Sisters Couplet Refinement Plan

November, 2004

Prepared for the City of Sisters

by Cogan Owens Cogan
CTS Engineers
& Robert Yakas

Table of Contents

Sections

Maps and Figures

1. Project Background and Overview

History

The City of Sisters has been studying ways to relieve current and future congestion on its main street (Highway 20/Cascade Avenue) for many years. Cascade Avenue currently experiences significant traffic congestion during peak traffic periods, which occur on weekends during the summer months. Traffic congestion is projected to continue to worsen during the next 20 years as population and traffic continue to grow both locally and throughout the state, including in other areas of Central Oregon. Increasing congestion will adversely affect traffic mobility, safety, and the quality of life of Sisters' and other Oregon residents.

One of the solutions to reducing congestion and improving mobility within and through Sisters is a "couplet"—a pair of one-way streets that can move traffic more efficiently and improve safety on the couplet streets, particularly for pedestrians who would not have to look both ways for traffic before crossing. A couplet has been discussed since the early 1980's though the priority for building one and plans for implementation have not been a high priority until recent years.

The couplet was identified in the City's Transportation System Plan (TSP), adopted in June 2001, as the preferred long-term solution to addressing future congestion. While it was not identified as a top priority project, it was preferred over other long-term options for addressing congestion. The couplet identified in the TSP is a non-traditional couplet in comparison to those implemented in most communities. Typically, a couplet consists of two parallel, adjacent, one-way streets. However, in Sisters, the proposed couplet would use two parallel one-way streets (Hood and Main Avenues), with a parallel two-way street between them (Cascade Avenue). As envisioned in the TSP, the couplet is intended to act as a "pressure relief valve," providing alternatives to Cascade Avenue for travelers during peak traffic periods. At other times, people would be likely to continue to use Cascade Avenue as the most direct route in order to take advantage of shopping and other commercial opportunities in Sisters.

The TSP was developed through a series of technical analyses, combined with systematic review and guidance by a Transportation Advisory Committee (TAC), the Oregon Department of Transportation, and citizens of Sisters. A variety of short and long-term transportation solutions were evaluated. Several short-term projects have been completed. The following alternatives were not recommended as long-term solutions for the following reasons:

- **No build option.** The option of making no changes to Sisters' street system would not address current and future problems related to congestion.
- **Temporary traffic control and rerouting**. This solution is being implemented on an interim basis but will not adequately address congestion in the long-term.
- **Expand and improve local streets**. Many of the local street improvement projects identified in the TSP have been implemented and others await private development activity.

While they provide additional connectivity for local residents they will not adequately address congestion on Highway 20 during the next 20 years.

- **Additional lanes on Cascade Avenue**. This option would preclude making pedestrian-oriented improvements (i.e., sidewalk widening) and would be incompatible with the City's adopted Urban Renewal Plan.
- **Highway Bypass**. This option would reduce traffic on Cascade Avenue somewhat more effectively than a couplet. However, the marginal increase in effectiveness is outweighed by a much higher cost and will have significant environmental impacts. The bypass alignment evaluated in the TSP was estimated to be nearly nine times as expensive as the couplet project (17.2 million vs. $2.0 million, respectively). Also, it is inconsistent with the state policies in the Oregon Highway Plan that restrict financing a bypass prior to implementing of other measures such as a couplet.
- **Other couplet alignment alternatives**. During the City's TSP update process, transportation consultants initially recommend a more traditional couplet alignment using two adjacent parallel streets (Cascade and Main Avenues) after considering Cascade/Hood and Main/Hood alignments as well. However, the City Council ultimately modified this alignment to recommend a Hood/Main couplet due to a variety of factors and concerns, including the impact of one-way travel along Cascade Avenue. This couplet refinement planning process was limited to evaluation of a Hood/Main couplet pursuant to this earlier direction from the City Council.

The TSP also envisions creating a Special Transportation Area (STA) plan to manage access within the downtown. The STA would provide more flexibility in meeting state mobility requirements and identify measures that could be taken to improve mobility outside the community. The STA process is described further on page 5.

Couplet Concept and Objectives

As noted above, unlike couplets in many other communities, the Sisters couplet would feature two one-way streets with a two-way street in between them. Main Avenue would become a one-way street for westbound traffic while Hood Avenue would carry eastbound traffic. Cascade Avenue would continue to be a two-way street. As noted above, the couplet would act as a pressure relief valve, by creating the opportunity for traffic to spread out among multiple streets during the most congested days and time periods. The couplet is intended to meet the mobility standards of the State Highway while respecting and preserving the City's livability and small town character. Other specific objectives of a couplet include the following:

- Refine design and operational elements, particularly how the couplet connects to two-way traffic on Cascade Avenue.
- Consider environmental concerns, impacts on businesses, traffic engineering and highway mobility standards.
- Meet the goals of the City's Comprehensive Plan, TSP, Urban Renewal Plan, Oregon Highway Plan, and state Transportation Planning Rule.
- Preserve the City's livability, small town character and economy, while accommodating increased local and through traffic.
- Maintain interconnectivity within the local street grid.

This plan describes a preferred design for the couplet, as well as the process used to develop it,

including a variety of other design alternatives and options considered. It is intended to provide sufficient detail to allow adjacent property owners such as the Sisters School District, Deschutes Public Library District, City of Sisters, United States Forest Service and commercial businesses, to ensure compatibility with their properties, and allow the City and state to estimate costs sufficiently for inclusion in the state's highway funding cycle and City transportation capital improvement plans.

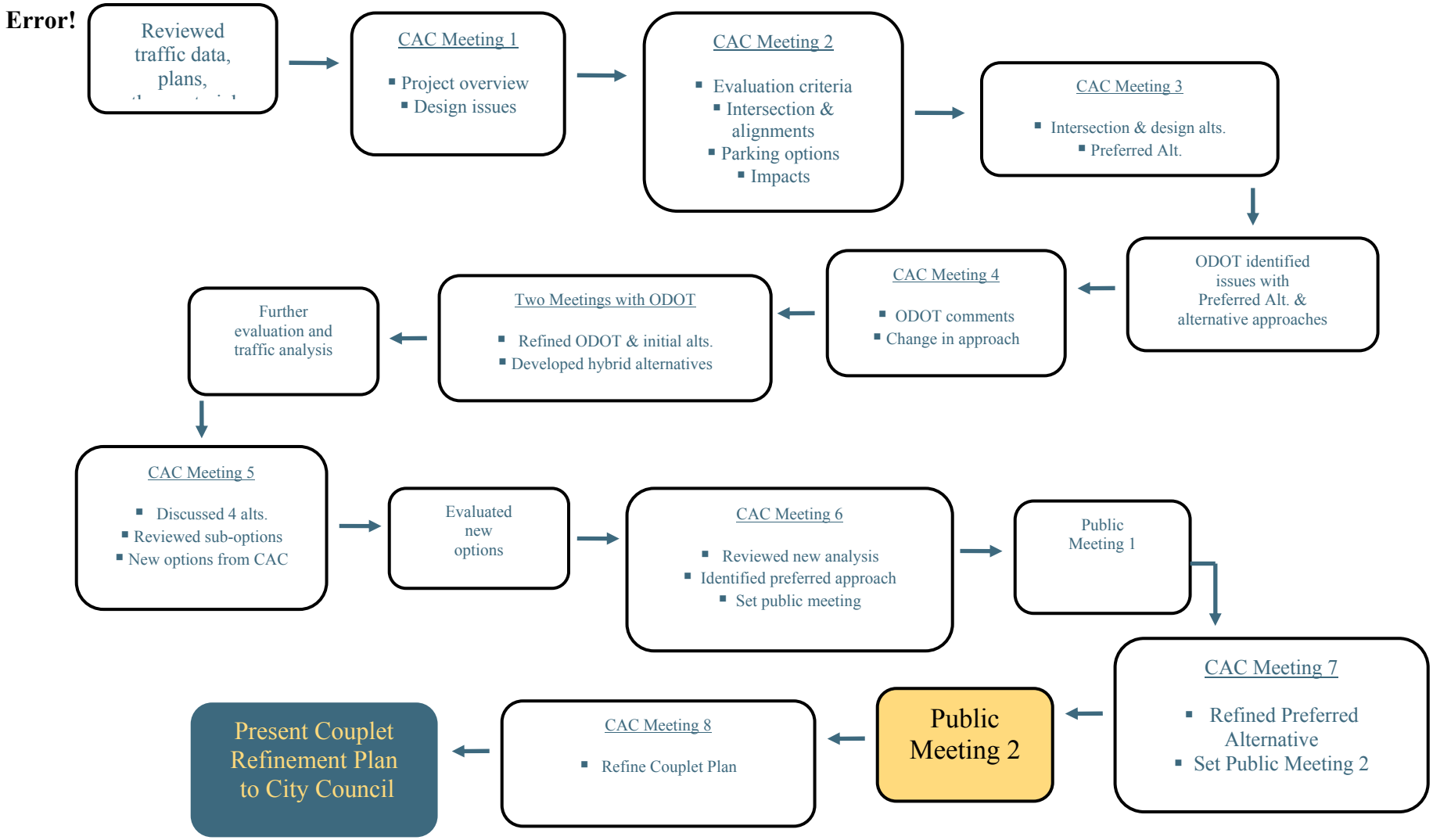
A number of alternatives to a couplet were suggested by members of the community during the course of this project. However, available resources did not allow for detailed evaluation of these options. They are described briefly in this report, including a summary of advantages and disadvantages associated with each (see pages 54 to 55).

