CITY OF
Oak Harbor
WHIDBEY ISLAND, WASHINGTON

Draft

Oak Harbor Transportation Element

MARCH 2016

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EXECUTIVE SUMMARY

Oak Harbor, named for the Garry Oak trees which line its streets, is a city rich in history and natural beauty. Over the past century, Oak Harbor has grown into Whidbey Island's largest incorporated community. This Transportation Element aims to provide a 20-year vision for Oak Harbor's transportation system, which respects the community's history and character, supports anticipated growth in the region, and builds on Oak Harbor's momentum as an attractive community in which to live, work, and play by supporting safe and comfortable travel by all modes through 2036.

The overall vision for Oak Harbor's Transportation Element is to provide a safe, balanced, and efficient multi-modal transportation system that is consistent with the City's overall vision and adequately serves anticipated growth. Guidance from City staff, the Planning Commission, City Council, stakeholders, and citizens helped identify several priorities:

- Improve safety for all road users in Oak Harbor through thoughtful planning and street designs that accommodate all modes
- Encourage the efficient movement of people and goods through an inter-connected transportation network that includes streets, sidewalks, bike paths, trails, public transit, and other facilities
- Ensure Oak Harbor's Transportation Element compliments the City's land use vision and adopted plans, and Island County's transportation network

Oak Harbor, Washington

The Transportation Element sets a framework for understanding, prioritizing, measuring, and creating a transportation network to help Oak Harbor achieve its vision. This document includes seven chapters:

- **Chapter 1 – Introduction:**
  Describes the purpose of the Transportation Element and the planning requirements it needs to address. Also provides an overview of Oak Harbor's position in the region and related planning efforts.
- **Chapter 2 – Conditions and Trends:**
  Describes conditions for all travel modes in the existing transportation system. This chapter also

identifies current challenges and trends that will affect Oak Harbor's transportation network in the future.

- **Chapter 3 – Community and Stakeholder Outreach:**
  Describes the public outreach process conducted as a part of the Transportation Element Update, as well as the specific stakeholder feedback received from community interests.
- **Chapter 4 – Transportation Goals and Policies:**
  Explains Oak Harbor's vision for transportation and the goals and policies that serve as the basis for the Transportation Element.
- **Chapter 5 – Future Transportation Vision:**
  Introduces a layered network concept that forms the foundation of this plan to accommodate all modes of travel and create a complete transportation network in Oak Harbor. This section also details how to accommodate each travel mode and establishes the City's level of service standards.
- **Chapter 6 – Capital Plan:**
  Provides a long-term capital plan based on the community values expressed in the transportation goals and layered network.
- **Chapter 7 – Implementing the Transportation Element:**
  Evaluates Oak Harbor's financial conditions over the next 20 years and provides guidance on plan implementation.

To serve as a useful document for the community, including both City staff and the general public, this Transportation Element focuses on the City's vision and the projects and programs intended to meet that vision. Technical and supporting information are available in the **Appendix**.

Pioneer Way, Oak Harbor

CHAPTER 1: INTRODUCTION

Oak Harbor, named for the Garry Oak trees which line its streets, is a city rich in history and natural beauty. Oak Harbor has continued to grow over the past century, aided by the construction of the Deception Pass Bridge in 1936, and the completion of the Naval Air Station Whidbey Island in 1942. Today, Oak Harbor is Whidbey Island's largest incorporated community.

This Transportation Element aims to provide a 20 year vision for Oak Harbor's transportation system, which respects the community's history and character, supports anticipated growth in the region, and builds on Oak Harbor's momentum as an attractive community in which to live, work, and play by supporting safe and comfortable travel by all modes through 2036.

PURPOSE

The overall vision for Oak Harbor's Transportation Element is to provide a safe, balanced, and efficient multi-modal transportation system that is consistent with the City's overall vision and adequately serves anticipated growth. Guidance from City staff, the Planning Commission, stakeholders, and citizens helped identify several priorities:

- Improve safety for all road users in Oak Harbor through thoughtful planning and street designs that accommodate all modes
- Encourage the efficient movement of people and goods through an inter-connected transportation network that includes streets, sidewalks, bike paths, public transit, and other transportation facilities
- Ensure Oak Harbor's Transportation Element compliments the City's land use vision and adopted plans, and Island County's transportation network

The Transportation Element sets a framework for understanding, prioritizing, measuring, and creating a transportation network to help Oak Harbor achieve its vision.

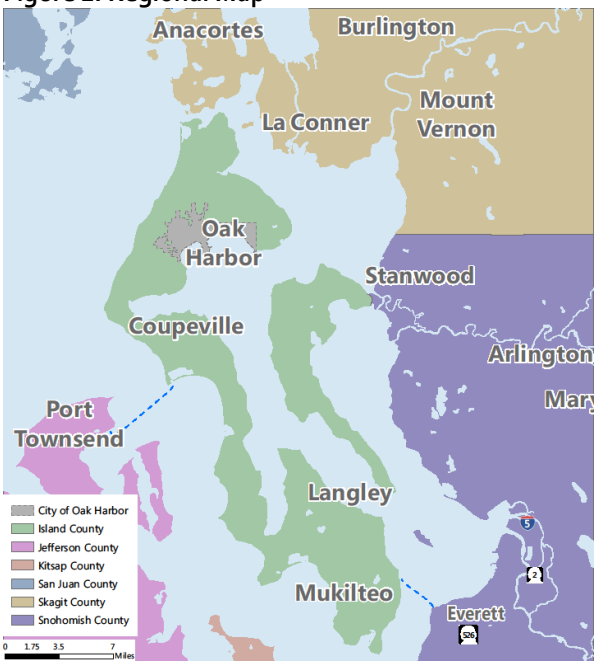
PLANNING REQUIREMENTS

Oak Harbor's regional location plays a role in the demands put on its transportation system. The City is located in North Whidbey Island, along the Whidbey Scenic Isle Way Corridor, a state scenic byway that consists of State Route (SR) 525 and SR 20. The byway connects to important regional destinations in Island County, and two ferry terminals, Keystone and Clinton, which provide connections to Port Townsend and Mukilteo, and the greater Washington area. Given Oak Harbor's position on Whidbey Island and status as an attractive summer tourist destination, the City is influenced by many regional travelers and trends.

The City must coordinate its transportation planning with a variety of jurisdictions and agencies, including Island County, Island Transit, Naval Air Station Whidbey, and the State of Washington.

Figure 1 shows the location of Oak Harbor in this regional setting.

Figure 1. Regional Map



GMA

The State's Growth Management Act of 1990 requires communities to prepare a transportation plan that ties directly to the City's land use decisions and financial planning. This Transportation Element Update fulfills the mandate.

Additionally, given the status of State Route 20 as a major transportation corridor that travels through Oak Harbor, this plan aims to coordinate with the Washington State Department of Transportation (WSDOT) to ensure that these state facilities can adequately serve the region's needs.

OTHER PLANS

As part of this planning process, several local, regional, and state plans and documents that influence transportation planning in the City of Oak Harbor were reviewed. This section summarizes some of the key regional plans that were reviewed.

SKAGIT AND ISLAND COUNTIES METROPOLITAN AND REGIONAL TRANSPORTATION PLAN

The Skagit and Island Counties Metropolitan & Regional Transportation Plan (2010-2035), prepared by Skagit Council of Governments, lays out the long term goals for growth management, economic, and transportation issues.

The Plan identifies six key priorities for transportation in the region:

1. Economic Vitality – Promote and develop transportation systems that stimulate, support, and enhance the movement of people and goods.
2. Preservation – Maintain, preserve, and extend the life and utility of prior investments in transportation systems and services.
3. Safety – Provide for and improve the safety and security of transportation user and the transportation system.
4. Mobility – Improve the predictable movement of goods and people throughout the region.
5. Environment – Enhance regional quality of life through transportation investments that promote energy conservation, support healthy communities, and protect the environment.
6. Stewardship – Continuously improve the quality, effectiveness, and efficiency of the transportation system

ISLAND COUNTY TRANSPORTATION PLAN

Island County's Transportation Element is intended to serve as guide for making transportation decisions to address both short and long term needs. The overarching goals of the plan are to provide a safe and integrated transportation system that maintains and preserves the existing system, while supporting the land use development and economic vitality. The projects outlined within the county's 20-year project list focus on preserving and managing the existing transportation system and implementing safety projects, rather than adding more roadway capacity.

The Plan identifies six key goals for transportation in Island County:

1. Provide a safe, comfortable and reliable transportation system that provides adequate mobility for people, goods and services, regardless of mode;
2. Support land use development and economic vitality by providing context-appropriate transportation infrastructure;
3. Minimize negative environmental impacts;
4. Preserve prior investments in the transportation system;
5. Promote physical activity by expanding options for active transportation modes;
6. Build strong relationships between Island County and other agencies to engage in cooperative planning of common transportation improvements.

STATE ROUTE 20, SWANTOWN ROAD TO CABOT DRIVE, CORRIDOR PRE-DESIGN ANALYSIS

In 2005, WSDOT partnered with the City of Oak Harbor to review SR 20 corridor needs and develop a detailed plan that will facilitate design and construction of future highway improvements. The goal of the analysis was to determine how best to redesign the section of the corridor, between Swantown Road to Cabot Drive, to improve levels of safety and mobility, while encouraging better access to land uses and improving the aesthetics of the corridor to match the city character.

Based on the traffic analysis of six key intersections within the project area, roundabouts were determined to be the best solution to improve safety and mobility along the corridor. In 2012, WSDOT released a briefing report and technical update to the 2005 plan, which further analyzed

traffic within the study area and updated the costing estimates of the improvements recommended in the pre-design analysis. As of June, 2015, the project was funded by WSDOT as part of the Connecting Washington Projects Highway Improvements Program[1]. The project is scheduled for implementation between 2027 and 2029.

WHIDBEY SCENIC ISLE WAY CORRIDOR MANAGEMENT PLAN

The Whidbey Scenic Isle Way Corridor Management Plan (CMP) was created for the state scenic byway that consists of SR 525 and SR 20 on Whidbey Island. The corridor, which spans from Deception Pass to the Clinton Ferry Terminal, is characterized as a "ribbon of commerce and connectivity for island communities". The vision of the Whidbey Scenic Isle Way is to enhance visitors' experience and preserve the quality of life enjoyed by island residents.

The CMP serves as a tool that provides recommendations for specific strategies and actions that improve, enhance, and sustain the corridor's unique intrinsic qualities and the many enjoyable experiences it offers. In regards to transportation, the plan outline several goals such as promoting the non-driving experience, improving the aesthetics of the transit system and park-and-ride lots, expanding the multiuse trail system, and providing safe and convenient crossing opportunities for pedestrians.

ROLE OF THE TRANSPORTATION ELEMENT

The transportation element provides a framework that outlines the policies, projects, and programs necessary to implement the City's vision of future mobility in and throughout the City of Oak Harbor. The transportation element also describes the financial environment for transportation investments out to 2036.

In essence, the Transportation Element informs the development of the Capital Improvement Program by identifying the types of projects the City should undertake to support future travel trends. The plan also evaluates how these projects coincide with the community's values and financial resources.

Goldie Road/ NE Midway Boulevard, Oak Harbor

Island County Harbor Station, Oak Harbor

[1] Leap Transportation Document 2015 NL-1

PLAN ORGANIZATION

This Transportation Element includes six chapters in addition to the Introduction **(Chapter 1)**:

- **Chapter 2 – Conditions and Trends:** Describes conditions for all travel modes in the existing transportation system. This chapter also identifies current challenges and trends that will affect Oak Harbor's transportation network in the future.

- **Chapter 3 – Community and Stakeholder Outreach:** Describes the public outreach process conducted, as well as the specific feedback received from stakeholder members.

- **Chapter 4 – Transportation Goals and Policies:** Explains Oak Harbor's vision for transportation as well as the goals and policies that form the basis for the Transportation Element.

- **Chapter 5 – Future Transportation Vision:** Introduces the layered network concept that forms the foundation of this plan to accommodate all modes of travel and create a complete transportation network in Oak Harbor. This section also details how to accommodate each travel mode and establishes the City's transportation level of service standards.

- **Chapter 6 – Capital Plan:** Provides the 20 year transportation investment list which reflects on the community values expressed in the transportation goals and layered network.

- **Chapter 7 – Implementing the Transportation Element:** Evaluates Oak Harbor's financial conditions over the next 20 years and provides guidance on plan implementation.

Old Town District, Oak Harbor

Public Meeting (February 2015), Oak Harbor

CHAPTER 2: CONDITIONS AND TRENDS

EXISTING CONDITIONS

This chapter describes how people use Oak Harbor's transportation network today, as well as how that may change over the next 20 years as the region grows. The way people travel is greatly influenced by the built environment, which includes land use and travel corridors, as well as the key destinations where people live, work, play, shop, and recreate. This chapter also describes trends in how people are traveling based on anticipated development patterns and travel mode data.

LAND USES AND KEY DESTINATIONS

The places where people live, work, and play are impacted by how a city and surrounding communities guide where development occurs. The Land Use Element of this Comprehensive Plan provides the guidance mentioned here. One way a city can influence this is through zoning. Zoning allows a city to encourage specific development, such as homes and businesses, to occur in targeted areas of the city. It is important to consider land use when planning for transportation because it provides insight into areas where more people may concentrate their travel.

The main commercial areas in Oak Harbor, where people tend to shop, are located downtown and along State Route (SR) 20; these areas are zoned Central Business District (CBD) and high intensity commercial as shown in **Figure 2**.

Oak Harbor's Old Town District (downtown) features older buildings that are home to a variety of commercial uses including a mix of office and retail uses, as well as restaurants. The area along SR 20 is characterized by auto-oriented commercial development that features larger scale buildings and parking lots. Other areas of commercial and industrial land uses are located in the northern portions of Oak Harbor, and military land uses abut the eastern and northern city limits. Much of the remaining City area is zoned for single-family residential.

It is important to consider that areas of commercial, industrial, and dense residential land use tend to have more concentrated trips and can be supportive of alternative modes of travel such as transit, whereas areas of low density residential tend to have dispersed trip patterns more conducive to trips made by personal vehicle.

OAK HARBOR'S OLD TOWN DISTRICT

Oak Harbor's Old Town District is characterized as the historical city center. It is a major trip generator for all modes. It features a mix of commercial, residential, and civic destinations such as City Hall and the public library.

Old Town District, Oak Harbor

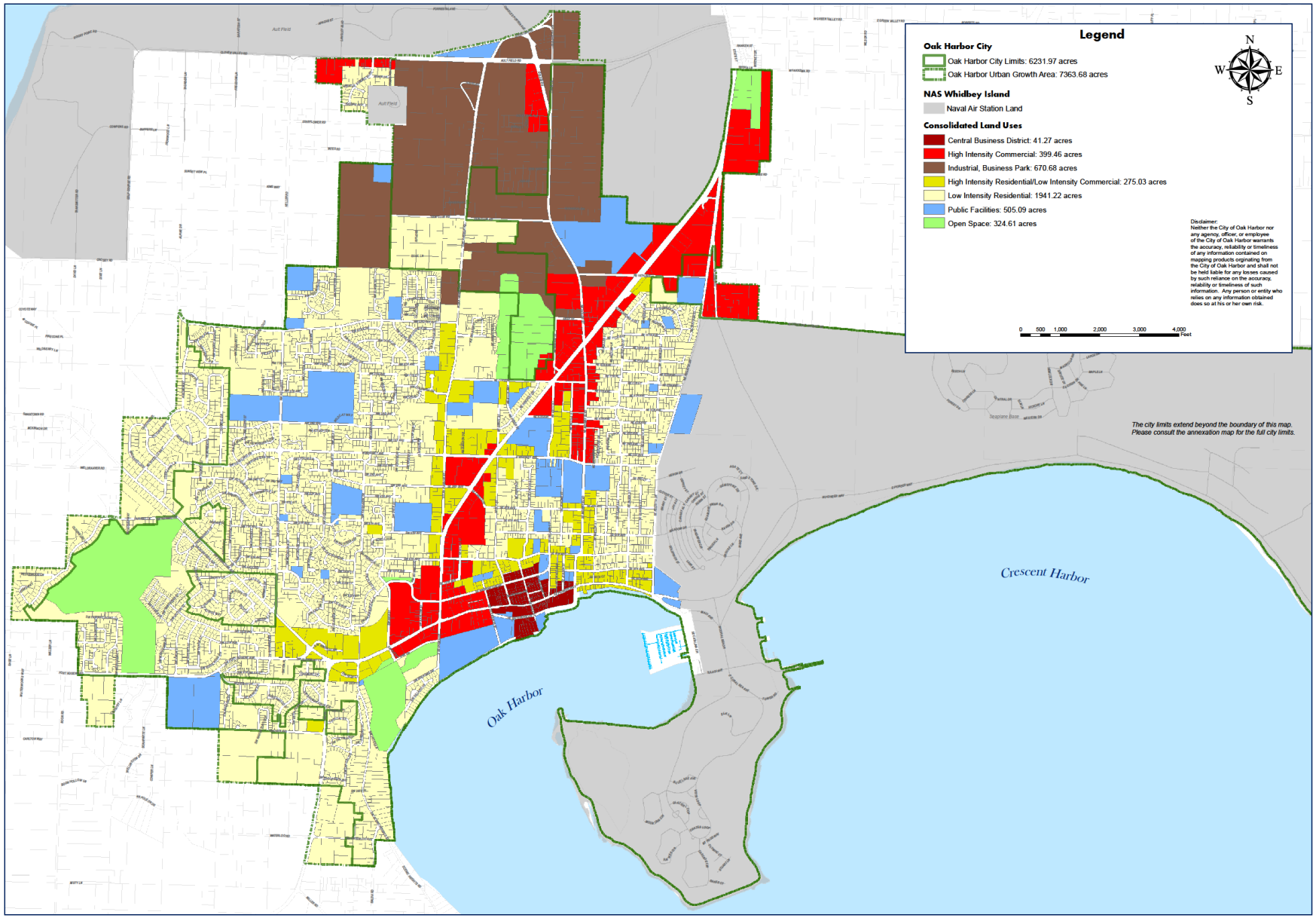
ISLAND TRANSIT'S HARBOR STATION

Island Transit's Harbor Station serves a major transit hub and transfer center in Island County. Located on Bayshore Drive, the Harbor Station is served by nine transit routes, and connects to destinations as far as the Anacortes Ferry Terminal and the Clinton Ferry Terminal. The Harbor Station is well connected to the Old Town District, and provides access to a nearby surface lot for passengers who access transit by car. There is also bicycle and pedestrian amenities at the station area, including shelters, bathrooms, benches, and bike parking.

OAK HARBOR'S WATERFRONT

Located on the south side of Oak Harbor's Old Town District, the Oak Harbor Waterfront provides access to parks, trails, and the Marina. Many residents and visitors alike enjoy the waterfront area and travel and recreate on Oak Harbor's Waterfront Trail, which spans the entire City waterfront. The Waterfront Trail serves as a major nonmotorized route for residents and commuters. It connects trail users to destinations in Old Town such as shops, restaurants, and the Skagit Valley College. The trail also provides important connections for residents who live on liveaboards in the Oak Harbor Marina.

Figure 2. Zoning Map



NAVAL AIR STATION WHIDBEY

The Naval Air Station (NAS) Whidbey is located on two pieces of land near Oak Harbor. The primary section of the base, Ault Field, is located about three miles north of Oak Harbor. Ault Field features the main airfield, administrative and industrial buildings, a hospital, a variety of housing units, and several recreational areas including an 18-hole golf course, totaling approximately 4,250 acres in size.

The secondary section of the base, Seaplane Base, is located just east of Oak Harbor's Old Town District. The Seaplane Base encompasses approximately 2,820 acres. About twenty percent of this land area is developed, primarily with single family housing. The remainder of the site covered by forest, wetlands, grasslands, and beaches[2].

NAS Whidbey's personnel contribute to a significant amount of traffic on roadways leading to Ault Field and the Seaplane Base. Traffic near the bases becomes backed up during shift changes, as personnel enter/exit the base at Goldie Road and West Ault Field Road; Langley Boulevard and West Ault Field Road; and West Crescent Harbor Road and Torpedo Road.

Although the majority of personnel commute by private vehicle, many young personnel do not own a vehicle, and rely heavily on Island Transit, walking, and/or biking for their travel. The growth in population is expected to increase the number of young personnel, who typically lack access to a personal vehicle and are dependent on other modes.

Today, approximately 7,000 personnel are stationed at NAS Whidbey. By 2020, the active duty population is projected to reach 8,000[3]. Anticipated growth and development near NAS Whidbey bases may necessitate roadway and operation improvements.

SCHOOLS

The Oak Harbor School District operates neighborhood schools that serve the City and surrounding areas, including:

- Broad View Elementary School
- Crescent Harbor Elementary School
- Hillcrest Elementary School
- Oak Harbor Elementary School
- Olympic View Elementary School
- North Whidbey Middle School
- Oak Harbor Middle School
- Oak Harbor High School

In addition, there are several private schools located within Oak Harbor including: Lighthouse Christian Academy, Oak Harbor Christian School, Montessori Der Kinderhuis, Oak Harbor Seventh Day Adventist Elementary School, and Oak Harbor Bible Baptist Christian School.

The City of Oak Harbor, the Oak Harbor School District, and neighborhood groups have made a commitment to provide safe access to the City's schools through the State Safe Routes to School (SRTS) program. The Oak Harbor SRTS program has been successful in securing grant funding for a variety of programs that support a safer transportation network near schools.

In 2009, the Oak Harbor School District was awarded a SRTS grant of approximately $360,000 to improve pedestrian access at eight heavily used roadway crossings by school children. The project was implemented by the Washington State Department of Transportation and the City of Oak Harbor, and completed in the summer of 2012.

Crossing near Olympic View Elementary School, Oak Harbor

Growth within the City of Oak Harbor will necessitate the need for new schools. Naval Air Station Whidbey alone is expected to add another

[2] City of Oak Harbor. 2015. "Comprehensive Plan". http://www.oakharbor.org/page.cfm?pageId=59

3 Whidbey News-Times. 2015. "Navy 'setting the foundation for the next 30 years" http://www.whidbeynewstimes.com/news/304773681.html

750 elementary students by 2019[4]. Given this growth, the Oak Harbor School Board has approved a plan to create two "hybrid schools". Instead of two middle schools for grades 6-8, there will be one school for grades 5-6 and one school for grades 7-8.

This could create challenges for school children who may need to cross SR 20 more often, given that their home school will not necessarily be the one closest to them.

Olympic View Elementary, Oak Harbor

SKAGIT VALLEY COLLEGE

A branch of Skagit Valley College is located in Oak Harbor at the east end of Pioneer Way. Approximately 1,400 students enroll on the campus annually[5]. The college is served by three Island Transit routes (3, 10, and 12), however the majority of students access the campus by car.

PARKS AND RECREATION AREAS

The City's park system consists of more than 30 parks on over 150 acres of land. The parks feature walking trails, picnic areas, ball fields, playgrounds, a marina, senior center, recreational vehicle park, and access to public shorelines[6].

In addition to schools and parks, retirement communities are major generators of non-motorized trips. Many residents of retirement communities no longer drive their own vehicles, so they are dependent on privately-operated shuttles, public transportation, walking, biking, and motorized scooters to get to doctors' appointments, residences of family and friends, and shopping/dining destinations. There are five retirement communities in Oak Harbor, located in a north-south corridor roughly centered on SR 20.

Flintstone Park, Oak Harbor

TRANSPORTATION NETWORK OVERVIEW

Oak Harbor's transportation network accommodates many modes of travel, including walking, bicycling, public transit, and driving. Vehicular travel is still the primary choice for most travelers in and around Oak Harbor (see **Chapter 3**).

City streets form the foundation of the transportation framework with roadways shaping how residents and visitors experience Oak Harbor. The main travel corridors in Oak Harbor are mostly roadways with sidewalks but also include trails and bus routes. The Old Town District has a relatively well-connected street grid, while the remaining areas of the city are characterized by larger blocks and curvilinear streets, which can make direct connections difficult.

This plan classifies Oak Harbor's roadways into principal arterials, collectors, and local streets, as shown in **Table 1** displayed **Figure 3**. Examples of each roadway type and the intended uses served are also described below.

[4] Oak Harbor Schools Going "Hybrid" to Save Space. 2016. http://www.king5.com/story/news/local/2016/03/07/oak-harbor-schools-going-hybrid-save-space/81460794/

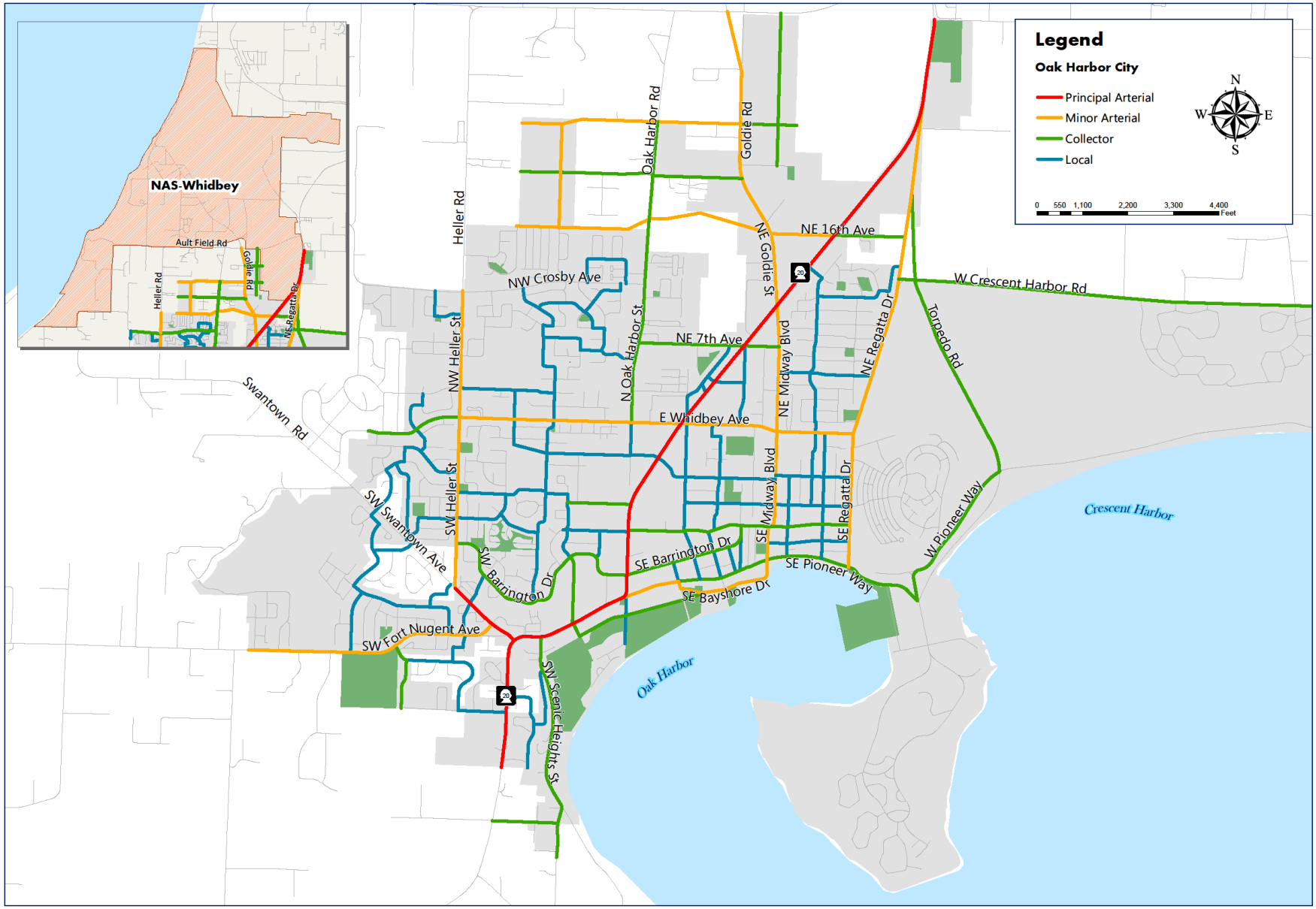
[5] Skagit Valley College. 2010. "2009/2010 Annual Enrollment Report." https://www.skagit.edu/imageuploads/file2882.pdf

[6] Parks, Recreation, and Open Space Plan. 2009.

Table 1. Classifications of Roadway

Roadway Type	Description / Purpose	Example	Photo
Principal Arterial	Principal arterials are Oak Harbor's highest functional classification and tend to carry the highest volumes. Major arterials serve regional through trips and connect Oak Harbor with the rest of the region.	**SR 20** Swantown Avenue	
Minor Arterial	Minor arterials are designed for higher volumes, but tend not to be major regional travel ways. Minor arterial streets provide inter-neighborhood connections.	**Whidbey Avenue** NE Regatta Drive	
Collectors	Collectors distribute trips between local streets and arterials and serve as transition roadways to or from commercial and residential areas. Collectors have lower volumes than arterials, and can include select traffic elements to balance experience for all modes.	**NE 7th Avenue** SW Barrington Drive	
Local Streets	Local streets are the lowest functional classification, providing circulation and access within residential neighborhoods.	**SE 6th Avenue** NW Cathlamet Drive	

Figure 3. Roadway Functional Classifications



Roadway Classification

PEDESTRIAN AND BICYCLE NETWORK

Residents and visitors in Oak Harbor walk and bike as a part of their daily travel for many reasons. Children attending school, commuters taking the bus or connecting with a carpool to get to work and senior citizens making midday trips, all require safe amenities. Over the past five years, Oak Harbor has made great strides in creating a more bicycle friendly and walkable community.

In 2012, Oak Harbor completed the Pioneer Way improvements as part of a downtown revitalization project. The reconstruction project converted Pioneer Way from a two-way to a one-way street and added pedestrian-friendly streetscape enhancements including wider sidewalks, landscape planters, and angled on-street parking.

South of Pioneer Way is Oak Harbor's waterfront trail. Oak Harbor's waterfront trail has grown into a popular pedestrian and recreational facility that spans the entire City waterfront. It connects to some of Oak Harbor's busiest parks and key destinations such as downtown, Skagit Valley College, the public library, and Oak Harbor's Marina.

Oak Harbor's bicycle route network is supported by a network of low speed and low volume residential streets, which offer the basic components of a safe bicycling environment. The City is working to make Oak Harbor more bicycle friendly by investing in bike facilities such as bike lanes and multiuse trails that support local and regional connections.

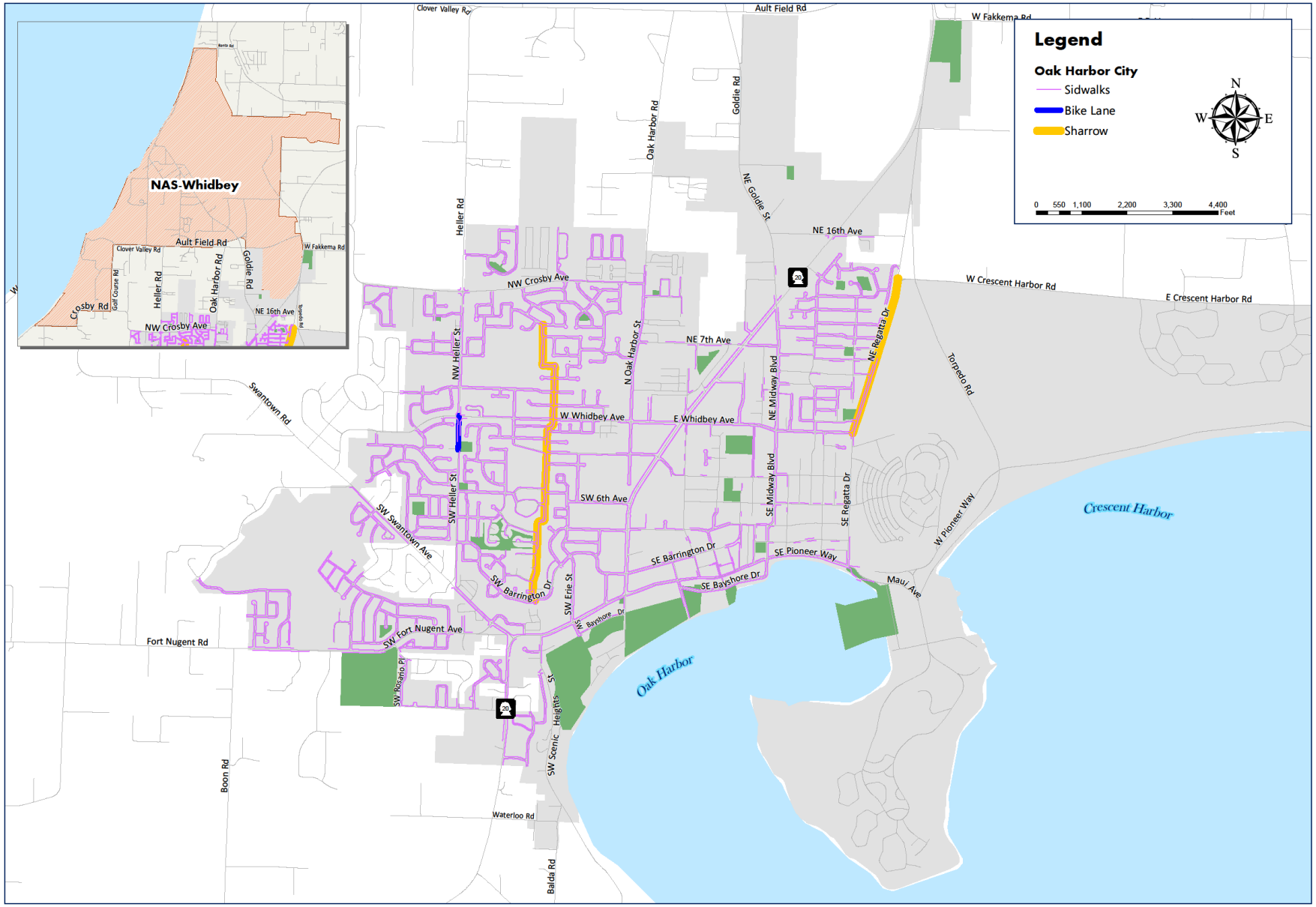
Locally, Oak Harbor has improved the bike network through projects such as the Freund's Marsh Trail from Scenic Heights Road to Oak Harbor' Windjammer Park. Regionally, Oak Harbor has worked with Island County, through planning efforts such as the Island County Non-Motorized Transportation Plan, to further develop Oak Harbor's bicycle network; identify short-term, mid-term, and long-term priority projects; and support a regional trail system that connects Oak Harbor with Deception Pass, Joseph Whidbey State Park, Dugualla State Park, and a number of additional parks and beach access areas.

