

Technical Memorandum

December 27, 2022

Project# 27024

To: Paul Wellington
 Bayshore Road District

From: Hermanus Steyn, PE; Nicholas Gross; Ashleigh Ludwig, AICP, PE

RE: Bayshore Road Safety Assessment



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EXPIRES: _____

BAYSHORE ROAD SAFETY ASSESSMENT

This memorandum summarizes the Road Safety Assessment conducted for the Bayshore Road District in June 2022. The memorandum is presented in the following sections:

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Project Background

The Bayshore Road District (Road District) is responsible for the maintenance and construction of roads within the Bayshore community, generally bordered by Highway 101 on the east, the Alsea River on the south, and NW Sandpiper Drive on the north. The Bayshore Road District has heard concerns regarding safety, particularly related to speed and pedestrian safety, on its roadways for many years. In response to these concerns, the Road District hired Kittelson & Associates, Inc. (Kittelson) to conduct a study with the goal of identifying treatments that could be implemented within Bayshore to help reduce the risk of crashes.

Bayshore is a small coastal community that is predominantly residential. There is a hotel on the south end of the community, a market located near Highway 101, and a community club house located within the community. The community is accessed from Highway 101, primarily through NW Bayshore Drive and NW Sandpiper Drive, forcing all the community traffic to use these roads regularly.

The Road District has authority and responsibility for maintaining the road and implementing any desired changes with its own funds. While no permit is required from Lincoln County to implement roadway modifications, the County does have the ability to determine that a roadway treatment is a "hazard" and deem a modification as unacceptable. Oregon Revised Statute (ORS) 368.256 Creation of a road hazard prohibited provides the following definition (see excerpt below):

ORS 368.256

Creation of road hazard prohibited

- (1) Except as authorized by the county governing body, an owner or lawful occupant of land shall not allow:
 - (b) Any structure, tree, drainage way, soil deposit or other natural or man-made thing on that land to present a danger to or create a hazard for the public traveling on a public road or facilities within the right of way of the public road by obstructing, hanging over or otherwise encroaching or threatening to encroach in any manner on a public road that is under county jurisdiction.

Therefore, this report focuses on identifying treatments that are appropriate for the roads within Bayshore, based on the context of the area, local and national engineering guidance and criteria, and engineering best practices. The treatments suggested in this report have been implemented across the country and have proven effectiveness at reducing speeds and/or crash frequency and severity. Because construction of some of these roadway features is not dictated by specific design guidelines and criteria, an engineer will review each treatment prior to construction to confirm proper implementation.

Existing Crash Data and Speed Data

Kittelton reviewed the available reported crash data and observed speed data. The Oregon Department of Transportation (ODOT) maintains a database of reported crashes, which includes crashes that result in an injury or fatality, or those that result in over \$2,500 of property damage. There is typically a one-to-two-year delay in obtaining crash data because ODOT completes a thorough quality control process to verify the data before releasing it for use.

Between 2015 and 2020, the following crashes were reported in Bayshore:

- One property damage only crash (no injuries) in June 2020, located at the intersection of NW Bayshore Drive/Highway 101. This was a rear-end crash that occurred during the daylight on dry roads.
- One property damage only crash (no injury) in January 2016 at the intersection of NW Sandpiper Drive/Highway 101. This was a fixed object crash on icy roads in the dark.
- One property damage only crash (no injury) on NW Sandpiper Drive, approximately 300 feet west of Highway 101 in January 2017. This was a fixed object crash that occurred on icy roads at dawn. (Note: NW Sandpiper Drive is not located within the Bayshore Road District, but the data is provided since it serves as the second access point into the community from Highway 101.)
- One non-fatal injury crash in January 2015 on NW Sandpiper Drive, approximately 700 feet west of Highway 101, on a horizontal curve. This was a fixed object crash on dry roadway conditions during

daylight. (Note: NW Sandpiper Drive is not located within the Bayshore Road District, but the data is provided since it serves as the second access point into the community from Highway 101.)

Although there were no other reported crashes at locations reviewed in this assessment, conditions of higher speed and shared facilities between vehicles and people walking and biking lead to risk. It is becoming common for agencies around the country to take a risk-based approach to addressing traffic safety and work to address these characteristics *before* crashes occur rather than responding *after* crashes have occurred.

County provided reported speed data indicating that about 20 percent of people are driving above the speed limit. Vehicles were observed exceeding the posted speed limit, particularly along Bayshore Drive and Westward Ho Drive.

Road Safety Assessment Overview

Kittelson used the Federal Highway Administration's (FHWA) Road Safety Audit (RSA) approach for the Bayshore Road Safety Assessment. The purpose of the RSA is to independently examine the roadway's safety performance. The RSA approach helps to identify potential issues contributing to crashes and suggests treatments for addressing those issues.

For this assessment, Kittelson used a condensed version of the FHWA process, combining field visits, stakeholder interviews, and brainstorming sessions into two-days. The Kittelson team worked with the Bayshore Road District's Board Members to complete the work. The team initiated work on Wednesday, June 8th and concluded on Thursday, June 9th. Field visits were conducted several times during the two-day process to observe varying traffic, lighting, and behavioral characteristics. The general schedule is summarized below in Table 1.

Table 1: Bayshore Road Safety Assessment Schedule

Wednesday, June 8	
10:00am	Kick-off Meeting: Introductions & Discussion of Key Issues
1:00pm	Field Visit
2:00pm	Meeting with Stakeholders: Fire District
2:30pm	Meeting with Stakeholders: Lincoln County Road Department
5:00pm	Afternoon Field Visit
Dark	Night Field Visit
Thursday, June 9	
7:00am	Morning Field Visit
8:00am	Brainstorming and Work Sessions
4:00pm	Presentation of Observations & Suggestions

Stakeholder Interviews

Kittelson met with the Fire District and Lincoln County Road Department to understand their perspective, key concerns, and considerations of potential recommendations.

Fire District

The Fire District must maintain access to the Bayshore community to respond to emergencies. Understanding their needs is critical to developing feasible solutions. The following points summarize the key takeaways from the discussion with the Fire District:

- The Fire District does not currently have ladder or 3x axel trucks. However, designs should not preclude these vehicles.
- Speed bumps are acceptable; and were not voiced as a concern.
- Emergency access and being able to get people out if needed is the Fire District's highest priority.
- They support mini roundabouts as long as they are passable for their trucks.

Lincoln County Road Department

Kittelson met with the Lincoln County Road Department to better understand the County's relationship and interests in the Bayshore roads. The following points summarize the discussion with the Road Department:

- Bayshore Roads are "Public Dedicated Roads" that are the responsibility of the Bayshore Road District.
- In-road modifications do not require a permit from the County.
- The County follows ODOT standards and specifications.
- Roadway modifications are acceptable as long as the County does not deem the modifications as a "hazard."

Kittelson further reviewed Oregon Revised Statute (ORS) 368.256 following this discussion. ORS 368.256 specifies "creation of road hazard prohibited." The treatments presented in this study focus on nationally-used traffic calming options to encourage slower speeds and safer travel behavior. If properly installed, the suggestions in this memorandum should not create a road hazard.

Key Challenges

Based on discussions with the Bayshore Road District Board and stakeholders, site observations, and data review, Kittelson summarizes the following key challenges for Bayshore:

- Reported speed data indicated that about 20 percent of people are driving above the speed limit. Vehicles were observed exceeding the posted speed limit, particularly along Bayshore Drive and Westward Ho Drive.
- People currently walk on the roadway pavement because there is no other space to walk. This creates potential conflict with vehicles, which are driving too fast in the community.
- There is currently inefficient "friction" to encourage slower speeds. There are several long, straight roadway segments with no intersection control, which leads to vehicles traveling at higher speeds. In addition, motorists have been observed disregarding regulatory traffic control devices (e.g., stop signs).
- There is concern regarding whether speed limits are appropriate for the context. Where people walking and biking share the road with cars, the desire is to slow traffic to minimize the speed differential between the various users.
- There is concern whether the intersection control at some locations is appropriate for the context. The configurations of the intersections do not necessarily emphasize the traffic control device, e.g., large corner radii result in higher right-turning speeds and do not encourage drivers to stop.

