little Pudding River and downstream to the west in the Willamette River (ODFW 2021). If federal permits become necessary for project development, then stormwater management for the project would be required to conform to NMFS standards.

The project would cause no effect to other terrestrial listed or proposed plant and wildlife species addressed here because none are known to occur in the study area, and there is no potential habitat for them.

No critical habitat has been designated within the study area.

Table 3-1. Federally Listed, Proposed, and Candidate Species with Potential to Occur in Project Vicinity

COMMON NAME	SCIENTIFIC NAME	AGENCY WITH JURISDICTION	FEDERAL STATUS	REPORTED OCCURRENCE*	ACTUAL OCCURRENCE IN ACTION AREA
WILDLIFE					
Marbled Murrelet	*Brachyramphus marmoratus*	USFWS	Threatened	None	None, no suitable habitat
Northern Spotted Owl	*Strix occidentalis caurina*	USFWS	Threatened	None	None, no suitable habitat
Streaked Horned Lark	*Eremophilia alpestris strigata*	USFWS	Threatened	None, although they are known to occur in the vicinity.	Unknown. Habitat may be suitable depending on vegetation height in ag fields during the nesting season.
Yellow Billed Cuckoo	*Coccyzus americanus*	USFWS	Threatened	None	None, no suitable habitat
PLANTS					
Kincaid's Lupine	*Lupinus Sulphureus Kincaidii*	USFWS	Threatened	None	Unknown. Habitat may be suitable.
Bradshaw's lomatium	*Lomatium bradshawii*	USFWS	Endangered	None	None, no suitable habitat
Nelson's checkermallow	*Sidalcea nelsoniana*	USFWS	Endangered	None	Unknown. Habitat may be suitable.
Water Howellia	*Howellia aquitalis*	USFWS	Threatened	None	None, no suitable habiat; historically found,but considered extirpated from Oregon
Willamette Daisy	*Erigeron decumbens*	USFWS	Endangered	None	Unknown. Habitat may be suitable.

Source: USFWS 2021

* ORBIC 2020

3.1.5 Open Space and Parks

There are no designated open space areas or parks within the immediate interchange area.

3.2 Hazardous Materials

A search through web-based databases was conducted to review the available federal and state records for identified hazardous waste sites within the study area. The hazardous material sites identified within the study area and within the interchange district are summarized in Table 3-2 below and further details are provided in

Volume 2*, Technical Memorandum #5*. The hazardous sites appear to be consistent, both in type and quantity, with uses within the study area. More detailed site-specific hazardous materials surveys will be necessary prior to construction of any interchange-related projects.

Table 3-2. Environmental Records Review Summary (Hazardous Materials)

DATABASE RECORD	SITES WITHIN STUDY AREA[1]	SITES WITHIN INTERCHANGE DISTRICT
Environmental Cleanup Site Information System (ECSI)	4	1
Hazardous Waste (HAZWASTE)	6	2
Leaking Underground Storage Tanks (LUST)	6	3
Solid Waste Information Facility Tracking (SWIFT)	2	0
Underground Storage Tanks (UST)	4	3
Oregon State Fire Marshall (OSFM) Hazardous Substance Incidents	12	4

1. Sites may be listed in more than one database.

Several sites within the interchange district overlay were identified on regulatory databases, including on the Oregon Department of Environmental Quality's (DEQ) Environmental Cleanup Site Information (ECSI) and Leaking Underground Storage Tank (LUST) databases.

- The Pilot Travel Center truck stop is located immediately to the southwest of the interchange (4220 Brooklake Road) and is within the interchange district. This site has also been referred to as the Bingo Truck Stop on regulatory databases. The site was developed in the 1970's as a retail fueling station and has continued to be used for this purpose. The property is listed on the DEQ ECSI and LUST databases, has had multiple hazardous substance incidents as reported by the OSFM and currently has a DEQ-permitted UST. Based on the past incidents and operational practices, as well as its proximity to the interchange area, there is some potential for residual subsurface conditions on or near the property that could impact future construction activities.

- Space Age Fuel is located southwest of the interchange (4150 Brooklake Road) and is within the interchange district, adjacent to the Pilot Travel Center's west property line. The property currently has a DEQ-permitted UST. Based on the operational practices and its proximity to the interchange area, potential impacts from hazardous materials on this site should be considered during project development or future construction activities related to the interchange.

- May Trucking is located to the northwest of the interchange (4185 Brooklake Road) and is within the interchange district. The property is listed on the DEQ LUST database and currently has a DEQ-permitted UST. Based on the operational practices and its proximity to the interchange area, potential impacts from hazardous materials on this site should be considered during project development or future construction activities related to the interchange.

3.3 Cultural Resources

3.3.1 Historic and Archaeological Resources

Under Section 106 of the National Historic Preservation Act of 1966 (Public Law 89-665), 16 USC 470-470m, and under federal regulations governing the protection of historic and cultural resources (36 Code of Federal Regulations [CFR] 800), federal agencies, and the state and local agencies to which the federal agency has delegated responsibility, are directed to avoid undertakings that adversely affect properties that are included in or are eligible for inclusion in the National Register of Historic Places (NRHP). The NRHP identifies and documents (in partnership with state, federal, and tribal preservation programs) districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture.

Future Project Development Considerations

It is unlikely that the study area has been completely surveyed for historical and archaeological resources. Before any ground disturbing actions, ODOT must conduct an archaeological field investigation. Additionally, if right-of-way acquisition is necessary for any proposed projects, ODOT must conduct a cultural resource survey determining the eligibility of buildings or structures more than 50 years of age.

The State Historic Preservation Office (SHPO) database does not indicate any potential historical resource listed in the study area. Additional historical resources may exist that have not yet been surveyed, although given that much of the land in the study area is either used for exclusive farm use and commercial uses, there are no obvious potential resources. However, the entire study area has not been surveyed for historical resources.

There may be additional historical and archeological resources in the management area that have not been identified or entered into the SHPO database.

3.3.2 Section 4(f)

Section 4(f) refers to a part of federal law that protects public parks, recreation lands, wildlife and waterfowl refuges, and public or private historic sites. Section 4(f) applies only to Departments of Transportation (DOTs) and their agencies. Highway projects that “use” public parks or other protected land must fulfill the requirements of Title 23, USC, Section 138, Section 4(f) of the Department of Transportation Act of 1966, as amended.

To qualify as a park, recreation area, or refuge under the statute, a property must meet all the following criteria:

- It must be publicly owned
- It must be open to the public (some exceptions for refuges)
- Its major purpose must be for park, recreation, or refuge activities
- It must be significant as a park, recreation area or refuge

There are no publicly owned parks or other recreation resources, including trails and wildlife refuges within the study area or within one mile of the study area. The interchange is one of many ways to access Willamette Mission State Park, approximately four miles to the northwest of the interchange, but interchange improvements are not expected to affect the park. Additionally, there are no planned parks or recreation projects within or near the study area identified in the 2010 Marion County Parks Master Plan.

A historic site is considered significant, for Section 4(f) purposes, if it is on or determined eligible for listing on the NRHP. To be considered eligible for the NRHP, a historic site must retain adequate integrity to convey its significance and meet one or more of the following criteria at the state, local, or national level:

- Be associated with events that have made a significant contribution to the broad patterns of our history;
- Be associated with the lives of persons significant in our past;
- Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Have yielded, or may be likely to yield, information important in history or prehistory.

Powerland Heritage Park (Antique Powerland) is an important community feature within the study area and provides 14 museums exhibiting antique farming, rail and truck transportation equipment. However, museums are not normally subject to Section 4(f) unless deemed significant (eligible for NRHP). Antique Powerland is not currently listed on the NRHP. To determine eligibility, FHWA in cooperation with the applicant, consults with the SHPO, tribes that may attach religious and cultural significance to the property, and when appropriate, with local officials to determine whether a site is eligible for the NRHP.

Several BPA towers are present within the project area. The towers and lines are part of the Big Eddy-Chemawa No. 1 line (Historically Oregon City-Chemawa No. 3). This line was constructed in 1955. The transmission line in the project area meets the criteria for eligibility for listing in the NRHP. No adverse impacts to the towers are anticipated at this time.

Future Project Development Considerations

In general, transportation improvements should try to avoid park areas. Additional cultural resources surveys should be completed to ensure there is no disturbance to any protected resource. A Section 4(f) evaluation will require ODOT to assess all reasonable options that adversely affect protected lands. If every potential option that can meet the project objective would impact some Section 4(f) property, then the option with the least impact must be selected unless it is not feasible and prudent.

If a site is determined not to be on or eligible for the NRHP, FHWA still may determine that the application of Section 4(f) is appropriate when an official (such as the Mayor, president of the local historic society, etc.) formally provides information to indicate that the historic site is of local significance. In rare cases such as this, FHWA may determine that it is appropriate to apply Section 4(f) to that property. If Section 4(f) is found inapplicable, the FHWA Division Office should document the basis for not applying Section 4(f). Such documentation might include the reasons why the historic site was not eligible for the NRHP.

3.3.3 Section 6(f)

The Land and Water Conservation Fund (LWCF) Act of 1965 established grants-in-aid funding to assist states in the planning, acquisition, and development of outdoor recreational land and water areas and facilities. Section 6(f) of the LWCF Act prohibits the conversion of property acquired or developed with the assistance of the LWCF to anything other than public outdoor recreation use without the approval of the Secretary of the U.S. Department of the Interior. No LWCF resource lands were identified in the study area.

3.4 Potential Land Use and Environmental Design Constraints

Table 3-3 summarizes land use and environmental resource issues that may present potential design constraints.

Table 3-3. Land Use and Environmental Summary

FEATURE	SUMMARY OF KEY RESOURCES AND OPTION GUIDANCE	KEY POTENTIAL CONFLICT LOCATION(S)	POTENTIAL APPROVAL/PERMIT IF RESOURCE IMPACTED
Land Use and Zoning	Improvements may be limited in EFU	East and west side of I-5	▪ Local land use approvals
Historical and Archaeological Resources	Historical and cultural resources - Further surveys will need to be completed, especially if improvements will include ground-disturbing activities and or right-of-way acquisition of property with potential historical resources.	Throughout study area	▪ National Historic Preservation Act ▪ FHWA – 4(f) ▪ State Historic Preservation Office ▪ Local land use approvals
Parks and Recreation and Section 4(f) Resources	Avoid resources if possible. Any "use" of Section 4(f) lands will need to demonstrate that it is either a "de minimis" impact or that there was no option for the impact.	4(f) potential for Antique Powerland, BPA towers and throughout study area	▪ FHWA – 4(f) ▪ Oregon Parks and Recreation ▪ Local land use approvals
Section 6(f) Resources	None identified	N/A	N/A
Floodplains and Floodways	Fill in floodways and floodplains should be avoided. The study area is identified as an area of minimal flood hazard by FEMA.	N/A	FEMA regulations administered through local land use approvals
Wildlife Habitat & Wetlands	Disturbance to undeveloped areas should be avoided if possible. Wetland delineations should be conducted once option footprints are identified. Impacts to wetlands should be avoided.	East of interchange	▪ U.S. Army Corps of Engineers ▪ Oregon Department of State Lands ▪ Oregon Department of Fish and Wildlife ▪ Local land use approvals
Threatened and Endangered Species	Options should avoid disturbance of areas where the species habitat is present. Water quality impacts and physical impediments in T&E species contributing waterways should be avoided.	N/A	▪ National Marine Fisheries Service ▪ U.S. Fish and Wildlife Service ▪ Oregon Department of Agriculture ▪ Oregon Department of Fish and Wildlife
HazMat	Further site investigations at identified sites in regulatory databases.	Interchange District	▪ Oregon Department of Environmental Quality

4 EXISTING AND FUTURE TRAFFIC OPERATIONS ANALYSIS

The assessment of baseline traffic conditions includes development of existing (year 2020) and future (year 2043) baseline traffic volumes, traffic operations evaluation, and a review of historical crash patterns. For more detailed data and evaluation results, refer to *Technical Memorandum #3* and *Technical Memorandum #4* in Volume 2 of this IAMP.

4.1 Traffic Analysis Methodology

The ODOT Analysis Procedures Manual (APM) guided the methodologies and assumptions for the traffic operations and safety analysis. Traffic volumes for analysis were developed from turning movement traffic counts collected at the study area intersections and adjusted to the existing baseline 30th highest hour volumes (30HV) by applying seasonal, growth and Covid adjustment factors. Volumes were balanced to achieve a uniform dataset for analysis that represent a system-wide peak hour of 4:15 to 5:15 p.m. Forecast traffic volumes were developed for the study intersections based on the existing baseline traffic volumes and information provided in the Oregon Statewide Integrated Model (SWIM) and historic Marion County traffic counts. The *Analysis Methodology and Assumptions Memorandum (Technical Memorandum #3, Attachment C*) provides details on the various adjustment factors and how they were applied.

Operations analysis for existing and future year conditions was conducted using tools based on the Highway Capacity Manual, Sixth Edition (HCM, TRB 2016). This included using HCS 7 software to analyze freeway mainline and merging/diverging point operations and Synchro 11 and SIDRA 8.0 software to analyze signalized and unsignalized intersection operations along Brooklake Road. Performance measures produced to describe system conditions included volume-to-capacity (v/c) ratios for freeway movements and v/c ratios, Level of Service (LOS) and 95th percentile vehicle queue lengths for signalized and unsignalized intersections.

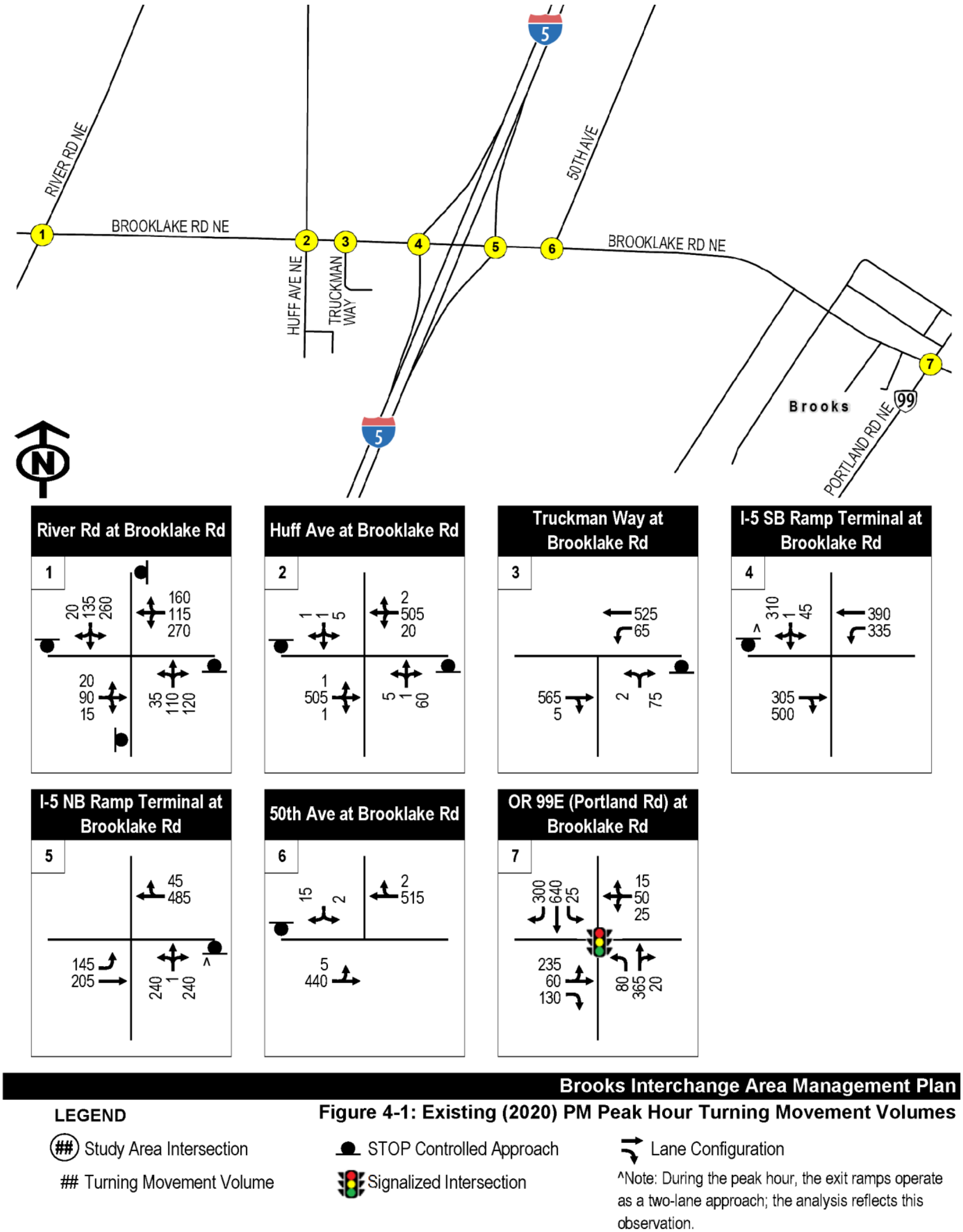
4.2 Existing Traffic Conditions

The assessment of existing conditions includes development of existing traffic volumes, assessment of traffic operations, a review of historical crash patterns and an assessment of conditions for bicycle and pedestrian traffic.

4.2.1 Existing (2020) Baseline Traffic Volumes

Traffic counts were collected in 2018 and 2020 and adjusted to correspond to the year 2020 30HV traffic volumes. These 30HV traffic volumes are illustrated in Figure 4-1. The 30HV typically occurs during the summer months and is the desired period to use for the analysis and design of transportation infrastructure improvements. Traffic counts were collected for the study area intersections and compared to post-processed turning movement volumes from the Marion County *May Trucking Study* (2018). It was found that the common weekday peak hour of traffic volume through the interchange area was approximately 4:15 p.m. to 5:15 p.m. All traffic counts conducted for 2020 were evaluated against historic counts to determine whether a “COVID adjustment” was necessary to bring volumes up pre-pandemic levels. A COVID adjustment was applied to intersections #2-#5. Intersections #1 and #3 was collected pre-COVID and intersection #7 did not require factoring up.

Figure 4-1. Existing (2020) PM Peak Hour Turning Movement Volumes



4.2.2 Traffic Operations

Intersection operations were analyzed using Synchro/SimTraffic 11 software consistent with the methodologies outlined in the *Highway Capacity Manual, 6th Edition* (HCM6) and the ODOT Analysis Procedures Manual (APM) Version 2. The analysis was conducted at all study intersections using the seasonally factored 30HV traffic volumes for 2020 shown in Figure 4-1.

4.2.2.1 Model Calibrations

Before analyzing the traffic conditions, the analysis files were calibrated for local conditions. The northbound and southbound ramp terminals were chosen as the key calibration locations. Traffic volumes, lane configurations, and lane utilization were input into the traffic models. SimTraffic was then run for the peak period. Turning speeds, saturation flow rate and headway factors in the SimTraffic model were adjusted and the model was re-simulated and, once again, compared to the field observed queue lengths and delays. This process was repeated until the model was visually comparable to field observations. Once this visual level of calibration was gained, volume throughputs were summarized from the SimTraffic simulations and compared to actual count data.

Finally, 11 SimTraffic simulation seeds were run, and any outliers were omitted. The five most consistent runs were averaged to obtain an average model run.

4.2.2.2 Existing (Year 2020) PM Peak Hour Traffic Operations Analysis Results

Performance measures used for this analysis included v/c ratios and LOS to align with ODOT and Marion County standards. Table 4-1 summarizes the results of the intersection operations analysis, comparing each intersection's performance against the adopted Marion County and ODOT mobility standards. Locations where congestion exceeds the mobility standard are shaded for ease of reference.

Field observations indicate that during the peak hour, the single lane northbound exit ramp and single lane southbound exit ramp each operate as if they had a two-lane approach. The analysis reflects the field observations.

As shown in Table 4-1, all but two study intersections meet applicable mobility targets under existing conditions in the PM peak hour. The intersection of Brooklake Road at River Road exceeds the Marion County standard and the intersection of Brooklake Road at the northbound ramp terminal exceeds the OHP target. Both intersections are also over capacity.

At the intersection of Brooklake Road at River Road, the westbound and southbound approaches have high traffic volumes. The intersection of Brooklake Road at the I-5 northbound ramp terminal has a high number of northbound left-turning vehicles that must wait for an adequate gap in cross-street traffic. This, paired with poor sight distance across the I-5 overpass and high volumes of large, heavy trucks creates delays on the northbound exit ramp.