Figure 4 shows the locations of pedestrian facilities and bike facilities in Oak Harbor.

Pioneer Way Improvement Project, Oak Harbor

Pioneer Way Improvement Project, Oak Harbor

Figure 4. Existing Bicycle and Pedestrian Facilities



TRANSIT NETWORK

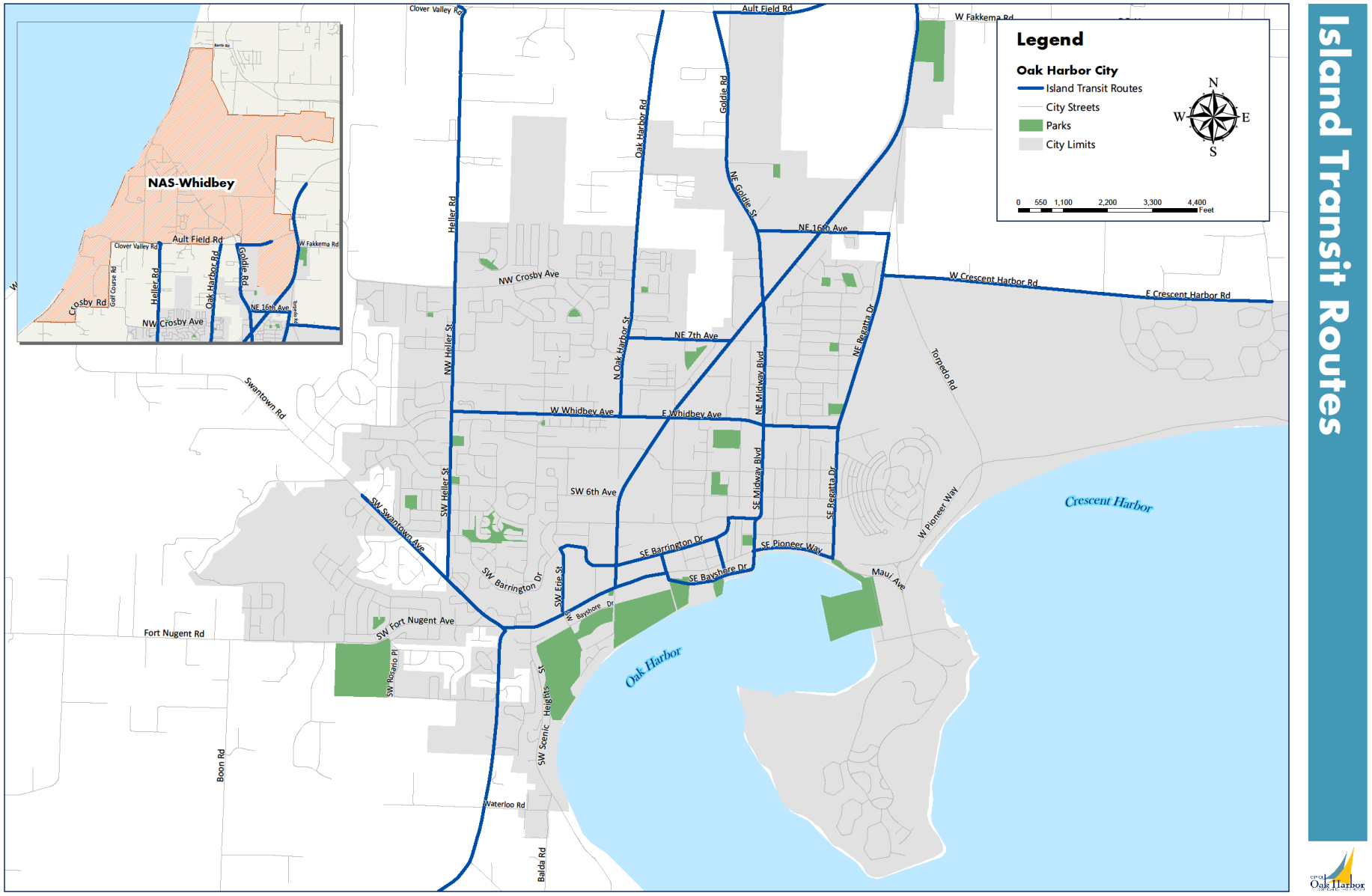
Island Transit provides local bus, express bus, and para-transit service with connections in Oak Harbor. The majority of transit riders access this transit service by walking or driving to a parking lot or on-street parking and then walking to connect to transit. Six Island Transit routes serve Oak Harbor with frequencies ranging from 20 – 60 minutes. Service is offered throughout all of Whidbey Island's eight park-and-ride lots, which are located along the state scenic byway that consists of the SR 525 and SR 20.

Island Transit connects to each of the ferry terminals on Whidbey Island, and many communities along the scenic byway. In addition, several transit agencies connect to Oak Harbor's transit network including Sound Transit, Skagit Transit, Community Transit, Everett Transit, Jefferson Transit and Whatcom Transit. Island Transit also offers a very successful vanpool and rideshare program

Figure 5 shows existing transit routes in the City's transit network.

Island Transit's Harbor Station, located in Oak Harbor's Old Town District

Figure 5. Island Transit Routes



FREIGHT NETWORK

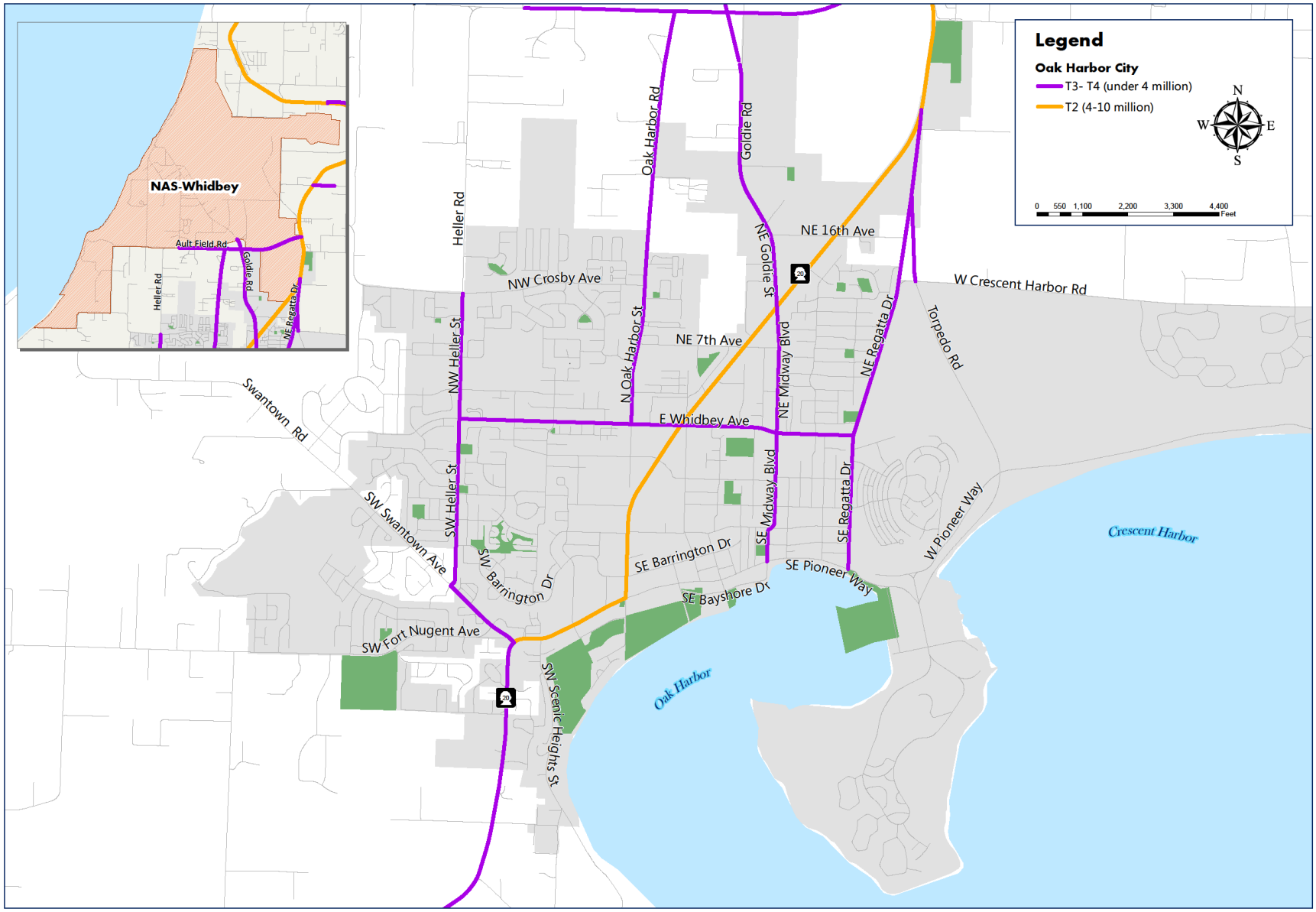
Freight and goods movement is a vital and often underappreciated element of the transportation network. Everyone is directly impacted by how goods are delivered to ports, distribution centers, stores and their homes. The City of Oak Harbor is a key regional player in the movement of goods with major highway and arterial connections to distribution facilities. Further, NAS Whidbey's Ault Field and Seaplane Base rely heavily on the efficient movement of goods.

SR 20, from Deception Pass Bridge through the City of Oak Harbor, is the most heavily-traveled roadway facility in Island County, with approximately 3.6 million tons of freight carried annually along the corridor. In addition, local city arterials such as Regatta Drive, Midway Boulevard, Oak Harbor Street, Whidbey Avenue, Swantown Avenue, and Heller Street serve as key freight arterials that provide connections to regional facilities.

The WSDOT freight corridors within Oak Harbor as well as additional truck routes designated by the City are shown in **Figure 6**.

State Route 20, Oak Harbor

Figure 6. Existing Truck Routes



AUTO NETWORK

With many Oak Harbor residents, employees, and residents relying on vehicles as their primary mode of transportation, the City's street network is critical to the transportation system. Growth within the region has increased traffic congestion along some of Oak Harbor's roadways.

To understand roadway operations in the City today, 31 intersections in the City of Oak Harbor were evaluated to identify the need for future roadway improvements. The study intersections within the area bounded by NE 16th Avenue (north), Regatta Drive (east), Swantown Avenue (west), and Pioneer Way (south), as seen in **Figure 7**. Intersections operations were evaluated and assigned a level of service (LOS) grade based on their operations in terms of vehicle delay.

Table 2 describes the Level of Service definitions laid out in Chapter 16 of the *Highway Capacity Manual* (HCM) (Transportation Research Board, 2010), which is a standard methodology for measuring the performance of intersections and corridors[7].

Table 2: Level of Service Definitions

Level of Service	Description
A	Free-flowing conditions.
B	Stable operating conditions.
C	Stable operating conditions, but individual motorists are affected by the interaction with other motorists.
D	High density of motorists, but stable flow.
E	Near-capacity operations, with significant delay and low speeds.
F	Over capacity, with delays.

The City's existing level of service policy sets the following standards for its roadways:

- LOS D or better for intersections on City streets within the City UGA
- LOS E for intersections along SR 20 within the City UGA

[7] In a few locations, HCM 2000 was used due to limitations in applying the HCM 2010 methodology.

Of the 31 intersections analyzed, all intersections operate at LOS D or better today. These intersections are generally located along key north-south arterials. Given the land use growth anticipated in Island County between now and 2036, some of the intersections that are currently meeting the City's LOS D standard would degrade to LOS E or F by 2036 without the infrastructure improvements identified in this plan. The locations of these intersections are shown in **Figure 8.**

Detailed reports of LOS are available in **Appendix A**.

Whidbey Avenue, Oak Harbor

West Pioneer Way, Oak Harbor

Figure 7. Intersection Count Locations

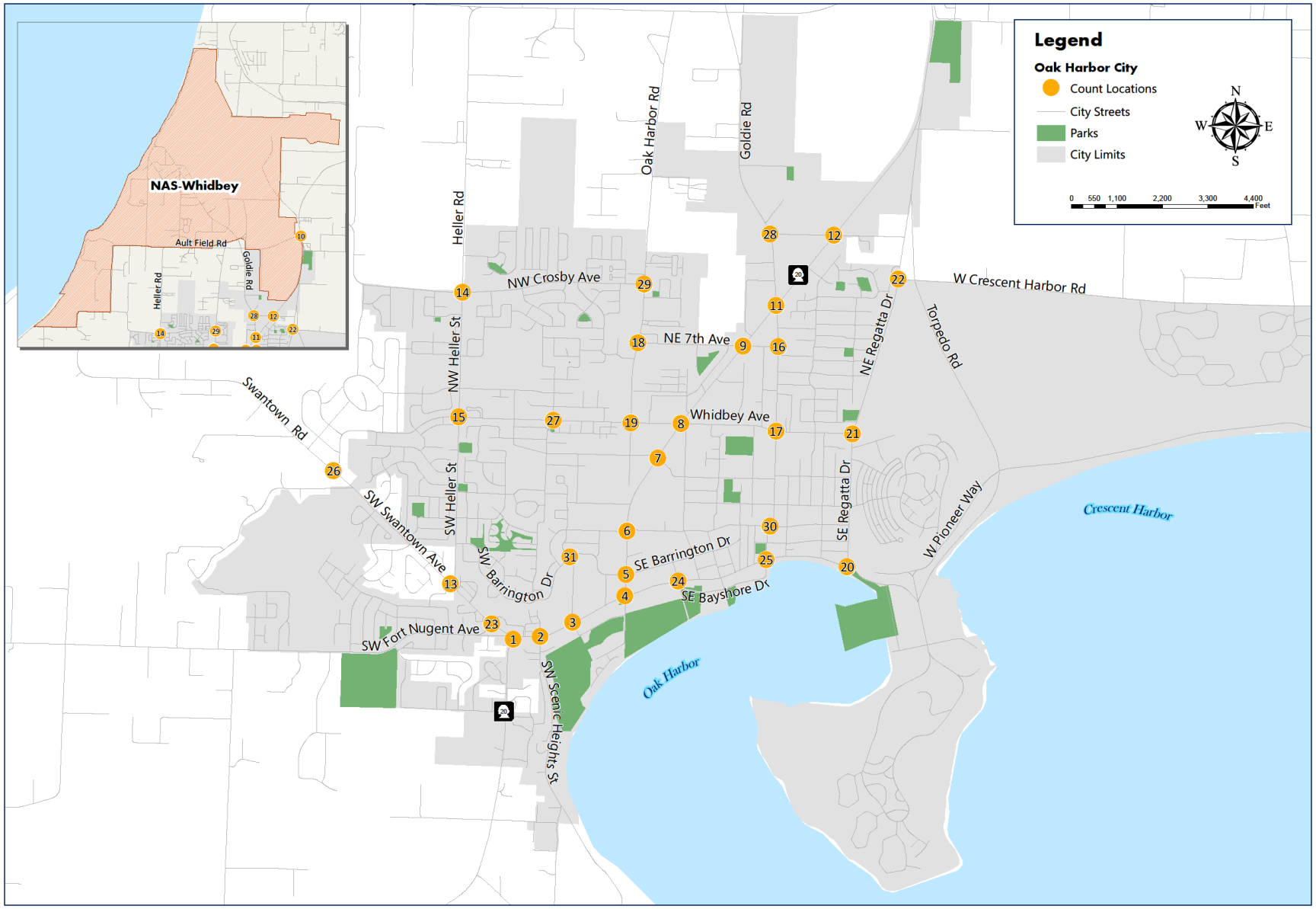
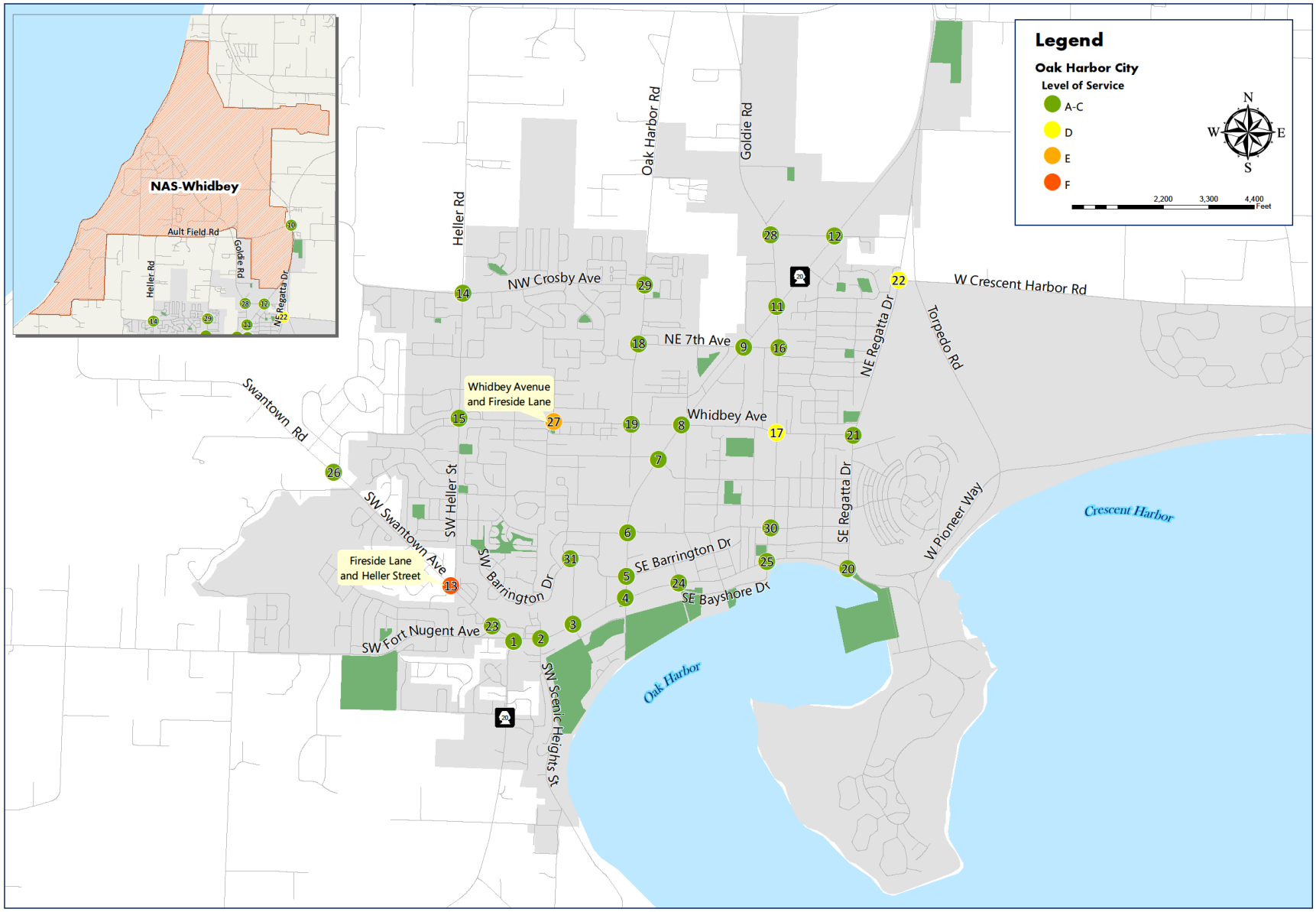


Figure 8. Intersection Level of Service (2036)



Future Level of Service

OPPORTUNITIES AND CHALLENGES

The City of Oak Harbor has several important challenges to face as it prepares for future growth and development. Motor vehicle travel currently dominates the City's transportation network. Oak Harbor is working to create a more balanced network, and addressing the transportation challenges below will be a key to the City's success.

NETWORK CONNECTIVITY

Barriers to Mobility

The City's roadway network creates several challenges for local traffic. Few east-west and north-south arterials serve the entire City. Further, poor connections between local streets (e.g. dead ends, cul-de-sacs, misaligned roads, etc.) encourage the use of SR 20 for local trips. This contributes to congestion on SR 20, especially during peak periods. In addition, SR 20 bisects the center of Oak Harbor creating barriers for walking and biking.

Pedestrian and Bicycle Infrastructure

Sidewalks are generally available along all arterials, streets within the Old Town District, and in newer subdivisions. However, many older residential areas, have incomplete or poorly maintained sidewalks. This limits the mobility of pedestrians between major destinations. The City's existing bicycle network is limited to a small number of trails and on-street facilities. These gaps in infrastructure, along with a topography that includes many hills, create challenges for bicycle travel within the City.

Transit Access and Availability

With no high capacity local transit system, bus service in Oak Harbor must be reliable and provide significant mobility. The bus routes that currently serve Oak Harbor operate on infrequent service schedules. This creates challenges for transit-dependent riders for accessing their needs, and it forces many potential transit users to drive instead. The City should look for ways to encourage enhanced transit service from Island Transit through investment in transit-supportive amenities to help residents, employees, and visitors access and use transit.

REGIONAL GROWTH

Regional development outside of the city itself will play a major role in the growing demands on Oak Harbor's transportation network by 2036. Island County is expected to continue adding residents and jobs during this time period. This growth will add traffic to Oak Harbor's streets, and the City must make a concerted effort to accommodate its own growth, while coordinating with its partners outside the city on regional needs.

DOWNTOWN MOBILITY

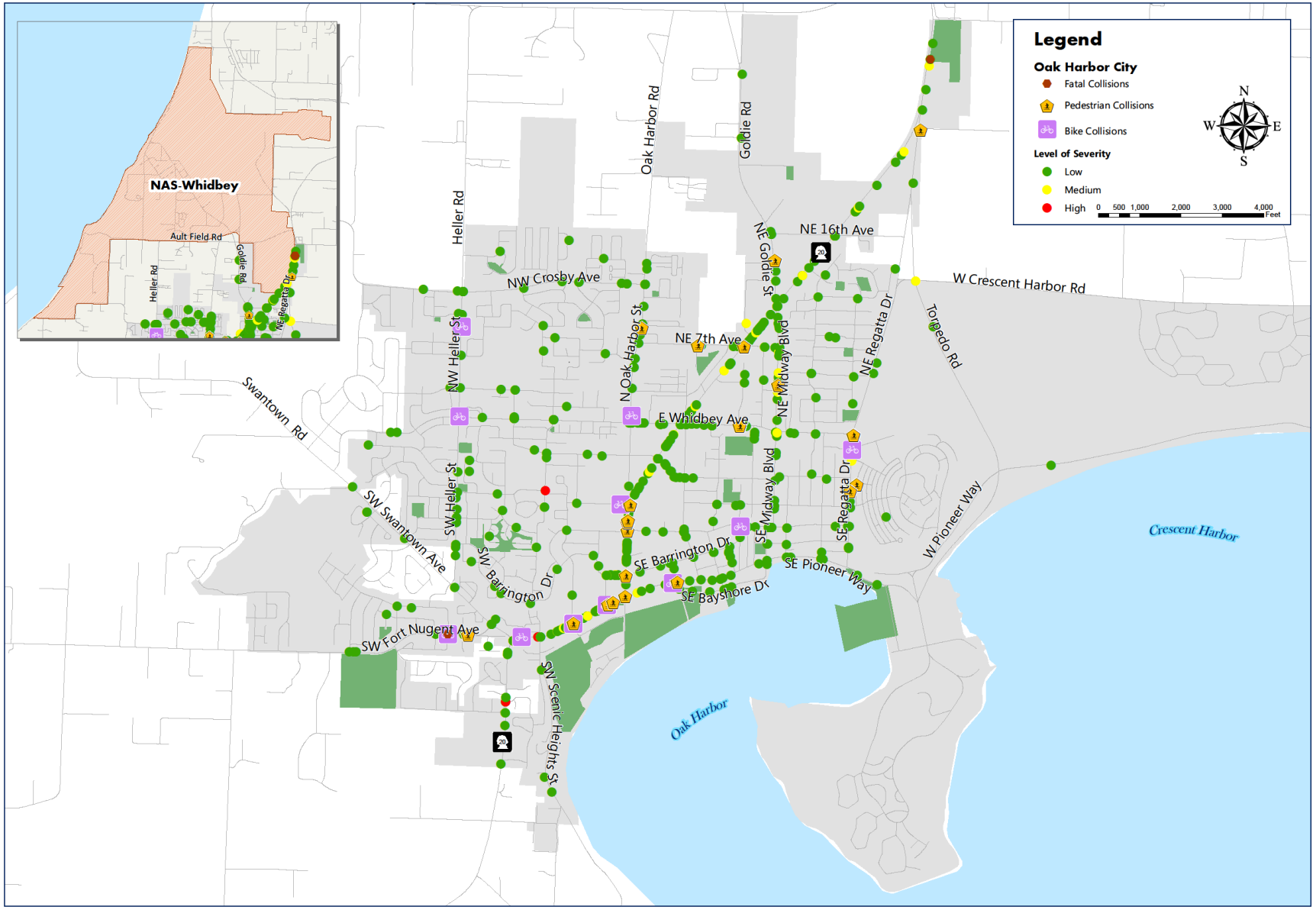
The City is working to develop safer connections to the Old Town District as part of this Transportation Element update. By improving bicycle and pedestrian amenities, by adding flashing beacons at crosswalks and bike lanes along Pioneer Way, the City will create a more accessible and attractive downtown. This will enhance the appeal of spending time in the downtown area.

SAFE ROUTES FOR ALL, ESPECIALLY PEDESTRIANS AND BICYCLES

Since 2010, Oak Harbor has seen 150 to 200 traffic collisions per year. **Figure 9** displays traffic crashes around the City over a five-year period spanning 2010-2014. In an effort to increase pedestrian safety, Oak Harbor has improved pedestrian facilities in the downtown. Sidewalk and crosswalk improvements have created a more welcoming environment for pedestrians moving around downtown, but busy corridors, such as Pioneer Way, SR 20, and Regatta Drive, have still seen a significant number of collisions involving pedestrians and bicyclists.

NE 7th Avenue, Oak Harbor

Figure 9. Collisions in Oak Harbor (2010-2014)



Collisions (2010-2014)

Oak Harbor Travel Demand Forecasting

The Growth Management Act (GMA) requires that the Transportation Element support the land uses envisioned in the Comprehensive Plan. Thus, an important component of this plan was forecasting how the future land uses envisioned in the City, as well as regional growth, would influence demand on Oak Harbor's transportation network. A description of the travel demand modeling process is provided below with more detail about land use assumptions in **Appendix C**.

The Tool. As a part of previous planning efforts, the Skagit Council of Governments created a travel model with the Visum software package. This model forecasted traffic volumes during the evening commute hour (4-6pm) along Oak Harbor's key streets and intersections. This tool provides a reasonable foundation for developing year 2036 forecasts, as the underlying land use assumptions have been updated to match the land use forecasts for the current Comprehensive Plan.

- **Estimate Land Use Growth in the City.** As a part of the Comprehensive Plan update, the City is planning for expected growth in housing units and employment over the next 20 years through 2036. Based on growth estimates from Island County and review by City staff, Oak Harbor is preparing for 1,600 new housing units and 2,000-3,000 new workers by 2036. The City then allocates the growth throughout Oak Harbor based on adopted zoning, observed development patterns, and other city policies.

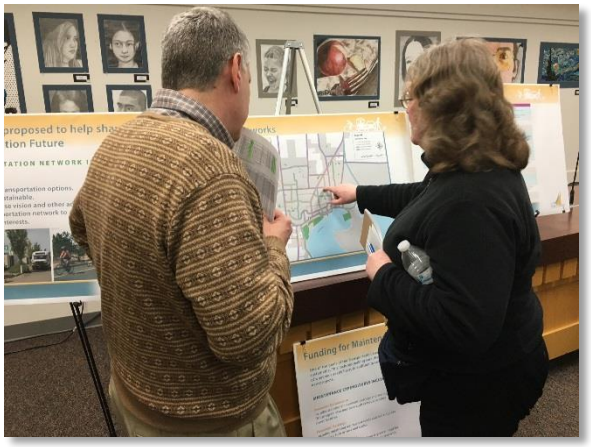
- **Capture Regional Growth Patterns.** Other communities throughout the region are going through this very same process. Since travel does not stop at a jurisdiction's borders, it is important to capture how regional growth could influence travel patterns on Oak Harbor's streets.

- **Translating Land Uses into Trips.** The next step is evaluating how the City and regional growth assumptions described above translate into walking, biking, transit, and auto trips. The travel model represents the number of housing units and employees in spatial units called traffic analysis zones (TAZs). TAZs can be as small as a few street blocks to as large as an entire neighborhood. They provide a simplified means to represent trip making rather than modeling individual parcels. The travel model estimates trips generated from each TAZ (both inside and outside of the City) using established relationships between different land use types with trip making. These trips are then assigned onto the roadway network to estimate how much traffic would be on each street during the evening commute hour.

CHAPTER 3: COMMUNITY AND STAKEHOLDER OUTREACH

Development of this Transportation Element included extensive community outreach through workshops, committee meetings, and a public survey. The City held open public workshops in November 2015 and February 2016 to gain insight on how Oak Harbor citizens would like to prioritize transportation for the next 20 years. The City also provided opportunities for public input at many community events including Oak Harbor's Farmers Market and Driftwood Day. In addition, the consultant team met frequently with City staff members, the Planning Commission, and City Council throughout the course of the planning effort.

