

# TECHNICAL MEMORANDUM #5

**TITLE:** Linear Design Plan  
**PROJECT:** Main Streets on Halsey  
**PROJECT #:** 23021.043  
**DATE:** February 29, 2024



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# I. INTRODUCTION

This memorandum presents the preferred streetscape and roadway design alternatives developed by the project team to improve multimodal access and circulation along the 3.5-mile segment of NE Halsey Street from NE 201<sup>st</sup> Avenue to SW 257<sup>th</sup> Drive (corridor). Previous memoranda presented alternative cross sections for various context zones along the corridor (residential, commercial, Edgefield), as well as alternative treatments for three intersections (NE 223<sup>rd</sup> Avenue, NE 238<sup>th</sup> Drive, and SW 257<sup>th</sup> Drive), and enhanced crossings at multiple locations. Previous memoranda also presented the criteria that were used to evaluate the alternatives and select preferred alternatives for the streetscape design plan. This memorandum summarizes the alternatives, the evaluation criteria, and the results of the evaluation that led to selection of the preferred alternatives.

This memorandum also presents a linear design plan for the corridor. The linear design plan reflects the preferred cross sections, intersection treatments, and enhanced crossings, and shows how they come together to improve access and circulation along the corridor for people walking, biking, and accessing transit. The linear design plan is supported by design directions for multiple features along the corridor. Finally, this memorandum presents potential code amendments to support implementation of the streetscape and roadway design plan within the three cities (Fairview, Wood Village, and Troutdale) and Multnomah County.

## II. EVALUATION OF DESIGN ALTERNATIVES

The preferred streetscape and roadway design alternatives presented in this memorandum were selected by the project team based on an evaluation of the alternatives using the project evaluation criteria. The alternatives and evaluation criteria are provided in *Tech Memo #3: Alternatives Analysis*. A summary of the alternatives, evaluation criteria, and the evaluation results is provided below.

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### Summary of Alternatives

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Streetscape and roadway design alternatives were developed by the project team to address the project goals and objectives as well as key issues identified along the corridor. The alternatives were developed based on input from the three cities (Fairview, Wood Village, and Troutdale) and Multnomah County, and on discussions with the project advisory committees on a preliminary set of alternatives. The alternatives consist of cross sections, intersection treatments, and enhanced crossings as described below.

#### Cross Section Alternatives

The project team developed several cross section alternatives for the residential, commercial, and Edgefield context zones along the corridor. The alternatives include one near-term solution for each context zone that could be implemented with minor changes to existing signing and striping, and three or four long-term solutions for each context zone that would require significant changes to the existing configuration of the roadway. Most of the alternatives are named based on the type of bicycle facilities included (e.g., separated bike lanes, sidewalk-level bike lanes, etc.) because the bicycle facilities have the widest variation of all the roadway elements across the alternatives. Also, the type of bicycle facility can affect the curb-to-curb width, sidewalk configuration, and location of street trees relative to the curb. The cross section alternatives were evaluated based on several criteria and a preferred alternative was selected for each context zone as indicated below.

#### Intersection Treatment Alternatives

The project team developed several intersection treatment alternatives for the NE 223<sup>rd</sup> Avenue, NE 238<sup>th</sup> Drive, and NE 257<sup>th</sup> Drive intersections. The alternatives include one near-term solution for each intersection that could be implemented with minor changes to the existing signing and striping, and one or two long-term solutions that would require significant reconfiguration of the intersections, such as reconfiguring the intersections as a single-lane roundabout or as a protected intersection. The intersection treatment alternatives were evaluated based on several criteria and a preferred alternative was selected for each intersection as indicated below.

#### Enhanced Crossing Alternatives

The project team developed several enhanced crossing alternatives for the corridor. The alternatives include various crossing treatments (e.g., curb extensions, raised median islands, high visibility signs and pavement markings, and rectangular rapid flashing beacons), and locations along the corridor. Unlike the cross section and intersection treatment alternatives described above, the enhanced crossing alternatives were not evaluated based on the evaluation criteria. This is because all the treatments and locations identified in the alternative analysis are identified as preferred and included in the linear design plan.



## Summary of Evaluation Criteria

Evaluation criteria were developed by the project team to evaluate the streetscape and roadway design alternatives and to select preferred alternatives for the linear design plan. The evaluation criteria reflect the project objectives developed at the outset of the project and provide the means to assess the extent to which the objectives have been met. The project objectives and related criteria are summarized below.

**Table 1. Project Objectives and Evaluation Criteria**

Project Objective	Evaluation Criteria
1. Create a cohesive Halsey streetscape and pedestrian environment that supports existing small businesses, attracts new businesses, and creates new jobs	1.1 Promotes economic development by supporting access to local businesses and business districts for all travel modes.
2. Design Halsey Street to unite the three cities while also allowing each city to be distinguished in the ways they build community and drive economic development	2.1 Minimizes impacts to adjacent properties
	2.2 Can be implemented on an incremental basis through development
	2.3 Construction and long-term maintenance costs are equal to existing costs
3. Make Halsey Street safer, more accessible, and more visually attractive	3.1 Creates safe and convenient access for people with disabilities
	3.2 Improves street appearance through added landscaping and street trees
	3.3 Creates space for adding street furnishing
4. Make public transit, walking, and biking in the Halsey Street corridor more appealing and safer	4.1 Improves safety for people walking, biking and taking transit
	4.2 Increases number and frequency of protected crossings of Halsey Street
	4.3 Improves access to adjacent land uses and public transit facilities and services
5. Improve the environment by reducing pollution, planting street trees, and using cost-efficient, sustainable landscaping treatments	5.1 Incorporates sustainable design strategies
	5.2 Creates space for incorporating stormwater facilities
	5.3 Reduces impervious surfaces
	5.4 Increases tree canopy coverage in the corridor
6. Enhance bikeability and walkability by slowing vehicular traffic, improving intersections, and discouraging through-traffic by trucks	6.1 Slows vehicular traffic
	6.2 Discourages through truck traffic
	6.3 Maintains access to local businesses for delivery trucks
	6.4 Provides low-street pedestrian and bicycle facilities
7. Engage with local business owners and the public to broaden commitment and ongoing involvement in the corridor	7.1 Supported by local property owners, business owners and operators, and the public.
	7.2 Consistent with previous planning efforts



Consistency with the criteria shown in Table 1 are presented on a scale of 1 to 5, where 1 means poor and 5 means good. Evaluation of each alternative is in relation to other alternatives, rather than against an absolute scale. All criteria are weighted equally for the purposes of the evaluation. Table 2 illustrates the evaluation matrix legend that was applied to each of the project objectives and criteria identified above.

**Table 2. Evaluation Matrix Legend**

1	2	3	4	5
Design concept has little or no benefit in achieving the project objective.	Design concept has poor benefit in achieving the project objective.	Design concept has some benefit in achieving the project objective.	Design concept has good benefit in achieving the project objective.	Design concept has significant benefit in achieving the project objective.

## Evaluation Results

The streetscape and roadway design alternatives were evaluated against the project evaluation criteria to determine the extent to which they meet the project objectives. The following summarizes the evaluation results for the cross sections and intersection treatments. As indicated above, the enhanced crossings were not evaluated against the criteria given that they were all identified as preferred.

### Cross Section Alternatives

The cross section alternatives for the residential, commercial, and Edgefield context zones were evaluated against the project evaluation criteria and a preferred alternative was selected for each zone. Table 3 below summarizes the results of the cross section evaluation for the three context zones. *A detailed summary of the evaluation is provided in Appendix A.*

#### Residential Context Zone

Three cross sections were developed and evaluated for the residential context zone. The cross sections include Separated Bike Lanes, Sidewalk-Level Bike Lanes, and Sidewalk-Adjacent Bike Lanes. All three cross sections would improve access and circulation along the corridor; however, the Sidewalk-Level Bike Lanes and Sidewalk-Adjacent Bike Lanes cross sections would provide more separation from adjacent street traffic as well as several other benefits over the Separated Bike Lanes cross section, and therefore are scored higher.

The scores for the Sidewalk-Level Bike Lanes and Sidewalk-Adjacent Bike Lanes cross sections are similar, and there are only a few criteria where one scores higher than the other. Ultimately the Sidewalk-Adjacent Bike Lanes cross section scored the highest among the alternatives. A key differentiator in the scoring is the location of the landscape strip relative to the sidewalks, bike lanes, and motor vehicle lanes. In the Sidewalk-Adjacent Bike Lanes cross section the landscape strip is located between the bike lanes and the motor vehicle lanes. This creates more separation from adjacent street traffic, more opportunities for sustainable design features, and improves access to adjacent land uses and local transit service. However, there are some drawbacks that should be explored during the final design phase, such as the potential for conflicts between people walking and biking in the residential zones.

*It should be noted that the preferred cross section presented later in this report for the residential context zone was refined to include a 1-foot buffer between the sidewalk and bike lane.*

## Commercial Context Zone

Four cross sections were developed and evaluated for the commercial context zone. The cross sections include Separated Bike Lanes, Sidewalk-Level Bike Lanes, Sidewalk-Adjacent Bike Lanes, and Parking-Protected Bike Lanes. All four cross sections would improve access and circulation along the corridor; however, like the residential context zone, the Sidewalk-Level Bike Lanes and Sidewalk-Adjacent Bike Lanes cross sections would provide more separation from adjacent street traffic as well as several other benefits over the other cross sections, and therefore are scored higher.

Like the residential context zone, the scores for the Sidewalk-Level Bike Lanes and Sidewalk-Adjacent Bike Lanes cross sections are similar, and there are only a few criteria where one scores higher than the other. Ultimately the Sidewalk-Adjacent Bike Lanes cross section scored the highest among the alternatives. Like the residential context zone, a key differentiator in the scoring is the location of the landscape strip relative to the sidewalks, bike lanes, and motor vehicle lanes. In the Sidewalk-Adjacent Bike Lanes cross section the landscape strip is located between the bike lanes and the motor vehicle lanes. This creates more separation from adjacent street traffic, more opportunities for sustainable design features, and improves access to adjacent land uses and local transit service – this effect is amplified in the commercial context zone given the presence of on-street parking. However, there are some drawbacks that should be explored during the final design phase, such as the potential for conflicts between people walking and biking in the commercial zones.

*It should be noted that the preferred cross section presented later in this report for the commercial context zone was refined to include 8-foot sidewalks and a 1-foot buffer between the sidewalk and bike lane.*

## Edgefield Context Zone

Three cross sections were developed and evaluated for the Edgefield context zone. The cross sections include Shoulder Bike Lanes with Shared-Use Paths, Sidewalk-Level Bike Lanes, and Shared-Use Paths Within Right-of-Way. All three cross sections would improve access and circulation along the corridor; however, the Shared-Use Paths Within Right-of-Way cross section would provide several benefits over the other cross sections, and therefore scored higher.

Key differentiators in the scoring include the presence of a center turn lane, the presence of continuous at-grade facilities on both sides of the roadway, and the location of the landscape strip relative to the shared-use paths and motor vehicle lanes. The center turn lane is a critical element of the preferred cross section and provides improved access to adjacent land uses, especially during peak time periods, as well as consistency with all prior planning efforts for the corridor. Like the center tun lane, the presence of continuous at-grade facilities is also a critical element. They provide improved access and circulation for people walking, biking, and accessing transit along both sides of the corridor. Finally, like the commercial and residential context zones, the location of the landscape strip between the shared-use path and the motor vehicle lanes creates more separation from adjacent street traffic, more opportunities for sustainable design features, and improved access to adjacent land uses and local transit service.

*It should be noted that the preferred cross section presented later in this report for the Edgefield context zone was refined and the 12-foot shared-use paths were replaced by 6-foot sidewalks and 6-foot bike lanes with a 1-foot buffer.*

## Cross Section Evaluation Summary

Table 3 below summarizes the results of the cross section evaluation for the three context zones. *Appendix A contains a detailed summary of the evaluation and provides further justification for the evaluation scores shown below.*



Table 3. Cross Section Evaluation Summary

Project Objectives	Evaluation Criteria	Residential Context Cross Section Evaluation			Commercial Context Cross Section Evaluation				Edgefield Context Cross Section Evaluation		
		Separated Bike Lanes	Sidewalk-Level Bike Lanes	Sidewalk-Adjacent Bike Lanes	Separated Bike Lanes	Sidewalk-Level Bike Lanes	Sidewalk-Adjacent Bike Lanes	Parking-Protected Bike Lane	Shoulder Bike Lanes with Shared-Use Path	Sidewalk-Level Bike Lanes	Shared-Use Paths Within Right-of-Way
1	1.1 Promotes economic development by supporting access to local businesses and business districts for all travel modes.	3	4	4	3	4	4	3	3	4	4
2	2.1 Minimizes impacts to adjacent properties	2	3	3	2	3	3	2	3	1	2
	2.2 Can be implemented on an incremental basis through development	4	3	2	4	3	2	2	4	2	4
	2.3 Construction and long-term maintenance costs are equal to existing costs	2	3	4	2	3	4	3	2	3	4
3	3.1 Creates safe and convenient access for people with disabilities	2	4	3	2	4	3	3	2	4	3
	3.2 Improves street appearance through added landscaping and street trees	3	4	5	3	4	5	3	3	4	5
	3.3 Creates space for adding street furnishing	3	5	4	3	5	4	5	3	4	4
4	4.1 Improves safety for people walking, biking and taking transit	3	4	5	3	4	5	3	3	4	5
	4.2 Increases number and frequency of protected crossings of Halsey Street	3	5	5	3	5	5	3	3	5	5
	4.3 Improves access to adjacent land uses and public transit facilities and services	2	4	5	2	4	5	3	2	4	5
5	5.1 Incorporates sustainable design strategies	3	4	5	3	4	5	3	4	4	5
	5.2 Creates space for incorporating stormwater facilities	2	4	5	2	4	5	2	4	4	5
	5.3 Reduces impervious surfaces	2	3	3	2	3	3	2	2	2	3
	5.4 Increases tree canopy coverage in the corridor	4	4	5	4	4	5	4	4	4	5
6	6.1 Slows vehicular traffic	3	4	5	3	4	5	5	3	3	3
	6.2 Discourages through truck traffic	3	4	4	3	4	4	5	3	4	4
	6.3 Maintains access to local businesses for delivery trucks	2	3	4	2	3	4	2	3	5	5
	6.4 Provides low-street pedestrian and bicycle facilities	3	5	5	3	5	5	4	3	5	5
7	7.1 Supported by local property owners, business owners and operators, and the public.	2	5	5	2	5	5	2	4	2	5
	7.2 Consistent with previous planning efforts	1	2	2	1	2	2	1	2	2	2
<b>Total</b>		<b>52</b>	<b>77</b>	<b>83</b>	<b>52</b>	<b>77</b>	<b>83</b>	<b>60</b>	<b>60</b>	<b>70</b>	<b>83</b>



# III. PREFERRED ALTERNATIVES

The preferred streetscape and roadway design alternatives are presented below. The alternatives include cross sections for various context zones along the corridor (residential, commercial, Edgefield), intersection treatments at three major intersections (NE 223<sup>rd</sup> Avenue, NE 238<sup>th</sup> Drive, SW 257<sup>th</sup> Drive), and enhanced crossings at multiple locations. Based on direction provided by the project team, the preferred alternatives are presented as both near-term and long-term solutions.

