



# CORRIDOR STUDY REPORT

## 72<sup>nd</sup> Avenue Transportation Study

### City of Tigard, Oregon

June 2020

Prepared for the City of Tigard by  
Angelo Planning Group, Alta Planning + Design,  
DKS Associates, and Wallis Engineering.



## **EXECUTIVE SUMMARY**

A summary of the 72<sup>nd</sup> Avenue Corridor Study Report is provided in a series of fact sheets on the following pages.

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# 72<sup>nd</sup> Avenue Transportation Study Overview + Public Involvement



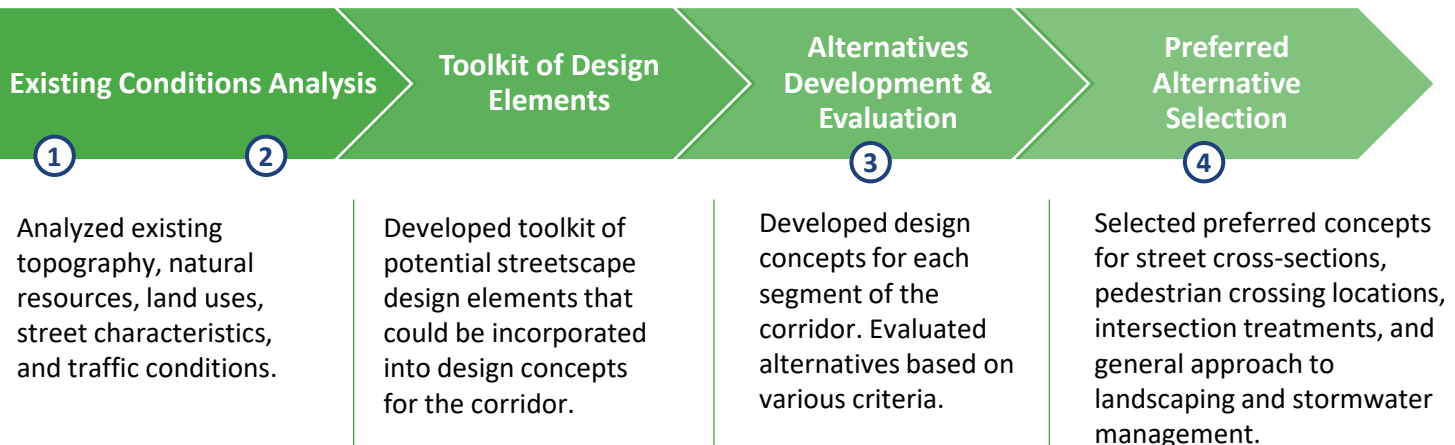
## Project Overview

**Project Purpose:** Identify a new roadway design concept for SW 72<sup>nd</sup> Avenue that will transform the busy arterial into an attractive, multimodal street for all users.

**Tigard Triangle Vision:** SW 72<sup>nd</sup> Avenue is the primary north-south thoroughfare through the Tigard Triangle, a special district in the northeast corner of Tigard. Improvements to 72nd Avenue will play a central role in achieving the vision for Triangle to become a highly walkable, pedestrian-oriented, mixed-use district.

**Project Outcome:** The final recommendations include new lane configurations, enhanced streetscape, pedestrian and bicycle crossings, and improved functionality for all transportation modes. Recommendations also include estimated costs, potential funding sources and strategies, a plan for improving the corridor in multiple phases and segments, and other implementation strategies. More detail can be found in the Corridor Study Report.

## Planning Process



# Public Involvement Summary

Throughout the planning process for the 72<sup>nd</sup> Avenue Transportation Study, the City received valuable input from the community. The project team used a variety of methods and provided a range of opportunities for people to influence the corridor design recommendations. The public involvement activities and highlights of the input received are summarized below. Additional results are included in the Preferred Alternative summary.

Activity	Description	Participants
Advisory Committees	The existing Tigard Transportation Advisory Committee (TTAC) and Transportation Strategy Team (TST) advised the project team on key project decisions.	TTAC: 13 members TST: 11 members
Stakeholder Interviews	Staff and consultants conducted one-on-one interviews with property and business owners, affordable housing developers, and a representative of Tualatin Valley Fire & Rescue.	7 stakeholders
Open Houses	Two open houses were held in April and September 2019. The April event sought input on general corridor design concepts and lane configuration options. The September event focused on alternatives for the Beveland to Dartmouth corridor segment and provided a preferred alternative for the remainder of the corridor.	Apr: 31 survey responses Sep: 12 survey responses
Online Surveys	<ol style="list-style-type: none"> <li><u>Corridor Aspirations</u>: General hopes and concerns about the corridor.</li> <li><u>Design Alternatives</u>: Corridor design concepts and lane configuration options.</li> <li><u>Preferred Alternative</u>: Alternatives for the Beveland to Dartmouth segment.</li> </ol>	<ol style="list-style-type: none"> <li>218 responses</li> <li>71 responses</li> <li>40 responses</li> </ol>
Project Webpage	City webpage with general information about the project. Linked to an Engage Tigard site, which provided access to project documents, online surveys, and survey results.	N/A

## Highlights of Community Input

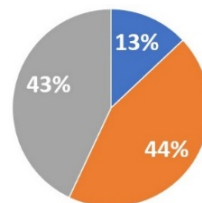
► **Safe Walking and Biking** – People want safer options for walking, biking, and taking transit in the Tigard Triangle. SW 72<sup>nd</sup> Avenue currently lacks adequate sidewalks and bike lanes.



*No sidewalks on segment of 72<sup>nd</sup> Ave*

► **Traffic** – Some are concerned about vehicle traffic and congestion on 72<sup>nd</sup> Avenue. Bike/ped improvements should not make congestion worse or impede movement for emergency vehicles.

► **On-Street Parking** – People generally prefer to maximize the pedestrian/bicycle experience over on-street parking. However, a few stakeholders noted the importance of providing on-street parking, since the code doesn't require off-street parking in the Tigard Triangle.

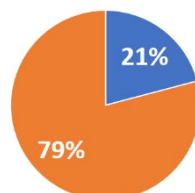


Maximize pedestrian experience  
Maximize on-street parking  
Balance of both

► **Pedestrian Amenities** – People generally think landscape planters, trash and recycling receptacles, and outdoor seating are relatively more important amenities than things like bike parking, drinking fountains, or wayfinding.



► **Bicycle Treatments** – People prefer protected bike lanes (separated from vehicle traffic by physical barriers) over buffered bike lanes (separated by pavement markings).



Protected bike lane  
Buffered bike lane





# 72<sup>nd</sup> Avenue Transportation Study

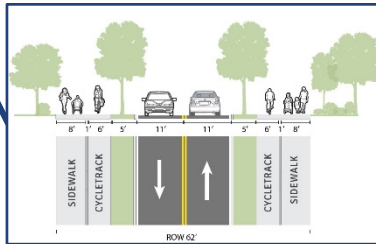
# Preferred Alternative

## Street Sections

The preferred alternative for the design of 72nd Avenue balances pedestrian and bicycle safety and mobility with the ability of cars, truck and transit vehicles to move within and through the corridor. The design also takes into account how right-of-way widths and traffic conditions vary throughout the corridor. Below are the preferred street cross-sections for each of the five corridor segments. Additional design recommendations are summarized on the next page.

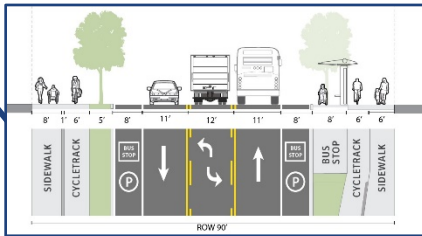
**The proposed designs for all segments include protected bike lanes, sidewalks, landscaping, and pedestrian amenities.**

### Red Rock Creek to Pacific Hwy



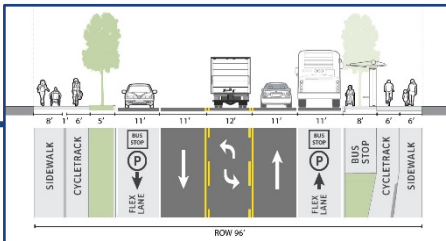
- One travel lane in each direction
- No center turn lane
- No on-street parking

### Dartmouth to Red Rock Creek



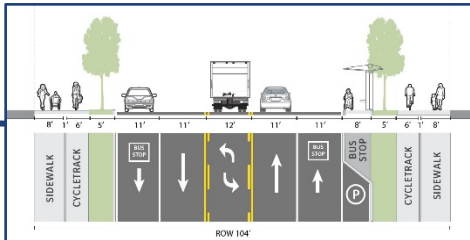
- One travel lane in each direction
- One continuous center turn lane
- On-street parking, both sides of street

### Beveland to Dartmouth



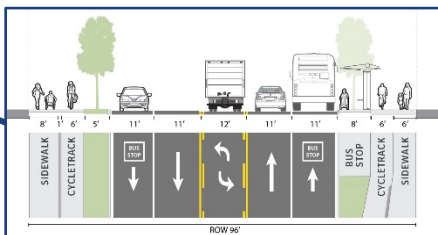
- Flex parking lanes on both sides: on-street parking lanes will be restricted during peak AM & PM travel times and used as additional travel lanes in each direction
- One continuous center turn lane

### Gonzaga to Beveland

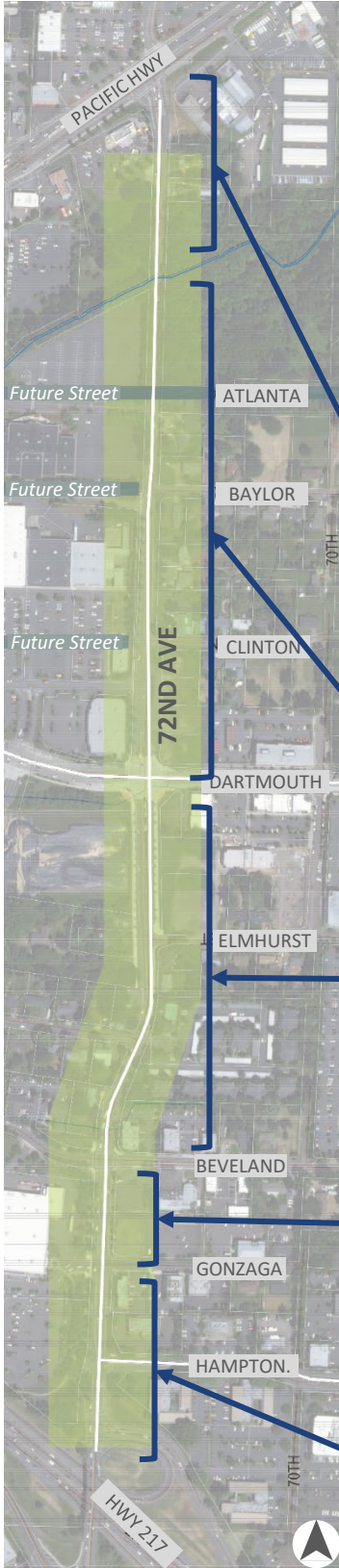


- Two travel lanes in each direction
- One continuous center turn lane
- On-street parking, east side of street

### Highway 217 to Gonzaga



- Two travel lanes in each direction
- One continuous center turn lane
- No on-street parking

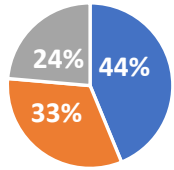


# Community Input Snapshot

Segment Cross-sections

## Beveland to Dartmouth

Survey respondents thought the 3-lane cross-section option performed better at the evaluation criteria than the 5-lane option.



3-lane is better  
5-lane is better  
Perform the same

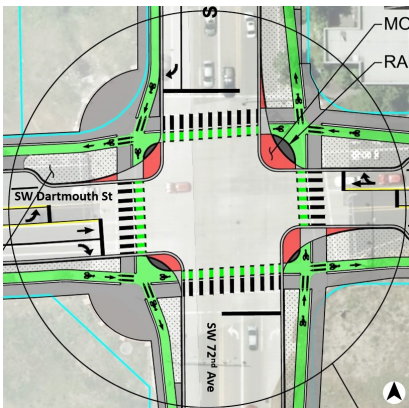
## All Segments

Respondents generally prioritized bike and pedestrian comfort over vehicle movement, selecting cross-section options with fewer vehicle lanes and protected bike lanes.



## Intersection Improvements

A detailed design concept was developed for the intersection of **Dartmouth Street and 72nd Avenue**. The proposed design includes a **protected intersection**, which keeps bicycles and pedestrians physically separate from motor vehicles up until the intersection, providing a high degree of comfort and safety for people of all ages and abilities. A diagram of the proposed design is provided below. See the Corridor Study Report for more details and Appendix F for the complete concept plan diagram.



Protected Intersection

Bike lanes are denoted in green.

## Design Details + Options

- **Landscape strips** planted with street trees between the bike lane and roadway will provide safer conditions for bicyclists and will help calm traffic on 72<sup>nd</sup> Avenue. Landscape areas could also be used to treat stormwater runoff from the road.

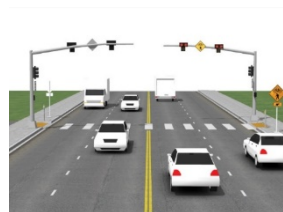


- **Bus stop locations** will depend on the lane configuration for each segment. Segments with one vehicle lane in each direction will have pullout bus stops; segments with two lanes in each direction will have in-lane stops; segments with flex parking lanes will use the parking lane for stops.



## Pedestrian Crossings

New traffic lights with pedestrian crossing signals are proposed at Elmhurst Street and Atlanta Street. A new **High Intensity Activated Crosswalk (HAWK)** signal is proposed at Gonzaga Street, and a new **Rapid Flash Beacon (RRFB)** is proposed between Clinton Street and Baylor Street (near the entrance to the WinCo shopping center). Finally, an enhanced pedestrian crossing of some kind is proposed for where a future trail crosses 72nd Avenue south of Red Rock Creek, but the facility type is yet to be determined.



HAWK



RRFB

LEGEND	
	Project Study Area
	Future Street
	Bike Lane (Both Sides)
	Bike Lane (East Side)
	Existing Trail
	Future Path
	Future Trail

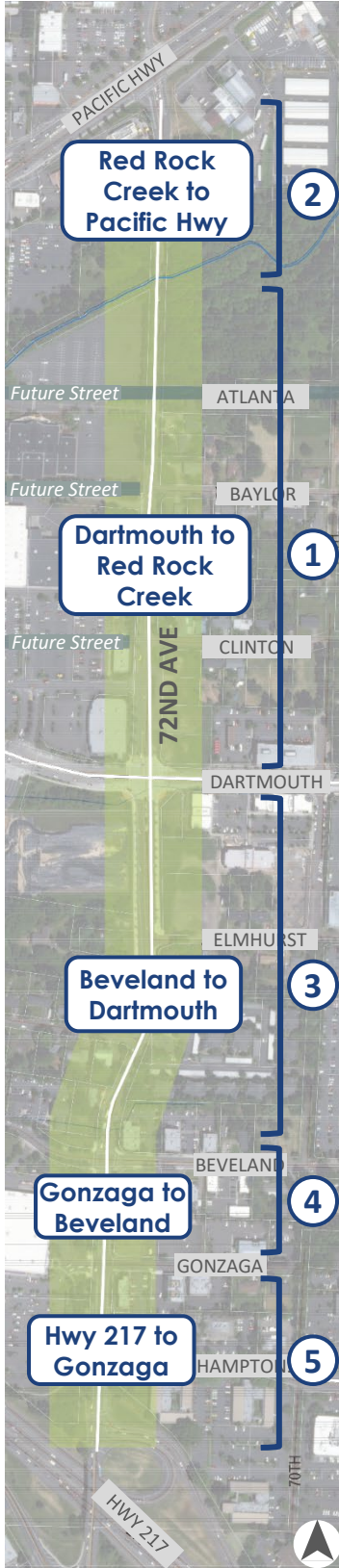






# 72<sup>nd</sup> Avenue Transportation Study

# Phasing Plan + Cost Estimates



## Phasing Plan

The recommended improvements to 72nd Avenue will not be implemented all at once. Improvements will be made in phases, with different portions of the corridor being improved at different times.

The map at left shows the recommended priority for phasing the construction of improvements to the five corridor segments. This is the most probable phasing option because of expected project costs.

These recommendations are based City of Tigard staff input and consideration of the factors below.

## Phasing Factors

### Future Traffic Demands – Vehicular

Traffic flow on 72<sup>nd</sup> Ave won't fully benefit from corridor improvements until the planned Hwy 217 overcrossing expansion work is completed. This work is currently not scheduled by ODOT. However, improvements north of Dartmouth won't increase traffic volumes and are primarily triggered by bike/ped needs; therefore, it can be improved and will see benefits sooner.

### Future Traffic Demands – Pedestrian

Dartmouth to Pacific Highway lacks sidewalks, so pedestrian improvements through this segment should be prioritized.

### Future Traffic Demands – Bicycle

Bike infrastructure within the corridor is limited. Bicycle infrastructure priorities should focus on filling existing gaps in the network and addressing challenging intersections. The segment north of Dartmouth is prioritized because it largely lacks bike lanes and the Pacific Hwy intersection is one of the most difficult bike connections.

### Right-of-Way Needs

Public right-of-way will need to be acquired to construct the full improvements. Segments requiring more property acquisition may be more difficult or expensive to construct. The Beveland to Dartmouth segment will require the most acquisitions.

### Development and Redevelopment

The bulk of anticipated development in the Tigard Triangle is located along the East side of 72nd Avenue. The City requires half-street improvements with development or contributions into a fee-in-lieu fund. Initial phases should focus on areas where we are seeing and expecting development to occur.