Public Workshop, February 3rd 2016



Public Workshop, February 3rd 2016

STAKEHOLDER INTERVIEWS: CURRENT SYSTEM

Stakeholder interviews were conducted to discuss different agencies' perspectives on the Transportation Element update, and to identify opportunities and challenges within Oak Harbor's transportation network. Over the course of the project, the project team met with the following stakeholders:

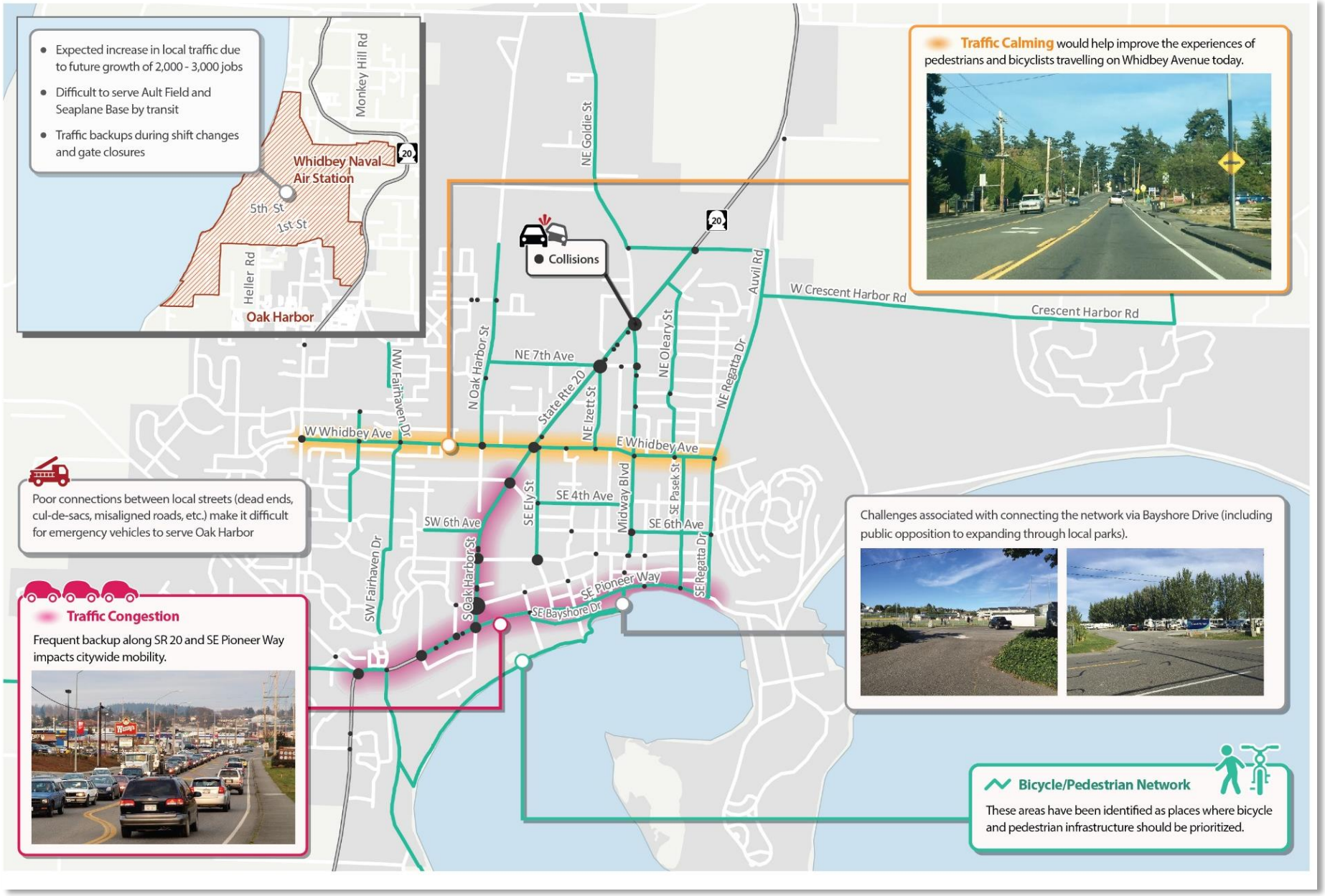
- Island County
- Island Transit
- Whidbey Bicycle Club
- Oak Harbor Police Department
- Oak Harbor Fire Department
- Naval Air Station (NAS) Whidbey
- Oak Harbor School District
- Washington Department of Transportation
- Oak Harbor Parks and Recreation Department

A variety of responses relating to transportation were provided and feedback is summarized in **Table 3** and displayed in **Figure 10**.

Table 3. Key Themes from Stakeholder Meetings

Efficient and Connected Network	Safe Corridors	Downtown Traffic	NAS-Whidbey
• Missing bicycle and pedestrian links on Fort Nugent Road, Whidbey Avenue, and other important nonmotorized activity corridors • Poor connections between local streets (e.g. dead ends, cul-de-sacs, misaligned roads, etc.) contribute to local traffic on SR 20	• Traffic calming needed on Whidbey Avenue and other high priority pedestrian corridors • Collision hotspots: Whidbey Avenue Corridor; Crescent Harbor Road and Regatta Drive; SR 20 and Midway Boulevard, Goldie Road, Barrington Drive	• Traffic backups along SR 20 corridor between Cabot Drive and Swanton Road • Traffic congestion on SE Pioneer Way • Challenges associated with connecting the network via Bayshore Drive	• Expected increase in local traffic due to future growth of 2,000-3,000 jobs • Difficult to serve Ault Field and Seaplane Base by transit • Traffic backups during shift changes and gate closures

Figure 10. Key Themes Identified in Stakeholder Interviews



PUBLIC WORKSHOPS & SURVEY: FUTURE NEEDS

Community input regarding the future of transportation in Oak Harbor was collected at two public workshops and through a survey available online and at community workshops and events. Over 100 responses were collected from the survey alone.

SURVEY RESPONSES

Survey respondents were asked how they travel in the City; which modes they would like to see the City focus their efforts on; and how they envision Oak Harbor's future transportation system. The comments provided through the online survey and public workshops were compiled, reviewed, and analyzed. Overall, respondents showed a desire for multimodal investments to reduce congestion, enhance safety, and improve network connectivity.

The popularity of each mode of travel is shown in **Figure 11**. The modes that need the most attention in the future are identified in **Figure 12**.

PUBLIC WORKSHOPS

The purpose of the November 10th workshop was to share with the public why we are updating the plan and discuss Oak Harbor's existing transportation network and residents' travel behavior. The November workshop also provided an opportunity to gain public input on how residents envision Oak Harbor's future network and to identify areas of the City in need of transportation investments to improve safety and mobility.

The purpose of the February 3rd workshop was to share with the public how public input was incorporated into the draft plan from the November workshop, including drafting a 20 - year project list based on the public's shared thoughts on transportation priorities in Oak Harbor. At the workshop participants were given the opportunity to provide feedback on the proposed project list. To facilitate this process, each attendee of the workshop was given ten dots to cast their vote for projects that they felt were most needed.

The top five projects identified as part of this process were:

1. NE 7th Avenue Roadway Reconstruction and Pedestrian Improvements
2. Midway Boulevard Road Diet
3. Fort Nugent Bike Lane
4. Midway Boulevard / Goldie Road Bike Lane
5. SW Heller Roadway improvements

Figure 11. How Oak Harbor Residents Travel Today (Survey Results)

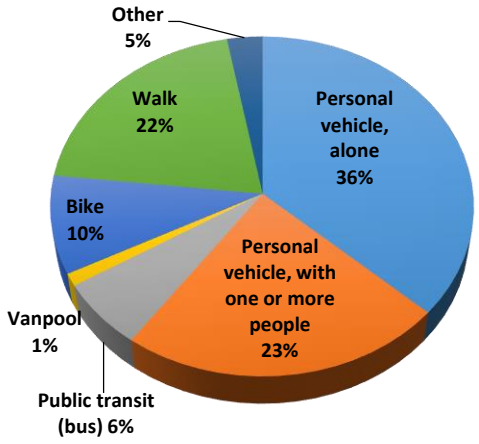
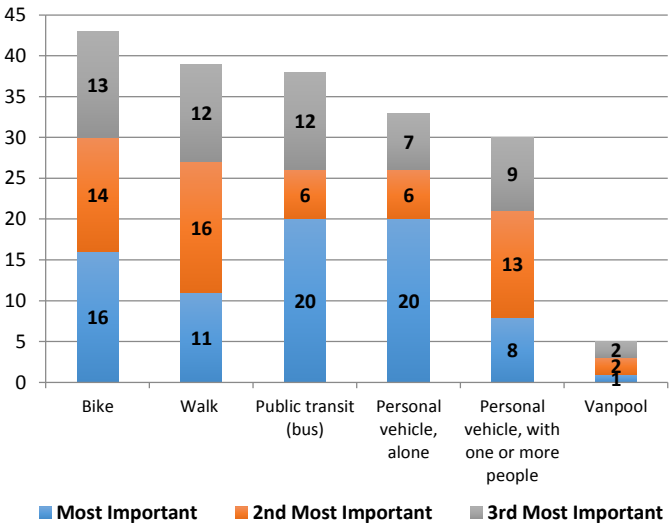


Figure 12. Travel Modes that Need the Most Attention in the Future (Survey Results)



CHAPTER 4: TRANSPORTATION GOALS AND POLICIES

Oak Harbor has established six goals to accomplish its overall vision for transportation in the future. The goals establish overarching priorities that serve the vision of this Transportation Element while policies lay out specific actions. Together, the goals and policies lay the foundation for the remainder of this Plan, including the proposed project list and ongoing implementation of the Plan. The consolidated set of goals and policies is included in this chapter.

GOAL 1 – SAFE FOR ALL USERS

1a. Strive to reduce traffic deaths and serious injuries in Oak Harbor to zero by 2030 as part of the State of Washington's traffic safety efforts using education, enforcement, engineering, emergency medical services, and leadership / policy.

1b. Prioritize locations with a history of collisions or other identified safety issues when selecting transportation projects to implement.

1c. Keep roadways operating in safe condition by taking steps to secure roadway funding from a variety of sources to maintain, rehabilitate, or replace roadways.

1d. Design street improvements to enhance the safe and efficient movement of pedestrians and bicycle traffic. Incorporate traffic calming measures where appropriate.

1e. Design new streets and, when the opportunity arises, redesign streets in order to reduce lane widths to accommodate vehicles that use the street most frequently; rather than large vehicles that may use the street only occasionally.

1f. Coordinate with emergency response services to ensure adequate and timely access as the city builds out the transportation network.

GOAL 2 – CONNECTED AND EFFICIENT

2a. Encourage the efficient movement of people and goods through an effective and inter-connected transportation network that includes: collector and arterial streets, trails, bike paths, public transit and other transportation facilities and is in balance with the land use and transportation requirements in the City of Oak Harbor.

2b. Provide for the efficient movement of people and goods on arterial streets through a balanced approach that only increases the automobile capacity of roadways when necessary.

2c. Work toward development of a multi-modal transportation system that achieves the following level of service metrics:

i. **Vehicular LOS** Maintain standards that promote growth where appropriate while preserving and maintaining the existing transportation system. Set LOS D as the standard for PM peak hour for allowable PM peak hour delay at intersections, with the exception of intersections along SR 20 within the City UGA, where LOS E operations will be considered acceptable during the PM peak period.

ii. **Pedestrian LOS-** Provide sidewalks, trails, and/or separated paths, as defined in Pedestrian Priority Network.

iii. **Bicycle LOS-** Provide bike lanes, separated paths, protected facilities, and bicycle boulevards, as defined in Bicycle Priority Network.

iv. **Transit LOS-** Partner with Island Transit and other transit operators to provide transit stop amenities and safe access to transit at major transit stops and park and ride facilities.

2d. Maintain concurrency between land development and installation of required transportation facilities, consistent with the Capital Improvement Plan.

2e. Facilitate efficient connections by encouraging street system design in a rectangular grid pattern with smaller block sizes, frequent interconnections, and clear wayfinding; strongly discourage cul-de-sacs or dead end streets.

2f. Coordinate all modes of transportation to enhance effectiveness and efficiency. Promote a transportation network, including non-motorized modes, that allows for convenient access to major destinations within the City of Oak Harbor.

GOAL 3 – MULTIMODAL, OFFERING USER FRIENDLY TRANSPORTATION OPTIONS

3a. Coordinate with private transportation providers to boost the effectiveness of public transportation providers.

3b. Coordinate with Island Transit to identify locations for future transit infrastructure and improvements that will more effectively serve the developing areas of Oak Harbor, such as bus stops, bus pullouts, bus stop shelters, and park-and-ride facilities.

3c. Provide incentives for the use of car and van pools through City development standards that support providing park-and-ride lots, designated car pool parking spaces, van pool pick up areas, and other supportive amenities.

3d. Participate and support in the planning for long-term sustainability of air and water transportation and facilities.

3e. Develop a bicycle priority network for the City of Oak Harbor and the UGA that promotes bicycling as an efficient choice for transportation and recreation. The priority network shall include but not be limited to the following: future on-street bicycle facilities, multi-use paths, and bike rack locations, using context-sensitive designs for bicycle facilities on the different roadway classifications and intersections.

3f. Enhance and beautify the Waterfront Trail, from Scenic Heights to Maylor Point, with widening, scenic viewpoints, historical signage and art.

3g. Develop and construct a pedestrian priority network for all streets and highways that interconnects with other modes of transportation and prioritizes streets used frequently by school children, senior citizens, people with disabilities, and streets in heavily congested areas. Use the Safe Routes to School program as a model for identifying locations for these facilities.

3h. Maintain a pedestrian-oriented atmosphere in the Old Town District (Downtown).

GOAL 4 – FINANCIALLY AND ENVIRONMENTALLY SUSTAINABLE

4a. Reduce the demand on roadways as a method of deferring or negating the need for capacity improvements.

4b. Integrate Transportation Demand Management goals with the development review process such that they become a part of any traffic impact assessment and mitigation program.

4c. Prioritize roadway preservation projects, review potential roadway preservation funding programs and consider the long term maintenance costs of new transportation capacity projects.

4d. Prioritize projects on the City of Oak Harbor Capital Improvement Plan (CIP) by evaluating and ranking them, taking into account their costs and benefits, to ensure effective investment of city funds.

4e. Maintain an Impact Fee Program that determines the proportionate share of infrastructure improvement costs to be assessed to new and redevelopment projects. Require proportionate funding of required transportation improvements by property owners and by developers whose developments impact the streets.

4f. Evaluate potential federal, state, and other funding (grants and loans) programs that may be compatible with prioritized transportation projects.

4g. Coordinate with state and regional agencies to obtain funding for identified improvements for SR-20 within the UGA.

4h. Promote property owners to finance neighborhood street improvements, for example through local improvement districts (LIDs).

4i. Protect air quality by improving the operating efficiency of the overall

transportation system and boosting the non-single occupant vehicle mode share in Oak Harbor.

4j. Consider the potential of using roundabouts in lieu of installing new signalized intersections or reconstructing existing signalized intersections.

4k. Protect and/or mitigate the preservation of natural vegetation in transportation rights-of-way, particularly regarding the City's trademark Garry Oak trees, in the construction and repair of streets.

4l. Protect and/or mitigate environmentally sensitive areas and resource lands when maintaining existing streets and planning for future ones (See Environmental Element.)

GOAL 5 – COMPLEMENTARY OF THE CITY'S LAND USE VISION AND OTHER ADOPTED PLANS

5a. Locate and design transportation facilities to meet the demands of existing and projected land uses as provided for in the Comprehensive Plan, including the growth anticipated within the Oak Harbor UGA.

5b. Implement transportation improvements that respect the community's residential character, natural features, and quality of life.

5c. Manage the supply of parking to ensure it serves the community's needs and maintains a positive aesthetic.

5d. Support the use of public transit, walking, and bicycling through development regulations and design guidelines that create infrastructure, land use patterns, and developments that are conducive to these modes. Require public transit opportunities for new and re-developed projects. Maintain an emphasis on a bicycle and pedestrian oriented atmosphere during development review.

GOAL 6 – INTEGRATED WITH THE REGIONAL TRANPOSRTATION NETWORK TO ADDRESS A DIVERSE RANGE OF TRANSPORTATION INTERESTS

6a. Ensure efficient management of all transportation resources through cooperation in planning and project development with Federal, State, regional, and local jurisdictions. Work with Island County to continue consistency and interconnectedness in Oak Harbor's Unincorporated UGA.

6b. Coordinate planning for transportation improvements and projects with other agencies in order to reduce costs, minimize environmental impacts, reduce duplication of services, and minimize disruption to the general public.

6c. Work with adjacent jurisdictions and transportation agencies to identify necessary improvements to the regional roadway system to ensure adequate regional access to and from the City of Oak Harbor.

6d. Coordinate with the Washington State Department of Transportation (WSDOT) on capacity improvements, access management and safety issues for SR 20.

6e. Continue to encourage the implementation of transportation demand management (TDM) strategies through coordination with WSDOT, Island County, and Island Transit.

CHAPTER 5: FUTURE TRANSPORTATION VISION

Oak Harbor envisions a future transportation system that serves all users and modes of travel by offering a safe and robust network of walkways, bicycle facilities, intersections, and roadways. This chapter describes Oak Harbor's vision for its future transportation network and the infrastructure improvements that will get the City there.

As identified in this plan, most of the improvements are focused on the development of a 'layered' transportation network, which focuses on providing complete accommodation for all modes of travel. While some of the roadway improvements identified in this Transportation Plan needed to meet the City's vehicular level of service (LOS) standard, most of the future improvements focus on providing safer and more complete facilities for walking, bicycling, and riding transit in order to improve access and mobility for all road users.

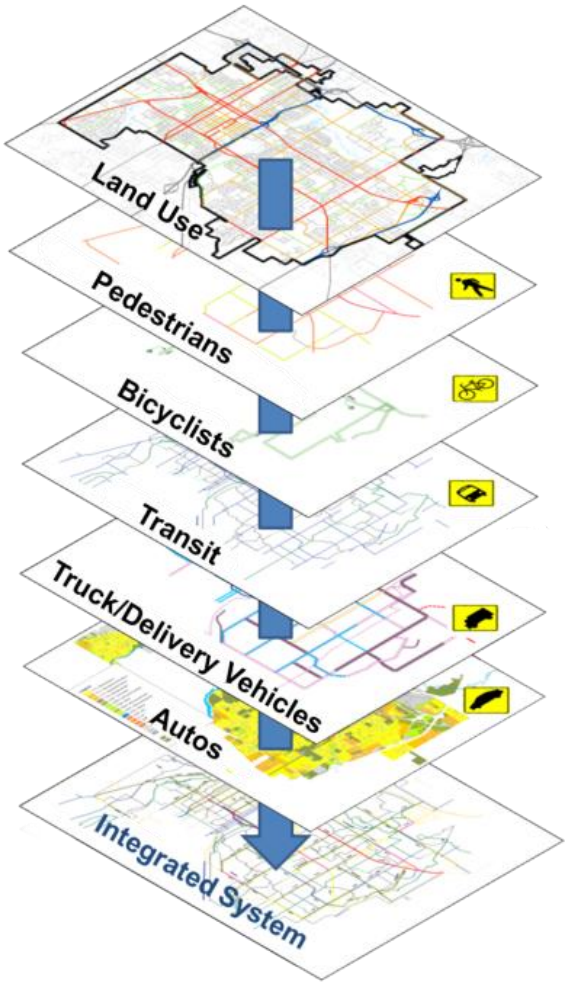
INTRODUCTION TO THE LAYERED NETWORK

It can be a challenge for a single roadway to meet the demands and expectations of all modes at any given time. This is also generally not desirable from a user or a planning perspective.

In response to this challenge, the City of Oak Harbor has adopted a layered network approach that focuses on how the City's transportation network can function as a system to meet the needs of all users. In such a system, different facilities are identified for different travel needs to ensure that everyone has complete accommodation throughout the overall network. **Figure 13** illustrates the concept of a layered network.

The City will implement this layered network through a system of modal networks that define each street's user priorities and associated infrastructure needs.

Figure 13. Layered Network



MODAL NETWORKS

Streets in Oak Harbor serve different travel purposes, and the modal networks therefore prioritize a different balance of users on each corridor. Determining how the entire transportation network fits together in Oak Harbor requires identifying desirable streets for each mode, combining them to locate overlaps, and the identify infrastructure enhancements to ensure safe and complete facilities for all modes. The following sections review the priority networks for each mode and establish their level of service standards.

WALKING

While Oak Harbor's local streets tend not to need fully separate sidewalks or paths due to their low traffic volumes and slow speeds, the City's arterials and commercial collectors do warrant dedicated pedestrian infrastructure. Dense areas with commercial land uses and streets that serve schools, parks, and churches are particularly important as they support more pedestrians and may have a larger portion of vulnerable users than other streets.

Figure 14 highlights the *Pedestrian Priority Network*, which specifies where pedestrian infrastructure should be provided in the long term.

Building on the *Pedestrian Priority Network*, **Table 4** establishes guidance in terms of the level of accommodation that the City wishes to provide for pedestrians around the City. The highest level of accommodation for walking, indicated in the green row, would provide buffered walkways or facilities in the *Pedestrian Priority Network*. The yellow level of accommodation would make strong progress in building out the *Pedestrian Priority Network* by filling sidewalks gaps to ensure that a sidewalks I proved on at least one side of the street. Incomplete or missing pedestrian facilities would fall into the red category and not satisfy the City's goals for accommodating pedestrians.

Table 4: Pedestrian Accommodation Descriptions

Within Pedestrian Priority Network	
	Pedestrian facility* where indicated in Pedestrian Priority Network, with a buffer
	Pedestrian facility* provided on one side of the street
	No pedestrian facility

BICYCLING

Oak Harbor already sees some bicycling along the Waterfront Trail, which connects to the Freund Marsh Trail on its western end. The City also has shared-use path on Regatta Drive and Fairhaven Drive, and a bike lane on a portion of Heller Street. Connecting to these routes from other areas of the City can be challenging, however, due to the lack of bicycle infrastructure. Key mobility corridors for bicyclists, such as Pioneer Way, Whidbey Avenue, and Midway Boulevard would be best served with on-street bike lanes, while bike boulevards and shared use paths would suffice on quieter streets.

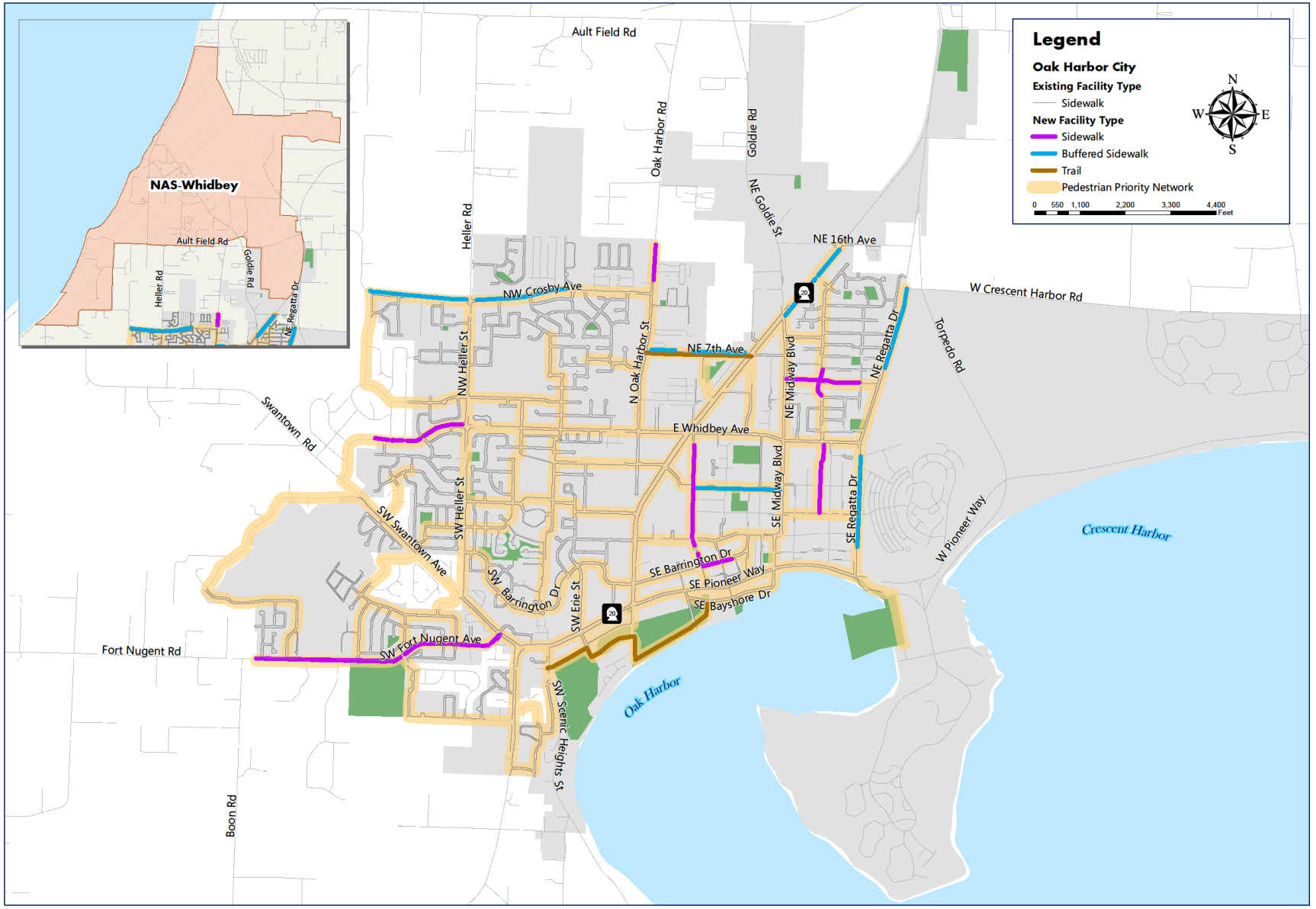
Figure 15 highlights the *Bicycle Priority Network*, which specifies where bicycle infrastructure should be provided in the long term

The City of Oak Harbor can strive for the green level of accommodation for bicycling by installing the bicycle facilities depicted in the *Bicycle Priority Network* or a facility that offers more separation from vehicle traffic. At a minimum, the City should make meaningful progress toward constructing this network by building some initial north-south and east-west spines, as depicted in the yellow level of accommodation projects. Incomplete or missing bicycle facilities do not meet the City's desired level of accommodation for bicycling, would fall into the red category as described in **Table 5** below.

Table 5: Bicycle Accommodation Descriptions

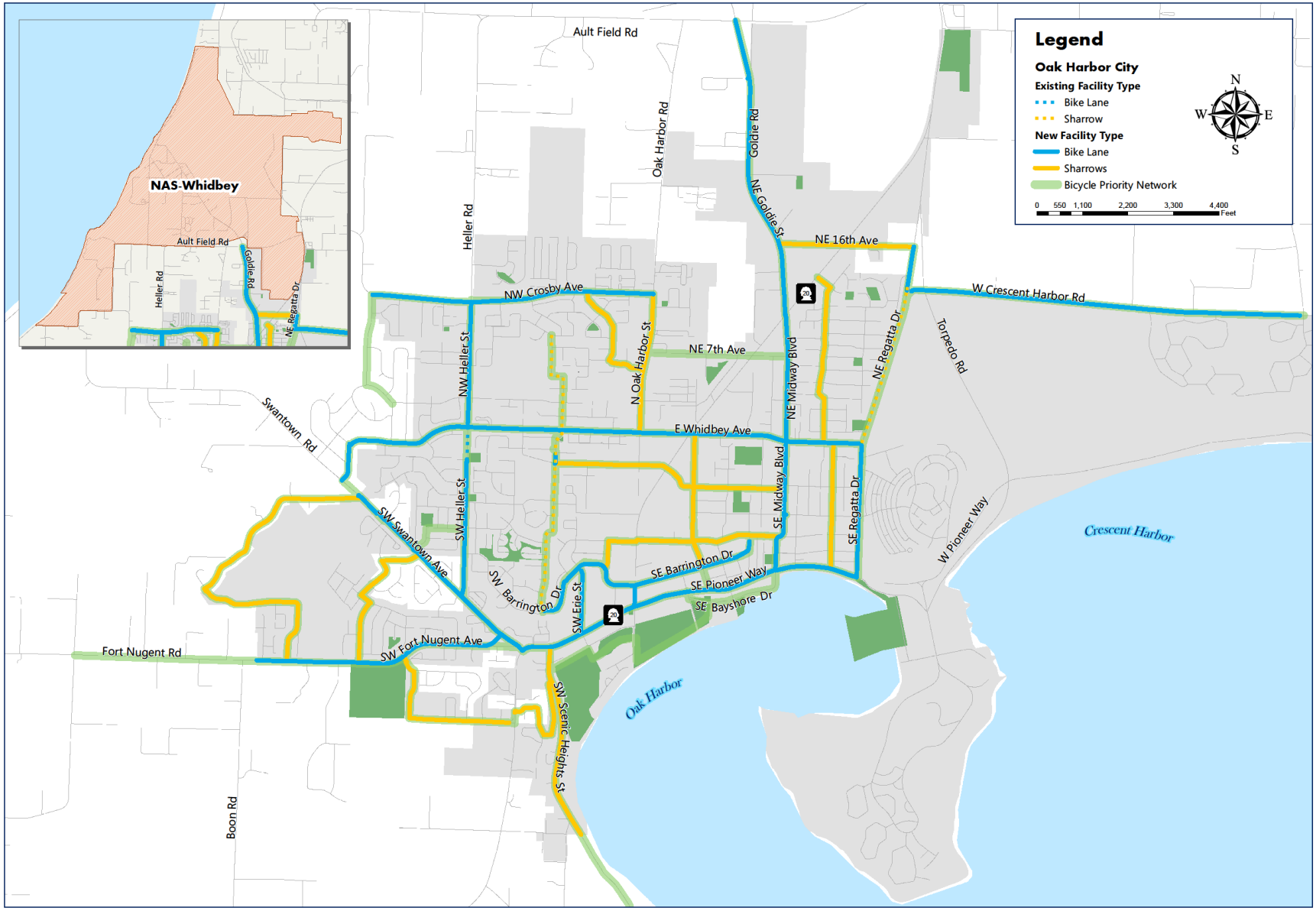
Within Bicycle Priority Network	
	Provides minimum treatment* recommendation, as shown within Bicycle Priority Network
	Provides a lower-level facility* than recommended in the Bicycle Priority Network
	No bicycle facility

Figure 14. Pedestrian Priority Network



Pedestrian Priority Network

Figure 15. Bicycle Priority Network



TRANSIT

Transit operations are out of the City's direct control, but Oak Harbor can still aim to create an environment that is welcoming to transit. The *Transit Priority Network* identifies the corridors where the City should focus its efforts in **Figure 16**. In addition to the treatments specified on the map, the City can boost transit use by offering:

- Street lighting
- Pedestrian and bicycle facilities for connecting to transit stops
- Real time arrival information

Oak Harbor's level of transit accommodation is defined based on the amenities discussed below.

The City can reach the highest level of accommodation (green) by providing the level of transit-supportive amenities such as benches, shelters, garbage cans, and lighting, in addition to providing amenities that support pedestrian access such as sidewalks, and marked crosswalks at all stops.

As a minimum target, the City can strive to provide the transit stop amenities depicted in yellow in **Table 6** as well as pedestrian access improvements, such as sidewalks, and marked crosswalks near stops where feasible.

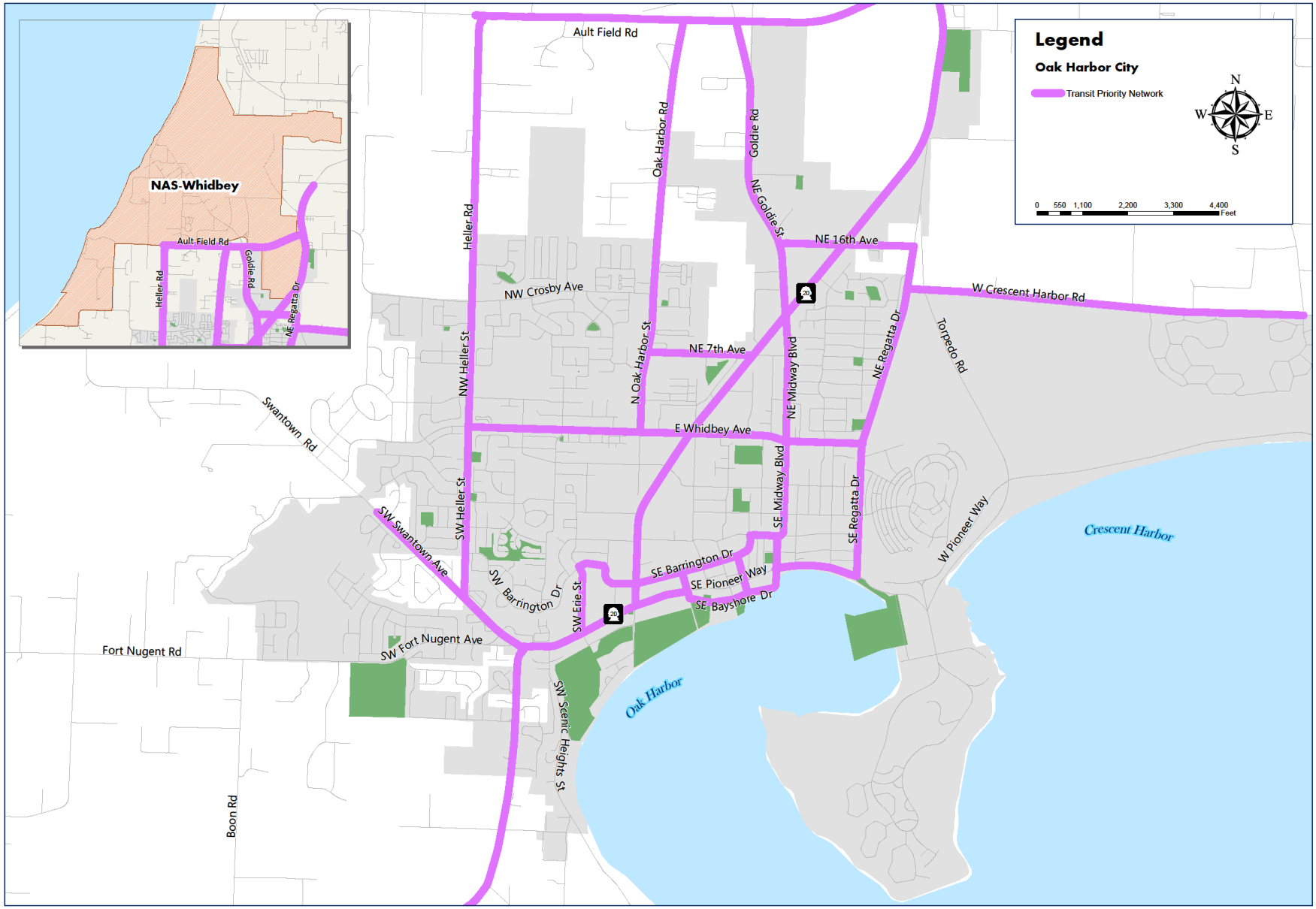
Island Transit Harbor Station, Oak Harbor

Island Transit Harbor Station, Oak Harbor

Table 6. Transit Accommodations – Stop Amenities and Pedestrian Access

	Transit Stop Amenities	Pedestrian Access
	Provide high quality stop amenities (benches, shelters, garbage cans, lighting)	Sidewalks and marked crosswalks serving all stops
	Provide some transit stop amenities	Sidewalks and marked crosswalks serving stops where feasible
	No amenities	General lack of sidewalks and marked crosswalks

Figure 16. Transit Priority Network



Transit Priority Network

FREIGHT AND AUTO

Most trips in Oak Harbor occur along its street network, which serves as the backbone for accessing homes, jobs, and other destinations. Many of these streets are local streets, however, and do not see significant traffic volumes throughout the day. Similarly, goods movement and delivery vehicles use some corridors frequently while other streets see only the occasional local delivery.