## Near-Term Solutions

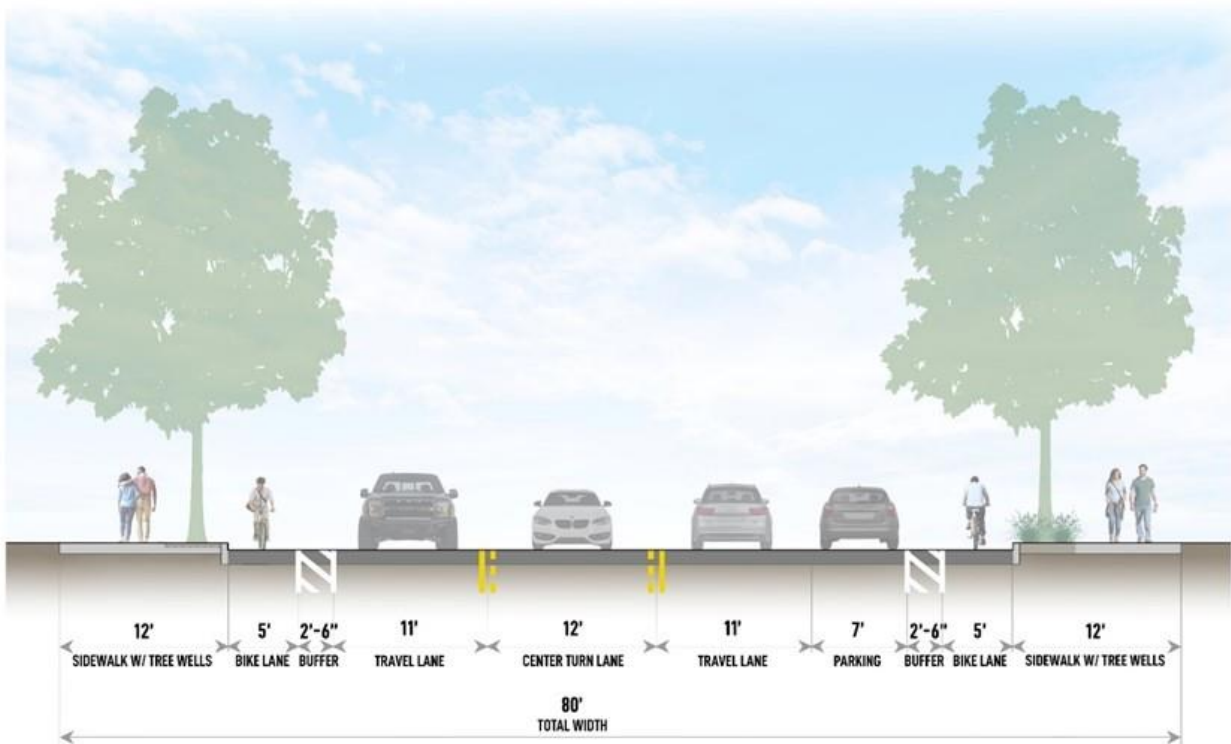
This section summarizes the near-term solutions for the NE Halsey Street corridor that could be achieved primarily through signing and striping modifications. These solutions should be considered as interim measures until the preferred cross sections, intersection treatments, and enhanced crossings can be constructed. These are low-cost solutions that can potentially improve comfort and safety of various users as well as encourage slower driving speeds, which is a major concern along NE Halsey Street.

### Near-Term Cross Sections

The near-term cross section reduces the width of the center turn lanes and travel lanes to dedicate more width to the bicycle lanes, allowing for painted buffers with each on-street bike lane. The sidewalks and planting strips remain unchanged, and the overall roadway width remains the same.

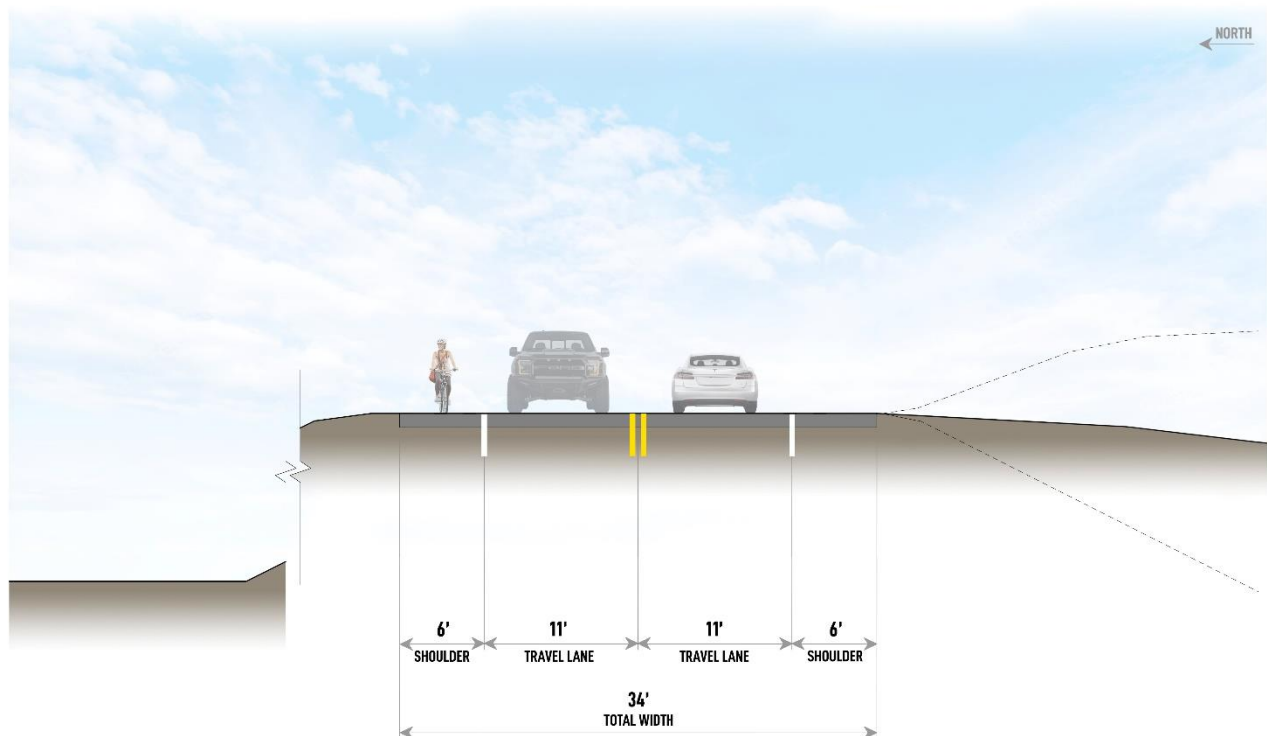
Most of the corridor currently has 12-foot travel lanes and 13-foot center turn lanes, and some segments have even wider travel lanes. The near-term cross section proposes to restripe the travel lanes down to 11 feet, the center turn lane down to 12 feet, and the bike lanes down to 5 feet, in which case the remaining 5+ feet can be dedicated to the bike lane buffer. At locations where the travel lanes are wider than 12 feet, they should also be restriped to 11 feet and the remaining space should be dedicated to the bike lane buffer. At locations where the bike lane buffer is at least 3 feet, diagonal chevron striping should be provided within the buffer as well. In locations where parking is provided, the bike lane should be striped on the inside of the parking lane and a door zone buffer should be provided. Figure 1 illustrates an example of the near-term cross section within a commercial context zone with on-street parking on one side.

Figure 1: Near-Term Cross Section



Along the Edgefield section, the existing travel lanes are 11 feet wide, while the shoulder bike lanes are 4 feet wide. The near-term cross section includes widening the shoulder bike lanes to 6-feet along the entire Edgefield segment. This wider shoulder bike lane can also be used by people walking, as there is no existing sidewalk on this segment. In addition, the resulting width of the roadway would be consistent with the long-term solution for the Edgefield context zone as described below. Figure 2 illustrates the near-term cross section along the Edgefield segment.

Figure 2: Near-Term Cross Section – Edgefield Segment



Additionally, the near-term solution includes speed feedback signs at multiple locations along the corridor, as speeding is one of the major corridor concerns. According to the Oregon Department of Transportation, speed feedback signs provide 10% reduction in crashes of all types and severities.

### Near-Term Intersection Treatments

Figures 3, 4, and 5 illustrate the near-term intersection treatments at three major intersections along NE Halsey Street. As shown, most of the treatments involve signing and striping modifications, while others involve changes to the traffic signal equipment. The signing and striping modifications include:

- High visibility crosswalks on all legs. The presented crosswalks use perpendicular bar or ladder style markings, but they can be replaced with longitudinal bar or continental style markings.
- Advanced stop bars within all approaching lanes.
- Green bike lane conflict striping at driveways, bus pullouts, beginning of the right-turn lanes, and through the intersection.
- Green bike lanes on all intersection approaches and bike boxes along NE Halsey Street.

Other potential near-term treatments include:

- Improved lighting, as necessary to meet City and/or County standards.
- Countdown pedestrian heads, as necessary to meet MUTCD requirements.
- Leading pedestrian intervals, as feasible with existing signal controllers.
- No right-turn on red, as feasible without significantly impacting traffic operations.

Figure 3: Near-term Intersection Treatments – NE 223<sup>rd</sup> Avenue



Figure 4: Near-term Intersection Treatments – NE 238<sup>th</sup> Drive

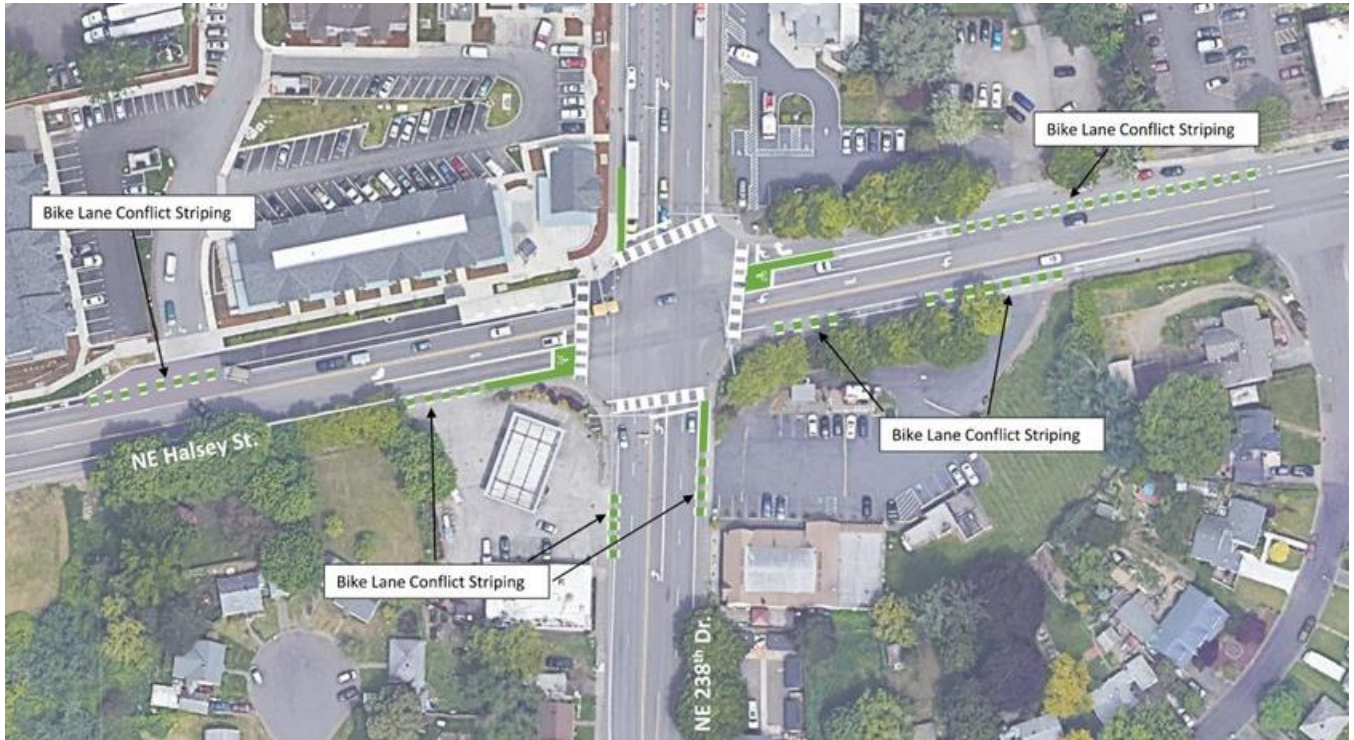
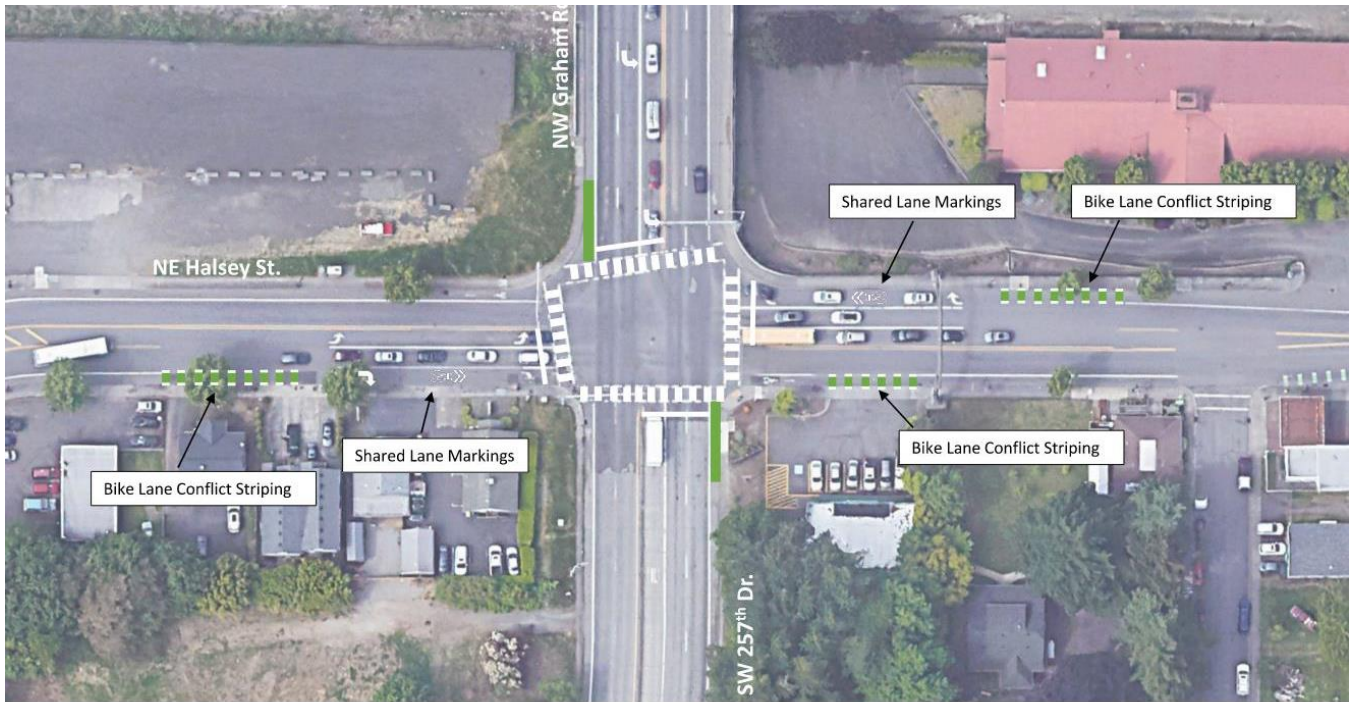


Figure 5: Near-term Intersection Treatments – SW 257<sup>th</sup> Drive



## Near-Term Enhanced Crossing Locations

The enhanced crossings section below presents a detailed overview of enhanced crossings along the corridor, including their locations and treatments. Certain crossings can be constructed on a near-term basis, as the only portion of these crossings that would require rebuilding as the complete cross section is constructed are the pedestrian ramps along the sidewalks. The pedestrian refuge islands at these crossings will remain in the same location in the near term, as in the long term. Figure 6 below presents the locations of near-term crossing locations.