Refinement Planning Process

This plan has been prepared by the consulting team of Cogan Owens Cogan, CTS Engineers and landscape architect Bob Yakas, in collaboration with City staff and with participation by the Oregon Department of Transportation, and a local Couplet Advisory Committee (CAC). Other community members have been involved through presentations to community groups and public meetings. The process included the following steps, as illustrated in the accompanying chart (**Figure 1**):

- Established project objectives and guidelines
- Identified evaluation criteria
- Identified reviewed and refined major couplet alignment alternatives
- Identified reviewed and refined design options associated with each alignment alternative
- Reviewed and ranked alternatives with the CAC and members of the public
- Identified a Preferred Alternative
- Reviewed and refined the Preferred Alternative based on feedback from the CAC and members of the public
- Prepared and revised a Couplet Refinement Plan

Figure 1. Couplet Refinement Planning Process



As noted previously, a Couplet Advisory Committee (CAC) of interested and affected parties provided guidance throughout the planning process. CAC meetings were open to the public and frequently provided an opportunity for the general audience to comment and participate, as time allowed at each meeting. Committee members represented the following groups and interests:

- City of Sisters (City Council, Planning Commission and staff)
- Oregon Department of Transportation (ODOT)
- Local Citizens and Business Owners
- Sisters Area Chamber of Commerce
- Sisters Camp Sherman Rural Fire District
- Sisters School District
- Deschutes Public Library District
- US Forest Service/Sisters Ranger District

In addition the consulting team and city staff conducted two public meetings to review and comment on couplet alternatives and a draft Couplet Refinement Plan. These meetings included presentations by the consultants, opportunities for questions, small group discussions, and a chance to complete a brief written questionnaire or comment form at each meeting.

Evaluation Criteria

Early in the process, members of the CAC agreed on the following evaluation criteria for assessing and comparing couplet alternatives:

- Maintain or enhance **safety**, including bicycle and pedestrian safety
- Enhance **mobility**, i.e., ability to maintain traffic flow through Sisters and meet state mobility standards
- Maintain **business vitality**
- Support **community character and livability**, including aesthetic impacts
- Minimize **cost**
- Maintain **operation and functionality**
- Reduce **impacts on adjacent properties**, including right-of-way
- Incorporate **longevity**, i.e., consistency with longer-term solutions to congestion and community livability
- Accommodate legal–size vehicles, i.e., **trucks**

They also identified the following additional overall objectives

- Avoid the need for a traffic signal, if possible
- Establish mechanisms to address conflicting criteria or goals

Related Plans and Policies

A variety of related plans and policies have been consulted or considered during this process, including the following.

- **City of Sisters Transportation System Plan (TSP).** The TSP guides overall design and development of the City's transportation system. As mentioned previously, the couplet was identified as a preferred long-term solution to addressing future congestion. The TSP also identified a variety of other local street improvements and connections. Planning for the couplet needs to be consistent with the TSP and has relied on traffic estimates and other information developed as part of the most recent update of the TSP. Identification of a preferred couplet alternative or consideration of alternatives to a couplet may require amendments to the TSP. A variety of local street improvements are identified in the City's TSP, some of which already have been

completed or are underway. Some specific projects impact the design or implementation of a couplet and need to be considered as part of the Couplet Refinement Plan. Proposed amendments to the TSP are described on page 56 and in Appendix 4.

- **City of Sisters Urban Renewal Plan**. This plan identifies a variety of proposed improvements to the City's downtown, including along Cascade, Hood, Main and other connecting local streets. Improvements are intended to promote the development of the downtown as the town's cultural and commercial center, improve pedestrian and vehicular mobility and circulation, make the area more attractive, promote high-quality design, encourage more intensive use of downtown properties, and promote year-round employment opportunities. The plan identifies a variety of improvements to streets and other public facilities, including widening sidewalks, adding pedestrian "bulb-outs" at corners along Cascade; benches, lighting, street trees and other amenities along Cascade, Fir, Elm and Main; off-street parking locations and facilities; alleyway improvements; and improvements to Barclay and Larch (renamed Cliff Clemens) parks. The Couplet Refinement Plan needs to be consistent with urban renewal goals and plans.
- **New City Hall and Library Site Plan**. The City is working with the library and school districts to develop plans for a new Civic Center (Civic Center) located between Cascade and Main Avenues, and Locust and Cedar Streets. Plans for the couplet will impact access to and design of these sites. Each couplet alignment studied during this project would affect the design of the site. As a result, plans for the couplet and Civic Center site are being coordinated to ensure consistency.
- **Special Transportation Area (STA) Plan**. The 1999 Oregon Highway Plan (OHP) allows for the designation of Special Transportation Areas (STA's) to help balance mobility needs of through travel on the state highways with access to properties abutting the highway. This is particularly important in cities like Sisters where the state highway also acts as the Main Street for the downtown area. In such situations, the STA designation is ODOT's way of recognizing that the function of the state highway is different inside the downtown area than it is outside the downtown area. The STA emphasizes convenient circulation for pedestrians, bicyclists, and local traffic. The primary objective of managing highway facilities in an STA is to provide access to community activities, businesses, and residences, and to accommodate pedestrian movement along and across the highway in downtowns, business districts, and/or community centers. Direct property access via driveways is very limited in an STA. Planning for the STA was initiated during the couplet planning process but will not be completed until after the Couplet Refinement Plan is finished. The STA is intended to guide ODOT and the City of Sisters in the management of U.S. 20/OR 126 within the town and will permit the creation of the public improvements envisioned in the Urban Renewal Plan.
- **Statewide Transportation Improvement Plan (STIP).** The STIP is the vehicle for allocating funding to state highway improvement and other transportation projects, including construction projects along Highway 20 through Sisters. The STIP is prepared on a six-year cycle. At this point, the earliest funding for couplet improvements would be available in the 2010/2011 fiscal year. The designation of which streets will

serve as the state highway, as defined in this plan, may impact the potential for funding couplet improvements through the STIP. It may be more difficult to obtain funding for the Preferred Alternative, where the couplet is located on Main and Hood Avenues, if those roads remain local streets.

2. Existing and Future Conditions

Existing and Forecasted Traffic Patterns and Volumes

For this study, the consulting team and ODOT relied on existing and 20-year future traffic volumes estimated for the TSP, updated where possible based on more recent counts from the nearest traffic counter on Highway 20. The consulting team also conducted supplemental analyses of the Highway 20/Locust Avenue intersection to assess the potential effects of increased future growth and development in the northern portion of Sisters. Following is a summary description of current and future traffic characteristics in Sisters.

Existing Traffic Patterns

Most traffic to/from the west travels along Highway 20/126, which is a state freight route and the most direct connection to the Willamette Valley from Central Oregon. On the east end of Sisters, about 65% of traffic is to/from Bend along Highway 20, and 35% is to/from the Redmond area along Highway 126.

ODOT requires traffic analysis of state highways to be conducted using the 30th highest annual hourly volume for both existing conditions (30th HV) as well as future design conditions (30th DHV). The 30th HV is the hourly traffic volume expected to be exceeded no more than 29 times over an entire year; the 30th DHV is the future projection of the 30th HV used for design purposes.