Figure 3 (page 12) calls out the functional classification of each of Oak Harbor's streets, in terms of whether it is an arterial, collector, or local street. These classes indicate the level of priority of each street for automobiles, specifically in terms of facilitating vehicle and freight mobility as well as other modes.

Figure 6 (page 18) specifies the WSDOT freight classification of Oak Harbor's major streets that support goods movement. These classifications indicate the annual weight of goods that travel a corridor, whether via large trailer loads or smaller delivery vehicles. The functional classification and freight class of a street should guide future investments in streetscape to ensure that streets can carry appropriate freight loads.

Oak Harbor will maintain its current LOS D standard for allowable PM peak hour delay at intersections in most locations, with the exception of intersections along SR 20 within the City and UGA, where LOS E operations will be considered acceptable during the PM peak period in recognition of the need to balance driver experience with other considerations, such as regional travel, cost, right of way, and other modes.

Appendix A of this element summarizes existing and future forecast delay at intersections in the City. The capital list provided in next chapter includes future roadway projects that would maintain the City's LOS standard through 2036.

SE 6th Avenue, Oak Harbor

State Route 20, Oak Harbor

CHAPTER 6: CAPITAL PLANS

This chapter presents the capital program that forms the basis of this Transportation Element. Collectively, this program adds up to $7 million in transportation improvements to be constructed over the next twenty years as seen in **Table 7**.

The components of the transportation program include $2.77 million in maintenance, operations and roadway rehabilitation. Maintaining Oak Harbor's transportation system is important for sustaining the quality and safety of roadways. The program also includes installing a traffic signal at the intersection of SW Heller Street and Fireside Lane[8], and full reconstruction of NE 7th Avenue between N Oak Harbor Street and SR 20.

Funding to support this program will come from a number of sources including Oak Harbor's general funds, gas taxes, property taxes, impact fees, as well as federal and state grants. Since the City's ability to attract outside funding sources is unknown, this project list may reach beyond 20 year time horizon.

The program was developed to create a transportation system that realizes Oak Harbor's ultimate transportation vision: to provide a safe, balanced, and efficient multi-modal transportation system that is consistent with the City's overall vision and adequately serves anticipated growth. This vision is guided by the transportation goals outlined in this Plan:

- **Goal 1:** Safe for all users
- **Goal 2**: Connected and efficient.
- **Goal 3**: Multimodal offering user friendly transportation options.
- **Goal 4**: Financially and environmentally sustainable.
- **Goal 5**: Complementary of the City's land use vision and other adopted plans.
- **Goal 6**: Integrated with the regional transportation network to address a diverse range of transportation interests.

With these goals in mind, as well as completing the layered networks described in the previous chapter, the project list was developed. **Table 7** describes the recommended projects, which represent a balance of safety, maintenance, and operational improvements for all modes.
These projects provide a starting point for the City in developing its financially constrained Six-Year Capital Improvement Plan, which is updated annually and is developed based on knowledge related to project feasibility and funding availability.

Table 7. Twenty Year Transportation Program

Project Description	*Project Description*	*Planning Level Cost*
Pavement Maintenance	• Annual pavement maintenance and overlay program	*$2.77M*
NE 7th Avenue Roadway and Pedestrian Improvements	• Full reconstruction of the roadway • Construction of the missing sidewalks on th north side of road and multiuse path on the south side of the road	*$3.6M*
SW Heller St & Fireside Ln Intersection Improvement	• Install a traffic signal at the intersection of Heller Street and Fireside Lane	*$630K*
Total		***$7M***

*All of the recommended transportation projects in Table 7 will require further analysis prior to actual construction

While the scope of the 20 year project list exceeds revenues from exclusively city sources over the next few decades, it has been sized to fit within reasonable assumptions for grants and other outside funding sources. Additional projects that were identified as part of the planning process that did not fit within the financially constrained 20 year project list but would further support the development of Oak Harbor's transportation network are described in **Table 8** and **Table 9** and displayed in **Figures 17-19**.

The additional projects are divided into two categories, Tier 1 and Tier 2. The categories are defined based on how well each project scored (see **Appendix E**) and were received by City staff, City Council, Planning Commission, and the public. Tier 1 projects are those that meet multiple criteria in terms of effectiveness, benefit to the community, and ability to be implemented.

[8] This intersection improvement is required to meet Oak Habror's LOS policy in the future.

Table 8. Twenty Year Contingency Project List Tier 1

Project Number	*Project Name*	*Project Description*	*Planning Level Cost*
Roadway and Intersection Improvement Projects			
T1-1	**Midway Boulevard Road Diet and Roadway Reconstruction**	Convert existing four-lane undivided roadway segment between Pioneer Way and NE 7th Avenue to a three-lane segment consisting of two through lanes and a center two-way left-turn lane. This project includes sidewalk improvements such as bulbouts, curb ramps and RRFBs, as well as bike lane.	*$10.1M*
T1-2	**Whidbey Avenue Roadway Reconstruction**	Reconstruct Whidbey Avenue between Heller Street and Regatta Drive. This project includes curb, gutter, drainage, transit and nonmotorized improvements (sidewalk maintenance and bike lanes).	*$10.2M*
T1-3	**Whidbey Road Diet between N Oak Harbor Street and SR 20**	Convert existing four-lane undivided roadway segment between N Oak Harbor Street and SR 20 to a three-lane segment consisting of two through lanes and a center two-way left-turn lane. This project will allow for improved bicycle and pedestrian conditions (sidewalk maintenance and bike lanes).	*$375K*
Pedestrian Priority Network Projects			
T1-4	**Whidbey Avenue Crossing Improvement**	Improve pedestrian crossing on Whidbey Avenue between N Oak Harbor Street and SR 20 near the intersection of Barron Drive.	*$200K*
T1-5	**Whidbey Avenue Pedestrian Refuge Islands at Fairhaven Drive and Jib Street**	Construct pedestrian refuge islands at the intersections of Whidbey Avenue and Fairhaven Drive and Whidbey Avenue and Jib Street.	*$140K*
T1-6	**SW Fort Nugent Avenue Sidewalks**	Complete sidewalk network near Fireside Development and Fort Nugent Park (both sides of the roadway).	*$788K*
T1-7	**SR 20 Sidewalks**	Construct buffered sidewalks on SR 20 between Goldie Road and NE 16th Ave/ W Cemetery Road.	*$500K*
T1-8	**Fairhaven Sidewalks**	Complete sidewalk connection between SW 3rd Avenue and SW 2nd Avenue.	*$78K*
T1-9	**Freund Marsh Trail Improvements**	Complete Freund Marsh Trail as planned, including links to neighborhoods and walkable beaches.	*$156K*
Bicycle Priority Network Projects			
T1-10	**SW Fort Nugent Avenue Bike Lane**	Add bike lane on Fort Nugent Road between Swantown Avenue and the City Limits.	*$154K*
T1-11	**Midway Boulevard/ Goldie Road Bike Lane**	Add bike lane on Goldie Road between NE 7th Ave and Ault Field Road.	*$180K*
T1-12	**Barrington Drive Bike Lane**	Add bike lane on Barrington Drive between Fairhaven Drive and SE Ireland Street.	*$154K*
T1-13	**Citywide Wayfinding Program**	Implement a Citywide Wayfinding Program to provide a clear visual language that can be universally understood and that will encourage walking, biking, and transit usage.	*$200K*
	Total		**$23.2M**

*All of the recommended transportation projects in Table 8 will require further analysis prior to actual construction

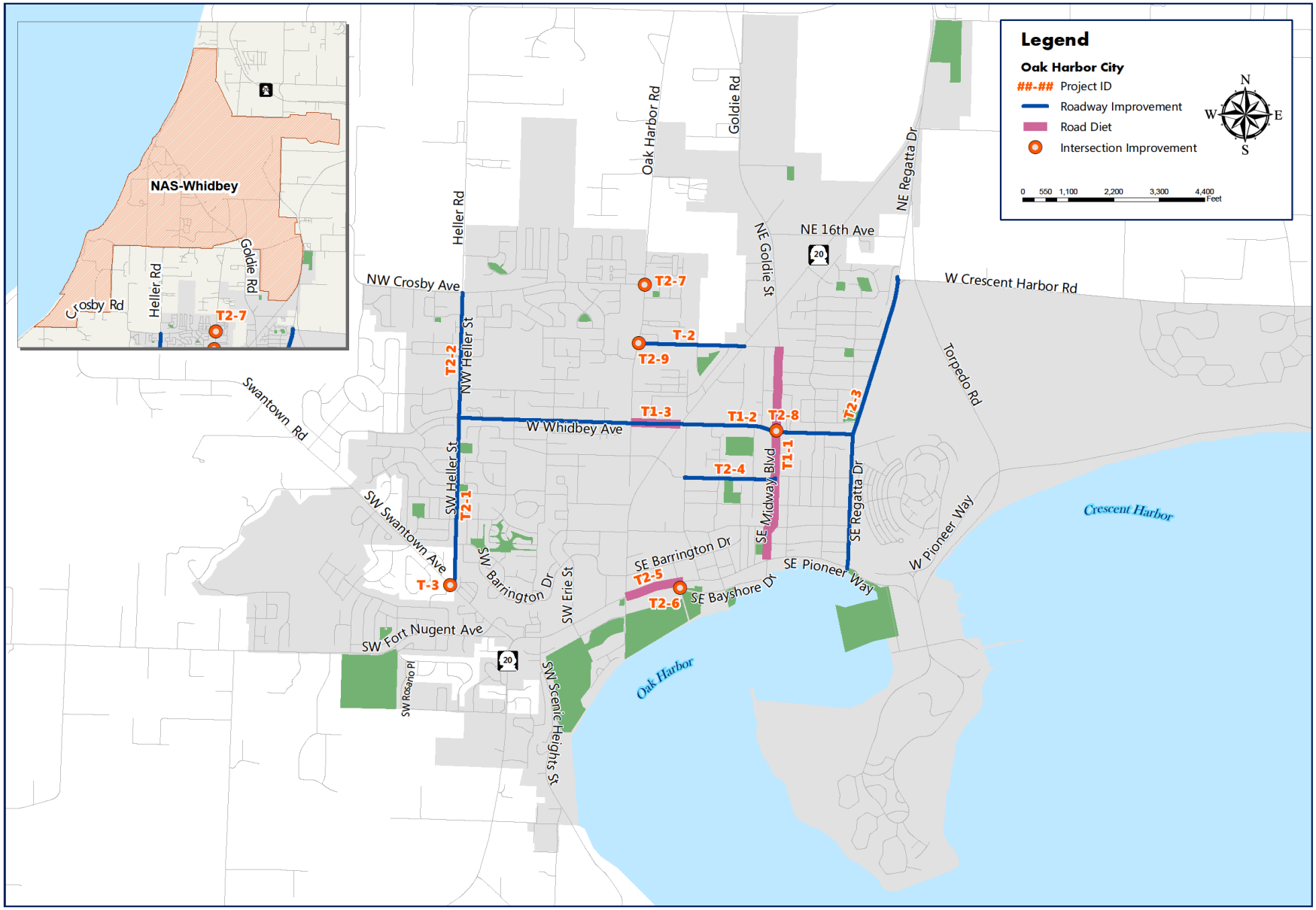
Table 9. Twenty Year Contingency Project List Tier 2

Project Number	*Project Name*	*Project Description*	*Planning Level Cost*
Roadway and Intersection Improvement Projects			
T2-1	**SW Heller Roadway Reconstruction**	Roadway improvements between SW Swantown Avenue to W Whidbey Avenue. Project includes overlay, curb and gutter improvement, sidewalk, bike lane, and transit improvements.	*$9.7M*
T2-2	**NW Heller Roadway Reconstruction**	Roadway improvements between Whidbey Avenue to NW Crosby Avenue. Project includes overlay for maintenance, restriping, curb ramps, as well as sidewalk improvements and bike lanes.	*$7M*
T2-3	**Regatta Drive Roadway Reconstruction**	Roadway improvements between Pioneer Way to Crescent Harbor Road. Project includes overlay, curb and gutter improvement, as well as sidewalk improvements and bike lanes.	*$10.1M*
T2-4	**SE 4th Avenue Roadway Improvements**	Reconstruct SE 4th Avenue between SE Ely Street to SE Midway Boulevard. Replace existing water and storm drainage facilities, and add sidewalks near Oak Harbor Elementary School.	*$1.8M*
T2-5	**Pioneer Way Road Diet between Beeksma Drive to SE City Beach Street**	Convert existing four-lane undivided roadway segment between Beeksma Drive and SE City Beach Street to a three-lane segment consisting of two through lanes and a center two-way left-turn lane. This project includes adding a bike lane between Beeksma Drive to SE City Beach Street.	*$118K*
T2-6	**W. Pioneer & City Beach Intersection Improvement**	Reconfigure the intersection of W Pioneer Way and SE City Beach. This project could include signage, a raised intersection or roundabout treatment.	*$200K*
T2-7	**Oak Harbor at Crosby Avenue Intersection Improvement**	Add a RRFB, restripe, and add signage at the intersection of N Oak Harbor Street and Crosby Road.	*$57K*
T2-8	**Midway Boulevard at Whidbey Avenue Intersection Improvement**	Signal modification at all four corners.	*$890K*
T2-9	**N Oak Harbor Street at NE 7th Ave Intersection Improvement**	Add a RRFB, restripe, and add signage at the intersection of N Oak Harbor Street and NE 7th Avenue.	*$40K*
Pedestrian Priority Network Projects			
T2-10	**Loerland Drive Sidewalks**	Add sidewalks on Loerland Drive between SW Heller Street and Swantown Road.	*$588K*
T2-11	**NE 5th Avenue Sidewalks**	Add sidewalks on NE 5th Avenue between NE Midway Boulevard to NE Ronhaar Street.	*$513K*
T2-12	**SE Barrington Drive Sidewalks**	Add sidewalks on Barrington Drive between Ely Street to Hathaway Street.	*$195K*
T2-13	**SE Ely Street Sidewalks**	Add sidewalks on Ely Street between Barrington Drive to Whidbey Avenue.	*$764K*
T2-14	**Crosby Avenue Sidewalks**	Add buffered sidewalks on NW Elwha Street to Airline Way.	*$1.3M*
T2-15	**Oleary Street Sidewalks**	Add sidewalks on SE Oleary Street between SE 6th Avenue and Whidbey Avenue, and NE Oleary between NE 4th Avenue and NE 6th Avenue.	*$663K*
T2-16	**N Oak Harbor Street Sidewalks**	Add sidewalks on N Oak Harbor Street between Crosby Avenue and City Limits.	*$260K*
Bicycle Priority Network Projects			
T2-17	**Pioneer Way Bike Lane**	Add bike lane/sharrow on Pioneer Way between SE City Beach Street and Regatta Drive.	*$186K*
T2-18	**N Oak Harbor Street Sharrows**	Add sharrows on N Oak Harbor Street between Whidbey Avenue and Crosby Avenue.	*$2K*
T2-19	**SW Erie Road Bike Lane**	Add bike lane on SW Erie Road between Barrington Drive to Pioneer Way.	*$38K*
T2-20	**Crosby Avenue Bike Lane**	Add bike lane on Crosby Road between Airline Way and N Oak Harbor Street.	*$172K*

Project Number	*Project Name*	*Project Description*	*Planning Level Cost*
T2-21	**SE 8th Avenue Sharrows**	Add sharrows on SE 8th Avenue between Midway Boulevard to Barrington Drive.	*$3K*
T2-22	**Swantown Avenue Bike Lane**	Add bike lane on Swantown Avenue between Pioneer Way to Loerland Road.	*$143K*
T2-23	**SW 3rd, SE 4th Avenue Sharrow**	Add sharrows on SW 3rd/SE 4th Avenue between Fairhaven Drive and Midway Boulevard.	*$4K*
T2-24	**Ely Road Sharrows**	Add sharrows on Ely Road between Pioneer Way and Whidbey Avenue.	*$2K*
T2-25	**Scenic Heights Area Sharrows**	Add sharrows on SW Scenic Heights between Waterloo Road and Pioneer Way and Capital Street between SR 20 and Pioneer Way.	*$6K*
T2-26	**Loerland Drive Bike Lane**	Add sharrows on Loerland Drive between Swantown Avenue and Heller Street.	*$98K*
T2-27	**SE Pasek/Oleary Sharrows**	Add sharrows on SE Pasek/Oleary Road between Pioneer Way to SR 20.	*$5K*
T2-28	**NE 16th Avenue Sharrows**	Add sharrows on NE 16th Avenue between Goldie Road and Regatta Drive.	*$2K*
T2-29	**Fort Nugent Area Sharrows**	Add sharrows on: SW Fairway Point Drive between Fort Nugent Avenue and Swantown Avenue; SW Victory Street between Fort Nugent Avenue and Heller Street; SW Rosario Place between Fort Nugent Avenue and SW 24th Avenue; SW 24th Avenue between SW Rosario Place and SR20 .	*$12K*
T2-30	**Cathlamet Drive Sharrow**	Add sharrows on Cathlamet Drive between N Oak Harbor Street and Crosby Avenue.	*$2K*
	Total		**$34.9M**

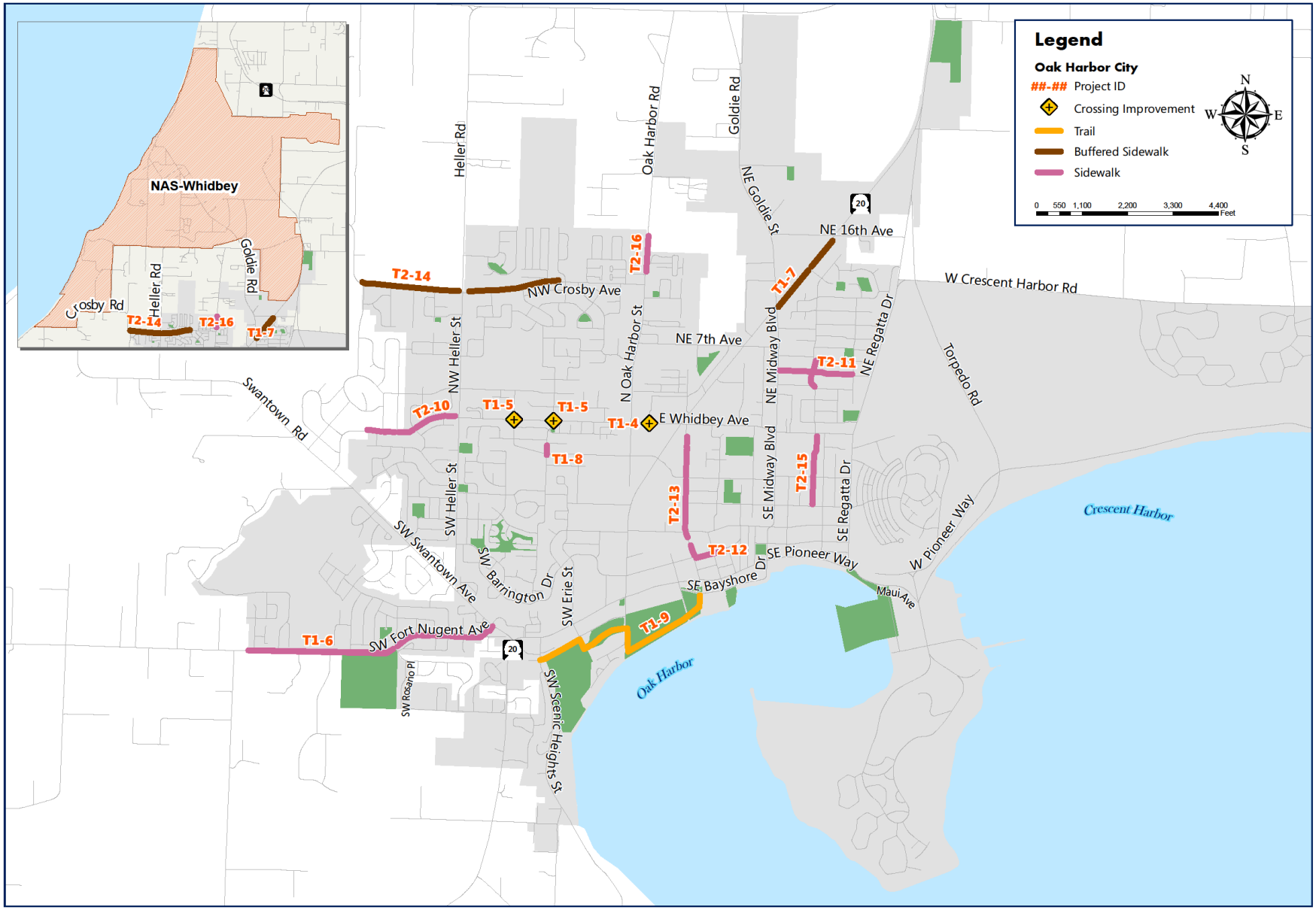
*All of the recommended transportation projects in Table 9 will require further analysis prior to actual construction

Figure 17. Twenty Year Roadway Projects (20 Year Program, Tier 1 and Tier 2)



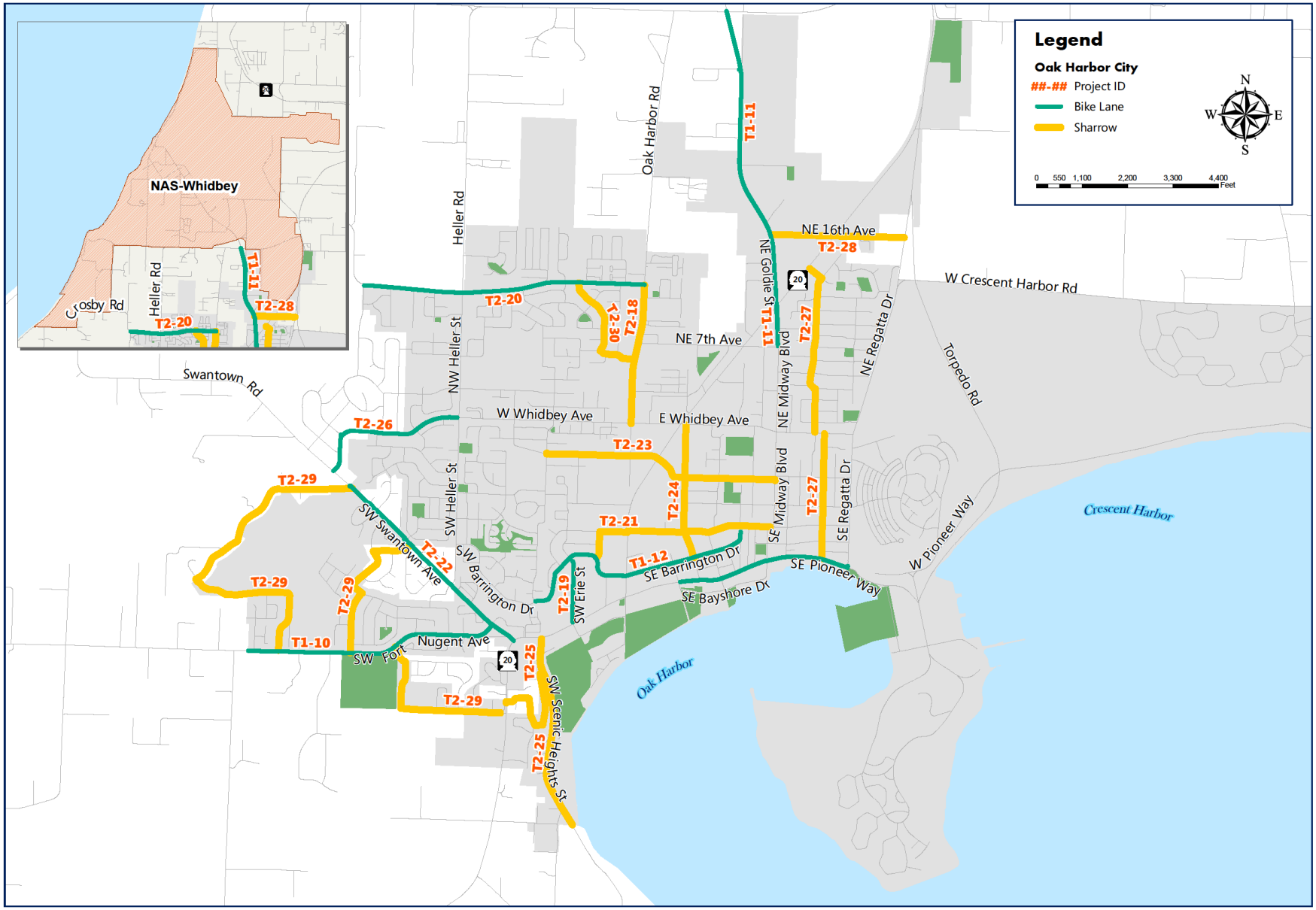
Roadway Projects

Figure 18. Twenty Year Pedestrian Projects (Tier 1 and Tier 2)



Pedestrian Projects

Figure 19. Twenty Year Bike Projects (Tier 1 and Tier 2)



Bicycle Projects

REGIONAL COLLABORATION

As stated earlier, the City's top priority in this plan is effective coordination with regional players to ensure that the local and regional transportation systems complement one another. A key element of this will be partnering with neighboring cities, Island County, WSDOT, and Island Transit to ensure regional travel patterns do not impact quality of life in Oak Harbor.

ROADWAY FACILITIES

There are projects outside of Oak Harbor's purview that will also affect travel in and around the City. One of the biggest projects that will impact travel in Oak Harbor is the completion of six roundabouts on SR 20 (see **Appendix D**). As of June 2015, this project is funded through Washington Legislative Evaluation and Accountability Program Committee (LEAP) Highway Improvements Program. Completion of this roadway is projected to improve safety and mobility within Oak Harbor.

As part of this planning process, several transportation projects were identified through stakeholder meetings, public workshops, and project development that fall outside Oak Harbor's city limits and local authority including:

- Pedestrian crossing improvement at SW 24th Avenue and SR 20
- Sidewalk improvements on Swantown Ave, Thornberry Drive, Capital Street, Airline Way
- Bicycle improvements on Airline Way and Crescent Harbor Drive
- Intersection improvements on SR 20 and NE 7th Avenue, SR 20 and Pioneer Way, and SR 20 and Barrington Drive
- Improved multimodal access to NAS Whidbey via Island Transit

TRANSIT FACILITIES

On the transit side, Island Transit is working to improve transit service and facilities within the City of Oak Harbor. Island Transit has several goals for their future specific to Oak Harbor including:

- Restoring the Harbor Station
- Improving traffic congestion around Harbor Station through better signage, lower speed limits, and/or a 3 way stop near the station.
- Reinstatement of Saturday service
- Reinstatement of Oak Harbor City Shuttles
- Reinstatement of Route 6 between Oak Harbor/Coupeville Ferry Terminal
- Continuation of Route 411W services

This Plan will support Island Transit's goals through bicycle and pedestrian access improvements.

Island Transit Paratransit, Pioneer Way

CHAPTER 7: IMPLEMENTING THE TRANSPORTATION ELEMENT

The recommended projects and programs of the Transportation Element were identified in the previous chapter based on their consistency with overall goals of this Plan and the anticipated revenues over the next 20 years. Implementing the Transportation Element will require close coordination among the City departments, citizens, businesses, and other agencies within the region.

In order to guide the City's implementation of the plan, priority should be assigned to assist in assembling an updated six-year Capital Improvement Program (CIP), working toward the 2036 planning horizon. This chapter summarizes the recommended plan, likely revenue sources, and documents the criteria used to prioritize projects.

The Transportation Element is a living document and serves as the blueprint for transportation in Oak Harbor over the next several years. Realistically, the plan is most useful over the next five years, at which point it should be updated. Several implementation steps should be initiated over the next couple of years to determine if changes are needed, or to reaffirm a particular strategy.

OVERVIEW OF COSTS AND REVENUES

A key GMA planning requirement is the concept of fiscal restraint in transportation planning. A fiscally constrained Transportation Element must first allow for operation and maintenance of existing facilities, and then capital improvements. To introduce fiscal constraint into the plan, an inventory of revenues and costs was undertaken to identify funds that are likely to be available for capital construction and operations.

The proposed Transportation Element for the City of Oak Harbor contains approximately $7 million worth in transportation investments over the next 20 years. The Transportation Element focuses on capital projects that will complete the layered network plan, as well as ongoing pavement maintenance to ensure that the roadway network is kept in good condition.

Table 10 summarizes how this overall investment would be broken down by transportation improvement category and by prioritization category.

Table 10: Costs of Oak Harbor Transportation Element (20+ years)

Project Needs	*Description*	*Total Cost*		
		20 Year Program	*Tier 1*	*Tier 2*
Auto/Freight Priority Projects	Traffic signals, intersection improvements, roadway diets	$4.23M	$20.7M	$29.9M
Pedestrian Projects	Sidewalks, crossings	$0	$1.8M	$4.3M
Bicycle Projects	Bike lanes, sharrows, trails	$0	$688K	$675K
Pavement Maintenance	Overlay and pavement repair	$2.77M	$0	$0
	Total	**$ 7M**	**$ 23.2M**	**$ 34.9M**

*Costs denoted in millions

It is worthwhile to note that the City of Oak Harbor anticipates to generate approximately $350,000 annually for transportation capital projects. Revenues include those from outside sources and grants, general city funds, impact fees, and gas tax receipts. If the city were able to maintain this level of revenue, the City could afford around $7 million in transportation projects over the next 20 years.

The project list included in the previous chapter includes $7 million in transportation investments, including ongoing system maintenance, in recognition that the City will be awarded grants over the duration of the plan. In addition, the inclusion of Tier 1 and Tier 2 transportation projects within the Plan acknowledges that should supplementary funding become available, projects that would further support the development of the transportation network have been identified and prioritized as part of this planning process.

FUNDING APPORACH

The comparison of revenues to costs indicates that the city will need to carefully prioritize its projects, since not all of the transportation needs may be affordable with existing revenue sources during the 20 year period. If this occurs, the City has several options:

- Increase the amount of revenue from existing sources, including impact fees or increased general fund revenues
- Adopt new sources of revenue, such as creating a Transportation Benefit District (see text box)
- Develop a grant strategy to secure additional funding for capital projects

The following section describes impact fees, transportation benefit districts, and grant strategies in more detail, and forecasts potential revenue based on stated assumptions.

IMPACT FEES

State law (RCW 82.02.050) authorizes communities to impose impact fees. Transportation impact fees are a one-time charge paid by development proportional to their impacts to fund improvements that provide new transportation system capacity. While transportation impact fees cannot be used for roadway maintenance or projects that exclusively address an existing traffic operations or safety issue without providing future capacity, they can fund a wide variety of projects in the street right-of-way.

The City currently has a transportation impact fee program that funds a limited number of roadway improvements. The current fee was developed as part of the last Comprehensive Plan update has a base rate of $589/PM peak hour trip, which places Oak Harbor's transportation impact fee among the lowest in the state.

Given the needs identified in the previous chapter, it may make sense for the City to consider updating its impact fee program to increase revenues for transportation and fund a more robust list of projects. Many jurisdictions around the state are looking to increase their impact fee rates and more communities are updating their programs to fund projects that benefit both motorized, as well as non-motorized travelers[9].

As a part of this process, the City evaluated how an updated Transportation Impact Fee program could contribute funding projects on the Tier 1 Contingency List. The analysis found that based on the planned growth over the next 20 years, as well as the eligible projects on the Tier 1 Contingency List, the City could increase its impact fee to approximately $6,300 per PM peak hour trip. Assuming that all of the growth anticipated by this Comprehensive Plan occurs, this would result in $12 million in revenues over the life of this plan.