Table 4-1. Existing (2020) PM Peak Hour Traffic Operations Analysis Results

INTERSECTION (CONTROL TYPE)	CRITICAL MOVEMENT[1]	V/C RATIO	LOS	JURISDICTION	MOBILITY TARGET[2,3]
1. River Rd at Brooklake Rd (AWSC)	WB L/T/R	**>1.0**	**F**	Marion Co.	LOS D, 0.85
	SB L/T/R	**0.89**	**E**		
2. Huff Ave at Brooklake Rd (TWSC)	WB L	0.03	A	Marion Co.	LOS E, 0.90
	NB L/T/R	0.18	C		
3. Truckman Way at Brooklake Rd (TWSC)	WB L	0.11	B	Marion Co.	LOS E, 0.90
	NB L/T/R	0.25	C		
4. I-5 SB Ramps at Brooklake Rd (TWSC)	WB L	0.45	B	ODOT	0.85
	SB R	0.53	C		
5. I-5 NB Ramps at Brooklake Rd (TWSC)	EB L	0.17	A	ODOT	0.85
	NB L	**>1.0**	F		
6. 50th Ave at Brooklake Rd (TWSC)	EB L	0.01	A	Marion Co.	LOS E, 0.90
	SB L/R	0.04	B		
7. Portland Rd (OR 99E) at Brooklake Rd (Signal)	Overall	0.79	B	ODOT	0.95

Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right.
AWSC = all-way stop control; TWSC = two-way stop control; Signal = signal control.
Intersections exceeding the applicable mobility target are **bold and shaded.**

Notes:
1. At signalized intersections, the overall results are reported; at all-way stop-controlled intersections, the results are reported for the worst movements; and at unsignalized intersections the results are reported for the worst major and minor movements that must stop or yield the right of travel to other traffic flows.
2. 1999 Oregon Highway Plan (OHP), Table 6, Policy 1F applies to existing conditions.
3. The Marion County Rural TSP designates the traffic operations standard on County facilities and defers to ODOT standards for intersections with state highways within the County.

Source: David Evans and Associates, Inc.

4.2.2.3 95^{th} Percentile Queues

Table 4-2 highlights the locations where the 95^{th} percentile queues either exceed available storage or extends beyond the nearest upstream intersection. There are two intersections with movements exceeding their available storage: Brooklake Road at the I-5 northbound ramp terminal and Brooklake Road at Portland Road (OR 99E). If a ramp queue is long enough to extend into deceleration zones or onto the mainline, it could result in a potential safety concern. The northbound exit ramp 95^{th} percentile queue extends back into the deceleration zone, although not onto the I-5 mainline. At Portland Road (OR 99E), the southbound right-turn movement exceeds the available storage and spills into the adjacent through lane, which backs up to block access to Riverton Street and Rockdale Street.

There are other intersections within the study area that have 95^{th} percentile queues that may impact adjacent accesses. At the west end of the study area, queues on the westbound approach of Brooklake Road at River Road extend back across the PNWR railroad tracks, creating a potential safety concern. They extend further east and may block driveway access during peak conditions. Between Truckman Way and the southbound ramp terminal, vehicles turning left onto Truckman Way or into the PILOT property do not exceed the available storage in the median, however it can cause slowing and congestion along Brooklake Road as passenger vehicles and freight trucks travel between the ramp terminals and the businesses immediately west of the interchange.

At the southbound ramp terminal, the exit ramp occasionally backs into the deceleration zone. Most of the vehicles are turning right to travel westbound on Brooklake Road and there is enough pavement width for the left-turning vehicles to queue back. The westbound left-turn at the I-5 southbound ramp terminal extends to the available storage capacity and may impact westbound through traffic.

Field observations suggest that queuing at both ramp terminals is a concern, particularly in the northbound direction. In some instances, vehicles have turned eastbound onto Brooklake Road from the northbound exit ramp to maneuver a U-turn to travel westbound on Brooklake Road to avoid waiting in the northbound left-turn queue.

Table 4-2. Existing (2020) 95th Percentile Queues Exceeding Available Storage

INTERSECTION	APPROACH & MOVEMENT	95TH PERCENTILE QUEUE (FT.)	AVAILABLE STORAGE (FT.)[1]
River Rd at Brooklake Rd	WB L/T/R	*1,050*	>2,000
I-5 SB Ramps at Brooklake Rd	WB L	*350*	350
	SB L/T	*700*	1,150
I-5 NB Ramps at Brooklake Rd	NB L	*950*	1,150
	NB T/R	**525**	400
Portland Rd (OR 99E) at Brooklake Rd	SB T	**600**	434
	SB R	**250**	100

Bold and highlighted indicates queue exceeds available storage; ***Italic and underlined*** indicates queue is excessive and/or may impact upstream traffic

Notes:

1. Storage distance is reported as either the length of the turn pocket or the distance to the next intersection, as applicable.

4.2.2.4 Freeway Operations

It is also important to evaluate how the interchange ramps interact with the mainline highway traffic on I-5 through an analysis of the points where traffic enters or merges onto the highway and where it exits or diverges from the highway. These analyses were conducted in accordance with the methodology prescribed in ODOT's APM to determine v/c ratio performance. The results of the analysis are summarized in Table 4-3.

The merge and diverge analyses for the design hour between 4:15 PM and 5:15 PM show that the freeway and the merge and diverge points associated with the Brooks interchange ramps are currently operating below the mobility standard of 0.85. During this period, the southbound direction has the higher directional flow on the freeway.

An alternate hour (7:00 AM to 8:00 AM) was also analyzed to evaluate conditions when the northbound direction has the higher directional flow. The alternate hour analysis also shows that freeway operations meet the state's mobility target.

Table 4-3. Existing (2020) Freeway Operations

DIRECTION/LOCATION	V/C RATIO[1]		OHP TARGET[4]
	DESIGN HOUR[2]	ALTERNATE HOUR[3]	
I-5 Northbound			
Mainline South of IC 263	0.65	0.62	0.85
Diverge: IC 263 Northbound Exit Ramp	0.66	0.63	0.85
Mainline between Exit and Entrance Ramps	0.57	0.53	0.85
Merge: IC 263 Northbound Entrance Ramp	0.45	0.40	0.85
Mainline North of IC 263	0.60	0.52	0.85
I-5 Southbound			
Mainline North of IC 263	0.69	0.49	0.85
Diverge: IC 263 Southbound Exit Ramp	0.71	0.50	0.85
Mainline between Exit and Entrance Ramps	0.64	0.46	0.85
Merge: IC 263 Southbound Entrance Ramp	0.58	0.43	0.85
Mainline South of IC 263	0.78	0.57	0.85

Acronyms: IC = Interchange, NA = Not Applicable

Notes:

1. The v/c ratios for the merge/diverge analysis are calculated based on the methodologies outlined in ODOT's Analysis Procedures Manual, using HCS 7 software.
2. The design hour is the system peak hour.
3. The alternate hour is AM peak hour.
4. 1999 Oregon Highway Plan (OHP), Table 6, Policy 1F applies to existing conditions.

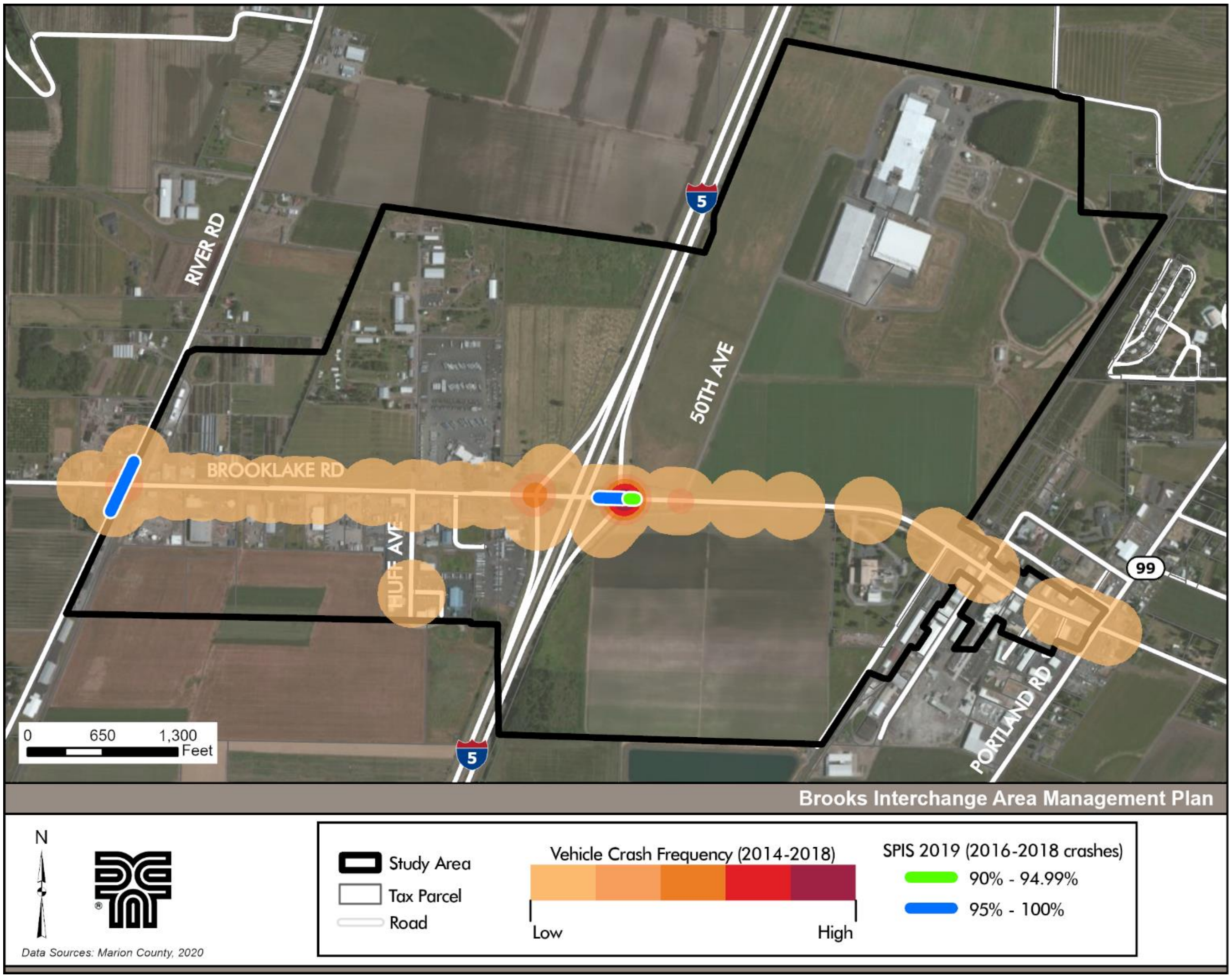
4.2.3 Crash History Analysis

A safety analysis was conducted to determine whether any significant, documented safety issues exist within the study area and to inform future measures or general strategies for improving overall safety. The study area for the crash analysis reviewed crashes on the local street system as well as on I-5 one mile north and south of the interchange and included a review of crash history data supplied by the ODOT Crash Analysis and Reporting Unit for the period between January 1, 2014, and December 31, 2018, which were the five most recent full years for which crash data were available at the time of the analysis. A review of ODOT Safety Priority Index System (SPIS) data was also performed. Figure 4-2 depicts a "heat map" of the crashes within the study area, including known SPIS sites and Table 4-4 summarizes crash type and severity of crashes at the study intersections.

There were 155 crashes reported at study intersections within the 5-year analysis period, and 25 along Brooklake Road that were not related to a study intersection. Of those 25 Brooklake Road crashes, 13 were related to driveways or access points, and the remaining 12 were segment crashes. None of the reported crashes resulted in fatalities.

In the 5-year analysis period, there were 114 freeway crashes, 65 in the northbound direction, and 49 in the southbound. The 5-year crash rate for the freeway segment north of the interchange is 0.26 crashes per million vehicle miles traveled (crashes/mvmt), and the segment south of the interchange is 0.23 crashes/mvmt. These crash rates were compared to the statewide average crashes rates from Table II for rural interstate freeways and were found to be below the average crash rates for comparable segments, with the statewide average crash rates for rural interstate freeways of 0.38 crashes/mvmt. The most common crash type reported was rear-end collisions (45%). One fatal injury crash occurred in the southbound direction about a ¼-mile north of the southbound exit ramp to the Brooks interchange. The collision occurred in 2017 and was a sideswipe-overtaking collision that occurred in low-light and rainy conditions.

Figure 4-2. Crash Heat Map (2014-2018)



4.2.3.1 Intersection Crash Rate Analysis

Crash rates are a measure of the number of crashes in relation to the amount of traffic volume served. Table 4-4 summarizes the study intersection crash rates and compares them to the statewide 90th percentile crash rates. The 90th percentile crash rates are obtained from Table 4-1 in the ODOT APM.

Two study intersections exceed the statewide 90th percentile crash rate. These intersections and further details of their crash history are summarized below.

> **I-5 Southbound Ramps at Brooklake Road (study intersection #4):** Exceeds statewide 90th percentile crash rate for rural three-legged stop-controlled intersections. Of the 29 crashes at this intersection, 14 were turning-related collisions and 11 were rear end collisions. The remaining crashes were fixed object, angle and backing. The most prevalent cause of the collisions was due to failing to yield the right of way and following too closely.

I-5 Northbound Ramps at Brooklake Road (study intersection #5): Exceeds statewide 90th percentile crash rate for rural three-legged stop-controlled intersections. Of the 54 crashes at this intersection, 30 were turning-related collisions and 17 were rear end collisions. The remaining crashes were fixed object and angle. The most prevalent cause of the collisions was due to failing to yield the right of way, following too closely, and making an improper turn.

4.2.3.2 Critical Crash Rates

The Highway Safety Manual Part B describes the critical crash rate method as a means of identifying locations that warrant further investigation. The critical crash rate is based upon average crash rates at comparable sites, traffic volume, and a confidence interval. There must be five comparable sites to make a reference population. The study area does not have enough sites of similar characteristics to form a reference population so critical crash rates were not calculated.

Table 4-4. Study Area 5-Year Crash Summary (2014-2018)

Intersection	Crash Type										Severity			Total	5-Year Crash Rate[1]	90th Percentile Crash Rate
	Rear End	Fixed Object	Angle	Backing	Turning	Sideswipe - Overtaking	Head On	Ped/Bike	Sideswipe-Meeting	Other	Property Damage Only	Minor Injury	Fatal & Serious Injury			
1. River Rd at Brooklake Rd	4	2	6	0	7	0	0	0	0	0	8	11	0	19	0.84	1.08
2. Huff Ave at Brooklake Rd	1	1	1	1	2	0	0	0	1	0	4	3	0	7	0.32	1.08
3. Truckman Way at Brooklake Rd	0	0	0	0	4	0	0	0	0	0	0	4	0	4	0.13	0.475
4. I-5 SB Ramps at Brooklake Rd	11	2	1	1	14	0	0	0	0	0	10	19	0	29	***0.70***	0.475
5. I-5 NB Ramps at Brooklake Rd	17	5	1	0	30	0	0	0	0	1	26	28	0	54	***1.57***	0.475
6. 50th Ave at Brooklake Rd	11	1	0	0	2	0	0	0	0	0	1	13	0	14	0.33	0.475
7. Portland Rd (OR 99E) at Brooklake Rd (Signal)	8	0	3	1	15	1	0	0	0	0	16	12	0	28	0.56	0.579
Totals	52	11	12	3	74	1	0	0	1	1	65	90	0	155		

Source: ODOT Crash Analysis and Reporting Unit 2014-2018

Notes:

1. Where the observed rate exceeds the Statewide 90th Percentile Crash Rate, the observed rate is ***bold, italic, and underlined.***

4.2.3.3 Safety Priority Index System (SPIS)

The SPIS is a method used in Oregon to identify safety problem areas. Roads are evaluated in approximately one-tenth mile increments (often grouped into larger segments). Each year these segments are ranked by assigning a SPIS score based on the frequency and severity crashes observed, while taking traffic volume into account. When a segment is ranked in the top 10% of the index, a crash analysis is typically warranted, and corrective actions are considered. There is one segment of roadway within the study area identified in the top 10% of the most recent (2018) SPIS rankings and it is summarized in Table 4-5.

Table 4-5. Study Area Top 10% SPIS Location

ROADWAY	CROSS STREET	ADT	CRASHES	FATAL/ INJURY A	INJURY B/ INJURY C	PERCENTILE	SPIS SCORE
Brooklake Rd	Northbound Ramp Terminal	9,300	10	0/1	1/8	90	51.84

Source: 2018 (2015-2017) On-State, Top 15% SPIS Sites, By Highway Mile Point, ODOT.

4.2.4 Pedestrian and Bicycle Travel Conditions

The existing bicycle and pedestrian facilities in the study area are limited. On Brooklake Road, there are striped bike lanes just east of the UP line between Front Street and Portland Road (OR 99E). On other segments of the study area, bicyclists are expected to share the road with vehicle traffic.

There is sidewalk across the I-5 overpass on the south side of Brooklake Road. The functional condition of the two sidewalk ramps on either side of the overpass are considered poor and are not ADA compliant[7]. Between Pueblo Avenue and Portland Road, sidewalk is partially provided on both north and south side.

A pedestrian and bicycle level of traffic stress (LTS) assessment was completed for the study area applying methodology from the ODOT Analysis Procedures Manual. LTS characterizes the quality of the pedestrian and bicycle environment. The level of stress experienced by pedestrians and cyclists was assessed by considering various roadway characteristics and applying a context-based, subjective stress rating of lowest, low, medium, or high where lowest indicates the least stressful environment and high indicates the most stressful. Both the pedestrian and bicycle LTS assessments resulted in the most stressful (LTS high) scores, due to the limited pedestrian and bicycle facilities immediately adjacent to high-speed roadways.

4.3 Future (2043) No-Build Traffic Conditions

The future no-build traffic operations analysis identifies how the study intersections will operate under year 2043 traffic conditions during the weekday PM peak hour, assuming no improvements have been made to the transportation system in the study area beyond any currently planned and programmed projects.

4.3.1 Future (2043) No-Build Traffic Volumes

Forecast traffic volumes were developed for the study intersections located within the study area based on the existing traffic counts, information provided in the Oregon SWIM and historic Marion County traffic counts.

Original methodology coordination with ODOT suggested the use of ODOT's published future volume tables for development of growth factors. However, the following issues were determined to be associated with the future volume table method:

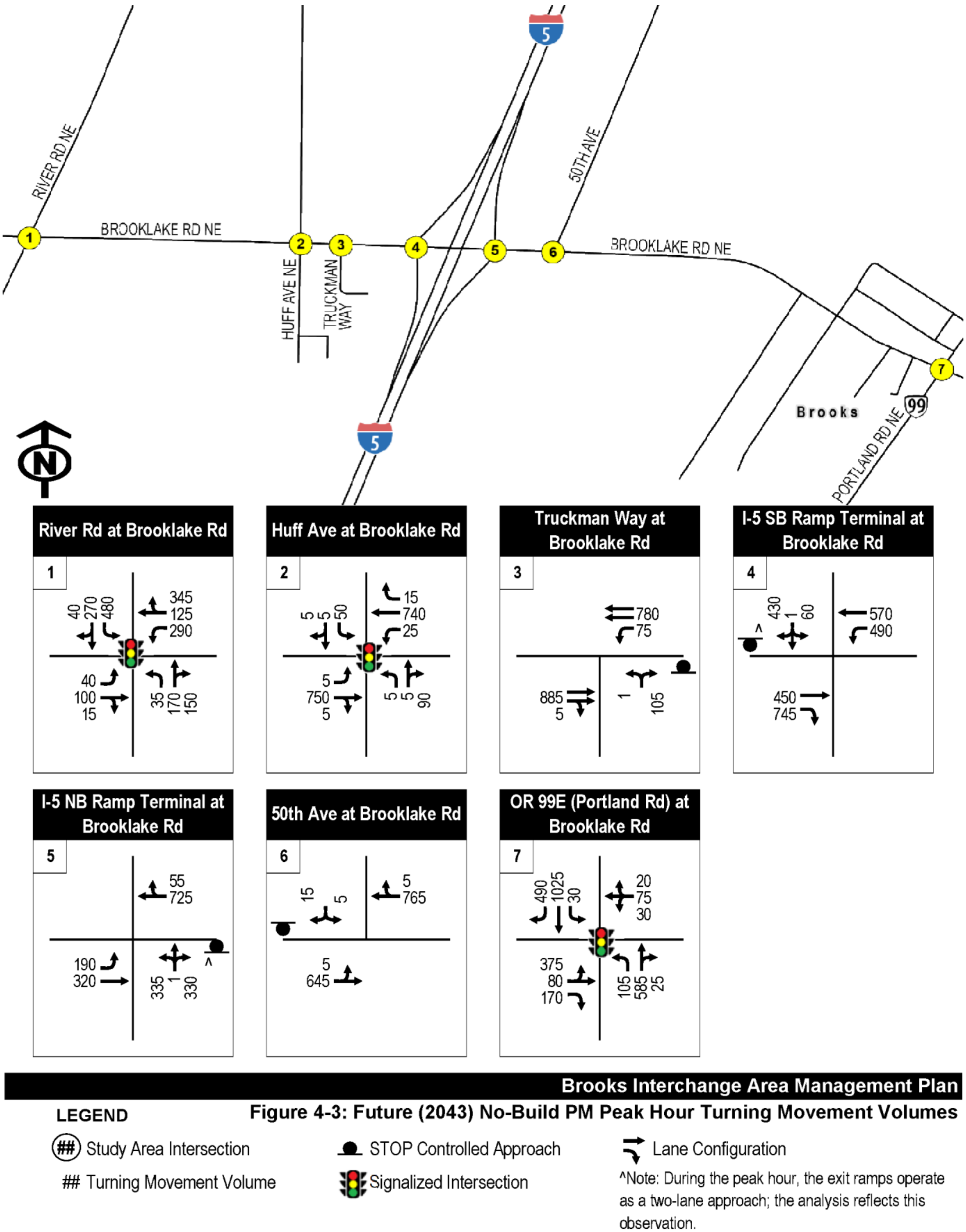
- PM trends were requested, and the future volume tables are daily.
- The Brooks Interchange is on the external boundary of the Salem-Keizer Area Transportation Study (SKATS) model. External stations in travel demand models are typically unreliable for modeled projections.