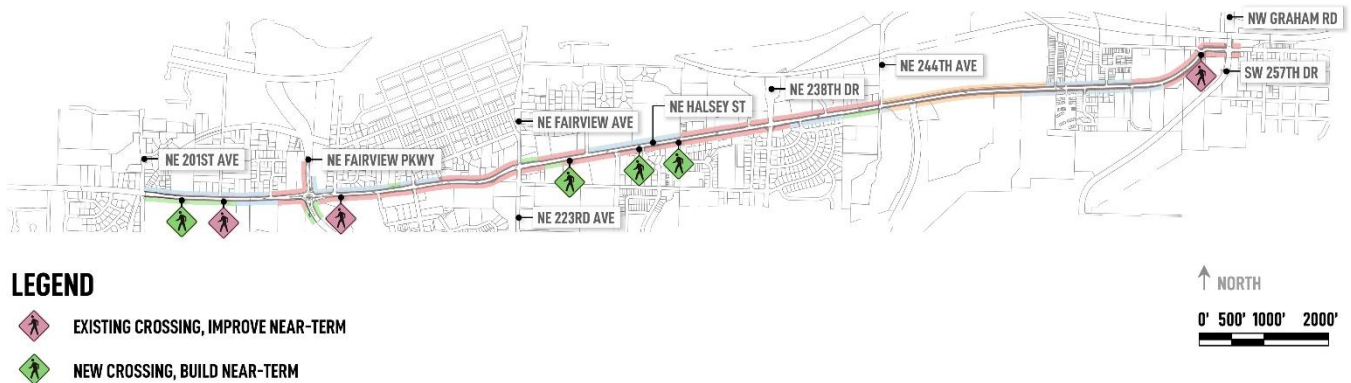
As funds become available, the following crossings can be constructed in the near term:

- In front of Reynold Middle School, east of NE 201<sup>st</sup> Avenue
- West of NE 227<sup>th</sup> Avenue, in front of the MLA Public Charter School
- West of NE 230<sup>th</sup> Court
- West of NE 238<sup>th</sup> Drive, near Flair Apartments

Additionally, the following existing crossings can also be improved in the near term:

- East of NE 206<sup>th</sup> Avenue – redesign existing refuge islands
- East of NE 213<sup>th</sup> Avenue – redesign existing refuge islands
- Intersection with W Historic Columbia River Highway – install RRFB’s and advance warnings

Figure 6: Near-Term Crossing Locations



## Long-Term Solutions

This section summarizes the proposed long-term streetscape and roadways design solutions for the NE Halsey Street corridor. These long-term solutions include preferred cross sections, intersection treatments, and enhanced crossings along the corridor.

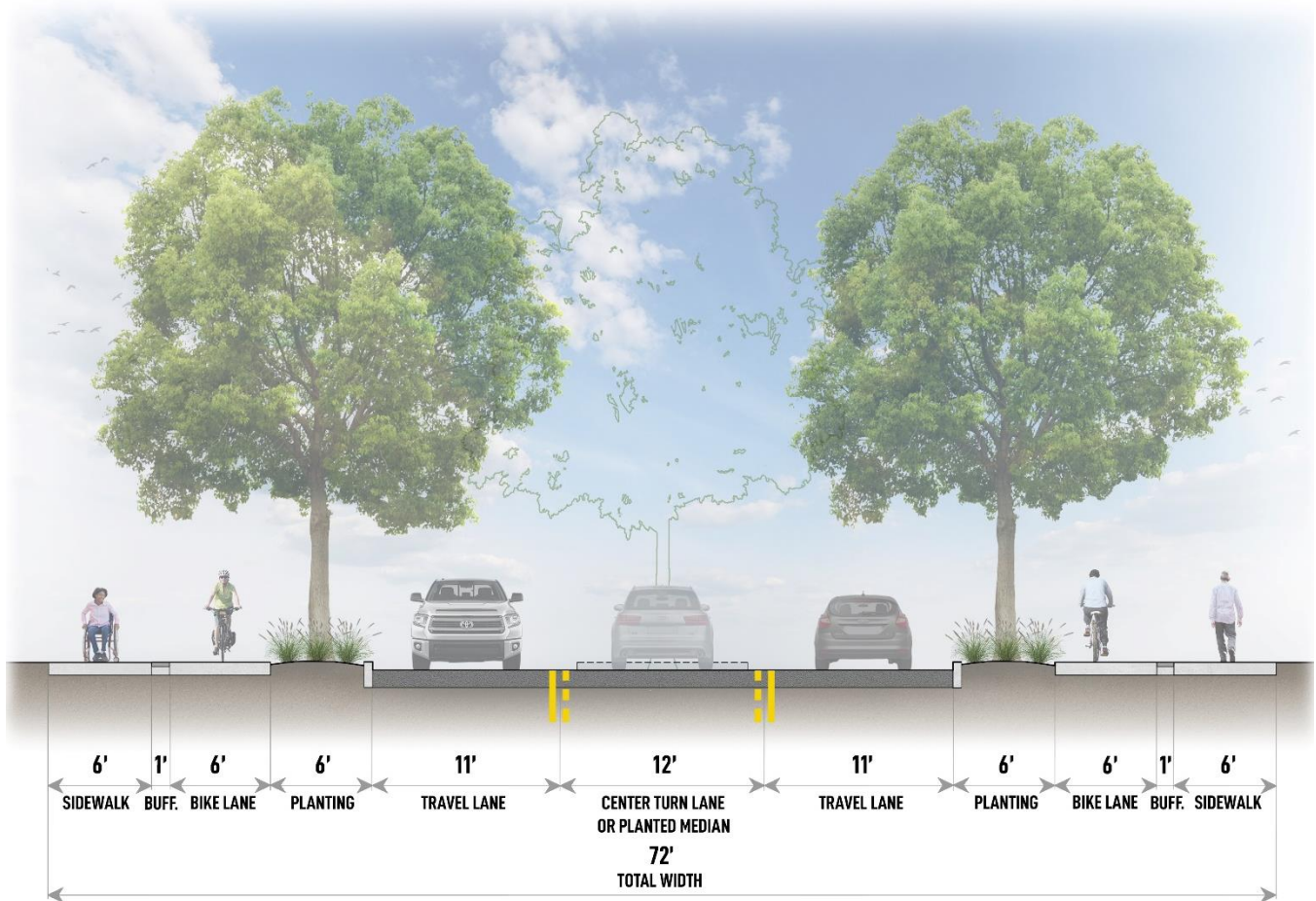
### Preferred Cross Sections

The preferred cross sections for the residential, commercial, and Edgefield context zones are presented below. In order to provide continuity along the entire corridor, the layout of the cross sections are very similar. Each context zone includes landscaping strips, sidewalk-level separated bike lanes, buffers, and sidewalks. The elements that provide distinction for each context zone include presence of parking, type and width of planting strips, and width of sidewalks.

## Residential Context Zone

The preferred cross section for the residential context zone is shown in Figure 7. This cross section includes two 11-foot travel lanes and a 12-foot center turn lane or planted median. The cross section also includes 6-foot sidewalks, 6-foot bike lanes, and 6-foot planting strips, that are all located behind the curb on both sides. There is also a 1-foot buffer between the sidewalks and bike lanes to provide clear separation between the facilities and improve the comfort of people walking and biking. The total width of the cross section is 72-feet, which is wider than Multnomah County’s preferred cross section width (70-feet), but narrower than the County’s minimum right-of-way width (80-feet).

Figure 7: Residential Context Zone



Notes:

1. Planted medians will only occur where there are no driveways or intersections.
2. Planting strips are continuous except for short, paved sections adjacent to on-street parking or in-lane bus stops.
3. Stormwater facilities may be used in place of the planting strips in some areas.
4. Where on-street parking is provided, planting strips would be 8’ long at each tree, with special paving in the strip between the planters.

On-street parking may be provided on at least one side of the roadway while staying within the County’s minimum right-of-way width; however, on-street parking is generally not desirable within the residential context zone. Figure 8 illustrates a plan view of the preferred cross section, including an enhanced pedestrian crossing and in-lane bus stop.

Figure 8: Residential Context Zone Enlargement



**LEGEND**

-  STREET LIGHTING
-  RECTANGULAR RAPID FLASHING BEACON

**KEY NOTES**

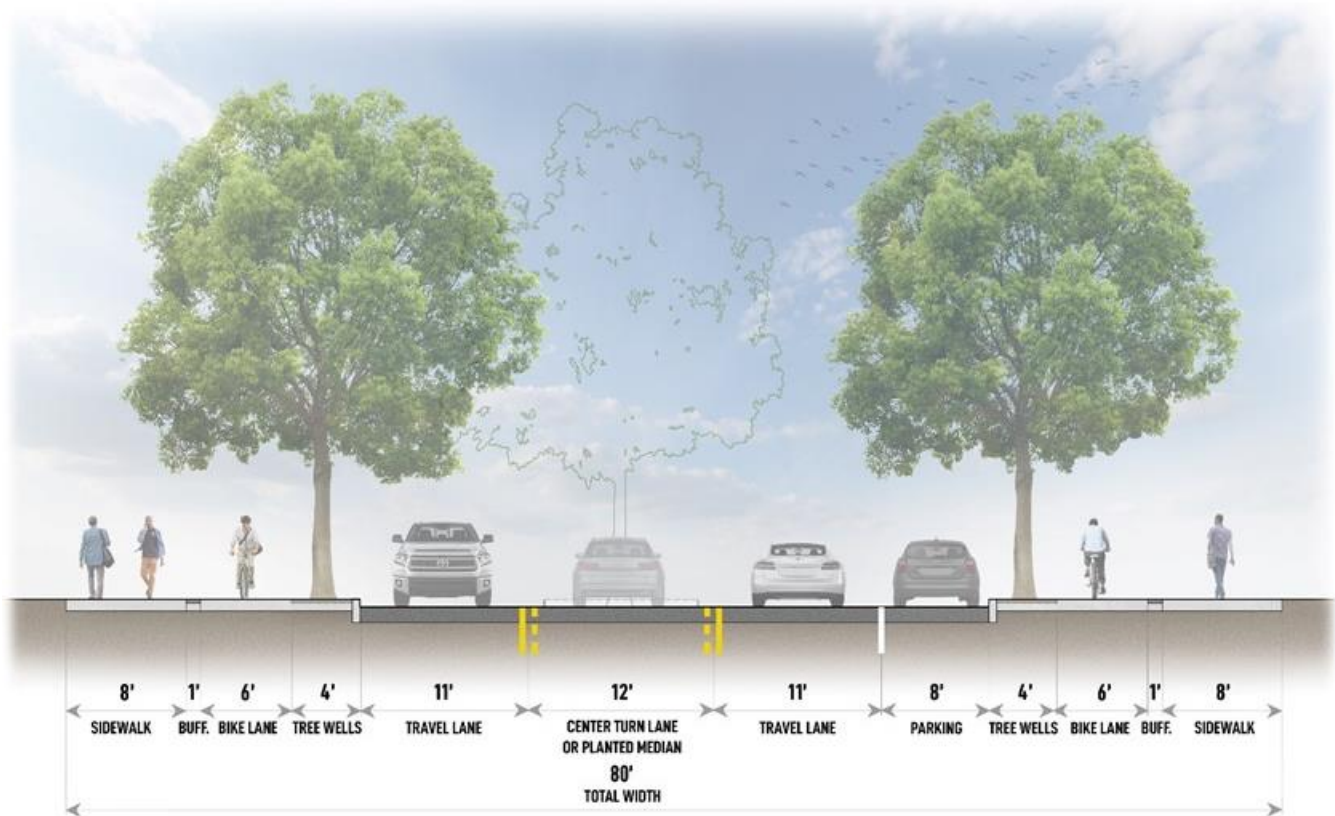
- 1** BUS STOP
- 2** ENHANCED PEDESTRIAN CROSSING
- 3** SIDEWALK
- 4** BUFFER - SPECIAL PAVING
- 5** BIKE LANE
- 6** PLANTING
- 7** CENTER TURN LANE
- 8** TRAVEL LANE
- 9** PROPOSED STREET TREES



## Commercial Context Zone

The preferred cross section for the commercial context zone is shown in Figure 9. This cross section includes two 11-foot travel lanes, a 12-foot center turn lane or planted median, and a 8-foot parking lane on one side. The cross section also includes 8-foot sidewalks, 6-foot bike lanes, and 4-foot tree wells on both sides. There is also a 1-foot buffer between the sidewalks and bike lanes to provide clear separation between the facilities and improve the comfort of people walking and biking. The total width of the cross section is 80-feet, which is wider than Multnomah County’s preferred cross section width (70-feet – excluding on-street parking), but consistent with the County’s minimum right-of-way width (80-feet).

Figure 9: Commercial Context Zone (Type A)



Notes:

1. Planted medians will only occur where there are no driveways or intersections.
2. Tree wells are 4' x 6' with special paving between.
3. Tree wells will include tree grates to maximize space for pedestrians and furnishings.

Figure 10 illustrates a plan view of the preferred cross section, including an enhanced pedestrian crossing.

Figure 10: Commercial Context Zone Enlargement (Type A)



**LEGEND**

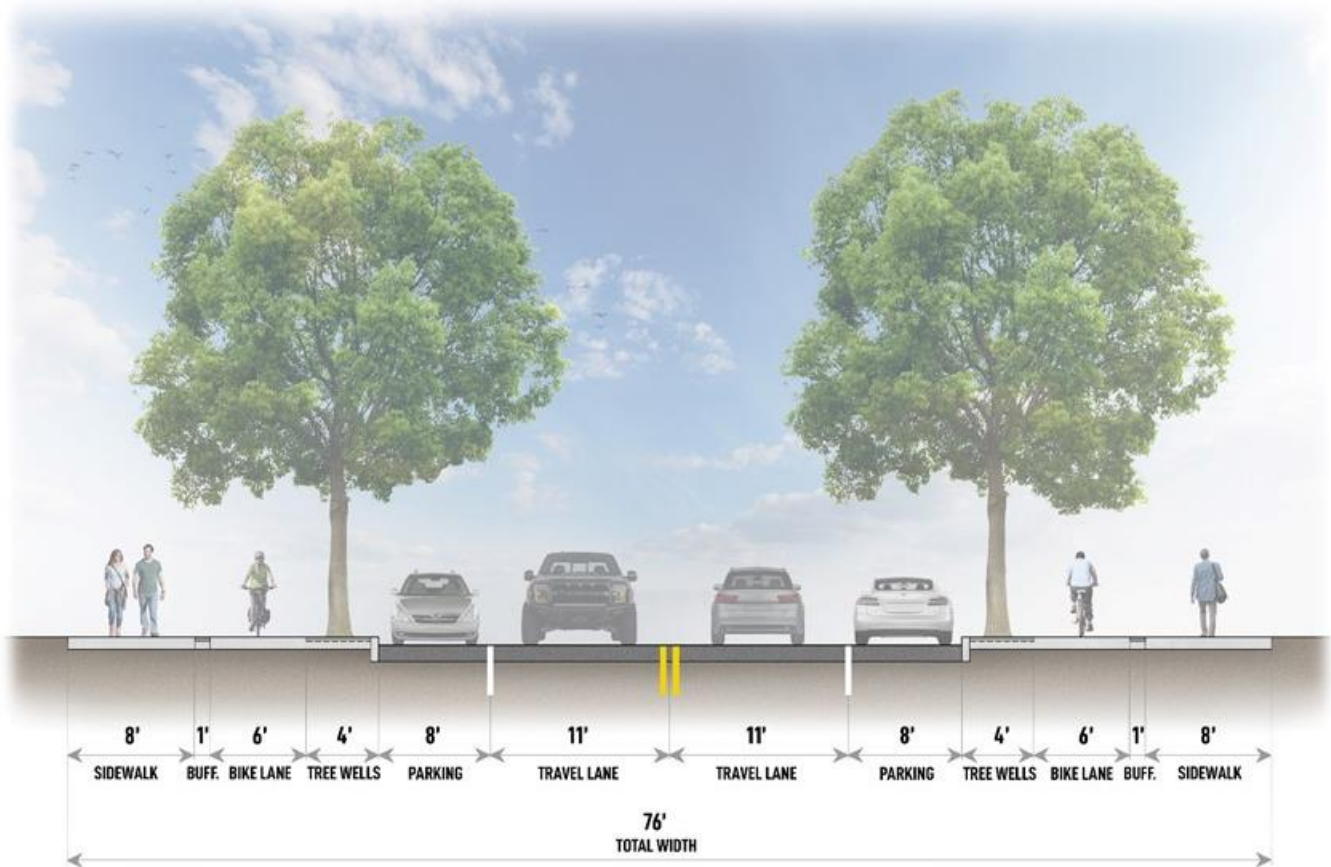
-  STREET LIGHTING
-  RECTANGULAR RAPID FLASHING BEACON
-  TRASH RECEPTACLE
-  BENCH

**KEY NOTES**

- |                                       |                           |   |
|---------------------------------------|---------------------------|---|
| <b>1</b> ENHANCED PEDESTRIAN CROSSING | <b>5</b> BIKE LANE        | <b>9</b> PROPOSED STREET TREES W/ TREE GRATES |
| <b>2</b> BIKE RACK                    | <b>6</b> FURNISHING ZONE  | <b>10</b> PARKING                             |
| <b>3</b> SIDEWALK                     | <b>7</b> CENTER TURN LANE |   |
| <b>4</b> BUFFER - SPECIAL PAVING      | <b>8</b> TRAVEL LANE      |   |

On-street parking may also be provided on both sides of the roadway within the commercial context zone; however, it would require eliminating the center turn lane and reconfiguring the roadway with a two-lane cross section to stay within the County’s minimum right-of-way width. An example of a two-lane cross section with on-street parking on both sides is shown in Figure 11. This cross section layout is proposed along a portion of the corridor in Fairview, between NE Village Street and NE 223<sup>rd</sup> Avenue, but could also be applied elsewhere.