While this rate is likely unrealistic in the near term, it is a maximum defensible rate that can be reduced by policy to a more palatable level, such as $1,500-$2,000 per PM peak hour trip. Even this more modest increase in impact fees would result in $2-$3 million increase over what the City current generates for transportation over the course of the plan.

[9] RCW 82.02.050 authorizes funding of projects that add transportation capacity for future development within the right-of-way of streets and roads. Many jurisdictions have broadened their interpretation to recognize sidewalk and bike lane projects as eligible under these criteria.

TRANSPORTATION BENEFIT DISTRICT

State law (RCW 36.73) authorizes cities and counties to form transportation benefit districts (TBDs) to raise revenue to fund local transportation projects, usually through vehicle license fees or sales taxes. TBD revenue is typically used for transportation projects such as roadway improvements, sidewalks, bike infrastructure, and transportation demand management. Construction, maintenance, and operation costs are also eligible.

If Oak Harbor chose to create a TBD using a vehicle licensing fee, residents would be required to pay an additional fee when they renew their vehicle tabs (typically a cost of $20-40 collected every two years). Currently, there are approximately 15,000 registered vehicles within Oak Harbor. If the City adopted a $20 licensing fee, approximately $3 million in transportation revenue would be generated over the next 20 years. For reference, additional revenue from the TBD alone could fund the total cost of the bicycle projects recommended as part of this Plan.

GRANT STRATEGY

The City has experience in competing successfully for grants, as exhibited in recent Pioneer Way streetscape improvements. While grants are among the best ways for cities to attract outside funding, they can be time consuming to put together, straining staff resources at unpredictable times.

Some communities develop annual grant strategies, which identify the projects they want to fund, the grant programs where these projects are most likely to successfully compete, and program resources (either staff time or consultant support) to develop grant applications. Given the robust public outreach process and strong safety and multimodal justifications for many of the projects, many of the projects on this Plan's Tier 1 Contingency List would likely perform well for Safe Routes to School, WSDOT Bike and Pedestrian Safety, Transportation Investment Board, or Federal Aid grants. Oak Harbor should consider developing an annual grant strategy to identify funds for design and construction of Tier 1 Contingency Projects.

WHAT ARE POTENTIAL NEW REVENUE SOURCES?

- Proceeds from General Obligation Bonds
- Creation of Local Improvement Districts
- Creation of a Transportation Benefit District
- Mitigation fees for pedestrian and bicycle facilities
- Reciprocal impact fees with adjacent jurisdictions
- Property tax levy lid lift for transportation
- Business license fee per employee

The city can explore the feasibility and likely revenue amounts from these or other sources, as the plan is implemented over the next several years.

SETTING PRIORITIES

Project prioritization is needed to help identify when best to fund and implement the projects since funding is limited. Criteria were established to help prioritize the projects and implementation. These criteria, not listed in any priority order, are identified in the following text box[10].

Using these criteria, the recommended projects were evaluated and ranked based on how well each could meet the criteria. High priority projects for Oak Harbor are those that meet multiple criteria in terms of effectiveness, benefit to the community, and ability to be implemented.

The Transportation Element includes the following actions to monitor and evaluate the progress of implementing the plan.

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CRITERIA FOR PROJECT PRIORITIZATION

1. Meets City's transportation goals:
   - Goal 1: Safe for all users.
   - Goal 2: Connected and efficient.
   - Goal 3: Multimodal offering user friendly transportation options.
   - Goal 4: Financially and environmentally sustainable.
   - Goal 5: Complementary of the City's land use vision and other adopted plans.
   - Goal 6: Integrated with the regional transportation network to address a diverse range of transportation interests.
2. Maintains/improves safety of traveling in Oak Harbor
3. Projects received strong public support at public workshops
4. Project costs are aligned with City budget constraints and leverage non-city (federal, state, private) funds

[10] See Appendix E for a detailed description for how each project was evaluated and scored relative to the transportation goals using a scoring matrix.

BI-ANNUAL MOBILITY REPORT CARD

A bi-annual mobility report card will be developed to document progress towards plan implementation and to monitor the transportation system performance. The City will use this information to inform the public regarding the City's actions, and results, related to the Transportation Element. The report card will also provide a basis for future updates of the Transportation Element.
The report card is expected to report on the following topics:

- Land Use and Transportation Trends – These data will describe general land use and transportation trends within Oak Harbor. Information will include:
    - Current population and employment levels and growth rates,
    - Summary of yearly development activity, and
    - Summary of growth in traffic volumes, transit service and other trends

- Transportation Performance – These data will focus on documenting the current performance of the transportation system, by mode. Information will include:
    - Transit route ridership (from Island Transit)
    - Park-and-ride lot utilization
    - On-street parking utilization in downtown and nearby park-and-ride locations
    - Traffic volumes
    - Collisions
    - Traffic level of service (auto/truck priority corridors)
    - Pedestrian and bicycle volumes
    - Pavement Maintenance Ratings

- Project Implementation Status – These data will summarize the city's progress towards implementing the priority network improvements recommended in the Transportation Element. Information is expected to include:
    - Auto/truck facilities constructed
    - Pedestrian facilities constructed
    - Bicycle facilities constructed
    - Transit stop improvements implemented
    - Miles of Pavement overlays

The report card will provide the necessary information to help the city adjust transportation priorities and to facilitate updates to the Transportation Element every few years.

APPENDIX

Contents

APPENDIX A - LOS REPORTS

This appendix shows level of service (LOS) calculations at 31 intersections for year 2015 Existing conditions, year 2036 No Actions, and year 2036 With Potential Mitigations. The 2015 volumes represent counts collected in fall 2015. For both of the 2036 future scenarios, volumes represent traffic forecasts developed using the Skagit Council of Government's (SCOG) Travel Demand Model and the traffic growth assumptions described in **Appendix C.** The 2036 No Action LOS calculations assume no changes are made to the City's existing transportation system. The 2036 With Potential Mitigations LOS calculations assume intersection improvements to Heller Street and Fireside Lane and West Whidbey Avenue at SW/NW Fairhaven Drive, as well as six roundabouts between Swantown Road to Cabot Drive[11] are in place (see **Appendix D**).

As noted within the plan, the City measures LOS at the intersection level. The City's level of service policy sets the following standards for its roadways:

- LOS D or better for intersections on City streets within the City UGA
- LOS E for intersections along SR 20 within the City UGA

Table 1. Level of Service— Weekday PM Peak-Hour

Intersection		EXISTING CONDITIONS			2036 FUTURE (No Actions)			2036 FUTURE (With Potential Mitigations)		
		Control	**LOS**	**Delay**	**Control**	**LOS**	**Delay**	**Control**	**LOS**	**Delay**
1.	**SR-20 @ Swantown Rd**	Signal	C	23.9 sec	Signal	C	26.6 sec			
	Change to Roundabout, two lanes [v/c = 0.387]							RAB	A	6.1 sec
2.	**Scenic Heights @ SR-20**	TWSC	C	20.7 sec	TWSC	C	24.8 sec			
	Right-in, Right-out restriction on Scenic Heights							TWSC	C	15.2 sec
3.	**SW Erie St @ SR-20**	Signal	B	18.6 sec	Signal	C	20.9 sec			
	Change to Roundabout, two lanes [v/c = 0.481]							RAB	A	6.7 sec
4.	**SE Pioneer Way @ SR-20/Beeksma Dr**	Signal	C	23.6 sec	Signal	C	24.3 sec			
	Change to Roundabout, two lanes [v/c = 0.461]							RAB	A	6.1 sec
5.	**SR-20 @ Barrington Dr**	Signal	B	19.9 sec	Signal	C	20.6 sec			
	Change to Roundabout, two lanes [v/c = 0.532]							RAB	A	8.4 sec
6.	**SR-20 @ SW/SE 8th Ave**	Signal	B	19.3 sec	Signal	C	22.1 sec			
	Change to Roundabout, two lanes [v/c = 0.391]							RAB	A	6.4 sec

[11] As of June, 2015, the project was funded by WSDOT as part of the Connecting Washington Projects Highway Improvements Program[11]. The project is scheduled for implementation between 2027 and 2029.

Intersection		EXISTING CONDITIONS			2036 FUTURE (No Actions)			2036 FUTURE (With Potential Mitigations)		
		Control	LOS	Delay	Control	LOS	Delay	Control	LOS	Delay
7.	**SR-20 @ Cabot Dr/ SW 3rd Ave**	Signal	B	16.5 sec	Signal	C	20.5 sec			
	Change to Roundabout, two lanes [v/c = 0.429]							RAB	A	6.5 sec
8.	**SR-20 @ E Whidbey Ave**	Signal	C	22.0 sec	Signal	C	24.6 sec			
9.	**SR-20 @ NE 7th Ave**	Signal	B	18.6 sec	Signal	B	19.5 sec			
10.	**W Ault Field Rd @ NE Goldie St/ Goldie Rd**	Signal	B	17.5 sec	Signal	B	19.4 sec			
11.	**N Goldie Rd/ Midway Blvd @ SR-20**	Signal	C	21.2 sec	Signal	C	21.2 sec			
12.	**SR-20 @ NE 16th Ave/ W Cemetery Rd**	Signal	A	7.4 sec	Signal	A	8.4 sec			
13.	**Heller St/ Fireside Ln @ SW Swantown Ave**	TWSC	D	28.3 sec	TWSC	F	101.7 sec			
	All way stop controlled							AWSC	D	33.5 sec
	Signalized Protected/Permitted Left Turns on Swantown. Split NB/SB on Heller							Signal	B	19.3 sec
	Change to Roundabout, single lane [v/c = 0.616]							RAB	A	8.8 sec
14.	**Heller St @ W Whidbey Ave/ SW Loerland Ln**	Signal	B	17.9 sec	Signal	C	22.1 sec			
15.	**NW Heller St @ NW Crosby Ave**	Signal	B	15.8 sec	Signal	B	17.7 sec			
16.	**NE Midway Blvd @ NE 7th Ave**	TWSC	C	16.2 sec	TWSC	C	18.5 sec			
17.	**NE Midway Blvd @ E Whidbey Ave**	Signal	D	48.9 sec	Signal	D	52.2 sec			
18.	**N Oak Harbor St @ NE 7th Ave**	TWSC	C	18.4 sec	TWSC	C	21.9 sec			
19.	**N/S Oak Harbor St @ W/E Whidbey Ave**	Signal	C	20.4 sec	Signal	C	22.8 sec			
20.	**SE Regatta Dr @ SE Pioneer Way**	TWSC	C	15.1 sec	TWSC	C	17.2 sec			

Intersection		EXISTING CONDITIONS			2036 FUTURE (No Actions)			2036 FUTURE (With Potential Mitigations)		
		Control	LOS	Delay	Control	LOS	Delay	Control	LOS	Delay
21.	**SE Regatta Dr @ E Whidbey Ave**	TWSC	C	16.5 sec	TWSC	C	20.1 sec			
22.	**NE Regatta Dr @ W Crescent Harbor Rd**	TWSC	C	21.5 sec	TWSC	D	32.1 sec			
23.	**SW Fort Nugent Ave/ SW Kimball Dr @ Swantown Ave**	Signal	C	21.0 sec	Signal	C	23.2 sec			
24.	**SE Pioneer Way @ SE City Beach St**	Signal	B	12.5 sec	Signal	B	12.6 sec			
25.	**SE Midway Blvd @ SE Pioneer Way**	Signal	C	24.2 sec	Signal	C	24.4 sec			
26.	**Loerland Ln @ Swantown Rd**	TWSC	A	9.5 sec	TWSC	A	9.7 sec			
27.	**W Whidbey Ave @ SW/NW Fairhaven Dr**	TWSC	D	25.6 sec	TWSC	E	40.0 sec			
	Widen North & South Legs and realign for separate SB LT lane							TWSC	D	30.2 sec
	Widen North Leg only for SB RT pocket							TWSC	E	35.7 sec
	All way stop controlled							AWSC	C	20.8 sec
	2 phase signal and EB & WB restriped for LT lane							Signal	A	8.9 sec
	Change to Roundabout, single lane [v/c = 0.416]							RAB	A	5.9 sec
28.	**Goldie Rd/ NE Goldie St @ NE 16th Ave**	TWSC	B	10.3 sec	TWSC	B	14.1 sec			
29.	**N Oak Harbor St @ NW Crosby Ave**	TWSC	C	18.4 sec	TWSC	C	24.5 sec			
30.	**SE Midway Blvd @ SE 8th Ave**	Signal	B	10.3 sec	Signal	B	10.4 sec			
31.	**SW Barrington Dr @ SW Erie St**	AWSC	B	10.3 sec	AWSC	B	11.1 sec			

APPENDIX-B - LAND USE AND TRAVEL DEMAND

The following figures depict housing, trip productions, trip attractions, and trips by traffic analysis zone (TAZ) around Oak Harbor. The 2012-2036 housing map shows the forecasted future housing based on the amount of growth assigned by the Skagit Council of Governments (SCOG) model and vetted by the City. Land use growth informs the City on where to expect increases in travel volumes and translates into future traffic levels through the travel demand forecasting process. The 2012-2036 trip productions, trip attractions, and trip growth figures display where travel is expected to occur in and around Oak Harbor.

The following list provides a description of Figures 1-5:

- **Figure 1: Growth in Households (2012-2036)** — Displays the raw growth in household by TAZ between 2012-2036. Housing data was provided by SCOG regional model. The land use in the SCOG TAZs comprising Oak Harbor was scaled to match City approved growth targets for housing units.

- **Figure 2: Growth in Trip Productions (2012-2036)** — Displays the percent growth in productions by TAZ between 2012-2036. Travel models describe land uses as producing or attracting trips at the TAZ level. Trips are typically "produced" by households and "attracted" to non-households. Production and attractions differ from origins and destinations.

- **Figure 3: Growth in Trip Attractions (2012-2036)** — Displays the percent growth in attractions by TAZ between 2012-2036. Trips are typically "attracted" to non-households, which can include key destinations such as employment centers, schools, and shopping centers.

- **Figure 4: Trip Growth (2012-2036)** —Displays the percent growth in trips by TAZ between 2012-2036.

- **Figure 5: Travel Demand (2012-2036)** — Displays the travel demand by roadway between 2012-2036 and level of service (LOS) calculations at 31 intersections for year 2036.

Figure 1: Growth in Households (2012-2036)

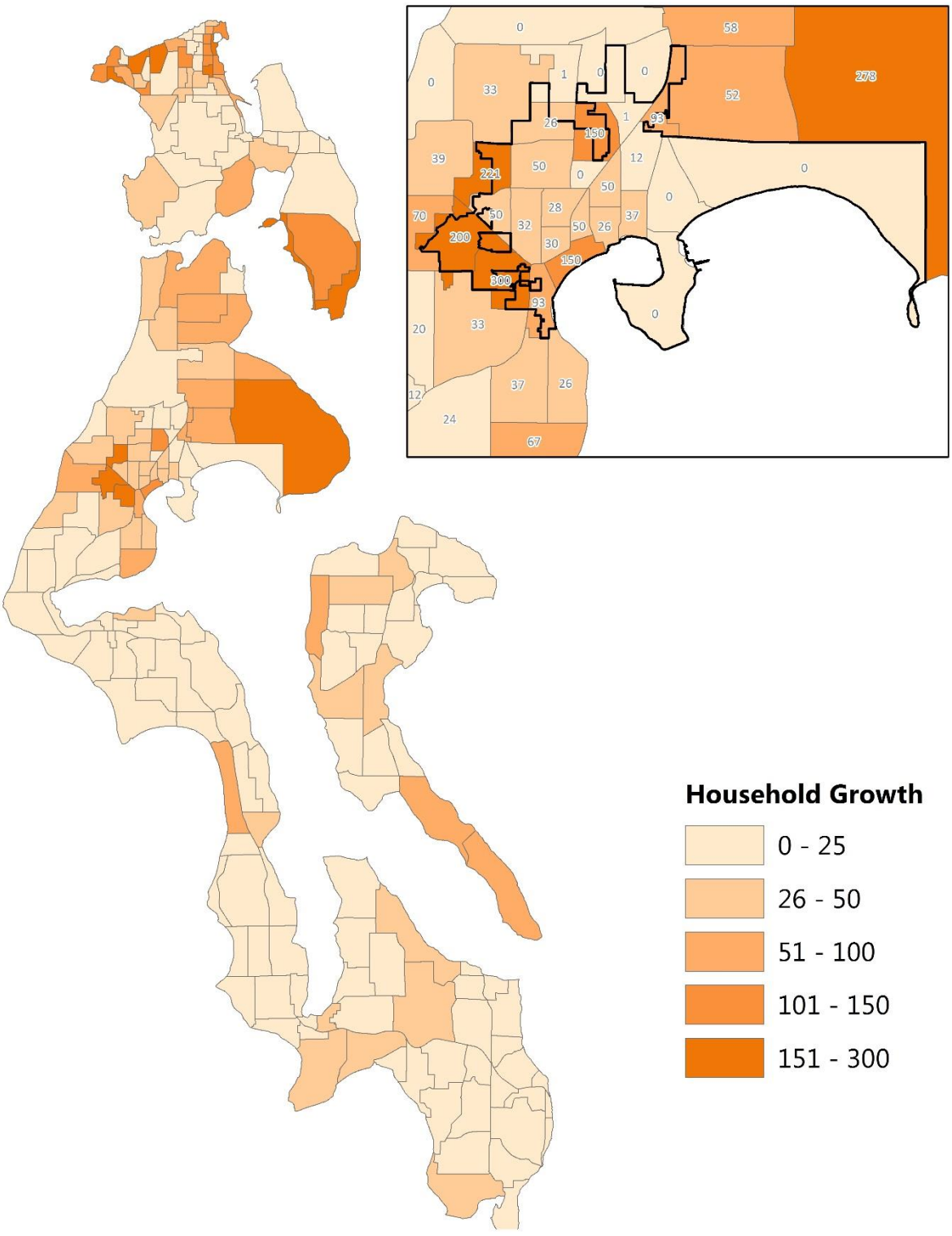


Figure 2: Growth in Trip Productions (2012-2036)

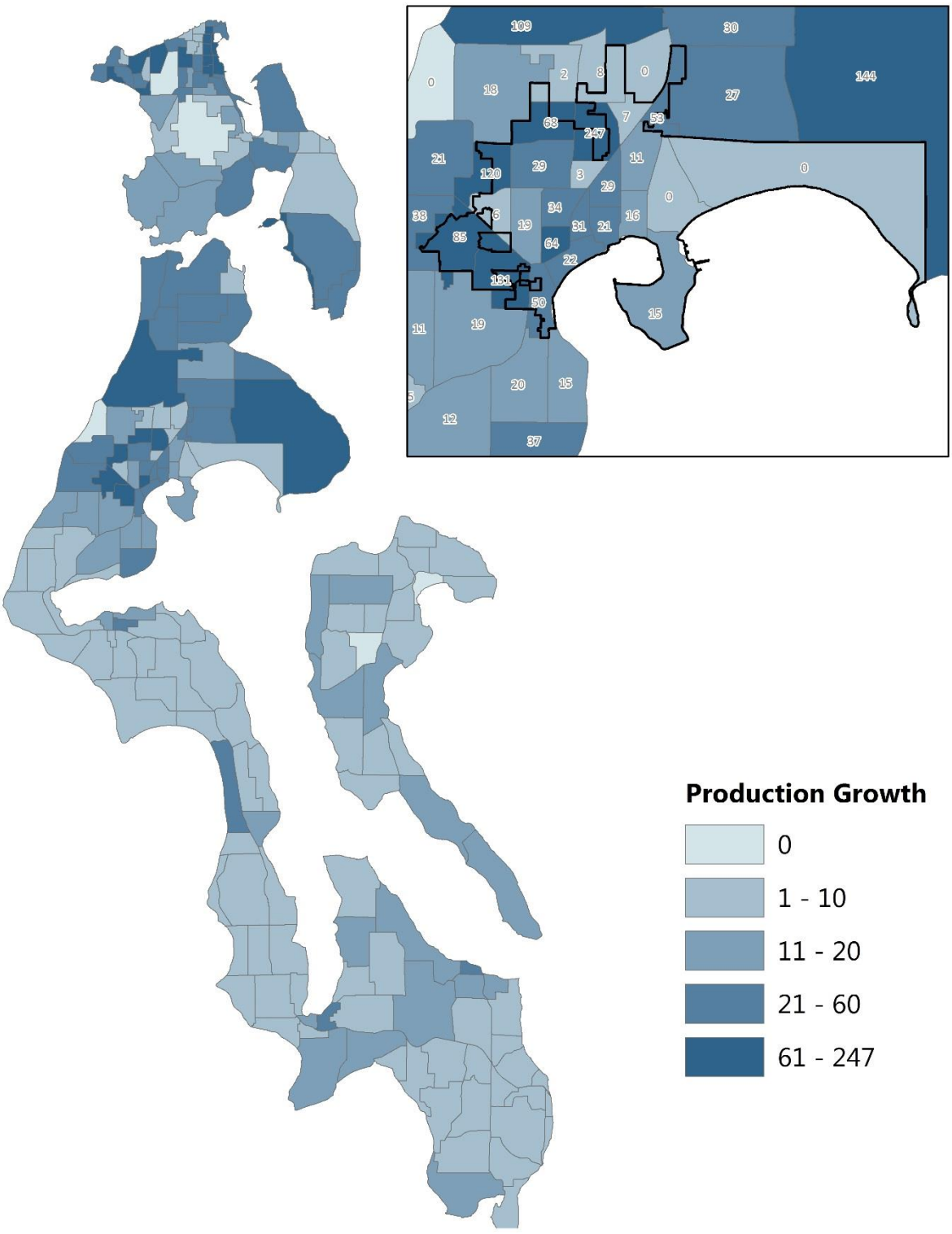


Figure 3: Growth in Trip Attractions (2012-2036)

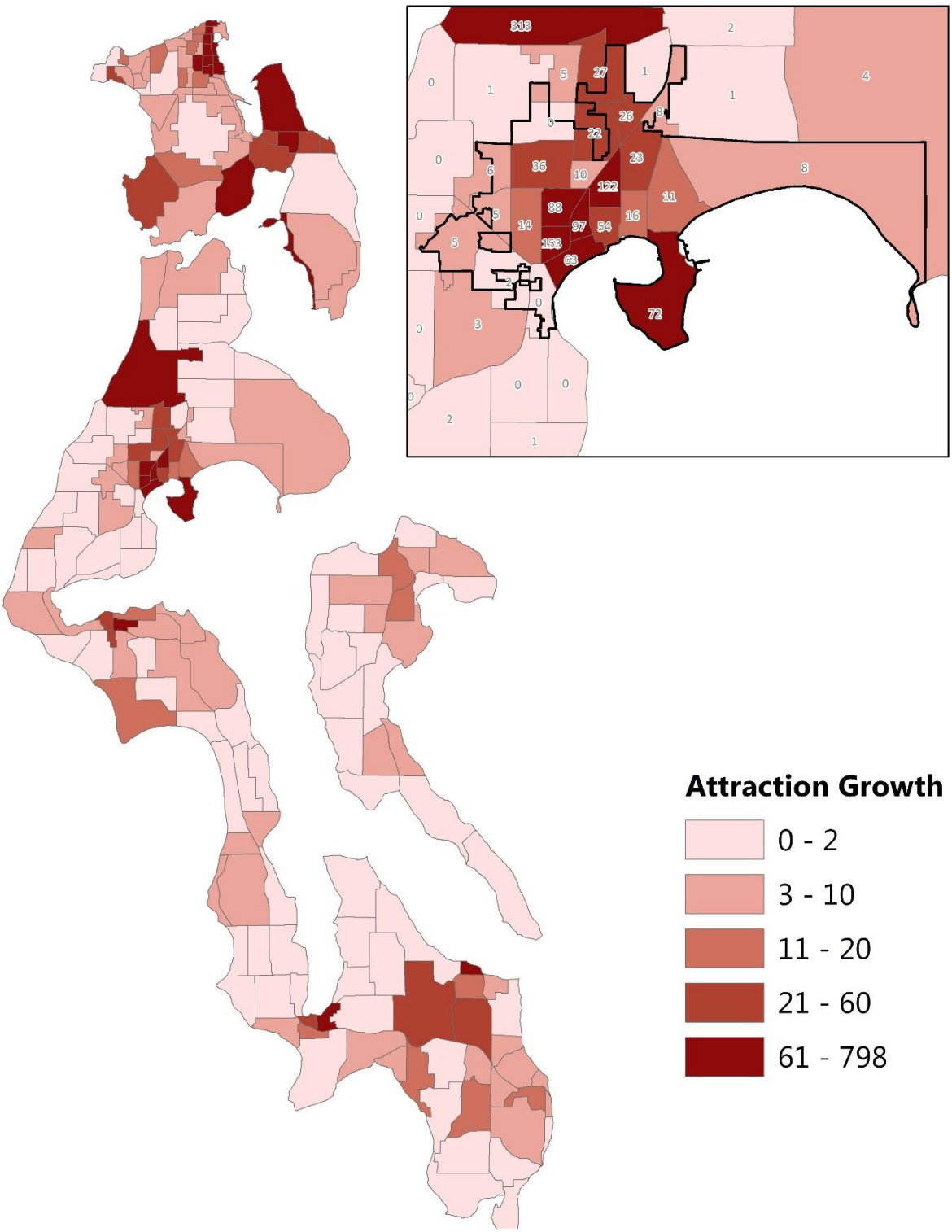


Figure 4: Growth in Trips (2012-2036)

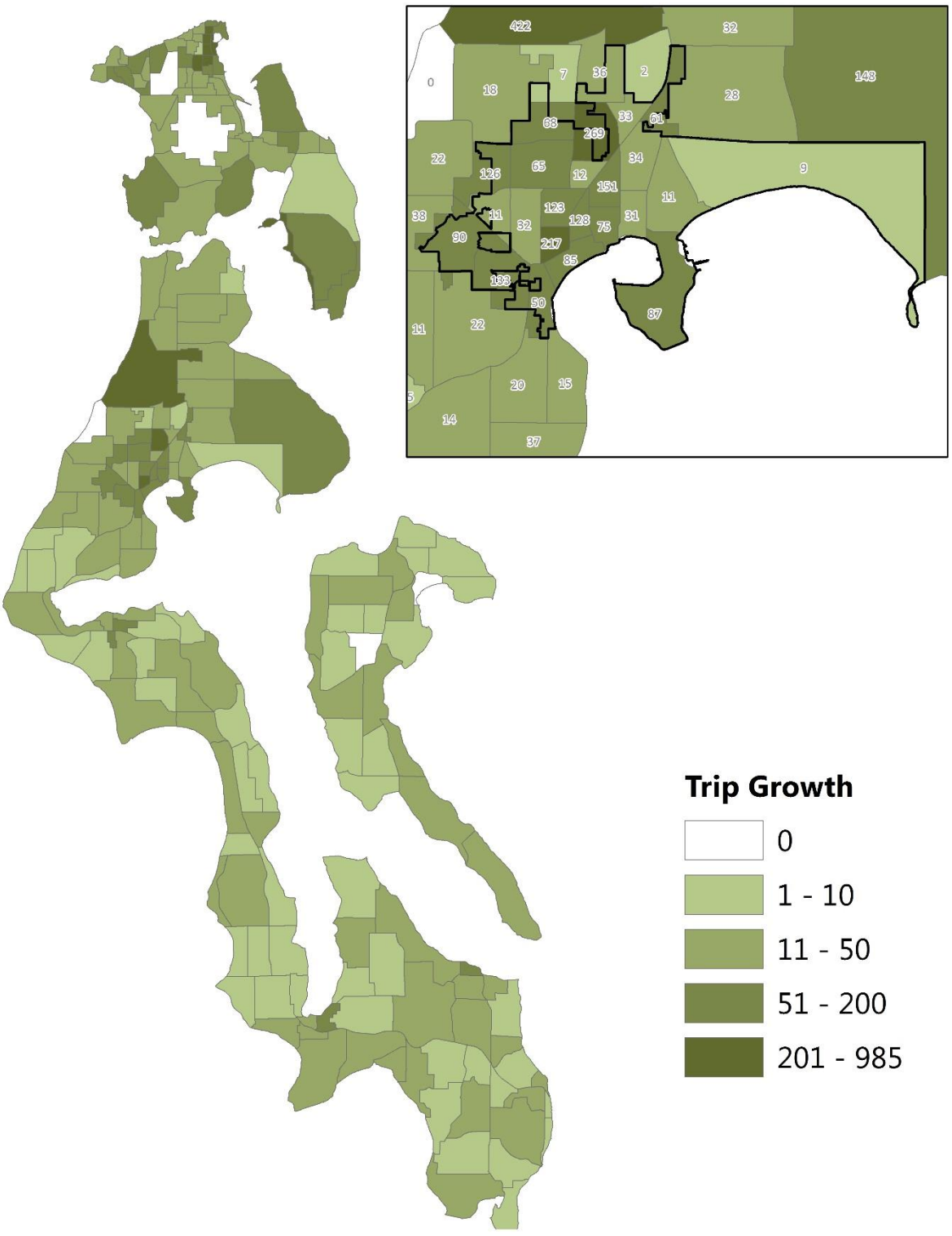
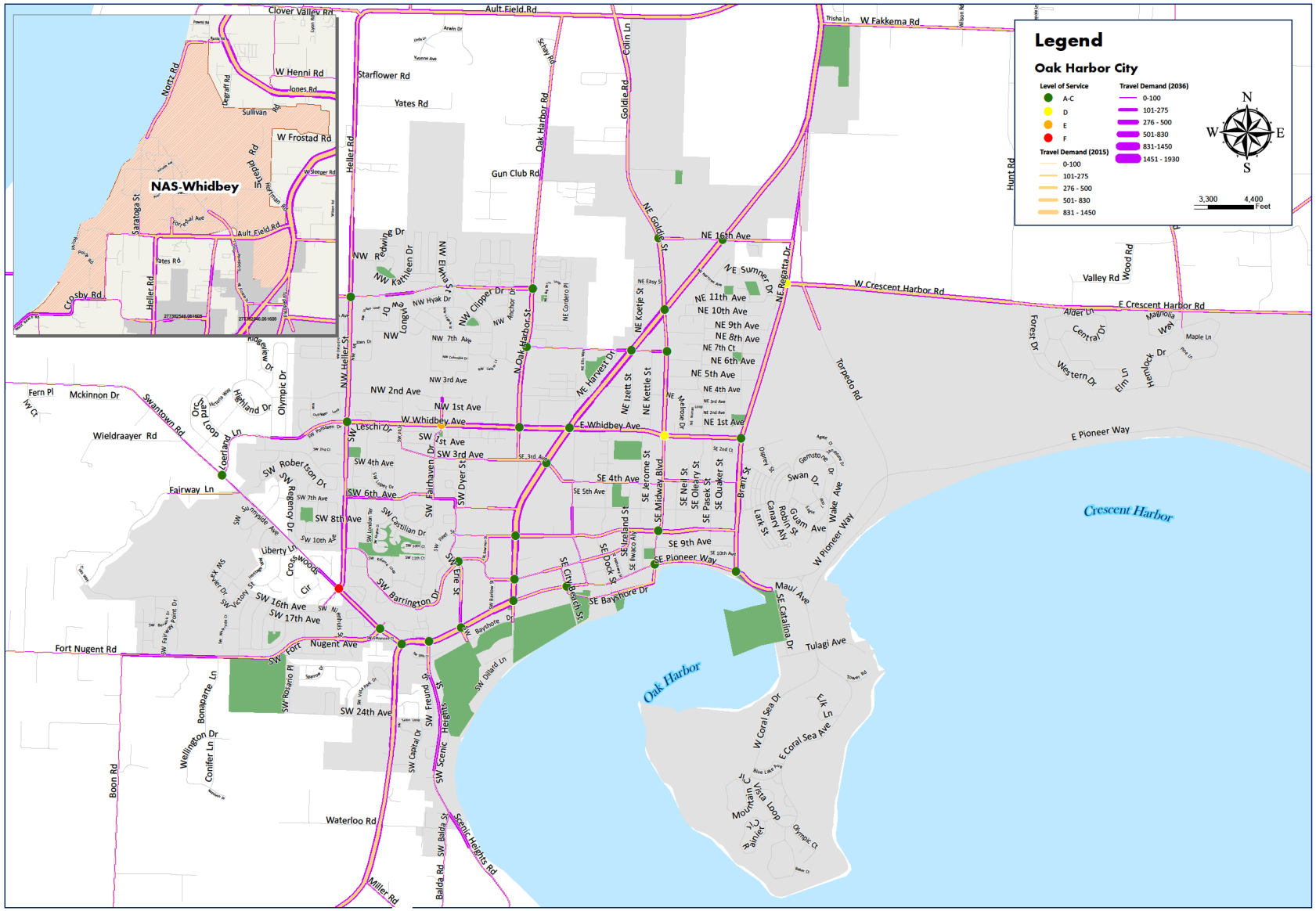


Figure 5: Travel Demand (2012-2036)



*Level of Service is depicted for 2036

Existing and Future Travel Demand

Skagit Council of Governments

TRAVEL DEMAND MODEL DOCUMENTATION

March 2015

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Chapter 1. Introduction

The Skagit Council of Governments Travel Demand Model (SCOG Model) was developed to provide a solid technical basis for evaluating transportation system needs in coordination with long-term planning in Skagit County, Island County, and local cities. The SCOG Model was built using Visum software and is consistent with local and regional growth plans within the two-county region. The SCOG Model is a composite of two separate model networks, one for Skagit County forecasting (Skagit County Model), and the other for Island County forecasting (Island County Model). The general scope of the model is the area of both Skagit and Island counties. Figures 1 and 2 illustrate the SCOG Model extents.