### Local and Regional Transportation Planning Projects

Several significant regional projects planned within the Tigard Triangle as well as City of Tigard projects should be considered when phasing improvements to 72<sup>nd</sup> Ave. These are described in the Corridor Study Report.

### Utility Planning

Needed improvements to water, sewer, stormwater, and private utilities should also be factored into phasing of improvements.

## Funding Sources and Strategies

The availability of funding is also critical to the phasing of improvements to 72<sup>nd</sup> Avenue. A number of funding sources and financing strategies can be used to help pay for proposed improvements.



Potential sources include the following.

- **Developer contributions** – Right-of-way improvements or a fee-in-lieu can be required when development happens along 72<sup>nd</sup> Avenue.
- **Tax revenues** - State gas tax and vehicle registration revenues from the Oregon Highway Trust Fund, as well as county and city gas tax revenues can be used to contribute to the cost of improvements.
- **Urban renewal funding** – The New Tigard Triangle: Planning for Equitable Development Implementation Strategy allocates approximately \$2 million dollars in funding to be dedicated to improvements along 72nd Avenue in the near term (2020-2025).
- **System development charges (SDCs)** – The City’s transportation SDC is intended to cover the cost of transportation improvements necessitated by new growth. However, SDCs do not produce enough revenue to cover the full cost of needed improvements.
- **Special assessments** – This tool allows local jurisdictions, with the agreement of property owners, to put into place additional property taxes to pay for specific capital projects or ongoing costs.
- **Local Improvement District (LID)** – LIDs are typically used to pay for infrastructure improvements in a specific geographic area which collectively benefit people or property owners in that area.
- **Bonding** – Method of financing construction projects by borrowing money and paying the borrowed sum with interest back over time.
- **Regional and state project funding** – Regional and state projects may provide opportunities to use state, regional or local funds to pay for a portion of the improvements to 72nd Avenue.
- **Grant programs** - A number of grant and other funding programs from federal, state, and regional agencies, as well as private corporations and non-profit groups, can be used to pay for specific types of transportation Improvements—particularly bicycle and pedestrian projects.

These funding sources and strategies for applying them are further described in the Corridor Study Report.

## Cost Estimates

Planning level cost estimates were prepared for construction of the proposed improvements for 72nd Avenue. The table below shows a summary of the total estimated costs for the project. The estimated costs take into account roadway improvements, retaining walls, earth work, landscaping, drainage swales, street signs, lighting, transit stops, ROW acquisition, permitting, and other costs. Estimated costs are based on unit costs for specific elements of the recommended design. Construction and ROW contingencies of 40% are also included in the total cost estimate.

Appendix B of the Phasing Plan (Appendix G to the Corridor Study Report) provides detailed cost breakdowns and assumptions specific to the half-street construction of each corridor segment.

### Total Estimated Costs

Construction and Right-of-Way Subtotal	\$ 14,344,076
Construction and Right-of-Way Contingencies: 40%	\$ 5,737,635
<b>TOTAL CONSTRUCTION &amp; RIGHT-OF-WAY COST</b>	<b>\$ 20,081,711</b>
Design Engineering & Administration: 13%	\$ 2,610,625
Construction Engineering Services: 12%	\$2,409,810
<b>TOTAL ENGINEERING &amp; ADMINISTRATION</b>	<b>\$ 5,020,435</b>
<b>TOTAL</b>	<b>\$ 25,102,146</b>







# 72<sup>nd</sup> Avenue Transportation Study

# Other Implementation Strategies

In addition to strategies related to phasing of improvements, costs, and funding, the City may consider additional strategies in implementing the preferred design alternative for 72nd Avenue. These include approaches to stormwater management, Development Code amendments, streetscape design, and additional public involvement.

## Approach to Stormwater Management

The City's approach to stormwater management will be a critical component of the design of the 72<sup>nd</sup> Ave improvements, and will have implications for streetscape design, land need, and cost, among other considerations. There are two basic approaches to consider:

### Regional Stormwater Management

The City of Tigard Stormwater Master Plan includes a series of stream and flood plain enhancement projects along Red Rock Creek. These projects may be able to provide some of the hydromodification and detention requirements for 72nd Avenue improvements. Stormwater quality will need to be addressed along the roadway area. A study is underway to refine and confirm that the stream restoration approach is adequate and acceptable to permitting agencies.

### LIDA Treatment

The corridor improvements propose the inclusion of 5-foot wide landscape and amenities zones on both sides of the roadway. There is sufficient width within these areas to accommodate Low Impact Development Approach (LIDA) facilities (likely Streetside LIDA planters) spaced throughout the corridor.

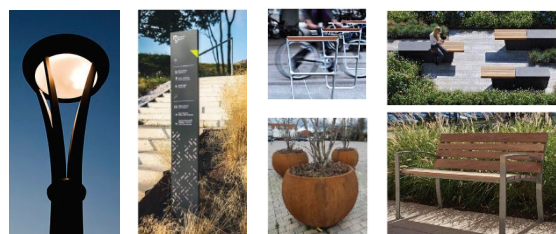
Due to the topography along the West side of 72nd Avenue, infiltrating LIDA facilities may not be appropriate due to potential impacts to steep slopes or retaining walls, and should be evaluated on a case-by-case basis.



## Design of Streetscape Improvements

Before design concepts for 72<sup>nd</sup> Avenue can be implemented, the City will need to develop detailed designs for each of the corridor segments. This will include more detailed engineering of the street facility and intersections as well as more detailed streetscape design. The Toolkit of Design Elements (Appendix C) to the Corridor Study Report provides a range of options for the City to consider regarding things like pedestrian and bicycle crossings, paving treatments, transit facilities, street trees and other landscaping, lighting, wayfinding, benches, bike racks, etc.

Detailed designs for the 72nd Avenue facility will benefit from additional stakeholder involvement and coordination. The City should first focus on designs for those segments identified as higher priorities for the phasing of improvements.



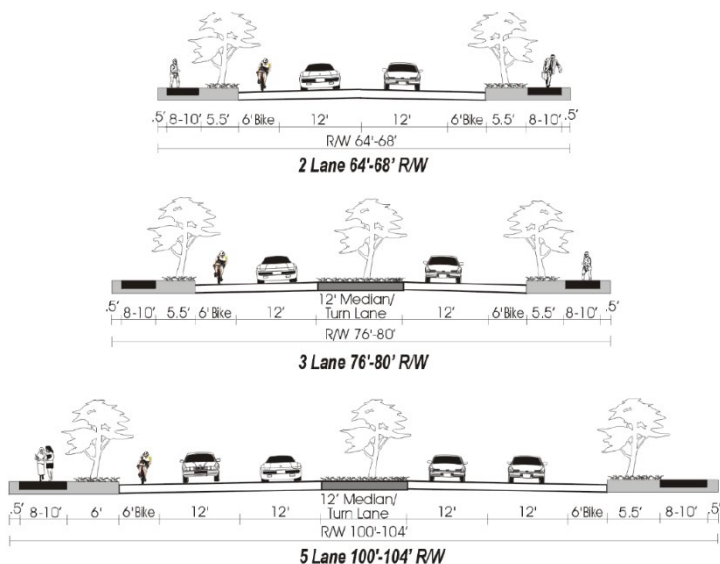
# Development Code Amendments

The proposed designs for 72nd Avenue differ from the City of Tigard’s typical design standards for arterial streets, which are provided in the Tigard Development Code (TDC) (see left-hand graphic below). As such, standards for the preferred design of the street will need to be codified in the TDC. The most appropriate place for street design standards specific to 72nd Avenue is in the Tigard Triangle Plan District chapter of the code (TDC 18.660). Similar street-specific standards for River Terrace Boulevard are found in the River Terrace Plan District chapter (18.640).

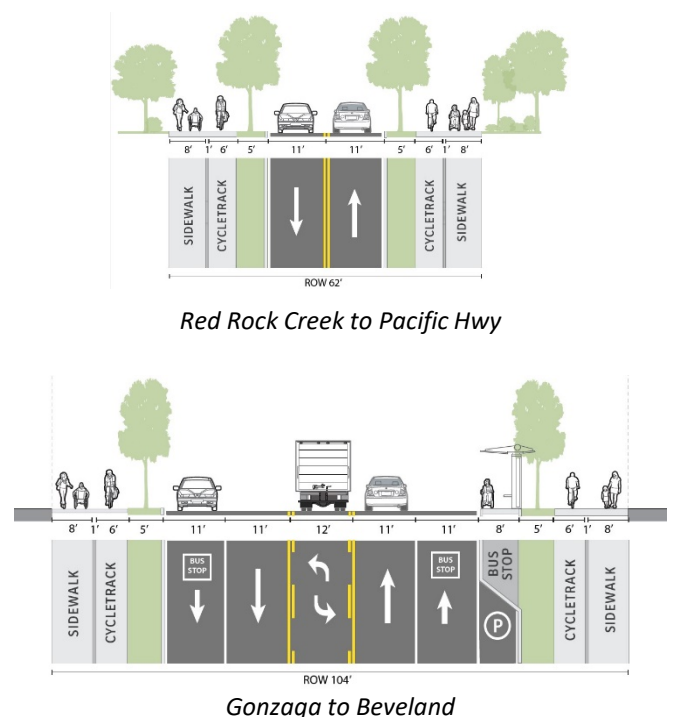
The table below identifies standards listed in the Tigard Triangle Plan District code to which modifications are recommended to reflect the preferred design of 72nd Avenue. New cross section drawings are also recommended to illustrate street design standards specific to each corridor segment (see right-hand graphic below).

Standard	Amendments Needed
<b>Driveways</b>	Modify section so that driveway standards further limit the number of driveways allowed for street frontages along 72nd Avenue.
<b>Transportation Facility Standards</b>	Add maps depicting right-of-way dedication needs for development sites on 72nd Avenue.
<b>Street Design</b>	<ul style="list-style-type: none"> <li>• Add a separate table for 72nd Avenue that defines standards for each discrete corridor segment.</li> <li>• Add cross-section figures for each segment.</li> <li>• Include notes about turn lanes, parking, bike lanes, sidewalks, furnishings, and transit facilities as needed.</li> <li>• Add plan view map of 72<sup>nd</sup> Avenue improvements.</li> </ul>
<b>Bicycle Facilities</b>	Add another type of bike facility to describe the 72 <sup>nd</sup> Avenue concept for protected bike lanes.
<b>Transit Facilities</b>	Modify language to say that transit facilities must meet City as well as TriMet standards.

**Existing cross sections standards for arterials (TDC Figure 18.910.1)**



**Examples of new cross section drawings specific to each corridor segment**



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# 1. INTRODUCTION

## 1.1 Project Purpose

The purpose of the 72<sup>nd</sup> Avenue Transportation Study is to identify recommended improvements to SW 72<sup>nd</sup> Avenue—the primary north-south thoroughfare through the Tigard Triangle, which is a special district in the northeast corner of Tigard. While its current development pattern is largely auto-dependent, the Tigard Triangle is envisioned to become a walkable, pedestrian-oriented, mixed-use district. Improvements to 72<sup>nd</sup> Avenue will play a central role in achieving this strategic vision for the district.

As part of the 72<sup>nd</sup> Avenue Transportation Study, the City of Tigard explored design strategies for transforming the busy arterial into an attractive, multimodal street for all users. The final recommendations summarized in this report include a new roadway design concept for 72<sup>nd</sup> Avenue with new lane configurations, enhanced streetscape, pedestrian and bicycle crossings, and improved functionality for all transportation modes. The report also includes estimated costs for the improvements, recommended funding sources and strategies to implement the plan, a plan for improving the corridor in multiple phases and segments, and other implementation strategies.

### *Objectives and Priorities*

At the outset, the project team (City staff and consultants) identified a list of objectives and priorities that would guide the project. These objectives and priorities shaped the planning process, the evaluation alternatives, and the ultimate selection of a preferred alternative for improvements to 72<sup>nd</sup> Avenue. As part of this effort, the team also considered the broader goals for the Tigard Triangle that are applicable to the Triangle's primary north-south route. Table 1 provides a list of objectives and priorities identified for the 72<sup>nd</sup> Avenue corridor, as well as the City's goals for the Tigard Triangle.

*Table 1. Project Objectives and Priorities*

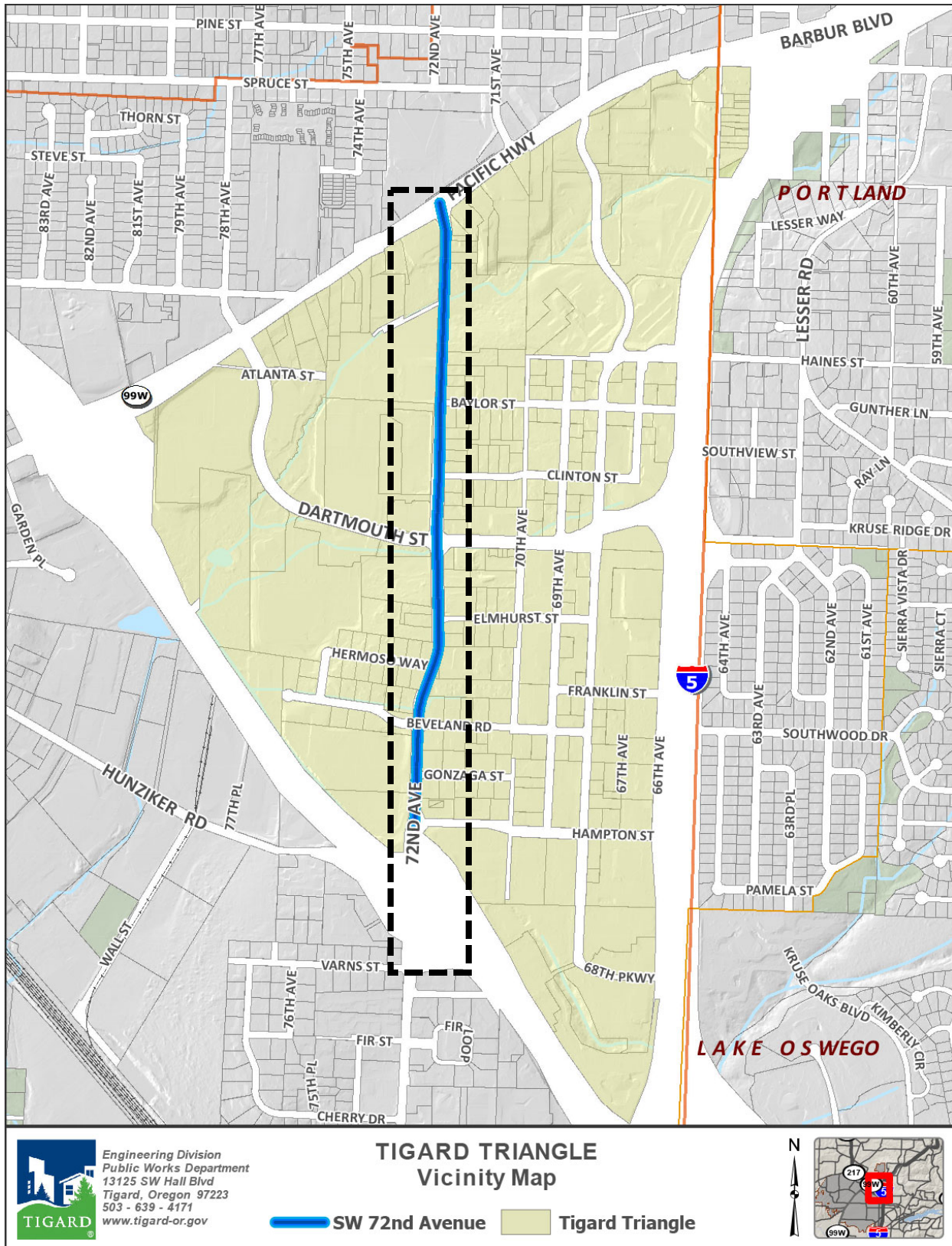
72 <sup>nd</sup> Avenue Objectives and Priorities	Tigard Triangle Goals*
<ul style="list-style-type: none"> <li>• Accommodate all modes of travel.</li> <li>• Improve safety and functionality for all users, with a focus on bicycle and pedestrian access, mobility and safety.</li> <li>• Support Tigard Triangle commerce and economic development goals. Contribute to a vibrant district.</li> <li>• Address current needs (drive to shopping and work) and future function (mixed-use and multimodal).</li> <li>• Improve corridor aesthetics.</li> <li>• Address water quality and runoff issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Support many types of transportation including driving, biking, walking, and public transit.</li> <li>• Provide safe access to and from the Tigard Triangle.</li> <li>• Provide transportation movement within the Tigard Triangle.</li> <li>• Create a vibrant town center.</li> <li>• Create a sense of community.</li> <li>• Encourage economic growth and attract new businesses.</li> </ul> <p><i>*As identified in the Tigard Triangle Strategic Plan (2015)</i></p>

## 1.2 Study Area

The project study area includes the SW 72<sup>nd</sup> Avenue corridor within the Tigard Triangle, which is bounded by Pacific Highway (99W) to the north and Beaverton Tigard Highway (Highway 217 / OR-217) to the south. Interstate 5 to the east forms the third side of the “triangle.” The study area includes the interchanges with Hwy 99W and Highway 217, and includes the land along either side of 72<sup>nd</sup> Avenue (see Figure 1).

While the study area includes land on either side of 72<sup>nd</sup> Avenue, the focus of the study is on design of the roadway itself and does not identify or recommend any changes to the future land uses proposed in the area. Several potential amendments to the City’s Development Code are identified in this report but they are limited to provisions associated with the design of transportation facilities in the area.