[7] TransGIS, 2020.

Given the conditions listed above, TPAU used the SWIM to calculate annual growth rates for roadway segments in the study area (growth rates can be found in *Technical Memorandum #5, Attachment A*). The annual growth rates were applied to the existing link volumes and the 2043 forecast traffic turning movement volumes were developed by applying the post-processing methodology presented in the National Cooperative Highway Research Program (NCHRP) Report 765, in conjunction with engineering judgment and knowledge of the study area. Figure 4-3 summarizes the year 2043 traffic volumes developed at the study intersections for the traffic operations analysis.[8]

[8] Traffic volumes consider existing land uses and approved developments.

Figure 4-3. Future (2043) No-Build PM Peak Hour Turning Movement Volumes



4.3.2 Operations Analysis – Planned Projects

The transportation network used to evaluate the future conditions includes projects that are expected to occur by year 2043. These projects have known funding sources or are programmed to be funded through the planning horizon.

There are three projects expected to impact the future traffic operations analysis within the study area. The SKATS Regional Transportation System Plan (RTSP) identifies two new traffic signals and a roadway widening project for a section of Brooklake Road. The Option details for the purpose of analysis were developed through coordination with ODOT, SKATS and Marion County and are summarized in Table 4-6.

Table 4-6. Planned Projects

PROJECT NAME/ LOCATION	DESCRIPTION	CATEGORY[1]	BROOKS IAMP ANALYSIS ASSUMPTIONS[2]
River Rd NE at Brooklake Rd NE	Signalize and realign intersection. Assume 50 percent developer funded.	Included	• Signalize intersection • Dedicated left-turn lanes on all approaches
Brooklake Rd N at Huff Ave	Add traffic signal and turn lanes. Assume 50 percent developer funded.[3]	Included	• Signalize intersection • Dedicated left-turn lanes on all approaches • Drop westbound right-turn lane
Brooklake Rd: River Rd to Huff Ave	Widen to two lanes each direction with turn lanes. Assume 50 percent is developer funded	Included	• 5-lane between Huff Ave and SB Ramp Terminal • Westbound right-turn is a drop lane at Huff Ave • Eastbound right-turn is a drop lane at SB Ramp Terminal • 3-lanes between River Rd and Huff Ave

Source: Project List for the SKATS 2019 – 2043 RTSP
Notes:
1. Category: A committed project is one that has funding identified (including local match) and will be built within the next five years. The project is typically also in the TIP. Projects that are listed as included have the highest priority to be constructed in the next 20 years, and funding is reasonably anticipated to be available.
2. Brooks IAMP Analysis Assumptions: Option details assumed for the Brooks IAMP analysis.
3. Assumes signal warrants are met.

4.3.3 Future (2043) Intersection Traffic Operations

Table 4-7 summarizes the results of the intersection operations analysis. The analysis reflects the calibrated conditions developed as part of the existing conditions analysis with peak hour. The signal timing for the new traffic signals follows guidance from the ODOT Analysis Procedures Manual and the splits at existing signals were optimized while maintaining the existing cycle length. Field observations indicate that during the peak hour, the single lane northbound exit ramp and single lane southbound exit ramp each operate as if they had a two-lane approach. The analysis reflects the field observations.

Table 4-7. Future (2043) No-Build PM Peak Hour Traffic Operations Analysis Results

INTERSECTION (CONTROL TYPE)	INTERSECTION CONTROL	V/C RATIO	LOS	JURISDICTION	MOBILITY TARGET[2,3]
1. River Rd at Brooklake Rd (Signal)	Overall	0.74	C	Marion Co.	LOS D, 0.85
2. Huff Ave at Brooklake Rd (Signal)	Overall	0.69	B	Marion Co.	LOS E, 0.90
3. Truckman Way at Brooklake Rd (TWSC)	WB L	0.23	C	Marion Co.	LOS E, 0.90
	NB L/T/R	0.34	C		
4. I-5 SB Ramps at Brooklake Rd (TWSC)	WB L	**0.86**	E	ODOT	0.85
	SB L	**>2.00**	F		
5. I-5 NB Ramps at Brooklake Rd (TWSC)	EB L	0.25	B	ODOT	0.85
	NB L	**>2.00**	F		
6. 50th Ave at Brooklake Rd (TWSC)	EB L	0.01	A	Marion Co.	LOS E, 0.90
	SB L/R	0.09	C		
7. Portland Rd (OR 99E) at Brooklake Rd (Signal)	Overall	**1.63**	E	ODOT	0.95

Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right.
AWSC = all-way stop control; TWSC = two-way stop control; Signal = signal control.
Intersections exceeding the applicable mobility target are **bold and shaded.**

Notes:
1. At signalized intersections, the overall results are reported; at all-way stop-controlled intersections, the results are reported for the worst movements; and at unsignalized intersections the results are reported for the worst major and minor movements that must stop or yield the right of travel to other traffic flows.
2. 1999 Oregon Highway Plan (OHP), Table 6, Policy 1F applies to existing and no build conditions.
3. The Marion County Rural TSP designates the traffic operations standard on County facilities and defers to ODOT standards for intersections with state highways within the County.

Source: David Evans and Associates, Inc.

As shown in Table 4-7, three study intersections are expected to exceed applicable mobility targets by year 2043 in the PM peak hour under No-Build conditions. Both stop-controlled interchange ramp terminals and the signalized intersection of Portland Road (OR 99E) are expected to exceed their available capacity and exceed the applicable OHP mobility targets.

At the intersection of Brooklake Road at River Road, the future condition assumes this is signalized, as opposed to the all-way stop-control that exists today, which explains the improvement in operations from the existing conditions analysis. The intersection of Brooklake Road at Huff Avenue is assumed signalized by 2043, however it will only be signalized if it meets warrants by 2043.

Traffic Signal Implementation Considerations

Traffic signal warrants must be met, and the State Traffic-Roadway Engineer's approval obtained before a traffic signal can be installed on a state highway. However, approval of a signal depends on more than just a warrant analysis. Meeting a warrant is necessary to install a signal, but it does not mean a signal should be recommended or guarantee its installation.

4.3.3.1 Preliminary Signal Warrants

ODOT's "preliminary" traffic signal warrants are based on a portion of the Manual on Uniform Traffic Control Devices (MUTCD) warrants but require less data for analysis. The preliminary warrants are generally not accepted as a basis for approving the installation of a traffic signal but are useful for projecting signalization needs for future years. Full warrants are evaluated later as part of the engineering study required by the MUTCD, and many other considerations go into determining whether a signal should be installed. Considerations to be evaluated include safety concerns, alternatives to signalization, signal systems, delay, queuing, bike and pedestrian needs, railroads, access, consistency with local plans, local agency support and others.

Four of the study area intersections with existing or anticipated congestion operational concerns were analyzed using the ODOT Preliminary Signal Warrants (PSW) to understand if a traffic signal may be justified to improve traffic conditions. It is important to note that meeting preliminary signal warrants does not guarantee that a signal shall be installed. Before a signal can be installed a field warrant analysis is conducted by the Region. If warrants are met, the State Traffic-Roadway Engineer will make the final decision on the installation of a signal.

Table 4-8 summarizes the results of the preliminary signal warrant analysis. Given the existing and forecasted traffic volumes, River Road and the Northbound I-5 Ramp terminal would meet at least one of the two preliminary signal warrants.

Although preliminary warrants for the southbound ramp terminal are not currently met, it is desirable to signalize it concurrently with the northbound ramp terminal since the interchange functions more efficiently as a coordinated system. At Huff Avenue, signal warrant analysis should be reevaluated with new development applications and considering the access management plan for Brooklake Road between Huff Avenue and the southbound ramp terminal; the Marion County Rural TSP and the SKATS RTSP both identify the need for a signal at Huff Avenue and Brooklake Road as development occurs.

Table 4-8. Preliminary Signal Warrants for Existing and No Build Conditions

INTERSECTION	EXISTING CONDITIONS (2020)		NO BUILD CONDITIONS (2043)	
	CASE A	CASE B	CASE A	CASE B
River Rd	**Met**	Not Met	**Met**	**Met**
Huff Ave	Not Met	Not Met	Not Met	Not Met
I-5 Southbound Ramp	Not Met	Not Met	Not Met	Not Met
I-5 Northbound Ramp	**Met**	Not Met	**Met**	**Met**

4.3.3.2 95th Percentile Queues

Table 4-9 summarizes the 95th percentile queues that exceed available storage or may impact upstream traffic. There are three intersections with movements exceeding their available storage: Brooklake Road at the I-5 southbound ramp terminal, Brooklake Road at the I-5 northbound ramp terminal and Brooklake Road at Portland Road (OR 99E). This aligns with the same intersections that exceed their available capacity and mobility targets.

Without improvements, both ramp terminals are expected to have queues that regularly back up onto the I-5 mainline. The stop-control cannot serve the anticipated demand and queuing for the westbound left-turn at the southbound ramp terminal is expected to exceed available storage, blocking westbound through traffic and compounding the congestion at the northbound ramp terminal. This congestion is expected to queue along Brooklake Road east of the interchange.

The queuing concerns that existed at Portland Road (OR 99E) at Brooklake Road in existing conditions are expected to worsen and create significant backups along Portland Road (OR 99E) in both directions.

Table 4-9. Future (2043) 95th Percentile Queues Exceeding Available Storage

INTERSECTION	APPROACH & MOVEMENT	95TH PERCENTILE QUEUE (FT.)	AVAILABLE STORAGE (FT.)[1]
River Rd at Brooklake Rd	EB T/R	*275*	>2,000
	WB L	*400*	400
	WB T/R	*400*	>2,000
I-5 SB Ramps at Brooklake Rd	WB L	**575**	350
	WB T	**975[2]**	650
	SB L/T	**>2,000**	1,150
I-5 NB Ramps at Brooklake Rd	WB T	**550**	500
	WB R	**75**	50
	NB L	**>2,000**	1,150
Portland Rd (OR 99E) at Brooklake Rd (Signal)	EB L/T	**675**	516
	EB R	**450**	300
	NB L	**425**	180
	NB T/R	**>2000**	618
	SB L	*175*	175
	SB T	**>2,000**	434
	SB R	**250**	100

Bold and highlighted indicates queue exceeds available storage; ***Italic and underlined*** indicates queue is excessive and/or may impact upstream traffic

Notes:

1. Storage distance is reported as either the length of the turn pocket or the distance to the next intersection, as applicable.
2. Traffic is blocked by the queuing in the adjacent lane.

4.3.4 Future (2043) Freeway Ramp Merge/Diverge Operations

It is also important to evaluate how the interchange ramps interact with the mainline highway traffic on I-5 through an analysis of the points where traffic enters or merges onto the highway and where it exits or diverges from the highway. These analyses were conducted in accordance with the methodology prescribed in ODOT's APM to determine v/c ratio performance. The results of the analysis are summarized in Table 4-10.

The merge and diverge analyses for the design hour between 4:15 PM and 5:15 PM show that the traffic operations for the freeway and the merge and diverge points associated with the Brooks interchange ramps will worsen by 2043. The southbound direction in the PM peak hour is expected to exceed operational targets at the diverge point and for the mainline section south of the interchange between the Chemawa interchange and the Brooks southbound entrance ramp.

An alternate hour (7:00 AM to 8:00 AM) was also analyzed to evaluate conditions when the northbound direction has the higher directional flow. The alternate hour analysis shows that freeway operations are expected to operate under the state's mobility target.

Table 4-10. Future (2043) Freeway Operations

	V/C RATIO[1]		
DIRECTION/LOCATION	**DESIGN HOUR[2]**	**ALTERNATE HOUR[3]**	**OHP TARGET[4]**
I-5 Northbound			
Mainline South of IC 263	0.78	0.75	0.85
Diverge: IC 263 Northbound Exit Ramp	0.79	0.75	0.85
Mainline between Exit and Entrance Ramps	0.67	0.62	0.85
Merge: IC 263 Northbound Entrance Ramp	0.54	0.53	0.85
Mainline North of IC 263	0.71	0.69	0.85
I-5 Southbound			
Mainline North of IC 263	0.83	0.59	0.85
Diverge: IC 263 Southbound Exit Ramp	**0.86**	0.60	0.85
Mainline between Exit and Entrance Ramps	0.75	0.55	0.85
Merge: IC 263 Southbound Entrance Ramp	0.72	0.53	0.85
Mainline South of IC 263	**0.96**	0.71	0.85

Acronyms: IC = Interchange, NA = Not Applicable

Notes:

1. The v/c ratios for the merge/diverge analysis are calculated based on the methodologies outlined in ODOT's Analysis Procedures Manual, using HCS 7 software.
2. The design hour is the system peak hour.
3. The alternate hour is AM peak hour.
4. 1999 Oregon Highway Plan (OHP), Table 6, Policy 1F applies to existing conditions.

4.3.5 Future Safety

As traffic volumes increase in the future and the congestion problems worsen, it is anticipated that crashes in the study area would also increase. A specific area of concern is the deceleration zone of the exit ramps, which are anticipated to experience queuing to the mainline. Also, with high levels of congestion projected for the ramp terminal intersections, drivers may attempt to turn onto Brooklake Road during smaller gaps in traffic than they would typically accept.

4.3.6 Pedestrian and Bicycle Travel Conditions

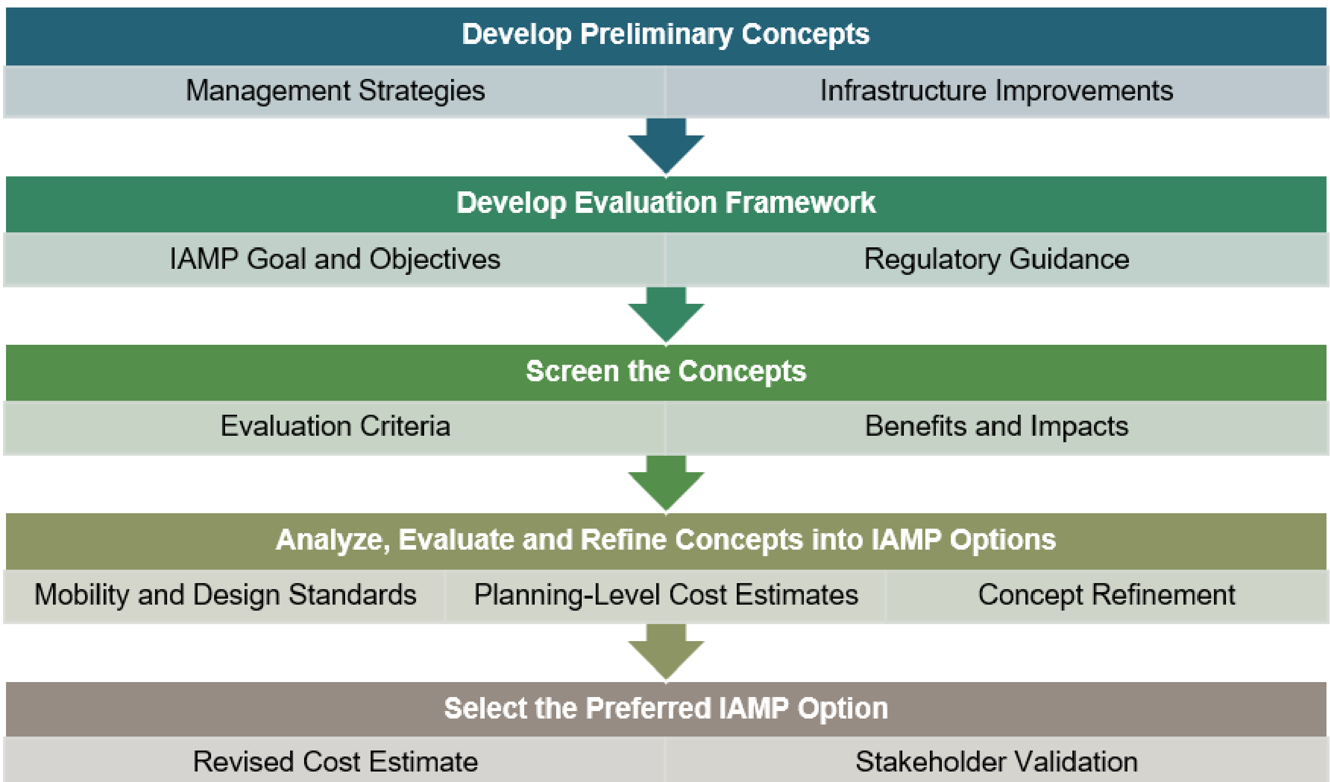
The pedestrian and bicycle LTS analyses that were conducted for existing conditions were repeated for the 2043 No-Build conditions to evaluate the quality of facilities for people walking and bicycling through the interchange area. Since no substantial pedestrian and bicycle improvements are conceived as part of the No-Build, the LTS is unchanged for both pedestrians and cyclists from that of existing conditions.

5 EVALUATION OF INTERCHANGE OPTIONS

5.1 Process Overview

The process of selecting a preferred option for the Brooks Interchange followed the overall process illustrated in Figure 5-1 to develop and refine a series of concepts into a Preferred IAMP Option. Evaluation criteria were applied to each concept, eliminating those with fatal flaws or that performed poorly, while retaining those that performed favorably for further refinement and evaluation.

Figure 5-1. Brooks IAMP Option Development and Selecting the Preferred IAMP Option



The Consultant hosted a workshop with ODOT and Marion County to identify a set of potential interchange configurations to address the existing and anticipated deficiencies of the Brooks Interchange. The group identified the following options for further assessment:

1. Tight Diamond Interchange (TDI)
2. Single Point Interchange (SPI)
3. Diverging Diamond Interchange (DDI)
4. Partial Cloverleaf (ParClo) – NW/NE
5. Partial Cloverleaf (ParClo) – NW/SE
6. Dogbone

5.2 Option Evaluation Framework

An initial set of evaluation criteria was developed to screen out any options that were unlikely to be implemented due to any "fatal flaws". The intent was to determine if an individual option had one or more defects preventing it from being successfully implemented. These initial criteria are listed below:

a) Clearly inconsistent with or unlikely to meet the project goal and objectives.
b) Requires the use of resources or properties which are highly unlikely to be available.
c) Incompatible with context of a rural interchange.

The results of the fatal flaw analysis did not definitively exclude any of the proposed interchange configurations, so all six options were evaluated using the detailed screening criteria described in the following section.

5.2.1 Detailed Screening

The **detailed evaluation criteria** were prepared to aid in evaluating how well each option meets the IAMP goals and objectives. When screening and evaluating potential interchange options, analysis included cost, traffic performance (operations and safety), right-of-way requirements, land use and business impacts, and environmental considerations. These broad criteria are described below, and detailed evaluation criteria are defined in Table 5-1.

5.2.1.1 Construction Cost

The overall cost of an improvement is a significant factor in the feasibility of a design option. Preliminary construction estimates for each design option were generated using conventional estimating techniques.[9] Each option's cost estimate includes a construction cost contingency to account for design uncertainties. The construction costs do not include costs associated with acquiring new rights-of-way (ROW). Construction cost also considers the potential ongoing and maintenance costs of the option.