1.1 Model Overview

The SCOG Model has a base year of 2013 and forecast horizon years of 2036 for the Island County model and 2040 for the Skagit County Model. The model trip assignment represents the PM peak hour period (one-hour volumes) between 4 and 6 p.m. on a typical weekday. The model has a total of 474 Transportation Analysis Zones (TAZs) including 14 external TAZs. However, each county Visum model has under 400 TAZs total (Skagit County Model has 387 and Island County Model has 206). The 2013 Skagit County Model has 1630 lane miles and the Island County Model has 950 lane miles coded that represent freeways, expressways, arterials, collectors, and a few local streets. The two county models overlap geographic areas, meaning they both share the same TAZs within the North Whidbey Island area and Fidalgo Island. Trip generation is performed in a spreadsheet and then exported to the Visum model software. The Skagit County Model and Island County Model use the same trip generation spreadsheet, which allows for consistency between the two models.

1.2 Model Documentation Outline

This report provides details about the structure of the model and the assumptions used in constructing the model.

- **Chapter 2 - Using the Model**. This section explains the basics of the model and how to do routine analysis with the model. This includes quality control checklists to help confirm that the model will perform as designed. Specific model details are presented in later chapters and appendices.
- **Chapter 3 - Travel Demand Inputs**. This section explains the various model inputs relative to estimating travel demands including land use, trip generation, trip distribution, mode choice, and other parameters.
- **Chapter 4 - Travel Supply Inputs**. This section explains the various model inputs relative to the supply or capacity of the network including planned improvements, roadway capacities, and other parameters.
- **Chapter 5 - Validation and Reasonableness Checks**. This section explains how the model compares to existing data sets at forecasting travel conditions.

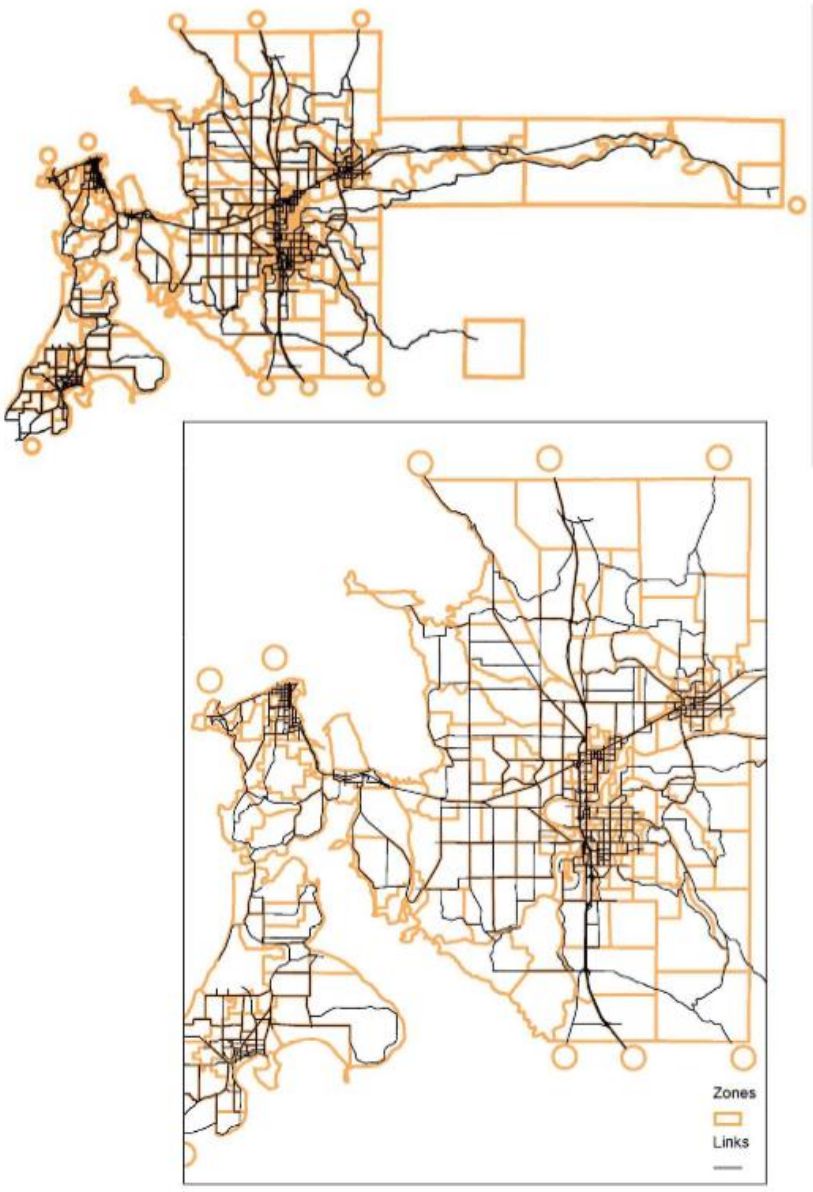


Figure 1. SCOG Travel Demand Model – Skagit County

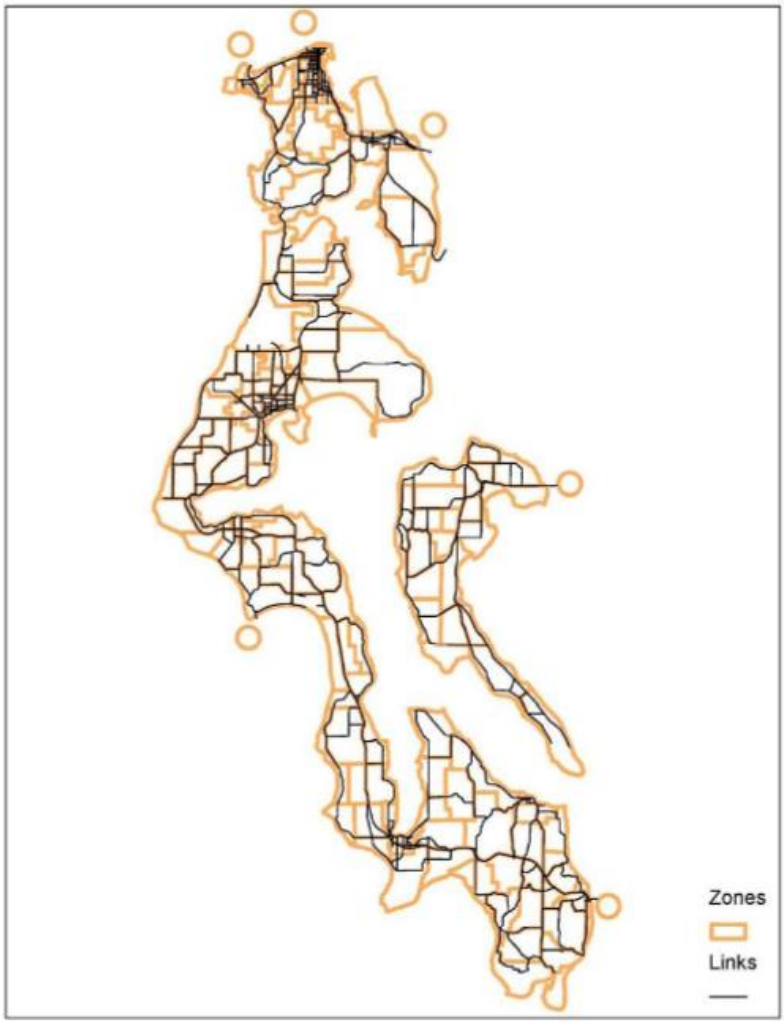


Figure 2. SCOG Travel Demand Model – Island County

Chapter 2. Using the Model

The main purpose of the model is to run various model scenarios to understand impacts and/or output traffic volume characteristics. Outlined below is how the model can be used or adapted for scenario testing or other analysis. This section describes how the model operates, how to use it when evaluating scenarios, and the method to post-process model volumes.

The anticipated model users of the SCOG model fall into the two general categories below. Chapter 2 is intended primarily for the basic model user.

- **Basic Model User.** These model users are able to perform basic model analysis including select-link/select-zone analysis, small edits to the model network, land use updates to several TAZs, exporting volumes for post-processing, and model plots.
- **Advanced Model User.** These model users can perform all the basic model user tasks as well as changing the TAZ structure, developing a new analysis horizon year, and calibration/validation of the model.

2.1 Select-Link or Select-Zone Analysis

Using Visum's internal "flow bundle" application, trips using a specific link or zone can be isolated for review. The path volumes are saved for the PM peak period, so flow bundle analysis of the PM peak period does not require the model to be rerun.

Quality Control Tip:
Be sure to be careful on how multiple links or zones are selected. The order they are clicked as well as the "and" versus "or" parameters can have significant impacts on the resulting output. In addition, be sure that both origins and destinations are chosen when doing select-zone analyses.

2.2 Changing the Model Network

The model was developed with that anticipation that the model network would be changed to test various scenarios. Some of the network editing is streamlined so that when the model procedures are run, many network attributes are automatically updated.

2.2.1 Model Links

The model relies on "link types" to assist in link editing. Link types are based on the number of lanes and free-flow (posted) speeds. After editing a link, be sure that the link type attribute is correctly coded. The number of lanes, capacity, and speed is updated for every link when the model is run. NOTE: The transport system link attribute is not automatically set, so manual adjustments are necessary to disable a link. See Appendix A for link types.

2.2.2 Model Nodes

The model relies on "node types" to help define intersection delays. When the model runs, the turn capacities, turn delays, and intersection capacities are automatically updated and applied based on node type. After editing the network, be sure that the node type attribute is

correctly coded. NOTE: The "ControlType" node parameter is not used in the SCOG model. See Appendix A for node types.

2.2.3 Model Turns

Model turn attributes need to be checked, because they can impact how the intersection delays are calculated. Besides two-way stop control (TWSC) intersections (Node Type 5), all node types assign turn capacities and delays based on major-street/minor-street designations as well as turn types (1-left, 2-thru, 3-right, 4-u-turn). Be sure that the nodes "major flows" are correctly oriented, and that the turn type attribute is correctly coded.

For two-way stop control intersections (Node Type 5), the intersection delay is based on intersection capacity and delays and are only applied to the stopped approach. To make this work properly, the approach with the stop sign should have the link attribute "TModel delay link for turns" set to one (1). The rest of the approaches should be set to zero (0).

2.2.4 Running the Model

After making network edits, make sure to activate the procedure steps in "Group Set Network Attributes" when running the model. To run the full model, activate all the procedures. If only the trip assignment needs to be run, only activate the procedures in the "Group Final Assignment" along with "Group Set Network Attributes."

Quality Control Checklist:
The following is a checklist to review after making any network edits. Using graphic parameters to illustrate the active parameters makes the review go quickly.

1. When editing the shape of a link, is the box to "take over length-polygon" checked?
2. Are the link types coded correct?
3. Are the node types coded correct?
4. Is the "TModel delay link for turns" set for stop-controlled approach links?
5. Are the major flows correctly oriented at nodes with traffic control?
6. Are turn type number correct at nodes with traffic control?
7. Are there any "prohibited turns" and "u-turns" in places not expected?
8. When running the model after network edits, were the procedure steps run in "Group Set Network Attributes"?

2.3 Changing Land Use

Land use inputs, trip generation, and trip balancing occur in the Trip Generation Spreadsheet.

2.3.1 Residential Land Use

Residential land use inputs are summarized by number of household per TAZ. In addition, the total number of households must be subdivided into cross-classification categories of persons per household and workers per household. This distribution into cross-classification categories is not an automatic spreadsheet process.

To make residential land use changes to existing conditions, make edits to the existing trip generation spreadsheet on the "Ex Land Use (HH)" tab.

To make residential land use changes to future conditions, make edits to the future trip generation spreadsheet on the "Fut Land Use (HH)" tab. NOTE: this tab represents growth only in households. This is the same process for both the 2036 Island County Model and the 2040 Skagit County model.

2.3.2 Employment Land Use

Employment land use inputs are summarized by number of employees per TAZ, by the categories discussed in Chapter 3. Changing land use has become more difficult with recent employment data suppression policies. Existing employment data is not available to consultants. SCOG processes existing employment data in a separate worksheet, and then transfers the resulting trips into the "SCOG Emp Input" tab.

To make employment land use changes to existing conditions, work with SCOG to make changes and re-export to the "SCOG Emp Input" tab. Alternately, use the factors to scale existing trips to match the number of trips expected in a zone (see Columns O and P on the "Trips_Both Models" tab).

For the 2036 Island County Model employment changes, you will be making edits on the "Fut Land Use (EMP)" tab, which represents growth only in employees. Only make these type of edits to the Island County TAZs (number 600 or higher).

For the 2040 Skagit County Model employment changes, you will be making edits on the "SCOG Emp Input" tab. Work with SCOG to get the total 2040 attraction trips by trip purpose. Only make these type of edits to the Skagit Model TAZs (below number 600).

2.3.3 Export Trips To Visum

Once the land use changes are made as discussed above, the model trips (Productions and Attractions) will be automatically calculated and are ready to export to Visum. First, open the Visum model file and open a Zone listing, and open the list layout "LanduseInput". Next open the trip generation spreadsheet and select the tab to be exported (either "Island Co Export" or "Skagit Co Export"). Copy the contents of that spreadsheet tab, and paste into the Zone listing. Save the Visum file.

2.3.4 Running the Model

After making the land use edits, make sure to activate all the procedure steps. All model steps should be run when making land use edits.

Quality Control Checklist:
The following is a checklist to review after making any land use edits.

1. Were the households expanded into the cross-classification categories?
2. For future horizon scenarios, remember that the residential land use being edited represent growth only, not total land use quantities. Future employment changes depend on the county on how they are updated.
3. After exporting, spot check that the production or attraction values in Visum match the spreadsheet values?

4. When running the model after land use edits, were all the procedure steps run?

2.4 Changing the TAZ Structure

Given the complexity of the two county models and the trip generation spreadsheet, it is not recommended to change the TAZ structure (the number of TAZs). The model does use multipoint assignment (MPA), so an alternate method to control where trips enter/exit the model is to provide more TAZ centroid connectors and assign shares (weights) to each connector.

2.5 Changing Model Horizon Year

Changing the model horizon year involves both land use changes and changes to external TAZ assumptions. It is not recommended to change the model horizon year without careful adjustments to the trip generation spreadsheet, external traffic volume forecasts, and forecasts of the external-to-external trip table. Because both models share overlapping areas, horizon year changes require land use updates to both county areas, not just one county.

2.6 Post-Processing Model Volumes

Post-processing refers to adjusting raw future model volumes to account for model calibration or validation differences inherent in all travel demand models.

The "difference method" is the recommended method to estimate post-processed future turning movement volumes at study intersections. The difference method works by subtracting the existing model volume from the future model volume, and adding that difference to existing counts. The difference method does not produce reasonable results 100 percent of the time, so the results need to be checked for reasonableness, similar to all model post-processing methodologies.

A basic model user can easily copy a Visum listing of turns (or links) and paste into a premade spreadsheet to automate the bulk of the post-processing work.

Chapter 3. Travel Demand Inputs

Travel demand inputs relate to any element that places trips on study area roadways. Land use plans, trip generation rates, and trip distribution parameters are discussed. Trips linked to areas outside the model study area (external trips) are discussed, as well as traffic counts.

3.1 Land Use

Socio-economic information is the basis for estimating the quantity of travel activity in the study area. This land use information was summarized by the categories shown in Table 1. These land use categories are the basic building blocks of travel demand.

Table 1. Land Use Categories

Type	Code	Units	Description
Residential	HH(a)_(b)	Households	Households are segmented for cross-classification purposes. The first number "(a)" represents the number of people in the household. The second number "(b)" represents the number of workers in the household.
Employment	RETAIL	Employees	Retail trade, food services
	FIRES	Employees	Finance, insurance, real estate, services
	GOV	Employees	Government
	EDU	Employees	Education
	WTCU	Employees	Wholesale trade, transportation, utilities
	MANU	Employees	Manufacturing
	RESOURCE	Employees	Agriculture, forestry, fishing, mining
	HEALTH	Employees	Heath care, social assistance

Source: Transpo Group, 2015

To generalize travel activity by small areas, transportation analysis zones (TAZs) were developed. The SCOG model has a total of 474 TAZs. These TAZs were established by reviewing current GIS data sets, US Census boundaries, and past SCOG modeling efforts. Figures 1 and 2 show the general size and extents of the model TAZs.

The existing and forecasted land use was developed by SCOG and BERK Consulting.

3.2 Trip Generation

Trips are generated by land uses and are assigned a trip type. In the SCOG model, there are five basic trip types (or the general purpose of the trip):

- Home-Based-Work (HBW): Vehicle trips that have their origin or destination at the place of residence and the other end at the resident's place of employment.
- Home-Based-Other (HBO): Vehicle trips that have their origin or destination at the place of residence and the other end at somewhere other than the resident's place of employment.
- Non-Home Based (NHB): Vehicle trips with no residential trip end.

- King or Snohomish County (KSCO): Any vehicle trip with one trip end in King or Snohomish County.
- Recreation Destinations (REC): Any vehicle trip with one trip end at a major recreation destination, such as: Anacortes Ferry, Keystone Ferry, or SR 20 in eastern Skagit County.

Trip generation rates used in the SCOG Model reflect weekday PM peak hour trips. Households produce a certain amount of trips, and employment areas attract a certain amount of trips. The total households within each TAZ were separated into groups according to household size and number of workers per household, with trip rates ranging from 0.24 to 2.21 depending on household characteristics. These household trip rates are based on the *2008 North Sound Travel Survey* (NuStats, April 2009). Trip rates for employees ranged from 0.35 to 1.8 depending on the employee classification, and are based on the previous SCOG Model. Detailed trip generation rates by trip type are included in Table 2.

Table 2. Trip Generation Rates

			Productions[2]			Attractions[3]		
Code[1]	Units	Total	HBW	HBO	NHB	HBW	HBO	NHB
HH1_0	Households	0.24	0.0000	0.1933	0.0483	0	0	0
HH1_1	Households	0.32	0.1340	0.1116	0.0734	0	0	0
HH2_0	Households	0.37	0.0000	0.2977	0.0744	0	0	0
HH2_1	Households	0.49	0.1238	0.2825	0.1056	0	0	0
HH2_2	Households	0.75	0.3158	0.2631	0.1729	0	0	0
HH3_0	Households	0.51	0.0000	0.4057	0.1014	0	0	0
HH3_1	Households	0.67	0.1125	0.4150	0.1419	0	0	0
HH3_2	Households	1.02	0.3442	0.4507	0.2294	0	0	0
HH3_3	Households	1.44	0.6048	0.5040	0.3312	0	0	0
HH4_0	Households	0.78	0.0000	0.6233	0.1558	0	0	0
HH4_1	Households	1.03	0.1296	0.6839	0.2149	0	0	0
HH4_2	Households	1.57	0.3966	0.8341	0.3431	0	0	0
HH4_3	Households	2.21	0.8363	0.8740	0.5022	0	0	0
RETAIL	Employees	1.80	0	0	0	0.2880	0.7560	0.7560
FIRES	Employees	0.70	0	0	0	0.2100	0.2870	0.2030
GOV	Employees	0.70	0	0	0	0.2940	0.2520	0.1540
EDU	Employees	1.56	0	0	0	0.7800	0.7488	0.0312
WTCU	Employees	0.59	0	0	0	0.4543	0.0177	0.1180
MANU	Employees	0.37	0	0	0	0.1554	0.0222	0.1924
RESOURCE	Employees	0.35	0	0	0	0.2800	0.0000	0.0700
HEALTH	Employees	1.06	0	0	0	0.3180	0.4346	0.3074

Source: Transpo Group, 2015

1. Code represents the land use category. See Table 1 for land use definitions.
2. Productions represent residential land uses. The trips rates were based on information in *2008 North Sound Travel Survey* (NuStats, April 2009). Trip from HBW, HBO, and HNB were reassigned to types KSCO and REC based location within the county.
3. Attractions represent employment land uses. The trips rates were based on the previous SCOG model. Trips from HBW, HBO, and HNB were reassigned to types KSCO and REC based location within the county.

Trip generation assigns trips first to the HBW, HBO, and NHB trip types by TAZ. Then a portion of these trips are reassigned to the KSCO and REC trip types. The reason that KSCO and REC trip types were added in the model was to better link sub-regions within the model to key external TAZs. The percent of trips of a sub-region area that traveled to King County, Snohomish County, and recreational areas were based on several studies including the *2008 North Sound Travel Survey* (NuStats, April 2009), the *2006 Washington State Ferry Origin-Destination Survey* (WSDOT, June 2007), and *Census Transportation Planning Products* (2006-2010 five-year estimates).

Trip generation calculations occur in a spreadsheet outside the Visum software platform. The spreadsheet version is more transparent for outside reviews, and is more robust when local and regional agencies update their plans and model inputs. The spreadsheet also allows for the trip generation to be consistent between the Skagit County Model and the Island County Model, even in overlapping areas. When the trip generation spreadsheet is updated, there is a very simple procedure to import the new information in Visum.

3.3 Trip Distribution

Trips are distributed between TAZs using the "gravity" model, which is incorporated into the Visum software. This gravity model is built on the theory that, all else being equal, the attraction between two masses will be proportional to the size of the masses and inversely proportional to the distance between the masses. In the travel demand model, the number of trips in a TAZ is used to reflect the size of the mass, and route travel time is used to reflect the distance factor in the gravity model.

The gravity model has parameters to adjust these relationships for each trip purpose. Simply put, these parameters influence average trip lengths of each trip type. In the SCOG Model, the "Combined" utility function controls the impact of the distance factor in the gravity model. In equation form, the function is $f(U) = a*(U^b)*(e^{cU})$ where U is travel time between zones. Congested travel times are used for distributing trips. The parameters differ by trip type as shown in Table 3 and are based on guidance in *NCHRP 716 Travel Demand Forecasting: Parameters and Techniques* (TRB, 2012).

Table 3. Gravity Model Distribution Parameters

	Skagit County Model			Island County Model		
	a	b	c	a	b	c
Home-Based Work (HBW)	100	-0.02	-0.125	100	-0.45	-0.125
Home-Based Other (HBO)	100	-0.90	-0.10	100	-1.30	-0.10
Non-Home Based (NHB)	100	-0.30	-0.10	100	-0.90	-0.10
King or Snohomish County (KSCO)	100	-0.02	-0.125	100	-0.45	-0.125
Recreation (REC)	100	-0.02	-0.125	100	-0.45	-0.125

Source: Transpo Group, 2015

Trip distribution in the SCOG model assigns productions (households) to attraction (destinations) for PM peak hour trips. The model then converts those matrices into origin and destination matrices.

3.4 Externals

External TAZs account for trips which start and/or end outside the model study area. The SCOG model has 14 external TAZs. Trip generation for these TAZs is based on the following data sources:

- Current daily traffic volumes
- Historical traffic volumes
- Land use growth forecasts

Existing and forecasted external trips were converted to either productions or attractions by trip type in the trip generation process. Trips from both internal and external TAZs were then distributed according to the gravity model process. External-to-external trips were estimated separately.

3.5 Mode Choice

Trip generation procedures produce vehicle trips directly from land use inputs. The conversion of daily person trips to vehicle trips by household type was based on mode split information in the *2008 North Sound Travel Survey* (NuStats, April 2009).

3.6 Time-of-Day

Trip generation procedures produce weekday PM peak hour trips directly from land use inputs. The conversion of daily person trips to weekday PM peak hour trips by household type was based on time-of-day information in the *2008 North Sound Travel Survey* (NuStats, April 2009).

3.7 Traffic Counts

Existing traffic counts are significant in the development of the model because they directly account for existing travel demands. These existing volume inputs are used in key metrics that determine the validation and reasonableness of the existing year model. Regional roadway counts (daily and hourly) were obtained from local agencies and WSDOT and represent year 2012 or later.

Chapter 4. Travel Supply Inputs

Travel supply inputs relate to any elements that process trips on study area roadways. Overall network structure is explained as well as link and node types. Volume-delay relationships for various link and nodes types are also discussed.

4.1 Existing Street Network

The street network models the available travel supply. In the travel demand model, the street network is composed of links (roadways segments) and nodes (intersections). At the nodes, capacities at turns (turning movements) are used to represent basic traffic control constraints. Travel demand enters and exits the street network at nodes called TAZ centroids. These centroids are connected to the network with links called connectors.

In the SCOG model, the scope of the street network includes most major roads in Skagit and Island counties. Street alignments and attributes of the existing street network (such as posted speeds, lanes, and traffic controls) were obtained from GIS data sources and field observation in spot areas. Visum software allows direct integration with available GIS information. A map of the network is shown in Figures 1 and 2.

4.2 Future Baseline Street Network

Adapted from the existing street network, the future baseline street networks include various planned, programmed, or otherwise committed network improvements. As part of the Island County Model development and planning process, several future 2036 baseline network improvements were assumed:

- Rave Road to Houston Road Connector Phase 1 and 2.
- Add traffic signals to the following intersections: SR 20/Troxell Rd; SR 20/Banta Rd; and SR 525/Harbor Ave.
- SR 20, Morris Road to Jacobs Road Safety Improvements. See WSDOT project website for more information on new alignments and intersections.

The 2040 Skagit County Model future baseline model did not have any planned improvements assumptions finalized by the time this model documentation was developed.

4.3 Link Types

Link types are used to define the basic roadway attributes assumed by the model. Specific link capacities are assigned to each link type based on access control type, posted speeds, restricted vehicle modes, and number of lanes. For consistency and quality control purposes, the SCOG model automatically updates link speeds and capacities based on a link type lookup table (when the model runs). This reduces the risk for link attribute errors in the model. The link type look up table is provided in Appendix A.

4.4 Node Types and Turn Capacities

Similar to link types, node types are used to define basic intersection control types. These types account for most basic types of intersections. These node types set the assumed turn capacities and basic turn delays from the major and minor approaches. Specific turn capacities are assigned to each node type, based on whether the intersection is uncontrolled, stop-controlled, or controlled with a traffic signal or roundabout.

For consistency purposes, the SCOG Model automatically updates capacities and base delays of turns based on the node type. This reduces the risk for model coding error, and reduces the effort in maintaining the model. Node type descriptions are included in Appendix A.

4.5 Volume-Delay Functions

Volume-delay functions dictate the level of delay along roadways or at intersections as traffic volumes approach network capacity. In other words, they calculate traffic congestion. Volume-delay functions were used to calculate both link (roadway) delays and turn (intersection-related) delays.

In the SCOG Model, link delays were calculated with "Conical" functions and generally follow the characteristics outlined below:

- Freeway Links. Congested speeds remained at freeway speeds until approximately 80 percent of capacity. At 90 percent, speeds drop close to 45 mph. At capacity, speeds represent stop and go conditions (about 30 mph).
- Non-Freeway Links. At 80 percent of capacity, congested speeds drop to about 60 to 70 percent of free-flow speeds. At capacity, congested speeds drop to about 30 to 35 percent of free-flow speeds.

In the SCOG Model, base turn delays were assigned to each turn based on intersection type. Additional turn delays were calculated with the "TModel Nodes" function. This function is sensitive to the volume-to-capacity ratios at the turning movement level. Characteristics of this function parameter set include:

- At 50 percent of turn capacity, additional delays are less than 5 seconds per vehicle.
- At 80 percent of capacity, additional delays are approximately 30 seconds per vehicle.
- At capacity, additional delays are approximately 75 seconds per vehicle.

4.6 Other Inputs

Multipoint assignment (MPA) was used for several TAZs in the SCOG Model. MPA refers to assigning a specific percentage of travel demand to a connector for TAZs that have multiple connectors, rather than allowing the shortest path to the centroid dictate connector traffic. However, the default setting for each TAZ is to not use MPA unless it is needed.

Chapter 5. Validation and Reasonableness Checks

The process of model validation and reasonableness checks confirms if the model building blocks, if correctly applied, reasonably predict real world travel patterns and is valid for forecasting and other transportation planning purposes. Several statistics were reviewed that were associated with screen line volumes and individual link volumes. Distribution and trip generation characteristics were reviewed using various checks.

5.1 Screen Line Analysis

Screen lines (a boundary line which identifies all links between two areas) were defined to compare model travel patterns to actual travel patterns between two areas. Screen line locations for each county model are shown in Figures 3 and 4.

Table 4 shows the screen line results for the Skagit County Model, and Table 5 shows the results for the Island County Model. Percent difference maximums vary by volume and are based on guidance from *Travel Model Validation and Reasonableness Checking Manual* (FHWA, 2010), but generally anything less than 22 percent is acceptable.

Table 4. Screen Line Results – Skagit County Model

	Southbound			Northbound			Both Directions		
	Model[1]	Count[2]	Diff[3]	Model	Count	Diff	Model	Count	Diff
North-South Movements									
Deception Pass	642	695	-8%	707	645	9%	1,349	1,340	1%
Southwest County	578	660	-14%	709	645	9%	1,287	1,305	-1%
Skagit River at I-5	3,007	2,450	19%	3,457	3,640	-5%	6,464	6,090	6%
Mount Vernon City	4,050	4,580	-13%	4,323	5,265	-22%	8,373	9,845	-18%
	Westbound			**Eastbound**			**Both Directions**		
East-West Movements									
Fidalgo/Mainland	1,666	1,400	16%	2,020	1,690	16%	3,686	3,090	16%
Northwest County	1,988	1,670	16%	2,279	2,210	3%	4,267	3,880	9%
Mount Vernon City	609	845	-39%	998	1,355	-36%	1,607	2,200	-37%
West Sedro-Woolley	1,645	1,435	13%	2,055	1,990	3%	3,700	3,425	7%
East Sedro-Woolley	409	335	18%	553	540	2%	962	875	9%

1. Represents the sum of all model volumes crossing the screen line in that direction
2. Represents the sum of all count volumes crossing the screen line in that direction
3. Represents to percent difference between the count and model volumes. Percent difference maximums vary by volume and are based on guidance from *Travel Model Validation and Reasonableness Checking Manual* (FHWA, 2010), but generally anything less than 22 percent is acceptable.