Figure 1. Study Area





### 1.3 Tigard Triangle Planning

The Tigard Triangle has been the focus of significant planning efforts by the City of Tigard in recent years. The Tigard Triangle Strategic Plan (TTSP), adopted in 2015, outlined a vision for a vibrant and walkable district where people of all ages, abilities and incomes can live and work within walking distance to shops, restaurants and parks. As part of the TTSP's implementation, the City adopted a new mixed-use zoning designation—Triangle Mixed Use (TMU)—and in 2017 rezoned much of the land within the Triangle with this new designation. The City also adopted the Tigard Triangle Plan District (Chapter 18.660 of the Tigard Development Code [TDC]), also referred to as the Tigard Triangle “Lean Code,” which applies a special set of standards and procedures for development in the TMU zone. The Plan District provides new use, dimensional, site and building design, and other standards for development in the Triangle. The Plan District also defines a set of transportation facility standards that are specific to the Triangle. This report recommends amendments to standards in the Tigard Triangle Plan District based on the proposed designs for 72<sup>nd</sup> Avenue.

In addition to these TDC amendments, the City also established a new Urban Renewal Area (URA) for the Tigard Triangle in 2017. The Tigard Triangle Urban Renewal Plan is intended to implement the land use and development vision for the Triangle with a series of projects funded through tax increment financing (TIF). Proposed projects include transportation improvements, utility improvements (for stormwater, sewer, and water), new public spaces and facilities, and development assistance for new and existing businesses and housing. One of the potential transportation projects identified in the Urban Renewal Plan includes improvements to 72<sup>nd</sup> Avenue, pending the outcomes of the 72<sup>nd</sup> Avenue Transportation Study.

### 1.4 Roadway Design Standards

As described in the Existing Conditions section of this report, 72<sup>nd</sup> Avenue is subject to the roadway design standards for arterials provided in the TDC. Sample arterial cross-sections are depicted in Figure 2. These standards do not support the vision for the Tigard Triangle as a highly walkable, multi-modal, mixed-use district and provide limited flexibility for a design that can vary along the length of the corridor. Specific issues with the current standards include:

- The cross-sections include 6-foot wide bicycle lanes which are not separated from the adjacent travel lanes. This approach will not encourage a wide range of bicyclists to use the corridor, particularly less experienced riders who do not feel safe bicycling next to faster moving automobiles.
- Travel lane widths are relatively wide for an urban road and can encourage people to drive faster, with resulting safety impacts.
- The cross-sections assume five lanes for the entire length of the corridor – two travel lanes in each direction and a center turn lane. While this design has the advantage of helping move large volumes of vehicle traffic with great mobility, it has several disadvantages:
  - It does not reflect the fact that traffic volumes vary along the corridor and that five lanes may not be needed to accommodate projected traffic levels in all segments of the corridor.

- It creates a wider road that makes crossing the road more difficult for pedestrians and bicyclists.
- It requires more land, leading to higher costs, more impervious surface, and higher impacts on adjacent property owners.

## 2. PLANNING PROCESS

The following section summarizes the planning process that led to selection of the preferred alternative for the 72<sup>nd</sup> Avenue roadway design. The project team consisted of City of Tigard Engineering and Community Development staff and consultants from Angelo Planning Group, Alta Planning + Design, DKS Associates, and Wallis Engineering.

### 2.1 Public Involvement

The project team engaged the community throughout the planning process, using a variety of methods and providing a range of opportunities for people to influence the corridor design recommendations.

**Advisory Committees.** Rather than forming a new committee, the City took advantage of two existing groups: the Tigard Transportation Advisory Committee (TTAC) and the Transportation Strategy Team (TST). The TTAC consists of Tigard residents and business owners, including self-identified pedestrian, bicycle, and transit advocates. The TTAC advises the Tigard City Council and staff on transportation planning and other transportation-related issues, and served as the “citizen advisory committee” for the 72<sup>nd</sup> Avenue project. The TST is a team of elected officials and department directors that serve as a decision-making body for transportation issues in Tigard. The team includes the Mayor, a City Councilor, City Manager, City Engineer, and Directors of Finance & Information Services, Public Works, and Community Development. The project team provided periodic updates to the TTAC and TST, and both groups advised the team on key project decisions.

**Stakeholder Interviews.** Early in the planning process, the project team consulted a variety of stakeholders with interest in the 72<sup>nd</sup> Avenue corridor and/or Tigard Triangle. These included property owners, business owners, affordable housing developers, and a representative of Tualatin Valley Fire & Rescue (whose headquarters is located near 72<sup>nd</sup> Avenue). These stakeholders provided input on the corridor’s transportation challenges, project goals, the future of the corridor, and potential transportation improvements. A brief summary of stakeholder input is provided in Section 2.2 Existing Conditions of this report.

**Open Houses.** Two open houses held in April and September 2019 provided opportunities for the community to learn about and provide input into the 72<sup>nd</sup> Avenue project. The April open house focused on corridor design topics that included bicycle treatment options, pedestrian crossing locations and treatments, sidewalk zone amenities, on-street parking, and lane configuration alternatives.

By September, the preferred alternative for most of the corridor segments had already been identified. The September open house focused on informing community members about the recommendations to that point, and sought feedback on the design of the remaining segment to be decided—SW Beveland Street to SW Dartmouth Avenue.

**Online Surveys.** Community members were able to provide input on the project through three online surveys, hosted on the City’s “Bang the Table” platform. The first “Corridor Aspirations” survey asked general questions about how people use the corridor, what their priorities are, and what changes they’d like to see. The survey was available in February 2019 and received 218 total responses.

The second and third online surveys corresponded to the April and September open houses and asked for similar input from respondents as at those events. The “Design Alternatives” survey was available from April to May 2019 and received 71 responses. The “Preferred Alternative” survey (focusing on the Beveland to Dartmouth segment) was available from September to October 2019 and received 40 responses. Summaries of the open house and online survey results are provided in the 2.4 Alternatives Development and Evaluation section of this report. Full reports of the survey and open house questionnaire results are attached as Appendix A.

**Project Webpage and Engage Tigard Site.** The City hosted a webpage with general information about the project. That webpage also linked to an Engage Tigard site for the project, which provided access to project documents, online surveys, and survey results.

## 2.2 Existing Conditions

The project team prepared an Existing Conditions Report that provided a foundation of data and information for the project. A brief summary of the report is provided below, with a focus on the opportunities and constraints for the 72<sup>nd</sup> Avenue project.

### *Topography and Natural Resources*

While the southern portion of the 72<sup>nd</sup> Avenue corridor is relatively flat, the northern portion is characterized by gently rolling hills. Along some portions of the corridor, there is a steep drop off to the west of the road. Sloping terrain should be considered for impacts to accessibility, as well as the cost to construct retaining walls or other stabilizing structures.

SW 72<sup>nd</sup> Avenue crosses two streams: Red Rock Creek and one of its tributaries. These intersecting streams and vegetated corridors offer opportunities for trails and active transportation, but the roadway design will need to avoid or mitigate any impacts to these sensitive areas.

### *Land Use Designation and Development Projections*

**Zoning** – Much of the land on both sides of the corridor is zoned Triangle Mixed Use (TMU), which allows a mix of uses at a fairly high density. This presents opportunities for development of vibrant activity centers along the corridor and can reduce auto dependence by making walking, biking, and taking transit more feasible, particularly if workers and residents can meet a variety of needs within the corridor without driving. However, higher density development may increase congestion on



72nd Avenue and adjacent streets if residents travel outside the Triangle for work, shopping or other purposes, or if there is a higher influx of workers coming into and out of the Triangle. Development standards in the Triangle Mixed Use zoning district encourage walking and other non-auto travel modes by fostering comfortable and attractive streetscapes with an active street edge. Designs for the 72nd Avenue right-of-way should complement current and future private development.

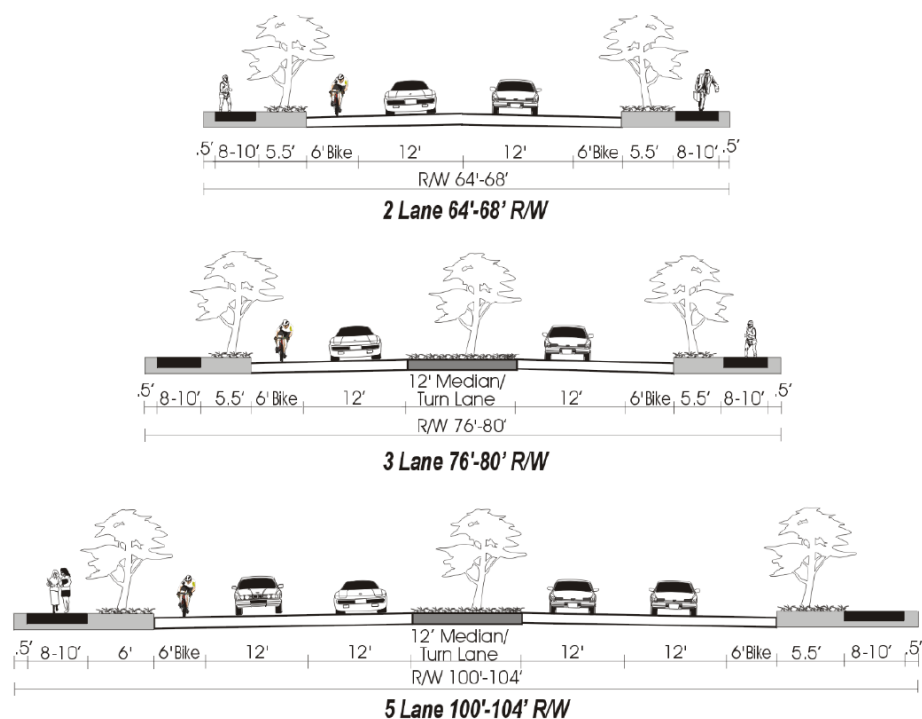
**Destinations** – Large grocery stores and retailers in the vicinity of the study area provide amenities for existing and future employees and residents and attract a lot of customers to the Tigard Triangle. However, their large surface parking lots and large blocks detract from a human-scaled and comfortable streetscape. These regional attractors also create additional traffic pressure along 72<sup>nd</sup> Avenue. There may be opportunities to better connect existing and future residential areas to employment and shopping areas in the Triangle, in order to reduce vehicle trips. Increasing land values and more intensive development patterns also may result in fewer uses with large surface parking areas over the long term.

**Development Projections** – As outlined in the Tigard Triangle Strategic Plan (TTSP), the market is expected to eventually support the uses necessary for a pedestrian- and transit-oriented district, but it is likely to happen gradually. Still, the City has already seen an increase in development interest within the Triangle, particularly along 72<sup>nd</sup> Avenue. Several projects are already in the works, including at least one mixed-use project that has already been permitted for development.

**Existing and Future Transit** – There is currently no transit that runs the length of 72<sup>nd</sup> Avenue, but frequent service is accessible from connecting streets. There may be opportunities to create better pedestrian and bicycle connections to bus lines and stops through improved access along 72<sup>nd</sup> Avenue. The Southwest Corridor Light Rail Project is likely to have a major impact on the Tigard Triangle by greatly improving regional transit access and supporting connecting transit lines. This future high-capacity transit line, proposed for completion in 2027, will link downtown Portland with Tigard and Tualatin, and is currently planned to run through the Tigard Triangle with a station near 72<sup>nd</sup> Avenue at Elmhurst. This presents opportunities to increase trips by non-auto modes and reduce vehicle trips and congestion. Frequent transit service will also reduce the need for vehicle parking, thus freeing up space for development.

**Existing Cross Section Standards** – SW 72<sup>nd</sup> Avenue is classified as an arterial road and is subject to the roadway design standards for arterials provided in TDC Chapter 18.910. As such, any upgrades to the roadway that are constructed by the City or required concurrently with new development along the corridor would have to meet the standards in this section. Sample cross sections for 2-, 3-, and 5-lane arterials are depicted in Figure 2. The five-lane design currently is applicable to 72<sup>nd</sup> Avenue. The cross-sections include 6-foot wide, unprotected bike lanes for each type of arterial, as well as 8- to 10-foot sidewalks separated from the roadway by landscape strips.

Figure 2. Arterial Sample Cross Sections (TDC Figure 18.910.1)



### Street Facility Characteristics

SW 72<sup>nd</sup> Avenue is the principal route for north-south traffic to access the Tigard Triangle, as it connects to ramps at Highway 217 and an additional intersection with OR-99W in the north.

Generally, SW 72<sup>nd</sup> Ave is a two-lane undivided roadway with 11- to 12-foot travel lanes and a posted 30 mph speed limit. Near the Highway 217 ramps in the south, an additional northbound traffic lane is provided and a narrow 5-foot median divides the travel lanes. Turn lanes are provided at all major intersections and driveways along 72<sup>nd</sup> Avenue, including portions of two-way left turn lanes. Narrow 5- to 6-foot bike lanes are also provided on select stretches of the road.

The existing right-of-way on 72<sup>nd</sup> Avenue ranges from 56 to 94 feet. The more constrained areas of the corridor are limited in their ability to adequately accommodate multiple transportation modes. Roadway expansions can involve expensive land acquisitions which would affect the project's financial viability.

Existing characteristics of each of the five segments of 72<sup>nd</sup> Avenue are provided in the Preferred Alternative section of this report (Section 3). Characteristics of roads that intersect 72<sup>nd</sup> Avenue and other key roads within the Tigard Triangle are described in the Existing Conditions Report (Appendix B).

### Existing Traffic Analysis

**Future Intersection Mobility** – The northbound ramp at 72<sup>nd</sup> Avenue and Highway 217 is one of the intersections determined to be non-compliant with Oregon's Transportation Planning Rule (TPR) for future operational performance. The intersection exceeds allowable queues based on required stopping

sight distance. The traffic analysis identified adding a second northbound-right turn lane at this intersection as a potential improvement to mitigate impacts.

**Safety** – 72nd Avenue experiences an excess proportion of angle and turning movement crashes at several intersections. The largest number of crashes occur at intersections with Highway 217 and with SW Dartmouth Street.

### *Early Engagement Results*

Following are brief summaries of the Stakeholder Interviews and Corridor Aspirations Survey. These were conducted early in the project and reflect community members' general feelings about the 72<sup>nd</sup> Avenue corridor.

**Stakeholder Input.** The project team interviewed property owners, business owners, affordable housing developers, and Tualatin Valley Fire & Rescue (TVF&R) representative about challenges and opportunities for the 72<sup>nd</sup> Avenue corridor. In general, stakeholders expressed a lot of support for potential improvements to pedestrian, transit, and bicycle facilities. They were concerned about the existing environment for pedestrians, bicyclists, and transit riders. They noted the lack of continuous sidewalks and protected crossings for pedestrians, and disconnected bike lanes. They also noted insufficient street lighting, which makes walking feel unsafe.

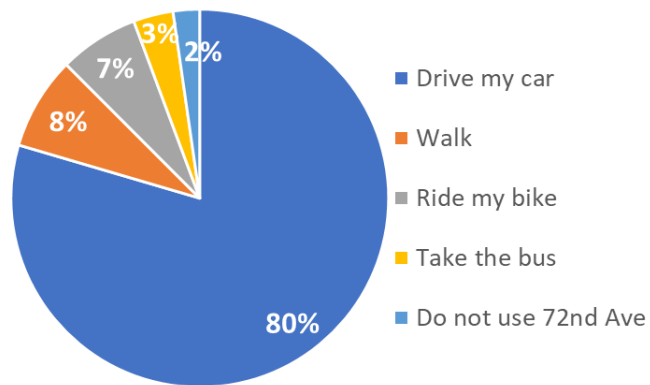
Some stakeholders also expressed concern about congestion on 72<sup>nd</sup> Avenue, and one noted his concerns about the ability to turn left from side streets and driveways onto 72<sup>nd</sup> Avenue. A few stakeholders expressed support for on-street parking. The affordable housing developer noted that development in the Tigard Triangle is not required to provide off-street parking, so on-street parking is important.

At least one stakeholder sees the economic benefits of transportation improvements and attractive streetscape, as these help attract businesses, investment, residential tenants. The affordable housing representative also noted that better facilities for transit, walking, and to a lesser extent biking, supports livability for low-income tenants.

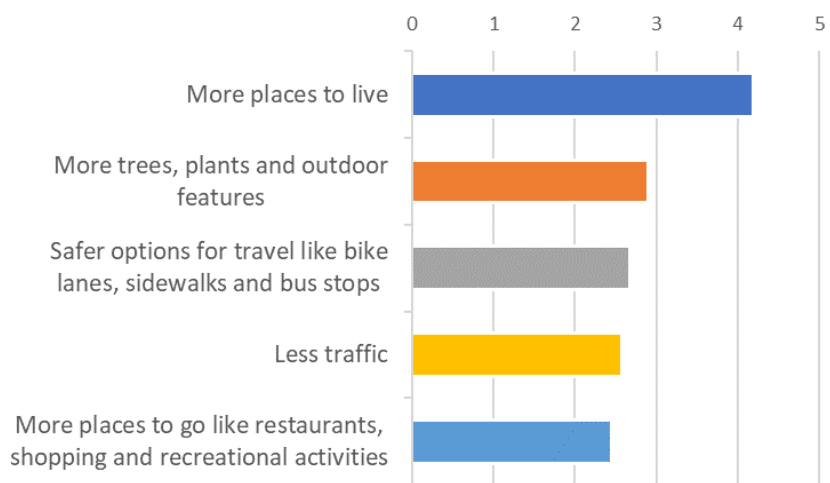
The TVF&R representative shared that access to the Triangle for fire trucks is a challenge, especially with congestion on 72<sup>nd</sup> Avenue, and that 72<sup>nd</sup> Avenue is an important route for police, fire, and medical response. He advocated for excluding barriers (e.g., raised medians) that restrict movement for emergency vehicles, and expressed support for anything that would reduce travel time and congestion on 72<sup>nd</sup> Avenue.

