STATE ROUTE 20, SWANTOWN ROAD TO CABOT DRIVE

Corridor Pre-Design Analysis

Oak Harbor, Whidbey Island, Washington

Washington State Department of Transportation

CITY OF Oak Harbor
WHIDBEY ISLAND, WASHINGTON

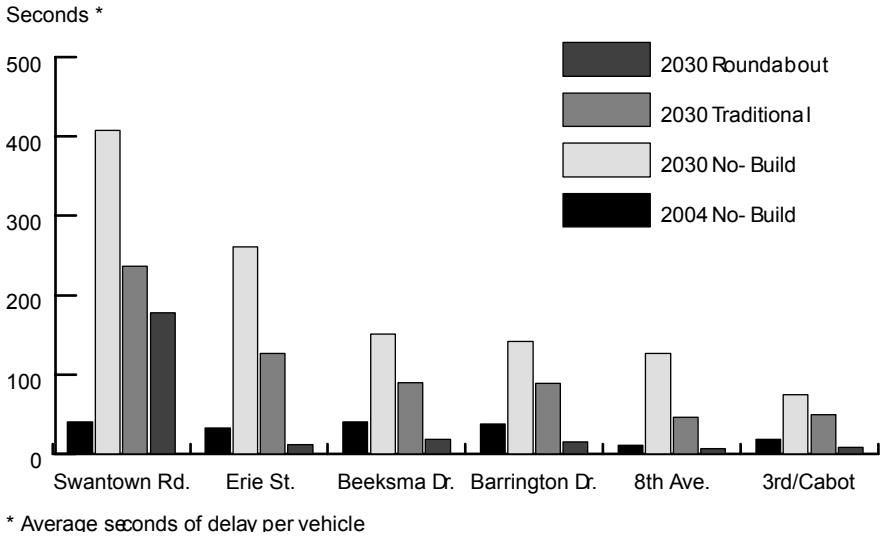
SR 20, Oak Harbor, Swantown Road to Cabot Drive

Executive Summary

Overview/Purpose

The city of Oak Harbor is the largest city in Island County, WA with a population of approx. 21,700. It is home to the Naval Air Station (NAS) Whidbey as well as most of the retail services on Whidbey Island. Currently SR 20 is mostly a 5-lane section with signalized intersections. The densest portion of the commercial and retail services have grown around State Route (SR) 20 over the years. There is also raised curbing down the center of most of the highway to manage access; the accident numbers have decreased since this curbing was installed but the land and business owners are not happy about the limitation to access their properties. The city and WSDOT partnered on this pre-design project. The state came to the table with goals of higher levels of safety and better mobility. The city wanted to see better access to land uses and aesthetic improvement of the corridor to match the city character.

Typical section of SR 20 with raised center curbing to prohibit turning movements.



This graphic shows the key finding of the study. That in the year 2030, the roundabout option will function better than the existing signalized intersections.

Washington State Department of Transportation

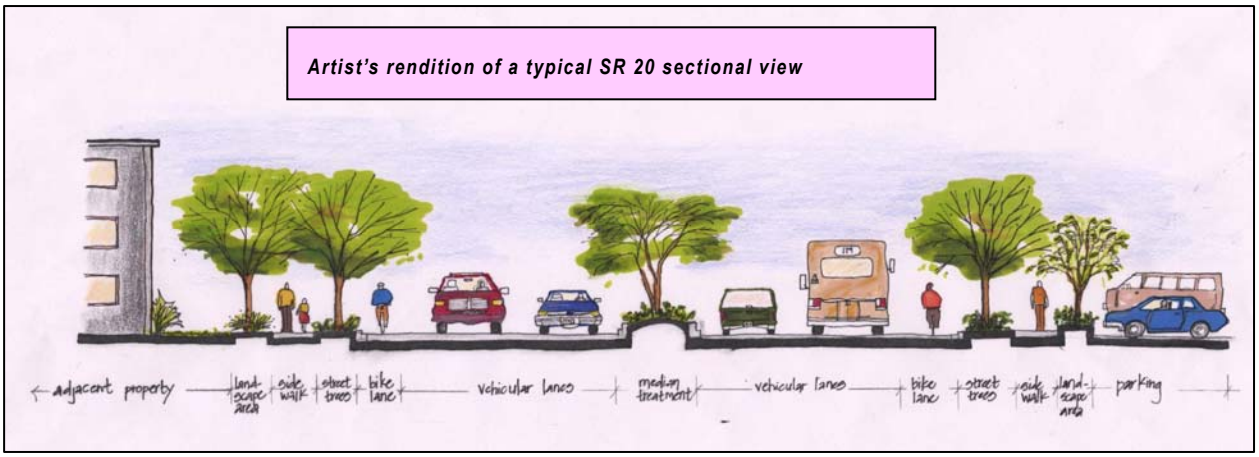
Findings

A traffic analysis was performed on the six key intersections within the project limits. Widening the highway was not considered an option. The two alternatives for final analysis were: 1) expanding the existing signalized intersections to accommodate u-turns and right turn pockets and left turn pockets where necessary and, 2) two-lane roundabouts at each intersection. The results of the traffic analysis showed the roundabouts would increase safety and provide a much better level-of-service (LOS) and lower delays. At five of the six intersections the roundabouts showed a better LOS in 2030 than exists today. One roundabout showed a LOS F in 2030. This is at a place along the highway where there is high growth and few other driving options besides the highway.

Recommendation

This analysis showed us that roundabouts are the best solution along SR 20 to both handle the volume of traffic and increase safety in the corridor. The city learned about a chokepoint in the system that they need to address in their comprehensive planning. The project was the subject of several articles in the local paper that prompted a lively public debate/discussion that is still ongoing. The aesthetic aspects of the project will help the city in their beautification efforts. The project also solidified a partnership of city and state that will be critical in our search for funding to make these improvements happen.

Artist's rendition of City Gateway at SR 20 and Swantown Road



Artist's rendition of a typical SR 20 sectional view

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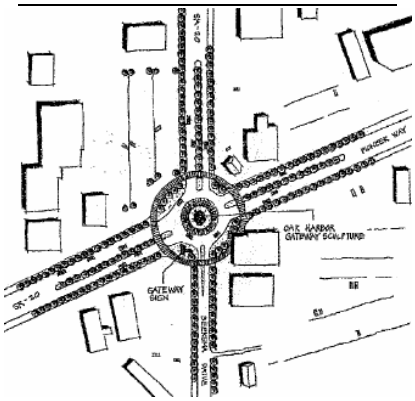
Chapter 1 Introduction

As you drive into Oak Harbor on State Route (SR) 20 from the south, the first major intersection you come to is at Swantown Road. If you keep driving north you pass Erie Street, Pioneer Way, Barrington Drive, 8th Avenue, and finally Cabot Drive. These six intersections are the basis of this pre-design analysis.



Corridor Enhancement Concept for Oak Harbor from the Whidbey Scenic Isle Way Corridor Management Plan. This sketch is at the intersection of Pioneer Way, Beeksma Drive, and SR 20.

Exhibit 1-1
SR 20, Oak Harbor, Vicinity Map

The above map shows the corridor studied during this pre-design. The key intersections are Swantown Ave., Erie St., Pioneer/Beeksma, Barrington Dr., 8th Ave., and Cabot Dr.

This work is a partnership between the Washington State Department of Transportation (WSDOT), the City of Oak

Harbor, and the Transportation Improvement Board (TIB). The goal of this analysis is to determine the design concepts for future construction projects along the corridor. The next step is to design the first phase of improvements and seek construction funding.

1 Genesis of Project

This project is the result of the following ideas, plans, and conversations:

- The city of Oak Harbor has identified through its transportation planning, that widening of the highway to 4 driving lanes from Beeksma to the southern city limits is necessary.
- The state has long had plans to widen the highway to 4 lanes in the Waterloo to Beeksma area.
- The city desires to create a more aesthetically pleasing corridor. This could be achieved through incorporating a wide planted median.
- Mayor of Oak Harbor Patty Cohen is a strong proponent of a roundabout at the intersection of SR 20 and Swantown Road. Her goal is to create a visual gateway to the south end of the city, and to calm the downhill traffic as it enters the city.
- In another recent study, the Whidbey Island Scenic Isleway Corridor Management Plan proposed a similar concept. It recommends, "Traffic calming and gateway improvements in Oak Harbor" as well as "urban softening". The draft also sketches an example of this showing a roundabout at the SR 20/Beeksma Drive/Pioneer Way intersection. (see sidebar on previous page)
- The city obtained a Transportation Improvement Board (TIB) grant for designing improvements to a portion of this corridor, and this project starts the design process, and ultimately construction, of a safer, more effective, and more aesthetically pleasing stretch of highway.

2 Budget

We wanted our budget to be enough for a complete analysis, but not so much as to impact the amount of funding left to begin the design of an alternative. It was decided to budget a total of $30,000, with $20,000 coming from the city of Oak Harbor's TIB grant and $10,000 coming from WSDOT Highways and Local Program Funds.

3 Team

The Pre-Design team consisted of both city and state representatives.

Project Oversight

Steve Powers	City of Oak Harbor, Director of Development Services
Todd Carlson	WSDOT, Planning and Operations Manager