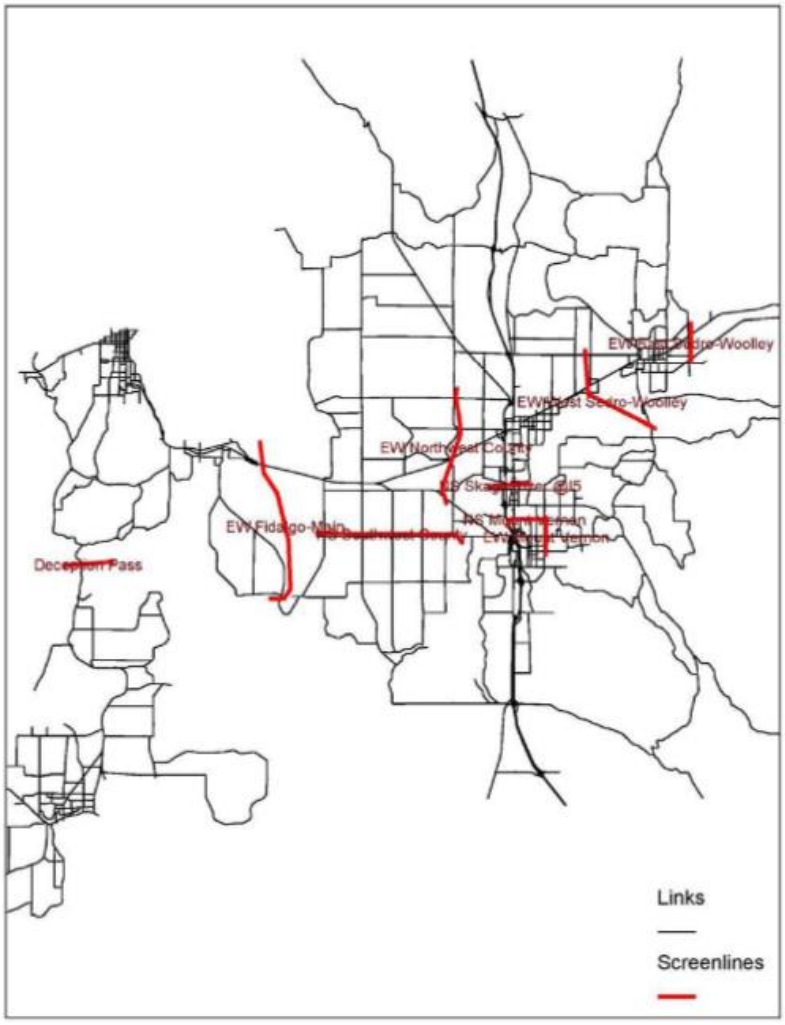


Figure 3. Screen Lines in Skagit County Model

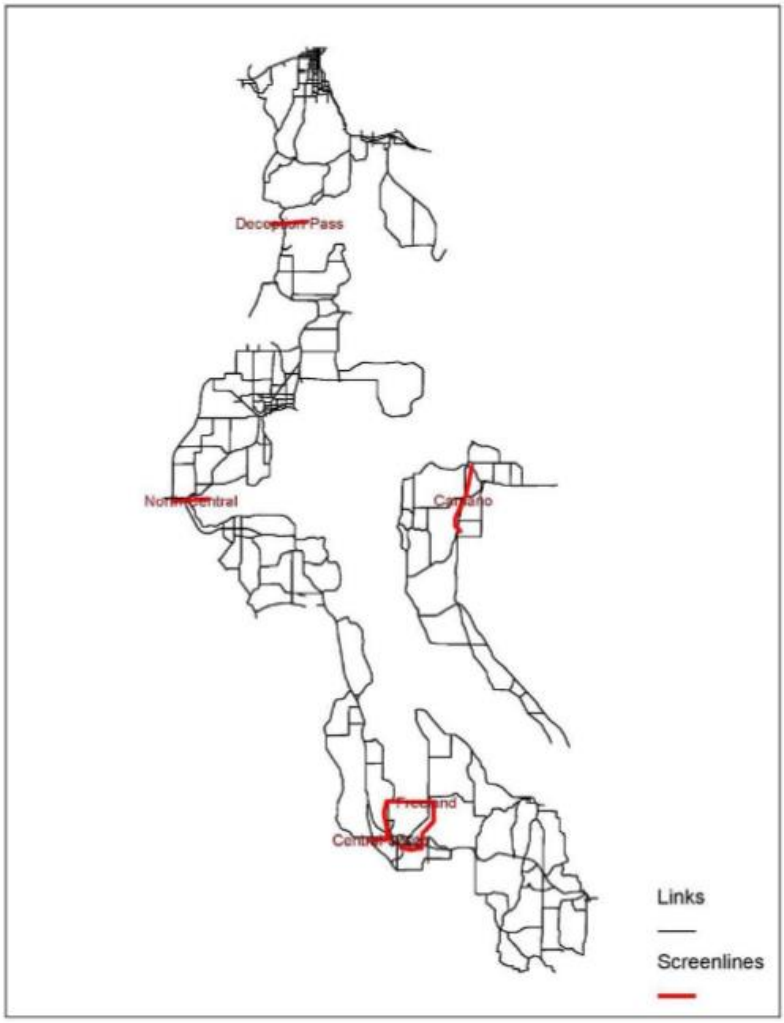


Figure 4. Screen Lines in Island County Model

As shown in Table 4, all but one screen line in Skagit County performed within an acceptable difference of 22 percent. The east-west screen line in the City of Mount Vernon had much lower volumes than what the counts would suggest. Given other screen lines were within targets, this may suggest a localized issue within the model, such as incorrect Mount Vernon land use inputs or poor traffic count quality. Given model travel patterns throughout Skagit County, these results were considered acceptable.

Table 5. Screen Line Results – Island County Model

	Southbound			Northbound			Both Directions		
	Model[1]	Count[2]	Diff[3]	Model	Count	Diff	Model	Count	Diff
North-South Movements									
Deception Pass	634	695	-10%	650	645	1%	1284	1340	-4%
North/Central Boundary	519	475	8%	479	530	-11%	998	1005	-1%
Central/South Boundary	443	440	1%	405	485	-20%	848	925	-9%
	Inbound/Westbound			**Outbound/Eastbound**			**Both Directions**		
East-West (Inbound-Outbound) Movements									
Freeland Cordon	1214	1350	-11%	1313	1450	-10%	2527	2800	-11%
Camano Central	1263	1210	4%	649	530	18%	1912	1740	9%

1. Represents the sum of all model volumes crossing the screen line in that direction
2. Represents the sum of all count volumes crossing the screen line in that direction
3. Represents to percent difference between the count and model volumes. Percent difference maximums vary by volume and are based on guidance from *Travel Model Validation and Reasonableness Checking Manual* (FHWA, 2010), but generally anything less than 22 percent is acceptable.

As shown in Table 5, all screen lines within Island County performed within an acceptable difference of 22 percent, based on recommendations in the *FHWA Manual*. Given overall model travel patterns, these results were considered acceptable.

5.2 Link Volume Analysis

The analysis of roadway link volumes compares roadway model volumes to actual traffic counts, by direction, for all locations where actual traffic counts are provided. Two common link volume statistics were reviewed to evaluate the model validity: Percent Root-Mean-Square-Error (RMSE) and R-squared or "goodness of fit".

Percent RMSE was calculated by roadway group to understand model behavior on key facilities. Percent RMSE is essentially the average of all the link-by-link percent differences—a good statistic to understand percent difference variability on links of a particular functional class. Table 6 shows the percent RMSE results for the different roadway groups during each respective time period. Generally, results below 40 percent RMSE are considered acceptable. In Island County, both state highways and arterials were below this 40 percent threshold. In Skagit County, state highways were below the 40 percent threshold but arterials were just above. This is likely due to the same isolated issues in Mount Vernon that also pushed screen line differences above targets. Collector and local roadways were above this threshold, however they typically have lower volumes that make the 40-percent target more challenging to achieve consistently.

R-squared indicates how well the model volumes represent the actual traffic counts. If model volumes exactly matched the actual counts, the R-squared value would be 1.00. For both

county models, the overall model R-squared was 0.94 or greater which is within guidelines from the *FHWA Manual*.

Table 6. Link Volume Statistics

	Skagit County Model			Island County Model		
	RMSE[1]	R-squared[2]	Difference[3]	RMSE	R-squared	Difference
State Highways	19%	0.96	14%	18%	0.88	13%
Arterials	42%	0.73	29%	38%	0.79	26%
Collectors/Local	68%	0.70	46%	44%	0.89	29%
Total	30%	0.95	20%	26%	0.94	18%

1. Percent Root-Mean-Square-Error (RMSE) refers to the percent difference on an average link-by-link basis.
2. R-squared indicates how well the model volumes represent the actual traffic counts. If model volumes exactly matched the actual counts, the R-squared value would be 1.00.
3. Refers to the percent difference on a total volume basis (sum total of all links).

Based on the data shown in Table 6 the SCOG model link-by-link variability (Percent RSME and R-squared) was considered acceptable. Maximums were established based on guidance from *FHWA Manual*. Link analysis scatterplots are shown in Figures 5 and 6.

5.3 Distribution Checks

Distribution checks relate to how the model is distributing and assigning trips through the model. The following types of distribution checks were performed for both county models.

5.3.1 Average Trip Lengths

The average trips lengths for the main trip types (HBW, HBO, and NHB) were compared back to trip length information in the *2008 North Sound Travel Survey* (NuStats, April 2009). For the Skagit County Model, average trip lengths were 20, 15, and 13 minutes for the HBW, HBO, and NHB trips, respectively. For the Island County Model, average trip lengths were 22, 15, and 12 minutes for the HBW, HBO, and NHB trips, respectively. These trip lengths were within 10 percent of the trip length information in the *2008 Travel Survey*.

5.3.2 Select-Link and Select-Zone Analysis

Select-link and select-zone refers to isolating a roadway or TAZ and flagging only those trips on the model network that are associated with that link or zone. This can identify problems with trip generation, trip distribution, and/or trip assignment model parameters. Select-link and select-zone analysis was performed at key roadways and TAZs to test the reasonableness of the model. This included major bridges, external TAZs, and major employment centers. For the SCOG model this process resulting in adjustments to external distribution parameters and improved network coding (nodes, links, and centroid connectors).

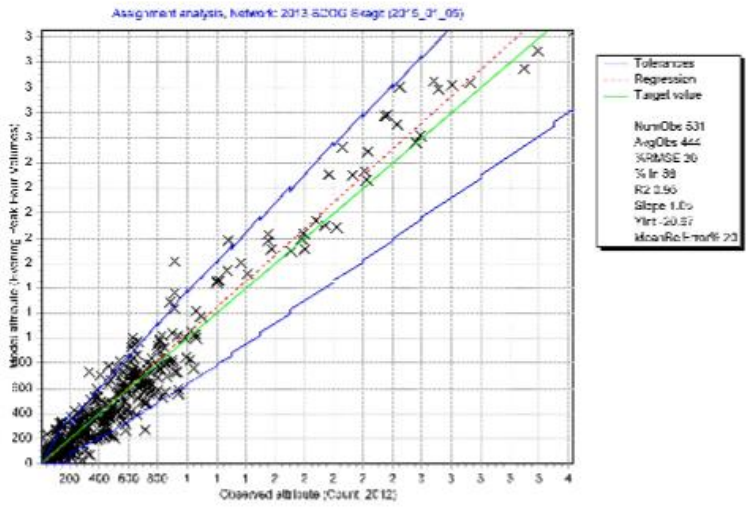


Figure 5. Link Analysis Scatterplot – Skagit County

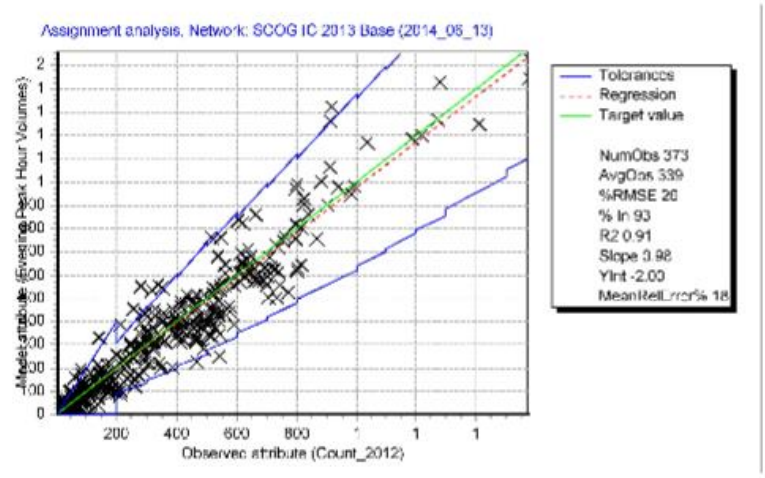


Figure 6. Link Analysis Scatterplot – Island County

APPENDIX A
Link Type Descriptions

Link Type	Description	Number of Lanes (per direction)	Capacity (vehicles per hour)	Speed (mph)
1	Blocked	0	0	0
2	Freeway (60mph, 2ln per dir)	2	3,600	60
3	Freeway (60mph, 3ln per dir)	3	5,400	60
4	Freeway (60mph, 4ln per dir)	4	7,200	60
5	Freeway (60mph, 5ln per dir)	5	9,000	60
6	Freeway (60mph, 6ln per dir)	6	10,800	60
7	Freeway (70mph, 2ln per dir)	2	3,600	70
8	Freeway (70mph, 3ln per dir)	3	5,400	70
11	Ramps (45mph, 1ln per dir)	1	1,500	45
12	Ramps (45mph, 2ln per dir)	2	3,000	45
13	Ramps (45mph, 3ln per dir)	3	4,500	45
14	Ramps (35mph, 1ln per dir)	1	1,200	35
15	Ramps (35mph, 2ln per dir)	2	2,400	35
16	Ramps (35mph, 3ln per dir)	3	3,600	35
17	Ramps (25mph, 1ln per dir)	1	1,200	25
18	Ramps (25mph, 2ln per dir)	2	2,400	25
19	Ramps (25mph, 3ln per dir)	3	3,600	25
20	HOV (55mph, 1ln per dir)	1	1,600	55
21	HOV (55mph, 2ln per dir)	2	3,200	55
22	Non-Freeway (55mph, 2ln)	1	1,600	55
23	Non-Freeway (55mph, 3ln)	1	1,700	55
25	Non-Freeway (55mph, 5ln)	2	3,000	55
26	Freeway (55mph, 2ln per dir)	2	3,600	55
27	Freeway (55mph, 3ln per dir)	3	5,400	55
28	Freeway (55mph, 4ln per dir)	4	7,200	55
29	Freeway (55mph, 5ln per dir)	5	9,000	55
32	Non-Freeway (50mph, 2ln)	1	1,600	50
33	Non-Freeway (50mph, 3ln)	1	1,700	50
35	Non-Freeway (50mph, 5ln)	2	3,000	50
40	HOV (45mph, 1ln per dir)	1	800	45
42	Non-Freeway (45mph, 2ln)	1	1,350	45
43	Non-Freeway (45mph, 3ln)	1	1,500	45
44	Non-Freeway (45mph, 4ln)	2	2,700	45
45	Non-Freeway (45mph, 5ln)	2	3,000	45
47	Non-Freeway (45mph, 7ln)	3	4,500	45
50	HOV (40mph, 1ln per dir)	1	800	40
52	Non-Freeway (40mph, 2ln)	1	900	40
53	Non-Freeway (40mph, 3ln)	1	1,100	40
54	Non-Freeway (40mph, 4ln)	2	1,650	40
55	Non-Freeway (40mph, 5ln)	2	2,200	40
57	Non-Freeway (40mph, 7ln)	3	4,500	40
60	HOV (35mph, 1ln per dir)	1	800	35
62	Non-Freeway (35mph, 2ln)	1	900	35
63	Non-Freeway (35mph, 3ln)	1	1,100	35
64	Non-Freeway (35mph, 4ln)	2	1,650	35
65	Non-Freeway (35mph, 5ln)	2	2,200	35
67	Non-Freeway (35mph, 7ln)	3	3,300	35
68	Non-Freeway (35mph, 8ln)	4	4,500	35
70	HOV (30mph, 1ln per dir)	1	800	30
72	Non-Freeway (30mph, 2ln)	1	900	30
73	Non-Freeway (30mph, 3ln)	1	1,100	30
74	Non-Freeway (30mph, 4ln)	2	1,400	30
75	Non-Freeway (30mph, 5ln)	2	2,000	30
80	HOV (25mph, 1ln per dir)	1	800	25
82	Non-Freeway (25mph, 2ln)	1	550	25
83	Non-Freeway (25mph, 3ln)	1	825	25
84	Non-Freeway (25mph, 4ln)	2	900	25
85	Non-Freeway (25mph, 5ln)	2	1,300	25
90	HOV (60mph, 1ln per dir)	1	1,600	60
91	HOV (60mph, 2ln per dir)	2	3,200	60
92	Non-Freeway (20mph, 2ln)	1	350	20
93	Non-Freeway (20mph, 3ln)	1	550	20
99	Connector	1	99,999	25

Source: Transpo Group

APPENDIX A - Continued

Node Type Descriptions

Node Type	Description
1	Shape node (no delay)
5	TWSC (uses node delay, not turn delay)
10	AWSC
20	Roundabout, single lane
25	Roundabout, dual lane
31	Signal, 3 approaches, single LT all, single RT minor
32	Signal, 3 approaches, single LT all, dual RT minor
41	Signal, 4 approaches, single LT all, 1x1 unbalanced volumes
42	Signal, 4 approaches, single LT all, 1x1 balanced volumes
43	Signal, 4 approaches, single LT all, 2x1 unbalanced volumes
45	Signal, 4 approaches, single LT all, 2x2 unbalanced volumes
46	Signal, 4 approaches, single LT all, 2x2 balanced volumes
53	Signal, 3 approaches, dual LT on major only
54	Signal, 4 approaches, dual LT on major only
61	Signal, 3 approaches, dual LT on minor only, single RT minor
62	Signal, 3 approaches, dual LT on minor only, dual RT minor
73	Signal, 3 approaches, dual LT on all approaches
74	Signal, 4 approaches, dual LT on all approaches

Source: Transpo Group

Turn Capacities and Delays based on Node Types

	Turn Capacities (vehicles per hour)						Initial Turn Delay (seconds)					
	Major Approach			Minor Approach			Major Approach			Minor Approach		
Node Type	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
1	99999	99999	99999	99999	99999	99999	0	0	0	0	0	0
5	99999	99999	99999	99999	99999	99999	0	0	0	10	10	5
10	250	450	250	250	450	250	15	15	15	15	15	15
20	800	800	800	800	800	800	5	5	5	5	5	5
25	1200	1200	1200	1200	1200	1200	5	5	5	5	5	5
31	350	2000	750	450	1000	750	12	5	8	12	5	8
32	350	2800	750	450	1000	1200	12	5	8	12	5	8
41	300	1500	450	230	380	380	12	5	8	12	5	8
42	250	800	450	230	600	380	12	5	8	12	5	8
43	500	2800	750	380	630	630	12	5	8	12	5	8
45	400	2800	1050	300	880	880	12	5	8	12	5	8
46	300	1200	500	250	1000	500	12	5	8	12	5	8
53	550	2000	750	450	1000	750	12	5	8	12	5	8
54	700	1500	500	300	1000	500	12	5	8	12	5	8
61	350	2000	750	700	1000	750	12	5	8	12	5	8
62	350	2000	750	700	1000	1200	12	5	8	12	5	8
73	550	2000	750	700	1000	750	12	5	8	12	5	8
74	550	1500	500	550	1000	500	12	5	8	12	5	8

Source: Transpo Group

Washington State Department of Transportation

SR 20 Swantown Road to Barrington Drive
Corridor Pre-design Analysis, Technical Update, April 2012

PURPOSE:
This technical paper summarizes additional analysis prepared by WSDOT subsequent to the completion, in 2005, of the State Route 20 Swantown Road to Cabot Drive Corridor Pre-Design Analysis (hereinafter referred to as the Pre-design Analysis).

KEY FINDINGS:
The following key findings are covered in more detail later in this technical paper.

- Traffic volumes along SR 20 have seen little change since 1999. The study intersections continue to operate well within the adopted level of service standard. Traffic would need to grow 40 percent or more over 2011 peak hour volumes before the intersections begin to fall below the level of service concurrency standard of LOS E.
- WSDOT recently updated the cost estimate for the improvements recommended in the Pre-design Analysis. The 2011 scoping estimate is $29.9 million (Swantown to Barrington).
- Coupled with more modest growth in traffic volumes, some lower cost alternatives would improve westbound traffic flow between Pioneer and Swantown, but there are trade-offs.

BACKGROUND:
WSDOT and the city of Oak Harbor completed a Pre-design Analysis in 2005 in order to:

- Examine existing (2004) and future (2030) no-build intersection traffic operations.
- Evaluate future (2030) intersection traffic operations for a set of improvement alternatives.
- Recommend corridor improvements, provide conceptual drawings, planning-level cost estimates and a project phasing plan.

Recommendations from the Pre-design Analysis included the following phased implementation:

- Phase One – two-lane roundabouts at Swantown and at Erie; convert the two-way-left-turn lane to a second westbound through lane from Erie to Swantown; restrict turns at Scenic Heights to right-in/right-out only
- Phase Two – Two-lane roundabouts at Pioneer Way and at Barrington Dr.
- Phase Three – Widen SR 20 to four lanes from Swantown to Pioneer, plus a landscaped median, bike lanes and new sidewalks from Swantown to Barrington
- Phase Four – Two-lane roundabouts at 8th Ave, and at 3rd Ave/Cabot, along with a landscaped median, bicycle lanes and new sidewalks from Barrington to 3rd Ave/Cabot

2011 WSDOT SCOPING DESIGN ESTIMATE:
In 2011 WSDOT updated the layouts and cost estimates from the 2005 pre-design analysis for the section of SR 20 from Swantown to Barrington. WSDOT's 2011 estimate is double what was estimated in 2005, as shown in Table 1.

Washington State Department of Transportation

Table 1

	2005 Pre-design	2011 Scoping
Pre-design Analysis, Phases 1, 2 and 3	$15.5 Million	$29.9 Million
Pre-design Analysis, Phase 4	$7 Million	not estimated
Cost basis	2005 dollars	2011 dollars

Reasons for the increased cost include the following:

- 2011 "scoping" estimate is at five percent design completed; the 2005 "planning" estimate was less than one percent design completed. The higher the percent design completed, the better the reliability and accuracy of the estimate.
- We know a lot more about roundabout design and costs in 2011 than we did in 2005. Very few roundabouts had been constructed statewide prior to 2006. Since 2007 twenty roundabouts have been built in Whatcom and Skagit Counties and more are coming.
- The 2011 estimate includes the latest standards and requirements for protection of sensitive areas and treatment of storm water runoff.

ADDITIONAL ANALYSIS COMPLETED BY WSDOT:

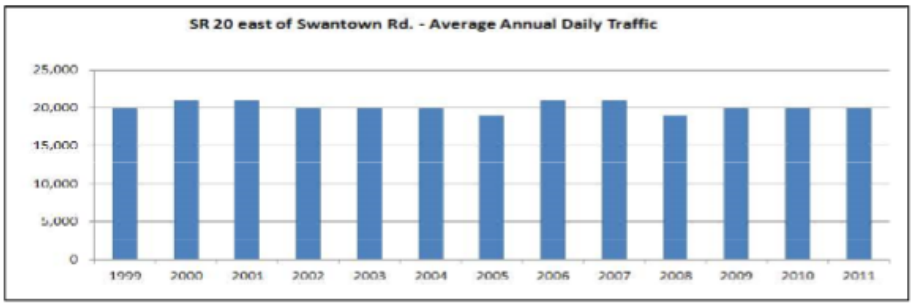
WSDOT investigated a number of potential lower cost alternatives to the improvements recommended in the Pre-design Analysis for the section of SR 20 from Swantown to Barrington. We also gathered and evaluated current traffic information that provides context for evaluating alternatives.

Our analysis shows that traffic volumes along SR 20 have varied little in the past 12 years. The leveling of traffic volumes has enabled the signalized intersections to continue to operate at or near the same level of service during that time. Over the past five years the frequency of traffic collisions has not significantly changed from year to year, and most importantly, there were no serious injury or fatality collisions during that time.

Average Annual Daily Traffic

There has been little or no growth in average annual daily traffic volumes along SR 20 in the past 13 years, as shown in Table 2.

Table 2



Intersection level of service

The traffic forecasts used for the 2005 pre-design analysis determined that traffic growth would degrade intersection level of service as early as 2010. The forecasted growth did not happen. WSDOT's updated traffic analysis, recently completed for 2011 peak hour volumes, indicates that all of the study intersections are operating at an acceptable level of service (LOS C). Table 3 provides a comparison of the Pre-design Analysis level of service projected for 2010 versus 2011 actual.

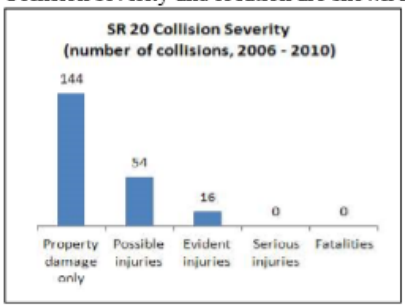
Table 3

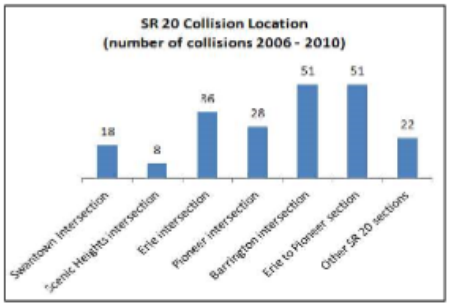
	2010 Projected		2011 Actual	
	LOS	Delay	LOS	Delay
SR 20/Swantown	F	82.9 sec	C	21.0 sec
SR 20/Scenic Heights	E	38.2 sec	C	18.4 sec
SR 20/Erie	E	59.2 sec	C	22.2 sec
SR 20/Pioneer	E	60.2 sec	C	26.7 sec
SR 20/Barrington	D	43.9 sec	C	28.5 sec

Traffic collisions

There were 214 collisions along SR 20 from Swantown to Barrington over a five year period (2006-2010). Collision frequency per year has been relatively consistent, not showing a trend up or down. The most frequent types of collisions were; rear-end collisions (43 percent of all collisions), opposite direction collisions (14 percent), and enter at angle collisions (12 percent). Only three collisions can be directly attributed to SR 20 westbound traffic merging at the lane drop between Erie and Scenic Heights.

Collision severity and location are shown in the charts below.

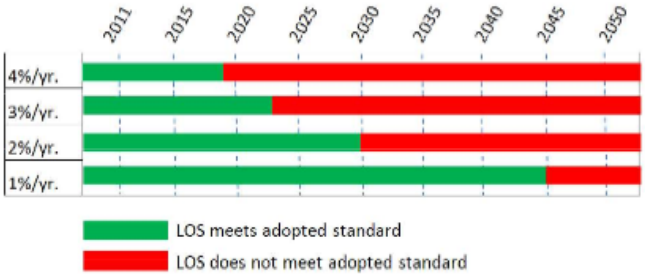




Additional Alternatives

Over the past several years a number of lane and intersection configurations have been reviewed, in varying degrees of detail, to determine if there are additional lower cost alternatives to the recommendations made in the 2005 Pre-design Analysis. With traffic growing at a much slower rate than originally forecasted, the need for more costly improvements may be delayed further into the future than initially thought.

How far into the future? For an example let's look at the SR 20/Barrington intersection, which had the highest average vehicle delay during peak hour of any of the study intersections in 2011. Traffic would need to grow by over 40 percent for the intersection to fall below the level of service standard for concurrency. At one percent traffic growth per year, it would take about 35 years for the SR 20/Barrington intersection to fall below the concurrency standard. The 40 percent threshold would be reached sooner at higher traffic growth rates, as shown in the chart below.



Compare this to a nearly flat growth rate in SR 20 traffic since 1999 and indications are that major improvements are not needed anytime soon in order to remain within the adopted intersection level of service (LOS E) at the study intersections. Even so, congestion and vehicle delay will increase as traffic grows. Again, using the SR 20/Barrington intersection as an example, the average delay in 2011 pm peak hour conditions was 28.5 seconds per vehicle (LOS C). Average vehicle delay could worsen to 79 seconds per vehicle and still meet the far limit of the LOS E standard. The good news is, there is time to plan and seek funding for incremental improvements in the corridor.

Table 4 on the next page provides a brief recap of eight additional lower cost intersection alternatives that were evaluated by WSDOT following the completion of the Pre-design Analysis. Three of the eight alternatives (alternatives one, seven and eight) were selected by WSDOT traffic engineers for additional traffic evaluation as they were likely to provide the highest benefit relative to their cost. Following Table 4 is a page each for alternatives one, seven and eight, showing the traffic results and a rough sketch layout of what they could look like.

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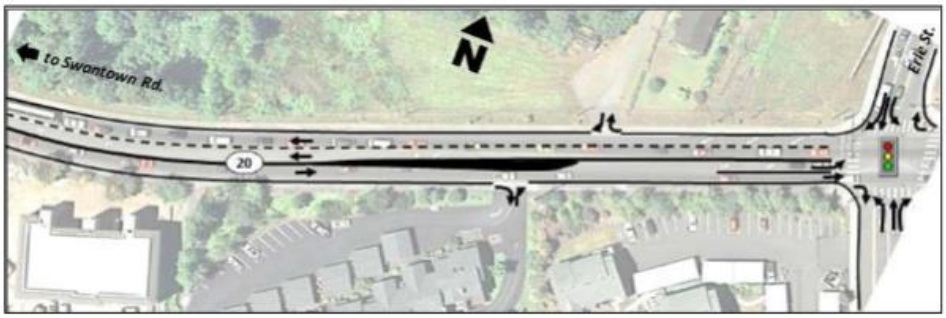
Table 4: Additional Alternatives Evaluated by WSDOT

	Alternatives	LOS (2011)	Estimated Cost	Benefits	Disadvantages	Notes
1	Convert SR 20 westbound two-way left-turn lane from Erie to Swantown into a second westbound through lane. Install median curbing on SR 20 and restrict turns at Scenic Heights to right-in/right-out only.	LOS C	no estimate available	The lowest cost alternative. Can be implemented quickly.	Eliminates left turns to and from SR 20 and Scenic Heights Dr. and driveways. Resulting in circuitous access for Scenic Heights via Waterloo Rd.	Future operational life of improvements has not been determined. See sketch page for more details.
2	Same as Alt.1 plus adds U-turn capability at SR 20/Swantown Rd and SR 20/Erie St intersections.	LOS not evaluated	no estimate available	U-turns at Swantown and Erie provide directional travel choices for Scenic Heights travelers.	Right of way, retaining walls and intersection modifications increase cost.	The cost to build a U-turns at Swantown and Erie would approach the cost of a roundabouts at those locations while not providing the same level of long term benefits roundabouts would provide.
3	Retain two way left-turn lane and all turning choices to/from Scenic Heights Dr. Widen SR 20 to add second westbound travel lane.	LOS not evaluated	no estimate available	Adds travel lane capacity without restricting turns at Scenic Heights and driveways.	Cost for right of way and construction for new westbound lane.	
4	Same as Alt.3 but eliminates left turn out from Scenic Heights in order to reduce the right-of-way required to widen SR 20 for the second travel lane.	LOS not evaluated	no estimate available	Less right of way needed versus Alt.3. Retains left turn in from SR 20 to Scenic Heights.	Cost for right of way and construction for new westbound lane.	
5	Same as Alt.4 plus adds U-turn capability at the SR 20/Erie St. intersection	LOS not evaluated	no estimate available	Compared to Alt.4, adding U-turn at Erie provides alternative for Scenic Heights drivers needing to travel west or south on SR 20.	Small number of left turns from Scenic Heights to SR 20 may not justify the expense.	
6	Same as Alt.1 plus adds a fourth leg to the SR 20/Swantown intersection to provide a new connection to Scenic Heights Dr. The existing intersection at SR 20/Scenic Heights could be closed or remain right-in/right-out only.	LOS not evaluated	no estimate available	Continues full turning access between SR 20 to/from driveways and to/from Scenic Heights. Could close existing access at SR 20/Scenic Heights.	Cost of right of way and cost to construct fourth leg of intersection.	
7	Same as Alt.1 except replaces the signal at SR 20/Swantown with a roundabout.	LOS B or C	no estimate available	SR 20/Swantown roundabout is first step in long-term vision for the corridor. Provides an alternative for left-turns in from SR 20 to Scenic Heights via the roundabout.	Cost for right of way and construction of Swantown roundabout is a lower cost, but not a low cost, alternative. Eliminates left turn outs from Scenic Heights to SR 20. Circuitous routing to Waterloo Rd. to make their turns.	See sketch page for more details.
8	Roundabouts at Swantown and Pioneer with uninterrupted median curb in between. Driveways and intersections between Swantown and Pioneer restricted to right-in/right-out turns only, including the SR 20/Erie-Bayshore intersection.	LOS B or C	no estimate available	Provides more capacity between Swantown and Pioneer. All turning movements between Swantown and Pioneer can be served. Room to make Erie to Pioneer 4 lanes.	Some of the left turns rerouted to the roundabouts increase trip length. Likely to induce some changes in trip patterns on local street system and at other intersections such as at SR 20/ Barrington.	Median the full length of SR 20 between Swantown and Pioneer would eliminate all left turns, including at Erie/Bayshore, redirecting those trips to the roundabouts. See sketch page for more details.

Sketch - Alternative 1: Restripe existing pavement to add a westbound drop lane on SR 20 from Erie St. to Swantown Rd. with a median curb that restricts access at driveways and at Scenic Heights Dr. to right-in/right-out turns only.
Location: SR 20 between Erie St and Swantown Rd.
Benefits/Disadvanatges: Lowest cost and can be implemented quickly, but eliminates all left turns to/from SR 20 between Erie and Swantown.