Desired Outcomes

Kittelson worked with the Bayshore Road District Board to define the following desired outcomes used to drive the development of suggestions in this study:

- Safety is the highest priority, consistent with FHWA's Vision Zero initiative, which prioritizes safety in decisions to work towards a goal of zero traffic fatalities and serious injuries.
- Reduce the speed differential between users (motorists, pedestrians, and bicyclists). Slower speeds by cars will provide a safer and more comfortable place for people walking and biking. People walking and biking are more vulnerable users; they are more likely to be injured when a crash occurs. Slower speeds lead to lower severity when crashes occur.

- Community education is needed for a successful program. Local residents need to lead by example. Information needs to be readily available for visitors.

Suggestions

During the RSA, Kittelson worked with the Road District Board to identify treatments that:

- Addressed the challenges identified in Bayshore;
- Have proven effectiveness at reducing speed and/or crash frequency and severity; and
- Are appropriate and reasonable for the context of Bayshore.

The suggestions are summarized in two general subsections below:

- **Treatment Toolbox:** Provides an overview of the treatments and strategies Kittelson suggests for consideration in Bayshore. This section is intended to serve as a reference and may be used to identify options for future locations where concerns may arise, in addition to those discussed in this memorandum. Many of these are lower cost treatments that may be implemented without larger capital improvement projects that require additional design and funding sources.
- **Location-Specific Suggestions:** This section provides an overview of the specific roadways and intersections where concerns exist. Kittelson developed conceptual sketches or renderings illustrating potential concepts for these locations.

Treatment Toolbox

Treatments presented in the toolbox below are those that are generally appropriate for addressing the speed and vulnerable users' safety concerns. These treatments should be used in conjunction with the existing roadway elements, such as speed humps.

All of the treatments suggested for Bayshore are effective at reducing vehicle speeds (traffic calming). With limited space and funds available to widen roadways to install dedicated pedestrian and bicyclist facilities, slowing speed is one of the best tools available to reduce crash risk. The following statistic illustrates the importance of slowing speeds:

- 95 percent of pedestrians will survive a crash with a vehicle traveling at 20 miles per hour (mph),
- 55 percent of pedestrians will survive a crash with a vehicle traveling at 30 mph, and
- 15 percent of pedestrians will survive a crash with a vehicle traveling at 40 mph.¹

Treatments suggested for consideration include:

- Gateway features
- Roadway striping
- Signage
- Mini Traffic Circles

¹ *Safety Study: Reducing Speeding-Related Crashes Involving Passenger Vehicles*. NTSB/SS-17/01. PB2017-102341. National Transportation Safety Board. <https://www.nts.gov/safety/safety-studies/Documents/SS1701.pdf>.

- Chicanes (Deflection)
- Extruded Curbs
- Enhanced Crossings
- Education and Outreach Programs

Gateway Features



Photo Source: Google Earth

Gateway features can be used to visually indicate arrival into the Bayshore community. Examples of possible gateway features include signage, monuments, landscaping, and traffic circles. In Bayshore, a traffic circle at the intersection of NW Bayshore Drive and NW Bayshore Loop could be used as a gateway treatment.

Roadway Striping



Photo Source: Kittelson

Roadway striping is a low-cost option to use paint to delineate shoulders, which provides space for pedestrians and bicyclists and also narrows the roadway, encouraging slower speeds. Striping can also be used to reinforce speed and traffic control messages such as speed limits and stop ahead signs. In Bayshore, striping may be useful to emphasize existing speed humps and better delineate beach access points, raising awareness of potential conflicts with pedestrians.

Signage

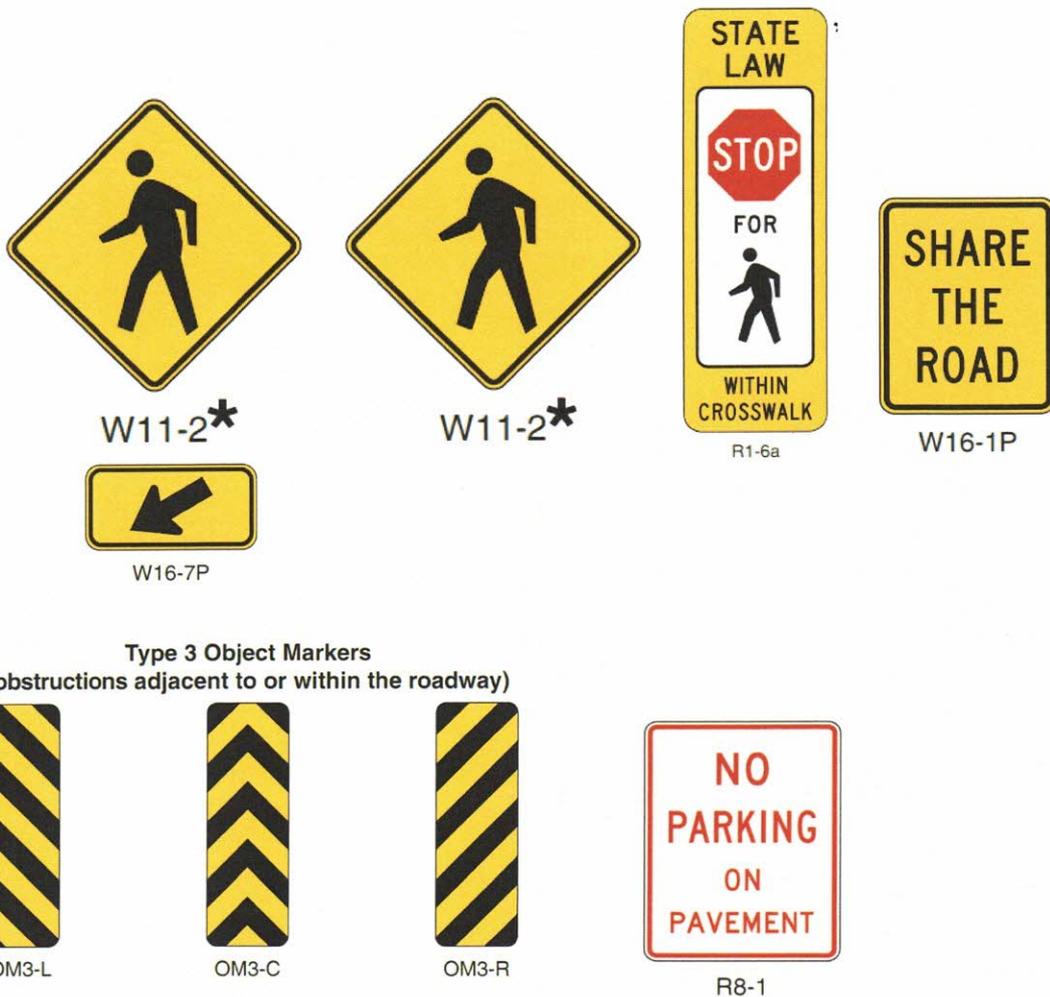


Image Source: Manual on Uniform Traffic Control Devices (MUTCD)

Signage is another low-cost tool that can be used to indicate where drivers may expect to see pedestrians, locations of key destinations such as beach access, locations where parking is or is not permitted, etc. Signage can also be used to delineate potential objects located near or within a roadway to minimize risk of conflicts with vehicles. In Bayshore, signage could be used in the following ways:

- Defining pedestrian crossings
- Defining roadways where pedestrians and bicyclists will share the roadway with vehicles
- Defining locations where parking is allowed, to prevent parking where it may obstruct sight lines to pedestrian crossings, for example,
- Emphasizing existing or future speed humps, as shown in Exhibit 1.

The *Manual on Uniform Traffic Control Devices (MUTCD)* is the standard reference for traffic signage in the United States. Signs should be selected from this resource.

Exhibit 1: Example of using signage to emphasize speed humps in Bayshore



Mini Traffic Circles



Photo Source: Kittelson



Image Source: Google Earth

Mini traffic circles are another effective traffic calming tool for low-volume roads. These have a similar effect that a roundabout does, physically requiring traffic to slow down approaching the traffic circle. These intersections (traffic circles) still use stop signs as a form of control, but the traffic circle helps slow traffic on the uncontrolled mainline as well. In Bayshore, construction of mini traffic circles at key intersections can help slow speeds along some of the primary travel corridors and create gateway treatments to establish a sense of place.