Project Manager

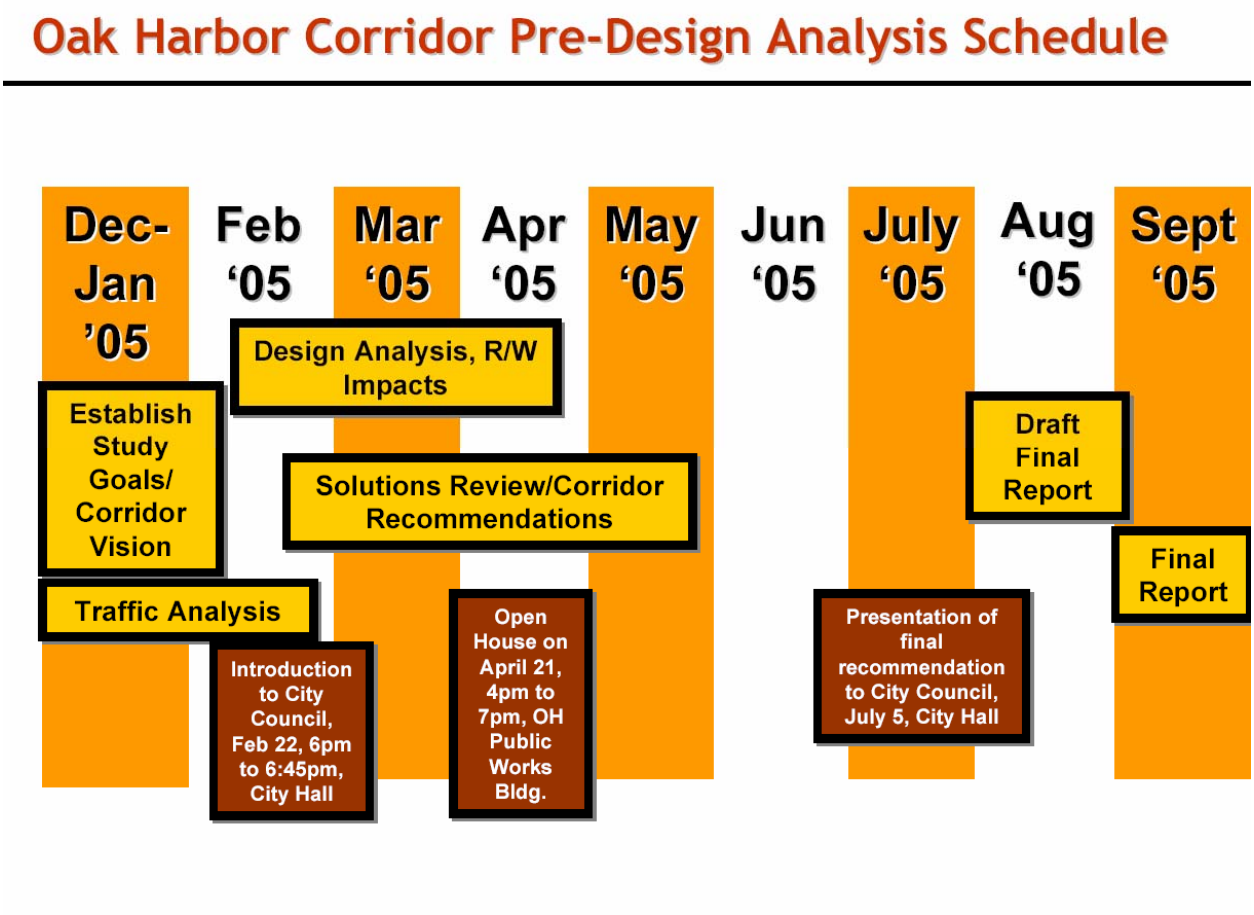
Eric Shjarback	WSDOT, Highway Planning Engineer

Project Support

Mike Koidal	WSDOT, Traffic Analysis
Dina Swires	WSDOT, Traffic Engineer
Sally Anderson	WSDOT, Landscape Design
Marina Arakelyan	WSDOT, Design
Eric Johnston	City of Oak Harbor, Project Engineer

4 Schedule

Exhibit 1-2
Corridor Pre-Design Analysis Schedule



5 Process

Project Deliverables/End Products

- Using standard traffic analysis software, complete traffic analyses for:
  - The existing system from Cabot to Swantown, inclusive
  - A future no-build scenario
  - Future build scenarios for each of the final alternatives. The number of final alternatives is to be determined but probably between 2-4 alternatives.
- Create a visual representation of the traffic network for existing, future no-build, and alternative scenarios. This product is useful to present results to the public and city council members.
- Report on the findings in a bound document with data and graphics to support the decision.
- Create landscape drawing style plans to reflect the outcome of the aesthetic analysis and include them in the report.

The traffic analysis and associated software will be described in more detail in chapter two

Priorities

1. Improve safety
2. Relieve traffic congestion
3. Improve access to land uses (business and residential)
4. Improve aesthetics

Chapter 2 Alternatives

Initially, the project team set out to determine what the alternatives should be for analysis. A raised median ('c' curbing) that had been placed along most of the project area has been doing its job of reducing accidents along the corridor. According to the Oak Harbor Police Department, the raised median has been key to a reduction in accidents in Oak Harbor.

1 Initial Alternative Analysis

Some options were unacceptable from the beginning. The most extreme change would be to build a limited access freeway through the city. That option would be destructive to the city as well as very expensive, and probably unnecessary even in the long range future of the area. The city and WSDOT agreed that was not an option.

Another option that was not kept on the initial list was a widening of the highway from four-lanes to six-lanes. It was agreed that unless the traffic analysis showed that it was absolutely necessary, it would be kept off the list.

Moving the highway to another location was also not considered in detail. Again, the cost would be prohibitive and would have large negative impacts to both the community and local businesses.

This left two very different options: 1) a traditional approach with signals, multiple turn lanes where necessary, and u-turn lanes at every intersection, or 2) using modern, multi-lane roundabouts at each intersection which would allow smooth

SR 20 six-lanes wide?

It was agreed early on that Oak Harbor did not want to go the direction of many other communities that have widened their main thoroughfare through town only to see more issues come up such as higher speeds, more injury accidents, and less bicycle and pedestrian activity. A quick cost estimate showed that a six-lane corridor would cost over $2 million more than non-widening options, not to mention large impacts to adjoining businesses and homes.

flow of traffic for all approaches and the ability to turn right, left, or go straight with no electronic traffic control device.

Both options are mainly intersection improvements. Between the intersections, the highway would look virtually identical regardless of the option.

Modern Roundabouts

For more information on Modern Roundabouts go to Chapter 5.

2 Round Two of Analysis

At first we viewed the signalized option as two separate alternatives:

1. "Traditional" – Built-out intersections with double turn lanes when necessary. Keep existing minor intersections.
2. "Traditional Modified" – Create U-turn potential at key intersections with extra widening. Restrict some minor intersections to Right-In-Right-Out (RIRO)

Right-In-Right-Out

This is the restriction of access of a driveway or intersection on the highway. The only way onto the street from the highway is by making a right turn onto the street. The only way onto the highway is to make a right turn onto the highway.

As the team analyzed the traffic information, it was soon evident that if the traditional option was to work, it would have to have the benefit of U-turns at all of the key intersections. Also, there could be no more uncontrolled (free) left turns out of any side street.

3 Final List

These two options were merged into one option that we called **"Traditional"** and this was compared to the **Roundabout** option.

Chapter 3 Traffic Analysis

1 The Initial Traffic Analysis

The goal of this pre-design analysis is to determine a design concept for SR 20. Before a problem is analyzed and solved, you must know what the problem is. Our first task was to collect traffic data throughout the corridor and analyze it to find current and future problems.

Data Gathering

We began the analysis by gathering data. We counted how many cars and trucks use the highway (traffic counts) and we counted how many go right, left, or straight at each intersection. The team also used general growth rates for different sections of the highway. Higher growth rates are used at Swantown, for example, because of all the residential growth expected in that area. Lower growth rates are shown at Cabot Drive. Although traffic will increase at 3rd/Cabot; because of the lack of build-able lots in the area, the growth will not be as high as the Swantown area.

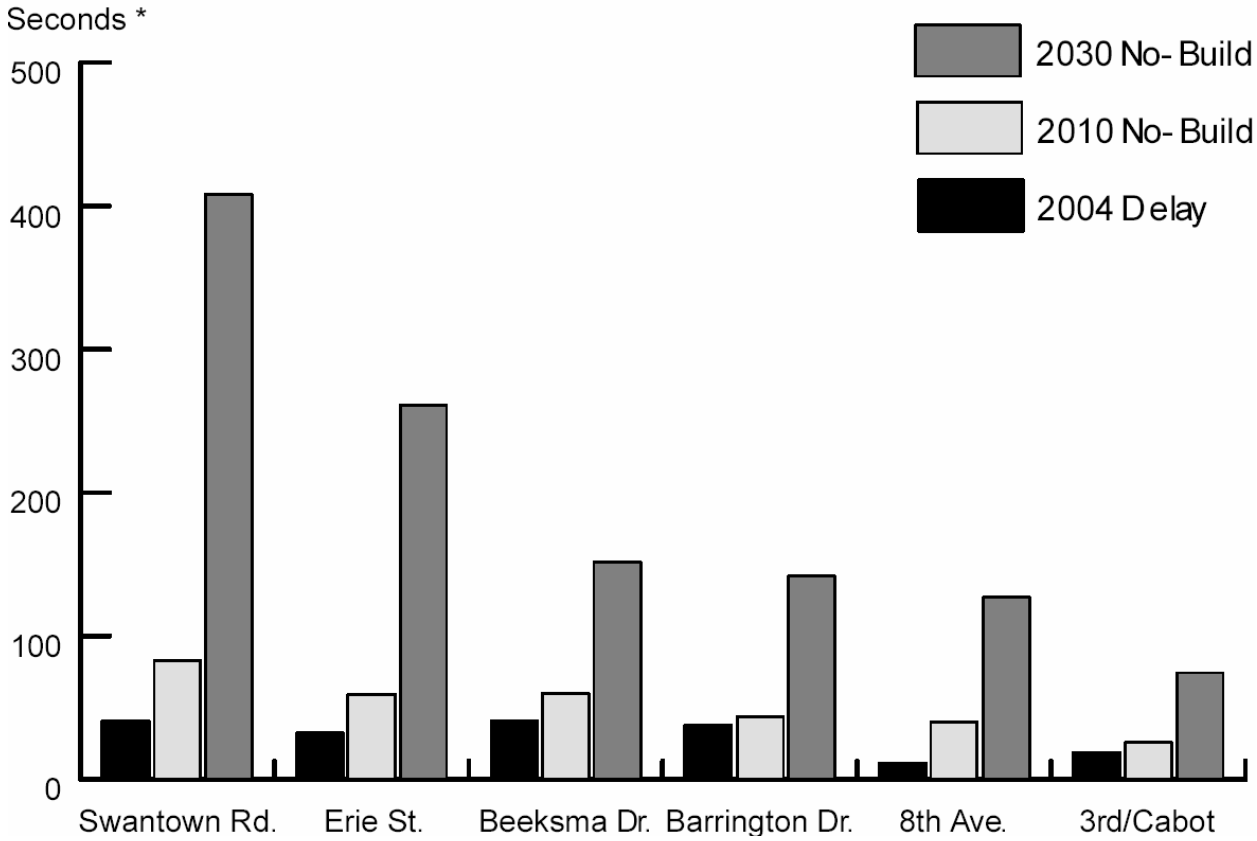
Traffic Analysis

This information was put into a traffic analysis computer model (SYNCHRO), and the results were as shown on the next page.

Synchro

Synchro is a software application for optimizing traffic signal timing, performing capacity analysis, and Level of Service analysis. The software optimizes splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network.

Exhibit 3-1
No-Build Traffic Analysis



This table shows what the delay (in seconds) will be in the year 2030 if no changes are made to the highway.

Data Analysis

In 2004 the southern four intersections (Swantown, Erie, Pioneer, Barrington) have close to the same delay and 8th and Cabot are noticeably lower. This will be important when we discuss construction phasing.

In 2010 Swantown is beginning to get worse than the other intersections. In 2030 Swantown has an intersection delay of over seven minutes, Erie 4-1/2 minutes, and Pioneer over 2 minutes. Swantown looks so bad in 2030 for a couple of reasons:

1. The growth rate given to the analysis is higher at Swantown, so the volume will increase there at a faster rate.

2. The Swantown leg of the intersection needs a large amount of the total "green time" that is simply not available. The mainline (SR 20) is also getting busier and has to have a minimum amount of green time just to get highway traffic through the intersection. In this competition for green time, Swantown loses, and therefore the entire intersection loses.