Figure 11: Commercial Context Zone (Type B)



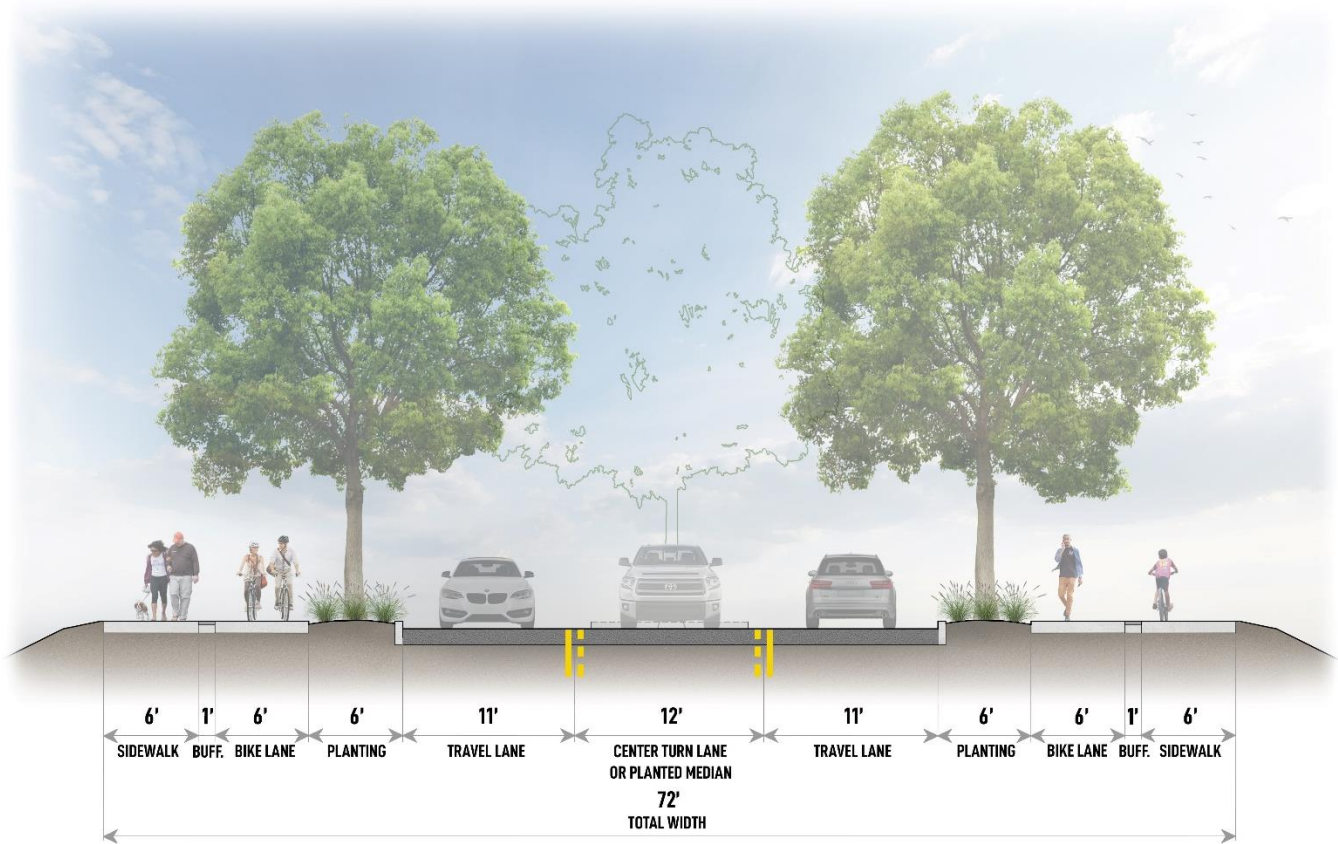
Notes:

1. Tree wells are 4' x 6' with special paving between.
2. Tree wells will include tree grate to maximize space for pedestrians and furnishings.

## Edgefield Context Zone

The preferred cross section for the Edgefield context zone is shown in Figure 12. This cross section includes two 11-foot travel lanes and a 12-foot center turn lane or planted median. The cross section also includes 6-foot sidewalks, 6-foot bike lanes, and 6-foot tree wells on both sides. There is also a 1-foot buffer between the sidewalks and bike lanes to provide clear separation between the facilities and improve the comfort of people walking and biking. The total width of the cross section is 72-feet, which is wider than Multnomah County’s preferred cross section width (70-feet), but narrower than the County’s minimum right-of-way width (80-feet).

Figure 12: Edgefield Context Zone

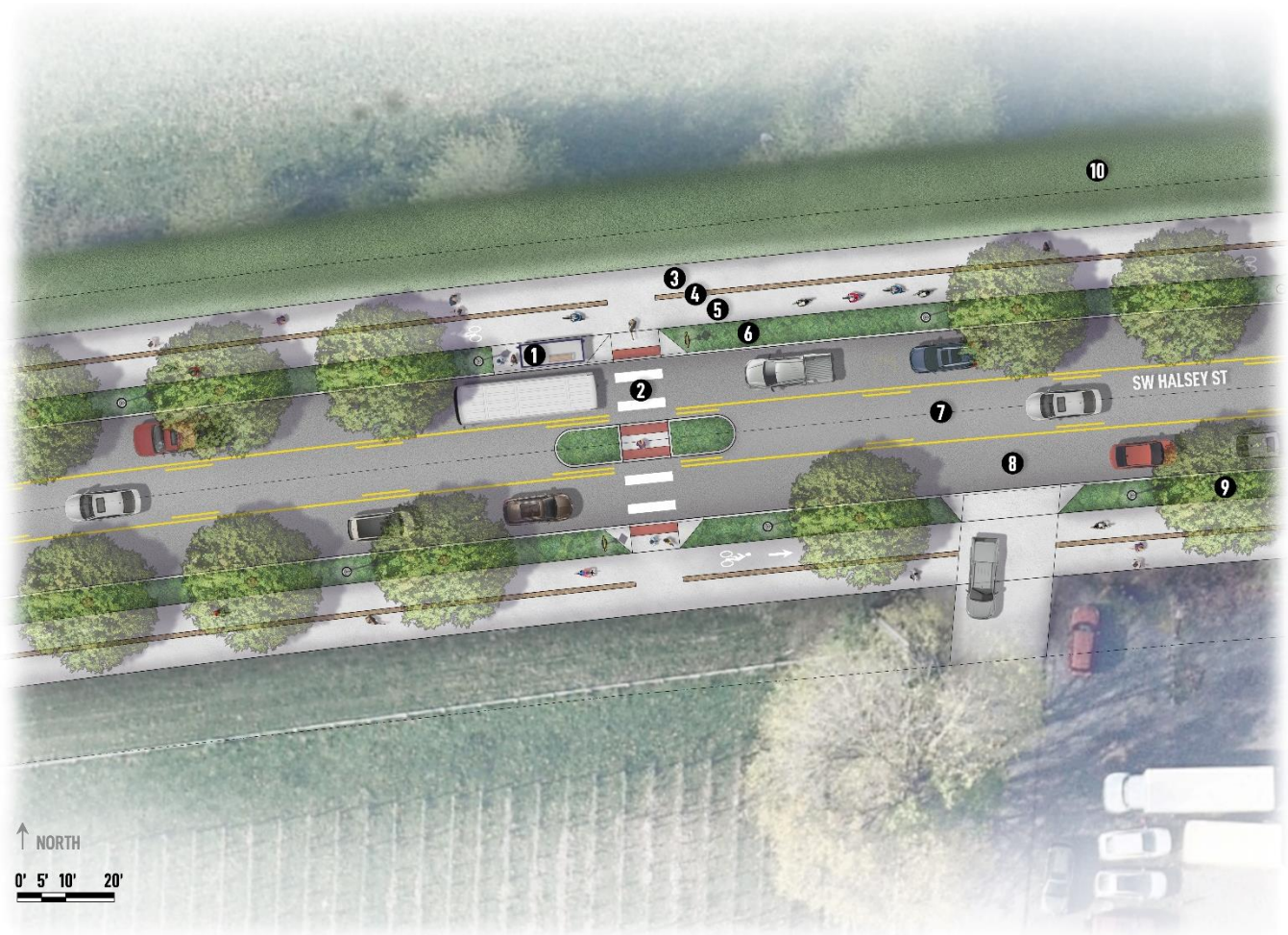


Notes:

1. Planted medians will only occur where there are no driveways or intersections.
2. Planting strips are continuous except for short, paved sections adjacent to in-lane bus stops.
3. Stormwater facilities may be used in place of the planting strips in some areas.

On-street parking may be provided on at least one side of the roadway while staying within the County’s minimum right-of-way width; however, on-street parking is generally not desirable within the Edgefield context zone. Figure 13 illustrates a plan view of the preferred cross section, including an enhanced pedestrian crossing and in-lane bus stop.

Figure 13: Edgefield Context Zone Enlargement



**LEGEND**

-  STREET LIGHTING
-  RECTANGULAR RAPID FLASHING BEACON

**KEY NOTES**

- |                                       |                           |                                |
|---------------------------------------|---------------------------|--------------------------------|
| <b>1</b> BUS STOP                     | <b>5</b> BIKE LANE        | <b>9</b> PROPOSED STREET TREES |
| <b>2</b> ENHANCED PEDESTRIAN CROSSING | <b>6</b> PLANTING         | <b>10</b> PROPOSED EMBANKMENT  |
| <b>3</b> SIDEWALK                     | <b>7</b> CENTER TURN LANE |                                |
| <b>4</b> BUFFER - SPECIAL PAVING      | <b>8</b> TRAVEL LANE      |                                |

**Preferred Intersection Treatments**

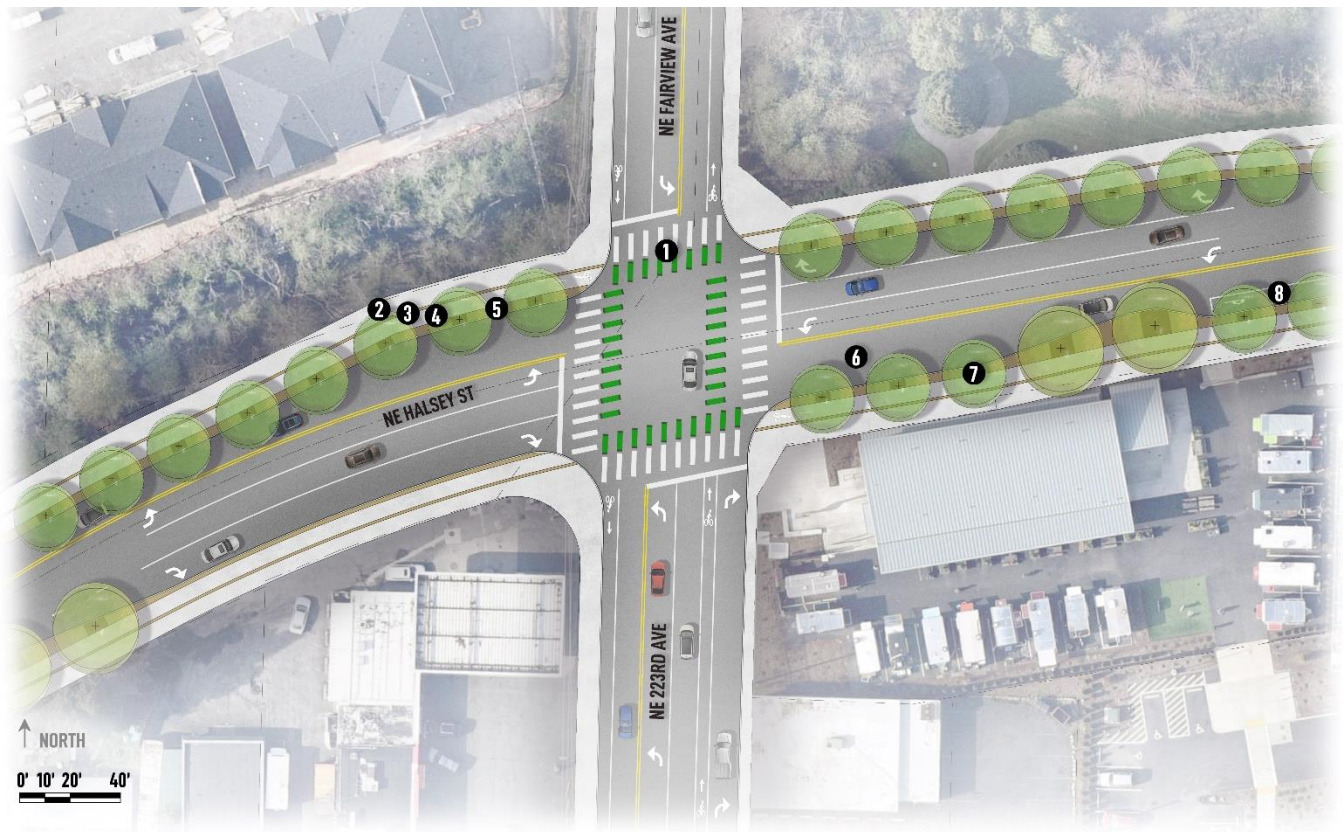
The preferred intersection treatments for the NE 223<sup>rd</sup> Avenue, NE 238<sup>th</sup> Drive, and SW 257<sup>th</sup> Drive intersections are presented below. These improvements are intended to improve multimodal access and circulation along the corridor without significantly impacting the capacity of the intersections or limiting the potential for large truck turning movements. In order to provide continuity along the corridor, the types of treatments included at each intersection are similar.

## NE Halsey Street/NE 223<sup>rd</sup> Avenue

The preferred alternative at the NE Halsey Street/NE 223<sup>rd</sup> Avenue intersection is illustrated in Figure 14. The alternative includes several enhanced features, including:

- Improved lighting, as necessary to meet City and/or County standards.
- Improved signal equipment, including: countdown pedestrian signal heads, as necessary to meet MUTCD requirements; leading pedestrian intervals, as feasible with existing signal controllers; and no right-turn on red, as feasible without significantly impacting traffic operations.
- Improved signing and striping, including: high visibility crosswalk signs and pavement markings on all legs, advanced stop bars within all approaching lanes, green bicycle crossing striping on all legs
- Limited or restricted access to land uses in the southwest corner of the intersection

Figure 14: Proposed Intersection Design at NE 223<sup>rd</sup> Avenue & NE Halsey Street



### KEY NOTES

- |                                |  |
|--------------------------------|--|
| ① ENHANCED PEDESTRIAN CROSSING | ⑤ FURNISHING ZONE                      |
| ② SIDEWALK                     | ⑥ TRAVEL LANE                          |
| ③ BUFFER - SPECIAL PAVING      | ⑦ PROPOSED STREET TREES W/ TREE GRATES |
| ④ BIKE LANE                    | ⑧ PARKING                              |

Final design of the NE Halsey Street/NE 223rd Avenue intersection should consider potential impacts to adjacent properties, including access. The final design should also consider the potential for protected intersection and other enhanced treatments. Figure 15 below presents a draft concept developed as part of a separate project.