Quick Built Traffic Circle / Roundabouts



Image Source: Kittelson

Quick-built traffic circles are another option for using intersection traffic control to reduce speeds. These require more space to create, as they operate more like a standard roundabout, with yield-controlled approaches. These treatments are accompanied by the appropriate MUTCD signing and striping to provide consistent messaging to drivers. However, rather than reconstructing the intersection which can be costly, these rely on post mounted delineators, curbs, striping, or other lower cost options to quickly and most cost effectively create the roundabout. Roundabouts are proven to reduce injury crashes by approximately 82 percent when installed in place of a two-way stop-controlled intersection.²

Chicanes



Image Source: Google Earth

² ODOT's list of Crash Reduction Factors (CRFs); AASHTO's *Highway Safety Manual (HSM)*



Image Source: Google Earth



Image Sources: Kittelson

Chicanes (horizontal deflection) are a common method of traffic calming that creates a narrowing of the road, slowing vehicles along the route. These can be created with delineators, curbs, landscaping, signage, etc. Physical changes are more effective than striping only.

Extruded Curbs



Image Source: Kittelson

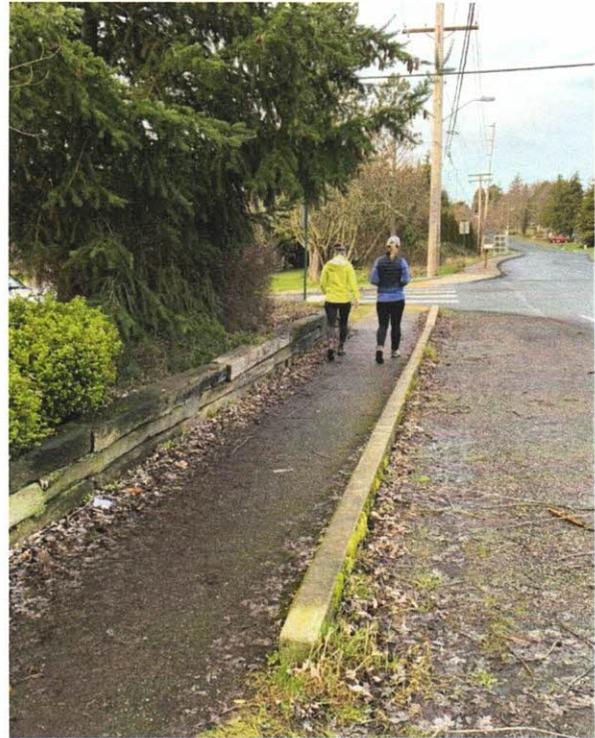


Image Source: Kittelson

Extruded curbs can be used to create a physical barrier between the travel lane and the place where people are walking. In Bayshore, this may be used to create a pedestrian path or space using the existing pavement width. The physical curb is more effective at keeping vehicles in their lane than simple striping would be.

Enhanced Crossings

Enhanced crossings use treatments such as striping, signage, curb extensions, illumination, and delineation to increase awareness and visibility of the crossing, further encouraging slower speeds. Curb extensions serve to slow traffic by narrowing the roadway and to increase the visibility of pedestrians by allowing them to stand closer to the roadway while waiting to cross. In Bayshore, signage may be used to increase visibility of existing and future crossings and reinforce requirements for vehicles to stop for pedestrians, as shown by the example in Exhibit 2.

Exhibit 2: Example of Potential Enhanced Crossing in Bayshore



Education and Outreach Programs

While this study focused on engineering suggestions for the roadways, combining engineering treatments with additional education and outreach to the community will have the greatest impact on reducing speeds and changing driver behavior. Given the characteristics of Bayshore as a vacation community, outreach will need to include both local residents and visitors.

Bayshore residents should be informed of the efforts being made to encourage safer travel in the community. The community may consider implementing a "Slow Down" program or campaign. Residents may lead by example in the community and help with reaching out to visitors. For example, campaign/yard signage/awareness with a message such as "drive like your kids live here" would be a good reminder for local residents and visitors.

To reach visitors, consider creating and providing a renter package that provides visitors with a welcome to the community message. This package can provide reminders for the community "Slow Down" program. Outreach to renters will require coordination between the Homeowners Association (HOA), AirBNB, Vacation Rental By Owner (VRBO), and other local rental agencies or hotels.

Location Specific Suggestions

Kittelton worked with the Road District Board to review the following key corridors and intersections. The following sections summarize options for these locations.

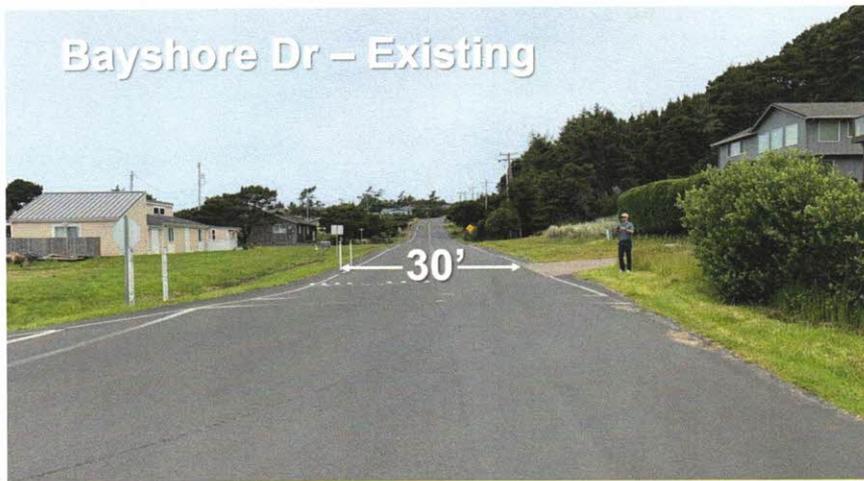
- Corridors
 - NW Bayshore Drive
 - NW Oceania Drive
- Intersections
 - NW Bayshore Dr/NW Westward Ho Drive
 - NW Parker Avenue/NW Westward Ho drive
 - NW Oceania Drive/NW Westward Ho Drive
 - NW Bayshore Drive/NW Bayshore Loop
 - NW Bayshore Drive/NW Westward Ho Drive

NW Bayshore Drive Corridor

NW Bayshore Drive serves as the primary access to the community from Highway 101, carrying some of the highest traffic volumes in the community. The vertical grade also contributes higher vehicle speeds on this corridor. Pedestrians and bicyclists use this corridor to travel to the market near the intersection of Bayshore Drive and Highway 101.

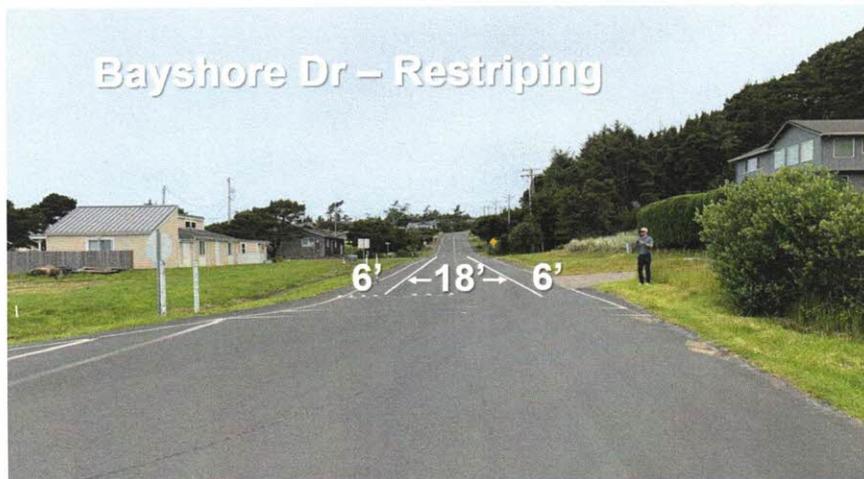
The existing pavement width is 30 feet, with no dedicated facilities for pedestrians or bicyclists, as shown in Exhibit 3. This creates potential conflicts between higher speed vehicles and non-motorized users.

Exhibit 3: Existing NW Bayshore Drive Cross-Section



Kittelson suggests using striping to narrow the travel lanes to nine feet, allowing for a six-foot shoulder, as shown in Exhibit 4. The 6-foot shoulder may not be ideal for shared space, but it provides a place for people to walk and bike in these constrained environments. This cross-section encourages slower vehicle speeds with narrower lanes and provides space for pedestrians and bicyclists without the cost and potential right-of-way needs associated with roadway widening.

Exhibit 4: Suggested NW Bayshore Drive Cross-Section



NW Oceania Drive Corridor

NW Oceania Drive runs parallel to the beach and serves all of the beach access points. Both vehicular and non-motorized travel is relatively high along this corridor with visitors and residents trying to access the beach. Parking is also common along the corridor.