ODOT maintains a permanent automatic traffic recorder (ATR) 7.2 miles northwest of Sisters along Highway 20/126; it counts traffic 24 hours per day, 365 days per year. Data from this ATR was used to estimate the 30th HV through downtown Sisters. In 2003, the 30th HV at the Highway 20/126 ATR west of Sisters was about 1,150 vehicles per hour (vph) in both directions (see Figure 2 and Table 1), or about 16-17 percent of average annual daily traffic (AADT). The majority of the top 30 hours at the ATR occurred on Saturday or Sunday mid-afternoon (2-3 PM) or Friday at 4-5 PM during the summer peak travel times especially during holiday weekends. The 4-5 PM traffic volumes were analyzed in Sisters to ensure commute traffic was included in the analysis.

The most recent 10 years of published data from the Sisters ATR (1993-2002) indicates that AADT and 30th HV have remained relatively constant over most of that interval. Since 1999, the AADT at the Sisters ATR decreased by about 1.5 percent, and the 30th HV decreased by about 11%. Year 2003 volumes showed a sharper decrease, but this was due largely to a more severe fire season that reduced summer travel. Traffic volumes are summarized in **Figure 2**.

Large trucks account for about 12% of traffic through downtown Sisters, increasing to about 16-

17% on the highways just outside the City limits. This is important because large trucks need more time than passenger vehicles for acceleration/deceleration, and thus consume a higher share of available capacity than passenger vehicles.

The existing 30th HV on Cascade Avenue is at or near capacity today during these summer time peak periods. There are also many special events held each year in Sisters that further impact street capacity. These events generate large numbers of pedestrians walking to and from shops, restaurants and the parking areas along, north and south of Cascade Avenue. The TSP reports that during the annual Quilt Show, the City's biggest summer event, as many as 1,600 pedestrians have been counted crossing Cascade Avenue in the downtown area, reducing hourly vehicle capacity along Cascade Avenue to about 350 vehicles per lane. Together these factors generate congested weekend conditions in downtown Sisters on a regular basis throughout the summer tourist season.

Projected Traffic Volumes

Although the estimates above indicate little recent increases in 30th HV traffic, per state requirements, ODOT's traffic growth projections have been used to estimate future traffic conditions. Those projections estimate that traffic through Sisters will grow about 2% per year, which equates to an increase of nearly 50% over 20 years. The TSP assumed this 50% increase for the 2020 traffic analysis. The Sisters TSP estimated that by 2020, the 30th DHV through the City will be about 1,200-1,350 vph along Cascade Avenue (combined total in both directions) and an additional 250-350 vph on Hood/Main. This represents total east-west traffic of about 1,600 vph. (See **Figure 2 and Table 1** for 2000 and 2020 30th DHV turn movements taken from the TSP).

At the same time, the capacity of a single lane along Cascade Avenue (or Main Avenue or Hood Avenue once they develop further) was estimated to be 850 vph/lane. Thus a two-lane Cascade Avenue with capacity of 1,700 would fail to meet applicable volume-to-capacity ratio (V/C ratio) standards for the state highway of 0.75 or better. Widening Cascade Avenue or removing on-street parking to accommodate future demand were explored as an alternative to a couplet during the City's TSP update process. However, widening Cascade was viewed negatively by the community and was not considered a preferred option to addressing long-term congestion issues.

Currently, the level of traffic along Hood Avenue is about 25% of the existing traffic volume on Cascade Avenue; and the relative traffic flows on Main Avenue are even lower. With full buildout of the downtown core area, traffic along Hood Avenue and Main Avenue should be roughly equal. As reported in the TSP, by 2020 traffic on Cascade Avenue is projected to substantially exceed capacity, but with an estimated 580 vph (6,000 AADT), volumes along Hood Avenue and Main Avenue would continue to be less than their capacity.

Locust and Pine Streets, the north-south streets that frame the downtown corridor, both carry significant levels of local traffic, as do Cascade Avenue, Hood Avenue and Main Avenue. The TSP estimates through traffic on Cascade Avenue averages about 20% of total traffic in the City, peaking to 45% at times. These two percentages were averaged to estimate a diversion (or through-traffic) to a one-way couplet system of about 30% of the total traffic through Sisters (i.e., the average share of current through-traffic).

The number of conflicting traffic movements for drivers at intersections also is greatly reduced with a couplet, compared to two-way circulation. Comparing a couplet to existing conditions, the congestion would be concentrated on either end of the downtown area where two-way traffic resumes, rather than throughout the downtown as is the case today. Furthermore, one-way traffic flow generally enhances safety, particularly for pedestrians as they face only one direction of oncoming traffic.

With a couplet, future traffic volumes along Cascade Avenue would be less than they are during peak conditions today, easing seasonal congestion. Volumes on Main Avenue would increase, but would still remain low, within its capacity. Volumes along Hood Avenue would be roughly equal to existing volumes, but all traffic would flow in one direction spread over two lanes. There still would be a heavily traveled main route through Sisters, but it would not operate at gridlock. There would be an alternate route (Hood and Main Avenues) that would carry significant traffic, that would not be congested, except at the endpoints. For this reason considerable attention was given to traffic circulation and operations analysis at the endpoint intersections during the planning process. See the section on Travel Patterns and Circulation Issues on page 13.

Figure 2. Current (2000, 2002 and 2004) Traffic Counts and Future (2020) Traffic Projections (Design Hourly Volumes)