Figure 15: NE 223rd Avenue Protected Intersection Concept

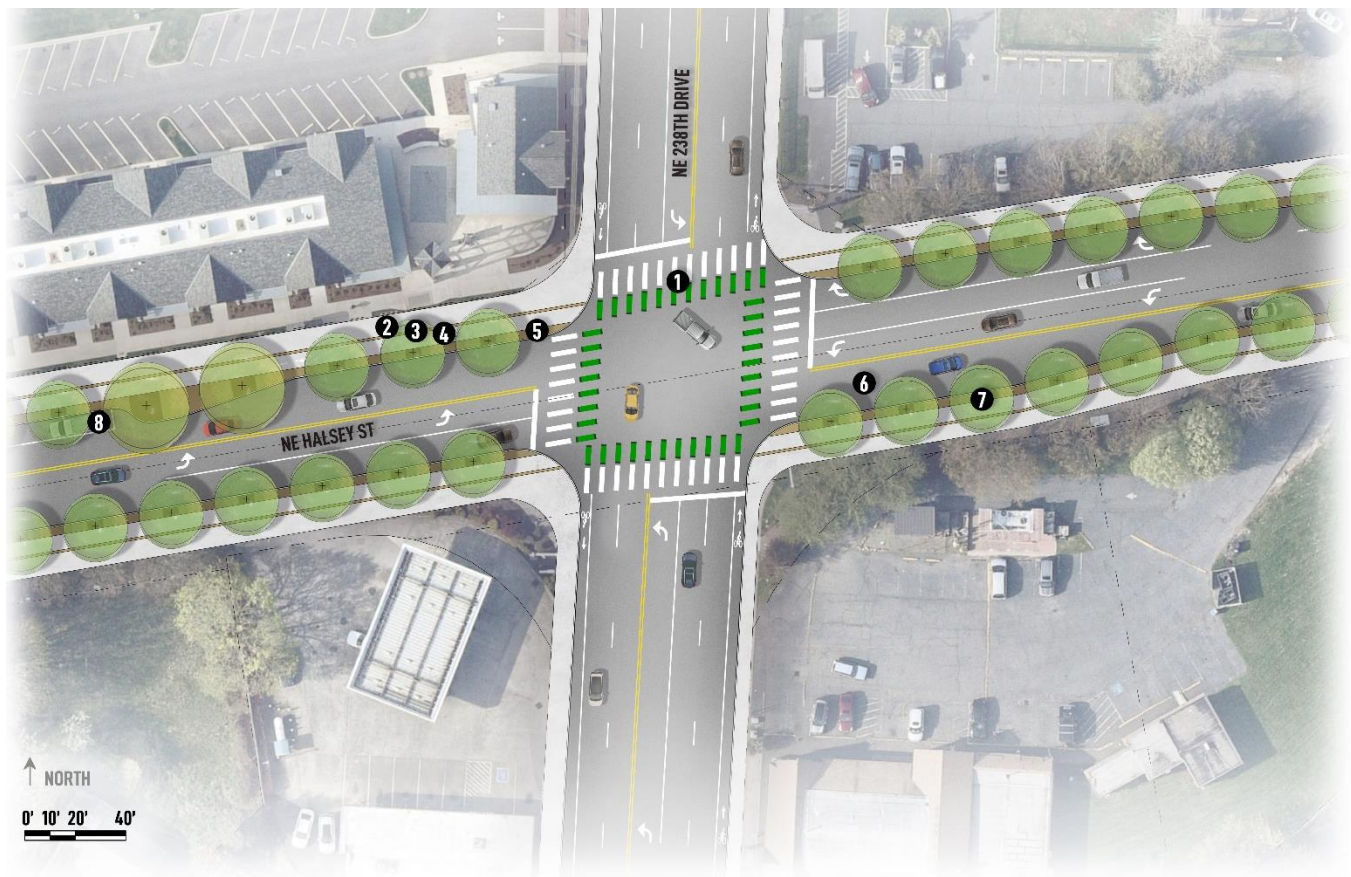


## NE Halsey Street/NE 238<sup>th</sup> Drive

The preferred alternative at the NE Halsey Street/NE 238<sup>th</sup> Drive intersection is illustrated in Figure 16. The alternative includes several enhanced features, including:

- Improved lighting, as necessary to meet City and/or County standards.
- Improved signal equipment, including: countdown pedestrian signal heads, as necessary to meet MUTCD requirements; leading pedestrian intervals, as feasible with existing signal controllers; and no right-turn on red, as feasible without significantly impacting traffic operations.
- Improved signing and striping: high visibility crosswalk signs and pavement markings on all legs, advanced stop bars within all approaching lanes, green bicycle crossing striping on all legs

Figure 16: Proposed Intersection Design at NE 238<sup>th</sup> Drive & NE Halsey Street



### KEY NOTES

- |                                |  |
|--------------------------------|--|
| ① ENHANCED PEDESTRIAN CROSSING | ⑤ FURNISHING ZONE                      |
| ② SIDEWALK                     | ⑥ TRAVEL LANE                          |
| ③ BUFFER - SPECIAL PAVING      | ⑦ PROPOSED STREET TREES W/ TREE GRATES |
| ④ BIKE LANE                    | ⑧ PARKING                              |

Final design of the NE Halsey Street/NE 238<sup>th</sup> Drive intersection should consider potential impacts to adjacent properties, including access. The final design should also consider the potential for protected intersection and other enhanced treatments as documented in *Tech Memo #3: Alternatives Analysis*.

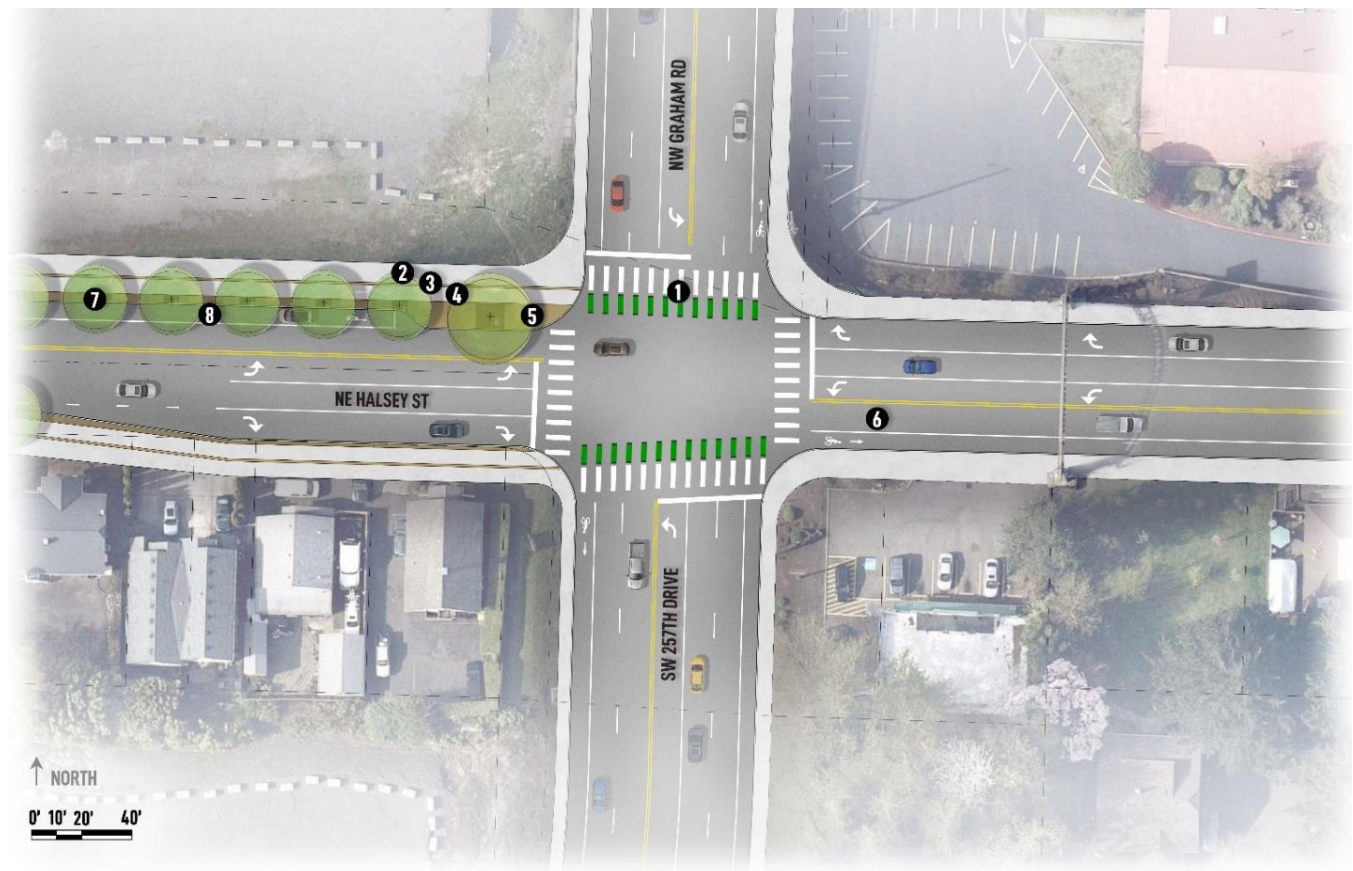


## SW Halsey Street/SW 257<sup>th</sup> Drive

The preferred alternative at the SW 257<sup>th</sup> Drive intersection is illustrated in Figure 17. The alternative includes several enhanced features, including:

- Improved lighting at all intersection corners
- Improved signal equipment, including: countdown pedestrian signal heads, as necessary to meet MUTCD requirements; leading pedestrian intervals, as feasible with existing signal controllers; and no right-turn on red, as feasible without significantly impacting traffic operations.
- Improved signing and striping: high visibility crosswalk signs and pavement markings on all legs, advanced stop bars within all approaching lanes, green bicycle crossing striping on all legs

Figure 17: Proposed Intersection Design at SW 257<sup>th</sup> Drive & SW Halsey Street



### KEY NOTES

- |                                |  |
|--------------------------------|--|
| ① ENHANCED PEDESTRIAN CROSSING | ⑤ FURNISHING ZONE                      |
| ② SIDEWALK                     | ⑥ TRAVEL LANE                          |
| ③ BUFFER - SPECIAL PAVING      | ⑦ PROPOSED STREET TREES W/ TREE GRATES |
| ④ BIKE LANE                    | ⑧ PARKING                              |

Final design of the NE Halsey Street/NE 257<sup>th</sup> Drive intersection should consider potential impacts to adjacent properties, including access. The final design should also consider the potential for protected intersection and other enhanced treatments as documented in *Tech Memo #3: Alternatives Analysis*.

## IV. DESIGN IMPLEMENTATION

This section presents considerations for various elements of the corridor design. Linear Design Plans 1, 2, and 3 below present the proposed liner design plan for the NE Halsey Street corridor.

### Key Considerations

Key considerations in the streetscape design process were developed at the outset of the project and documented in *Tech Memo #2: Cross Section Deficiencies and Needs*. The key considerations were refined throughout the planning process and are provided below.

- NE Halsey Street is a Multnomah County facility and classified as a minor arterial. Multnomah County is responsible for defining its major design elements and multimodal features, which were considered in developing the preferred cross sections.
- The three cities (Fairview, Wood Village, and Troutdale) are responsible for approving land use applications and providing conditions of approval for private development. Any development on or near a road or other right-of-way owned by the County (NE Halsey Street) requires a transportation planning review by the County as part of the land use decision. The review will identify what impacts the project will have on the transportation system and how these effects may be offset with frontage improvements and/or dedication as part of its conditions of approval.
- The existing facilities on NE Halsey Street do not provide a safe and comfortable environment for people walking, biking, or taking transit. In addition, the facilities tend to encourage high traffic volumes and travel speeds along the corridor, especially from through and heavy vehicle traffic.
- NE Halsey Street has many essential destinations as well as existing and well-established natural features and urban design elements that encourage crossing activity at key locations along the corridor. These destinations, features, and elements were considered and emphasized when developing a preferred cross section and when identifying potential crossing locations.
- The community has been engaged on several occasions over the last several years on the form and function of NE Halsey Street. Their input has been incorporated into the planning process.
- Recommendations from prior planning efforts, such as previous phases of the Main Streets on Halsey project, were considered in developing the corridor design.










The corridor design presented in this memorandum is intended to address the following corridor concerns:

- Potential refinements to Multnomah County's standard cross section for NE Halsey Street (perhaps through an overlay) that enhance multimodal access and circulation – the cross sections were designed to reflect various context zones along the corridor (residential, commercial, Edgefield).
- Potential improvements at several key intersections along the corridor (NE 223<sup>rd</sup> Avenue, NE 238<sup>th</sup> Drive, SW 257<sup>th</sup> Drive) to enhance traffic operations and safety for all travel modes.
- Potential improvements at several mid-block crosswalks along the corridor to enhance access and circulation for people walking, biking, and accessing transit as well as other adjacent land uses.