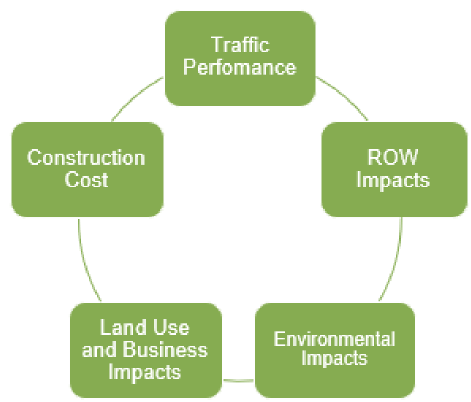


Figure 5-2. Concept Evaluation

5.2.1.2 Traffic Performance

The traffic performance of each design option will be evaluated at study intersections based on v/c ratio and LOS as outlined in the approved Methodology Memorandum, as well as potential benefits to safety.

The Oregon Highway Plan (OHP) mobility targets are applicable to the interchange for the development of the IAMP. The OHP establishes a v/c ratio of 0.85 at freeway ramp terminals and an I-5 mainline mobility target of 0.85, ratios more than this result in unacceptable levels of congestion. The ODOT Highway Design Manual (HDM) design performance thresholds for new intersection ramp terminals is a v/c ratio of less than 0.75. Both mobility standards will be considered in the evaluation of transportation performance analysis of the IAMP options,

[9] The average bid item costs increased significantly throughout the planning process. The initial evaluation of the concepts considered year 2021 average bid item costs, while costs of the Preferred Concepts were developed using updated 2022 average bid item costs.

however the OHP targets are the governing standard for facility plans and will be used to guide the recommendations of this IAMP.

The project team analyzed traffic performance for each option. In addition to the operational performance, the options will be evaluated on how they address existing SPIS locations and historical crash trends.

5.2.1.3 Right-of-Way Impacts

The options were evaluated based on the anticipated amount and location of additional ROW needed to accommodate the conceptual interchange design. The amount of additional ROW was estimated in acres using GIS.

5.2.1.4 Land Use and Business Impacts

The project team evaluated the options qualitatively to determine the relative impacts on land use and businesses. The interchange design options were evaluated based on the estimated ROW impacts to developed parcels and developable land as designated in the Marion County's Rural Zoning Code.

5.2.1.5 Specific Business and Farm Impacts

Specific business and farm impacts were evaluated for the May Trucking and Pilot Travel Center businesses in the in the northwest and southwest quadrants of the interchange, respectively. Other lands that may be impacted by new roadway connectors associated with the interchange design options were also studied.

5.2.1.6 Environmental Impacts

The IAMP anticipates that each of the interchange design options will have some impact on the built and/or natural environments. *Technical Memorandum #5* provides a "visual windshield validation" of environmental conditions in the I-5/Brooks IAMP study area. Each of the interchange design options was evaluated based on their relative impact to the documented built and natural environmental features in the study area.

Table 5-1. Detailed Evaluation Criteria

Screening Criteria	Objective	Evaluation Description
Construction Cost	Level of investment needed to implement	● - Low cost / within existing ROW ◕ - Moderate cost / within existing ROW ◑ - Moderate cost / some ROW needed ◔ - Significant cost / some ROW needed ○ - Significant cost / significant ROW needed
	Impact on maintenance and operations	● - Significantly reduces maintenance/operations costs ◕ - Minor reduction in maintenance/operations costs ◑ - Little to no impact on maintenance/operations costs ◔ - Minor increase in maintenance/operations costs ○ - Significantly increases maintenance/operations costs
Traffic Performance	Impacts to congestion and operations	● - Significantly reduces congestion / meets HDM v/c targets ◕- Reduction in congestion / meets OHP v/c targets ◑ - Little or no impact on congestion / exceeds OHP targets but better than No Build conditions ◔ - Minor increase in congestion / exceeds No Build v/c ○ - Significant increase in congestion/exceeds capacity (v/c >1.0) at ramp terminals

Screening Criteria	Objective	Evaluation Description
	Benefit to safety	● - Directly addresses crash pattern(s)/known deficiencies ◕ - Potential positive impact on crash pattern(s)/known deficiencies ◑ - No impact on safety ◔ - Potential negative impact on crash pattern(s)/known deficiencies ○ - Would directly worsen crash pattern(s)/known deficiencies
Right-of-Way Impacts	Limit impacts to ROW	● - ROW impacts are limited to one quadrant of interchange ◕ - ROW impacts are limited to east side of interchange ◑ - No change to current ROW impacts ◔ - ROW impacts to three quadrants of interchange ○ - ROW impacts to all quadrants of interchange
Land Use and Business Impacts	Limit business impacts	● - Improves access to existing businesses ◕ - No impact to existing businesses ◑ - Maintains access to existing businesses but relocates driveway ◔ - Restricts movements into and out of existing business / impacts site plan ○ - Removes access to existing business / impacts structures
	Limit impacts to developable and EFU lands	● - Positive impact to both developable and EFU lands ◕ - Positive impact to either developable or EFU lands ◑ - Does not impact developable or EFU lands ◔ - Negative impact to either developable or EFU lands ○ - Negative impact to both developable and EFU lands
Environmental Impacts	Acknowledge and plan for natural resources, wildlife and hazardous materials	● - Improves areas with known environmentally sensitive areas ◕ - Avoids negative impacts to environmentally sensitive areas ◑ - Does not impact environmentally sensitive areas ◔ - Improves condition for one resource at the expense to others ○ - Degrades environmentally sensitive areas
IAMP Goal*	Maintain efficient movement of freight traffic.	● - Improves freight movement through interchange. ◑ - No impact to freight movement ○ - Does not support or negatively impacts freight movement
	Improvements can be implemented over time	● - The improvement could be implemented in phases ◑ - The improvement cannot be implemented in phases ○ - The improvement replaces already planned / implemented improvements

* To capture components of the IAMP goal not included in other evaluation criteria

5.3 Interchange Option Screening

This section describes how each of the six preliminary interchange options performed with respect to the evaluation framework described above. All options assume the future improvements will be built to 2012 ODOT HDM standards. The DDI option follows the guidance in the Federal Highway Administration (FHWA) Diverging Diamond Interchange Informational Guide (2nd Edition). All interchange options also assume that the centerline of Brooklake Road remains on its current alignment and is widened to five lanes between Huff Avenue and the southbound ramp terminal. For construction staging purposes, the Preferred Option could consider shifting the alignment to construct the new interchange parallel to the existing structure, although this is not considered in the scoring evaluation of options.

5.3.1 Option 1: Tight Diamond Interchange (TDI)

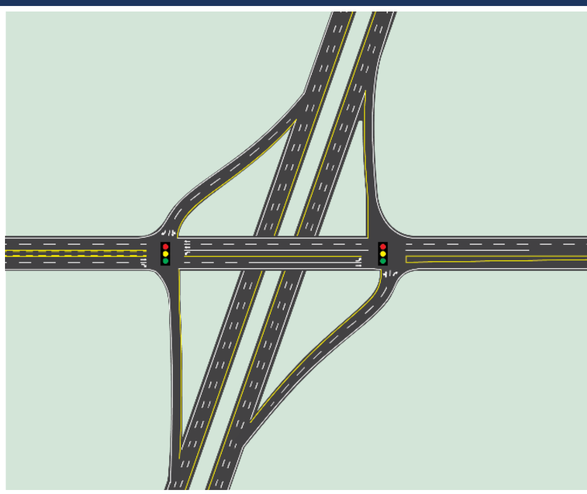
Description

A Tight Diamond Interchange (TDI) is a compressed version of diamond interchange, the latter being the most common interchange configuration. There are four one-way diagonal ramps, one in each quadrant of the interchange. Each exit ramp provides for right, through and left-turn movements at the intersection with the crossroad. Because left turns are made at grade, across conflicting traffic on the crossroad, intersection sight distance is a primary consideration. The TDI is generally used in areas where right-of-way is a constraint as the two ramp terminals are closely spaced with coordinated signal timing.

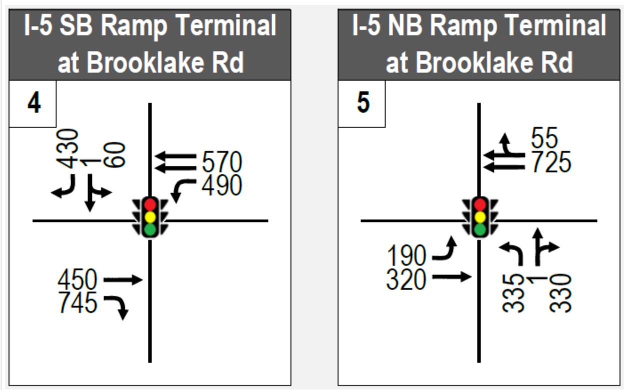
Design Features and Assumptions

- Replace the current structure over I-5 to attain the needed vertical clearance from I-5 and structure width for necessary capacity.
- Access management between Huff Avenue and southbound ramp terminal to accommodate the grade changes on Brooklake Road.
- Widen northbound and southbound exit ramps to accommodate two lanes of storage.
- Install coordinated traffic signals at northbound and southbound ramp terminals.
- Add bicycle and pedestrian facilities to both sides of the new bridge, with configuration to be refined during the design phase.

Conceptual Diagram

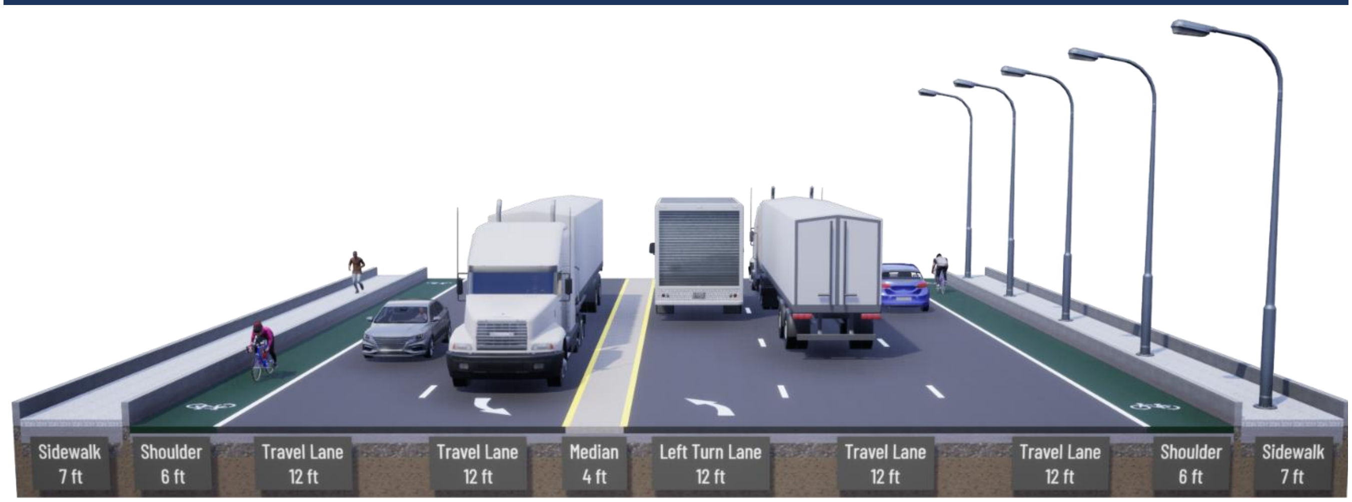


2043 PM Peak Hour Volumes and Lane Configurations



The images provided are conceptual and for planning purposes only. Should funding become available, the design features and cost estimates will be refined through the engineering process.

Conceptual Cross-section of Structure (Brooklake Road facing west)



5.3.1 Option 1: Tight Diamond Interchange (TDI)

Screening Criteria

Construction Cost Opinion

$56.9 million

Cost opinion is in 2021 dollars and does not assume right-of-way, utility relocation, new utilities or hazmat costs.

Right of Way: 3.3 acres

Quadrant	Acres	**Marion County Zoning (Comprehensive Plan)**
NW	1.5	Interchange District (Commercial)
NE	0.6	Unincorporated Community Industrial - Limited Use (Industrial)
SW	0.6	Interchange District (Commercial)
SE	0.6	Exclusive Farm Use (Primary Agriculture)

2043 Traffic Operations

Intersection	Critical Movement	v/c	LOS	OHP Mobility Target	HDM Mobility Target
SB Ramp Terminal	Overall	0.80	F	v/c ≤ 0.85	v/c ≤ 0.75
NB Ramp Terminal	Overall	0.76	C	v/c ≤ 0.85	v/c ≤ 0.75

Safety

- Improves sight distance for ramps terminals due to new interchange bridge.
- Traffic signals at the ramp terminals could reduce angle crashes but may increase rear end collisions on Brooklake Road.
- Increased storage on exit ramp reduces risk of traffic backing into safe stopping distance or onto the freeway.
- The TDI is similar to the most common interchange configuration; therefore, it meets driver expectation.
- TDI and diamond interchanges could have possible wrong-way entry on the ramps from the crossroad.

Land Use and Business Impacts

- The grade requirements and the widening of Brooklake Road to five lanes between Huff Avenue and the southbound ramp terminal would require significant modification to the access points to businesses on either side of Brooklake Road.
- West of I-5, the access the businesses north and south of Brooklake Road would need to be closed and traffic routed to Huff Avenue.
- Impacts to existing structures and BPA transmission line towers are not anticipated.
- On the east side of I-5, access modifications would be required at 50th Avenue NE to accommodate the widening of Brooklake Road at the approach to the northbound ramp terminal.

Environmental Impacts

- Least likely to have environmental impacts.
- There are no documented wetlands within the anticipated ROW.
- If the northbound entrance ramp were to be extended, Fitzpatrick Creek and a freshwater emergent wetland may be impacted.

IAMP Goal

Freight

- Signalized interchange, additional exit ramp storage, and correcting the approach grade would improve freight movement through the interchange

Phasing

- An initial phase to this interchange could be signalizing the interchange ramp terminals.
- The 4-lane version of this option has the potential to be designed as a retrofit of the existing structure.

Recommendation: Recommend Further Evaluation

5.3.2 Option 2: Single Point Interchange (SPI)

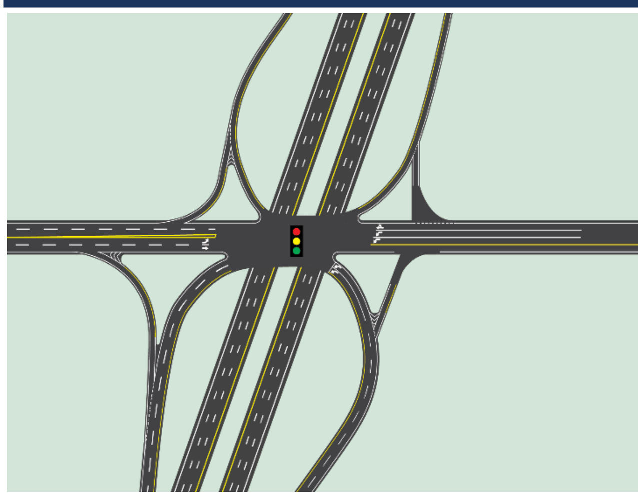
Description

The geometry of the entrance and exit ramps of a SPI is such that they appear to intersect at a single point. There is only one central intersection. The left and right turns from the exit ramp are channelized, prohibiting through movements onto the entrance ramp. Opposing left-turn paths do not cross and can be made at the same time. The long, gradual turns are a particular advantage for larger vehicles. While the SPUI can be beneficial where right-of-way is limited, the pavement area and the footprint of the structure is considerably wider. The larger intersection width requires greater structure length and depth, which increases costs for bridge construction, retaining walls and earthwork.

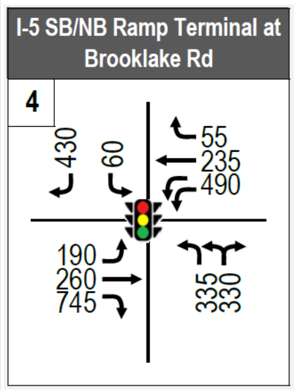
Design Features and Assumptions

- Replace the current structure over I-5 to attain the needed vertical clearance from I-5 and structure width for necessary capacity.
- Access management between Huff Avenue and southbound ramp terminal to accommodate the grade changes on Brooklake Road.
- Widen northbound and southbound exit ramps to accommodate two lanes of storage.
- Traffic flow at the ramp terminals would be controlled by a single traffic signal.

Conceptual Diagram



2043 PM Peak Hour Volumes and Lane Configurations



The images provided are conceptual and for planning purposes only. Should funding become available,
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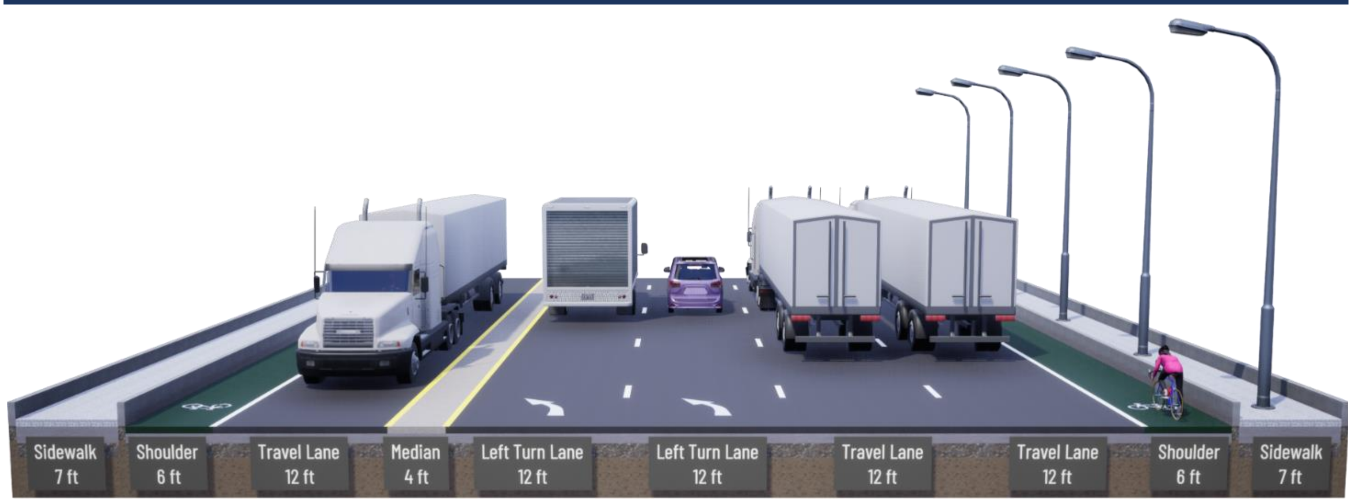
Conceptual Cross-section of Structure (Brooklake Road facing west)



5.3.2 Option 2: Single Point Interchange (SPI)

Screening Criteria

Construction Cost Opinion

$87.1 million

Cost opinion is in 2021 dollars and does not assume right-of-way, utility relocation, new utilities or hazmat costs.

Right of Way: 7.3 acres

Quadrant	Acres	Marion County Zoning (Comprehensive Plan)
NW	2.8	Interchange District (Commercial)
NE	1.3	Unincorporated Community Industrial - Limited Use (Industrial)
SW	0.4	Interchange District (Commercial)
SE	2.8	Exclusive Farm Use (Primary Agriculture)

2043 Traffic Operations

Intersection	Critical Movement	v/c	LOS	OHP Mobility Target	HDM Mobility Target
NB/SB Ramp Terminal	Overall	0.74	C	v/c ≤ 0.85	v/c ≤ 0.75

Safety

- Improves sight distance for ramps terminals due to new interchange bridge.
- Ramp terminal traffic signal could reduce angle crashes but may increase rear end collisions on Brooklake Road.
- Reduced conflict points by allowing opposing left turns to proceed simultaneously with fewer traffic signals, meaning vehicles only cross paths at one location.
- Increased exit ramp storage reduces risk of queuing into safe stopping distance or onto the freeway.
- Improved turning radii for large vehicles.

Land Use and Business Impacts

- The grade requirements and the widening of Brooklake Road to five lanes between Huff Avenue and the southbound ramp terminal would require significant modification to the access points to businesses on either side of Brooklake Road.
- West of I-5, the access the businesses north and south of Brooklake Road would need to be closed and traffic routed to Huff Avenue.
- With one exception, impacts to existing structures are not anticipated.
- Will likely require the relocation of the BPA transmission line tower in the northwest quadrant.
- On the east side of I-5, access modifications would be required at 50th Avenue NE to accommodate the widening of Brooklake Road at the approach to the northbound ramp terminal.