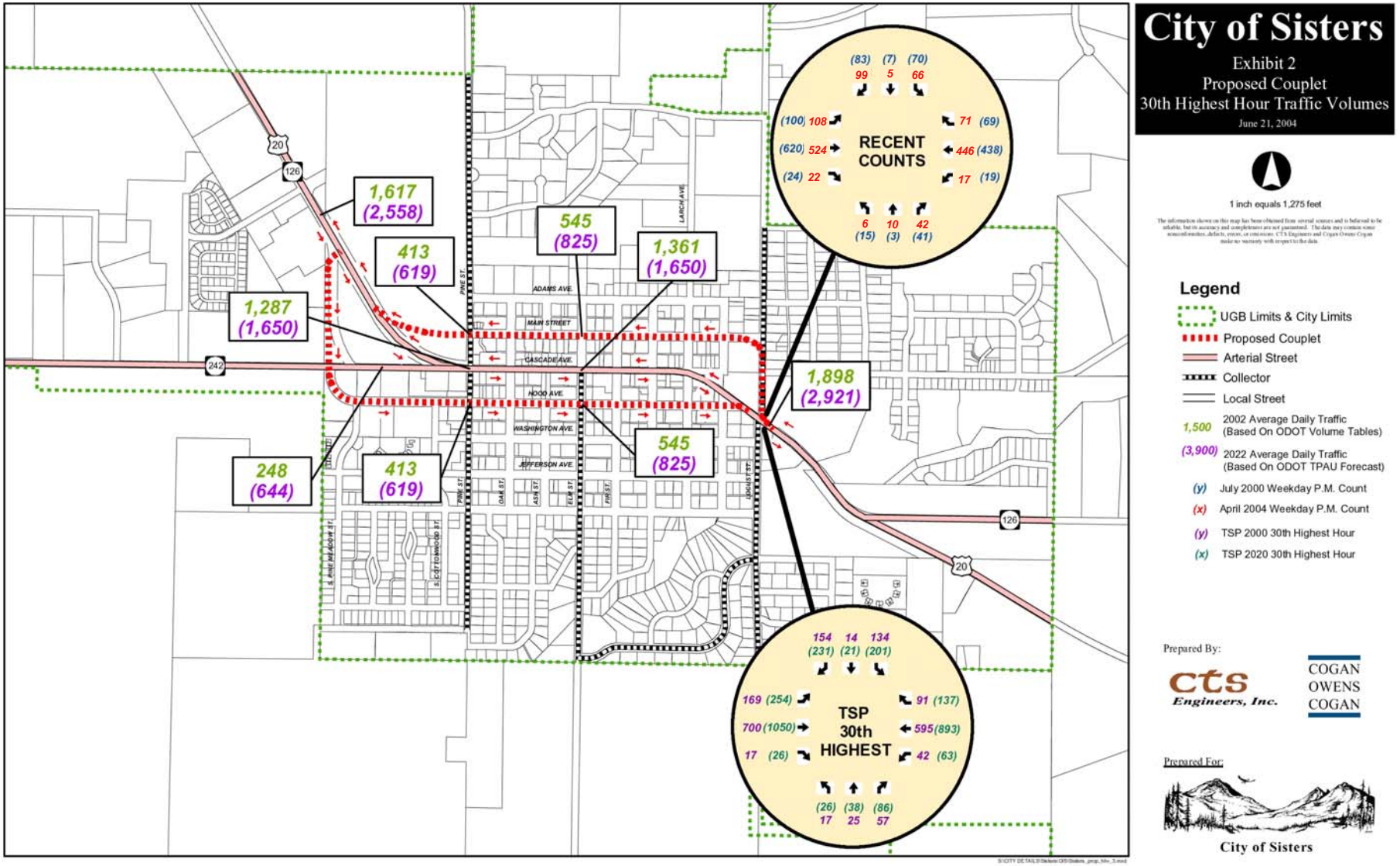


Table 1. Summary of Existing and Future Traffic Projections

	Along Highway 20/Cascade	Along Hood & Main Avenues
Yearly Average Daily Traffic	11,200 per day (both directions)	Less than 3,000 per day
August Peak Volumes	16,700 per day	Less than 5,000 per day
Peak Summer Hourly Volumes	1,700 per hour	500 – 600 per hour
Truck and Pedestrian Traffic	Trucks = 15% of traffic 700 – 1,000 pedestrian crossings per hour during peak	Few trucks or pedestrians
Capacity	1,700 vehicles per hour (850 per lane)	1,250 per lane per hour

Transportation Facilities

The Sisters couplet refinement planning area is bounded generally by Main Avenue on the north, Hood Avenue on the south, Locust Street on the east, and Pine Street on the west (although some west end alternatives considered an area extending to the north/south portion of Hood Avenue). Cascade Avenue runs east/west through the center of Sisters, paralleled by Main Avenue one block to the north and Hood Avenue one block

to the south. Cascade Avenue is designated as a federal and state highway: US Highway 20/OR Highway 126. Cascade serves as the City's main street, carrying local traffic and regional traffic between the Bend-Redmond area to the east and the I-5 corridor to the west. All intersections are stop-controlled at the side streets; there are no traffic signals.

Between Pine Street and Larch Street the street system is largely a traditional grid, with one lane in each direction on both east-west and north-south streets. On-street parking is a very important resource within the couplet refinement planning area. Diagonal on-street parking exists along both sides of Hood and generally along both sides of the north-south streets. Along Cascade Avenue the on-street parking spaces are all parallel. On-street parking along Main Avenue is a mix of improved diagonal in most blocks, with some unimproved stretches typically used as by recreational vehicles and horse trailers for parallel parking, and no formal parking areas along some blocks segments.

Cascade Avenue has sidewalks along both sides through the couplet study area. Sidewalks along Cascade Avenue are generally six feet wide, but the effective width is reduced due to signposts, building awnings, fire hydrants, newspaper vending machines and other obstacles. The area bounded by Hood Avenue, Main Avenue, Larch Street and Pine Street includes continuous sidewalks on both sides although some block segments on Main Avenue are without sidewalks. **Figure 3** illustrates sidewalks, bicycle lanes, parking locations and roadway features in the downtown area.

Figure 3. Inventory of Sidewalks, Bike Lanes, Parking & Other Roadway Features

City of Sisters

Couplet Refinement Plan
Existing Inventory Analysis
May 20, 2004

1 inch equals 465 feet

Legend

- Existing Driveway
- Existing Crosswalk
- Existing A.D.A. Ramp (No Parking within 20 ft.)
- Existing Designated "No Parking" Area
- Existing Parking
- Existing Sidewalk
- Existing Rutted Pavement Area
- Existing Building
- 25 mph Street (All other streets 20 mph)
- Existing Lane Travel North
- Existing Lane Travel East
- Existing Lane Travel West
- Existing Lane Travel South

Symbol	Sign Type/Description
A	No Parking Over 6 1/2 FT. High of This Block
B	State Forestry Three Green Lake Three Green Park
C	Visitor's Center
D	City Hall Post Office Restroom
E	Public Library
F	Visitor's Center 2 Blocks
G	Airport

Prepared By:

CTS Engineers, Inc.

COGAN OWENS COGAN

Prepared For:

City of Sisters

Adjacent Land Uses and Traffic/Pedestrian Travel Generators

During peak summer travel periods, much of the traffic in Sisters is comprised of through traffic traveling between the Willamette Valley and central Oregon, including the Bend area and points east. However, a significant number of people are destined for Sisters for one of the community's many popular summer events, or choose to stop in Sisters to shop or eat. In addition, community members use the local street system, including the state highway, to meet their shopping and other community needs. **Figure 4** shows major destinations and traffic generators in Sisters.

Both sides of Cascade Avenue through the downtown core area are lined with shops and restaurants, resulting in very high levels of pedestrian traffic during Sisters' tourist season. In addition, many summer special events take place in the Village Green Park, located two blocks south of Cascade Avenue. There is limited parking available at Village Green Park, so many people park north of the highway and walk to the event, crossing Cascade Avenue. The annual Quilt Show is the largest annual event in Sisters. During the Quilt Show, on-street parking along Cascade Avenue is prohibited, and the parking lanes on each side of the street are used instead as additional sidewalk space. As noted already, the City's TSP reports 700 to 1,600 pedestrians per hour crossing Cascade Avenue during the Quilt Show. As a result, traffic along Cascade Avenue slows to a crawl. The annual Sisters Rodeo involves a parade that closes Cascade Avenue completely for an hour and resulting traffic congestion impacts the highway for nearly four hours before and after this event. There are numerous other summer festivals and events that draw smaller but still substantial numbers of tourists, such as the Village Green Craft Show, Sisters Antique Fair, Sisters Folk and Jazz Festival, and Sisters Harvest Faire.

Travel Patterns and Circulation Issues

The following overall circulation issues were considered in evaluating different couplet alternatives and design options. Recommended options or alternatives are described in section 4 (Preferred Alternative).

- ***Provide access to parcels and businesses on the west side of Sisters along Hood Avenue west of Pine Street.*** If a one-way couplet is implemented along Hood Avenue, people from neighborhoods south of Cascade Avenue may not be able to head west along Hwy 242/McKenzie Hwy without traveling out of direction. For this reason, this section of Hood was evaluated as a one-way or a two-way street to allow travel to the west. This may be awkward for a short section of road, because it would be difficult to communicate to tourists how to travel to the west, particularly if they entered the city from this direction. On the other hand, residents of Sisters would readily know this route and having a two-way section would reduce adverse impacts of a couplet on residents in the south neighborhoods.
- ***Provide access and circulation to the elementary school from areas south of Cascade and north of Main Avenue***. If a one-way couplet is implemented along Locust to Main Avenue, people from rural neighborhoods north of Sisters and on Sisters' east side may not be able to head south on Locust without travelling out of direction. This is an issue for all scenarios. However, this issue is less significant for Alternative 1, with a two-way section of Locust Street between

Highway 20 and Main Street. It is more significant in alternatives where this section of Locust Street must be one-way.

- ***Operation of Locust Street:*** Traffic operations at the key Locust Street intersections between Main and Hood Avenues were assessed for both the existing two-way traffic and one-way northbound traffic. Restricting the north leg of Locust Street to one-way northbound traffic would provide superior operational and safety performance if the intersection remains stop-controlled. However, this would force local residents living to the north and east to travel out of direction and through the downtown core to get to many destinations, including the elementary school and the Bend and Redmond highways. In addition, limiting traffic operations on the south leg (i.e. right in/out or right in only) would reduce congestion significantly at the Locust/Hwy 20 intersection. Traffic from the south leg of Locust Street could be rerouted through downtown Sisters or along Jefferson Street (see above).