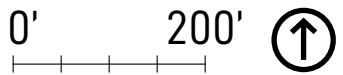
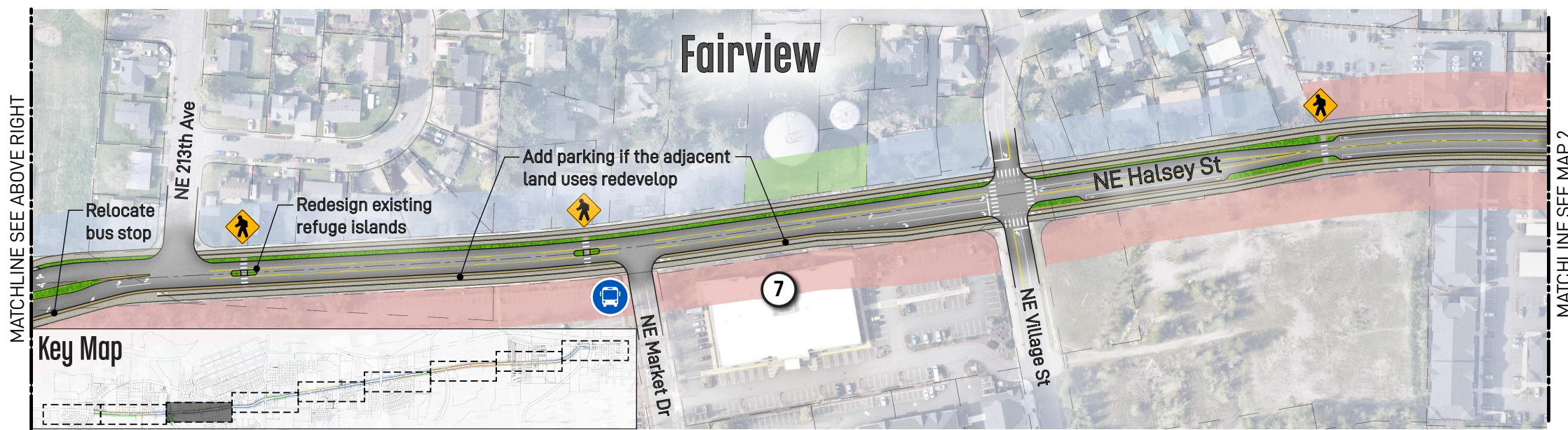
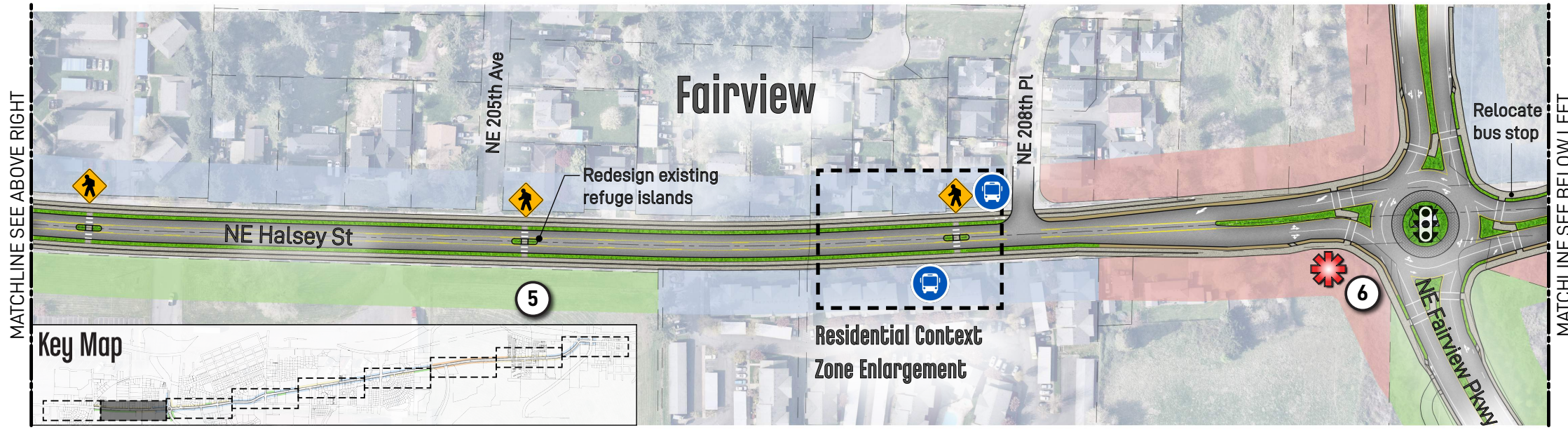
# LINEAR DESIGN PLAN 1

## Legend

-  City Limits
-  Residential Context Zone
-  Commercial Context Zone
-  Edgefield Context Zone
-  Other / Open Space
-  Enhanced Pedestrian Crossing
-  Proposed Intersection Improvements
-  Special Opportunity Area
-  Bus Stops










## Key Notes

-  Reynolds Learning Academy
-  Reynolds SD Park & Ride
-  Connection to Gresham-Fairview Trail, and Potential Trailhead Improvements
-  Gresham Fairview Trail
-  Renolds SD Baseball Diamond
-  Potential Connection to Salish Ponds City Trail
-  VA Outpatient Clinic



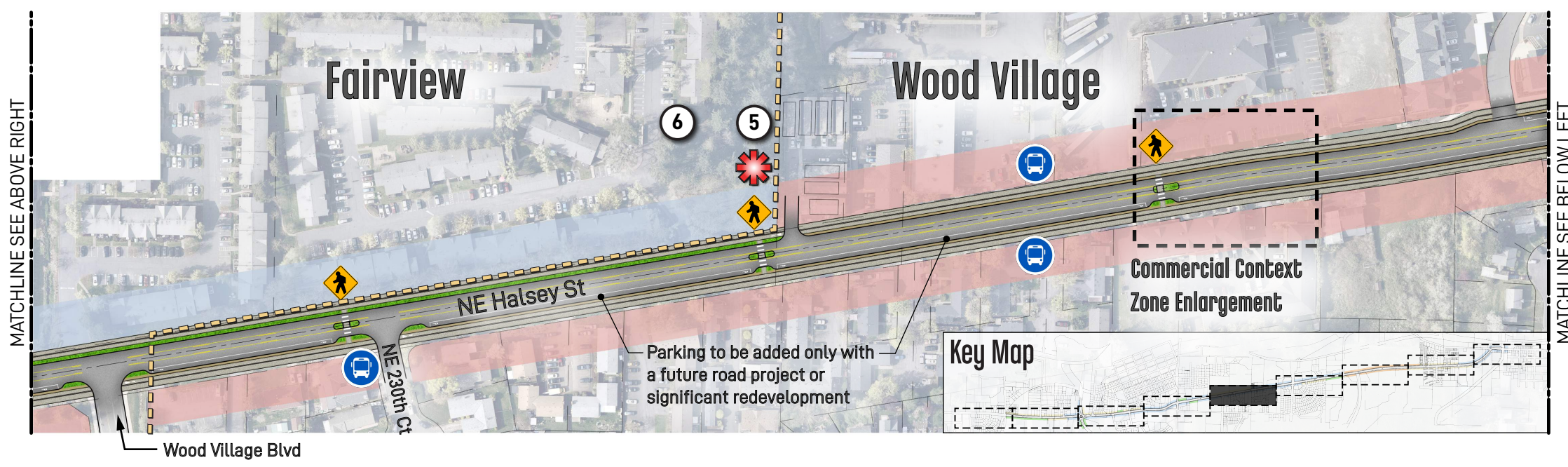
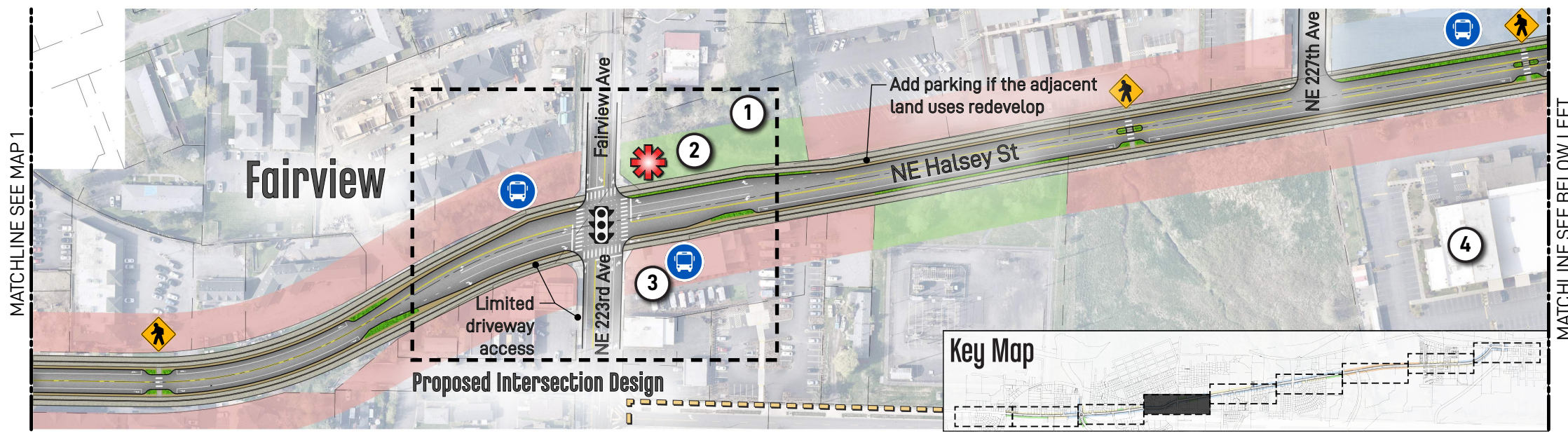
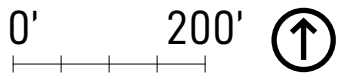
# LINEAR DESIGN PLAN 2

## Legend

-  City Limits
-  Residential Context Zone
-  Commercial Context Zone
-  Edgefield Context Zone
-  Other / Open Space
-  Enhanced Pedestrian Crossing
-  Proposed Intersection Improvements
-  Special Opportunity Area
-  Bus Stops










## Key Notes

- ① Fairview Creek
- ② Marilyn's Park - Opportunity to Highlight Fairview Creek
- ③ Fairview Food Plaza and "The Fork"
- ④ Ukrainian Bible Church
- ⑤ Access to Fairview Woods Wetland Park
- ⑥ Mt. Hood Community College  
Head Start - Fairview
- ⑦ The Byway Retail / Dining
- ⑧ Wood Village City Hall and Civic Center
- ⑨ Donald L. Robertson City Park
- ⑩ Reynolds School District
- ⑪ Arata Creek
- ⑫ Opportunity to Highlight Arata Creek






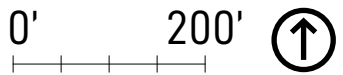
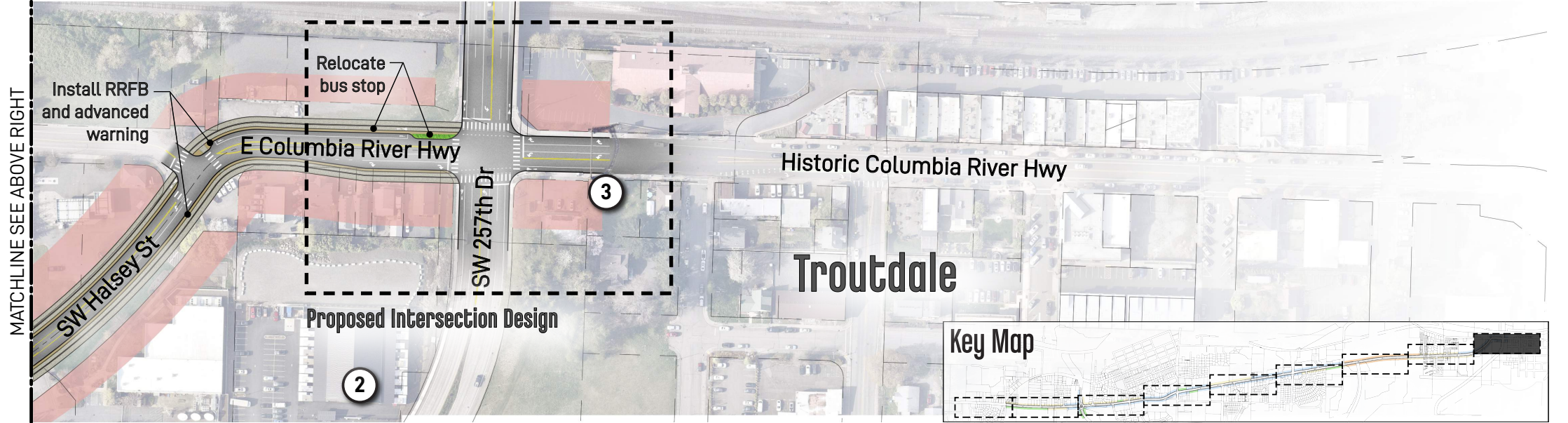
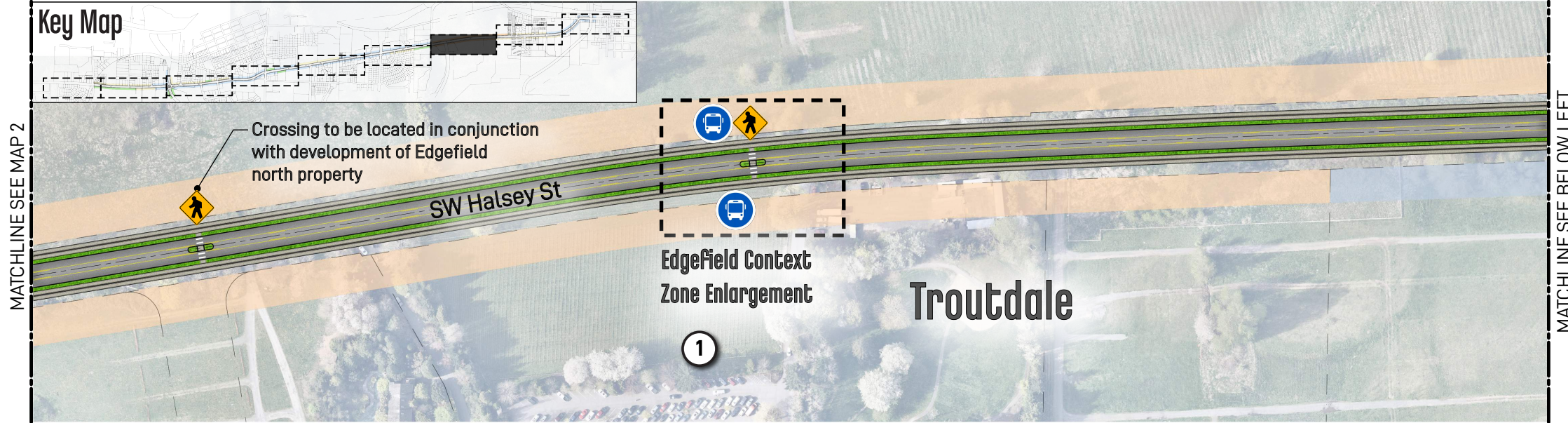
# LINEAR DESIGN PLAN 3

## Legend

-  City Limits
-  Residential Context Zone
-  Commercial Context Zone
-  Edgefield Context Zone
-  Other / Open Space
-  Enhanced Pedestrian Crossing
-  Proposed Intersection Improvements
-  Special Opportunity Area
-  Bus Stops

## Key Notes

-  McMenamins Edgefield
-  Troutdale Station Food Carts
-  Troutdale Gateway Sign



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## Elements of Distinction and Continuity

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When selecting standards in future design stages for visible items like light poles, furnishings, and planting, the following categories provide an intentional divide that emphasizes the unique character of each city, while also tying the corridor together visually as a cohesive whole.

### Elements of Distinction

These elements express the individual character of each city and provide visual cues to people as they move from one city to the next.

- Gateway features
- Public art
- Street tree and plant palette, in the planting strips and planted medians
- Tree grates
- Storm grates
- Event-specific banners on the light poles
- Paver color and pattern, or other materials, in the buffer separating the sidewalk from the bike lane
- Bridges and culverts
- Hanging flower baskets (but having these should be agreed to as an Element of Continuity)

### Elements of Continuity

These elements visually unite the corridor.

- Halsey Corridor Branding elements, including wayfinding features
- Light poles with banner brackets
- Seasonal or year-round banners (between events) on the light poles, derived from the corridor branding
- Benches
- Drinking fountains
- Bike racks
- Trash receptacles
- Paving: roadway, sidewalks, bike lanes, and crosswalks
- Building signage standards
- Bus stops
- Landscape maintenance (all by one entity)
- Move utilities underground, over time



## Corridor Branding

The three cities of Fairview, Wood Village and Troutdale engaged with Arnett Muldrow, a creative planning firm with specialized expertise in “Place Branding”. Arnett Muldrow was charged with developing a recognizable brand for Halsey Street as it passes through the three cities. This brand will be used to help market the corridor to residents and visitors to the region who may come through on their way to and from the Columbia River Gorge, Mt. Hood, and Central Oregon. This brand will be used to promote economic development, shopping, dining, entertainment, and redevelopment opportunities along NE Halsey Street.

The brand is built on some of the attributes for the landscape and culture currently found in this part of East Multnomah County. Key words used to describe the area include Nature, Recreation, Gather, and Discovery. In many ways, this reach of NE Halsey Street is a bridge that links the urbanity of the Portland Metropolitan Area with the rural and natural environments of the Columbia River Gorge and Cascades. The branding effort is ongoing, with the brand name still to be finalized by the three cities. Several of the branding name options that are being considered are illustrated below.



The preferred streetscape and roadway design alternative illustrated in this tech memo reflects this branding direction for NE Halsey Street. It is desired that the branding be incorporated into the streetscape, signage, and visual environment of the NE Halsey Street corridor.

## Design Directions

### Planting

Streetscape planting can create a strong visual character for the corridor with changing interest across the seasons, while also increasing safety, providing environmental benefits, and raising property values. Planting areas can also be used to manage stormwater, as described below.

## Street Trees

As the biggest objects in the streetscape, street trees are one of the main elements that define the visual character of the corridor. They also shade the surrounding paving, intercept stormwater before it hits the ground, filter air pollutants, and absorb carbon dioxide. The trunks lined up along each curb and in planted medians also tend to calm traffic speeds, increasing safety for all road users.