Environmental Impacts

- Potential environmental impacts in the southeast quadrant due to an existing drainage ditch.
- There are no documented wetlands within the anticipated ROW.
- If the northbound entrance ramp were to be extended, Fitzpatrick Creek and a freshwater emergent wetland may be impacted.

IAMP Goal

Freight

- One single signalized intersection and additional exit ramp storage would improve freight movement.
- Improved turning radii for large vehicles.

Phasing

- This interchange option does not lend itself to a phased option or retrofit of existing structure.

Recommendation: Not Recommended for Further Evaluation

5.3.3 Option 3: Diverging Diamond Interchange (DDI)

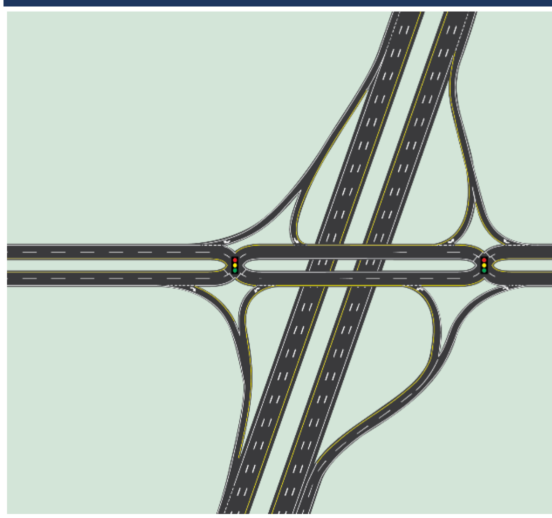
Description

A diverging diamond interchange (DDI), also called a double crossover diamond interchange, allows traffic on the minor road to cross to the opposite side of the road while within the interchange. Dual traffic signals control the movement of traffic during this crossover maneuver. Upon reaching the second signal, vehicles return to driving on the right side of the road. This orientation allows all signals in the intersection to operate in a two-phase operation. It also improves safety as opposing left turns are eliminated.

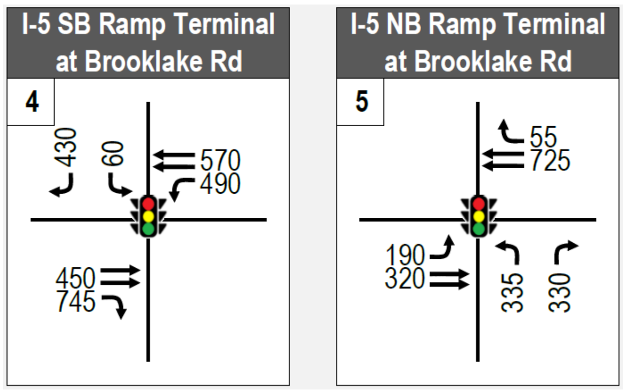
Design Features and Assumptions

- Replace the current structure over I-5 to attain the needed vertical clearance from I-5 and structure width for necessary capacity.
- Access management between Huff Avenue and southbound ramp terminal and between northbound ramp terminal and 50th Avenue to accommodate the grade changes on Brooklake Road.
- Widen northbound and southbound exit ramps to accommodate two lanes of storage.
- Widen northbound and southbound entrance ramps to accommodate two receiving lanes before merging to a single lane in advance of the freeway.
- Install two-phase traffic signals at northbound and southbound ramp terminals.

Conceptual Diagram



2043 PM Peak Hour Volumes and Lane Configurations



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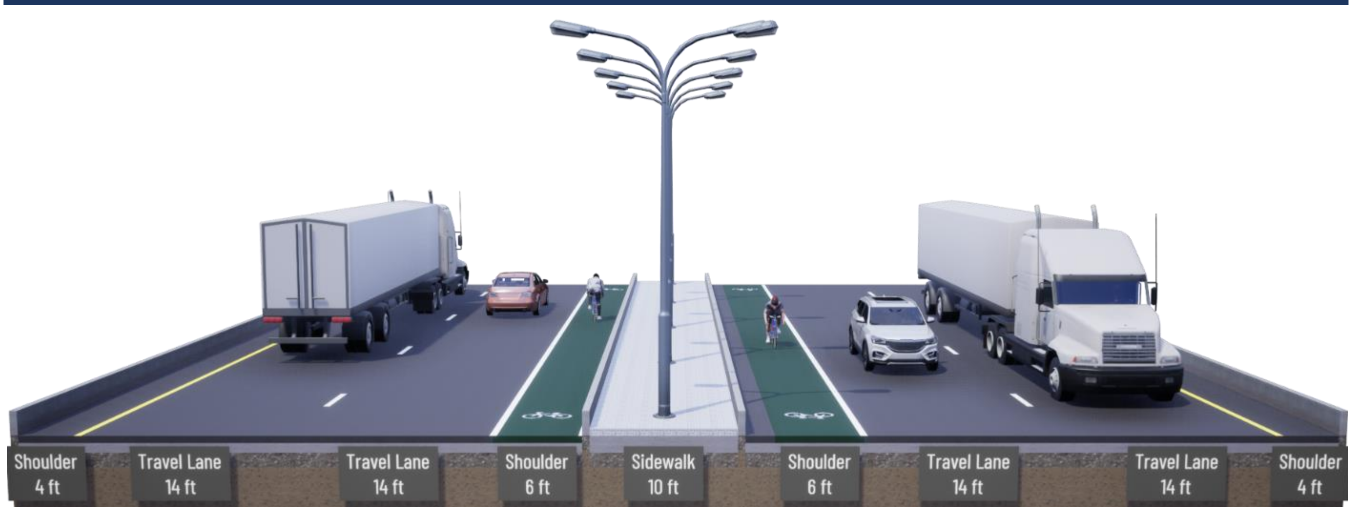
Conceptual Cross-section of Structure (Brooklake Road facing west)



5.3.3 Option 3: Diverging Diamond Interchange (DDI)

Screening Criteria

Construction Cost Opinion

$60.5 million

Cost opinion is in 2021 dollars and does not assume right-of-way, utility relocation, new utilities or hazmat costs.

Right of Way: 8 acres

Quadrant	Acres	Marion County Zoning (Comprehensive Plan)
NW	4.0	Interchange District (Commercial)
NE	1.9	Unincorporated Community Industrial - Limited Use (Industrial)
SW	0.9	Interchange District (Commercial)
SE	1.2	Exclusive Farm Use (Primary Agriculture)

2043 Traffic Operations

Intersection	Critical Movement	v/c	LOS	OHP Mobility Target	HDM Mobility Target
SB Ramp Terminal	Overall	0.69	A	v/c ≤ 0.85	v/c ≤ 0.75
NB Ramp Terminal	Overall	0.41	B	v/c ≤ 0.85	v/c ≤ 0.75

Safety

- New bridge structure and vertical curve provide improved sight distance for ramp terminals.
- Traffic signals at the ramp terminals could reduce angle crashes but may increase rear end collisions on Brooklake Road.
- Increased storage on exit ramp reduces risk of queuing into safe stopping distance or onto the freeway.
- Fewer conflict points than standard interchange design.
- Reduced potential for wrong-way entry to ramps.
- Decreased distance of pedestrian crossings.

Land Use and Business Impacts

- The grade requirements and the widening of Brooklake Road to five lanes between Huff Avenue and the southbound ramp terminal would require significant modification to the access points to businesses on either side of Brooklake Road.
- West of I-5, the access the businesses north and south of Brooklake Road would need to be closed and traffic routed to Huff Avenue.
- Potential impact to existing structures in the southwest quadrant unless design refinements are made, including a retaining wall.
- May require the relocation of the BPA transmission line tower in the northwest quadrant.

Environmental Impacts

- Potential for environmental impacts in the southeast quadrant due to an existing drainage ditch.
- There are no documented wetlands within the anticipated ROW.
- If the northbound entrance ramp were to be extended, Fitzpatrick Creek and a freshwater emergent wetland may be impacted.

IAMP Goal

Freight

- Removal of left-turn conflicts, clear channelization, and additional exit ramp storage would improve freight movement through the interchange.
- Improved turning radii for large vehicles.

Phasing

- This interchange option does not lend itself to a phased option or retrofit of existing structure.

Recommendation: Not Recommended for Further Evaluation

5.3.4 Option 4: Partial Cloverleaf (ParClo) – NW/NE

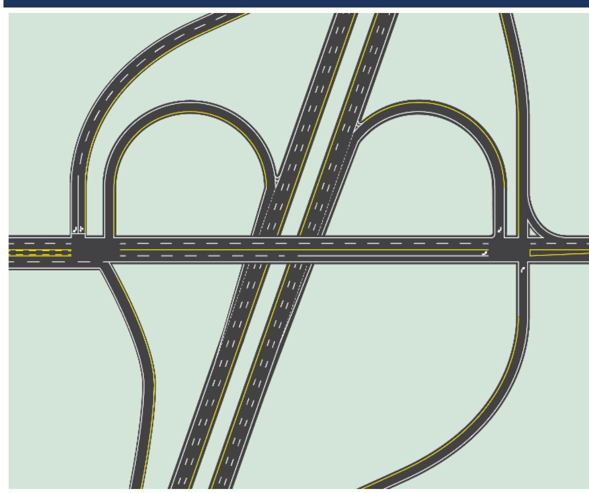
Description

Partial cloverleaf interchanges are a modified version of a full cloverleaf interchange. The orientation of the loop ramps and diamond ramps can be chosen based on the specific needs of the site: the layout does not need to be symmetrical. The diamond ramps are used to turn right, while the loop ramps replace left turns with right turn movements. This version of the ParClo option provides a loop ramp in the northwest quadrant for the westbound to southbound entrance ramp and a loop ramp in the northeast quadrant for the northbound to westbound exit ramp movements.

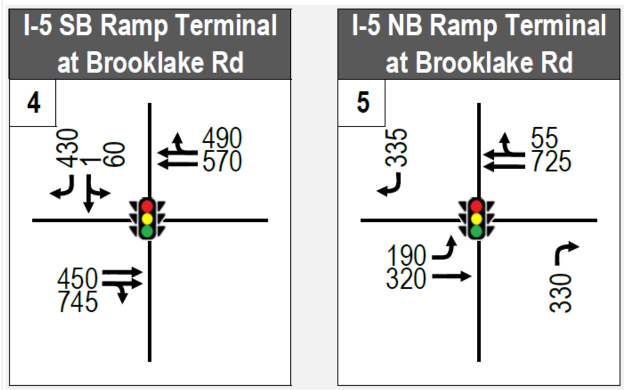
Design Features and Assumptions

- Replace the current structure over I-5 to attain the needed vertical clearance from I-5 and structure width for necessary capacity.
- Access management between Huff Avenue and southbound ramp terminal to accommodate the grade changes on Brooklake Road.
- Widen southbound exit ramp to accommodate two lanes of storage.
- The northbound exit ramps are single lanes.
- Traffic flow at the ramp terminals would be controlled by traffic signals, including the loop ramp traffic. The non-free flow ramps are preferred for multimodal considerations.

Conceptual Diagram



2043 PM Peak Hour Volumes and Lane Configurations



The images provided are conceptual and for planning purposes only. Should funding become available, the design features and cost estimates will be refined through the engineering process.

Conceptual Cross-section of Structure (Brooklake Road facing west)

5.3.4 Option 4: Partial Cloverleaf (ParClo) – NW/NE

Screening Criteria

Construction Cost Opinion	*Right of Way: 15.1 acres*		
$75.8 million *Cost opinion is in 2021 dollars and does not assume right-of-way, utility relocation, new utilities or hazmat costs.*	Quadrant	Acres	**Marion County Zoning (Comprehensive Plan)**
	NW	5.7	Interchange District (Commercial)
	NE	4.6	Unincorporated Community Industrial - Limited Use (Industrial)
	SW	0.7	Interchange District (Commercial)
	SE	4.1	Exclusive Farm Use (Primary Agriculture)

2043 Traffic Operations

Intersection	Critical Movement	v/c	LOS	OHP Mobility Target	HDM Mobility Target
SB Ramp Terminal	Overall	0.60	C	v/c ≤ 0.85	v/c ≤ 0.75
NB Ramp Terminal	Overall	0.51	C	v/c ≤ 0.85	v/c ≤ 0.75

Safety

- Improves sight distance for ramp terminals due to new interchange bridge.
- Traffic signals at the ramp terminals could reduce angle crashes but may increase rear end collisions on Brooklake Road.
- Increased storage on exit ramp reduces risk of queuing into safe stopping distance or onto the freeway.
- May create weaving concerns between the ramp terminals in the westbound direction.
- Reduced number of left-turn conflicts.
- Loop exit ramps are not preferred for safety of exiting freeway (speed differential entering a curve)
- Need to consider potential for wrong way traffic of exit ramp.

Land Use and Business Impacts

- The grade requirements and the widening of Brooklake Road to five lanes between Huff Avenue and the southbound ramp terminal would require significant modification to the access points to businesses on either side of Brooklake Road between Huff Avenue and 50th Avenue.
- This option has the largest impact to developable lands.
- Access modifications would be required at 50th Avenue NE to accommodate the northbound to westbound loop ramp.

Environmental Impacts

- Potential for environmental impacts in the southeast quadrant due to an existing drainage ditch.
- There are no documented wetlands within the anticipated ROW.
- If the northbound entrance ramp were to be extended, Fitzpatrick Creek and a freshwater emergent wetland may be impacted.

IAMP Goal

Freight

- Removal of left-turn conflicts and additional exit ramp storage would improve freight movement through the interchange.
- Requires lane changes between the northbound ramp terminal and Huff Avenue to access freight businesses south of Brooklake Road.
- Design would need to consider heavy freight use to avoid trucks tipping on the loop ramps

Phasing

- Potential to be constructed in phases (northbound ramp terminal first).
- Potential to be constructed as a retrofit to the existing structure requiring design exceptions for clearance and sight distance.

Recommendation: Not Recommended for Further Evaluation

5.3.5 Option 5: Partial Cloverleaf (ParClo) – NW/SE

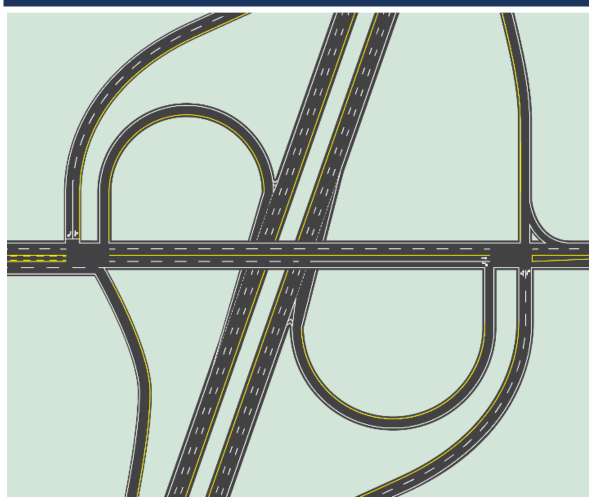
Description

Partial cloverleaf interchanges are a modified version of a full cloverleaf interchange. The orientation of the loop ramps and diamond ramps can be chosen based on the specific needs of the site: the layout does not need to be symmetrical. The diamond ramps are used to turn right, while the loop ramps replace left turns with right turn movements. This version of the ParClo option provides a loop ramp in the northwest quadrant for the westbound to southbound entrance ramp and a loop ramp in the southeast quadrant for the eastbound to northbound entrance ramp movements.

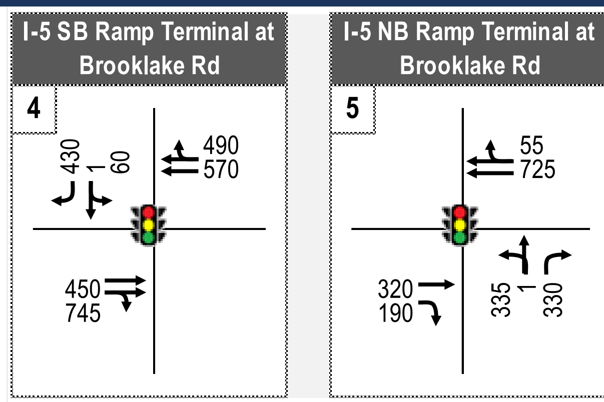
Design Features and Assumptions

- Replace the current structure over I-5 to attain the needed vertical clearance from I-5 and structure width for necessary capacity.
- Access management between Huff Avenue and southbound ramp terminal to accommodate the grade changes on Brooklake Road.
- Widen southbound exit ramp to accommodate two lanes of storage.
- The northbound exit ramps are single lanes.
- Traffic flow at the ramp terminals would be controlled by traffic signals, including the loop ramp traffic. The non-free flow ramps are preferred for multimodal considerations.

Conceptual Diagram



2043 PM Peak Hour Volumes and Lane Configurations



The images provided are conceptual and for planning purposes only. Should funding become available, the design features and cost estimates will be refined through the engineering process.

Conceptual Cross-section of Structure (Brooklake Road facing west)

5.3.5 Option 5: Partial Cloverleaf (ParClo) – NW/SE

Screening Criteria

Construction Cost Opinion

$75.4 million

Cost opinion is in 2021 dollars and does not assume right-of-way, utility relocation, new utilities or hazmat costs.

Right of Way: 14.7 acres

Quadrant	Acres	Marion County Zoning (Comprehensive Plan)
NW	5.7	Interchange District (Commercial)
NE	2.6	Unincorporated Community Industrial - Limited Use (Industrial)
SW	0.7	Interchange District (Commercial)
SE	5.7	Exclusive Farm Use (Primary Agriculture)

2043 Traffic Operations

Intersection	Critical Movement	v/c	LOS	OHP Mobility Target	HDM Mobility Target
SB Ramp Terminal	Overall	0.60	C	v/c ≤ 0.85	v/c ≤ 0.75
NB Ramp Terminal	Overall	0.55	B	v/c ≤ 0.85	v/c ≤ 0.75

Safety

- Improves sight distance for ramp terminals due to new interchange bridge.
- Traffic signals at the ramp terminals could reduce angle crashes but may increase rear end collisions on Brooklake Road.
- Increased storage on exit ramp reduces risk of queuing into safe stopping distance or onto the freeway.
- Reduced number of left-turn conflicts.
- Need to consider potential for wrong way traffic of exit ramp

Land Use and Business Impacts

- The grade requirements and the widening of Brooklake Road to five lanes between Huff Avenue and the southbound ramp terminal would require significant modification to the access points to businesses on either side of Brooklake Road between Huff Avenue and 50th Avenue.
- This option has the second largest impact to developable lands.
- Access modifications would be required at 50th Avenue NE to accommodate the northbound to westbound loop ramp.

Environmental Impacts

- Potential for environmental impacts in the southeast quadrant due to an existing drainage ditch.
- There are no documented wetlands within the anticipated ROW.
- If the northbound entrance ramp were to be extended, Fitzpatrick Creek and a freshwater emergent wetland may be impacted.

IAMP Goal

Freight

- Removal of left-turn conflicts and additional exit ramp storage would improve freight movement through the interchange.
- Design would need to consider heavy freight use to avoid trucks tipping on the loop ramps

Phasing

- Potential to be constructed in phases (northbound ramp terminal first).
- Potential to be constructed as a retrofit to the existing structure requiring design exceptions for clearance and sight distance.

Recommendation: Not Recommended for Further Evaluation

5.3.6 Option 6: Dogbone Interchange

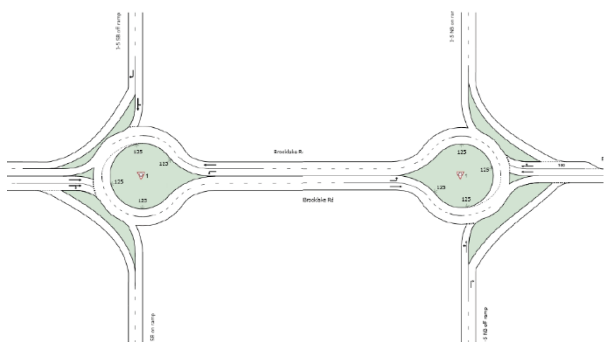
Description

The dogbone is like a diamond interchange, except instead of stop- or signal-controlled ramp terminals, the ramp terminals are controlled by teardrops pointing towards each other. The teardrop shape as opposed to a full roundabout helps to reduce conflicts and queues. The teardrop also allows for smoother traffic flow, with the yield control preventing complete stops while still calming traffic when maneuvering the curve.