3. In a no-build (existing conditions) scenario there is not a good way around Swantown and SR 20, especially for tourist traffic unfamiliar with the local roads. If you are in central or north Oak Harbor and need to get to Coupeville, you are going to go through this intersection. This shows a need for alternate routes in this area.

Green Time

Green Time is the duration of time the Traffic signal phase is "green" allowing traffic to go.

2 Alternatives Considered

Widening to 6 or 7 lanes with signals and u-turns at key intersections

This is a traditional next step when a 4-5 lane roadway becomes congested, however this could negatively impact adjoining property owners due to the right-of-way needs associated with such widening. Our pre-design team decided that although it would solve the problem of moving traffic, it would not be an aesthetic enhancement to the corridor, and should only be considered if none of the other options proved feasible.

Improving the existing key intersections by maximizing signal throughput with extra storage lanes and u-turns.

Our goal here was to find out whether or not the volume of the signalized intersections would increase enough to solve the issues along the corridor, if we maximized the throughput of the signalized intersection with extra storage and turning lanes where necessary.

Storage

'Storage' is the space available for autos waiting at a red light. As a roadway widens coming up toward a signal this allows more storage and therefore more cars can get through on the next green light.

Installing two-lane roundabouts at key intersections.

Roundabouts have been used successfully in just this situation all over the country in the last 10-15 years. Their advantage is

that the roadway between intersections does not need to be widened for vehicles waiting for a red light, like signalized corridors do.

3 Important Considerations

Agreed upon early in the project were the items to focus on as discussions unfolded:

- Improve safety
- Relieve traffic congestion
- Improve access to land uses (business and residential)
- Improve aesthetics

Traffic Congestion Relief

SR 20 is the main north/south corridor for Whidbey Island, arguably the single most important road on the island. SR 20 is also a Highway of Statewide Significance (HSS), a priority highway for the State and a roadway where congestion needs to be kept at a reasonable level throughout the Island.

Safety

WSDOT places the value of human life and/or potential suffering from crashes as more important than any other consideration, including access to businesses or side streets and mobility. However, WSDOT also realizes that there is usually a solution that will please the majority and still increase safety.

Improved access to land uses

The curbing that was placed down the center of the highway in 2003 has done its job by reducing potential conflicts (accidents); however, it also limits access to many of the driveways along the highway. We would like our final recommendation to enhance the access either by building u-turn lanes or by using roundabouts for their u-turn-ability

Aesthetics – Consistent with Oak Harbor Character

The City of Oak Harbor is intent on a beautification effort for this downtown corridor. The City and WSDOT are working

together to understand what can and cannot be done in the way of street trees, plantings in the median, meandering sidewalks, bike lanes and items that make the highway more a part of the City than it is now.

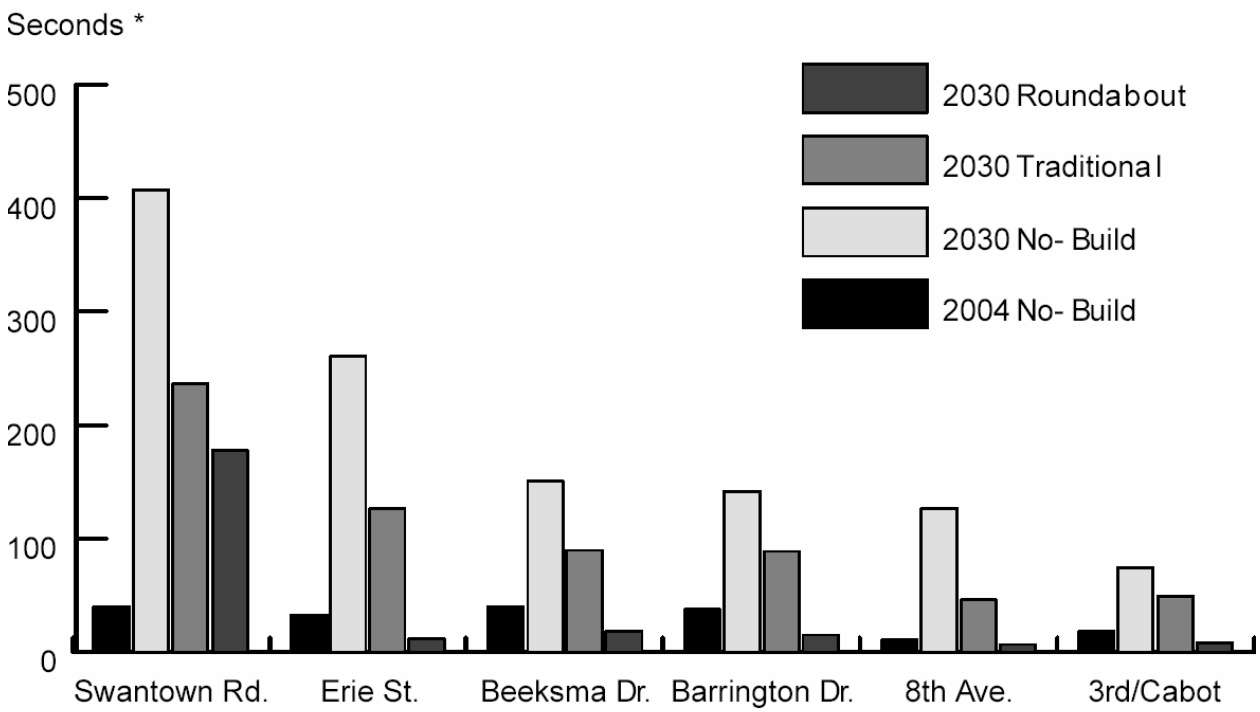
4 Final Alternatives Analysis

We took the Signal and Roundabout alternatives and compared them using two kinds of traffic analysis software. Synchro for the traditional alternative and aaSidra for the roundabouts alternative.

The results were surprising as you can see below.

AaSIDRA is a software package, which is used to evaluate and compare capacity, level of service and performance of roadway treatments involving roundabouts. It is widely considered to be the best available package for this type of analysis.

Exhibit 3-2
Alternatives Analysis



This table shows what the delay (in seconds) will be in the year 2030 if no changes are made to the highway.

There were several points that the team took away from this analysis that formed the basis of our final recommendation.

- Currently the Swantown to Barrington corridor is much busier than the Barrington to Cabot corridor.
- In 2030 the corridor is failing between Swantown to Erie.
- The traditional (signal) fix is an improvement over doing nothing but by 2030 the corridor is at a LOS F with the signal fix.
- The roundabout fix shows better function (except Swantown) in 2030 than there exists now.
- The failure at Swantown, in both the no-build and build scenarios, is a combination of a confluence of roadways with a lack of obvious alternative routes, high growth in that part of town, and growth in general on Whidbey Island.

Chapter 4 Final Recommendation

1 Recommendation

The recommendation resulting from this Corridor Pre-Design Analysis is to implement, over time, a series of roundabouts along the SR 20 corridor. Roundabouts have proven to be safer than signals to autos as well as non-motorized users. This traffic study shows that a roundabout controlled corridor, in the year 2030, will function with less delay than is experienced today on SR 20.

The aesthetic potential of a roundabout corridor is twofold: 1) The interior of each roundabout is an area where art or planting can be located and 2) The actual driving portion of the highway corridor is able to stay narrow, allowing room for trees, plantings, and meandering sidewalks along the roadway.

2 Funding

Funding is always a challenge for large projects such as SR 20 through Oak Harbor. As with most projects, funding will need to come from multiple sources. WSDOT will support the city in grant applications and continue to seek WSDOT funding.

3 Suggested Phasing

Funding will most likely not be available to build all six roundabouts at one time and it will take time for drivers who are not familiar with roundabouts to learn how to drive them. The following phasing approach is recommended to meet both of these realities.

Phase One ($3.5M in 2005 Dollars)

The main public comment and the most noticeable problem along the corridor is the narrowing of the highway southbound between Erie and Swantown. This would be a logical first phase.

There is also enough existing pavement to create two southbound lanes and one northbound lane if the center two-way-left-turn-lane is eliminated. This will require Scenic Heights to be a right-in-right-out only intersection. Roundabouts will be constructed at Swantown and Erie to allow for smoother flow of traffic and turnaround ability for Scenic Heights traffic.

These three lanes will function for about another 10 years and by then SR 20 will need to be widened to four lanes.

Phase One

Phase One would construct a two-lane roundabout at Swantown and Erie Streets, and stripe the existing pavement to two lanes southbound and one lane northbound. It would also place a median barrier between the intersections to eliminate left turns in and out of Scenic Heights. The roundabouts will increase safety and capacity as well as give the Scenic Heights traffic a way to access their road easily.

Phase Two ($5.0M in 2005 Dollars)

The next logical phase will be to construct two-lane roundabouts at the Pioneer/Beeksma and Barrington intersections.

Phase Two

Phase Two would complete the crucial intersection upgrade portion of the corridor. The reason for completing these two roundabouts before widening the highway from Swantown to Pioneer Way is to free up traffic circulation in the most dense traffic area in Oak Harbor. The widening (to four lanes) is important for future traffic volumes and aesthetic beautification, but is not imperative for the next decade as long as the intersections are improved.

Phase Three ($7M in 2005 Dollars)

Before the 8th and 3rd/Cabot roundabouts are constructed, it will be necessary to widen SR 20 to four driving lanes from Swantown to Pioneer/Beeksma, along with widening for landscaped medians, bicycle lanes, and new sidewalks.

Phase Three

Phase Three will widen the highway to four lanes from Swantown to Pioneer and widen the entire Swantown to Barrington section to a new aesthetically pleasing cross-section with bike lanes, wider sidewalks, landscaping between the road and sidewalk, and a raised, planted median, etc.

This will eliminate traffic congestion along SR 20 far into the future.

Phase Four ($7.0M in 2005 Dollars)

Complete the corridor by building two-lane roundabouts at 8th and 3rd/Cabot along with widening for landscaped medians, bicycle lanes, and new sidewalks.

This phase has a higher aesthetic value than functional value as the intersections of 8th Avenue and Cabot Drive do not show as failing in the future. In other words this phase is important in the aesthetic look for the city, and has value in traveler safety and retail sales potential, as well as pedestrian and bicycle safety; however it is not crucial to the travelers on the highway.

Phase Four

Phase Four will complete the corridor enhancements by constructing two new roundabouts at 8th Avenue and Cabot Drive. It will also reconstruct the highway to the new cross section configuration. This will tie the downtown area in with the existing street beautification existing in the Cabot Drive area.

Chapter 5 Roundabouts

The purpose of this chapter is to answer some questions and common concerns that the public has about roundabouts, and some key differences between roundabouts and signals. This Chapter is in a "Frequently Asked Questions" format. All of the questions shown are either shown verbatim from real questions from real people or are a combination of similar questions common to the subject.