**Corridor Aspirations Survey.** This survey asked general questions about respondents' experience, hopes, and concerns about the 72<sup>nd</sup> Avenue corridor and the Tigard Triangle more generally. Below are a few highlights from the survey results.

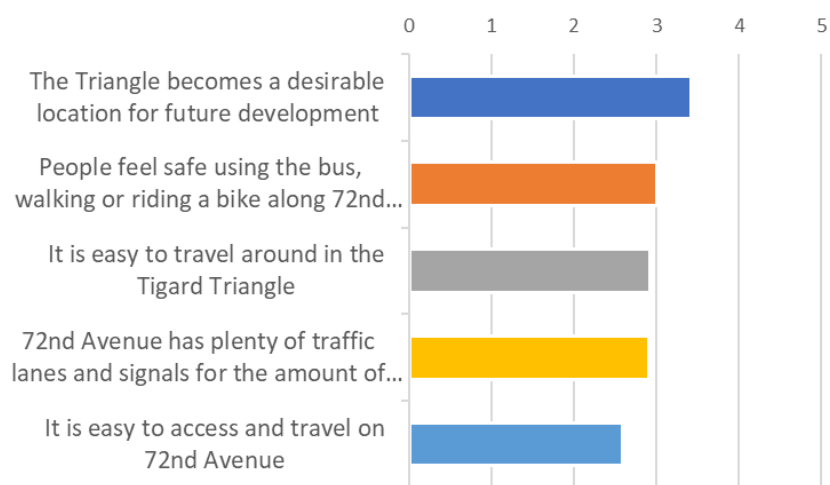
A large majority of respondents primarily drive their cars to travel along 72<sup>nd</sup> Avenue.



When asked to rank the features they'd most like to see on 72<sup>nd</sup> Avenue, "Safer options for travel like bike lanes, sidewalks and bus stops" received the third highest ranking, and "Less traffic" received the fourth highest.



When asked to rank what's most important when traveling in the Triangle, safety for using the bus, walking and biking received the second highest ranking. Plenty of traffic lanes and signals received the fourth highest ranking.



## 2.3 Toolkit of Design Elements

Based on the objectives and priorities for the project, as well as the existing conditions, opportunities, and constraints identified for 72<sup>nd</sup> Avenue, the project team put together a toolkit of potential streetscape design elements that could be incorporated into alternative design concepts for the corridor. Design elements in the toolkit included bikeway types, traffic calming measures, pedestrian and bicycle crossings, curb management (such as on-street parking), signs and wayfinding, green infrastructure treatments, environmental considerations, street furnishings, transit treatments, and vehicle lane configurations and treatments. Some of these approaches have been incorporated directly into the proposed preferred alternative design – protected bicycle facility, HAWK and Rapid Flashing Beacon pedestrian crossings, in-lane transit stops, street trees and associated grates, and vegetated stormwater filtration facilities. Other toolkit approaches such as specific benches, lighting, and other pedestrian amenities will be identified in future detailed design phases for the corridor.

The complete Toolkit of Design Elements is provided in Appendix C.

## 2.4 Alternatives Development and Evaluation

Using the Toolkit of Design Elements as a starting point, the project team developed and evaluated specific design concepts for the corridor. The team developed several realistic and buildable conceptual designs that accommodated traffic capacity, pedestrian and bicyclist crossings, AASHTO design standards, Right-of-Way constraints and acquisition costs, topography, environmental impacts, stormwater requirements, and aesthetics.

### Corridor Segments

During the planning process, the 72<sup>nd</sup> Avenue corridor was divided into five distinct segments, each with its own unique set of characteristics, constraints and opportunities. The five segments are illustrated in Figure 3.

### Design Charrette

Development of the alternatives began with an interactive workshop exercise (“design charrette”) that included the project team (staff and consultants) as well as other key City of Tigard staff members. Because each segment of 72<sup>nd</sup> Avenue has different right-of-way widths and physical constraints, the team considered lane configuration and streetscape design options that would be appropriate for each corridor segment. The team

Figure 3. Corridor Segments





reached consensus on the types of treatments and general options that should be considered for each segment.

### Cross Section Options

Based on outcomes of the design charrette, the team put together cross-section options for the five corridor segments as well as options for the crossing of Red Rock Creek. The primary options for each of the five segments are listed in Table 2. These are the options that were evaluated during the Alternatives Evaluation phase of the process, as described below.

Table 2. Cross Section Options by Segment

SEGMENT	TRAFFIC LANE OPTIONS	ON-STREET PARKING OPTIONS	BIKE LANE OPTIONS
Highway 217 to Gonzaga	Four or five lanes	No parking*	Buffered or protected bike lanes
Gonzaga to Beveland		Parking on one or both sides	
Beveland to Dartmouth	Three or five lanes	Parking on both sides*	
Dartmouth Red Rock Creek			
Red Rock Creek to Pacific Highway**	Two lanes*	No parking*	

\* Indicates treatments for which only one option was examined due to existing right-of-way or other constraints.

\*\* Note: The existing 72<sup>nd</sup> Ave right-of-way is wider than two lanes at the approach to Pacific Hwy. That portion of the segment from Red Rock Creek to Pacific Hwy is not proposed to be narrowed to two lanes.

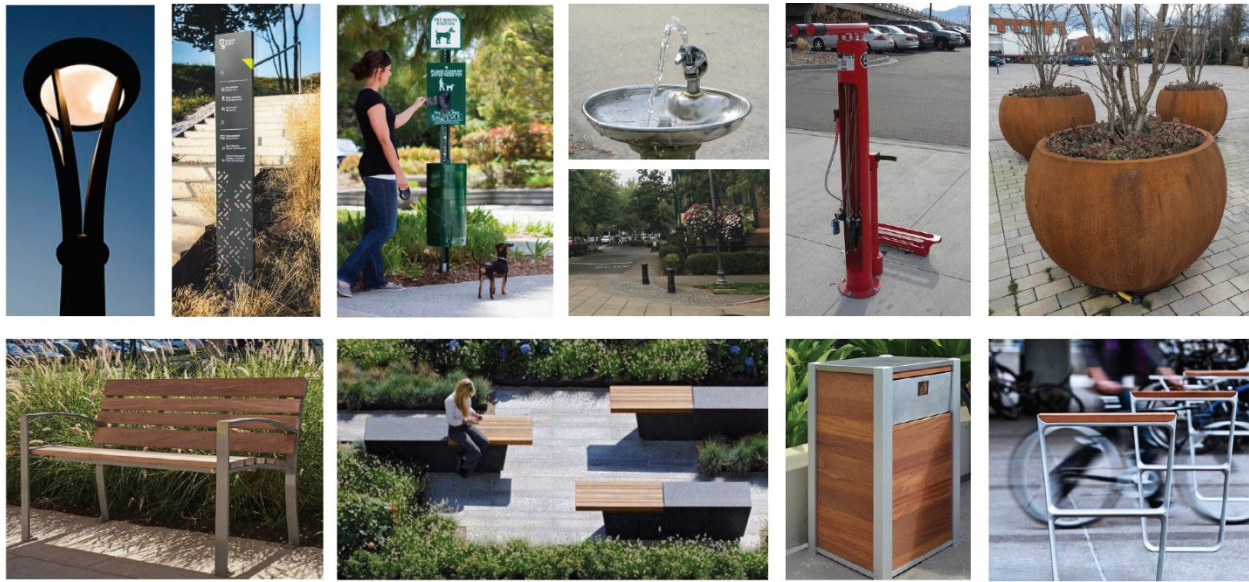
### Other Design Options

The team also developed options for intersection improvements, pedestrian crossings and pedestrian amenities. Pedestrian crossing options include High Intensity Activated Crosswalk (HAWK) signals, Rapid Flash Beacons, pedestrian refuge islands, and curb extensions (see Figure 4). Pedestrian amenities and furnishings include lighting, wayfinding, pet waste stations, drinking fountains, bollards, bike fix-it stations, planters, benches, trash receptacles, bike racks, etc. (see Figure 5).

Figure 4. Pedestrian Crossing Treatments



Figure 5. Pedestrian Amenities and Furnishings Options



### Future Traffic Analysis

The project team prepared an analysis of the Future Year 2035 traffic operations, comparing the performance of the proposed cross-sections for 72<sup>nd</sup> Avenue. As explained in the Future Conditions Analysis memo (Appendix D), the mobility performance for 72<sup>nd</sup> Avenue must comply with state and local mobility targets that the City of Tigard's Transportation System Plan (TSP) identifies for the year 2035. The analysis takes into account how recent zone changes to intensify land use in the Tigard Triangle Planning area will increase demands on the transportation network in the future. Cases where performance targets cannot be met should be considered for upgrades in transportation services and/or expansion of existing roadway facilities to better serve future demands.

A summary of the key findings from the Future Traffic Analysis is provided below:

- An additional northbound right-turn lane will likely be required at the OR-99W / 72<sup>nd</sup> Avenue intersection.
- Without improvements to the OR-217 interchange, long queues and delays will be experienced along 72<sup>nd</sup> Avenue as well as on most side-street approaches.
- With a five-lane cross-section between OR-217 and SW Beveland Street, an additional westbound left-turn lane on the Beveland approach should be considered.
- A five-lane cross section between OR-217 and SW Beveland Street results in improved performance and reduced queues on 72<sup>nd</sup> Avenue and on side streets at the OR-217 NB ramps and SW Beveland Street.
- A five-lane cross section between OR-217 and SW Dartmouth Street results in improved performance on 72<sup>nd</sup> Avenue and a significant reduction of side streets queues at the OR-217 NB ramps, SW Beveland Street, and SW Dartmouth Street.
- Widening to five lanes north of SW Dartmouth Street has relatively minor benefits to reducing queues or improving performance.
- None of the options have any impact on northbound queues (greater than 3,000 feet on average) south of OR-217.

These findings factored into the selection of the preferred alternative for some of the cross-sections. The finding that a five-lane cross section between OR-217 and SW Dartmouth Street results in improved performance on 72<sup>nd</sup> Avenue and reduced queues on side streets contributed to the five-lane option being selected for the Hwy 217-to-Gonzaga and Gonzaga-to-Beveland segments, and to the hybrid three/five lane option with flex parking lanes being selected for the Beveland-to-Dartmouth segment. (Note: Flex parking lanes are described in Section 3.2 in the description of the Preferred Alternative for the Beveland-to-Dartmouth segment). The finding that widening to five lanes north of SW Dartmouth Street has relatively minor benefits to reducing queues or improving performance also contributed to preferred alternative having only three lanes from Dartmouth to Red Rock Creek segment, and two lanes from Red Rock Creek to Pacific Hwy.

### *Alternatives Evaluation*

Earlier in the planning process, the project team developed a set of evaluation criteria to compare and assess alternative design concepts for the 72<sup>nd</sup> Avenue corridor. The criteria were based on the objectives and priorities developed at the outset of the project and included a mix of quantitative and qualitative measurements or assessments.

Evaluation criteria were organized into the following categories:

- **Transportation Safety and Mobility**
  - Bicycle Connectivity and Access
  - Pedestrian Connectivity and Access
  - Transit Connectivity and Access
  - Motor Vehicle Through-Movement and Mobility
  - Safety
  - Emergency Vehicle Accommodations
  - Freight maneuverability
- **Streetscape Aesthetics and Sustainability**
  - Improved Street Appearance
  - Public Health and Quality of Life
  - Environmental Quality
- **Land Use and Economy**
  - Consistent with Previous Planning Efforts
  - Supports Business and Mixed-Use Development
  - Relative Cost Effectiveness

For the purposes of combining the scores for all of the criteria into a single overall ranking, the criteria were further divided into the following categories:

1. Bicycle mobility, safety, connectivity
2. Pedestrian mobility, safety, connectivity
3. Vehicle through-movement and mobility, including freight & emergency vehicles
4. Streetscape aesthetics and sustainability
5. Land use and economy

## 6. Transit accommodation (raw score)

Specific evaluation criteria were developed for each of the above categories. These criteria were used to evaluate design alternatives for each of the five segment cross-sections, as well as the Red Rock Creek crossing. The team assessed each alternative and assigned a score from 0 to 4 based on how well it performed for each evaluation criterion (4=optimal, 3=minor challenges, 2=moderate constraints, 1=major constraints, 0=not advisable).

A summary of the evaluation results is included in Table 3; the full evaluation matrix is provided in Appendix E. The summary table lists the weighted scores for each alternative by the six evaluation criteria categories noted above. Each category was given equal weight in combining the category-based scores into a total score for each option. The exception was the criterion related to transit because it only reflects a single criterion.

The results show that all the design alternatives scored significantly higher than the existing configuration of 72<sup>nd</sup> Avenue. For each segment, the alternatives with protected bike lanes (which include a physical barrier between bike lanes and vehicle traffic) scored quite a bit higher than those with buffered bike lanes (which are separated from traffic by space and lane striping). As for vehicle lane alternatives, for some segments, the alternatives with more vehicle lanes (e.g., 5-lanes versus 4-lanes) scored higher than those with fewer lanes, but this was not the case across the board. For most of the segments, the alternative that received the highest weighted score was ultimately selected as the preferred alternative. For those segments whose preferred alternative received a lower score, the scoring was close enough as to make the differences virtually insignificant and more review and discussion of the specific advantages and disadvantages of those options was required by the project team.

Table 3. Evaluation Matrix Summary – Weighted Scoring by Criteria Category

	HWY 217 TO GONZAGA					GONZAGA TO BEVELAND				
	4 Lanes, Buffered Bike Lanes, No Parking	4 Lanes, Protected Bike Lanes, No Parking	5 Lanes, Buffered Bike Lanes, No Parking	5 Lanes, Protected Bike Lanes, No Parking	Existing Conditions	4 Lanes, Buffered Bike Lanes, Parking on East Side Only	4 Lanes, Protected Bike Lanes, Parking on East Side Only	5 Lanes, Buffered Bike Lanes, Parking on East Side Only	5 Lanes, Protected Bike Lanes, Parking on East Side Only	Existing Conditions
Bicycle mobility, safety, connectivity	10.3	17.6	8.8	16.1	1.5	10.3	17.6	8.8	16.1	0
Pedestrian mobility, safety, connectivity	11.4	15.8	7	12.3	2.6	12.3	17.6	7	12.3	3.5
Vehicle through-movement and mobility, including freight & emergency vehicles	5.1	5.1	10.3	11	13.2	4.4	4.4	11	11.7	13.2
Streetscape aesthetics and sustainability	5.5	7.7	7.7	9.9	3.3	7.7	13.2	9.9	12.1	3.3
Land use and economy	11	11	9.9	9.9	7.7	9.9	11	8.8	8.8	9.9
Transit accommodation (raw score)	1	3	1	4	2	0	3	2	4	1
<b>Total Weighted Score</b>	<b>44.3</b>	<b>60.2</b>	<b>44.7</b>	<b>63.2</b>	<b>30.3</b>	<b>44.6</b>	<b>66.8</b>	<b>47.5</b>	<b>65</b>	<b>30.9</b>

Note: The preferred alternative for each segment is highlighted by a yellow box.



Table 4. Evaluation Matrix Summary – Weighted Scoring by Criteria Category

	BEVELAND TO DARTMOUTH					DARTMOUTH TO RED ROCK CREEK					RED ROCK CREEK TO PACIFIC HWY		
	3 Lanes, Buffered Bike Lanes, Parking Both Sides	3 Lanes, Protected Bike Lanes, Parking Both Sides	5 Lanes, Buffered Bike Lanes, Parking Both Sides	5 Lanes, Protected Bike Lanes, Parking Both Sides	Existing Cond.	3 Lanes, Buffered Bike Lanes, Parking Both Sides	3 Lanes, Protected Bike Lanes, Parking Both Sides	5 Lanes, Buffered Bike Lanes, Parking Both Sides	5 Lanes, Protected Bike Lanes, Parking Both Sides	Existing Cond.	2 Lanes, Buffered Bike Lanes, No Parking	2 Lanes, Protected Bike Lanes, No Parking	Existing Cond.
Bicycle mobility, safety, connectivity	10.3	17.6	8.8	16.1	0	10.3	17.6	8.8	16.1	0	8.8	17.6	0
Pedestrian mobility, safety, connectivity	12.3	17.6	7	12.3	3.5	12.3	17.6	7	12.3	2.6	9.7	15	1.8
Vehicle through-movement and mobility, including freight & emergency vehicles	4.4	4.4	11	11.7	13.2	4.4	4.4	13.2	13.9	13.2	9.5	8.1	8.1
Streetscape aesthetics and sustainability	7.7	13.2	9.9	12.1	3.3	9.9	15.4	12.1	14.3	3.3	8.8	12.1	3.3
Land use and economy	9.9	11	8.8	8.8	9.9	9.9	11	8.8	8.8	9.9	12.1	12.1	4.4
Transit accommodation (raw score)	0	3	2	4	1	1	3	2	4	0	0	1	0
<b>Total Weighted Score</b>	<b>44.6</b>	<b>66.8</b>	<b>47.5</b>	<b>65</b>	<b>30.9</b>	<b>47.8</b>	<b>69</b>	<b>51.9</b>	<b>69.4</b>	<b>29</b>	<b>48.9</b>	<b>65.9</b>	<b>17.6</b>

Note: The preferred alternative for each segment is highlighted by a yellow box. Two alternatives are highlighted for the Beveland-to-Dartmouth segment because the preferred alternative includes hybrid parking/travel lanes, as described in Section 3.2.