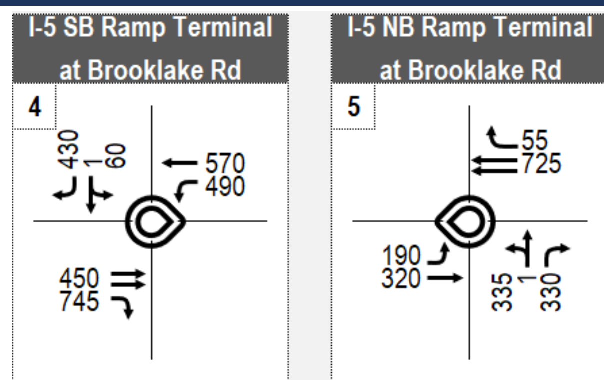
Design Features and Assumptions

- Replace the current structure over I-5 to attain the needed vertical clearance from I-5 and structure width for necessary capacity.
- Access management between Huff Avenue and southbound ramp terminal to accommodate the grade changes on Brooklake Road.
- Widen northbound and southbound exit ramps to accommodate two lanes of storage.
- Ramp terminals are controlled by connected teardrop roundabouts.
- Geometry prevents U-turns at the individual ramp terminals. Traffic would have to travel through the whole interchange to complete a U-turn.
- Assumes bypass lanes are included to remove all right-turn traffic from the teardrop operations. If selected for advancement beyond the adopted IAMP, further assessment and analysis will be completed to determine the need for each bypass lane.

Conceptual Diagram

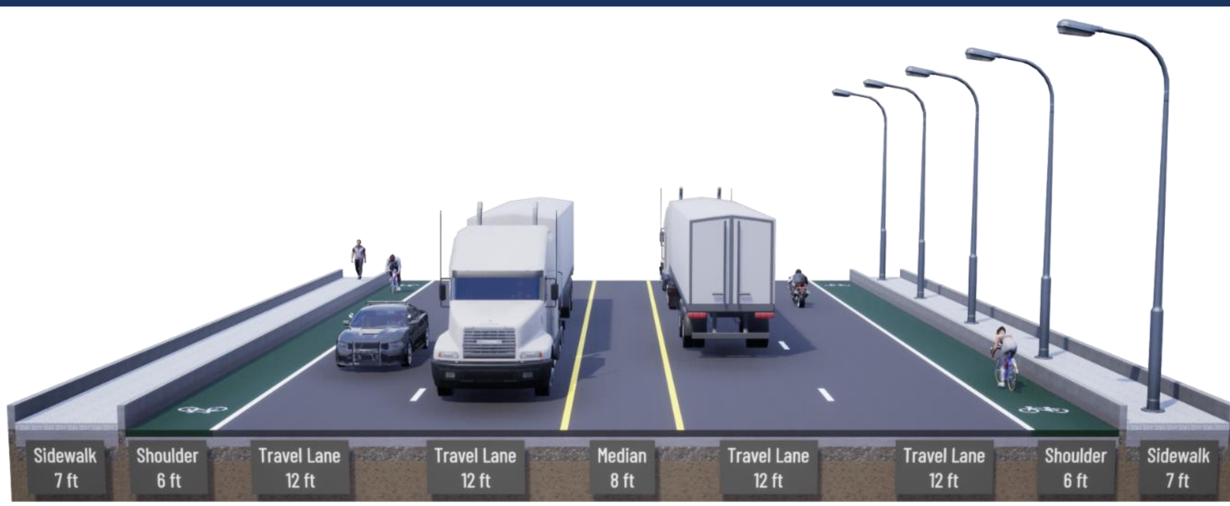


2043 PM Peak Hour Volumes and Lane Configurations



The images provided are conceptual and for planning purposes only. Should funding become available, the design features and cost estimates will be refined through the engineering process.

Conceptual Cross-section of Structure (Brooklake Road facing west)



5.3.6 Option 6: Dogbone Interchange

Screening Criteria

Construction Cost Opinion	*Right of Way: 4.3 acres*		
$59.1 million *Cost opinion is in 2021 dollars and does not assume right-of-way, utility relocation, new utilities or hazmat costs.*	Quadrant	Acres	**Marion County Zoning (Comprehensive Plan)**
	NW	1.7	Interchange District (Commercial)
	NE	1.3	Unincorporated Community Industrial - Limited Use (Industrial)
	SW	0.8	Interchange District (Commercial)
	SE	0.5	Exclusive Farm Use (Primary Agriculture)

2043 Traffic Operations

Intersection	Critical Movement	v/c	LOS	OHP Mobility Target	HDM Mobility Target
SB Ramp Terminal	Overall	0.70	A	v/c ≤ 0.85	v/c ≤ 0.75
NB Ramp Terminal	Overall	0.60	B	v/c ≤ 0.85	v/c ≤ 0.75

Safety

- Improved sight distance for ramps terminals with the new interchange.
- Reduces number of conflict points, reduces crash severities, and eliminates potential for right-angle and head on collisions.
- Continuous flow minimizes backups onto the freeway or into safe stopping distance area.
- Can be difficult to navigate for unfamiliar oversized truck/freight drivers, although this should be able to be addressed in design.
- Reduces speed of vehicles traveling through intersection.

Land Use and Business Impacts

- The grade requirements and the widening of Brooklake Road to five lanes between Huff Avenue and the southbound ramp terminal would require significant modification to the access points to businesses on either side of Brooklake Road.
- West of I-5, the access the businesses north and south of Brooklake Road would need to be closed and traffic routed to Huff Avenue.
- Existing parking lots would be impacted in both the northwest and southwest quadrants.
- May require the relocation of the BPA transmission line tower in the northwest quadrant without alignment modifications.

Environmental Impacts

- Potential for environmental impacts in the southeast quadrant due to an existing drainage ditch.
- There are no documented wetlands within the anticipated ROW.
- If the northbound entrance ramp were to be extended, Fitzpatrick Creek and a freshwater emergent wetland may be impacted.

IAMP Goal

Freight

- Removal of left-turn conflicts and additional exit ramp storage would improve freight movement through the interchange.
- Unfamiliar freight and oversized vehicles users can have trouble navigating teardrop (offtracking), although this should be able to be addressed in design.
- Weaving between Huff Avenue and the southbound ramp terminal could be a concern without traffic signals providing adequate gaps in traffic for lane maneuvers

Phasing

- Potential to retrofit the existing structure if cross-section is three-lanes.

Recommendation: Recommend Further Evaluation

5.4 Selecting the Preferred and Supplemental Options

In June 2022, the project management team (PMT) met to review the revised concept evaluation findings above (and summarized in *Technical Memorandum #7*) and forward those findings to the project Stakeholders, with recommendations of the TDI and Dogbone as the Preferred and Supplemental interchange options. The Stakeholders met and reviewed these findings in their meeting in July 2022, which resulted in their consensus recommendation of the TDI as the Preferred Option and Dogbone as the Supplemental Option.

The TDI and Dogbone options each have relatively lower costs, provide sufficient capacity to service future traffic operations and have relatively lower environmental and land use impacts than the other interchange options examined. Several stakeholders expressed support in furthering the Dogbone as the Supplemental Option due to its ability to facilitate more continuous flow operations for truck traveling through each of the I-5 ramp intersections.

Region 2 management agreed with the stakeholder recommendation and directed the project team to present these findings in the public open house meeting (July 2022) and summarize the TDI Preferred Option and Dogbone Supplemental Option in the final IAMP. It is the intent of these findings that both options will be carried forward in future environmental analysis and preliminary engineering in the eventual selection of a final interchange design for funding and construction.

6 PREFERRED AND SUPPLEMENTAL OPTIONS

This chapter describes the Preferred and Supplemental interchange options for the Brooks IAMP. The following sections provide an overview of the concept phasing options, right-of-way requirements, and environmental impacts. This chapter also includes findings from traffic analysis performed by the project team. See Volume 2, *Technical Memorandum #7* for additional information on the Preferred Option.

6.1 Preferred Option: Tight Diamond Interchange

ODOT selected a TDI as the Preferred Option for the I-5/Brooklake IAMP (Figure 6-1) after developing and evaluating several different interchange options (as discussed in Chapter 5).

The Preferred Option would replace the current structure over I-5 to attain the needed vertical clearance over I-5 and structure width for necessary capacity. This would result in closure of adjacent accesses immediately west of I-5 to accommodate the grade changes on Brooklake Road. Both proposed I-5 exit ramps are single lanes that widen to two lanes at the Brooklake Road intersections. Traffic flow at the ramp intersections of Brooklake Road would be controlled by coordinated traffic signals (assuming the Intersection Control Evaluation analysis supports signalization).

The Preferred Option consists of the following elements:

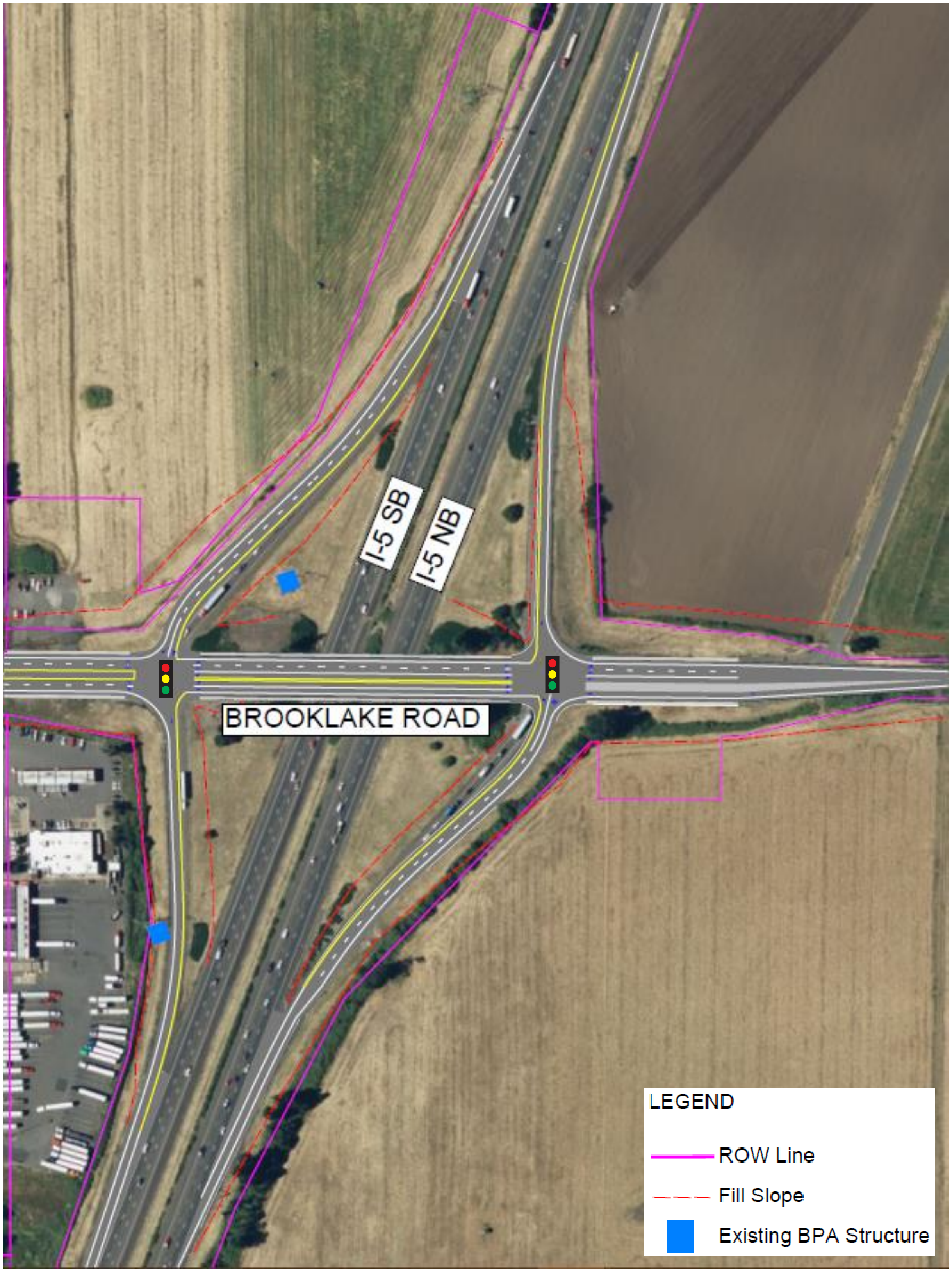
- Construction of a new TDI with new signalized intersections located at the northbound and southbound ramp terminals on Brooklake Road.
- Reconstruction of the I-5 ramps to match grades and add lanes for turning movement channelization at the signals. The exit ramps would be lengthened to meet HDM standards for deceleration, and the entrance ramps would also be lengthened to meet HDM standards for acceleration.
- Replacement of the Brooklake Road bridge over I-5 to improve the vertical grade and provide a wider cross section of Brooklake Road over I-5. The wider road would include dual westbound lanes, separate left-turn lanes (side-by-side) and a single eastbound through lane, with new bicycle and pedestrian facilities. The flatter vertical grades will provide improved acceleration and deceleration for traffic operations at the signals as well as improved accessibility for pedestrians to be compliant with ADA requirements.
- Widening of Brooklake Road to five lanes between Huff Avenue and the I-5 southbound ramp intersection, including a new traffic signal at Huff Avenue. As part of preliminary engineering following the IAMP, ODOT will conduct an Intersection Control Evaluation, which is used to determine the most appropriate traffic control and will consider a traffic signal or a potential roundabout (as an alternative to a traffic signal) at the intersection of Brooklake Road and Huff Avenue.
- Widening and extension of Huff Avenue north of Brooklake Road to provide alternate access to May Trucking.
- Widening and extension of Huff Avenue south of Brooklake Road, with a new street connection between Huff Avenue and Truckman Way to provide alternate access to the Pilot station and parking.

The estimated construction cost is $59.8 million (assumes 2022 average bid item prices). The Preferred Option cost estimate is included in Volume 2.

6.1.1 Phasing Options

An initial phase to the TDI Preferred Option could include lengthening and widening the exit ramps similar to the phased construction on the northbound exit ramp at nearby Aurora-Donald interchange. That project similarly improved deceleration length, vehicle storage and turn channelization to reduce the chance of the exit ramp affecting I-5 operations and did so without adding a traffic signal. At Brooklake Road, signalizing the interchange ramp terminals could be included in an interim phase if needed to resolve intersection sight distance issues, or to accommodate increased use by pedestrians. Adding traffic signals on the existing steep grades, however, would make the operational issues along Brooklake Road more acute for freight with increased acceleration and deceleration distances at the signals. The Preferred Option also has the potential to be designed as a retrofit and widening of the existing structure over I-5 or phased as part of the interim improvements discussed in Section 6.4.

Figure 6-1. Preferred Option: Tight Diamond Interchange



Note: An Intersection Control Evaluation will be used to determine/confirm the appropriate traffic control.

6.1.2 Right-of-Way

The anticipated new right-of-way needed for the Supplemental Option total about 3.3 acres. Right-of-way impacts are generally related to the improvements necessary to adjust Brooklake Road and the ramp terminals to the correct grade. Although the interchange ramp terminals remain in approximately the existing horizontal location for this concept, embankment to flatten Brooklake Road and widen it to five lanes west of the interchange will impact ROW for all quadrants, with the largest impact in the northwest quadrant. Retaining walls will be designed to minimize right-of-way impacts where possible, and especially to avoid developed areas.

This concept may also require retaining walls to avoid impacting the Bonneville Power Administration (BPA) towers located west of I-5, both north and south of Brooklake Road. Coordination with BPA for construction within their right-of-way will also be required.

6.1.3 Environmental Impacts

The Preferred Option would have impacts to the built and natural environments, but for a project of its size and scale, the impacts are expected to be mitigable. Below is a brief description of impacts to the natural and built environments.

6.1.3.1 Natural Environment

- Wetlands – There are no documented wetlands within the anticipated needed ROW.
- Stormwater – Increases in impervious surface and changes in drainage patterns would trigger stormwater management requirements.
- Endangered Species Act (ESA) – No critical habitat has been designated within the study area.

6.1.3.2 Built Environment

- Historic Resources – Two BPA towers are present within the project area. The towers and lines are part of the Big Eddy-Chemawa No. 1 line (Historically Oregon City-Chemawa No. 3). This line was constructed in 1955. The transmission line in the project area meets the criteria for eligibility for listing in the NRHP. No adverse impacts to the towers are anticipated. No other historic resources are present in the project area.
- Cultural Resources – There are no publicly owned parks or other recreation resources, including trails and wildlife refuges within the study area or within one mile of the study area. The project will require right-of-way acquisition, and thus an archaeological field investigation and cultural resource survey will need to be conducted as part of future environmental study.
- Socioeconomic – The project would benefit the traveling public and area businesses by improving safety and relieving congestion at the interchange and along Brooklake Road.
- Air Quality – The project area is in attainment with a maintenance plan for all air quality requirements.[10]
- Hazardous Materials – The project is near two truck stops (May Trucking and Pilot Travel Center) that have generated hazardous waste, and three industrial uses along Brooklake Road. Interchange improvements and the widening of Brooklake Road may require hazardous material mitigation.

6.1.4 Transportation Performance

Table 6-1 summarizes transportation performance of the Preferred Option for the 2043 design year. All intersections would perform acceptably and would meet mobility targets, with the ramp intersections having

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[10] https://www.oregon.gov/deq/aq/pages/maintenance-areas.aspx

reserve capacity for the future. The Preferred Option traffic analysis report is included in Volume 2, *Technical Memorandum #7*.

The TDI Preferred Option would maintain mobility at both I-5 ramp intersections below the required 0.85 v/c mobility target for OHP and below the HDM target of 0.75.

Table 6-1. Preferred Option 2043 Performance

INTERSECTION	2043 V/C	OHP MOBILITY TARGET	HDM MOBILITY TARGET
I-5 Southbound Ramp Terminal	0.80	v/c ≤ 0.85	v/c ≤ 0.75
I-5 Northbound Ramp Terminal	0.75	v/c ≤ 0.85	v/c ≤ 0.75

6.2 Supplemental Option: Dogbone

The Supplemental Option (Dogbone) interchange concept would replace the current structure over I-5 to attain the needed vertical clearance over I-5 and structure width for necessary capacity. Like the Preferred Option, this would result in closure of adjacent accesses to accommodate the grade changes on Brooklake Road. Traffic flow at the I-5 ramp terminals would be controlled by teardrop roundabouts. The proposed ultimate design allows for right-turn slip lanes (also called roundabout bypass lanes), for turning movements that do not require crossing the bridge.

Figure 6-2 shows the Supplemental Option.

The Supplemental Option consists of the following elements:

- Construction of a new Dogbone interchange with teardrop roundabout intersections located at the northbound and southbound ramp terminals at Brooklake Road.
- Reconstruction of the I-5 ramps to match grades and realign lanes for turning movements to the roundabouts. The exit ramps would be lengthened to meet HDM standards for deceleration, and the entrance ramps would also be lengthened to meet HDM standards for acceleration.
- Replacement of the Brooklake Road bridge over I-5 to improve the vertical grade and provide a wider cross section of Brooklake Road over I-5. The wider road would include two lanes in each direction, with new bicycle and pedestrian facilities separated from the vehicle travel lanes.
- Widening of Brooklake Road to five lanes between Huff Avenue and the I-5 southbound ramp intersection, including a new traffic signal at Huff Avenue. As part of preliminary engineering following the IAMP, ODOT will conduct an Intersection Control Evaluation that considers a potential roundabout at the intersection of Brooklake Road and Huff Avenue (as an alternative to a traffic signal).
- Widening and extension of Huff Avenue north of Brooklake Road to provide alternate access to May Trucking.
- Widening and extension of Huff Avenue south of Brooklake Road, with a new street connection between Huff Avenue and Truckman Way to provide alternate access to the Pilot station and parking.

The estimated construction cost is $70 million (assumes 2022 average bid item costs). There is opportunity to reduce cost during design refinement if slip lanes are not desired for all right-turns. The Supplemental Option cost estimate is included in Volume 2.

6.2.1 Phasing Options

Phasing the project to utilize the existing structure with the Supplemental Option would limit the intersections to be single-lane roundabouts. Grading and paving of the outer lanes of the roundabouts and construction of the bypass lanes as a first phase could improve traffic staging for the eventual replacement of the bridge.