1 Frequently Asked Questions

What is a modern roundabout?

A modern roundabout is a form of intersection control where traffic flows around a center island. Vehicles in the roundabout have right-of-way over vehicles waiting to get into the roundabout.

How are signals and roundabouts different?

Traffic signals use a "queuing and platooning" theory to get cars and trucks through an intersection. The cars line up at the red light (queue) and then drive off together when the light turns green (platooning). In other words the traffic takes turns going through the intersection. Whichever queue has the green light has the right-of-way through the intersection. If the light is green, then the traffic flows through the intersection at the posted speed.

Roundabouts use a first-come-first-serve theory. As a driver pulls up to the roundabout, the driver must yield to any traffic inside the roundabout (similar to entering the freeway from an

WSDOT Roundabout Website

Visit our webpage to learn more about roundabouts. The site includes links to other roundabout information as well as a video on 'How to Drive a Roundabout'

www.wsdot.wa.gov/Projects/roundabouts/washingtons.htm

on-ramp, but at a much slower speed). When there is a gap in the slow moving traffic, the driver can merge into the

intersection. If there is no traffic in the roundabout, then it is not necessary to stop, only to slow down to negotiate the turning around the roundabout.

I grew up on the east coast and those roundabouts are being taken out because they are so dangerous!

Most of these intersections that are being removed are called rotary's. These are an older design with high speeds and usually a much larger diameter. The entrances to the circles are not designed to slow incoming traffic down or point you into the circle. Also, there are no fast rules as to who has right-of-way coming within the circle. In some cases, entering cars have right-of-way and in some cases cars within the roundabout have right-of-way.

A modern roundabout has three characteristics: 1) A small diameter, usually in the 140' to 180' range, 2) Slower traffic (by not allowing cars to enter without slowing down), and 3) A yield at entry, so the traffic within the roundabout always stays moving.

The sidebar to the right shows the difference in size between a classic, old rotary and a newly constructed roundabout in the center.

Exhibit 5-1

Roundabout vs. Rotary

This picture shows the construction of a modern roundabout inside of a rotary. Once the roundabout was built the rotary was taken out of use.

Let's cut to the chase here, people are going to die left and right in these roundabouts!

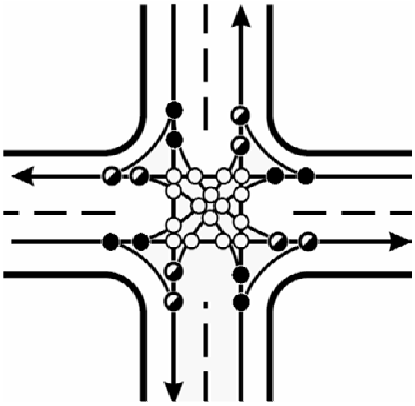
Actually, roundabouts have been shown to reduce the number and severity of accidents compared to signalized intersections. The Virginia Institute for Traffic Safety (ITS) has reported that fatalities can decrease by 90%, injuries by 70%, and the overall number of accidents can decrease by 30%.

The two main reasons for this are:

1. The low speeds through the intersection. Traffic through these intersections will be reduced to 15 to 20 mph. Any impacts at that speed will be minor.
2. All of the traffic will rotate around the roundabout in the same direction, so the most critical of impacts (head-on and T-bone collisions) will not be able to occur any more.

Exhibit 5-2

Potential Accident Locations at a Typical Intersection



All of the points on the above picture show locations of converging, diverging, or crossing traffic. These are the places where accidents can happen.

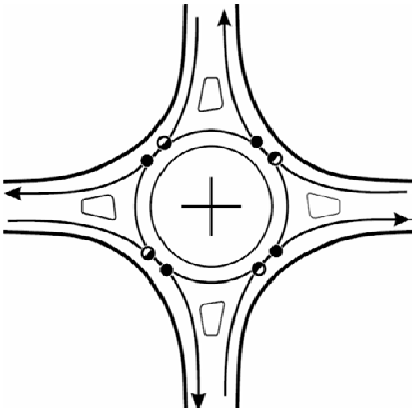
What's wrong with good, old-fashioned signalized intersections?

Signals still work well in many applications. Roundabouts however, are able to process vehicles in a more efficient way as more traffic from different directions can use the intersection at the same time. Roundabouts also give us another option to consider in the realm of traffic management.

As populations and associated traffic increases, as in Oak Harbor, there is a point where signals begin to experience delay and poor level of service. One solution is to widen the road with more lanes to get more cars through the signal, but that can be expensive when right-of-way is needed. Traffic engineers in the United States are learning that the capacity of a four lane roadway with roundabouts is about the same as a six lane roadway with signalized intersections. This means narrower roads, less impact to communities, less storm water run off, more room for beautification and civic pride aspects, and less distance for pedestrians to walk across the street. The list goes on.

Exhibit 5-3

Potential Accident Locations at a Roundabout Intersection



All of the points on the above picture show locations of converging, diverging, or crossing traffic. These are the places where accidents can happen.

How do roundabouts work for pedestrians and bicycles?

To date, there have been no pedestrian accidents at any of the 67 Washington state roundabouts. Roundabouts force cars to slow down, which makes crossing the street safer for pedestrians. Cars are required to yield to pedestrians in roundabouts, resulting in pedestrians only having to concentrate on the cross-traffic in one direction at a time. Roundabouts have a "safe refuge island" for pedestrians between the opposing directions of traffic.

Exhibit 5-4
Roundabout with Typical Pedestrian Crossings

The circled feature above is a pedestrian crossing. It is well marked and the pedestrian crosses in a two-step process, first looking one direction while crossing to the middle of the road then looking the other way while crossing from the middle to the sidewalk.

I drive a big rig through Oak Harbor several times a day. How can I fit my truck through these roundabouts?

Roundabout designers considered truck traffic in their analysis. The roundabouts are designed using the turning ability of the largest trucks feasible. Again, if there is an accident between a

You can watch how easily trucks and fire engines are able to drive through a roundabout in the "Driving a Roundabout" video which is on the CD accompanying this report.

truck and a car the odds are that the accident will not be serious because of the low speeds.

Education is the key. Very large trucks bigger than your typical 18-wheeler will need to take up both lanes in the roundabout. Other drivers need to recognize this and respond accordingly. As previously mentioned, when the speed in the roundabout is 15-20 mph, the accidents that do occur are going to typically be minor, non-injury types.

What is the speed limit through a roundabout?
We will set the speed limit through the roundabouts between 15 mph and 20 mph. Drivers will have to slow down to enter and proceed through a roundabout, however slowing down to drive through a roundabout is faster than coming to a complete stop at a red light.

Do roundabouts cause congestion and extend commute times?
No. Roundabouts promote a continuous flow of traffic. Unlike intersections with traffic signals, you don't have to wait for a green light at roundabouts to get through the intersection. You only have to yield to oncoming traffic. In fact, a roundabout can service numerous vehicles, all with different destinations, all at the same time.

You keep talking about low speeds, won't that slow me down as I drive down the highway?
This is something that is hard to imagine about roundabouts. The reality is that even though you slow down to 10 to 20 mph to go through each roundabout, your overall travel time will decrease.

I don't like them because they make me nervous when I drive through them…
Roundabouts are relatively new to Washington. We've been building them across the state since 1997. It's common for drivers to be nervous their first couple times through a roundabout. The more you do it, the more comfortable you become using them.

Often, people assume that roundabouts are unsafe because they are uncomfortable or nervous when they drive through the roundabout. We'd argue that roundabouts are safe for that very reason. Not because people are learning to use them, but because they force drivers to slow down, pay attention and be more alert each and every time they drive through a roundabout.

Common responses from people who are nervous about roundabouts sound like this, "I don't like roundabouts, why don't you put in a signal instead. Everyone already knows how to use those." The truth is, we're all so used to signals that we assume they are safe. We assume that drivers will stop every time for a red light but they don't. This is why we have severe and sometimes fatal accidents at signals.

Roundabouts force drivers to slow down to 15 to 20 miles per hour in order to pass through. Drivers entering the roundabout have to yield to cars already in the roundabout. The chances of having a severe injury or fatal accident at 15 mile per hour are significantly reduced.

Why won't we build a mix of roundabouts and traffic signals?

Roundabouts and traffic signals move traffic differently. Traffic signals create stop and go conditions while roundabouts create a continuous flow of traffic. If we placed both stop and go and continuous flow operations together, they could work against each other.

How will roundabouts affect traffic on SR 20?

The new roundabouts will allow traffic to flow more freely on both city streets and SR 20. While they force traffic to slow down through the intersection, they allow continuous traffic flow instead of forcing drivers to wait at stoplights. As shown at tens of thousands of other locations around the world, roundabouts keep traffic moving while improving safety significantly.

Contrary to many peoples' perceptions, roundabouts actually move traffic through an intersection faster and with less congestion on approaching roads. Roundabouts promote a continuous flow of traffic. Unlike intersections with traffic signals, you don't have to wait for a green light at a roundabout to get through the intersection. Traffic is not required to stop – only yield – so the intersection can handle more traffic in the same amount of time.

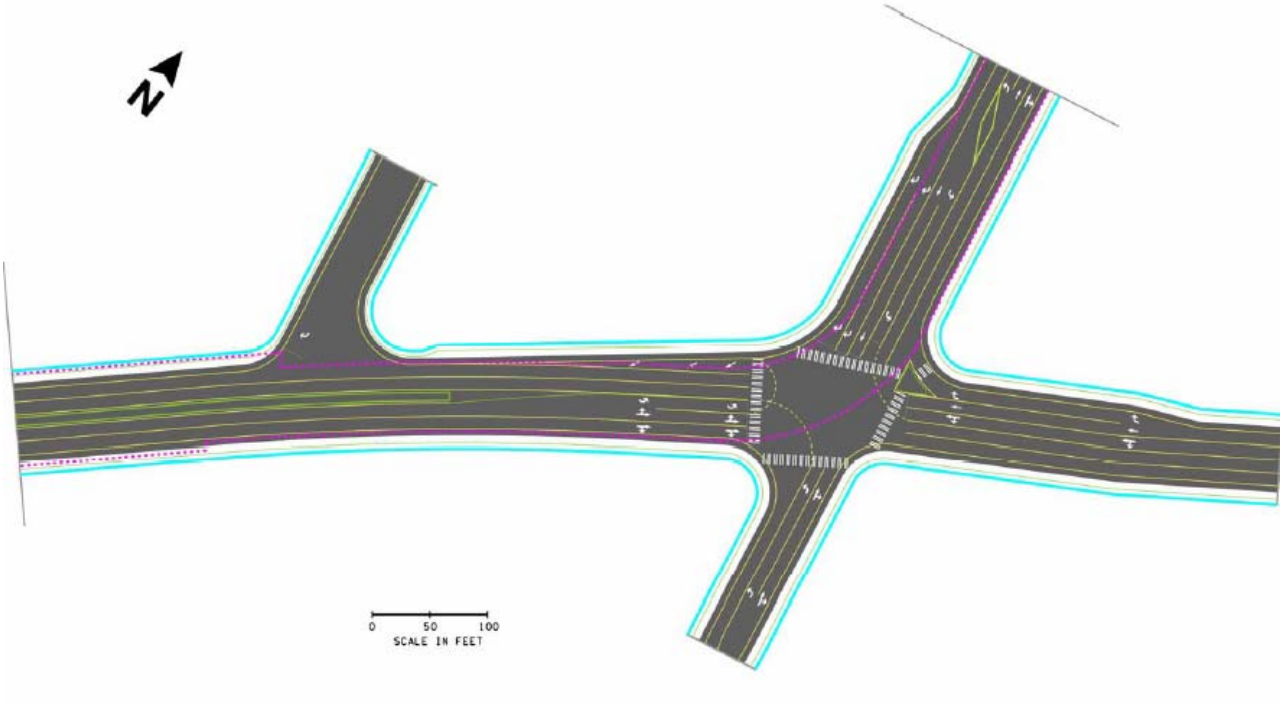
Studies by Kansas State University have measured traffic flow at intersections before and after conversion to roundabouts. In each case, installing a roundabout led to a 20 percent reduction in delays. The proportion of vehicles that had to stop – just long enough for a gap in traffic – was also reduced.