Existing pavement width is 27 feet wide, as shown in Exhibit 5. Kittelson suggests consideration of several cross-sections for Oceania Drive, as shown in Exhibit 6 through Exhibit 8. Options 1 and 2 involve creating a wider (nine-foot wide) path on one side of the road for pedestrians and bicyclists. Selecting the side of the road will need to consider access to destinations as well as potential conflicts. When two-way bicycle traffic is present in a path, conflicts with driveways and intersections should be minimized. Drivers in these conflict areas may not be aware of potential two-way bicyclist traffic. Option 3 involves creating space on both sides of the road, but the width of the pathway becomes narrower at 4.5 feet to accommodate both sides. Physical barriers such as curb or delineators are not recommended with the 4.5 feet wide shoulder because deviations may be necessary to avoid conflicts between pedestrians and bicyclists in the shoulder.

Exhibit 5: NW Oceania Drive Existing Cross-Section

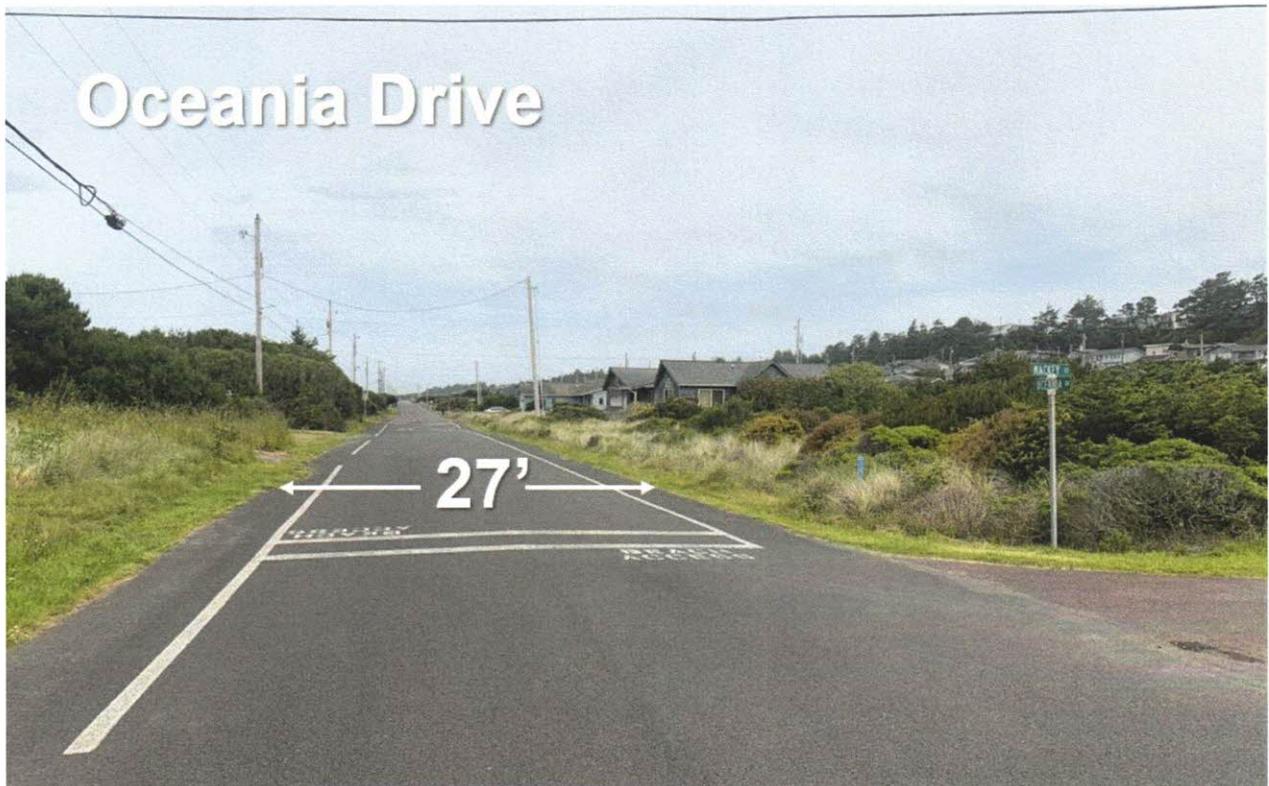


Exhibit 6: NW Oceania Drive Suggested Cross-Section (Option 1)

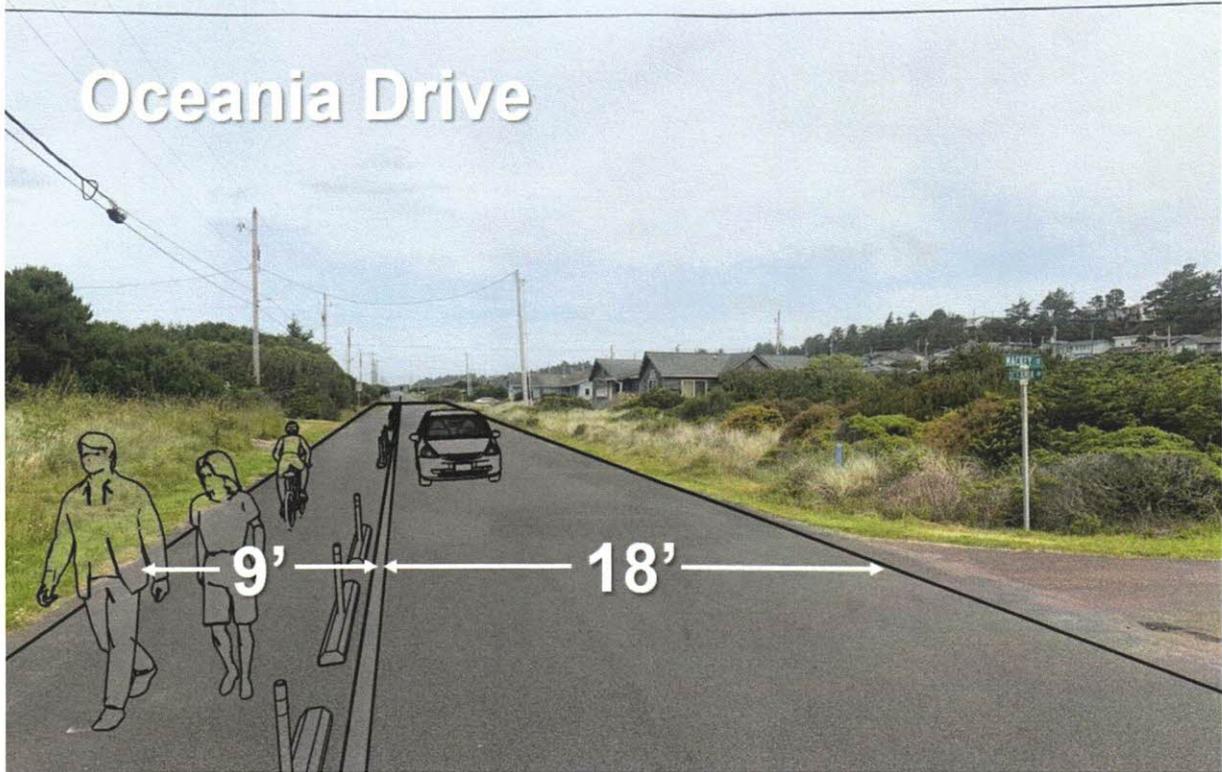


Exhibit 7: NW Oceania Drive Suggested Cross-Section (Option 2)