Tree species should be selected carefully for the available space and growing conditions, with an emphasis on tough, drought tolerant species that can handle reflected heat. A variety of species should be used in small groups, rather than a monoculture that would be at risk of a mass failure from an unknown future disease.

In the Commercial Context Zone, street trees will be planted with tree grates to maximize space for pedestrians and furnishings. In the Residential and Edgefield Context Zones, street trees will be planted in the planting strips. Street trees should also be included in planted medians, as applicable.

Providing adequate volume of quality, uncompacted soil for the tree roots is critical to the trees' growth and long-term health. Typical urban tree planting pits do not provide enough soil volume and result in smaller, short-lived trees that increase costs for maintenance or replacement, have shallow roots that disturb paving, and can potentially become safety hazards. With enough soil volume, street trees will be bigger and healthier, live longer, require less maintenance, not impact surrounding paving, and provide more of the environmental and social benefits described above.

When trees are planted in small tree wells or narrow planting strips, soil volume can be increased by using a structure to support the surrounding paving while preventing soil compaction. There are a variety of custom suspended paving system options or modular products that can achieve this, such as Silva Cells. The higher initial investment for creating adequate soil volume will pay off over time with higher performing trees that live longer and require less maintenance.

## Planting Strips

Located between vehicle traffic and the sidewalk, the planting strips in Residential and Edgefield Context Zones provide a welcome buffer and enhance the pedestrian experience. In addition to the street trees, planting strips can host shrubs, groundcovers, and ornamental grasses. Plants should generally be less than 30" height to not block visibility. All species should be tough and drought-tolerant, and there should be a diversity of colors, textures, forms, flowers, and evergreen vs. deciduous leaves.

## Planted Medians

Where the center turn lane is not needed for turning into a driveway or cross street, it should instead be a raised planted median with street trees and plantings like the planting strips. The refuge islands at enhanced pedestrian crossings are like planted medians, except they should not include trees. The added vegetation in medians will contribute to the vibrant character of the corridor, and the extra row of tree trunks will visually narrow the roadway which will further calm traffic and increase safety.

## Maintenance

Careful plant selection, quality planting soil, and adequate soil volume for trees will minimize maintenance costs over time. Plants and trees should be chosen that do not drop fruit, large leaves, or other significant debris. Broadleaf evergreen trees such as live oaks will drop far fewer leaves per year than the typical deciduous street trees, as well as providing a green presence throughout the winter. The mature sizes of all plants need to be considered, as well as their placement relative to paving edges, to minimize or eliminate the need for annual trimming.





## Stormwater Facilities

Stormwater planters and rain gardens manage both the volume and water quality of the runoff, and will be located in the planting strips or in the wider curb extension at some intersections and enhanced pedestrian crossings. Runoff from the roadway, sidewalk, and bike lane directly enters these facilities through curb cuts, and then infiltrates through the soil. There will typically be an overflow drain in each facility that connects to the storm sewer.

Vegetated stormwater facilities are planted with native or adapted wetland plants that thrive in wet conditions and are also drought tolerant. Since they are close to the roadway, most plants should be no more than three feet tall, so they do not block visibility of pedestrians or cross traffic. Occasional maintenance will be required to remove trash that washes into the facilities, remove weeds, and top off the mulch.

The strategies described above to increase soil volume for street trees can also be useful for stormwater management, by directing runoff into the trees' root zones. This frees up space in the constrained urban environment by reducing the area needed for other types of stormwater facilities. While stormwater trees are increasingly being implemented in other places like Minneapolis, Vancouver BC, and Sweden, they are not currently an established stormwater BMP in this area so they would likely need to be considered a pilot program.

Larger stormwater facilities can be an opportunity for more expressive planting and other materials, and can be a highly visible venue for public art.

## Off-Street Facilities Materials

There are two off-street facilities for which building material options should be considered:

- **Bike lane:** Two primary materials that could be considered for construction of the separated bicycle facility, include asphalt and concrete.
  - The main benefit of constructing the bike lane out of asphalt is that it will reduce the project cost by approximately 30%. Additionally, constructing the bike lane out of a different material than the sidewalk would provide a clear distinction between the space that is dedicated to people biking and the space dedicated to people walking. At intersections, the mixing zone for people biking and walking can be constructed out of concrete, which would provide an additional cue to people biking that they need to yield to people walking.
  - The benefits of constructing the bike lane out of concrete are aesthetic reasons and the ability to use colored concrete. Colored concrete creates a welcoming environment for people biking and can provide visual cues to people driving that they need to yield to cyclists.
- **The Buffer between bike lane and sidewalk:** there are many materials that can be used for providing a visual and tactile separation between the bike lane and sidewalk. It should be a material of contrast color and texture so that people with visual impairments could use it for navigating the sidewalk. This buffer space should not be simply painted.

## Driveways

There are many driveways along NE Halsey Street, which provide access to a combination of single-family, multi-family residential and commercial uses. The linear design plan provides limited access management recommendations; however, the plan provides guidance for typical treatments at driveways. These treatments are intended to increase driver's awareness of people walking and biking, while accommodating private vehicles and delivery trucks.

The linear design plan recommends maintaining the level of the sidewalk and the bike lane consistent across driveways. The width of the landscaping buffer (6-feet in residential zones and 4-feet in commercial zones) can be utilized for constructing



driveway aprons. If additional width is needed, the bike lane can also be used for providing appropriate driveway apron grades. The following provides guidance for minor and major driveways along the corridor.

- **Minor driveways:** these driveways serve single-family homes or small multi-family developments. They typically experience a relatively small volume of vehicular traffic – less than 20 trips a day. At these types of locations, bicycle conflict striping is optional. Figure 18 illustrates an example treatment at a minor driveway in Cambridge, Massachusetts.
- **Major driveways:** These driveways serve commercial uses or large multi-family developments. They typically experience a relatively large volume of vehicular traffic – more than 20 trips a day. At these locations, the plan recommends providing bicycle conflict striping as shown in Figure 19, or utilizing colored concrete as shown in Figure 20. If colored concrete is utilized for the bike lane, it should be green color for consistency with other treatments along the corridor. The design should also consider providing yield pavement markings for vehicles at major driveways to warn them about pedestrian and bicycle movements.

Figure 18: Example Treatment at Minor Driveways (Cambridge, Massachusetts)



Image Source: Google Maps Streetview

Figure 19: Example Treatment of Conflict Striping at Driveways (Portland, Oregon)



Image Source: Google Maps Streetview

Figure 20: Example Treatment at Major Driveways (Clackamas, Oregon)



Image Source: Google Maps Streetview

## On-Street Parking

On-street parking is proposed along most commercial corridor segments on at least one side of the street. In a few segments, parking is proposed on both sides of the street, dependent on the context of the adjacent properties and the available right-of-way. Parking zones can also be used for loading-and-unloading zones for local delivery trucks.

The linear design plan proposes to keep on-street parking 8-feet wide along the 3-lane cross section of the corridor and 8-ft wide along the 2-lane cross section. At bus-stop and mid-block crossing locations the plan proposes to introduce curb extensions for the width of the parking lane to improve pedestrian user experience and safety. Figure 21 illustrates a typical on-street parking layout along the corridor.

Figure 21: Typical Corridor On-Street Parking Layout (West of NE Halsey St and NE 238<sup>th</sup> Drive)



### LEGEND

- STREET LIGHTING
- RECTANGULAR RAPID FLASHING BEACON
- TRASH RECEPTACLE
- BENCH

### KEY NOTES

- 1** ENHANCED PEDESTRIAN CROSSING
- 2** BIKE RACK
- 3** SIDEWALK
- 4** BUFFER - SPECIAL PAVING
- 5** BIKE LANE
- 6** FURNISHING ZONE
- 7** CENTER TURN LANE
- 8** TRAVEL LANE
- 9** PROPOSED STREET TREES W/ TREE GRATES
- 10** PARKING



## Transit Stops

Transit stops are located at multiple points along the corridor. Some stops are recommended to be relocated while some are recommended to be enhanced to accommodate the preferred cross section. Per direction from TriMet, bus stops are proposed to be in-lane at most locations, except for major signalized intersections, where existing pull-outs are proposed to remain. The benefit of maintaining in-lane stops along most of the corridor is to minimize transit delays caused by the bus needing to merge back into traffic after a stop.

Figure 22 shows an example of proposed treatment for in-lane bus stops and right-of-way constrained bus pullouts. At such locations, the plan recommends narrowing the bike lane to four or five feet to increase the pedestrian waiting area. The width of the landscaping buffer (four feet in commercial and six feet in residential zones) should be used for providing bus loading and unloading area. The design should utilize pavement markings and signs to require bicyclists to stop for pedestrians.

Where right-of-way allows, the waiting area should be increased to 10 or 12 feet and the bike lane should be moved to the back of the waiting area, as shown in Figure 23. At bus pullouts at intersections, the plan suggests concrete like shown in Figure 22 or painting the roadway with red paint, like shown in Figure 23.

Bus shelters should be installed at all bus stops, where the right-of-way is available. Bus shelters provide wind, rain, and sun cover and significantly increase the user experience. Additional lighting should also be provided at all bus stops for improved security, as lighting is one of the major corridor concerns expressed by the community.

Figure 22: Example Proposed Typical Bus Stop Treatment (Portland, Oregon)



Image Source: Google Maps Streetview



Figure 23: Example Bus Pullout Treatment (Portland, Oregon)



Image Source: Google Maps Streetview

## Enhanced Crossings

NE Halsey Street currently has numerous enhanced crossings at major intersections and midblock locations within the study corridor; however, there are several long stretches between intersections with no designated crossings. These are an inconvenience for residents and other pedestrians who go out of their way to use the designated crossings, and a potential safety hazard when they choose to cross the street between designated crossings.

## Crossing Treatments

As presented in *Tech Memo #3: Alternatives Analysis*, the typical components of an enhanced crossing increase user safety and comfort by reducing the crossing distance and by providing appropriate signage, striping, and beacons. Figure 24 illustrates the following components included in the linear design plan at all mid-block crossings along NE Halsey Street:

- Continental style crosswalk markings
- Advanced stop bars with “Stop Here for Pedestrians” signage
- Crosswalk signage
- Rectangular Rapid Flashing Beacons (RRFBs) with audible pushbuttons

Additionally, 3-lane segments include pedestrian refuge islands, as shown in Figure 24, and locations with on-street parking include curb extensions, as shown in Figure 25.

Figure 24: Typical Enhanced Pedestrian Crossing with a Refuge Island



Image Source: Google Maps Streetview

Figure 25: Example Pedestrian Crossing with a Refuge Island and Curb Extensions (Portland, Oregon)



Image Source: Google Maps Streetview

## Crossing Locations

*Tech Memo #3: Alternatives Analysis* identifies three locations for enhanced crossings, and the linear design plan identifies an additional nine crossing locations, which brings the total of proposed crossings to 12. This results in an average spacing of 620 feet between mid-block and protected intersection crossings. The Blueprint for Urban Design (ODOT, 2021) recommends a target spacing of 500 to 1,000-feet along commercial and residential corridors. Additionally, the plan recommends relocating or enhancing six of the existing crossings, which are outlined below. All existing and future crossing locations are presented in Figure 26.

Proposed enhanced pedestrian crossings include (from west to east):

- In front of Reynold Middle School, east of NE 201<sup>st</sup> Avenue
- West of NE 208<sup>th</sup> Place, at the existing bus stop
- Two crossings at the proposed roundabout at Fairview Parkway
- West of NE Market Drive, at the existing bus stop
- East of NE Village Street, west of the Stomping Grounds Coffee House driveway
- West of NE 223<sup>rd</sup> Avenue, west of the Scrubby's Express Lube and Car Wash driveway
- West of NE 227<sup>th</sup> Avenue, in front of the MLA Public Charter School
- West of NE 230<sup>th</sup> Court
- West of NE 238<sup>th</sup> Drive, near Flair Apartments
- East of 224<sup>th</sup> Avenue, near westmost Edgefield driveway
- Between 224<sup>th</sup> Avenue and SW Lancaster Court, near the Edgefield bus stop
- West of SW Halsey Loop (East)

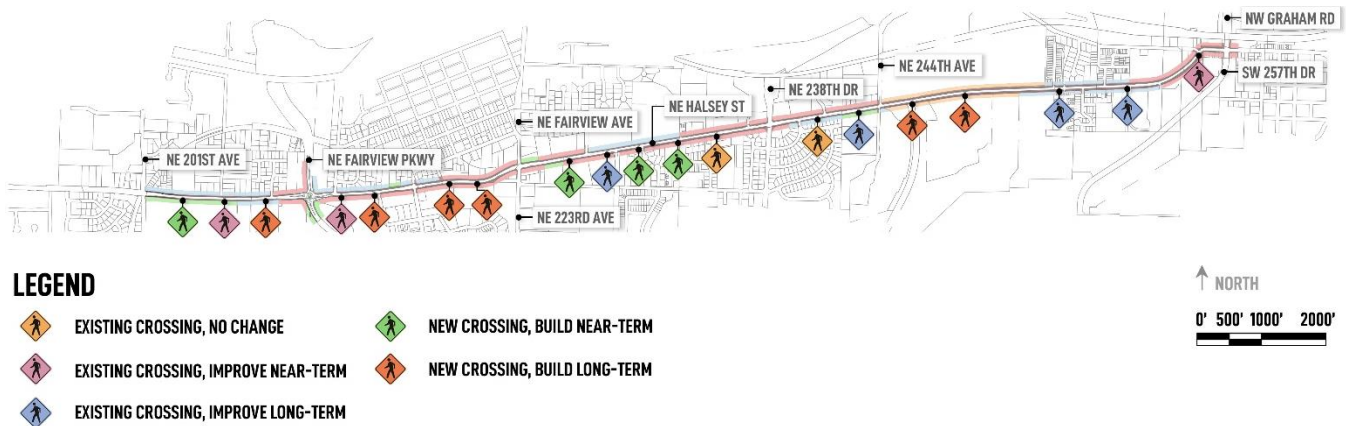
Upgraded existing pedestrian crossings include (from west to east):

- East of NE 206<sup>th</sup> Avenue – redesign existing refuge islands
- East of NE 213<sup>th</sup> Avenue – redesign existing refuge islands
- West of NE Wood Village Boulevard – construct curb extension on the south side
- West of NE 224<sup>th</sup> Avenue – construct curb extension on the south side
- West of SW Edgefield Meadows Avenue – relocate crossing 60 feet to the west and construct refuge islands
- Intersection with W Historic Columbia River Highway – install RRFB's and advance warnings





Figure 26: Existing and Proposed Mid-Block Crossing Locations



### Major Street Intersections

There are four major street intersections along the NE Halsey Street corridor, including NE Fairview Parkway, NE 223<sup>rd</sup> Avenue, NE 238<sup>th</sup> Drive, and SW 257<sup>th</sup> Drive. While the NE Fairview Parkway intersection is expected to be reconfigured as a multi-lane roundabout, all other major street intersections are expected to remain as traffic signals. As indicated above, the linear design plan includes enhanced features at each intersection and identifies the potential for additional features, such as protected intersection treatments. The following provides additional details on bike lanes at the major intersections.

Figure 27 below illustrates an example of how sidewalk-level bike lanes could be handled at major street intersections. As illustrated, the bike lanes are to be lowered down to the roadway level and the bike crossings are to be located near the pedestrian crossings. This treatment would best improve visibility of people walking and biking. Additionally, pavement markings and signs should require bicyclists to yield to pedestrians at intersections.