### Community Input

In addition to the project team conducting its internal evaluation of the design alternatives for 72<sup>nd</sup> Avenue, community members were also given the opportunity to weigh in at a public open house and via an online survey. Open house attendees and survey respondents were asked about the following roadway design topics: Bicycle treatment options; pedestrian crossing locations and treatments; priorities for sidewalk zone features or amenities; lane configuration alternatives for four discrete segments of the corridor; and approach to on-street parking. There were 100 total responses. A brief summary of the results is provided below:

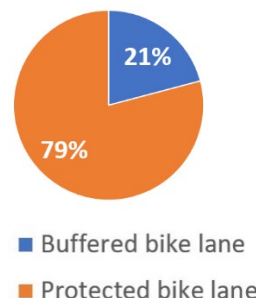
### BICYCLE TREATMENTS

A large majority of participants (79%) prefer **protected** bike lanes (with a physical barrier) over **buffered** bike lanes (which are separated from vehicle lanes by space and striping).

Buffered Bike Lanes - Option A



Protected Bike Lanes - Option B



### PEDESTRIAN CROSSINGS AND TREATMENTS

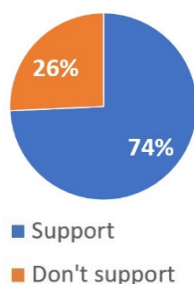
Participants generally support (74%) the treatments proposed at three key intersections along 72<sup>nd</sup> Avenue:

- HAWK signal at Hampton
- Rapid flashing beacon between Baylor and Clinton
- Intersection traffic signals and crosswalks at Beveland, Dartmouth (existing), Elmhurst, and north of Baylor

Hawk



Rapid Flash Beacon



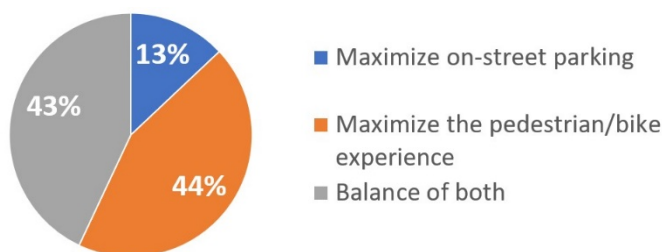
### LANE CONFIGURATION OPTIONS

Consistent with the bike treatment question, participants generally prefer the lane configuration options that include protected bike lanes versus buffered bike lanes. Participants also generally prefer the options that include fewer vehicle lanes (4 lanes versus 5 lanes; 3 lanes versus 5 lanes).

- Highway 217 to Gonzaga: 4 lanes, protected bike lanes
- Gonzaga to Beveland: 4 lanes, protected bike lanes, parking on east side only
- Beveland to Red Rock Creek: 3 lanes, protected bike lanes, parking on both sides (*Note: the evaluation matrix broke this segment up into two: Beveland to Dartmouth and Dartmouth to Red Rock Creek*)
- Red Rock Creek to Pacific Hwy: 2 lanes, protected bike lanes, no parking

### ON-STREET PARKING

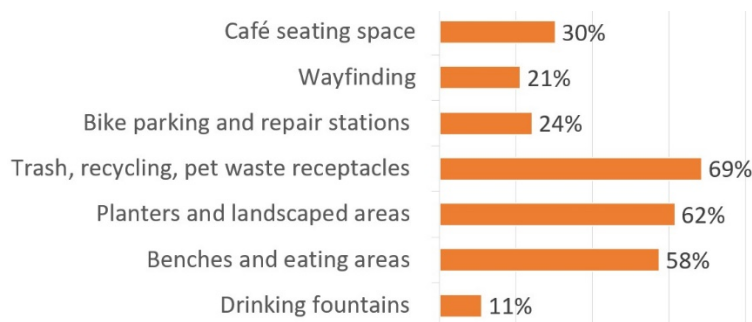
Although results were somewhat mixed, participants generally recommend maximizing the pedestrian/bicycle experience in comparison to maximizing on-street parking.



### PEDESTRIAN AMENITIES

When asked to select their top three preferred sidewalk zone amenities, the following were selected most often:

1. Trash, recycling and pet waste receptacles (69%)
2. Planters and landscaped areas (62%)
3. Benches and resting areas (58%)



## 2.5 Preferred Alternative Selection

Using the results of the alternatives evaluation, open house, and online survey, the project team assembled for another team meeting to select the preferred alternative. The team focused on lane configuration, bike lane, and parking options for each segment, potential project costs, impacts to adjacent properties, as well as pedestrian crossing locations and treatments and other streetscape design features. At the end of the workshop, the team came to a consensus on the lane configurations for four of the five corridor segments:

- Highway 217 to Gonzaga – 5 lanes, no parking, protected bike lanes
- Gonzaga to Beveland – 5 lanes, parking on east side, protected bike lanes
- Dartmouth to Red Rock Creek – 3 lanes, parking both sides, protected bike lanes
- Red Rock Creek to Pacific Hwy – 2 lanes, no parking, protected bike lanes

These recommendations are generally consistent with results from the community outreach activities, with the exception of the segments from Highway 217 to Gonzaga and Gonzaga to Beveland. For these segments, the majority of open house and survey participants preferred the 4-lane option to the 5-lane option. However, the 5-lane option was chosen as the preferred alternative for these segments for the following reasons:

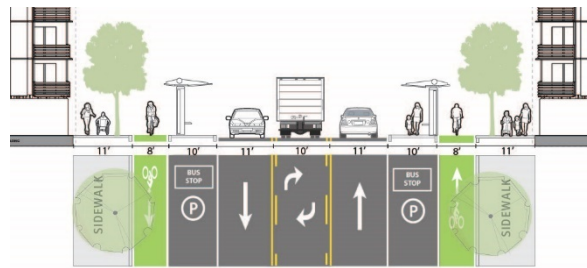
- The 5-lane option has significant advantages in terms of reducing vehicle queues on both 72<sup>nd</sup> Avenue and side streets compared to the 4-lane option.
- Both options have significant benefits over the existing configuration related to bicycle and pedestrian comfort and safety and the 5-lane option represents only minor disadvantages related to the total width of the roadway and crossing distance for pedestrians.
- Having an improved level of vehicle mobility is particularly important in the vicinity of the Hwy 217 interchange.
- Impacts associated with additional needed right-of-way and cost are more limited than in other segments of the corridor.
- Overall, the combination of advantages of the 5-lane option outweighed its disadvantages based on these considerations and give a very small difference in the overall evaluation criteria scores of the two options.

For the remaining segment—Beveland to Dartmouth—the team had already decided to recommend protected bike lanes and sidewalk widths consistent with the other segments, but they had not reached consensus on the number of vehicle lanes (3 lanes versus 5 lanes).

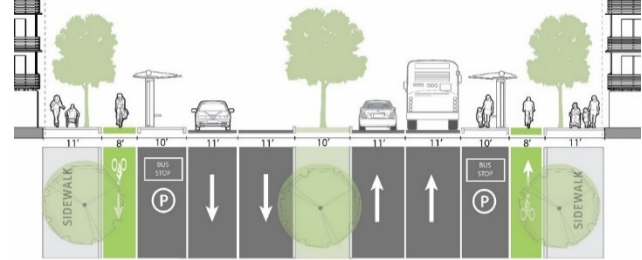
The team took advantage of the community open house and online survey in September 2019 to seek input on this segment (as well as the Dartmouth to Red Rock Creek segment, since the prior survey lumped these two segments into one).

Participants were asked to assess which of the 3-lane or 5-lane options performs better on a variety of criteria.

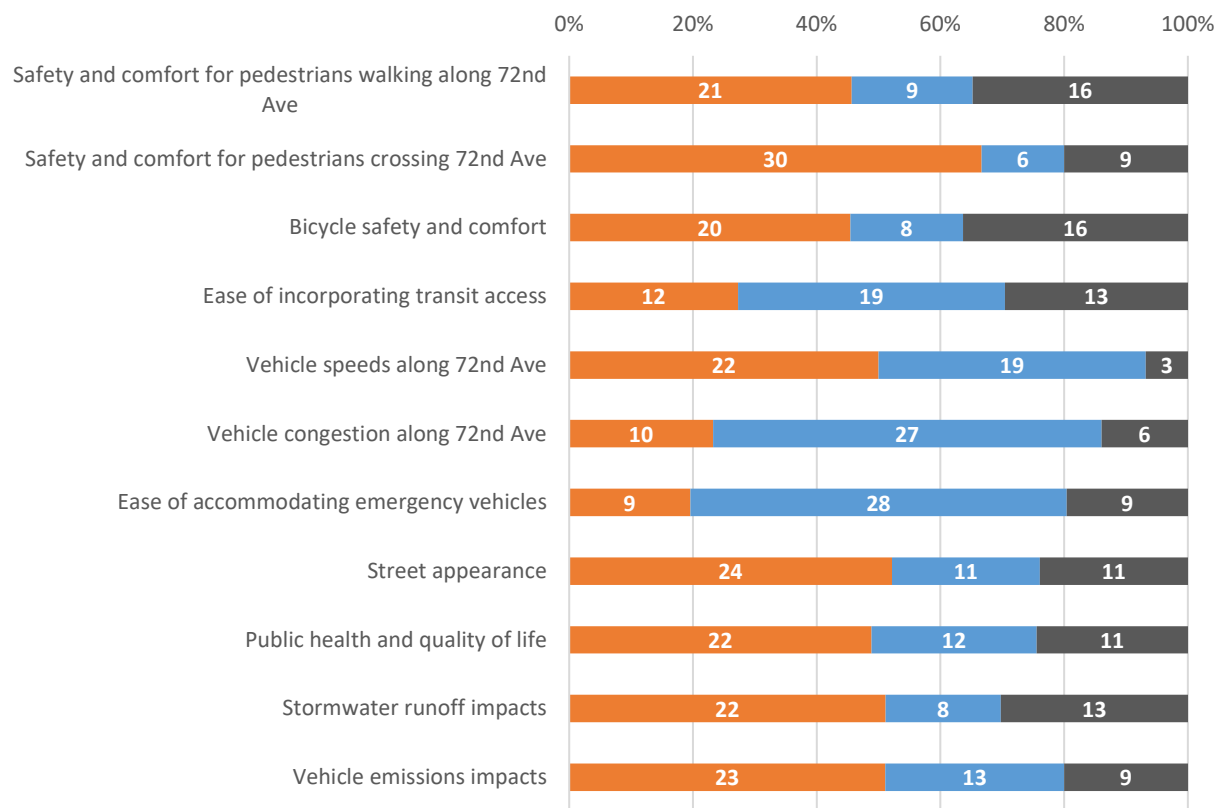
**3-Lane Option**



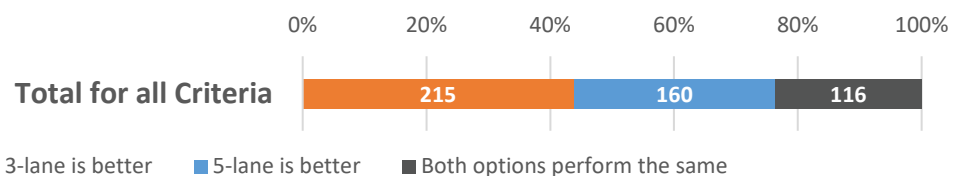
**5-Lane Option**



Looking at all criteria combined, the majority of respondents (44%) indicated that the 3-lane option performs better, while 33% rated the 5-lane option higher overall, and 24% indicated that both options perform the same. The only criteria for which the 5-lane option received higher ratings were “vehicle congestion along 72<sup>nd</sup> Ave” and “ease of accommodating emergency vehicles.”



3-lane is better    5-lane is better    Both options perform the same



3-lane is better    5-lane is better    Both options perform the same



However, just before the open house was held, the project team met again and came up with a hybrid approach to the Beveland to Dartmouth segment that includes a hybrid parking / travel lane on both sides of the street. These would be on-street parking lanes most of the time, but would be restricted during peak AM and PM travel times so they could be used as additional travel lanes. This approach combines relative advantages of both the 3- and 5-lane options:

- Eases congestion and improves vehicle mobility during peak traffic times, helping reduce vehicle queues on 72<sup>nd</sup> Avenue and side streets.
- Maintains the same overall roadway width as the 3-lane section, with a positive impact on the appearance of the corridor, pedestrian crossing distances, impervious surfaces, right-of-way acquisition and project costs.
- Helps improve bicycle and pedestrian safety during non-peak hours. During peak hours, higher levels of traffic will have similar effects even with more travel lanes.
- Continues to provide on-street parking during non-peak traffic periods, supporting local businesses and reducing land needs for off-street parking.

While this hybrid option was not developed in time to include it in the open house materials or online survey, the project team verbally explained the approach to open house attendees and most of them expressed support for this option.

The preferred alternative for each segment is described in more detail in Section 3 of this report.

### 3. PREFERRED ALTERNATIVE

The preferred alternative for the design of 72<sup>nd</sup> Avenue prioritizes pedestrian and bicycle safety and mobility in addition to vehicular movement. The design also takes into account how right-of-way widths and traffic conditions vary throughout the corridor. The preferred alternative identifies a shift in the centerline alignment, street cross-sections for each of the five segments, preliminary intersection design concepts for the Dartmouth Street intersection, locations for pedestrian crossings, intersection treatments, and a general approach to landscaping and stormwater management.

#### 3.1 Centerline Alignment Shift

The preferred design assumes a shift in the right-of-way centerline for 72<sup>nd</sup> Avenue between Elmhurst Street and Dartmouth Street. This is recommended for the following reasons:

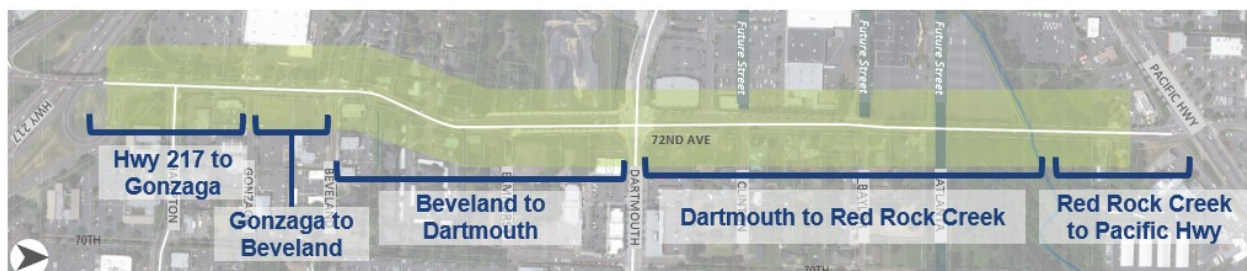
- To avoid impacts to properties with less redevelopment potential or where existing structures will more likely be retained.
- To minimize widening into areas with relatively steep slopes (the alignment north of Beveland Street affects alignment near steep slopes south of Beveland Street).
- To adjust the horizontal curve approaching the Beveland Street intersection (north and south of the intersection) to minimize offset lane geometry on the far side of the approaches.

This centerline shift will impact future right-of-way acquisition requirements (as discussed in the Phasing Recommendations in Section 4). The proposed future roadway alignment and right-of-way needs are depicted in the maps attached as Appendices F and H.

#### 3.2 Preferred Street Cross-Sections

The preferred alternative for all segments of 72<sup>nd</sup> Avenue includes sidewalks, protected bike lanes (also known as cycletracks), and landscape strips on both sides of the street. Where the segments vary is in the number and configuration of vehicle travel lanes and the location of on-street parking. The preferred design treatments for each segment are described below and illustrated in Figure 7 through Figure 11. Design considerations for flex parking lanes, landscape strips, stormwater treatment, bus stop locations, and bike and sidewalk facilities are discussed in Section 3.3. The full concept plan depicting proposed improvements for the corridor in plan view is attached as Appendix F.

Figure 6. Corridor Segments



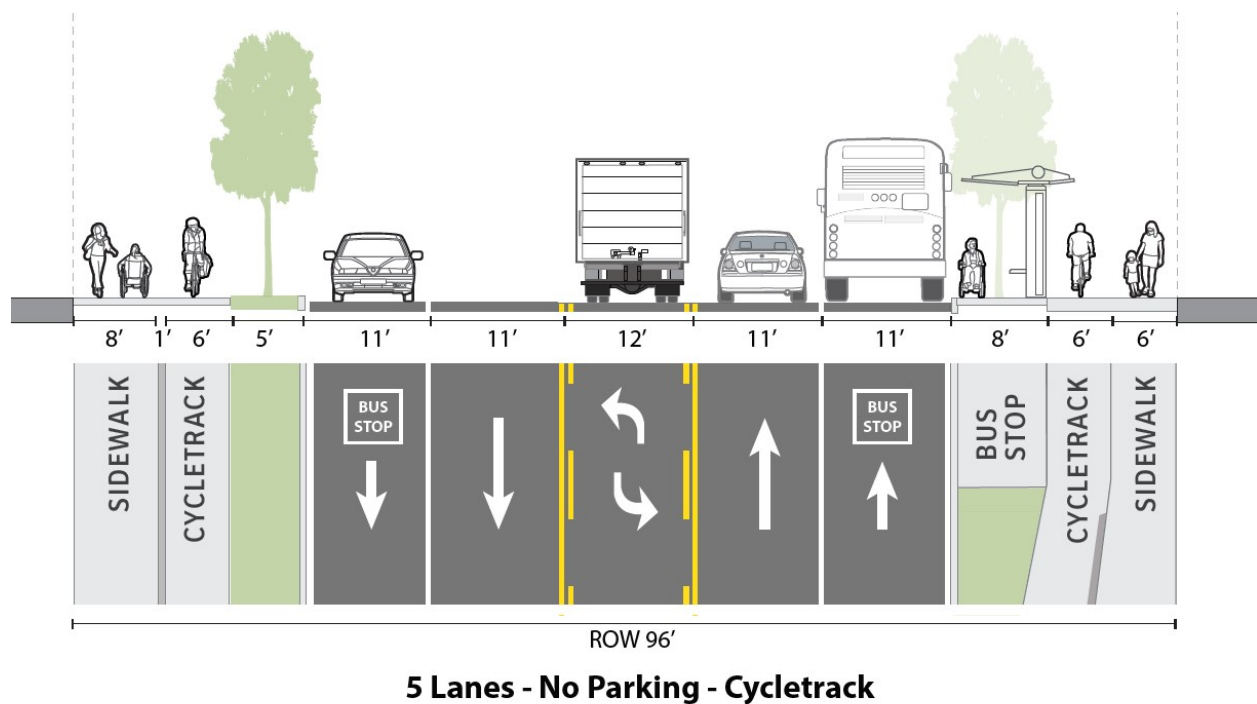
### HIGHWAY 217 TO GONZAGA STREET

This segment at the south end of 72nd Avenue is currently relatively wider than the rest of the corridor in order to accommodate multiple turn lanes onto existing Highway 217. There are bike lanes on both sides of the street, a complete sidewalk and landscaping strip on the west side of the street, and limited sidewalk on the east side of the street.