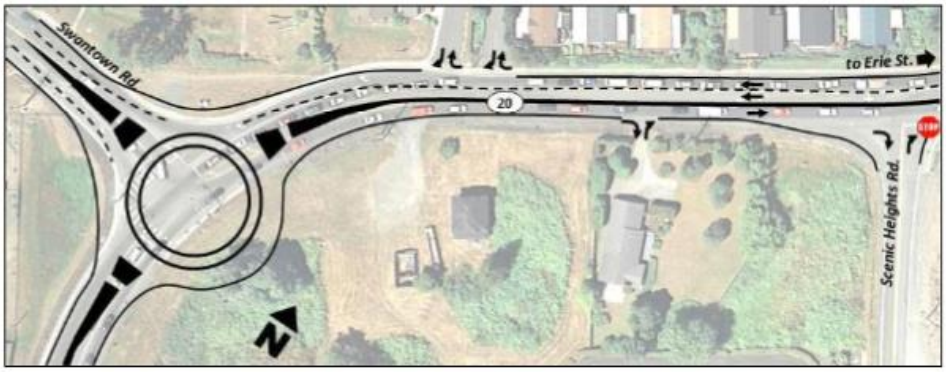
Intersection Traffic Analysis (2011 PM peak hour):

Assumptions:

- Left turns from Scenic Heights to SR 20 will reroute to Waterloo Rd
- Left turns from SR 20 to Scenic Heights will reroute to Waterloo Rd

	2011 Existing		2011 Alternative 1	
	LOS	Delay	LOS	Delay
SR 20/Swantown Rd.	C	21.0 sec	C	26.7 sec
SR 20/Scenic Heights Rd.	C	18.4 sec	C	17.8 sec
SR 20/Erie St.	C	22.2 sec	C	22.2 sec
SR 20/Pioneer Way	C	26.7 sec	C	26.7 sec
SR 20/Barrington Dr.	C	28.5 sec	C	28.5 sec

Sketch - Alternative 7: Add westbound drop lane on SR 20 from Erie St. to Swantown Rd. with a median curb that restricts access at driveways and at Scenic Heights Dr. to right-in/right-out turns only. Construct a roundabout at SR 20/Swantown Rd. intersection.
Location: SR 20 between Erie St and Swantown Rd.
Benefits/Disadvanatges: Roundabout services left turns from SR 20 into Scenic Heights and provides long-term corridor improvement, but at higher cost than Alternative 1. Unable to make left turns from Scenic Heights to SR 20, rerouting them to Waterloo Rd.

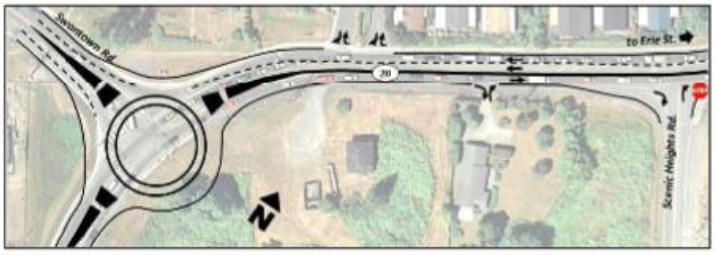


Intersection Traffic Analysis (2011 PM peak hour):

Assumptions:
- Left turns from Scenic Heights to SR 20 reroute to Waterloo Rd
- Left turns from SR 20 to Scenic Heights reroute to Swantown roundabout

	2011 Existing		2011 Alternative 7	
	LOS	Delay	LOS	Delay
SR 20/Swantown Rd.	C	21.0 sec	B	10.4 sec
SR 20/Scenic Heights Rd.	C	18.4 sec	C	17.8 sec
SR 20/Erie St.	C	22.2 sec	C	22.2 sec
SR 20/Pioneer Way	C	26.7 sec	C	26.7 sec
SR 20/Barrington Dr.	C	28.5 sec	C	28.5 sec

Sketch - Alternative 8: Roundabouts at Swantown and Pioneer with an uninterrupted median curb on SR 20 between Swantown and Pioneer, with right-in/right out access at all driveways and intersections in between, including at the SR 20/Erie-Bayshore intersection.
Location: SR 20 between Pioneer Way and Swantown Rd.
Benefits/Disadvantages: All restricted left turns can be accommodated at the Swantown and Pioneer roundabouts. Adds key long-term corridor improvements. SR 20 would be four lanes between Erie and Pioneer without adding pavement. Disadvantages are cost for R/W and construction, longer trip lengths for some left turns, and diversion of trips to SR 20/Barrington.



Intersection Traffic Analysis (2011 PM peak hour):

Assumptions:

- Left turns from Scenic Heights to SR 20 reroute to Pioneer roundabout
- (continued on page 9)

	2011 Existing		2011 Alternative 8	
	LOS	Delay	LOS	Delay
SR 20/Swantown Rd.	C	21.0 sec	B	11.9 sec
SR 20/Scenic Heights Rd.	C	18.4 sec	C	21.0 sec
SR 20/Erie St.	C	22.2 sec	C	24.2 sec #
SR 20/Pioneer Way	C	26.7 sec	B	10.7 sec
SR 20/Barrington Dr.	C	28.5 sec	C	28.5 sec

- delay is for worst movement (northbound right turn)

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Assumptions for Alternative 8 traffic analysis (continued from page 8)

- Left turns from SR 20 to Scenic Heights reroute to Swantown roundabout
- Left turns from Erie to SR 20 reroute to Swantown roundabout
- Left turns from SR 20 to Erie reroute to Pioneer roundabout
- Remove signal at SR 20/Erie-Bayshore
- Left turns from Bayshore to SR 20 reroute to Pioneer roundabout
- Left turns from SR 20 to Bayshore reroute to Swantown roundabout

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APPENDIX E- 20 YEAR PROJECT LIST

This appendix describes the process by which the 20 year project list was developed and evaluated. The 20 year project list was developed to create a transportation system that realizes Oak Harbor's ultimate transportation vision: to provide a safe, balanced, and efficient multi-modal transportation system that is consistent with the City's overall vision and adequately serves anticipated growth. This vision is guided by the transportation goals outlined in this Plan:

- **Goal 1:** Safe for all users
- **Goal 2**: Connected and efficient.
- **Goal 3**: Multimodal offering user friendly transportation options.
- **Goal 4**: Financially and environmentally sustainable.
- **Goal 5**: Complementary of the City's land use vision and other adopted plans.
- **Goal 6**: Integrated with the regional transportation network to address a diverse range of transportation interests.

With these goals in mind, as well as completing the layered networks; evaluating existing and future infrastructure needs based on adopted LOS; reviewing existing transportation plans; and working with the public, Planning Commission, and City Council to identify areas in need of transportation improvements, a draft project list was developed. The draft project list included over 50 potential projects. Each project was evaluated and scored relative to the transportation goals using a scoring matrix. The scoring matrix included 14 metric covering the 6 goals. Each metric's description, as well as its scoring potential, can be seen in **Table 1**. In addition, the composite score of each project evaluated as part of this Plan can be seen in **Table 2**. The composite scores were standardized based on a scale of 1-10 (10 being the highest score possible).

Table 1: Project Scoring Table

Goal	Metric Description	Ranking
Safe for all users	1. Addresses location with a history of injury/fatality collisions	4= Fatality and/or bike/ped collision 2= On the top 10 list of collision locations in City 0= Low collision rate
	2. Fixes an identified sight distance issue or identified modal conflict point	4= Identified by City staff, public and/or consultants 2= Conflict with the auto priority network 0= Other
Connected and efficient	3. Consistency with the layered network	2= Yes 0= No
	4. Provides connection to: employment, services, school, retail, government, recreation, or regional transportation.	2= Connects five or more destinations 1= Connects 3 or 4 destinations 0= Connects less than three destinations
Multimodal offering user friendly transportation options	5. Encourages pedestrian travel	2= Exclusive facility (e.g. buffered sidewalk, trail) 1= Pedestrian facility (e.g. sidewalk w/o buffer or one side) 0= Other
	6. Encourages bicycle travel	2=Exclusive facility (e.g. trail, separated bike lane) 1=Shared facility (e.g. bicycle lane, sharrow) 0=Other
	7. Encourages transit travel	2= Infrastructure or access to transit improvement within 1/2 mile proximity 1= Infrastructure or access to transit improvement within 1 mile proximity 0= Other
	8. Supports Auto LOS	2= Currently failing LOS standard 1= Degrades by 1 letter LOS in future 0= No problems in the future
Financially and environmentally sustainable	9. Supports Low Impact Development (LID); (e.g. street width, utilizes permeable surfaces, etc.)	2= Permeable surface, reduction in impervious surfaces 1= Repurpose existing space for multiuse 0= Other
	10. .Project's costs are aligned with City budget constraints	2= High 1= Medium 0= Low
Complementary of the City's land use vision and other adopted plans	11.. Project supports the character of Oak Harbor's Districts	2=Yes 0=No
	12. Project is on the books	2= Yes 0= No
Integrated with the regional transportation network to address a diverse range of transportation interests	13. Supports regional transportation network	2= Offsets SR 20, adds to regional bike/transit network 1= Congestion relief, pedestrian access to transit 0= Other
	14. Project impact per user	2= Impacts a high number of users 1= Impacts a medium number of users 0= Impacts a low number of users

Table 2: Project Scores

Project Name	Project Description	Score
Midway Boulevard Road Diet and Roadway Reconstruction	Convert existing four-lane undivided roadway segment between Pioneer Way and NE 7th Avenue to a three-lane segment consisting of two through lanes and a center two-way left-turn lane. This project includes sidewalk improvements such as bulbouts, curb ramps and RRFBs, as well as bike lanes.	7.81
Whidbey Avenue Roadway Reconstruction	Reconstruct Whidbey Avenue between Heller Street and Regatta Drive. This project includes curb, gutter, drainage, transit and nonmotorized improvements (sidewalk maintenance/bike lanes).	7.50
NE 7th Avenue Roadway Reconstruction and Pedestrian Improvements	Full reconstruction of the roadway, lighting, completing the missing sidewalks on the north side of the road, and constructing a natural paved multiuse path on the south side of the road .	7.50
SW Heller Roadway Reconstruction	Repave existing roadway and add curb and gutter improvements between SW Swantown Avenue to W Whidbey Avenue. This project includes sidewalk, bike, and transit improvements.	6.88
Whidbey Avenue Crosswalk	Improve pedestrian crossing on Whidbey Avenue between N Oak Harbor Street and SR 20 near the intersection of Barron Drive.	6.88
Whidbey Road Diet between N Oak Harbor Street and SR 20	Convert existing four-lane undivided roadway segment between N Oak Harbor Street and SR 20 to a three-lane segment consisting of two through lanes and a center two-way left-turn lane. This project will allow for improved bicycle and pedestrian conditions (bike lanes and sidewalks upgrades).	6.88
Regatta Drive Roadway Reconstruction and Bicycle Improvements	Repave existing roadway and add curb and gutter improvements between Pioneer Way and Crescent Harbor Road. This project includes buffered sidewalks on Regatta Drive between SE 9th Avenue to Whidbey Avenue and NE 6th Avenue to Crescent Harbor Road & bike lanes between Pioneer Way and Crescent Harbor Road.	6.88
Midway/Goldie Bike Lane	Add bike lane on Midway Blvd/Goldie Rd between NE 7th Avenue and Ault Field Road.	6.56
NW Heller Roadway Improvements	Roadway improvements between Whidbey Ave to NW Crosby Ave. Project include overlay for maintenance, restriping, and curb ramps.	6.25
Fort Nugent Bike Lane	Add bike lane on Fort Nugent Road between Swantown Avenue and West City Limits.	6.25
Fort Nugent Avenue Sidewalks	Complete sidewalk network near Fireside Development and Fort Nugent Park (both sides).	5.94
Pioneer Way Bike Lane	Add bike lane on Pioneer Way between SE City Beach Street and Regatta Drive.	5.94
Whidbey Avenue Pedestrian Refuge Islands at Fairhaven Drive and Jib Street	Construct pedestrian refuge islands at the intersections of Whidbey Avenue and Fairhaven Drive and Whidbey Avenue and Jib Street.	5.94
Freund Marsh Trail	Complete Freund Marsh Trail as planned, including links to neighborhoods and walkable beaches.	5.63
SE 4th Avenue Roadway Improvements	Reconstruct SE 4th Avenue between SE Ely Street to SE Midway Boulevard. Replace existing water and storm drainage facilities, and add sidewalks near Oak Harbor Elementary School.	5.63
SW Heller Street Bike Lane	Add bike lane on SW Heller Street between Whidbey Avenue to Crosby Avenue.	5.63
N Oak Harbor Street Sharrow	Add sharrow on N Oak Harbor Street between Whidbey Avenue and Crosby Avenue.	5.63

Project Name	Project Description	Score
Barrington Drive Bike Lane	Add bike lane on Barrington Drive between Fairhaven Drive and SE Ireland Street.	5.63
Pioneer Way Road Diet between Beeksma Drive to SE City Beach Street	Convert existing four-lane undivided roadway segment between Beeksma Drive and SE City Beach Street to a three-lane segment consisting of two through lanes and a center two-way left-turn lane.	5.63
Whidbey Ave & SR 20 Lighting	Install additional lighting on Whidbey Ave / SR 20.	5.63
W. Pioneer & City Beach Intersection Improvement	Reconfigure the intersection of W Pioneer Way and SE City Beach. This project could include signage, a raised intersection or roundabout treatment.	5.31
SR 20 Sidewalks	Add buffered sidewalks on SR 20 between Goldie Road and NE 16th Ave/ W Cemetery Road.	5.31
SW Erie Road Bike Lane	Add bike lane on SW Erie Road between Barrington Drive to Pioneer Way.	5.31
Loerland Drive Sidewalks	Add sidewalks on Loerland Drive between SW Heller Street and Swantown Road.	5.00
Fairhaven Sidewalks	Add missing sidewalk connection between SW 3rd Avenue and SW 2nd Avenue.	5.00
NE 5th Avenue Sidewalks	Add sidewalks on NE 5th Ave between NE Midway Boulevard to NE Ronhaar Street.	4.69
SE Barrington Drive Sidewalks	Add sidewalks on Barrington Drive between Ely Street to Hathaway Street.	4.69
SE Ely Street Sidewalks	Add sidewalks on Ely St between Barrington Drive to Whidbey Avenue.	4.69
Crosby Avenue Sidewalks	Add buffered sidewalks on NW Elwha Street to Airline Way.	4.69
Crosby Road Bike Lane	Add bike lane on Crosby Avenue between Airline Way and N Oak Harbor Street.	4.69
SE 8th Avenue Sharrow	Add sharrows on SE 8th Ave between Midway Boulevard to Barrington Drive.	4.69
NE Regatta Dr & E Whidbey Ave Traffic Signal	Install traffic signal at Regatta Drive & Whidbey Avenue.	4.69
Oleary Street Sidewalks	Add sidewalks on SE Oleary Street between SE 6th Avenue and Whidbey Avenue, and NE Oleary between NE 4th Ave and NE 6th Avenue.	4.38
Swantown Avenue Bike Lane	Add bike lane on Swantown Avenue between Pioneer Way to Loerland Drive.	4.38
SW 3rd, SE 4th Avenue Sharrow	Add sharrow on SW 3rd/SE 4th Ave between Fairhaven Drive and Midway Boulevard.	4.38
Ely Road Sharrow	Add sharrow on Ely Road between Pioneer Way and Whidbey Avenue.	4.38
Oak Harbor St & NE 7th Ave Roundabout	Install a roundabout at the intersection of Oak Harbor Street & NE 7th Avenue.	4.38
Bayshore Dr at Flintstone Park Pedestrian Crossing Improvement	Install safe pedestrian crossing on Bayshore Drive at Flintstone Park.	4.38

Project Name	Project Description	Score
SW Fort Nugent Ave at Fort Nugent Park Pedestrian Crossing Improvement	Install lower plantings, traffic calming, sharrows, bicycle exit ramps at existing Fort Nugent Park pedestrian crossing.	4.38
SW 24th Ave & SR 20 Pedestrian Crossing Improvements	Install crossing improvements on SR 20 at SW 24th Avenue.	4.38
Scenic Heights Area Sharrows	Add sharrows on SW Scenic Heights between Waterloo Road and Pioneer Way and Capital Street between SR 20 and Pioneer Way.	4.06
Loerland Drive Sharrow	Add sharrow on Loerland Drive between Swantown Avenue and Heller Street.	4.06
SE Pasek/Oleary Sharrow	Add sharrow on SE Pasek/Oleary Road between Pioneer Way to SR 20.	4.06
NE 16th Avenue Sharrow	Add sharrow on NE 16th Avenue between Goldie Road and Regatta Drive.	4.06
Midway Blvd & 8th Ave Roundabout	Install roundabout at Midway Boulevard and 8th Avenue.	4.06
Bayshore Drive Pedestrian Crossing Improvement	Install Crosswalk on Bayshore Drive and slow speed limit to 25 mph.	4.06
Transit Improvements on Heller Road	Install bus pullouts along Heller Street. Install bus shelter and better lighting.	4.06
N Oak Harbor Street Sidewalks	Add sidewalks on N Oak Harbor Street between Crosby Road and City Limits.	3.75
SW Barlow St & SW Barrington Dr - Roundabout, Walmart Access	Install compact roundabout at SW Barlow Street and SW Barrington Drive. Otherwise reduce demand for back entrance to Walmart.	3.75
Transit Improvements on NW Crosby Ave	Install better lighting on NW Crosby Avenue and bus shelter on Crosby Avenue at Parkwood Manor area.	3.75
Fort Nugent Area Sharrows	Add sharrows on: SW Fairway Point Drive between Fort Nugent and Swantown; SW Victory Street between Fort Nugent and Heller; SW Rosario Place between Fort Nugent and SW 24th Ave; SW 24th Ave between Rosario and SR20	3.44
Cathlamet Drive Sharrow	Add sharrow on Cathlamet Drive between N Oak Harbor Street and Crosby Road.	3.44
Oak Harbor at Crosby Road Intersection Improvement	Add a RRFB, restripe, and add signage at the intersection of N Oak Harbor Street and Crosby Road.	3.44
Intersection Improvement at the Midway Boulevard Northbound and SR 20	Change lane configuration and/or add northbound left turn arrow to better accommodate northbound Midway at SR 20	3.44
Intersection Improvement at Midway Boulevard Southbound and SR 20	Allow left turns when there is a green for through traffic southwest bound at Midway Boulevard and SR 20- permitted protected left turn.	3.44

Project Name	Project Description	Score
7th & Midway Roundabout	Install roundabout at NE 7th Avenue and Midway Boulevard.	3.44
Heller Street and Fireside Lane Intersection Improvement: Signal Option	Traffic signal installation at the intersection of Heller Street and Fireside Lane.	3.13
Heller Street and Fireside Lane Intersection Improvement: Roundabout Option	Construct a roundabout at the intersection of Heller Street and Fireside Lane.	3.13
Whidbey Avenue at Fairhaven Drive: Compact Roundabout Option	Construct a compact roundabout at the intersection of Whidbey Avenue and Fairhaven Drive.	3.13
Midway Boulevard at Whidbey Avenue Intersection Improvement	Signal modification at all four corners.	2.81
Bayshore Drive Extension	Roadway extension between SW Beeksma Drive to SE City Beach Street.	2.50
N Oak Harbor Street at NE 7th Ave Intersection Improvement	Add a RRFB, restripe, and add signage at the intersection of N Oak Harbor Street and NE 7th Avenue.	2.50
Gun Club Road Extension	Extend Gun Club Road between Heller Road to NE Goldie Street.	2.19
Rename 8th Ave SE to Barrington Drive	Rename SE 8th Avenue (Regatta to Ireland) to Barrington Avenue.	2.19
Create Gateways to Downtown at Pioneer Way & City Beach and Pioneer Way and Midway	Reconstruct Pioneer Way entrance (City Beach to Midway) to be wider and more welcoming	2.19

APPENDIX F- 20 YEAR PROJECT LIST COST ESTIMATES

Table 1: 20 Year Project List Cost Estimates for Select Projects

Item Description	Unit	Qty	Cost	Total
NE 7th Avenue Roadway Reconstruction and Pedestrian Improvements				
Cut and Fill Grading	CY	258	$75.00	$19,350.00
Asphalt	SF	127119	$7.00	$889,833.00
Aggregate Base	CY	7062	$45.00	$317,790.00
Sidewalk	SF	9639	$8.00	$77,112.00
Curb Ramp	EA	3	$2,350.00	$7,050.00
Curb and Gutter	LF	6365	$40.00	$254,600.00
Street Light w/LED and Foundation	EA	36	$5,800.00	$208,800.00
Concrete Removal	SF	1287	$4.50	$5,791.50
Striping	LF	11577	$8.00	$92,616.00
Permeable Path Material	SY	2547	$140.00	$356,580.00
Street Light wiring	LF	15000	$3.50	$52,500.00
Conduit	LF	5000	$7.50	$37,500.00
Trenching	LF	5000	$8.00	$40,000.00
Electric Service Connection and Meter	EA	3	$15,000.00	$45,000.00
Subtotal				**$2,404,522.50**
20% Contingency				$480,904.50
Engineering, Permitting				$721,356.75
Total				**$3,606,783.75**
Gun Club Rd. Extension				
Asphalt	SF	250000	$7.00	$1,750,000.00
Aggregate Base	CY	4625	$45.00	$208,125.00
Cut and Fill Grading	CY	10000	$75.00	$750,000.00
Clear, Grub, Tree Removal	SF	125000	$7.00	$875,000.00
Striping	LF	25000	$5.00	$125,000.00
Roadside Signage	EA	6	$450.00	$2,700.00
Curb Ramp	EA	6	$2,350.00	$14,100.00
Sidewalk (curb returns @ Intersections)	SF	4800	$8.00	$38,400.00
Utility Pole Relocation	LS	8	$20,000.00	$160,000.00
Underground Utilities	LS	1	$150,000.00	$150,000.00
Right of Way Acquisition	SF	110000	$75.00	$8,250,000.00
Subtotal				**$12,323,325.00**
20% Contingency				$2,464,665.00
Engineering, Permitting				$3,696,997.50
Total				**$18,484,987.50**

Item Description	Unit	Qty	Cost	Total
Midway Boulevard Road Diet (Full Reconstruction)				
Cut and Fill Grading	CY	65	$75.00	$4,875.00
Asphalt	SF	323310	$7.00	$2,263,170.00
Aggregate Base	CY	71846	$45.00	$3,233,070.00
Sidewalk	SF	10738	$8.00	$85,904.00
Curb Ramp	EA	45	$2,350.00	$105,750.00
Curb and Gutter	LF	1458	$40.00	$58,320.00
Signal Modification	LS	3	$175,000.00	$525,000.00
Striping Removal	LF	0	$1.50	$0.00
Striping	LF	27426	$8.00	$219,408.00
Concrete Removal	SF	11246	$4.50	$50,607.00
RRFB	EA	10	$12,500.00	$125,000.00
Utilities	EA	0	$2,800.00	$0.00
Bike Lane	LF	5,360	$133,170	$135,187.00
Right of Way Acquisition	SF	0	$150.00	$0.00
Subtotal				**$6,671,104.00**
20% Contingency				$1,334,220.80
Engineering, Permitting				$2,001,331.20
Total				**$10,141,844.00**
Whidbey Road Diet between N Oak Harbor Street and SR 20				
Striping Removal	LF	5200	$1.50	$7,800.00
Striping	LF	8250	$5.00	$41,250.00
Signal Mod at Oak Harbor	LS	1	$159,000.00	$159,000.00
Roadside Signage	EA	10	$450.00	$4,500.00
Pavement Legends	SF	250	$15.00	$3,750.00
Curb and Gutter	LF	220	$40.00	$8,800.00
Sidewalk	SF	975	$8.00	$7,800.00
Curb Ramp	EA	2	$2,350.00	$4,700.00
RRFB	LS	1	$12,500.00	$12,500.00
Subtotal				**$250,100.00**
20% Contingency				$50,020.00
Engineering, Permitting				$75,030.00
Total				**$375,150.00**

Item Description	Unit	Qty	Cost	Total
Whidbey Avenue Pedestrian Refuge Islands at Fairhaven Drive and Jib Street				
Cut and Fill Grading	CY	0	$75.00	$0.00
Asphalt	SF	0	$7.00	$0.00
Aggregate Base	CY	0	$45.00	$0.00
Sidewalk	SF	5255	$8.00	$42,040.00
Curb Ramp	EA	8	$2,350.00	$18,800.00
Curb and Gutter	LF	671	$40.00	$26,840.00
Signal Modification	LS	0	$185,000.00	$0.00
Striping Removal	LF	450	$1.50	$675.00
Striping	LF	600	$8.00	$4,800.00
Roadside Signage	EA	0	$2.00	$0.00
Utilities	LS	0	$10,000.00	$0.00
Right of Way Acquisition	SF	0	$150.00	$0.00
Subtotal				**$93,155.00**
20% Contingency				$18,631.00
Engineering, Permitting				$27,946.50
Total				**$139,732.50**
Heller Street and Fireside Lane Intersection Improvement (Signal Option)				
Cut and Fill Grading	CY	65	$75.00	$4,875.00
Curb Ramp	EA	4	$3,250.00	$13,000.00
Sidewalk	SF	2500	$8.00	$20,000.00
Striping Removal	LF	400	$1.50	$600.00
Striping	LF	800	$5.00	$4,000.00
Traffic Signal Installation	LS	1	$375,000.00	$375,000.00
Roadside Signage	EA	3	$450.00	$1,350.00
Subtotal				**$418,825.00**
20% Contingency				$83,765.00
Engineering, Permitting				$125,647.50
Total				**$628,237.50**

Item Description	Unit	Qty	Cost	Total
Heller Street and Fireside Lane Intersection Improvement (Roundabout Option)				
Cut and Fill Grading	CY	750	$75.00	$56,250.00
Asphalt	SF	10800	$7.00	$75,600.00
Aggregate Base	CY	200	$45.00	$8,991.00
Splitter Islands	EA	4	$7,500.00	$30,000.00
Concrete truck apron	SF	6200	$8.00	$49,600.00
Curb and Gutter	LF	1800	$40.00	$72,000.00
Curb Ramp	EA	8	$2,350.00	$18,800.00
Striping	LF	4000	$5.00	$20,000.00
Roadside Signage	EA	12	$450.00	$5,400.00
Pavement Legends	SF	165	$15.00	$2,475.00
Overhead Utility Relocation	LS	1	$225,000.00	$225,000.00
Right of Way Acquisition	SF	5372	$150.00	$805,800.00
Subtotal				**$1,369,916.00**
20% Contingency				$273,983.20
Engineering, Permitting				$410,974.80
Total				**$2,054,874.00**
Oak Harbor at Crosby Avenue Intersection Improvement				
Remove Asphalt/Concrete	SF	950	$3.50	$3,325.00
Asphalt	SF	125	$7.00	$875.00
Aggregate Base	CY	2	$45.00	$104.06
Sidewalk	SF	500	$8.00	$4,000.00
Curb and Gutter	LF	260	$40.00	$10,400.00
Striping Removal	LF	400	$1.50	$600.00
Striping	LF	800	$5.00	$4,000.00
Roadside Signage	EA	3	$450.00	$1,350.00
RRFB	LS	1	$12,500.00	$12,500.00
Subtotal				**$37,154.06**
20% Contingency				$7,430.81
Engineering, Permitting				$11,146.22
Total				**$55,731.09**

Item Description	Unit	Qty	Cost	Total
Whidbey Avenue at Fairhaven Drive: Compact Roundabout Option				
Concrete truck apron	SF	2050	$8.00	$16,400.00
Striping Removal	LF	800	$1.50	$1,200.00
Striping	LF	3500	$5.00	$17,500.00
Pavement Legends	SF	108	$15.00	$1,620.00
Splitter Islands	EA	4	$7,500.00	$30,000.00
Roadside Signage	EA	12	$450.00	$5,400.00
Curb Ramp	EA	8	$2,350.00	$18,800.00
Subtotal				**$90,920.00**
20% Contingency				$18,184.00
Engineering, Permitting				$27,276.00
Total				**$136,380.00**
Midway Boulevard at Whidbey Avenue Intersection Improvement				
Item Description	Unit	Qty	Cost	Total
Signal Modification (4 corners)	LS	1	$295,000.00	$295,000.00
Relocate Storm Drain	EA	4	$3,000.00	$12,000.00
Sidewalk	SF	1498	$8.00	$11,984.00
Curb and Gutter	LF	915	$40.00	$36,600.00
Striping Removal	LF	2500	$1.50	$3,750.00
Striping	LF	3760	$5.00	$18,800.00
Asphalt	SF	180	$7.00	$1,260.00
Aggregate Base	CY	3	$45.00	$149.85
Remove Asphalt/Concrete	SF	3432	$3.50	$12,012.00
Acquire Right of Way	SF	1000	$200.00	$200,000.00
Utilities	LS	1	$1,000.00	$1,000.00
Subtotal				**$592,555.85**
20% Contingency				$118,511.17
Engineering, Permitting				$177,766.76
Total				**$888,833.78**

Item Description	Unit	Qty	Cost	Total
N Oak Harbor Street at NE 7th Ave Intersection Improvement				
Remove Asphalt/Concrete	SF	1860	$3.50	$6,510.00
Asphalt	SF	190	$7.00	$1,330.00
Aggregate Base	CY	4	$45.00	$158.18
Striping Removal	LF	400	$1.50	$600.00
Striping	LF	850	$5.00	$4,250.00
Roadside Signage	EA	3	$450.00	$1,350.00
RRFB	LS	1	$12,500.00	$12,500.00
Subtotal				**$26,698.18**
20% Contingency				$5,339.64
Engineering, Permitting				$8,009.45
Total				**$40,047.26**
Pioneer Way Road Diet between Beeksma Drive to SE City Beach Street				
Striping Removal	LF	1300	$1.50	$1,950.00
Striping	LF	2119	$5.00	$10,595.00
Roadside Signage	EA	5	$450.00	$2,250.00
Pavement Legends	SF	60	$15.00	$900.00
Curb and Gutter	LF	55	$40.00	$2,200.00
Curb Ramp	EA	2	$2,350.00	$4,700.00
RRFB	LS	1	$12,500.00	$12,500.00
Bike Lane	LF	1200	$133,170	$30,265.00
Subtotal				**$35,095.00**
20% Contingency				$7,019.00
Engineering, Permitting				$10,528.50
Total				**$118,003.50**
SR20 at Barrington				
5 section signal heads	EA	2	$1,500.00	$3,000.00
Programming work in controller	LS	1	$1,200.00	$1,200.00
Mast arm signs	EA	2	$350.00	$700.00
Wiring	LS	1	$5,600.00	$5,600.00
Remove signal heads	EA	2	$450.00	$900.00
Subtotal				**$11,400.00**
20% Contingency				$2,280.00
Engineering, Permitting				$3,420.00
Total				**$17,100.00**

Item Description	Unit	Qty	Cost	Total
SR 20 @ Pioneer Way				
Modify Signal Phasing Equipment	LS	1	$4,500.00	$4,500.00
Programming work in controller	LS	1	$1,200.00	$1,200.00
Signage	EA	4	$350.00	$1,400.00
Subtotal				**$7,100.00**
20% Contingency				$1,420.00
Engineering, Permitting				$2,130.00
Total				**$10,650.00**
SR 20 @ NE7th Ave				
Cut and Fill Grading	CY	50	$75.00	$3,750.00
Asphalt	SF	2250	$7.00	$15,750.00
Aggregate Base	CY	42	$45.00	$1,873.13
Sidewalk	SF	780	$8.00	$6,240.00
Curb Ramp	EA	5	$2,350.00	$11,750.00
Curb and Gutter	LF	365	$40.00	$14,600.00
Signal Modification	LS	1	$185,000.00	$185,000.00
Striping Removal	LF	1000	$1.50	$1,500.00
Striping	LF	1500	$5.00	$7,500.00
Roadside Signage	EA	450	$2.00	$900.00
Utilities	LS	1	$10,000.00	$10,000.00
Right of Way Acquisition	SF	1000	$150.00	$150,000.00
Subtotal				**$408,863.13**
20% Contingency				$81,772.63
Engineering, Permitting				$122,658.94
Total				**$613,294.69**
SR 20/Goldie/Midway Roundabout				
Item Description	Unit	Qty	Cost	Total
Utilities	LS	1	$25,000.00	$25,000.00
Right of Way Acquisition	SF	3040	$325.00	$988,000.00
Retaining Wall	LF	150	$85.00	$12,750.00
Traffic Signal Removal	LS	1	$95,000.00	$95,000.00
Asphalt	SF	22037	$7.00	$154,259.00
Aggregate Base	CY	408	$45.00	$18,345.80
Sidewalk	SF	6700	$8.00	$53,600.00
Concrete Apron	SF	5500	$8.00	$44,000.00
Splitter Islands	EA	4	$11,500.00	$46,000.00
Cut and Fill Grading	CY	150	$75.00	$11,250.00
Curb and Gutter	LF	1743	$40.00	$69,720.00
Striping	LF	8000	$5.00	$40,000.00
Roadside Signage	EA	12	$450.00	$5,400.00

Pavement Legends	SF	450	$15.00	$6,750.00
Curb Ramp	EA	8	$3,250.00	$26,000.00
Street Lighting	LS	1	$15,000.00	$15,000.00
Subtotal				**$1,611,074.80**
20% Contingency				$322,214.96
Engineering, Permitting				$483,322.44
Total				**$2,416,612.20**

CITY OF
Oak Harbor
WHIDBEY ISLAND, WASHINGTON

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