Won't they take up more land and space than a signal would?

Recognizing that every intersection is different, roundabouts and signals, when built to handle the same amount of traffic, will take up a similar amount of land. Roundabouts tend to take more land for the intersection. Traffic signals need car and truck storage approaching the intersection, so they tend to take more property at locations along the highway away from the intersections. The example on the next page shows a graphical example of this.

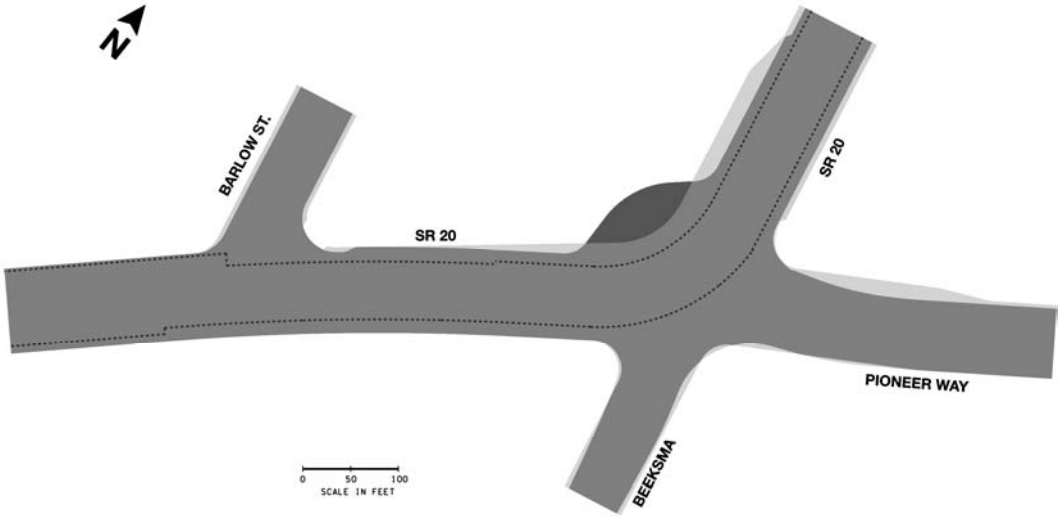
Exhibit 5-5

Signals vs. Roundabouts -- Right-of-Way Impacts at Pioneer Way/ SR 20



This graphic shows the lane configuration and footprint of the Signalized option.

This graphic shows the lane configuration and footprint of the Roundabout option.



This graphic shows the Signal and Roundabout options laid over one another. The dark gray shows the area needed by both options; the light gray sections are sections that the signal would take; and the darkest section is the area that the roundabout would take.

The signalized option you show does take up less right-of- way along the corridor. Isn't that the most expensive part of construction?

Right-of-Way is expensive, but there isn't a large difference between the two options. The roundabout option takes up somewhere in the neighborhood of 0.5 acre total difference along the corridor. If, for example, the going rate of commercial land is $20 per square foot then the total cost difference along the entire corridor will be $400,000.

Chapter 6 Aesthetics

At the beginning of this pre-design project the City of Oak Harbor and WSDOT had different priorities. The priorities of the city were focused on what is happening within the borders of the city., how residents can travel across the city, how conveniently can people get to the stores, and how the city looks to those passing through. The State, realizing that this is the main thoroughfare for Whidbey Island, and that SR 20 is a Highway of Statewide Significance, wanted traffic to be able to flow through Oak Harbor in a safe manner and in a reasonable amount of time.

The aesthetic look of a highway is not as high of a priority for the State as it is for the City. However, WSDOT has learned, especially over the last 10-15 years, that this is important to many cities and counties in Washington. In these days of limited budgets and partnerships, it is in everyone's best interest to come to a solution that benefits all if possible.

This chapter discusses what is possible along SR 20, what are important considerations, and how can the city go about implementing a Landscaping/Aesthetic improvement plan.

Web Links:

WSDOT Context Sensitive Design

contextsensitivesolutions.org/content/gen/state-profiles/WA

WSDOT Understanding Flexibility in Highway Design

www.wsdot.wa.gov/eesc/design/urban/default.htm

1 Goals of the project

Incorporate aesthetic features while maintaining safety standards

Safety is the WSDOT's number one concern. Some aesthetic features, such as street trees, if located in the wrong place and are the wrong sizes, can be a detriment to safety. This does not mean they cannot be installed; only that thought must be put

into their location, style, and size before they are suggested as a design element.

Exhibit 6-1

SR 20 Corridor Conceptual Sketch

Aesthetically pleasing corridor

Oak Harbor is at a crossroads in their growth where they want to let the beauty and specialness of Oak Harbor come across to visitors, even visitors just passing through on the highway. The City is currently analyzing the potential revitalization of their older downtown area along Pioneer Way just east of SR 20

Traffic calming

Traffic calming is the theory of designing roadway elements so that they "calm" the flow of traffic (in other words, slow traffic down), rather than using speed limit signs.

Traffic calming, if used in a way that won't decrease the capacity of the highway, is an acceptable tool for State highways; however it is typically utilized more on minor city/county roads with less traffic.

Definition of Traffic Calming

"Policies and measures that correct the negative effects of motorized vehicle use on individuals and society in general by changing the design and role of the streets to serve a broad range of social, environmental, and transport objectives."

Traffic Calming: Basics and Beyond
Copyright Coleman/Hartnett 1998

Urban softening – increase canopy cover of trees

There is a growing awareness of the benefits of trees in the urban environment. Some of the benefits of trees are a savings in energy costs, a perception of quality and value, protection from storm runoff, improvement of air quality, reduction in noise pollution, increased economic benefits, added beauty, traffic calming, and reduction in crime.

Benefits of Trees

A great location for tree information is the National Arbor Day Foundation website at:

www.arborday.org

A site that addresses specifically the benefits of trees is at:

www.arborday.org

Integration of pedestrian and bicycle

When there is increased accessibility for pedestrians and cyclists, people have more travel options. This can lead to a reduction in traffic congestion and an increase in air quality.

The construction of bike lanes along SR 20 will be a big step toward providing travel options.

Gateway improvements

"Gateway" is a term used to imply an entrance to a corridor, a place that announces that things are about to change. This could happen through the use of lighting, flags, art, or signs. For this project, Swantown Road is the Gateway. Driving north on SR 20 south of town, there is a rural, high-speed feel. Once you get to Swantown, there is a difference in the highway. There is more traffic, the speeds slow down, and there are many high-density developments, retail and service oriented businesses, and lots of intersections.

The Swantown Road and SR 20 intersection could be an excellent place for an "entrance" to Oak Harbor.

Exhibit 6-2

SR 20 Corridor Gateway Concept at Swantown Road-Plan View Sketch

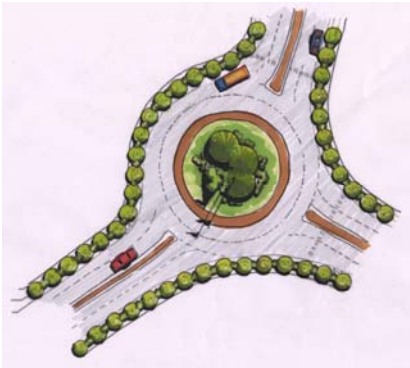


Exhibit 6-3

SR 20 Corridor Gateway Concept at Swantown Road-Perspective Sketch

Community Identity

Oak Harbor has a chance to let visitors know that it is worth turning off of the highway to get to know Oak Harbor better. With roundabouts as the intersection control on SR 20, it will be easier to exit and enter the highway during peak traffic hours.

Economic vitality

Businesses can benefit when they are easily accessible from the roadway system, when the roadway system is functioning well and when they are located in a beautiful place where people would like to be. See the adjacent sidebar for an example of roundabouts being good for business.

Are Roundabouts Good For Business? By Alex J. Ariniello, LSC Transportation Consultants, Inc.

When a series of roundabouts were built on an urban arterial in Golden, CO the businesses showed an increase in sales receipts.

www.ci.golden.co.us/files/roundaboutpaper.pdf

2 Aesthetic Treatment

Aesthetic treatment means:

- An increase in visual quality by unifying elements and softening with natural elements
- Create a community identity
- A scaling of the environments appropriate to viewer groups

Some of the elements of Aesthetic treatment are:

- Lighting
- Paving textures/colors
- Concrete surface treatment
- Curbing styles
- Signing and
- Street furnishings (art, benches, trash cans, signs)

3 Roadside Treatment Conceptual Categories

Unify the appearance through the corridor

Coordinate all visual elements with art themes, color, proportions, shapes, vegetation, etc, to give the feeling of

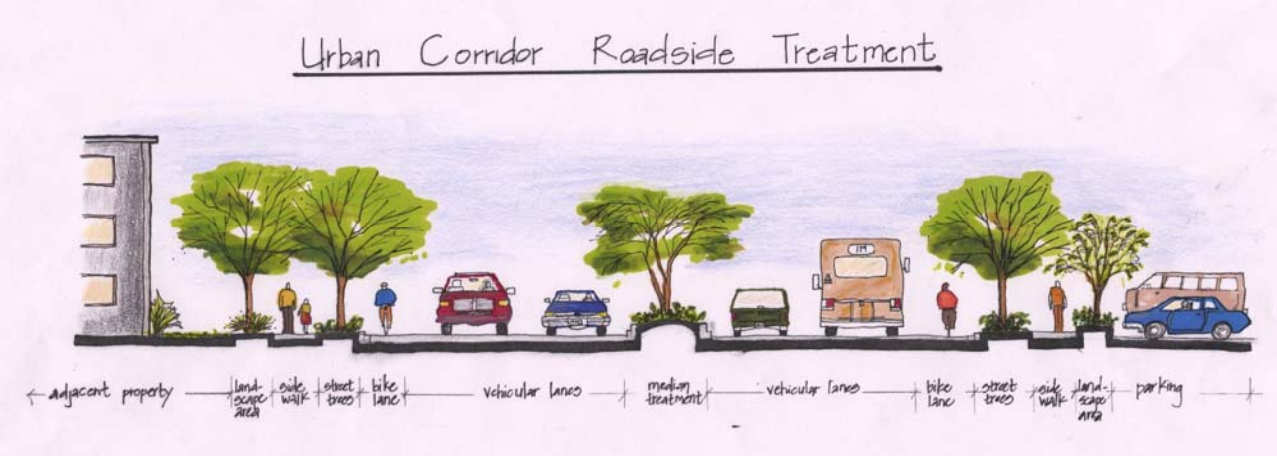
coordination, pride, and forethought to the users of the highway.