The proposed cross-section for this segment includes two travel lanes in each direction, one continuous center turn lane, protected bike lanes, and sidewalks and pedestrian amenities on both sides. Bus stops would be located in the outside travel lanes. See Figure 7.

At the north end of this segment, an enhanced pedestrian crossing with a High Intensity Activated Crosswalk (HAWK) signal is proposed at Gonzaga Street. See Figure 12 in Section 3.4.

Figure 7. Highway 217 to Gonzaga Street Section

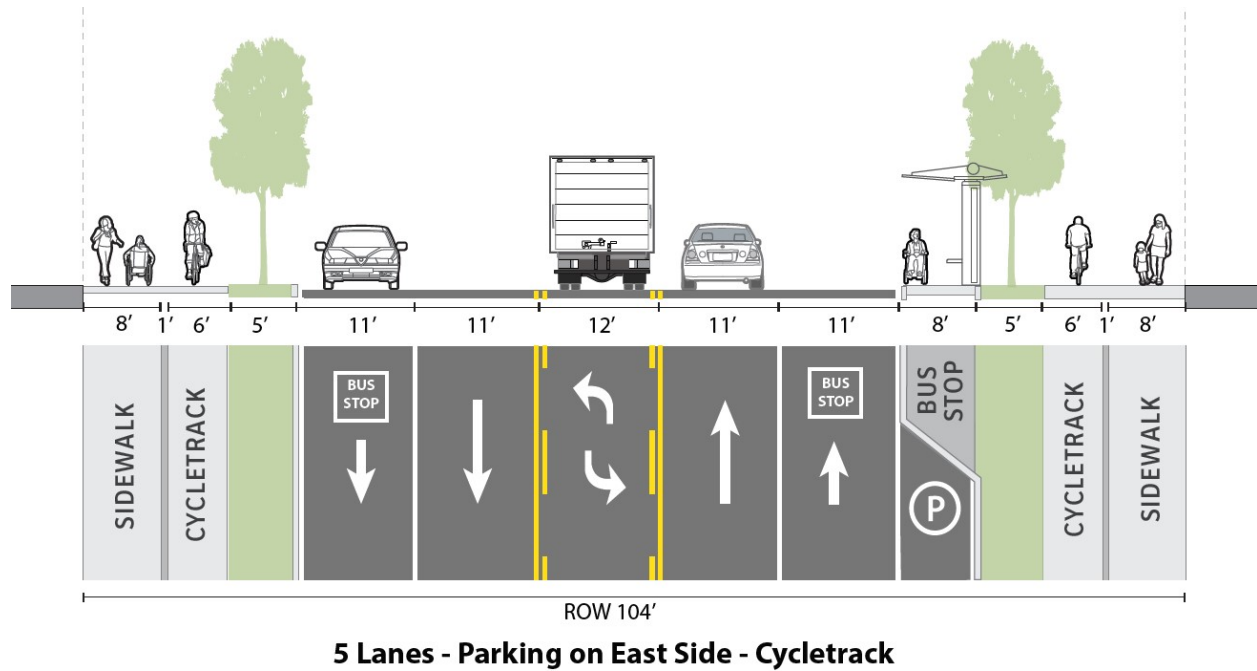


### GONZAGA STREET TO BEVELAND STREET

This one-block segment currently includes a travel lane in both directions, turn lanes at the intersection, bike lanes in both directions, and sidewalk and landscaping strip on the west side of the street.

The proposed cross-section for this segment includes two travel lanes in each direction, one continuous center turn lane, protected bike lanes, sidewalks and pedestrian amenities, and on-street parking on the east side of the street. See Figure 8.

Figure 8. Gonzaga Street to Beveland Street Section



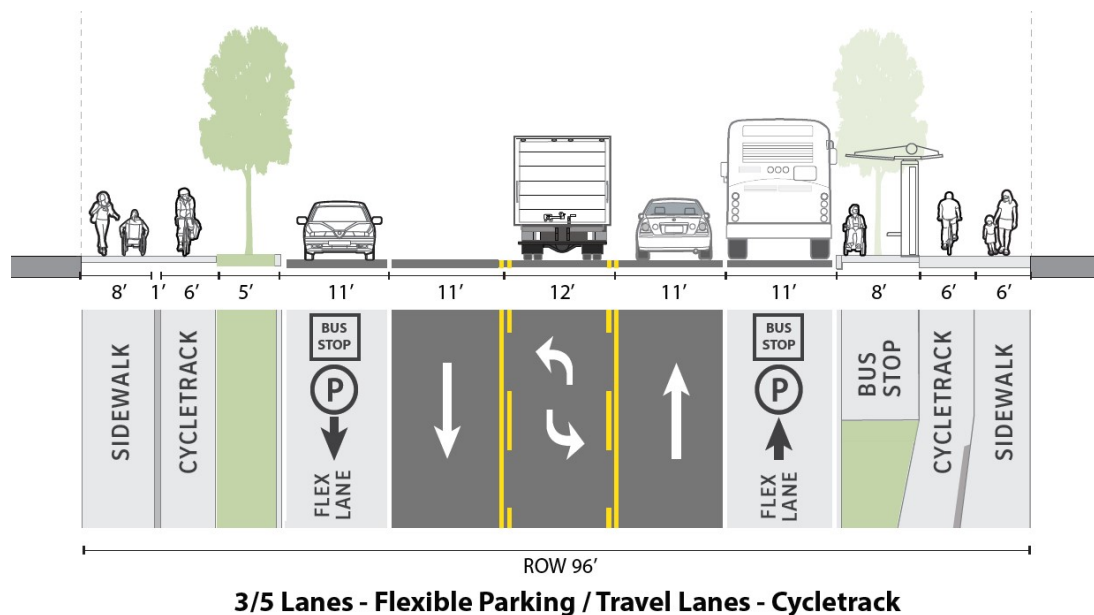
### BEVELAND STREET TO DARTMOUTH STREET

Between Beveland Street and Elhurst Street, this segment of 72nd Avenue currently consists of one travel lane in each direction, sidewalk on the east side of the road, and limited sidewalk on the west side of the road. Between Elhurst Street and Dartmouth Street, the section widens to accommodate a center turn lane, an additional southbound travel lane, and right turn lane. This last block also includes bike lanes, tree planters, and sidewalk in each direction of travel.

The proposed cross-section for this segment includes one travel lane in each direction, flex parking lanes on both sides, one continuous center turn lane, protected bike lanes, and sidewalks and pedestrian amenities. Flex parking lanes are hybrid on-street parking/vehicle travel lanes. Most of the time, these will provide on-street parking, but during peak AM & PM travel times, parking will be restricted and the parking lanes will be used as additional travel lanes in each direction to relieve congestion during rush hour. (Additional discussion of flex parking lanes can be found in Section 3.3 Design Considerations). Flex parking lanes would also serve as bus pull-out lanes. See Figure 9.

An enhanced pedestrian crossing is also proposed within this segment, with a new traffic signal and pedestrian crossing signal at Elhurst Street. See Figure 12 in Section 3.4.

Figure 9. Beveland Street to Dartmouth Street Section





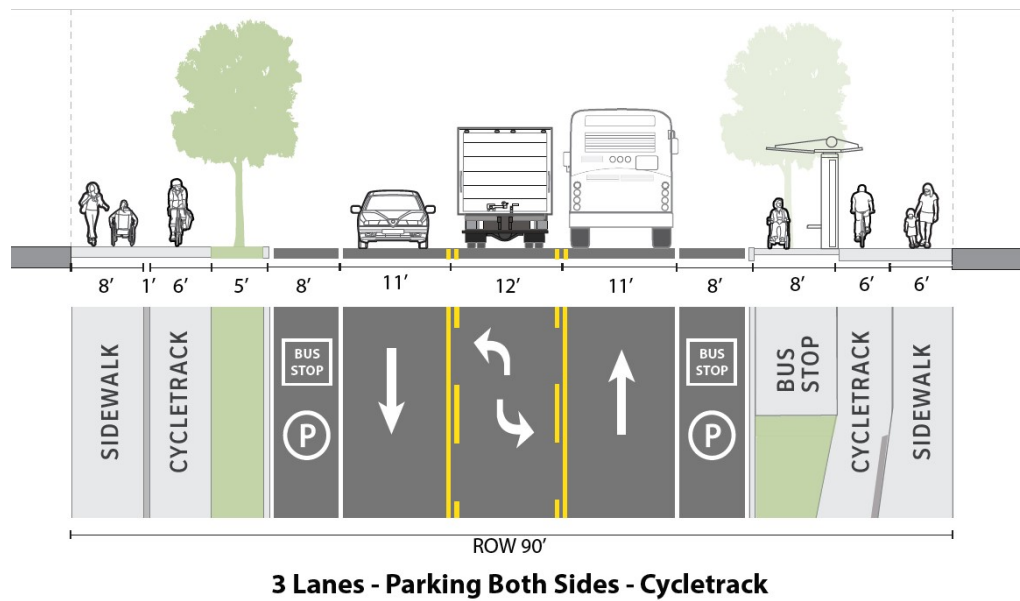
### DARTMOUTH STREET TO RED ROCK CREEK

From north of Dartmouth Street to Baylor Street, this segment of 72nd Avenue currently consists of a center turn lane and travel lanes in each direction. From Baylor Street to south of Red Rock Creek, the section narrows with the loss of the center turn lane.

The proposed cross-section for this segment includes one travel lane in each direction, one continuous center turn lane, protected bike lanes, sidewalks and pedestrian amenities, and on-street parking on both sides of the street (which also serves as a bus pull-out lanes). See Figure 10.

Two new enhanced pedestrian crossings are proposed within this segment. A crossing with a Rapid Rectangular Flash Beacon (RRFB) is proposed between Clinton Street and Baylor Street and an enhanced crossing of some kind (to be determined) is proposed for a future trail crossing south of Red Rock Creek. See Figure 12 in Section 3.4.

Figure 10. Dartmouth Street to Red Rock Creek

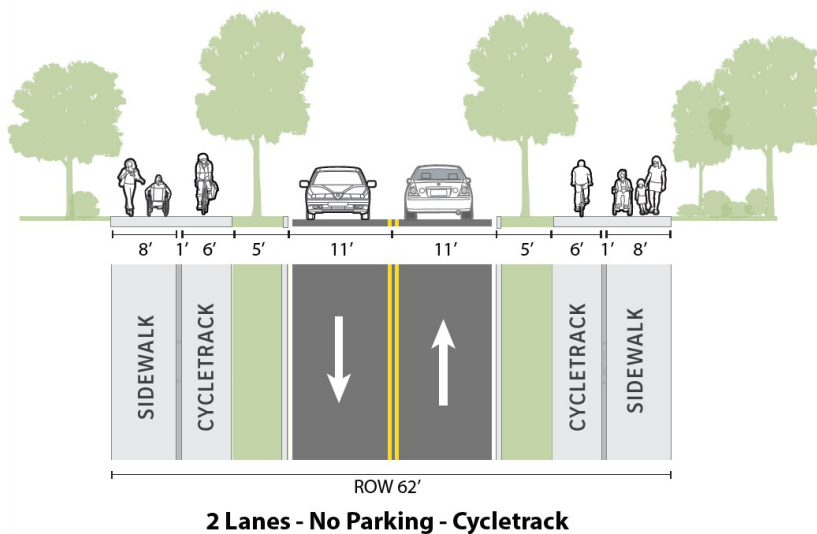


## RED ROCK CREEK TO PACIFIC HIGHWAY

This segment at the north end of the corridor is constrained by adjacent steep topography and vegetation. The existing cross section of 72<sup>nd</sup> Avenue along this section, from south of Red Rock Creek to South of Pacific Highway consists of a narrow two-lane road, widening with turn lanes at the intersection of 72nd Avenue with Highway 99.

The proposed cross-section for this segment includes one travel lane in each direction, protected bike lanes, and sidewalks and pedestrian amenities. No turn lane or on-street parking are proposed. See Figure 11.

Figure 11. Red Rock Creek to Pacific Highway



## 3.3 Design Considerations

### FLEX PARKING LANE DESIGN

The preferred alternative for the Beveland to Dartmouth segment includes flex parking lanes, which are hybrid on-street parking/vehicle travel lanes. Some criteria to consider for successful flex lane design include:

- Enforcement of parking during prohibited periods.
- Parking demand during periods when parking is allowed.
  - If parking demand is low, the facility may not operate as intended during off-peak hours.
- Permanent signs within the furnishing zone informing users of parking restrictions.
- Parking restrictions in place either during routine peak periods or during periods of heavy traffic, determined through automatic traffic data monitoring applications activating electronic signs.
- Electronic signs indicating real-time proper lane usage at major intersections.

- Pavement markings using solid lane lines in advance of intersections to reduce instances of turning from the improper lane.
- Pavement markings indicating parking stalls (parking “T”s) may be considered to reinforce the ability of where to park within the lane when allowed.
- In general, design elements that increase the chance for mistakes to be fail-safe if a misunderstanding occurs.

Flex lane transition points should include the following:

- Transitioning from one to two lanes does not need to be overly informative to the driver, as the roadway will open up without the need for merging to occur.
- Transitioning from two to one lane requires the need to communicate with the driver in advance of the transition, either through the use of permanent signs or electronic signs displaying real-time information. In general, pavement markings cannot be relied upon for conveying detailed time-of-day information. The consideration of including pavement markings for parking should be considered exploratory at the moment.

### **STREET TREE / STORMWATER PLANTER STRIP LOCATION**

Landscape strips are proposed to be located between the bike lane and roadway. These landscape strips are proposed to include street trees and stormwater management facilities using Low Impact Design Approach (LIDA) planters (if the City chooses the local approach versus the regional approach to stormwater management—see Section 5.1). This placement of the landscape strip has the following advantages:

- Simpler to accommodate storm drainage from both the sidewalk space as well as the roadway space.
- Further separates bicyclists from: 1) the door zone of parked cars, and 2) splashing from adjacent drivers.
- Visually ‘narrows’ the street more.
- Provides extra width for driveways to ramp higher up toward the level of the bikeway, rather than requiring the bikeway to drop down / raise up a significant amount throughout the corridor.
- The extra space between the bikeway and the roadway will provide partial separation by default for what’s required at the approaches to protected intersection treatments.
- Permeable pavers can be used between plantings at locations of high parking demand to allow for passengers to be able to step out of the vehicle onto a firm surface.
- A combined walking/biking area will allow for easier maintenance of the facility.
- Street tree species selected for the corridor should not produce litter that interferes with bike/ped zone or branches that will be hit by buses or large trucks

## **BUS STOP LOCATIONS (IN-LANE vs. PULLOUT)**

The concept plan and street sections display two detailed examples of bus stop configurations (as well as the association with bike and pedestrian facilities): in-lane and pullout stops.

In the case of flex parking lanes, parking at bus stops will be restricted at all hours to allow for curbside service.

Along segments of the roadway that do not contain flex parking, it is assumed the bus stop would be:

- a pullout stop if there is a single motorized vehicle lane in the same direction of travel
- an in-lane stop if there are two motorized vehicle lanes in the same direction of travel

For the pullout bus stop example shown between Dartmouth and Red Rock Creek, the street width would expand by 2' to transition from an 8' wide parking lane to a 10' wide dwell location for the bus, an 8' wide platform, a 6' wide bike facility, and a 6' wide sidewalk. The assumed widths should be verified by all relevant stakeholders before proceeding with detailed design of a given corridor segment.

Note: Potential bus stops are shown in the illustrative street sections between Hwy 217 and Beveland. Although there are no current plans by TriMet to locate bus stops here, the transit agency has suggested that there could be future service in this segment of the corridor.

## **SIDEWALK / BIKE FACILITY CROSS SECTION**

Following are guidelines which are typically used to design bike facilities and sidewalks. The widths of these facilities identified in the preferred alternative design are generally consistent with these guidelines.

### 72<sup>ND</sup> AVENUE CROSS SECTION ASSUMPTIONS

- Total sidewalk/cycletrack: 20'
- Sidewalk: 8'
- Buffer (pavers, colored concrete, directional indicators): 1'
- Cycletrack: 6'
- Tree planting/amenity zone/possible stormwater facility (soil cells or structural soil) under permeable pavement): 5'

### BIKEWAY WIDTH GUIDANCE

A bikeway width of 6.5' is typically desired to enable people biking to be able to comfortably pass each other while traveling in the same direction.