6.2.2 Right-of-Way

The anticipated new rights-of-way needed for the Supplemental Option is about 4.3 acres. The right-of-way impacts of the Supplemental Option are generally related to the improvements necessary to adjust Brooklake Road and the ramp terminals to the correct grade and provide for the right-turn slip lanes (or bypass lanes). Although the interchange ramp terminals remain in the existing location for this concept, the teardrop intersections require a larger footprint, so this concept requires slightly more ROW than the TDI Preferred Option.

6.2.3 Environmental Impacts

With one exception, the Supplemental Option would generally have the same impacts to the built and natural environments as the Preferred Option (Section 6.1.3). This concept has potential for environmental impacts in the southeast quadrant of the I-5 interchange due to an existing drainage ditch. See *Technical Memorandum #5* in Volume 2 for details.

Figure 6-2. Supplemental Option: Dogbone

6.2.4 Transportation Performance

Table 6-2 summarizes transportation performance of the Supplemental Option for the 2043 design year. All intersections would perform acceptably and would meet mobility targets, with the ramp intersections having reserve capacity for the future. The Supplemental Option traffic analysis report is included in *Technical Memorandum #7*.

Table 6-2. Supplemental Option 2043 Performance

INTERSECTION	2043 V/C	OHP MOBILITY TARGET	HDM MOBILITY TARGET
I-5 Southbound Ramp Terminal	0.70	v/c ≤ 0.85	v/c ≤ 0.75
I-5 Northbound Ramp Terminal	0.60	v/c ≤ 0.85	v/c ≤ 0.75

6.3 Local System Improvements

The local system improvements focus on the study intersections along Brooklake Road within the study area and access management to Brooklake Road within ¼-mile of the interchange ramps. The concepts build on the projects identified in the SKATS RTSP.

Access to the interchange is affected by traffic delays on the supporting arterial network: Brooklake Road, River Road and OR 99E (Portland Road). The intersections at the east and west gateways to the interchange already experience congestion, which is expected to worsen over the next 20 years.

The concepts developed for local system improvements address operational and safety deficiencies at individual study area intersections outside of the interchange ramps, which includes any necessary improvements needed beyond what was assumed in the 2043 No Build analysis (included in the SKATS RTSP and summarized in *Technical Memorandum #4*). Other improvements identify the changes needed to support the interchange configurations assuming design to current standards. In some cases, this may require access closures or modifications and new local network connections. The local system improvements are summarized below in Table 6-3 and depicted in Figure 6-4 for improvements between River Road and the I-5 northbound ramp terminal.

Table 6-3. Local System Improvements

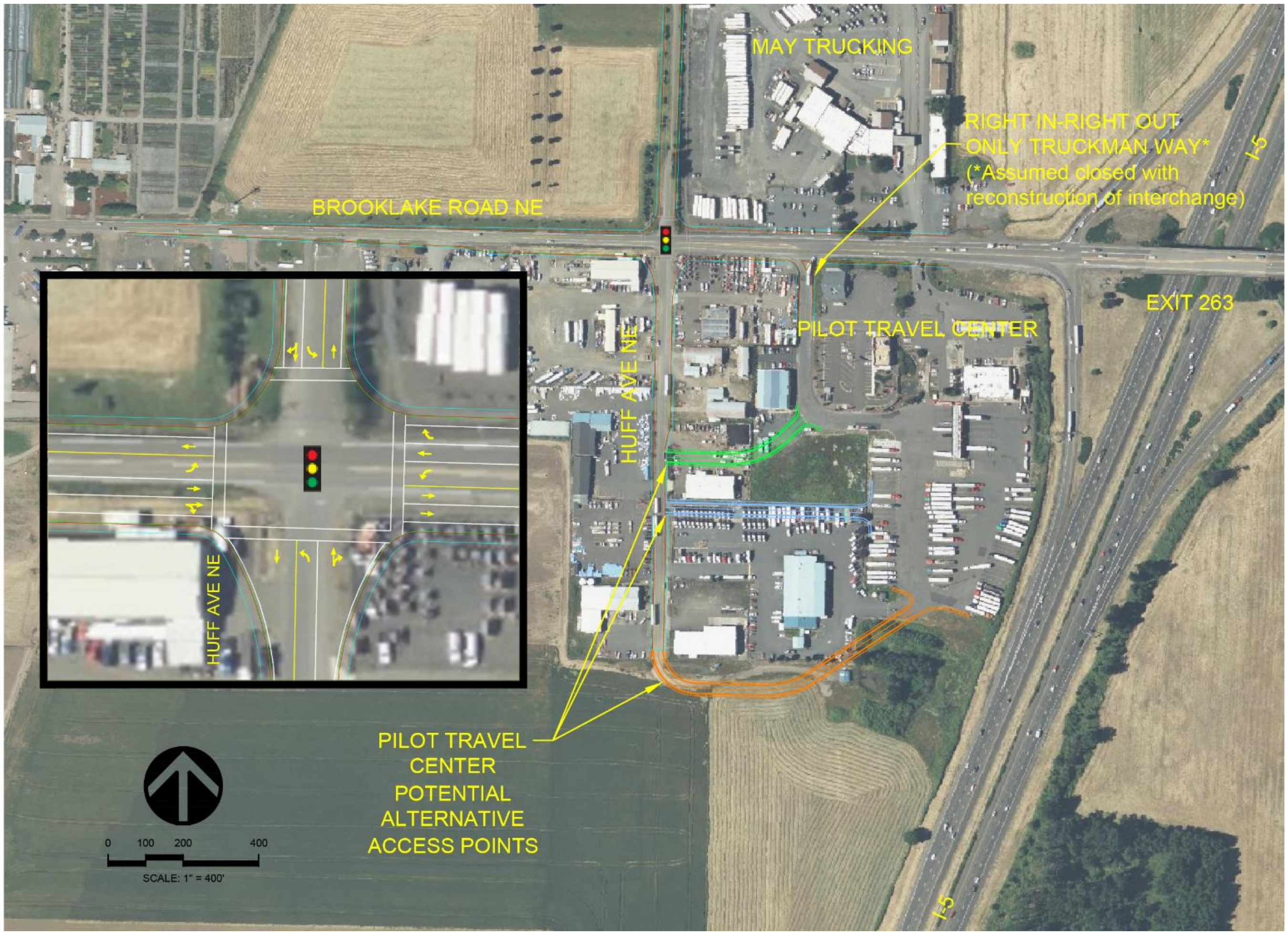
LOCATION	IMPROVEMENT	PROBLEM ADDRESSED	TIMING
River Rd at Brooklake Rd	Assumes new traffic signal but no additional approach lanes.	Intersection expected to meet County mobility target by 2043 with LOS C and v/c 0.82	Signalize as soon as possible[1]; intersection is currently over capacity. Add dual southbound left-turn lanes when signalized intersection exceeds mobility targets.
May Trucking/ PILOT access and Truckman Way	Close accesses, create local connection to Huff Ave and divert traffic to Huff Ave.	Accesses between Huff Ave and SB Ramp Terminal must be restricted or closed with grade improvements to Brooklake Rd	With new interchange or with widening of Brooklake Rd to five lanes.
Huff Ave at Brooklake Rd	▪ Add capacity to signalized intersection[1]: ▪ Add dedicated eastbound through/right-turn lane.	With new interchange, intersection and access closures, Huff Ave is expected to narrowly meet County mobility targets by 2043 at LOS E and v/c 0.85	Development-driven or paired with new interchange, whichever comes first.
50th Ave at Brooklake Rd	Modify (right-out only) or move access to east.	Accesses within a ¼-mile of the new interchange ramp terminals need to move toward achieving ODOT access management standards.	With new interchange.
OR 99E (Portland Rd) at Brooklake Rd	Consider implementing alternate mobility target.	Intersection is expected to narrowly exceed ODOT OHP mobility targets by 2043, operating at LOS D and v/c = 0.91.	Medium-term; intersection over capacity in 2043. Not tied to interchange improvements.

Note:
1. Intersection assumed signalized by 2043 per Project List for the SKATS 2019 – 2043 RTSP.

The interim improvement to close or restrict the existing accesses between Huff Avenue and the southbound ramp terminal help to move toward meeting OHP access spacing requirements and allow for the widening of Brooklake Road to five lanes for this segment of roadway. To maintain access to the existing businesses on either side of Brooklake Road, traffic needs to be diverted west to Huff Avenue. On the north side, May Trucking would shift site traffic from the existing Brooklake Road driveway to Huff Avenue. On the south side, a previous study for Marion County and ODOT identified three alternative alignment scenarios to provide a local road connection to Huff Avenue, shown in Figure 6-3.[11] All three alternatives would require right-of-way acquisition and potential building impacts.

[11] Brooklake Road/I-5 Interchange Transportation Study – Long Term Evaluation, DKS Associates, September 5, 2019.

Figure 6-3. Potential Local Access Connections to Huff Avenue



Note: Huff Avenue assumed signalized by 2043 per Project List for the SKATS 2019 – 2043 RTSP as development warrants its need; other traffic control may be considered during design.

6.4 Interim Interchange Improvements

There are current operational and safety concerns that could benefit from interim capacity and safety improvements in the study area prior to major interchange re-construction. Those improvements are listed below and illustrated in both Figure 6-4 and Figure 6-5. The preliminary construction cost estimate for the interim interchange improvements is $7.4 million (assumes 2022 average bid item costs). The timing for the interim interchange improvements depends on the availability of construction funding. The traffic analysis assumes interim improvements are in place by 2030.

- Widening to provide storage and turn channelization for two lanes on the southbound and northbound exit ramps.
- Grading improvements at ramp terminals to flatten approach grades on the exit ramps for freight turning movements.
- Signalize the northbound and southbound ramp terminals if needed as mitigation for intersection sight distance issues or to accommodate increased pedestrian use. This requires an Intersection Control Evaluation by ODOT.

- Add pedestrian pushbutton signals and ADA-compliant landing areas with any traffic signals, as well as sidewalk connections from the traffic signals to the sidewalk on the south side of the existing bridge.
- The exit ramp improvements can be incorporated into the preferred option.

Figure 6-4. Local System and Interim Interchange Improvement Summary

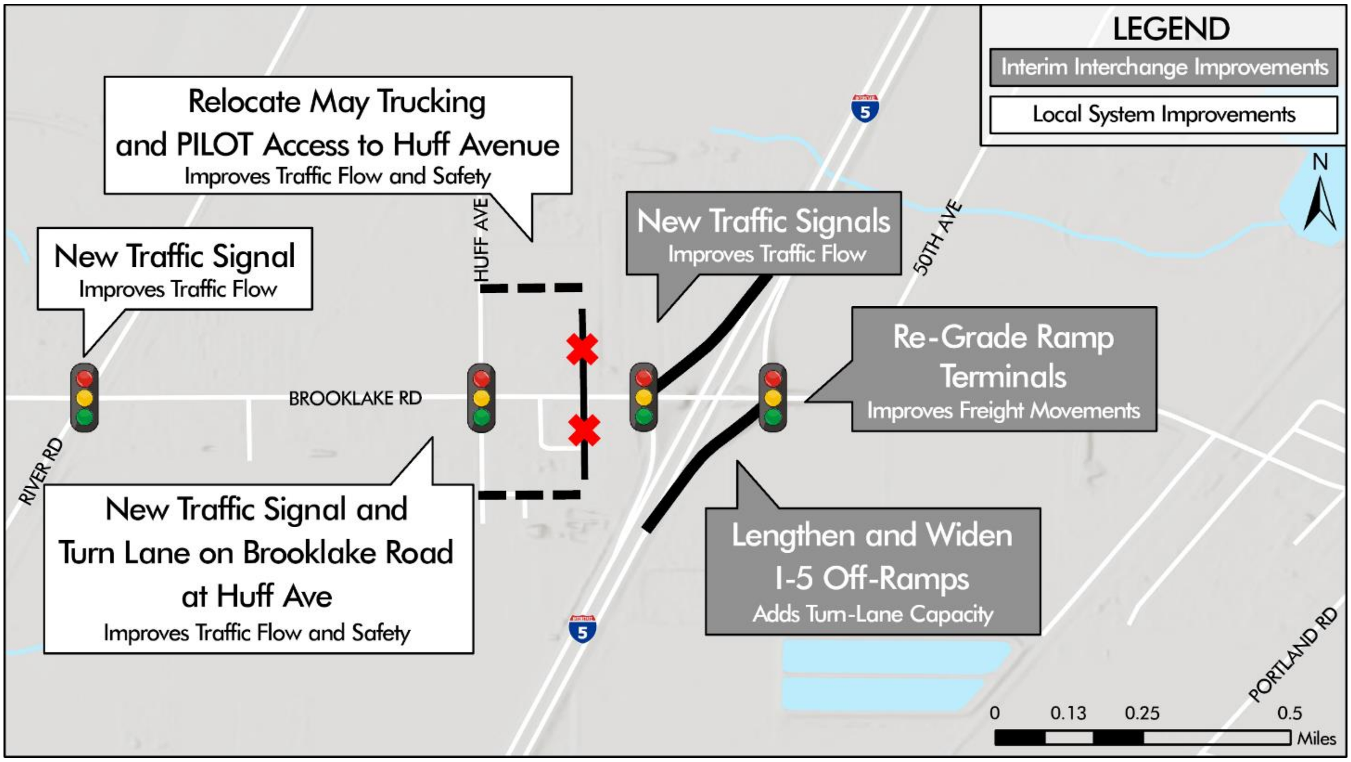
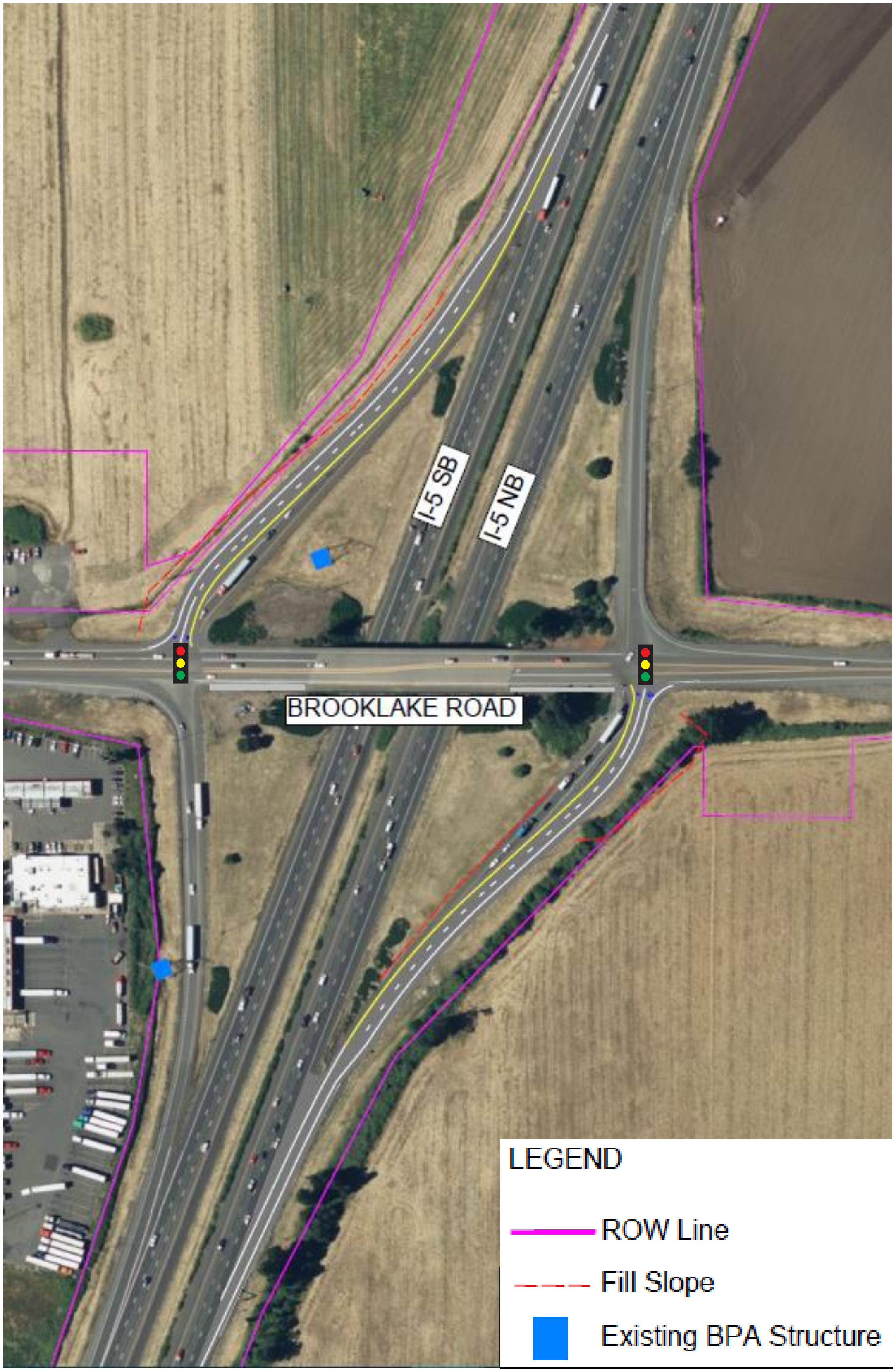


Figure 6-5. Interim Interchange Improvements



Note: An Intersection Control Evaluation will be used to determine/confirm the appropriate traffic control.

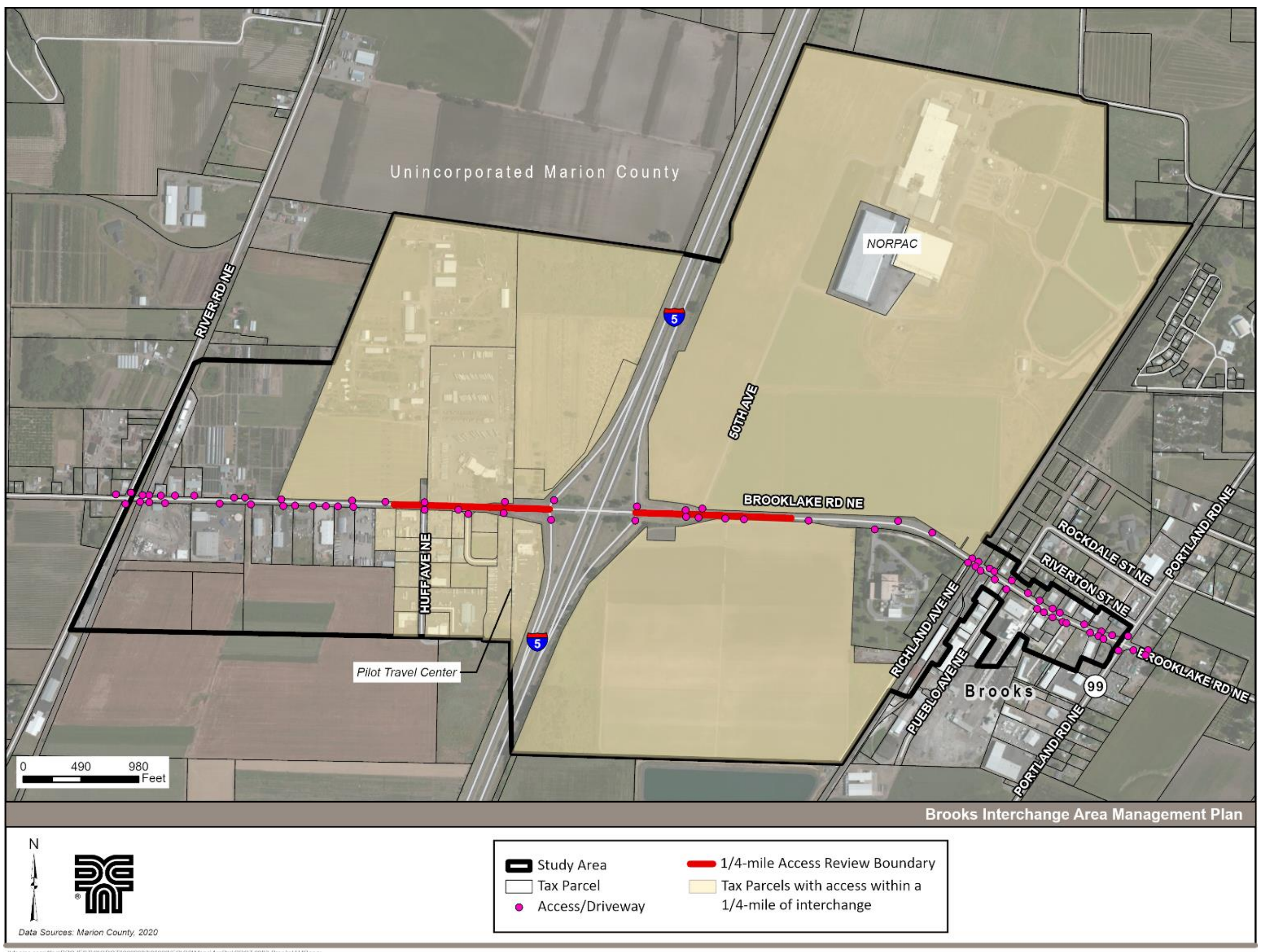
6.5 Access Management

This section describes the process and development of an access management plan for the Preferred Option. ODOT's access management rule (OAR 734-051) defines the State's role in managing access to state highways is to maintain functional use and safety and to preserve the public's investment. The rule directs ODOT to address access management during the development of an IAMP by developing key access management principles and a methodology that will be used to evaluate how properties abutting the highway may retain or obtain access. ODOT also must include opportunities for affected property owners that abut the highway to review the key access management principles.