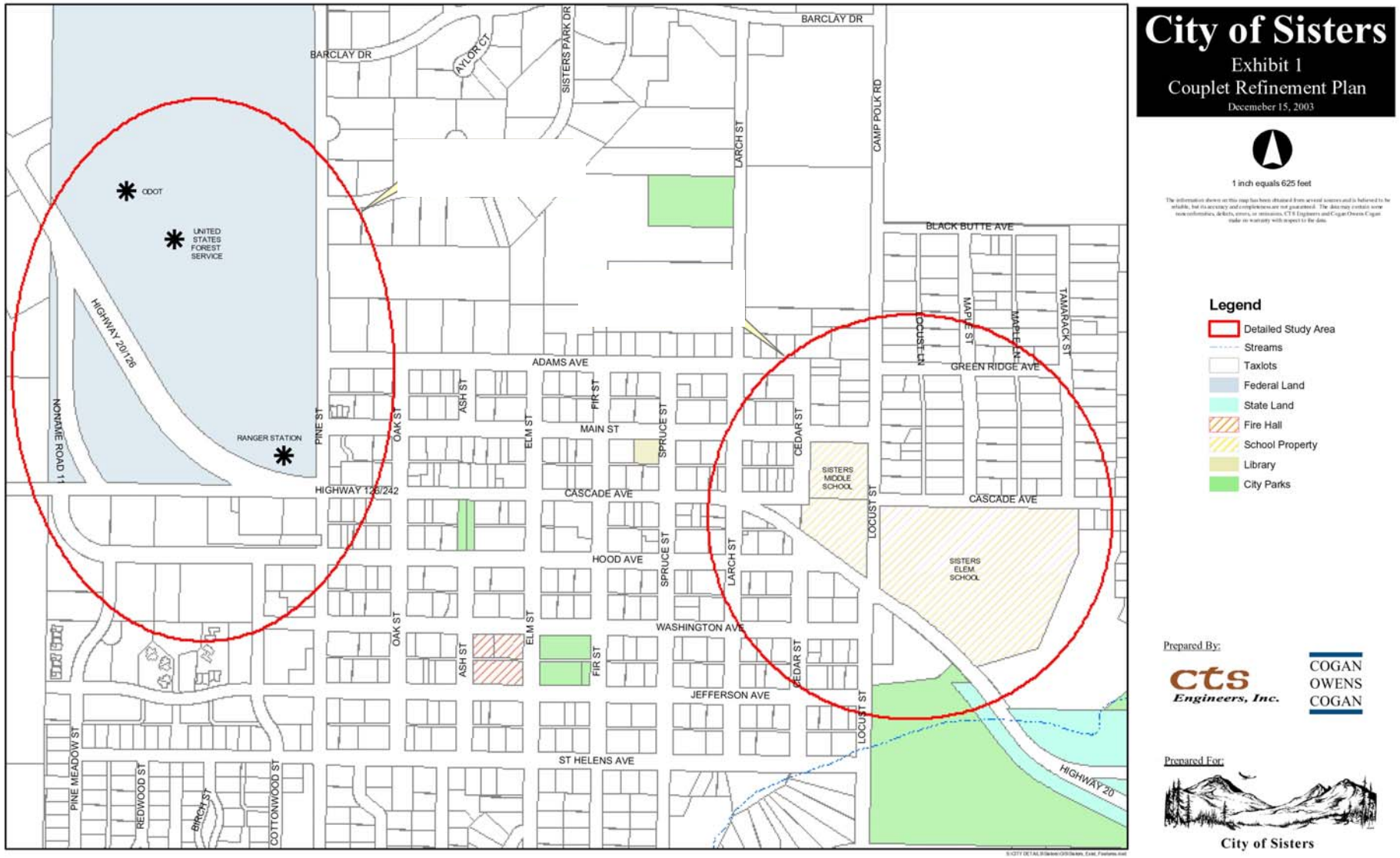
  Although southbound traffic from the north leg of Locust Street has multiple alternate routes, the dominant movement is to the east towards Bend and Redmond, which would mean traffic would be redirected through downtown Sisters if Locust Street was made one-way northbound. Operation of the southbound left turn toward the Bend-Redmond area would benefit from planned Timber Creek Subdivision streets and a bridge crossing over Squaw Creek linking East Cascade Avenue and Highway 126, at a cost of routing additional traffic through the Timber Creek neighborhood.

- ***East Cascade from future Civic Center site west to Highway 20.*** As part of the proposed new Civic Center, a connecting link of East Cascade between Cedar and Locust will be created. The City plans for this to be a local street. One-way westbound and two-way traffic operations for this segment have been debated and evaluated. General access to this site would be improved with a two-way street. The fact that some of the City's emergency service providers may be located at the new Civic Center site in the future (e.g., police vehicles) also argues for two-way traffic flow.

- ***North-south circulation between Hood/Cascade/Main.*** Some scenarios (i.e., Alternatives 2 and 3) result in a significant amount of traffic traveling north–south through the core business area of Sisters because they do not allow for direct access to Cascade Avenue for drivers entering town from either direction. This could overload some streets such as Pine and travelers use these streets to access businesses along Cascade or travel between Main and Hood. This could necessitate special routing signs, particularly on the east side of Sisters, which has fewer north-south streets (e.g., Larch is not a good north-south street). The potential impact on adjacent properties from additional north-south traffic needs to be considered. Another major concern is trucks traversing these streets, particularly where high-turnover diagonal on-street parking exists.

- ***Circulation and access to areas on the south side of Cascade on either side of Hood Avenue.*** A couplet could require eliminating some existing access points along the segment of Highway 20 between Larch and Locust Streets. Some of the driveways to the affected uses may have to be limited, or consolidated with existing driveways created to provide access to other local streets such as Cedar Street and Larch Street.

Figure 4. Major Traffic Generators



3. Alternatives and Options Evaluated

As mentioned previously, a variety of non-couplet alternatives were identified and assessed during the City's TSP update process in 1999 to 2001. They are described briefly on pages 1 and 2. While these alternatives were discussed during development of this Couplet Refinement Plan, they were outside the scope of this project and not evaluated further. Within the confines of the project, consultants and CAC members evaluated four major couplet alignment alternatives and a variety of associated design options, which are described in detail below.

Alignment Alternatives

A range of alternatives was studied. In keeping with the pressure relief valve concept, the CAC and consultant team began by developing Alternative 1 (see description below) and various related intersection and alignment sub-options at each end of the couplet. In the midst of this process, representatives of ODOT identified significant concerns with this alternative and identified a second potential alignment alternative. Consulting team members and city staff subsequently met with ODOT to review and discuss these and other alternatives, with the objective of identifying a range of alternatives for review by the CAC that were technically feasible and acceptable to ODOT and the City. Ultimately, the following four alternatives were identified and evaluated. Additional information about these alternatives is found in **Tables 2 - 5**, following the description of the alternatives.

- ***Alternative 1: Couplet as Local Streets.*** **Figure 5** presents the original plan from the TSP updated based on discussions with the CAC, City and ODOT staff. This alternative is consistent with the vision of the couplet as a pressure relief valve. It retains Cascade as a through traffic option, while providing alternative routes and additional capacity through town. It will move congestion the couplet endpoints. On the east side, Hood Avenue would be right-out with a single lane approach. Congestion will occur, but if it backs up, drivers could use other local streets to travel up to Cascade. Future traffic volumes at the Highway 20/Locust Street intersection will necessitate a traffic signal and additional turning lanes there. Also, traffic movements may be limited to/from the south leg of Locust Street.

  Essential to this alternative, however, is the assumption that, Cascade Avenue would continue to be the State Highway. Keeping Cascade Avenue as the State Highway, or alternatively by not moving the State Highway jurisdiction to the couplet, allows the fundamental notion of driver choice in the pressure relief value concept to be considered. This notion is opposite driver expectancy policies articulated in state highway design guidelines. Further, the desire to retain diagonal parking on Hood and Main Streets was also a consideration. Again, state highway design guidelines prohibit the use of diagonal parking on state highways and designated freight corridors. **This was not the fundamental assumption going into this study; it was initially assumed the couplet streets (Hood and Main) would become the State Highway and Cascade would become a local street.**

- ***Alternative 2: Couplet as State Highway.*** **Figure 6** presents the requirements for the

couplet streets with state highway design guidelines applied to them. In this alternative, direct connections to Cascade would be severed at each end of town. This would ensure that drivers using the state highway to travel through town would face no ambiguity or confusion about which road is the designated highway and through-route. If Alternative 1 were implemented in the short term, Alternative 2 could be implemented in the longer term to further reduce congestion on Cascade Avenue, if needed. The advantage of this alternative is its emphasis on the couplet streets (Hood and Main) as the main routes through Sisters and elimination of congestion points at the both the west and east ends of Sisters. Its main drawbacks are the de-emphasis of Cascade as a major travel street, and the resulting impacts on businesses along Cascade Avenue, elimination of angled parking along Hood and Main, and limited access to the future Civic Center site. Other concerns include the impacts of local delivery trucks and other vehicles circulating north/south between Hood, Cascade, and Main Avenues, and potentially high traffic volumes along Pine Street.