Specific minimum and recommended bikeway widths are dependent on future bike volumes, which are difficult to estimate along the corridor given the significant transformation expected to occur within the study area due to this project as well as changes to land use in the surrounding area based on zoning allowances.

Available guidance provides three scenarios of bike volumes to consider (during the peak hour in the same direction of travel) that correspond to minimum and recommended bikeway widths:

- less than 150 people biking = 5' minimum, 6.5' recommended
- 150-750 people biking = 6.5' minimum, 8' recommended
- greater than 750 people biking = 8' minimum, 10' recommended

A high-quality and continuous bike facility along a commercial corridor combined with expected dense redevelopment activity in the project vicinity will likely result in future bike volumes that surpass 150 people during the peak hour in the same direction of travel. Based on this assumption, the proposed bikeway width of 6' is considered to be relatively narrow, but acceptable, as the bikeway will be at the same elevation as the adjacent sidewalk which will allow people biking to ride closer to the edge of the bikeway when being passed by others, effectively operating more similarly to a 6.5' wide bikeway.

### BIKE-PEDESTRIAN SEPARATION

Bike facilities directly adjacent to and at the same elevation as sidewalks benefit from visual and textural differences to separate the two facilities, potentially also including a minimally raised form of separation at the seam between the two facilities that can be detected by people walking that have vision impairments. It is ideal for the raised form of separation to not be so obtrusive that it prevents people from being able to easily cross the space if needed, and the separation should not be so large that it becomes a tripping hazard and potential liability. Introduction of taller vertical elements alongside the bikeway and sidewalk would also reduce the usable width of each facility.

The use of vertical flex posts (aka flexible delineators, candle sticks, etc.) has become more commonplace alongside separated bike facilities. The intent of using such vertical elements is to better separate people biking from adjacent motor vehicle traffic due to significant differences in travel speeds and is not ideal for use on sidewalks.

Examples of bikeway/sidewalk treatments illustrating these principals of bike-pedestrian separation are provided below.

#### **High Quality:**



#### **Acceptable:**



#### Undesirable:

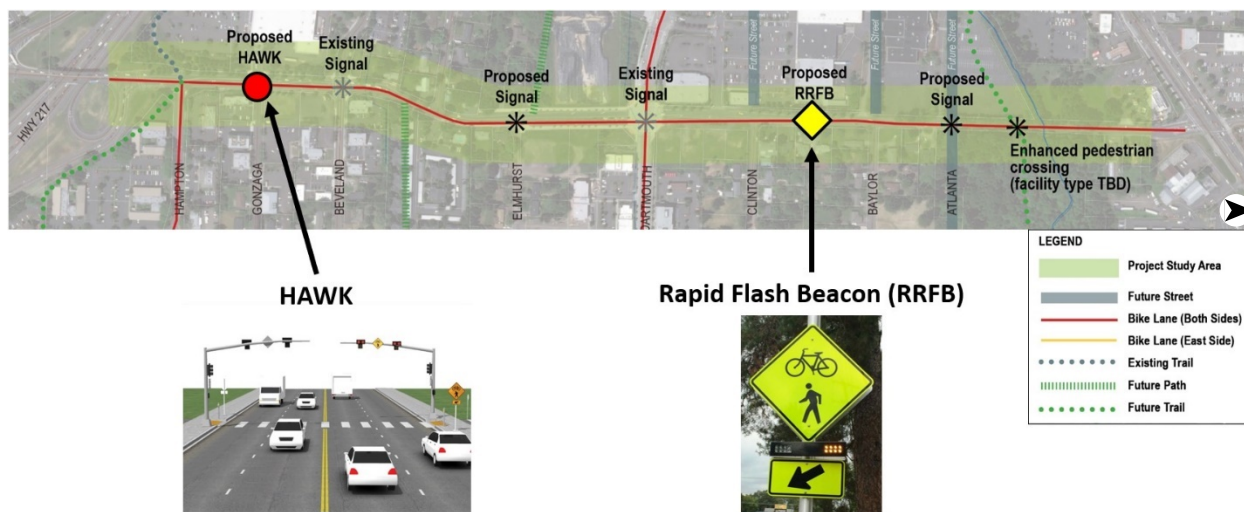


### 3.4 Pedestrian Crossings

The preferred alternative identifies locations of several new protected pedestrian crossings (see Figure 12). New traffic signals with pedestrian crossing signals are proposed at Elmhurst Street and Atlanta Street. A new High Intensity Activated Crosswalk (HAWK) signal is proposed at Gonzaga Street, and a new Rapid Rectangular Flash Beacon (RRFB) is proposed between Clinton Street and Baylor Street. Finally, an enhanced pedestrian crossing of some kind is proposed for where a future trail crosses 72<sup>nd</sup> Avenue south of Red Rock Creek, but the facility type is yet to be determined.



Figure 12. Proposed Pedestrian Crossings



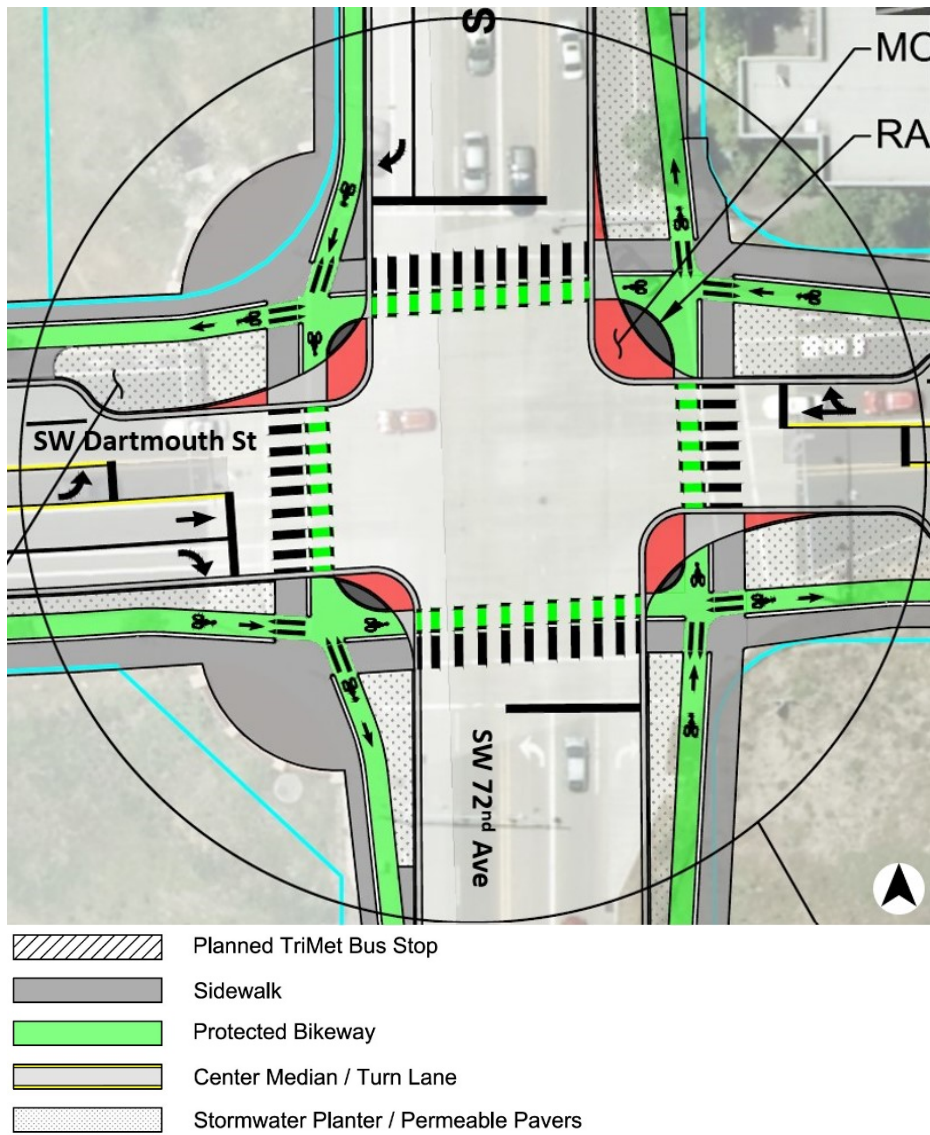
### 3.5 Intersection Improvements

The project team developed detailed design concepts for the intersection of Dartmouth Street and 72<sup>nd</sup> Avenue. The proposed design includes a protected intersection, which keeps bicycles and pedestrians physically separate from motor vehicles up until the intersection, providing a high degree of comfort and safety for people of all ages and abilities. This design can reduce high-speed vehicle turns, improve sightlines, and reduce the distance and time during which people on bikes are exposed to conflicts.<sup>1</sup> A diagram of the proposed design is provided in Figure 13. The intersection design was evaluated to ensure it can accommodate turning by large vehicles such as buses and large trucks. A typical TriMet bus was used as the design vehicle for this assessment. The outline of the bus’s path (turning radii) is shown in red on the diagram.

Design concepts for the remaining intersections were not part of the current project scope, but will be developed by the City as part of the detailed design of corridor segments in which they occur. The approach for the Dartmouth intersection can be used as a starting point for the design of those intersections.

<sup>1</sup> NACTO, *Don’t Give Up at the Intersection: Designing All Ages and Abilities Bicycle Crossings*, May 2019

Figure 13. Design Concept for Dartmouth and 72<sup>nd</sup> Avenue Intersection



## 4. PHASING RECOMMENDATIONS AND COST ESTIMATES

The recommended improvements to 72<sup>nd</sup> Avenue will not be implemented all at once. Rather, improvements will be made in phases, with different portions of the corridor being improved at different times. This section of the report summarizes the proposed phasing plan for 72<sup>nd</sup> Avenue; the full plan is attached as Appendix G.

### 4.1 Phasing Factors

In determining the optimal phasing for making the corridor improvements, there are several factors that should be considered, including future traffic demands, ultimate ROW needs, development and redevelopment, local and regional transportation planning, utility planning, and availability of specific funding. Each of these factors and their influence on the recommended phasing is described below.

#### *Future Traffic Demands – Vehicular*

From a vehicular traffic perspective, the key factor influencing the phasing of the project would be the future planned improvements for the Highway 217 overcrossing. The current overcrossing accommodates only three lanes, which constrains traffic conditions at the southern end of the project. Therefore, traffic flow would not fully benefit from constructing the full corridor improvements (all additional lanes) until the Hwy 217 overcrossing was constructed. This work is currently not scheduled by ODOT. However, improvements to the road segments from Dartmouth Street to Pacific Highway can be done independently of the Hwy 217 overcrossing, because they would not increase future traffic volumes and would be primarily triggered by needed bike/ped facilities. Therefore, it can be improved and will see benefits sooner.

#### *Future Traffic Demands – Pedestrian*

The City of Tigard identifies the segment between Dartmouth and Pacific Highway as a difficult connection for walking, due to the lack of available pedestrian facilities. Because of this deficiency and the fact that there are several points of interest along this segment (large grocery stores and a movie theater), pedestrian improvements through this section should be prioritized to provide improved pedestrian access to these and other land uses within this segment.

In addition, there are additional gaps in existing pedestrian infrastructure on the West side of 72<sup>nd</sup> between Elmhurst and Beveland, and on the east side between Beveland and Gonzaga.

#### *Future Traffic Demands – Bicycle*

SW 72<sup>nd</sup> Avenue through this corridor is identified as a regional bikeway on Metro's regional transportation plan and represents one of the few opportunities to cyclists traveling north-south to cross Hwy 217. Bike infrastructure exists sporadically throughout the corridor and the City bike map has identified the sections between Hampton Street and Hwy 217 and the intersection with Pacific Hwy as the most difficult connections within the corridor. From a phasing perspective, bicycle infrastructure

priorities should focus on filling existing gaps in the network and addressing challenging intersections. The segment north of Dartmouth is prioritized because it largely lacks bike lanes.

### *Right-of-Way Needs*

There is insufficient available publicly-owned right-of-way (ROW) in order to construct the full corridor improvements. The extent of ROW needs varies by segment, as described below. Segments requiring larger amounts of property acquisition may be more difficult or expensive to construct.

- **Hwy 217 to Gonzaga** – Acquisition of a strip of right-of-way (“strip takes”) will be needed from three parcels along 72<sup>nd</sup> Avenue, as well as additional slope and temporary construction easements for one parcel.
- **Gonzaga to Beveland** – Strip takes will be necessary from four parcels.
- **Beveland to Dartmouth** – Strip takes will be necessary from fourteen parcels, and three entire residential parcels will need to be acquired. However, these properties are likely to be redeveloped at some point in the future. Waiting for redevelopment to occur prior to construction of this segment would help the City avoid the need to acquire these parcels and would allow for developer contributions to be used as a funding strategy in this segment.
- **Dartmouth to Red Rock Creek** – Strip takes will be necessary for 10 parcels on the east side of 72<sup>nd</sup> Ave. Slope easements and temporary construction easements will be required for up to three parcels on the west side for construction of retaining walls and driveways.
- **Red Rock Creek to Pacific Hwy** – Strip takes will be necessary for four parcels.

A map of proposed corridor improvements illustrating ROW acquisition needs is attached as Appendix H.

### *Development and Redevelopment*

The Phasing Plan (Appendix G) includes a map that shows parcels in the Tigard Triangle with anticipated interest in development. The bulk of anticipated development is located along the East side of 72<sup>nd</sup> Avenue. Development interest is currently focusing on 72<sup>nd</sup> Avenue around Dartmouth Street and extending north towards Pacific Highway. Should development of those properties move forward, the City may require half street improvements or contributions into a fee in lieu for public right-of-way improvements (as described below in Section 4.3 Funding Sources and Strategies). The City may wish to consider constructing public improvements across the remaining development gaps concurrently, to both encourage development and eliminate gaps within constructed infrastructure. This anticipated development interest is a key factor in establishing the phasing plan.

### *Local and Regional Transportation Planning Projects*

There are three significant projects being planned within the Tigard Triangle by regional agencies as well as several City of Tigard projects which should be considered when phasing improvements to the 72<sup>nd</sup> Avenue corridor. Funding and the schedule of these projects is relatively unknown. The projects are described in more detail in Phasing Plan.

- **Southwest Corridor** – The planned crossing of the SW Corridor Light Rail Line at 72<sup>nd</sup> Avenue at Elmhurst Street could impact phasing of the Beveland to Dartmouth segment. Construction of

improvements in this segment should not occur until the light rail improvements are either constructed or at least designed in more detail, in order to avoid reconstruction of costly improvements and to build on funding from the SW Corridor Project.

- **Hwy 217 Interchange Improvements** – This project would reconstruct the freeway interchange and would include several improvements to 72<sup>nd</sup> Avenue. The segment between Hwy 217 and Gonzaga should be phased with this project in mind.
- **Beveland Overcrossing Improvements** – The project may include the reconstruction of Beveland Street at 72<sup>nd</sup> Avenue. It might be wise to break this intersection out into a separate segment, to allow it to be constructed separately from the 72<sup>nd</sup> Avenue improvements.
- **Red Rock Creek Trail** – Trail connections should be considered during the development of the two segments adjacent to Red Rock Creek.
- **Atlanta Street Extension** – Improvements within the Dartmouth to Red Rock Creek section should anticipate development of this new road extension.
- **Baylor/Clinton Street Extensions** – These street extensions would cross developed private property. Phasing of 72<sup>nd</sup> Avenue improvements should only consider this if the parcel is slated for development.
- **Multi Use Path Improvements** – Several multi use path improvement projects perpendicular to 72<sup>nd</sup> Avenue could affect the design of the street improvements, but they are unlikely to have an impact on phasing considerations.
- **Highway 99W / 72<sup>nd</sup> Avenue Intersection Improvements** – The intent of the project is to provide increased capacity at priority intersections, including bus queue bypass lanes at some locations, improved sidewalks, priority pedestrian crossings, and an access management plan. These improvements are unlikely to have an impact on phasing considerations.

### *Utility Planning*

The following utilities should be factored into the phasing of improvement to 72<sup>nd</sup> Avenue.

- **Water Facilities** – The Tigard Triangle Plan notes that the existing water system is adequate to support proposed development. Water improvements anticipated to be limited to modifications to existing hydrants and meters only.
- **Sewer Facilities** – The Tigard Triangle Plan notes that the existing sewer system is adequate to support proposed development. No modifications to the existing sewer system are anticipated.
- **Stormwater Facilities** – Should the city elect to utilize regional stormwater facilities in lieu of in-corridor mitigation techniques, it would have an impact on street cross sections and potentially conveyance infrastructure. See the discussion of Approach to Stormwater Management in Section 6: Other Implementation Strategies for more information.
- **Private Utilities** – Private power and communication services are run overhead on poles along the east side of 72<sup>nd</sup> Avenue between Hwy 217 and SW Hermoso Way, underground from SW Hermoso to SW Clinton, and then back to overhead between Clinton and Pacific Hwy. Coordination with private utility providers for utility relocation or undergrounding will need to be considered if phased improvements are considered.

## 4.2 Phasing Recommendations

Based upon the above considerations and City staff input, the corridor segments are prioritized in the following phasing sequence:

1. Dartmouth Street to Red Rock Creek
2. Red Rock Creek to Pacific Highway
3. Beveland Street to Dartmouth Street
4. Gonzaga Street to Beveland Street
5. Highway 217 to Gonzaga Street

## 4.3 Funding Sources and Strategies

The availability of funding is also critical to the phasing of improvements to 72<sup>nd</sup> Avenue. A number of funding sources and financing strategies can be used to help pay for proposed improvements. Potential sources and strategies are summarized below; greater detail is provided in Appendix G.