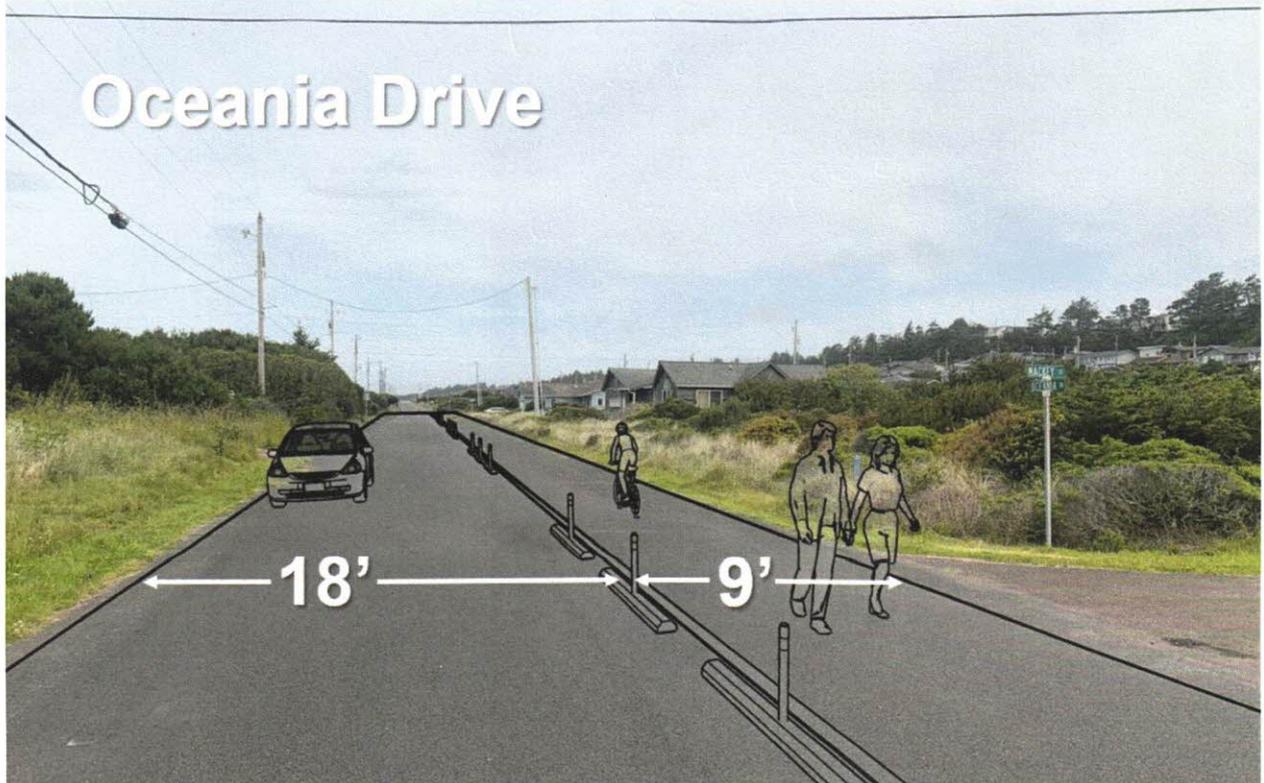


Exhibit 8: NW Oceania Drive Suggested Cross-Section (Option 3)



NW Bayshore Drive / NW Westward Ho Drive

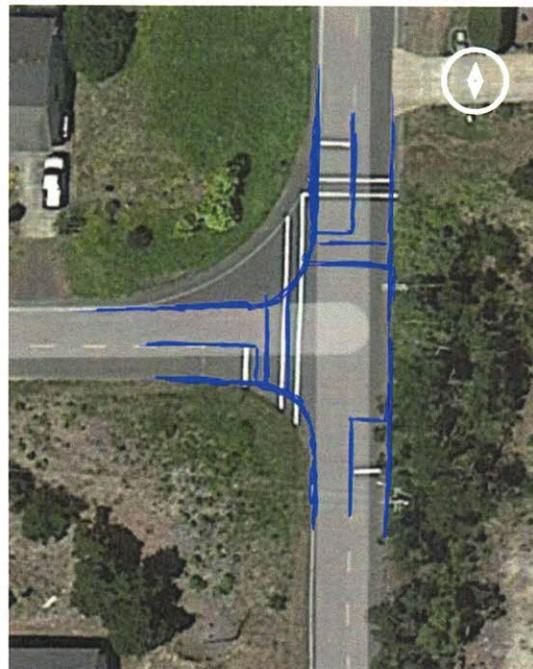
The intersection of NW Bayshore Drive / NW Westward Ho Drive is located at the bottom of a hill, resulting in traffic approaching the intersection at higher speeds. It is also an important route for all users to access Highway 101 and the destinations at the intersection of Highway 101/Bayshore Drive.

The goal at this intersection is to reduce speeds and encourage vehicle compliance with the stop signs, particularly the southbound approach. Kittelson suggests two options for consideration. Option 1, shown in Exhibit 9, is a layout illustrating a potential mini roundabout or a traffic circle. This would require all approach vehicles to slow and yield (roundabout) or stop (traffic circle) at the intersection. Option 2, shown in Exhibit 10, is an intersection reconfiguration that tightens up the pavement at the intersection to encourage slower speeds. The existing excess pavement in the northwest corner of the intersection allows for a fast, sweeping, southbound right-turn movement.

Exhibit 9: Option 1: Mini Roundabout



Exhibit 10: Option 2: Geometry Modifications



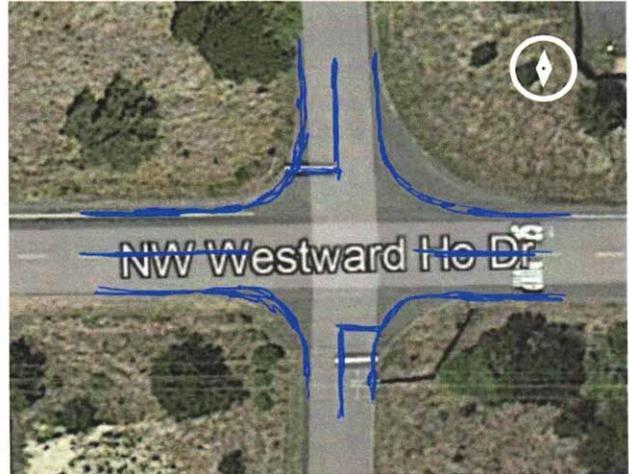
NW Parker Avenue / NW Westward Ho Drive

NW Parker Avenue / NW Westward Ho Drive is another critical intersection to the flow of traffic in Bayshore. NW Parker Avenue serves many homes in the community, with residents and visitors using this intersection to access that corridor. Similarly to the previous intersection, Kittelson presented two options for consideration. Exhibit 11 shows a mini roundabout or a traffic circle, which would help slow speeds and also better facilitate turning movements to and from Parker Avenue. The intersection geometry modifications shown in Exhibit 12 would help slow speeds but would not improve turning movements at Parker Avenue, and this configuration can also be converted to an all-way stop-controlled intersection similar to the NW Bayshore Drive / NW Westward Ho Drive and NW Oceania Drive/NW Westward Ho Drive intersections.

Exhibit 11: Option 1: Mini Roundabout



Exhibit 12: Option 2: Geometry Modifications



NW Oceania Drive / NW Westward Ho Drive

The NW Oceania Drive/NW Westward Ho Drive intersection is located in front of the community club house and is another higher volume intersection, with much of the beach traffic using this intersection to access Oceania Drive. Kittelson suggests two options for consideration here, with a mini roundabout or traffic circle shown in Exhibit 13 that would slow speeds but allow traffic to continue flowing. Exhibit 14 illustrate a tightening of the intersection to further encourage vehicles to come to a stop and make a slower turning movement. Both options will require the reconfiguration of parking at the community club house.