- ***Alternative 3: Hybrid Plan 1.*** **Figure 7** presents a variation of Alternative 2 that is a hybrid of alternatives 1 and 2. This alternative would allow traffic to enter Sisters along Cascade, but drivers would need to divert to Hood or Main Street to exit. This option would reduce the number of intersections along Cascade at both ends of town, improving traffic operations, while allowing people to use the same method of entering town that they do now. Its major shortcomings are the impacts of trucks and other vehicles traveling between Cascade/Hood/Main as they find a route to exit Sisters; access to the school for residents south of Cascade; and expected conflicts at the Larch/Cascade intersection.
- ***Alternative 4: Hybrid Plan 2.*** **Figure 8** presents a second variation of Alternative 2. It also is a hybrid of alternatives 1 and 2, and in a sense the opposite of Alternative 3. In this alternative, the connection to Cascade for drivers entering Sisters at either end would be severed, but travelers could leave town directly along Cascade. Like Alternative 3, this option would reduce the number of intersections along Cascade at either end of town and improve traffic operations. In contrast to Alternative 3, by allowing cars and trucks to leave via Cascade, this alternative would lessen the need to turn from Cascade onto north/south streets to access Hood or Main. This would reduce congestion and other impacts on these cross-streets. This plan addresses some of ODOT's concerns about traffic entering the City having an unambiguous route. It also addresses the issue of truck circulation because trucks would have the option to enter Sisters on Highway 20/Cascade Avenue and exit as a through movement along the same street. Operations at the merge intersection at Hood/Cascade on the east side of Sisters are an issue with this option. In this case, traffic along Cascade would have to yield to traffic along Hood.

Tables 2 through 5 provide a more detailed summary of advantages and disadvantages of these options in relation to the evaluation criteria developed for this project.