### FUNDING SOURCES

**Developer Contributions.** As development occurs along 72<sup>nd</sup> Avenue, developers can be required to make certain improvements to the roadway. Developers can only be required to pay for the portion of the improvement that is proportionate to their impact on the facility. As an alternative, the City can charge a “fee-in-lieu” which is intended to cover the developer’s share of the costs. However, requiring developers to construct improvements is preferable, as it results in greater certainty that the improvements will be made.

**Tax Revenues.** Three sources of tax revenues are used to fund transportation improvements within the City of Tigard and can be used to contribute to the cost of improvements to 72<sup>nd</sup> Avenue. These include state gas tax and vehicle registration revenues from the Oregon Highway Trust Fund, as well as county and city gas tax revenues. Funding is flexible, but is used throughout the City for a wide variety of transportation projects and maintenance needs. Approximately one (1.0) percent of this fund must be reserved for maintenance and construction of bicycle facilities.

**Urban Renewal Funding.** The Tigard Triangle Urban Renewal District uses tax increment financing to pay for a variety of projects within the district, including transportation and other infrastructure improvements. The New Tigard Triangle: Planning for Equitable Development Implementation Strategy allocates approximately \$2 million in funding to be dedicated to improvements along 72<sup>nd</sup> Avenue in the near term (2020-2025). These funds potentially could be used to pay for a portion of the improvements or for detailed design of the improvements in the corridor.

**System Development Charges (SDCs).** The City charges a transportation SDC for new development which covers the cost of transportation improvements necessitated by new growth. SDC revenues are pooled and used to pay for transportation improvements projects identified in the city-wide capital improvement plan associated with SDC.



**Special Assessments.** Special assessments allow local jurisdictions, with the agreement of property owners, to put into place additional property taxes to pay for specific capital projects or ongoing costs. A variety of special assessments are available in Oregon to fund a range of improvements, including sidewalks, curbs, gutters, street lighting, parking structures, and downtown or commercial zone transportation improvements. These assessments are commonly counted as revenue towards the limitations established by Measure 50.

**Local Improvement District (LID).** This tool is typically used to pay for infrastructure improvements in a specific geographic area which collectively benefit people or property owners in that area. LIDs are particularly well-suited for projects that have a more localized special benefit and where property owners have sufficient resources, anticipated benefits and motivation to agree to participate in the LID. Portions of the 72nd Avenue corridor could lend themselves to use of this tool.

**Bonding.** Bonding is a method of financing construction projects by borrowing money and paying the borrowed sum with interest back over time. Funds could be obtained by general obligation bonds approved by voters, revenue bonds, or other debt financing. This method requires smaller regular payments than the full cost of the project, but increases the total cost of the project due to interest.

**Related Regional and State Project Funding.** As described in Section 4.1 Phasing Factors, a number of projects are planned or programmed by the Oregon Department of Transportation (Highway 217 interchange projects), Metro/TriMet (Southwest Corridor Light Rail Corridor), and the City of Tigard (within its Transportation System Plan). These projects may provide opportunities to use state, regional or local funds to pay for a portion of the improvements to 72<sup>nd</sup> Avenue.

**Grant Programs.** A number of grant and other funding programs from federal, state, and regional agencies, as well as private corporations and non-profit groups, can be used to pay for specific types of transportation improvements—particularly bicycle and pedestrian projects. Programs that could be applicable to improvements along 72<sup>nd</sup> Avenue include but are not limited to:

- **Federal:**
  - Office of Sustainable Communities Greening America’s Communities Program
  - Community Development Block Grant (CDBG) program – Can be used for infrastructure projects in areas with low and moderate incomes.
- **State of Oregon:**
  - Oregon Department of Transportation (ODOT)
    - Statewide Transportation Improvement Program (STIP)
    - All Roads Transportation Safety Program (ARTS)
    - Oregon Community Paths Program (OCPP)
    - Washington County Major Streets Transportation Improvement Program
    - Multi-Modal Active Transportation Fund
    - Oregon Transportation Infrastructure Bank Loan program
  - Oregon Department of Environmental Quality (DEQ) – Federal funding to address non-point pollution

- Oregon Parks and Recreation – Local Government Grant Program, Land and Water Conservation Fund, and Recreational Trails Program
- **Metro:** Flexible funding and grant programs for transportation, restoration, and neighborhood livability
- **Private and Non-Profit:**
  - Corporate donations and sponsorships
  - PeopleForBikes Community Grant Program
  - The Robert Wood Johnson Foundation – Public health grants
  - The Wal-Mart Foundation – Environmental Sustainability grants

These programs are described in more detail in the Phasing Plan.

## FUNDING STRATEGIES

General strategies for using available funding sources at different times include:

- Continue to require developers to make improvements associated with new projects along specific stretches of 72<sup>nd</sup> Avenue. This strategy may be used for any segment and may be particularly helpful in segments for development directly adjacent to 72<sup>nd</sup> Avenue is anticipated or proposed in the short term.
- Within the highest priority corridor segments, supplement developer contributions with one or more other sources of available funding to complete a half or full-street improvement for the entire segment. To the extent that enough funding is available to pay for a complete portion of a segment on one or both sides of the roadway in a high priority segment where development is occurring in the short-term, specific funding sources should be used. In other segments, the timing or phasing of use of specific funds will depend on their availability for projects in the 72<sup>nd</sup> Avenue corridor vis-à-vis other areas of the City.
- Consider using the urban renewal funds programmed for 72<sup>nd</sup> Avenue either to complete detailed design work for the entire corridor or to allow for completion of construction for a high priority segment in the near term. Urban renewal funds also may be available in the longer term to help fund lower priority corridor segments as urban renewal funds build up over time.
- Continue to apply for and use available state and/or federal grant funding on an opportunistic basis to supplement the funding sources above.
- Consider use of one or more LIDs if property owners are willing and motivated to approve them to fund completion of segments where other funding sources are not available. The timing of use of LIDs will depend on the overlap of property owner willingness and gaps in other funding sources.

## 4.4 Cost Estimates

The project team prepared planning level cost estimates for construction of the proposed improvements for 72<sup>nd</sup> Avenue. Table 5 provides cost estimates for each project component, split out by half street for each segment and by intersection. For each project component, estimates take into account roadway improvements, retaining walls, earth work, landscaping, drainage swales, street signs, lighting, transit stops, ROW acquisition, permitting, and other costs. Estimated costs are based on unit costs for specific

elements of the recommended design. Construction and ROW contingencies of 40% are also included in the total cost estimate.

Detailed cost breakdowns and assumptions specific to each project component are included in Appendix B of the Phasing Plan (Appendix G to this report).

Table 5. Planning Level Cost Estimates

<b>PROJECT WORK ITEMS</b>	<b>COST</b>
Mobilization [3]	\$ 1,304,010
Temporary Traffic Control [4]	\$ 600,925
Erosion/Sediment/Pollution Control Plan [5]	\$ 240,370
Removal of Structures and Obstructions [6]	\$ 60,095
Clearing and Grubbing [7]	\$ 120,185
Project Component: SW 72nd Ave: Hwy 99 to Red Rock Creek -East side	\$ 625,276
Project Component: SW 72nd Ave: Hwy 99 to Red Rock Creek -West side	\$ 510,836
Project Component: SW 72nd Ave: Red Rock Creek to SW Dartmouth St - East Side	\$ 1,380,106
Project Component: SW 72nd Ave: Red Rock Creek to SW Dartmouth St - West Side	\$ 1,284,906
Project Component: Intersection of SW 72nd Ave and SW Baylor St	\$ 241,750
Project Component: Intersection of SW 72nd Ave and SW Clinton St	\$ 244,600
Project Component: Intersection of SW 72nd Ave and SW Dartmouth St	\$ 564,200
Project Component: SW 72nd Ave: SW Dartmouth St to SW Beveland St - East side	\$ 981,272
Project Component: SW 72nd Ave: SW Dartmouth St to SW Beveland St - West side	\$ 2,730,462
Project Component: Intersection of SW 72nd Ave and SW Elmhurst St	\$ 262,625
Project Component: Intersection of SW 72nd Ave and SW Hermoso Wy	\$ 262,400
Project Component: Intersection of SW 72nd Ave and SW Beveland St	\$ 373,950
Project Component: SW 72nd Ave: SW Beveland St to SW Gonzaga St- East Side	\$ 404,126
Project Component: SW 72nd Ave: SW Beveland St to SW Gonzaga St- West Side	\$ 495,946
Project Component: Intersection of SW 72nd Ave and SW Gonzaga St	\$ 375,925
Project Component: SW 72nd Ave: SW Gonzaga St to Highway 217-East Side	\$ 550,840
Project Component: SW 72nd Ave: SW Gonzaga St to Highway 217-West Side	\$ 597,370
Project Component: Intersection of SW 72nd Ave and SW Hampton St	\$ 131,900
<b>Construction and ROW Subtotal</b>	<b>\$ 14,344,076</b>
Construction and ROW Contingencies: 40%	\$ 5,737,635
<b>TOTAL CONSTRUCTION AND ROW COST</b>	<b>\$ 20,081,711</b>
Design Engineering & Administration: 13%	\$ 2,610,625
Construction Engineering Services: 12%	\$ 2,409,810
<b>TOTAL ENGINEERING &amp; ADMINISTRATION</b>	<b>\$ 5,020,435</b>
<b>TOTAL</b>	<b>\$ 25,102,146</b>

## 5. OTHER IMPLEMENTATION STRATEGIES

In addition to strategies related to phasing of improvements, costs, and funding, the project team has identified additional strategies for the City to consider in implementing the preferred design alternative for 72<sup>nd</sup> Avenue. These include approaches to stormwater management, Development Code amendments, streetscape design, and additional public involvement, as described below.

### 5.1 Approach to Stormwater Management

The City of Tigard has adopted Clean Water Services (CWS) standards for stormwater facilities within the city. At the time of permitting application, the City will be required to meet the latest CWS standards in the design and construction of corridor improvements for 72<sup>nd</sup> Avenue. The City's chosen approach to stormwater management will be a critical component of the design of the improvements, and will have implications for streetscape design, land need, and cost, among other considerations. There are two basic approaches to consider: regional stormwater treatment and local treatment through the use of LIDA planters.

#### *Option 1: Regional Treatment*

The City of Tigard Stormwater Master Plan includes a regional wetland detention pond downstream of the proposed improvements (CIP #501). The 72<sup>nd</sup> Avenue project is noted as a potential part of the regional stormwater management approach to support redevelopment in the Tigard Triangle. This project also notes that the area fills with silt from upstream erosion, and that completion of upstream projects (CIPs 502, 503, 504 & 506) may need to be completed prior to the regional detention system project. This regional detention system could be used to meet water quality treatment requirements per CWS standards.

#### *Option 2: LIDA Treatment*

The corridor improvements propose the inclusion of 5-foot wide landscape and amenities zones on both sides of the roadway. There is sufficient width within this amenities zone to accommodate LIDA facilities (likely Streetside LIDA planters) spaced throughout the corridor.

Due to the topography along the West side of 72<sup>nd</sup> Avenue, infiltrating LIDA facilities may not be appropriate due to potential impacts to steep slopes or retaining walls, and should be evaluated on a case-by-case basis.

The City also could consider acquiring right-of-way along the corridor for stormwater facilities such as extended dry basins or constructed water quality wetlands.

Further analysis of the stormwater management requirements and options is provided in Appendix A of the Phasing Plan (Appendix G to this report).

## 5.2 Development Code Amendments

The proposed designs for 72<sup>nd</sup> Avenue differ from the City of Tigard's typical design standards for arterial streets, which are provided in the Tigard Development Code (TDC). As such, standards for the preferred design of the street will need to be codified in the TDC. The most appropriate place for street design standards specific to 72<sup>nd</sup> Avenue is in the Tigard Triangle Plan District chapter of the code (TDC 18.660). Similar street-specific standards for River Terrace Boulevard are found in the River Terrace Plan District chapter (18.640).

Table 6 identifies the sections of the Tigard Triangle Plan District code to which the project team recommends modifications to reflect the preferred design of 72<sup>nd</sup> Avenue

The recommended draft code text in underscore and strikeout format is attached as Appendix I.

Table 6. Recommended Development Code Amendments

TDC Section	Amendment Needed
<p><b>18.660.070.G. Site Design Standards: Driveways</b> Provides standards for the quantity, location, and needed site distance for driveways on properties within the Tigard Triangle.</p>	Modify section so that driveway standards further limit the number of driveways allowed for street frontages along 72 <sup>nd</sup> Avenue.
<b>18.660.090 Transportation Facility Standards</b>	
<b>C.1.b. General standards.</b>	Add maps depicting right-of-way dedication needs for development sites on 72 <sup>nd</sup> Avenue.
<p><b>C.4.a. Street design.</b> Table 18.660.9 provides standards for street right-of-way width, vehicle lane number and width, on-street parking, and sidewalk corridor widths and features. The cross-section in Figure 18.660.5 illustrates these standards.</p>	<ul style="list-style-type: none"> <li>• Add a separate table for 72<sup>nd</sup> Avenue that defines standards for each discrete corridor segment.</li> <li>• Add cross-section figures for each segment.</li> <li>• Include notes about turn lanes, parking, bike lanes, sidewalks, furnishings, and transit facilities as needed.</li> <li>• Add plan view map of 72<sup>nd</sup> Avenue improvements.</li> </ul>
<p><b>C.4.e. Bicycle facilities.</b> Lists the types of bike facilities and improvements.</p>	Add another type of bike facility to describe the 72 <sup>nd</sup> Avenue concept for protected bike lanes.
<p><b>C.4.f. Transit facilities.</b> Lists the types of transit facilities, improvements, and factors that determine the level of transit improvements needed.</p>	Modify language to say that transit facilities must meet City as well as TriMet standards.

## 5.3 Planning and Design for Future Improvements

### *Streetscape Improvements*

The outcome of the 72<sup>nd</sup> Avenue Transportation Study is a proposed conceptual design for improvements to the 72<sup>nd</sup> Avenue corridor. Before these improvements can be implemented, the City of Tigard will need to develop detailed designs for each of the corridor segments. This will include more detailed engineering of the street facility and intersections as well as more detailed streetscape design. The Toolkit of Design Elements (Appendix C) provides a range of options for the City to consider regarding things like pedestrian and bicycle crossings, paving treatments, transit stations, street trees and other landscaping, lighting, wayfinding, benches, bike racks, etc. These components of the streetscape will be important elements of a cohesive design scheme that makes 72<sup>nd</sup> Avenue a comfortable, safe, and desirable place for those walking and biking.

### *Additional Public Involvement*

Detailed designs for the 72<sup>nd</sup> Avenue facility will benefit from additional stakeholder involvement and coordination. Community members should have the opportunity to weigh in on specific streetscape and intersection designs through surveys, public events, and/or other engagement techniques. While some of these design elements—such as street furnishings—will be applicable to the entire corridor, others will be specific to individual corridor segments. As such, the City should first focus on those segments identified as higher priorities for the phasing of improvements, as outlined in Section 4.3 of this report.

### *Coordination with TriMet*

The City should also coordinate with TriMet on designs for a future light rail transit (LRT) crossing, which is planned as part of the Southwest Corridor Light Rail Project. Current plans for the project show the LRT alignment crossing 72<sup>nd</sup> Avenue at Elmhurst Street, with a station approximately 200 feet east of 72<sup>nd</sup> Avenue on Elmhurst. Improvements associated with this crossing should be coordinated with other improvements to the 72<sup>nd</sup> Avenue corridor. The City and TriMet should coordinate design considerations such as the potential need for a traffic signal, the design of bike/ped crossing facilities, access spacing, and transitions with on-street parking areas. Preliminary designs and recommendations for a potential crossing have been prepared by DKS Associates and are included as Appendix J to this report.

### *Interchange Area Management Plan for Highway 217*

As noted in the future traffic analysis, the Highway 217 interchange is expected to constrain traffic at the south end of the corridor. Without improvements to the interchange, long queues and delays will be experienced along 72<sup>nd</sup> Avenue as well as on most side-street approaches. The Phasing Plan (Appendix G) notes that improvements to the Highway 217/72<sup>nd</sup> Avenue are indeed planned, as identified in the City of Tigard Transportation System Plan, the Metro Regional Transportation Plan 2014, and on the Highway 217 Corridor Improvements list from Washington County. As part of the planning effort for these improvements, the City should consider partnering with ODOT to prepare an Interchange Area Management Plan (IAMP). The purpose of an IAMP is to determine what



transportation solutions and/or land use and policy actions are needed in an interchange area and how best to balance and manage transportation and land use issues over time. Its intent is to protect the function and operations of state highway interchanges and the supporting local street network. The development of an IAMP would require close coordination between ODOT and the City and should include public outreach to affected property and business owners, and users of the transportation facilities.

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## **APPENDICES**

APPENDIX A: PUBLIC INVOLVEMENT SUMMARIES

APPENDIX B: EXISTING CONDITIONS REPORT

APPENDIX C: TOOLKIT OF DESIGN ELEMENTS

APPENDIX D: FUTURE TRAFFIC CONDITIONS ANALYSIS REPORT

APPENDIX E: ALTERNATIVES EVALUATION MATRIX

APPENDIX F: CORRIDOR DESIGN CONCEPT

APPENDIX G: PHASING PLAN

APPENDIX H: RIGHT-OF-WAY EXHIBIT

APPENDIX I: DRAFT AMENDMENTS TO TIGARD DEVELOPMENT CODE

APPENDIX J: DESIGN CONCEPT FOR POTENTIAL CROSSING AT ELMHURST STREET