Exhibit 13: Option 1: Mini Roundabout

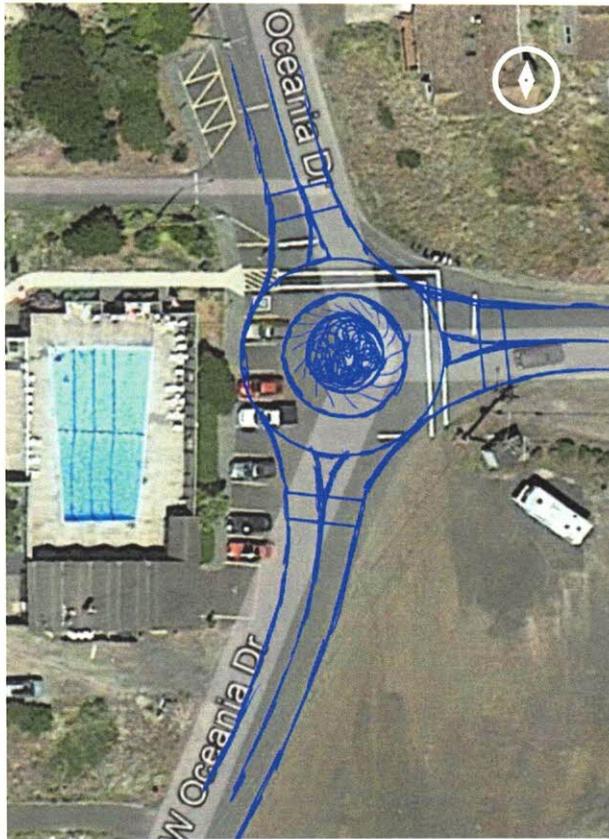
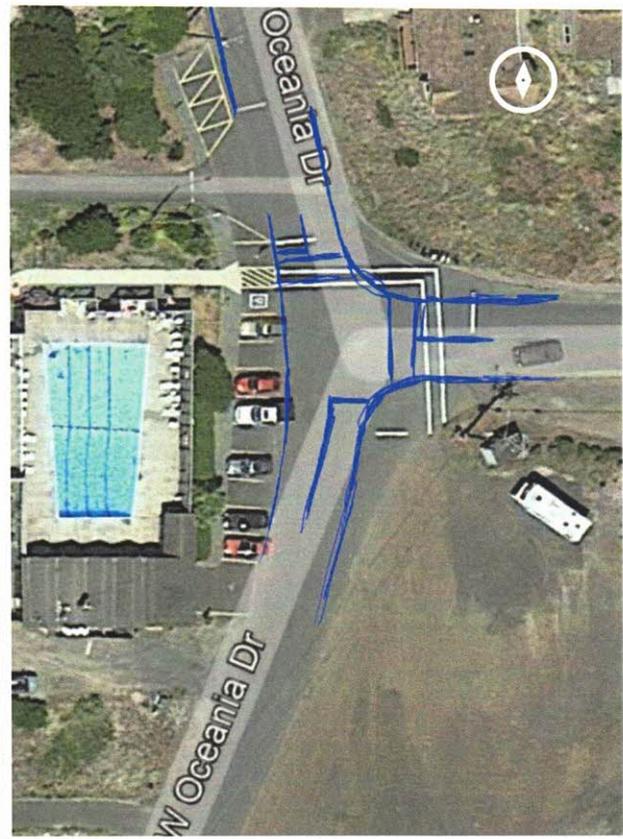


Exhibit 14: Option 2: Geometry Modifications



NW Bayshore Drive / NW Bayshore Loop

The intersection of NW Bayshore Drive/NW Bayshore Loop is located on a horizontal curve near the top of the Bayshore community, just three blocks from Highway 101. The current intersection configuration includes an eastbound stop-controlled approach and a southbound stop-controlled approach. However, the wide open pavement in this area leads to confusion regarding right-of-way. Kittelson suggests two options for consideration at this intersection to reduce speeds and clarify expectations. Exhibit 15 illustrates geometry modifications to reduce excess pavement, encourage slower speeds through the curve, and use signage and striping to reinforce traffic control (which approach are expected to stop). Exhibit 16 illustrates a potential mini roundabout that could serve to slow speeds, facilitate the turning movements, and also serve as a gateway to the Bayshore community with signage or a monument in the center.

Exhibit 15: Option 1: Intersection Geometry Modifications



Exhibit 16: Option 2: Mini Roundabout



Implementation Suggestions

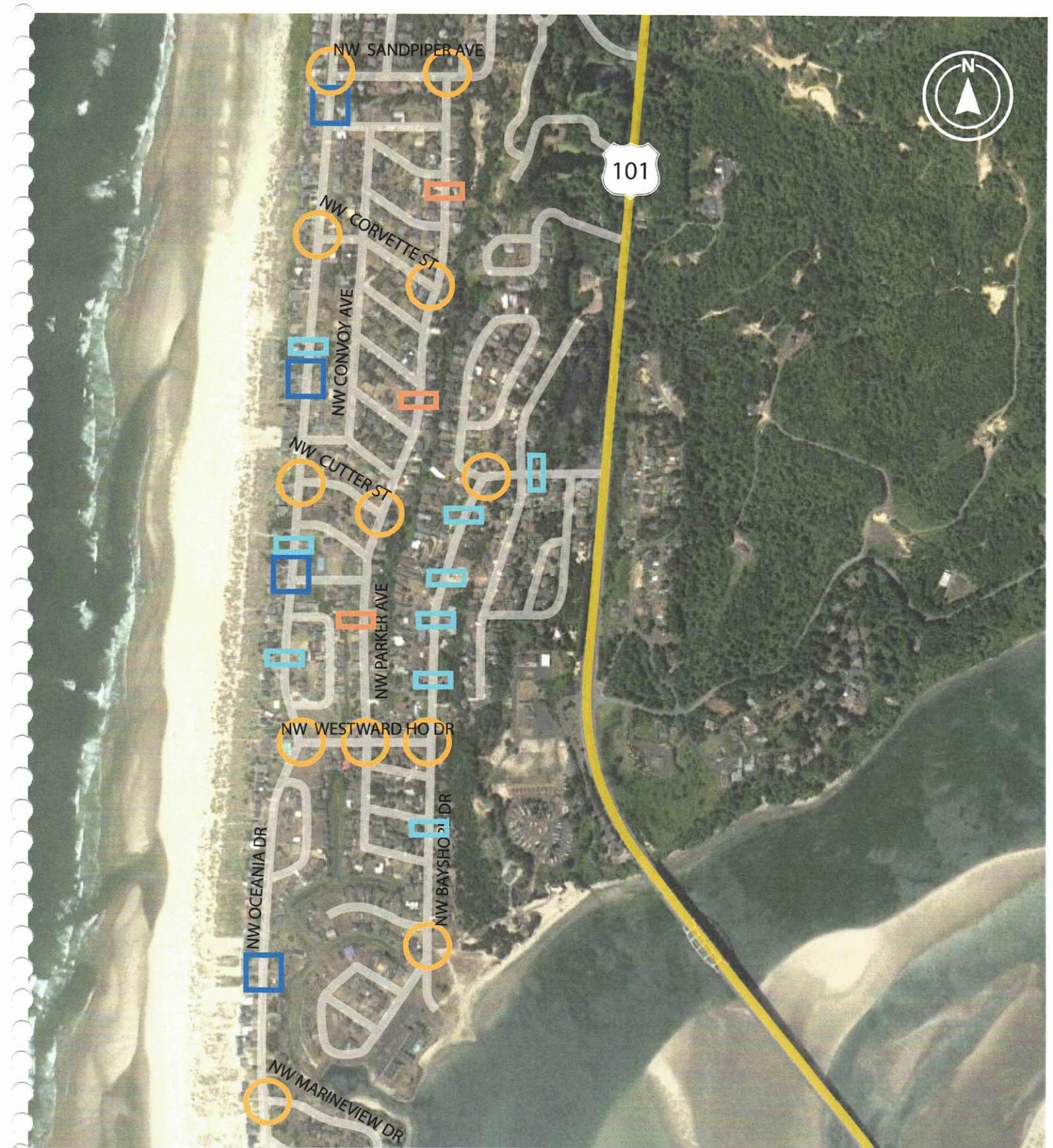
When implemented together, the treatments suggested in this memorandum all work towards creating a slower-speed multimodal community. Figure 1 illustrates potential locations for implementing all of these treatments in the community to illustrate the full picture. The figure also illustrates where existing speed humps and beach access points are located. Striped pedestrian crossings are provided at the existing beach access locations. These crossings may be enhanced with additional signage as shown by treatments in the Toolbox of this memorandum.

Implementation of everything presented in this memorandum will take time and funds to accomplish. Implementation should be phased based on priority and cost/feasibility. Relative priority of each option is based on crash risk, speeds, traffic volume, pedestrian/bicyclist volumes, and community input. Priorities may shift over time if development occurs or user behavior changes. The cost and feasibility of each option drives the ease of implementation. This memorandum focuses on options that are feasible; projects that would require substantial right-of-way, for example, are not presented. Of the options presented, some of the intersection modifications, such as mini roundabouts or traffic circles, would require more funding than striping improvements. These higher cost projects will need to be phased as funds allow.

Phasing is intended to provide flexible guidance on implementation. All of the Phase 1 recommendations do not need to be completed prior to implementing Phase 2 recommendations. For example, if implementing a partial set of Phase 1 recommendations achieves the desired result of speed reduction along the corridor, the Road District may move on to Phase 2 recommendations. Alternatively, if conditions change and speeds or volumes increase along a Phase 2 area or a Phase 3 area, these may become higher priority than Phase 1.