Figure 5. Alternative 1: Couplet as Local Streets and Pressure Relief Valve

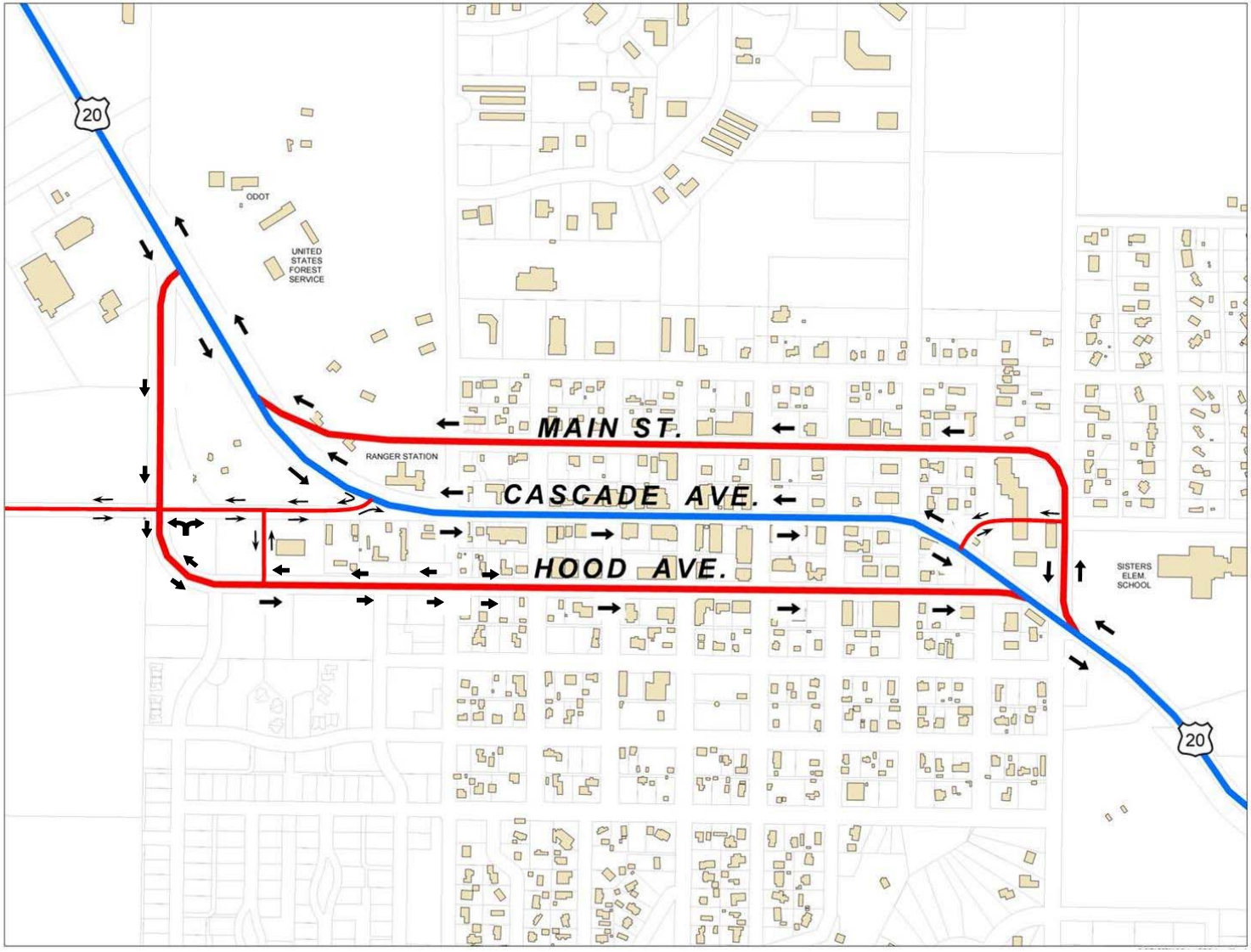


Figure 6. Alternative 2: Couplet as State Highway

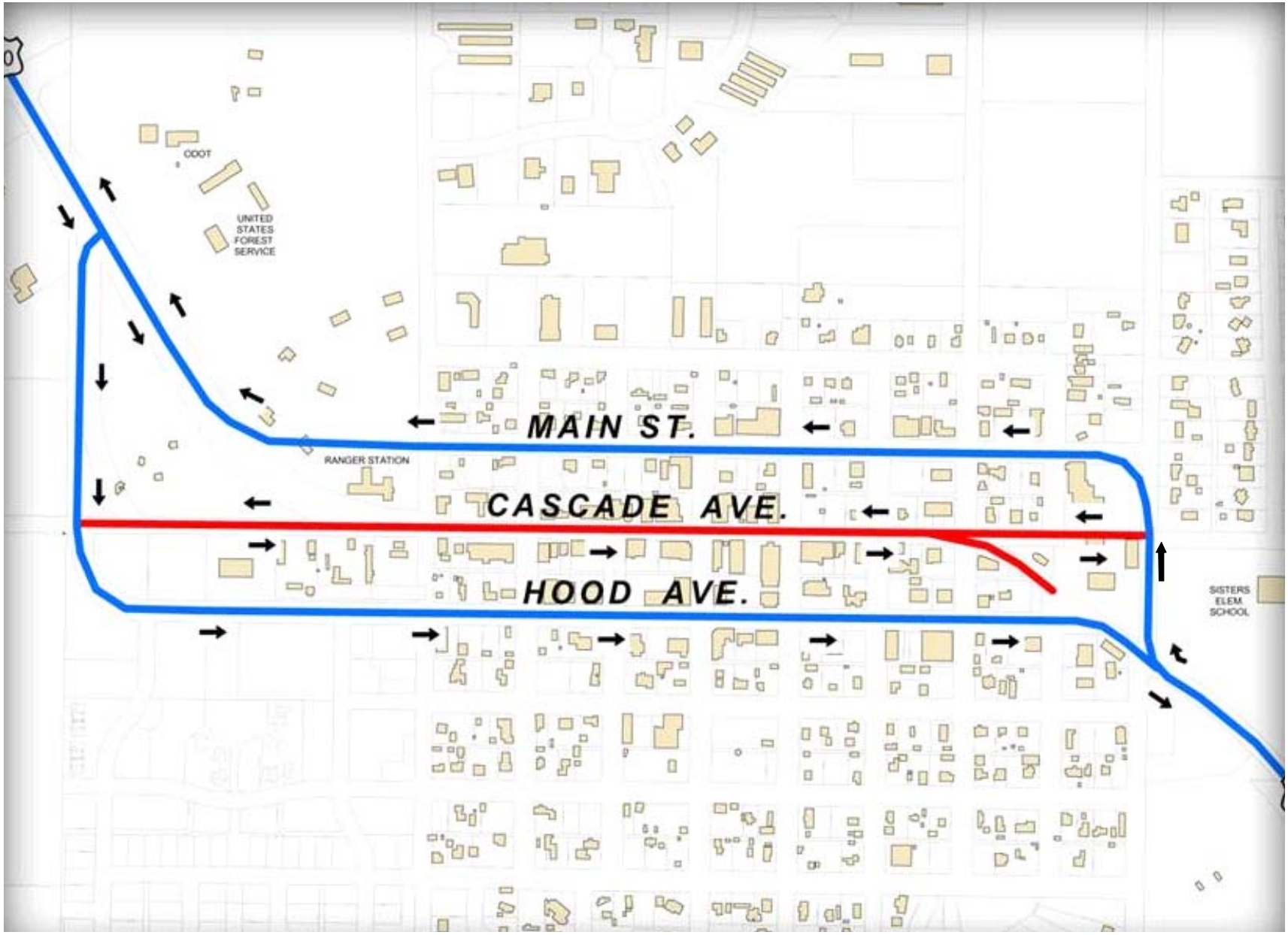


Figure 7. Alternative 3: Hybrid Plan 1

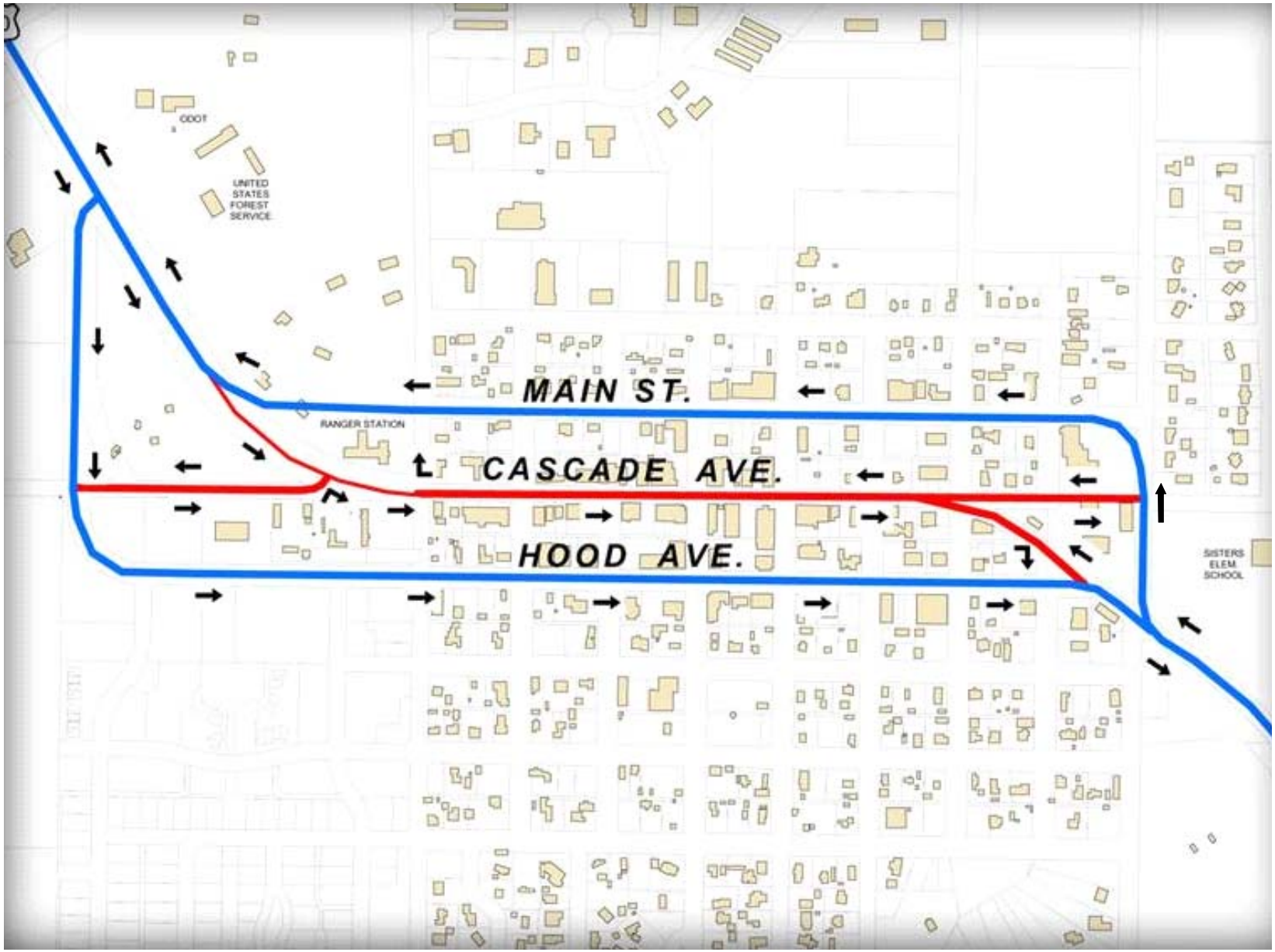


Figure 8. Alternative 4: Hybrid Plan 2

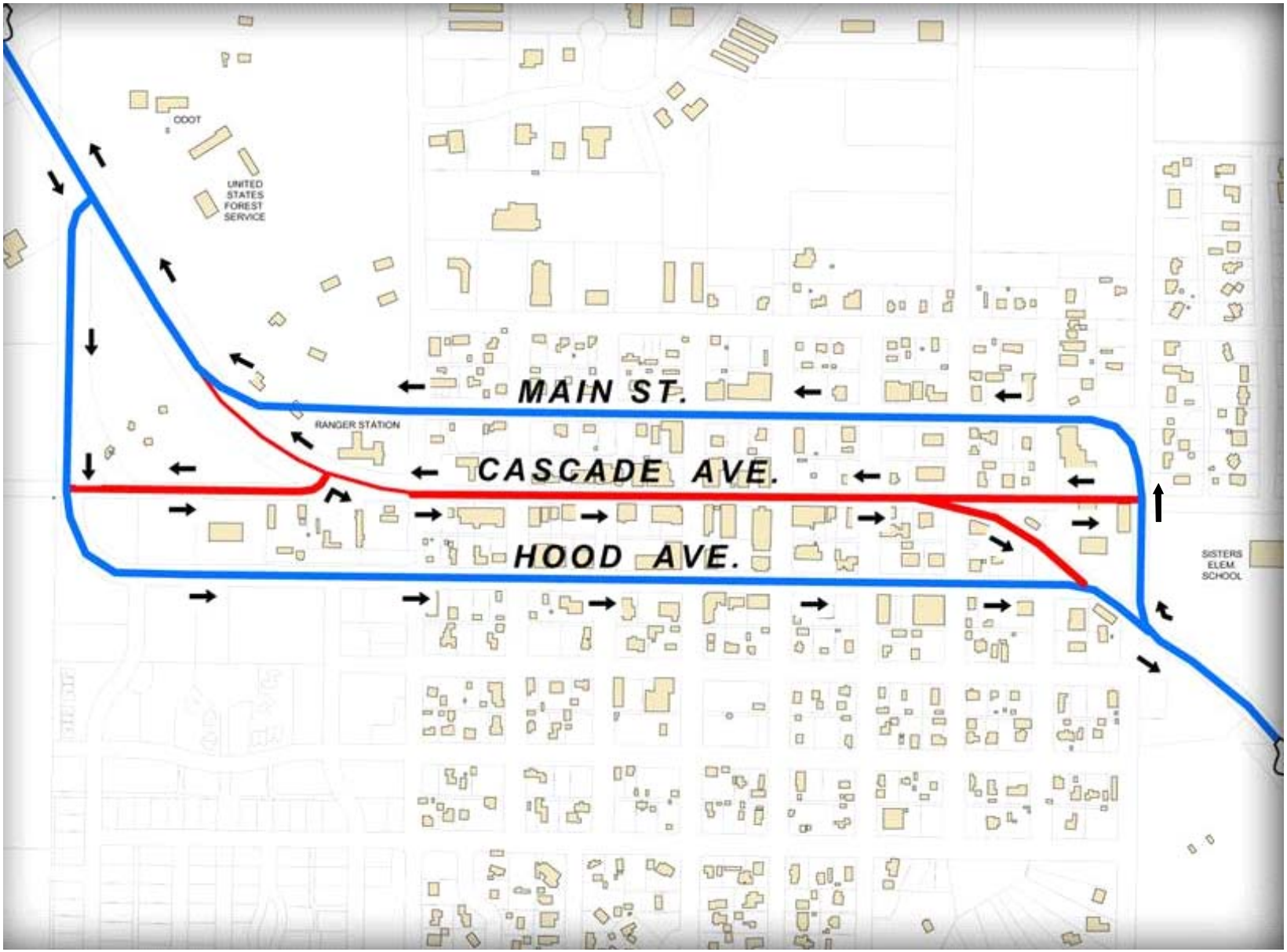


Table 2: Design and Operational Features of Couplet as Local Streets (Alternative 1)