Figure 27: Example Major Intersection Treatment (Cambridge, Massachusetts)



Image Source: Google Maps Streetview

## Minor Street Intersections

There are approximately 16 unsignalized, minor street intersections along the NE Halsey Street corridor. Some of them have four legs, but most are three-legged intersections. These intersections experience a higher volume of vehicular traffic than major driveways, therefore it is even more important to properly delineate space for people biking and walking to minimize conflicts with vehicles. The plan includes two options for minor-street approach treatments:

### Raised Crosswalks

One of the major concerns along NE Halsey Street is increased vehicular speeds. Traffic calming can be provided by introducing vertical features, like raised crosswalks. They are designed to be flush with the sidewalk, thus providing approximately a gradual 6-inch rise. Where possible, the plan suggests introducing raised crosswalks across minor street approaches for people walking and biking. Raised crosswalks allow people to cross the street at the same level as the sidewalk and the elevated bike lane. They make crossings more comfortable for non-motorized users, especially people using wheelchairs or other mobility devices. Figure 28 presents an example of a raised crosswalk that allows people walking and biking to cross the street at continuous level.

Figure 28: Example Raised Crosswalk



Photo Source: The City of Boston

### Conflict Striping

Another design option for minor street intersections is to bring the bicycle lane and the sidewalk down to the roadway level. It is a less expensive design option, but it provides fewer benefits in terms of traffic calming and the user experience of people walking and biking. Figure 29 illustrates an example from NE Halsey Street, west of the study corridor.

Figure 29: Minor Street Conflict Striping Example (Portland, Oregon)



Photo Source: Google Maps

## V. COST ESTIMATES

Planning level cost estimates were prepared for the preferred cross sections, intersection treatments, and enhanced crossings based on unit costs from similar projects completed in the northwest. The cost estimates include the total cost to implement the long-term solutions along the 3.5-mile segment of NE Halsey Street, the total cost to implement the long-term solutions within the three cities (Fairview, Wood Village, Troutdale), and the total cost to implement the preferred cross-section per linear foot within the three context zones (residential, commercial, and Edgefield). Table 4 summarizes the cost estimates. A list of detailed bid items and cost estimate assumptions are documented in Appendix E.

Table 4. Cost Estimates

Units	Construction Cost	Engineering Support (25%)	Contingency (40%)	Total Cost
3.5-Mile Corridor	\$34.5M	\$8.7M	\$13.8M	\$57.0M
Fairview City Limits	\$16.2M	\$4.1M	\$6.5M	\$26.8M
Wood Village City Limits	\$7.3M	\$1.8M	\$2.9M	\$12.0M
Troutdale City Limits	\$11.0M	\$2.8M	\$4.4M	\$18.2M
Residential Context Zone (LF)	\$1,300	\$320	\$650	\$2,270
Commercial Context Zone 2-Lane (LF)	\$1,350	\$340	\$680	\$2,370
Commercial Context Zone 3-Lane (LF)	\$1,430	\$360	\$720	\$2,510
Edgefield Context Zone (LF)	\$1,220	\$300	\$610	\$2,130



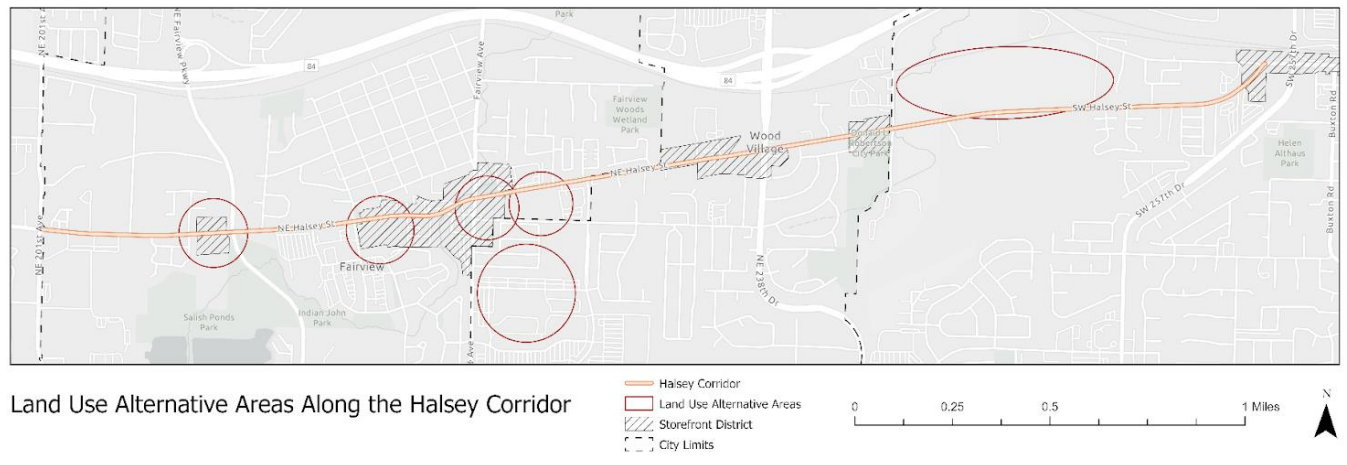
## VI. LAND USE AND CODE EVALUATION

In 2021, as part of an earlier phase of the project, development code amendments were proposed for each city to implement the Main Streets on Halsey vision and recommendations. Specifically, the amendments include a Storefront District and establish building and site design standards intended to implement the Halsey Mainstreet design and development concepts. The code amendments were adopted by Fairview and Wood Village, and proposed amendments for Troutdale will be considered in 2024. Staff from Fairview and Wood Village indicated that the updated standards and requirements generally meet the land use implementation objectives for the Main Streets on Halsey project.

### Land Use Opportunities and Alternatives Evaluation

The project team coordinated with City staff representatives to define and agree to conduct targeted, site-specific land use opportunities and alternatives analysis to support implementation of the Halsey Main Streets concepts. This analysis is documented in *Tech Memo #4: Land Use and Transportation Alternatives (TM 4)*. The purpose of this exercise was to identify potential rezoning or other land use/transportation interventions to support the transportation and land use objectives of the project. Sites either within or near each city's Storefront District were identified based on their development/redevelopment potential to help activate a walkable, mixed-use environment. Sites were also evaluated for their possible relationship with streetscape improvements and opportunities to integrate with multimodal and main street design concepts that were identified in *Tech Memo #3: Alternatives Analysis*. The general locations for the opportunity sites are shown in Figure 30. See TM 4 for more details on the land use alternatives and opportunities that were considered for the identified sites.

Figure 30: Land Use Alternative Areas in Fairview, Wood Village, and Troutdale



### Assessment of Potential Development Code Updates

Project team members continued to coordinate and discuss how best to follow on previous project work and add value to earlier corridor planning phases regarding additional amendments to local development codes. The efforts described in the remainder of this section reflect those conversations. The Cities of Wood Village and Troutdale have indicated that they do not anticipate a need for code amendments to support the land use alternatives and opportunities identified in TM 4 for their respective jurisdictions. However, some of the alternatives that were considered for Fairview may necessitate code amendments to remove barriers and enable land use and development opportunities that are compatible with the

preferred streetscape design alternatives. The project team is considering the following potential updates to the Fairview code to support implementation of Halsey Main Street:

- Double-frontage, orientation, and access standards in the Town Center Commercial and Storefront districts
- Exceptions to setback requirements
- Exceptions to height step back requirements
- Exceptions to design standards

Fairview's requirements and standards for each of these code areas are summarized below. Each summary includes a brief assessment of potential code barriers and preliminary amendment options.

## Lot Dimension and Building Orientation Options

Table 4 assesses certain code standards/requirements related to building orientation, lot dimensions, and other standards that may be a barrier to development that supports walkable main street environment in the TCC and Storefront districts. The code language or standards that may be an issue and/or considered for amendment are formatted in **bold text** under the "Applicable Code Language" column. These code sections were identified based on discussions with staff and some of the site-specific challenges that were discussed in TM 4. In addition, City of Fairview staff and developers have generally expressed a need for additional flexibility for various development and design requirements in the TCC district, which may serve as a model for offering design/development flexibility in other zones and overlay districts. A component of allowing more flexibility may be to establish a list of design and development *exceptions*. Clear and reasonable exceptions may enable development to still meet the intent and purpose of the TCC zone without having to navigate additional approval processes that can deter development from occurring.



Table 4: Potential Updates for FMC Sections

FMC Section and Potential Issue Area	Applicable Code Language	Assessment and Potential Code Update Options
<p>FMC 19.65.040 Building Orientation and Setbacks</p> <p><u>Exceptions for setback requirements</u> – The City is exploring increasing flexibility for setback requirements. Some sites in the TCC/Storefront districts have constraints in the setback area that may be challenging for developers to resolve under the current setback requirements.</p>	<p>Building setbacks are measured from the wall or facade to the respective property line. The setback standards, as listed on the following page, apply to primary structures as well as accessory structures. <b>The standards may be modified only by approval of a variance.</b></p>	<p>Any deviations to the setback requirements in the TCC district may only be granted through the City’s variance process. Typically, the burden of proof to approve a variance is relatively onerous and the extent of the variance is limited, making it a challenge to use this process. To enable additional flexibility, the City may consider exceptions where it is difficult or not practical to meet the maximum setback due to existing site constraints. The City may consider maximum exceptions to help ensure that setbacks are still maintaining the storefront scale that is intended for Halsey (e.g., exception up to an additional 20 feet).</p> <p>Note that this section of the FMC already has provisions for exceptions, however they only apply to architectural features that encroach into the setback area.</p>
<p>FMC 19.65.040 Building Orientation and Setbacks</p> <p><u>Double frontage</u> – Some of the sites evaluated in TM 4 had multiple frontages. Frontage improvement requirements for double-frontage parcels may affect the location/design of streetscape improvements on Halsey, including setback requirements.</p>	<p>2. Maximum Setback: b. Applicability. iii. On corner lots with <b>or lots with more than one frontage, the maximum setback only applies to the street property line which abuts the higher classification street. If the lot abuts two streets of the same classification, then the applicant may select which street property line the maximum setback applies to.</b></p>	<p>Some of the corner properties in the storefront district front onto streets that are a higher functional classification than Halsey Street, such as Fairview Parkway. If the intention of the Storefront district is to ensure all buildings/development along Halsey face the street, then the City may consider amendments to clarify that this provision does not apply to corner properties in the Storefront district. In addition, the City may consider that the maximum setback/frontage requirements apply to Halsey in the Storefront district.</p>
<p>FMC 19.65.040 Building Orientation and Setbacks</p> <p><u>Maximum setbacks</u> – some sites may have difficulty meeting the maximum setback standard due to exiting constraints, including drainage</p>	<p>2. Maximum Setback: c. Standards. i. <b>Maximum Setback. Unless otherwise specified, the maximum a building can be set back from a street lot line is 10 feet. On sites within a storefront district, at least 75 percent of the length of the ground level street-facing facade of the building must meet the</b></p>	<p>See assessment for setback exceptions above for options on how the City may address properties that cannot meet the maximum setback due to site constraints.</p>

<p>easements and existing utilities for one of the identified opportunity sites.</p>	<p><b>maximum setback standard.</b> On all other sites, at least 50 percent of the length of the ground level street-facing facade of the building must meet the maximum setback standard. Eaves, chimneys, bay windows, overhangs, cornices, awnings, canopies, porches, decks, pergolas, and similar architectural features on the facade do not count towards meeting the maximum setback standard. The standard applies to the facade wall.</p>	
<p>FMC 19.65.040 Building Orientation and Setbacks  <u>Setback Improvements</u> – Some sites may be unable to meet setback improvements due to existing site constraints or right-of-way issues. As mentioned above, one of the opportunity sites has an existing drainage easement and public sewer that would be within the setback area.</p>	<p>2. Maximum Setback:  c. Standards.  ii. Improvements in the Setback Between a Building and a Street Lot Line. <b>The land between any building and a street lot line must be landscaped to at least the standards of FMC 19.163.030(E)(1) and/or hard surfaced for use by pedestrians.</b></p>	<p>Some properties in the Storefront district may be unable to meet landscaping or hard surfacing/pedestrian improvement requirements due to challenges with easements and utilities. The City may also consider specific exceptions for these cases that include provisions to ensure the frontage still maintains cohesion with neighboring storefront properties. For example, landscaping criteria may include specific types of landscaping that also serve as a drainage or stormwater facility, such as bioswales or street planters.</p>
<p>FMC 19.65.050 Block Layout  <u>Requirements for alley or interior parking court</u></p>	<p>B. Block Layout Standard.  1. New land divisions and developments with more than one building, which are subject to site design review, shall be configured to provide an alley or interior parking court, as shown in Figure 16.85.050(B). When new public streets are created on larger sites, blocks (areas bound by public street right-of-way) shall have a length not exceeding 200 feet, and a depth not exceeding 200 feet.  2. Pedestrian pathways shall be provided from the street right-of-way to interior parking courts between buildings, as necessary to ensure reasonably safe, direct, and convenient access to building entrances and off-street parking.  3. Exceptions to the alley or interior parking court standard may be approved, and longer block lengths or depths allowed, when the proposed development provides a mid-block pedestrian pathway. The mid-block pedestrian pathway must connect across the site to both street frontages, be at least 10 feet in width, and be lit with pedestrian-scale lighting.</p>	

	<p>C. Variances. Variances will be made in accordance with Chapter 19.520 FMC. The standard may be varied to address topographic or other physical constraints, in accordance with the provisions for Class B or C variances in Chapter 19.520 FMC.</p>	
<p><b>FMC 19.65.060 Building Height Height Step Down</b> – Interested developers for some of the opportunity sites identified in TM 4 suggested that this requirement may be hard to meet. The City is considering updates to offer flexibility to these standards.</p>	<p>B. Height Step Down. In the following situations, the base height is reduced, or stepped down, to create a transition to areas with lower building heights or to reduce the massing of the building as seen from the street:</p> <ol style="list-style-type: none"> <li>1. Adjacent to Residential Zone. The following step-down height limits apply within 25 feet of sites zoned residential. Sites with property lines that abut residential zones for less than a five-foot length are exempt from these standards:             <ol style="list-style-type: none"> <li>a. On the portion of the site within 25 feet of a site zoned R, R-7.5, R-10, or VSF, the step-down height limit is 35 feet. See Figure 19.65.060(B).</li> <li>b. On the portion of the site within 25 feet of a site zoned R/MF, VA, VTH, VO, VC, VMU, the step-down height limit is 45 feet. See Figure 19.65.060(B).</li> </ol> </li> <li>2. Across a Local Street or Alley from a Residential Zone. On the portion of the site within 15 feet of a lot line that is across a local street or alley, as identified in the Fairview Transportation System Plan (TSP), from any of the zones listed in subsection (B)(1) of this section, the step-down height limit is 45 feet.</li> <li>3. Adjacent to Any Street. If a project is approved for a height bonus pursuant to FMC <a href="#">19.65.070</a>, then step-down height limit applies to a portion of the site as follows:             <ol style="list-style-type: none"> <li>a. For sites eligible for a height bonus of 10 feet, allowing an overall height of 55 feet, the step-down height limit is 45 feet on the portion of the site within five feet of any street lot line. See Figure 19.65.060(B).</li> <li>b. For sites eligible for a height bonus of 20 feet, allowing an overall height of 65 feet, the step-down height limit is 45 feet on the portion of the site within 15 feet of any street lot line. Additionally, any rooftop area within 15 feet of the street lot line must be usable outdoor space or developed as an eco-roof. See Figure 19.65.060(B).</li> </ol> </li> </ol>	<p>The City has indicated that developers have faced challenges meeting the step down requirements when applying height bonuses. The city may consider exceptions for height step downs if specific bonuses are provided (e.g., affordable housing). Alternatively, to simplify the requirement or enable flexibility, the city may consider providing the option of a step down calculated as a percentage of the total height or frontage length, which may help ensure the stepdown is proportional to the scale of the building. For example: “The step-down height limit is 45 feet or 75% of the building height, whichever is less.”</p>



## VII. APPENDICES

The appendices listed below include full-size versions of the graphics included in this memorandum and the evaluation matrix:

- **Appendix A:** Evaluation Summary
- **Appendix B:** Near-Term Solutions
- **Appendix C:** Long-Term Solutions
- **Appendix D:** Linear Design Plans