In addition to the engineering/roadway recommendations provided, several non-engineering recommendations are important for encouraging slower speeds in the community:

- An educational program should be started in the near-term that includes outreach to both local residents and visitors to the community.
- On-going coordination and communication with the County and enforcement partners. The County's staff may provide additional input and lessons learned from their efforts and experiences in trying to reduce crashes and speeds in other locations. On-going coordination will also help the Road District stay informed of potential grant or other funding opportunities to assist with roadway projects or enforcement in the community.



-  Potential Intersection Improvements (geometry modifications or mini-roundabouts)
-  Potential New Speed Hump Locations
-  Existing Speed Hump Locations
-  Existing Beach Accesses

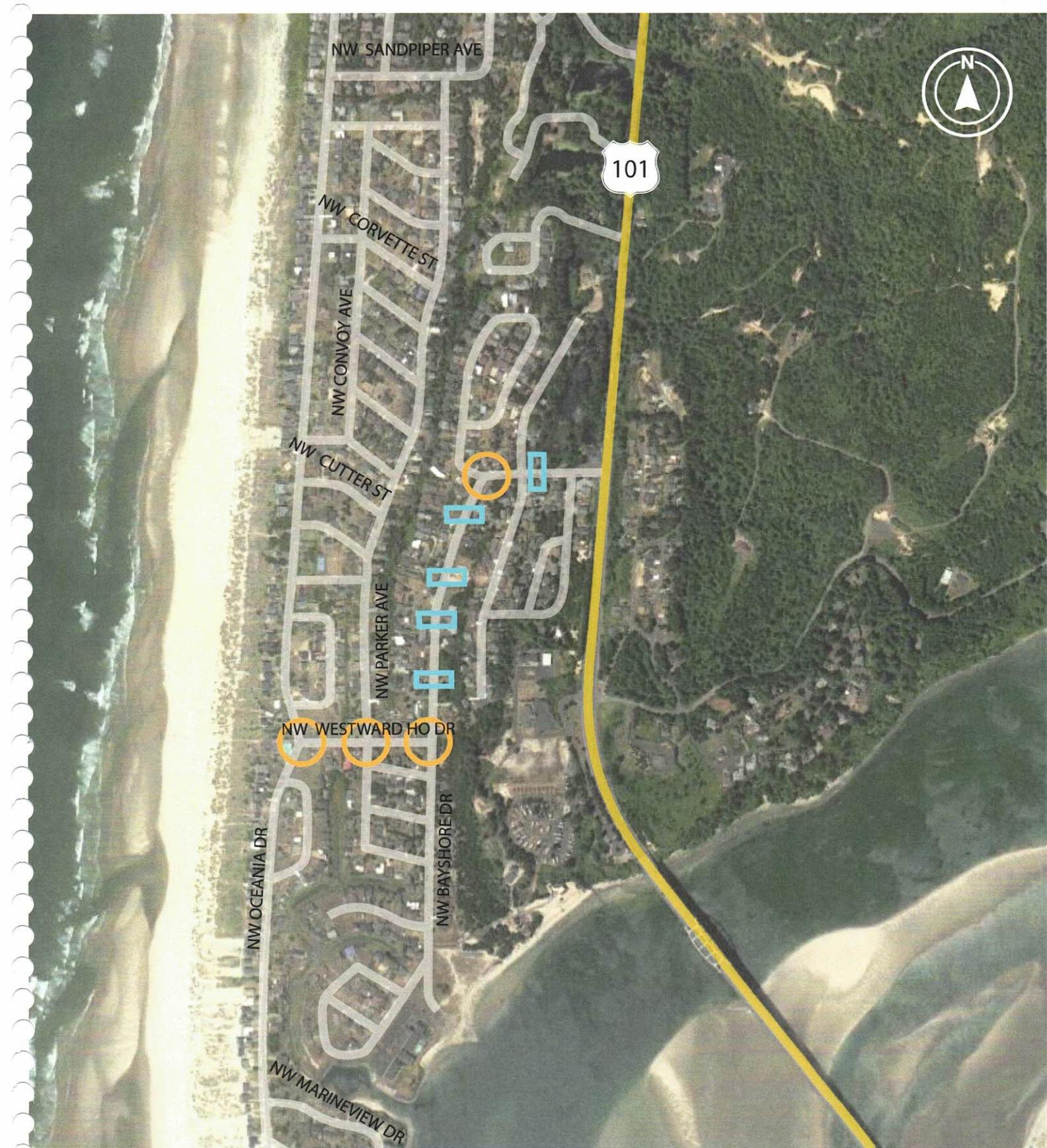
Bayshore Recommendations

Figure
1

Phase 1 Recommendations

Phase 1 recommendations are highest priority based on traffic speed and volume observations and crash risk. Phase 1 includes Bayshore Drive (between Westward Ho Drive and Highway 101) and Westward Ho Drive. As funding allows, implementation of some of these recommendations may begin in the near-term. These two segments provide primary access to the Bayshore neighborhood, carrying the highest traffic volumes in the community. In addition, people walking and biking use this to access destinations at the Bayshore Drive/Highway 101 intersection, leading to conflicts between vehicles and non-motorized users. The recommendations for these corridors include intersection enhancements as well as roadway cross-section modifications to encourage slower speeds. Specific elements of Phase 1 are shown in Figure 2 and summarized below and refer to concepts presented in the previous section of the memorandum:

- Restripe Bayshore Drive (see Exhibit 4) to provide space for people walking and biking and to encourage slower speeds. The restriping project should also include the following elements, which may also be completed in the near-term without the full restriping project:
 - Enhance existing crossings with signage
 - Emphasize existing speed humps
 - Install Share the Road signage
- Install intersection modifications (modify intersection geometry OR install mini-roundabout) at the following locations:
 - Bayshore Loop and Bayshore Drive (see Exhibit 15 and 16)
 - NW Bayshore Drive and NW Westward Ho Drive (see Exhibit 9 and 10)
 - NW Westward Ho Drive and NW Parker Avenue (see Exhibit 11 and 12)
 - NW Oceania Drive and Westward Ho Drive (see Exhibit 13 and 14)



-  Potential Intersection Improvements (geometry modifications or mini-roundabouts)
-  Existing Speed Hump Locations
-  Existing Beach Accesses