Brooklake Road is owned by Marion County. The project team determined that the best way to maintain the functional use and safety of the interchange and to preserve the public's investment was to apply ODOT's access management rule requirements along Brooklake Road between within ¼-mile of either ramp terminal. This area along Brooklake Road is defined as the operational area of the interchange. See

Figure 6-6 for a summary of the access points and parcels with access within the operational area of the interchange.

Figure 6-6. Access Management Plan



6.5.1 Process

To develop an access management plan for the IAMP, the project team engaged in the process described in the rule to address access management during the project planning and preliminary engineering process. The process involved the following activities:

- Define access management draft key principles.
- Vet the key principles with affected landowners abutting Brooklake Road.
- Develop a methodology for assessing retention of access or creating new accesses along Brooklake Road.
- Develop an access management plan for the IAMP.

6.5.1.1 Draft Key Principles

The Brooks IAMP goals and objectives were used to guide development of the draft key principles. These principles will be used to evaluate how abutting properties may retain or obtain access to Brooklake Road and I-5 during and after implementation of the IAMP and construction of the proposed improvements:

1. Protect the public investment and long-term safety/operations of the interchange and Brooklake Road by reducing or eliminating turn conflicts within the operational area of the interchange.
2. Follow access management guidance in the Marion County Rural TSP Brooks Interchange Area Sub-Area Plan.[12]
3. Plan for future management of the interchange and adjacent existing and planned land uses.
4. Assist phased construction of interchange improvements with minimal reconstruction.
5. Move toward meeting the ODOT access spacing standards.[13]
6. Ensure that the location and design of approaches are safe, they reflect the unique needs of each property, and they will serve current and anticipated future traffic.
7. Ensure that new local access roads are designed to an appropriate standard to address operations and safety.

These draft key principles were sent to all potentially affected landowners within the vicinity of the interchange along Brooklake Road in November 2021. Landowners had an opportunity to review the key principles, ask questions or get clarification from ODOT staff, and provide comments to ODOT. The access management key principles were presented at the stakeholder engagement meeting and project open house on October 27, 2021, and staff were available for questions, clarifications, or comments. No comments were received, and no revisions were made to the key principles. Volume 2 contains the access management key principles memorandum and stakeholder notification documentation.

6.5.1.2 Methodology

ODOT's access management rule requires development and application of a methodology for determining access to properties abutting the highway and interchange that is consistent with the key principles. ODOT's access spacing standard for public roads is a minimum of 1,320 feet from the interchange ramps. The project team started with Key Principle #5: "Move toward meeting the ODOT interchange access spacing standards." This key

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[12] https://www.co.marion.or.us/PW/Engineering/rtsp/Documents/chapter12sub_areaplans.pdf
[13] https://www.oregon.gov/ODOT/Engineering/Doc_TechnicalGuidance/AM13-02b.pdf

principle is consistent with OAR 734-051-1070 that defines implementation of access management strategies as those actions that help in "moving in the direction of the objective [spacing] standards…" This key principle is considered a pass/fail criterion for existing and future accesses; if existing or future access points do not move in the direction of meeting standards, the access should not be permitted. Volume 2 includes the Access Management Methodology.

6.5.1.3 Application

There are multiple existing public and private accesses off Brooklake Road within ¼-mile of the interchange. Both the Preferred Option and Supplemental Option would close or modify the existing accesses. On the west side, accesses between Huff Avenue and the southbound ramp terminal would be closed to accommodate the widening of Brooklake Road to five lanes and traffic rerouted to Huff Avenue through the development of new local road connections. On the east side, accesses between the northbound ramp terminal and 50th Avenue would be closed, and 50th Avenue would likely be relocated to the east outside of the ¼-mile influence area of the interchange.

Huff Avenue is within 1,320 feet from the future interchange ramps but would improve intersection spacing over existing conditions. Based on existing land uses, county zoning, and the construction costs and impacts of relocating the county road system, the project team determined that creating a new local road connection to Huff Avenue moved toward meeting the access management spacing standard, improving current conditions, and complying with ODOT's access management rule.

6.6 Land Use and IAMP Implementation

This section describes the land use permitting requirements, IAMP alternate mobility targets, and IAMP implementation steps. This section documents specific land use considerations for the interchange improvements that have been jointly coordinated and agreed upon by Marion County and ODOT. It also outlines local and state IAMP implementation steps.

6.6.1 Local Policy and Permitting

The Preferred Option modifications to the Brooks Interchange and local roadway system are located within Marion County on land zoned either ID or EFU.[14] The County Rural TSP, the transportation element of the comprehensive plan, identifies the need to improve the Brooks Interchange and widen Brooklake Road to five lanes to improve safety and traffic operations. The recommendations in the IAMP refine local policy by providing the location and design of needed improvements within the interchange area. The process for adopting the Preferred Option on state and county roads have been discussed and confirmed with Marion County and is summarized in the *IAMP Adoption Process* below.

6.6.2 Alternative Mobility Targets

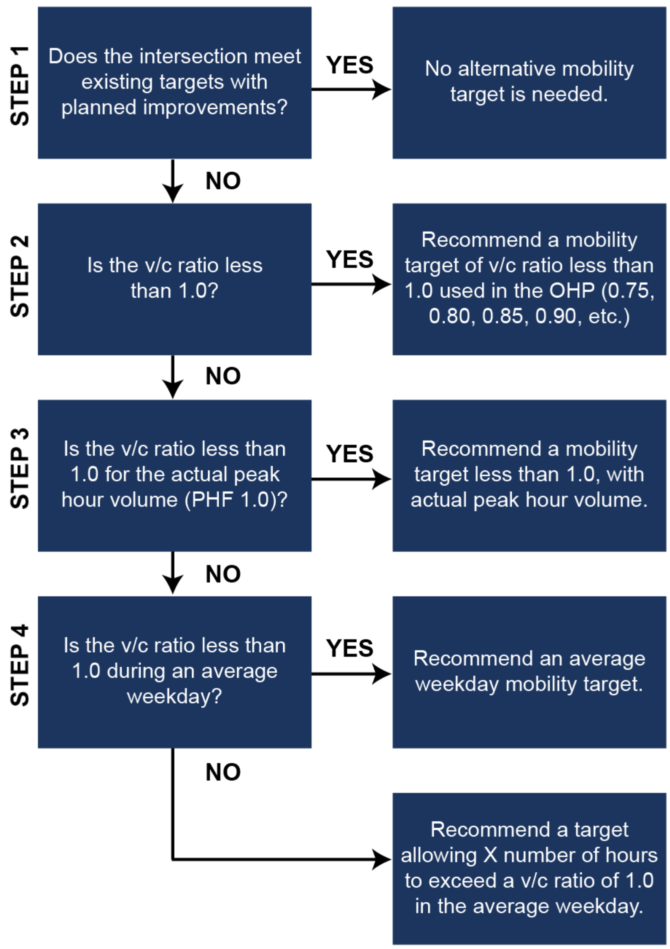
Based on currently projected funding availability, the necessary funding for construction by 2043 of the Preferred Options might not be available. Therefore, it is expected that each of the ramp intersections will exceed the OHP

[14] Widening of roads, including public roads and highway projects, is a permitted use in the EFU zone where the improvement is accommodated within the right-of-way, does not remove or replace buildings, and does not create a new parcel. Pursuant to OAR 660-012-0065 and ORS 215.283, these types of transportation improvements do not require a Goal Exception.

mobility target without the interchange improvements. Recognizing these funding limitations, the following Alternative Mobility Targets (AMTs) are proposed for adoption by the State and Marion County at the interchange ramp terminals to reflect the operating conditions for the planning year (2043) horizon.

6.6.2.1 Alternative Mobility Target Methodology

The development of AMTs follows the methodology established by ODOT in the Operational Notice PB-02 (effective May 2, 2013). The intent of Operational Notice PB-02 was to provide guidance for implementing OHP Policy 1F, Action 1F.3 for situations where it might be appropriate to consider AMTs for measuring mobility. The graphic below is taken from the *Oregon Highway Plan Mobility Policy White Paper* (August 2020), which summarizes the AMT procedure outlined in Operational Notice PB-02.



6.6.2.2 Determination of Alternative Mobility Targets

The following steps outline the process for determining the AMTs for the two I-5 ramp terminal intersections at Brooklake Road. The process follows the methodology recommended in the ODOT Operational Notice PB-02 described previously. Table 6-4 summarizes the results of the AMT determination process and the related Synchro analysis sheets and intersection critical v/c calculations are provided in Volume 2.

Step 1: Future year 2043 PM peak hour volumes used in the analysis represent the 30th highest hour (30 HV) conditions. The interim planned improvements included in the analysis are traffic signal controls at the two I-5 ramp intersections at Brooklake Road and the widening of Brooklake Road to five lanes between Huff Avenue and the I-5 southbound ramp terminal.

Based on these conditions and following ODOT APM methodology for critical intersection v/c ratio calculations, the southbound ramp terminal is expected to operate at a v/c ratio of 0.88, and the northbound ramp terminal intersection is expected to operate at a v/c ratio of 0.99. The analysis was conducted for the peak 15 minutes using a Peak Hour Factor[15] (PHF) of 0.95 for the southbound ramp intersection and a PHF of 0.93 for the northbound ramp intersection.

Step 2: Based on the results in Step 1, both ramp terminal intersections are projected to have critical intersection v/c ratios that exceed the currently adopted OHP mobility target of 0.85, but that are less than 1.0. As such, it is recommended that AMTs be established for the two ramp terminal intersections.

Step 3 and Step 4: Not applicable with a v/c ratio from Step 2 that is less than 1.0.

Table 6-4. Determination of Alternative Mobility Target

INTERSECTION	CONTROL	OHP MOBILITY TARGET	CRITICAL MOVEMENT	STEP 1: WITH INTERIM IMPROVEMENTS	STEP 2: IS V/C < 1.0?	STEP 3: PHF 1.0	STEP 4: AVERAGE WEEKDAY	RECOMMENDED AMT
I-5 SB Ramps at Brooklake Rd	Traffic Signal	0.85	Overall Intersection v/c ratio	0.88	Yes (0.88)	N/A	N/A	**0.90**
I-5 NB Ramps at Brooklake Rd	Traffic Signal	0.85	Overall Intersection v/c ratio	0.99	Yes (0.99)	N/A	N/A	**0.99**

Note: N/A = not applicable, NB = northbound, SB = southbound.

6.6.2.3 Recommended Alternative Mobility Targets

The two I-5 ramp terminal intersections at the Brooklake Road interchange are forecasted to exceed the OHP mobility target of 0.85 in future year 2043 without the full interchange improvements as proposed in the interchange concepts. With the interim improvements of signalization at the two ramp terminal intersections and the planned widening of Brooklake Road between Huff Avenue and the southbound ramps, the two ramp intersections are expected to operate at a v/c ratio of less than 1.0 in 2043 under peak 15-minute conditions.

The recommended AMT for the southbound terminal intersection is 0.90 and the recommended AMT for the northbound terminal intersection is 0.99, which is consistent with v/c ratio values used in the OHP.

In addition, it is expected that the northbound ramp intersection will exceed the currently adopted OHP mobility target of 0.85 with interim improvements by approximately 2030, while the southbound ramp intersection is expected to exceed it with interim improvements by approximately 2033. The AMTs are not anticipated to be needed after the implementation of either the Preferred or Supplemental Option.

[15] The Peak Hour Factor (PHF) is used to convert the hourly traffic volume into the flow rate that represents the busiest 15 minutes of the peak one hour.

6.6.3 IAMP Adoption Process

This IAMP will be presented to the OTC for adoption as a state facility plan and minor amendment to the OHP. Prior to adoption by the OTC, ODOT and Marion County will work collaboratively to ensure that the local comprehensive plan, TSP, and Marion County Rural Zoning Code support the Preferred Option and that the IAMP recommendations are consistent with local plans and codes. While both the state and the local governments take action to adopt the recommendations of an IAMP, the processes are different, as are the roles and responsibilities at the two levels of government.

This IAMP guides improvements and funding at the interchange, a state facility, as well as serving as a refinement plan to the Rural TSP for improvements to the local roadway system in the immediate vicinity of the interchange. The Brooks Sub-Area Plan in the Rural TSP anticipates the need for signalization at both ramp terminal intersections, construction of additional exclusive right turn lanes on both I-5 off ramps, and improved access to I-5 from Brooklake Road. While largely consistent with the Rural TSP, the Preferred Option includes refinements to meet transportation needs based on an updated horizon year. Marion County and ODOT have determined that the County can acknowledge support for the IAMP recommendations through a local compatibility determination letter that recognizes that the Preferred Option is consistent and compatible with the existing adopted comprehensive plan and that no immediate local l actions are necessary to implement the IAMP. Ultimately, the Rural TSP will be updated to include the refinements detailed in the IAMP's Preferred Option. This two-step local process is outlined below:

1. The County will prepare a local compatibility determination letter that recognizes that the IAMP is consistent and compatible with the existing adopted comprehensive plan and that no additional local actions are necessary to implement the IAMP in the near-term. The County has determined that interim improvements in the vicinity of the interchange are consistent with adopted transportation policy, and that the local street system improvements are consistent with the Marion County Rural TSP and SKATS RTSP. The letter will also agree to the Alternative Mobility Targets for the interchange ramp intersections, documented in Section 6.6.2.3 which are expected to be adopted by the OTC as part of the OHP. See Volume 2 for the Marion County Brooks IAMP Land Use Compatibility Statement.
2. When the County updates and adopts the Rural TSP, it will include adoption of the IAMP as a refinement plan to ensure consistency between state and local plans. This will require a legislative amendment with hearings before the Marion County Board of Commissioners during the Rural TSP adoption process. Specifically, the County action would:
    a. Adopt the IAMP goal statement, acknowledging the need for safe, efficient movement of passenger and freight traffic through the interchange.
    b. Modify the Brooks Interchange Area Sub-Area Plan, Rural TSP Chapter 12 to recognize the necessary roadway configurations and improvements on Brooklake Road (Sections 6.1, 6.2, and 6.3) and the access management plan documented in Section 6.5.

The OTC adoption will entail amending the OHP to include the Brooks IAMP and the associated AMTs as a state facility plan. Upon adoption, the IAMP will become the planning document that governs future improvements in the defined interchange area. Changes to the current land use plan and zoning would need to be found consistent with the adopted AMTs and the IAMP.

7 PUBLIC INVOLVEMENT

This chapter describes the stakeholder and public involvement process for the Brooks IAMP.

The public involvement effort started with documenting the decision-making process and approach to building awareness about the need for the project, presenting project information and gathering public feedback at key milestones, selecting a preferred interchange option, defining interim improvements, and supporting development of the IAMP.

The following sections summarize stakeholder identification, engagement activities, and stakeholder feedback. *Technical Memorandum #1 and Title VI Summary* in Volume 2 includes a detailed description of stakeholder and public process and events.

7.1 Stakeholders

Public outreach efforts were focused on keeping local jurisdictions and their elected officials – Marion County Board of Commissioners, the Brooks-Hopmere Community and City of Keizer – updated on the review of interchange options and options, ODOT selection of a preferred option, design refinements of the full interchange, and definition of interim improvements. The Mid-Willamette Valley Area Commission on Transportation (MWACT) and the SKATS Policy Committee were briefed periodically to ensure the broader community was informed and could share concerns.

A stakeholder group of interchange area businesses and property owners was convened periodically throughout the duration of the project (2020-2022) to share project progress and direction, review ODOT work, and to understand comments, questions, and concerns about proposed improvements to the interchange and the county roads. The meetings were open to everyone, but the direct invitation list was built from businesses and property owners in the area.

Multiple public open houses were held to share project direction and to hear comments and concerns from the public about proposed improvements to the interchange and the county roads.

7.2 Outreach Summary

The following sections summarize the rounds of outreach that occurred at key project milestones. The briefings and meetings helped ODOT inform area stakeholders and collect comments and questions leading to the selection of the Preferred Options. The key milestones were:

- Project Kick-Off
- Confirm Deficiencies and Needs
- Concept Development
- Preferred Option Selection and Refinement

After IAMP adoption, outreach will continue related to final design of the Preferred Option and construction to prepare the community for implementation and temporary disruptions resulting from construction.

7.2.1 Project Kick-Off

A project kick-off meeting was held for ODOT and local agency staff to learn about the project, review the IAMP goal and objectives and confirm historical findings of the various studies completed at the Brooks Interchange. Attendees included representatives from the Consultant team, ODOT (Traffic, Roadway, Right of Way, Interchange Design, TPAU, Environmental and Policy and Data Analysis Division), MVCOG/SKATS, and City of Keizer (Public Works and Planning).

7.2.2 Confirm Deficiencies and Needs

Public information materials were developed to introduce the project to the public and confirm the deficiencies and needs of the Brooks Interchange.

- **Website** – a map and background information were included on the project website (https://www.oregon.gov/odot/projects/pages/project-details.aspx?project=BrooksIAMP)
- **A project information postcard** was mailed to addresses near the interchange, as well as a list of other regional interested parties. The mailer introduced the project purpose and timeline and shared the project website as an ongoing reference for updates or a means to contact the project manager. (March 2021)
- **Stakeholder Workshop Meeting #1 (March 2021)** – The project team invited area stakeholders – property owners, residents, agency representatives, and business owners/managers – through a mailing, emails, and phone calls to an initial stakeholder engagement meeting, to introduce the project and highlight funding limitations, gather feedback on the interchange concerns, and discuss the purpose of the IAMP. Ten stakeholders attended. Generally, there was broad support for any improvement to ease congestion at the interchange. Specific concerns were expressed about the congestion in front of the truck stop, the northbound exit ramp, and the barriers to multimodal connectivity between the Brooks and Hopmere communities.
- **Online Public Comment Form (March 2021)** – An online map and comment form were made available to stakeholders to document concerns or share specific areas of concern. An email was sent out to 859 stakeholders in the area on March 29, 2021, to alert them of the upcoming planning process and provide the opportunity to give feedback online. On April 13, 2021, a second email was sent out to 668 recipients who hadn't opened the email to encourage their participation and alert them to the comment form closing date. The feedback opportunity was available from March 29 until April 21, 2021. Public comment responses echoed the concerns raised by Stakeholders about congestion, particularly at the northbound exit ramp.

7.2.3 Concept Development

After development of interchange options and narrowing to two option interchange designs, the following stakeholder and public involvement activities were conducted in late 2021:

- **Briefings to elected bodies and other stakeholders (September 2021)** – The project team introduced the project and schedule to MWACT.
- **Stakeholder Workshop Meeting #2 (October 2021)** – The project team invited area stakeholders – property owners, residents, agency representatives, and business owners/managers – through a postcard mailing and email invitation. The purpose of the meeting was to review the evaluation criteria for the interchange concepts, provide a summary of each of the six potential concepts and present the access management draft key principles. Eleven stakeholders attended. Questions were raised about the anticipated timeline and expressed desire to see improvements made before the end of the 20-year planning horizon.

7.2.4 Preferred Option Selection and Refinement

The following stakeholder and public involvement activities were conducted during the process of selecting the Preferred Option in summer 2022:

- Stakeholder Workshop Meeting #3 (July 2022) – The project team invited area stakeholders – property owners, residents, agency representatives, and business owners/managers – through an email. The intent of the meeting was to review the six concepts in more detail and explain the process for arriving at the Preferred and Supplemental Options (TDI and Dogbone). Nineteen stakeholders attended. The project team answered specific questions about how trucks and vehicles would navigate the various options. There were also questions raised about potential land use and right of way impacts. The project team responded that when funding is available, further design refinement and additional environmental work would need to occur to understand the exact level of impact. At that time, additional coordination and outreach to landowners and the public would be a critical component of the project development.
- Briefings to elected bodies and other stakeholders (August 2022) – The project team reviewed the preferred options and local system improvements with MWACT.

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