Create boulevard effect by maximizing the tree canopy

The dictionary definition of boulevard is, "A broad city street, often tree-lined and landscaped."

Exhibit 6-4

Example of Roadside Concept for SR 20



Appropriate design for viewer speed (vehicle and pedestrian)

As driver speed increases, the field of vision narrows and as speeds decrease, the field of vision widens. This widened field of vision should be accounted for when landscaping or placing roadside artwork.

Exhibit 6-5

Enhancements on SR 99 In Sea-Tac— Before and After

Pedestrian separation from highway — plantings between curb and sidewalk

The city has already done this on sections of SR 20. If the sidewalk is more pleasant to walk on, that creates opportunity for increased pedestrian travel between sidewalk businesses.

Medians

Plant medians to separate lanes, control access, and reduce paved areas, which reduces impervious areas and decreases stormwater treatment needs. Can use low-profile barrier where speeds are 35mph or greater.

Exhibit 6-6

Enhancements on SR 99 In Sea-Tac --- Before and After

Key focal point intersections

Swantown Road and Pioneer Way/Beeksma Drive are the two key focal point intersections within this projects limit. They are the two intersections which should establish community identity and draw motorists into the City with city entrance features (we use flags as an example in this report). Signalized intersections use one of the corners of the intersection;, while roundabouts can use the center of the intersection, within the roundabout, for these items.

Secondary Intersections

The other intersections regarded as secondary intersections in our project were Erie Street, Barrington Drive, 8th Avenue, and

Cabot Drive/3rd Avenue. Their function as secondary intersections are to blend into the corridor, while providing continuity through the corridor.

4 Design Considerations and Guidelines

Clear Zone

The clear zone is defined as the roadside border area, starting at the edge of the traveled roadway, available for safe use by errant vehicles. It is a portion of the roadway kept clear for safety reasons. In an urban environment, with curb and gutter, the clear zone is usually 2 feet beyond the face of curb.

Sight Distance

For traffic to move safely through intersections, drivers need to be able to see traffic signals, signs, and oncoming traffic in time to react accordingly. Plantings next to the roadway must be placed so they do not block sight distances.

Pedestrian and Bicycle Facilities

Much of the reason behind this effort is to make SR 20 more pleasant for users other than drivers of automobiles and trucks.

Roadside Functions

The following are functions of the roadside outside of the traveled way, i.e. curb, gutter, sidewalk, shoulder, and planted landscape areas.

Operational functions

Operational functions include:

- Safety - the area within the clear zone
- Maintenance; - how can the normal roadway maintenance occur? How can the added maintenance needed by the extra landscaping occur? Who will be responsible for this maintenance?
- Signage, in context with the landscaping improvements must guide travelers in a safe and efficient manner. We can’t forget that beneath everything else, this is a state highway and the cars and truck using the highway must be able to get where they are going safely.

Environmental

Environmental concerns include:

- Water quality/quantity – this is vastly different than a typical widening project. Tree planting and other various plantings in the median and in other areas will reduce storm water runoff, and less money will have to be spent on water treatment and detention.
- Sensitive areas – this is a term used by maintenance for areas where they have to take care of some specific sort of what? to apply their maintenance tasks.
- Air Quality should show benefits because the roundabouts will significantly lessen the amount of cars waiting and idling at each intersection. Most cars will simply flow through the intersection with no waiting at all.
- Noise levels should show benefits because the roundabouts will significantly lessen the amount of cars waiting, idling, and then accelerating at each intersection. Most cars will simply flow through the intersection with no waiting at all. This also lowers the truck noise typical to accelerating and decelerating of trucks at signalized intersections.
- Visual – improve visual quality, soften urban features, viewer guidance, directional helps and recognition of place

5 Next Steps

Contact the WSDOT Northwest Region Landscape Office at (206) 440-4500 or visit their website.

WSDOT Northwest Region Landscaping Office

wwwi.wsdot.wa.gov/regions/northwest/rp&s/Landscape_Architecture/index.htm

References

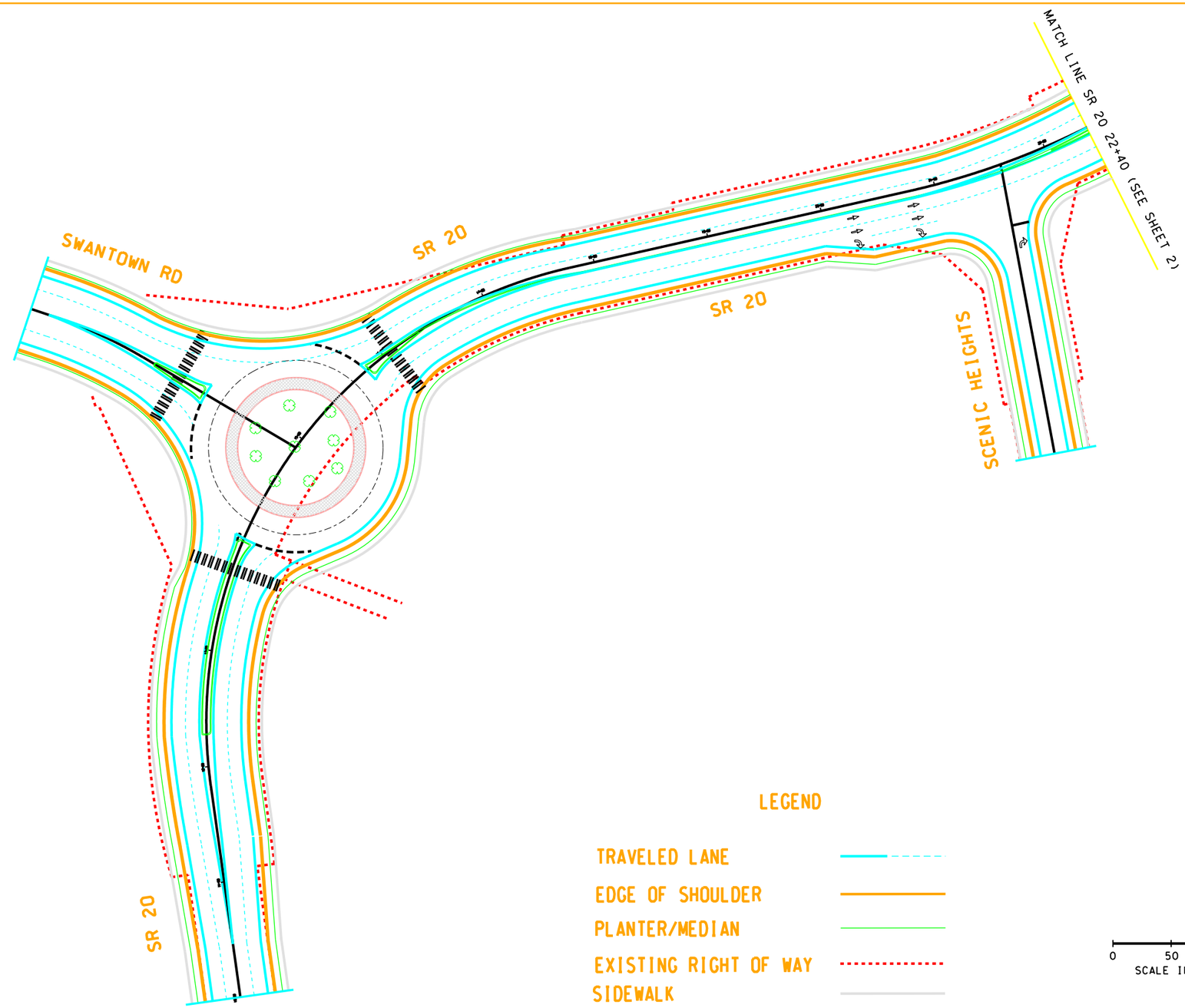
WSDOT Roadside Corridor Plan

WSDOT Design Manual

WSDOT Roadside Manual

WSDOT Flexibility in Highway Design

Oak Harbor Comprehensive Plan



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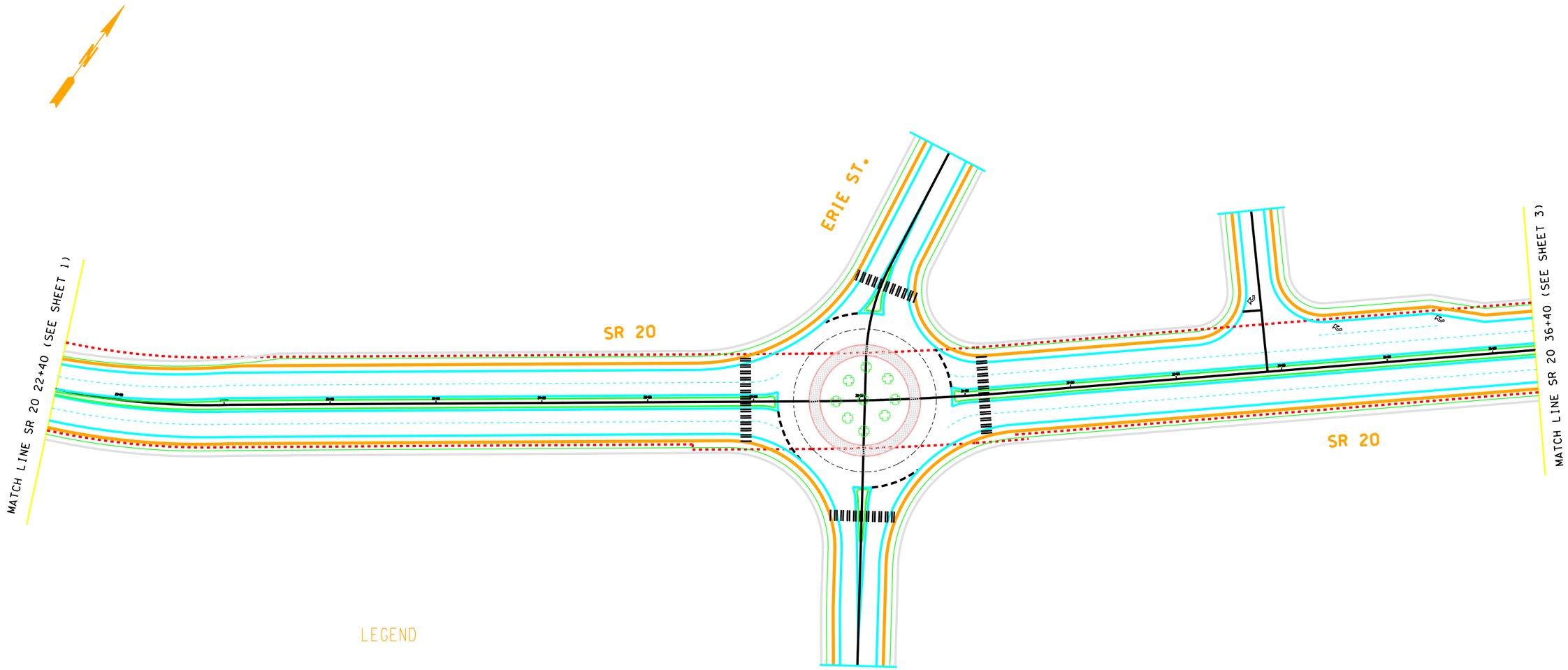
Washington State Department of Transportation