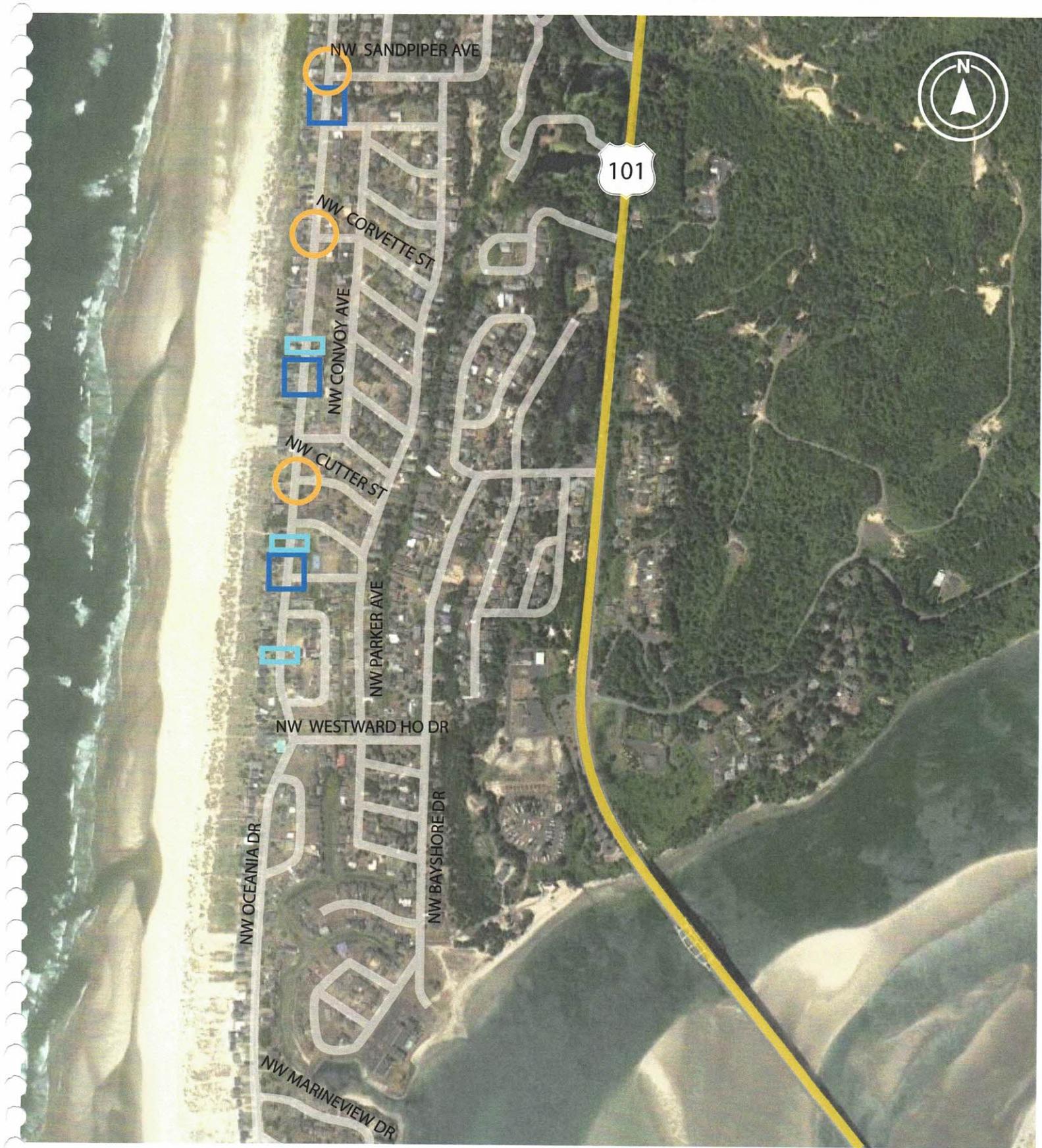
Phase 1 Recommendations

Figure 2

Phase 2 Recommendations

Phase 2 recommendations include those that are located along NW Oceania Drive, north of NW Westward Ho Drive. This corridor also carries vehicular, pedestrian, and bicyclist volume as it serves as a key north-south connection in the community and also provides beach access. Recommendations for this corridor are focused on providing space for people walking and biking, improving visibility of crossings, and reducing vehicle speeds. Phase 2 recommendations are shown in Figure 3 and include the following locations:

- Restripe NW Oceania Drive (see Exhibits 6 through 8). The restriping project should also include the following elements, which may also be completed in the near-term without the full restriping project:
 - Enhance existing crossings with signage
 - Emphasize existing speed humps
 - Install Share the Road signage
- Intersection improvements recommended as part of Phase 2 do not have conceptual sketches provided in this memorandum. However, the intent with these locations is similar to those in Phase 1: provide geometry modifications or traffic control modifications that encourage slower speeds and compliance at the intersection. Modifications may include options that tighten the intersection to reduce turning speeds, convert to all-way stop-control (AWSC), provide enhanced signage to increase visibility and awareness at the intersection, install pedestrian crossings, and increase reflectivity for better visibility at night. Phase 2 intersection recommendations are provided at:
 - NW Oceania Drive/NW Sandpiper Drive (This intersection does not fall under the Road District's responsibility, but since this provides access to this community and may be opportunity to coordinate with neighboring communities.)
 - NW Oceania Drive/NW Corvette Street
 - NW Oceania Drive/NW Cutter Street



-  Potential Intersection Improvements (geometry modifications or mini-roundabouts)
-  Existing Speed Hump Locations
-  Existing Beach Accesses

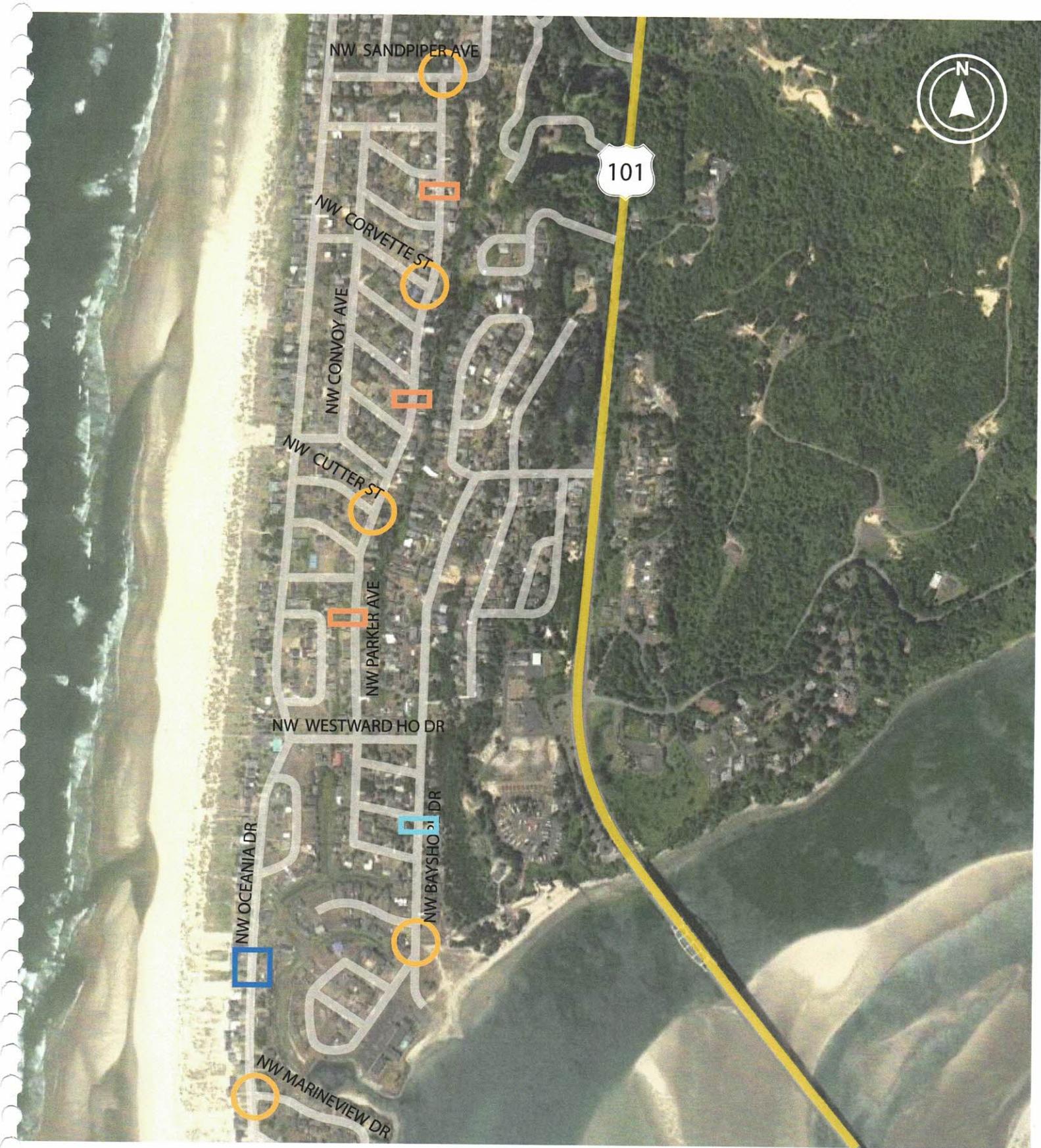
Phase 2 Recommendations

Figure
3

Phase 3 Recommendations

Phase 3 recommendations include those along NW Parker Avenue and everything south of NW Westward Ho Drive. These corridors generally carry lower volume than the Phase 1 and Phase 2 corridors. Phase 3 recommendations are shown in Figure 4 and include the following locations:

- Intersection improvements recommended in Phase 3 do not have conceptual sketches provided in this memorandum. Similar to Phase 2, the intent with these locations is to provide modifications to reduce speed and increase compliance and visibility at the intersections.
 - NW Oceania Drive/NW Marineview Drive
 - NW Bayshore Drive/NW Admiralty Court
 - NW Parker Avenue/ Sandpiper Drive (Sandpiper Drive does not fall under the Road District's responsibility, but this intersection provides access to the Bayshore community and may be opportunity to coordinate with neighboring communities.)
 - NW Parker Avenue/NW Corvette Street
 - NW Parker Avenue/NW Cutter Street
- Install speed humps on NW Parker Avenue to encourage slower speeds.



Potential Intersection Improvements
(geometry modifications or mini-roundabouts)

Potential New Speed Hump Locations

Existing Speed Hump Locations

Existing Beach Accesses

Phase 3 Recommendations

Figure
4

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