SR 20 – OAK HARBOR
SWANTOWN RD TO CABOT
PRE – DESIGN STUDY

ROUNDABOUT INTERSECTIONS OPTION

SHEET 1 OF 6 SHEETS



LEGEND

TRAVELED LANE

EDGE OF SHOULDER

PLANTER/MEDIAN

EXISTING RIGHT OF WAY

SIDEWALK

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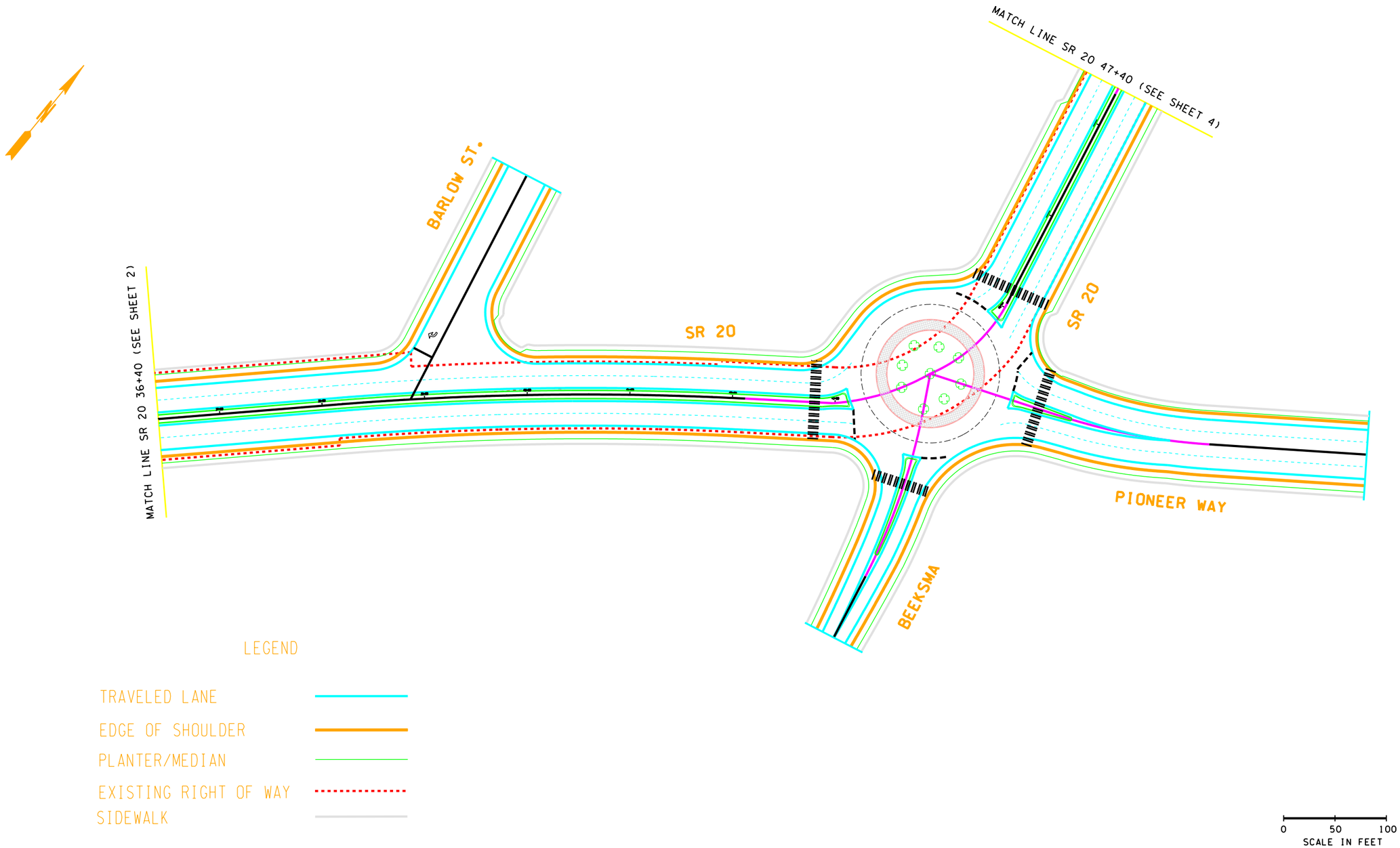
Washington State
Department of Transportation

SR 20 – OAK HARBOR
SWANTOWN RD TO CABOT
PRE – DESIGN STUDY

ROUNDABOUT INTERSECTIONS OPTION

PLOT12

SHEET 2 OF 6 SHEETS



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SWANTOWN RD TO CABOT
PRE – DESIGN STUDY

ROUNDABOUT INTERSECTIONS OPTION

PLOT13

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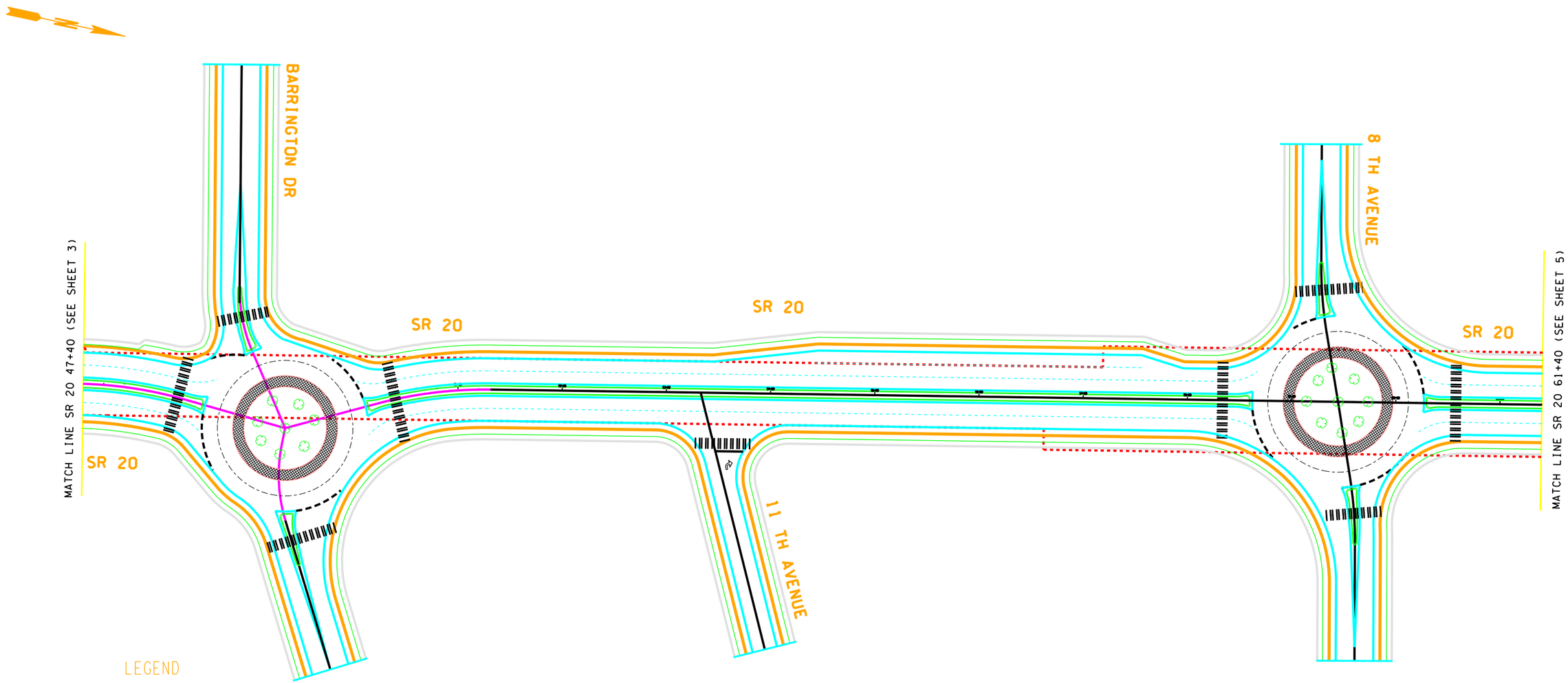

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EDGE OF SHOULDER

PLANTER/MEDIAN

EXISTING RIGHT OF WAY

SIDEWALK

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SCALE IN FEET

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ROUNDABOUT INTERSECTIONS OPTION

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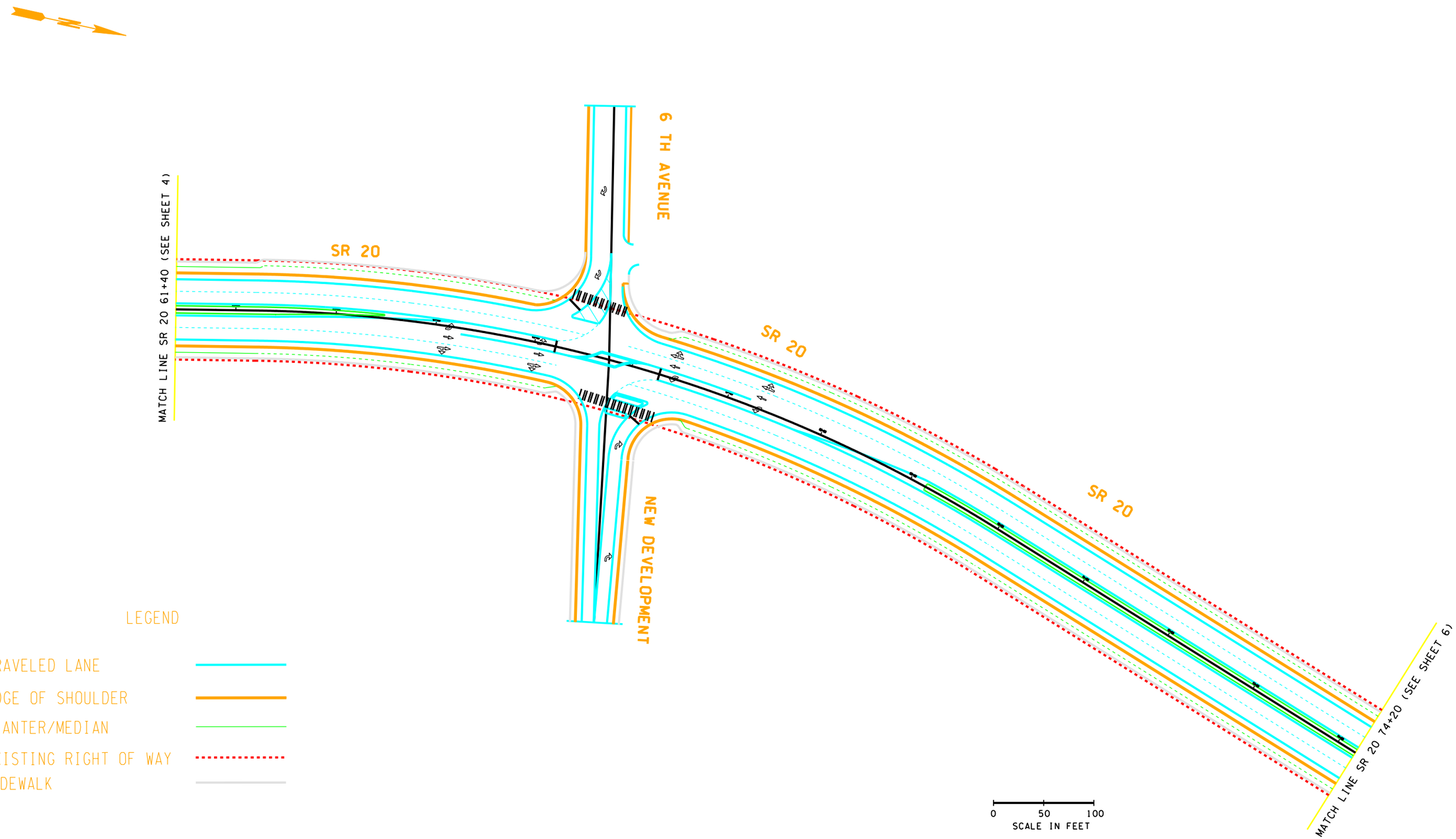

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SR 20 – OAK HARBOR SWANTOWN RD TO CABOT PRE – DESIGN STUDY

ROUNDABOUT INTERSECTIONS OPTION

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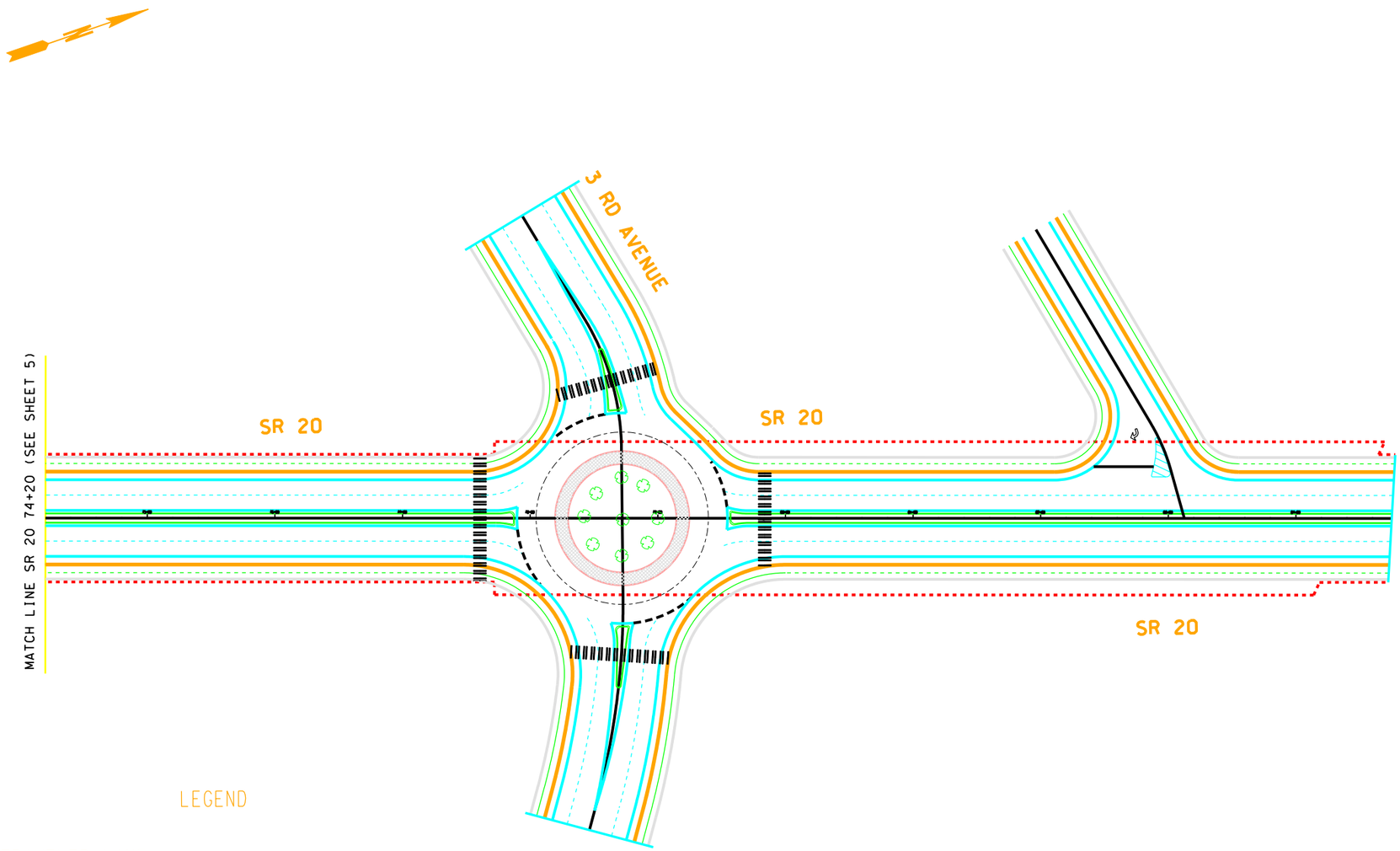

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PLANTER/MEDIAN

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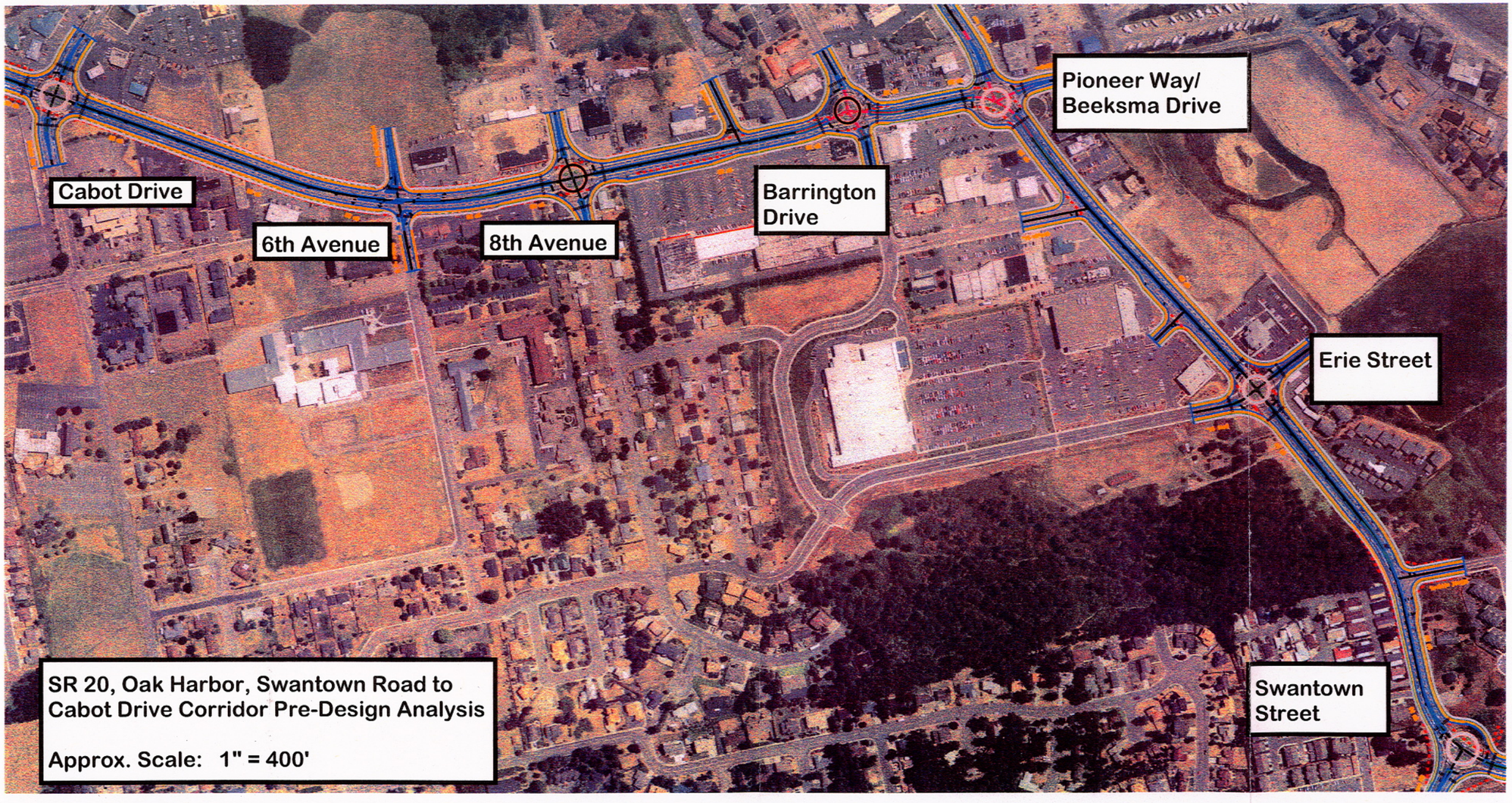
Washington State Department of Transportation

SR 20 – OAK HARBOR
SWANTOWN RD TO CABOT
PRE – DESIGN STUDY

ROUNDABOUT INTERSECTIONS OPTION

SHEET 6 OF 6 SHEETS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Cabot Drive
Barrington
Drive
6th Avenue
8th Avenue
Erie Street
Swantown
Street
SR 20, Oak Harbor, Swantown Road to
Cabot Drive Corridor Pre-Design Analysis
Approx. Scale: 1" = 400'

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