Direction	Mobility/Traffic Operations		Impact on Adjacent Properties			Impact on Business Core Area		Truck Travel	Parking
	Travel Lanes	Congestion Points	Impact on Library/City Hall Site	Access to School	Access to West Commercial Areas	N/S Circulation	Off-Peak Travel		
Westbound	3 Lanes Cascade 1 lane Main 2 lanes	Main/Hwy 20 merge	Cascade local street plus Main/Cedar	No impact	Some reduced access	Not forced	Cascade remains through route	Trucks have two routes	Angled parking maintained on Hood and Main
Eastbound	3 Lanes Cascade 1 lane Hood 2 lanes	Hood/Cascade/ Locust	Left turn at Locust	Same-left turn onto Locust	Along Hwy 242 and EB along Hood	Not forced	Cascade remains through route		

Table 3: Design and Operational Features of Couplet as State Highway (Alternative 2)

Direction	Mobility/Traffic Operations		Impact on Adjacent Properties			Impact on Business Core Area		Truck Travel	Parking
	Travel Lanes	Congestion Points	Impact on Library/City Hall Site	Access to School	Access to West Commercial Areas	N/S Circulation	Off-Peak Travel		
Westbound	2 Lanes Main 2 Lanes	Pine/Cascade (could backup into Main)	Cascade driveway plus Main/Cedar	Locust 1-way NB	Reduced access	WB travel forced to Main	Main through route	Trucks will have one route and need to circulate N/S to access Cascade	Angled parking will be removed from Hood/ Main which is State Hwy
Eastbound	2/3 Lanes Hood 2 lanes local Cascade 1 lane	Hood/Larch (could back up into Cascade)	Left turn at Locust	Same-left turn onto Locust	Along Hwy 242 and EB along Hood	EB travel forces to Hood	Hood through route/ Cascade local entry, Exist via Hood		

Table 4: Design and Operational Features of Enter along Cascade Hybrid Plan 1 (Alternative 3)

Direction	Mobility/Traffic Operations		Impact on Adjacent Properties			Impact on Business Core Area		Truck Travel	Parking
	Travel Lanes	Congestion Points	Impact on Library/City Hall Site	Access to School	Access to West Commercial Areas	N/S Circulation	Off-Peak Travel		
Westbound	2/3 lanes: Main 2 lanes Cascade enter 1 lane	Pine/Main (could backup into Cascade)	Cascade Local Street and Main/Cedar	Locust 1-way NB	Reduced access	WB travel forced to Main	Main through route/ Cascade entry, exit via Main	Trucks can enter downtown via Cascade or Main/Hood, but must use side streets to exit Sisters	Angled parking will be removed from Hood/Main which is State Hwy
Eastbound	2/3 Lanes Hood 2 Lanes Cascade Enter 1 Lane	Hood/Larch (could back up into Cascade)	Left turn at Locust	Same-left turn onto Locust	Along Hwy 242 and EB along Hood	EB travel forces to Hood	Hood through route and Cascade main entry, exit via Hood		

Table 5: Design and Operational Features of Exit along Cascade Hybrid Plan 2 (Alternative 4)

Direction	Mobility/Traffic Operations		Impact on Adjacent Properties			Impact on Business Core Area		Truck Travel	Parking
	Travel Lanes	Congestion Points	Impact on Library/City Hall Site	Access to School	Access to West Commercial Areas	N/S Circulation	Off-Peak Travel		
Westbound	2/3 Lanes Main 2 Lanes Cascade Local Street 1 Lane	Hwy 20/Main Merge	Cascade Local Street Plus Main/Cedar	Locust 1-way NB	Same as now	Not forced	Main through route/Cascade local entry-exit via either route	Trucks enter downtown via two routes (indirectly from the west) along Cascade and Hood/Main. They can also exit directly along both routes	Angled parking will be removed from Hood/Main which is State Hwy
Eastbound	2/3 Lanes Hood 2 Lanes Cascade Local Street 1 Lane	Hood/Cascade stop (backup on Cascade-Alternative routes)	Left turn at Locust	Same-left turn onto Locust	Along Hwy 242 and EB along Hood	Not forced	Hood through route and Cascaded local entry-exit either route		

Design Options

The following design options were assessed as part of one or more of the alignment alternatives described above.

West End Alignment Design Options - Options A, B and C. Three design options were considered, as shown in **Figures 9 - 11** and summarized in **Table 6**. All three options would place either a roundabout or two-way stop control at the intersection of Hood Avenue/Cascade Avenue-Highway 242. Variations among the alignment alternatives include:

Option A. Extend Main Avenue to Hood Street, and extend the downtown Sisters grid. This alignment vacates the existing Highway 20 between Hood Street and Pine Street, preserving the USFS lands to the north of Main Avenue. Access to the area between Main Avenue and Cascade Avenue could require out-of-direction travel depending on the access locations, due to Cascade Avenue operating as a one-way westbound street (see **Figure 9**). The need for out-of-direction travel could be mitigated to some extent by additional north/south street connections in the extended grid area.

Option B. Option B extends the grid pattern of downtown Sisters west by extending Main Avenue to Highway 20, where it would merge with northbound traffic. Highway 242 has already been realigned where it meets Cascade Avenue to form a "T" intersection, with the Highway 242 leg designed as the minor street (see **Figure 10**). This project was completed as part of a separate ODOT safety request but the improvements were designed anticipating the couplet. This option could include a one-way or two-way section of Hood Avenue between Highway 242 and Pine Street.

Option C. Option C also extends Main Avenue to the west, where it would merge with the existing

Highway 20. In Option C, the section of Highway 20 between Pine Street and Hood Avenue would be one-way westbound (see **Figure 11**). To reach this section of highway, drivers entering Sisters from the west would need to turn right on Hood (the couplet) then loop back to Highway 20 via Pine Street or another north-south street.

Table 6: West End Alignment Options

Alternative/Option	Advantages	Disadvantages
Option A: Extend Main Avenue to Hood Avenue	• Extends downtown business area to the west. • Preserves USFS land north of Main Ave. for new Forest Service facility. • Configuration depends on State highway route.	• Vacates existing Hwy 20. • Awkward access from west/to east limits development potential.
Option B: Extend Main Avenue to Hwy 20	• Retains Cascade Ave. as state Hwy. • Extends downtown grid to Hood Ave. (Main Ave extended to Hood Ave.; one or two new north/south local streets between Main Ave. and Hood Ave.; Hwy 20/126 abandoned between Hood Ave. and Hwy 242). • Allows for two-way travel on Hood from Pine Street to Highway 242. • Creates additional development opportunities. • Shorter new section of Main Ave. • Preserves area for new Forest Service facility north of Main Ave. extension. • Most direct route.	• Left turn movement required for travel from southbound Hwy 20 onto Cascade Ave. • Opens up less USFS land between Barclay Road and Main Avenue compared to Option A.
Option C : Extend Main Avenue to Hwy 20	• Similar to Option B, except that eastbound Hwy 20-126 is one-way northbound between Pine St. and Hood Avenue, and Cascade Ave. is one-way eastbound west of Pine St. to the future access to USFS properties (returning to two-way west of the future USFS access).	• One-way southbound segment of Hood Ave. requires left turn to enter Sisters from Hwy 20-126. • One-way eastbound segment of Cascade Ave. west of Pine St. requires out-of-direction travel to reach Hwy 242.

Figure 9. West End Alignment Option A

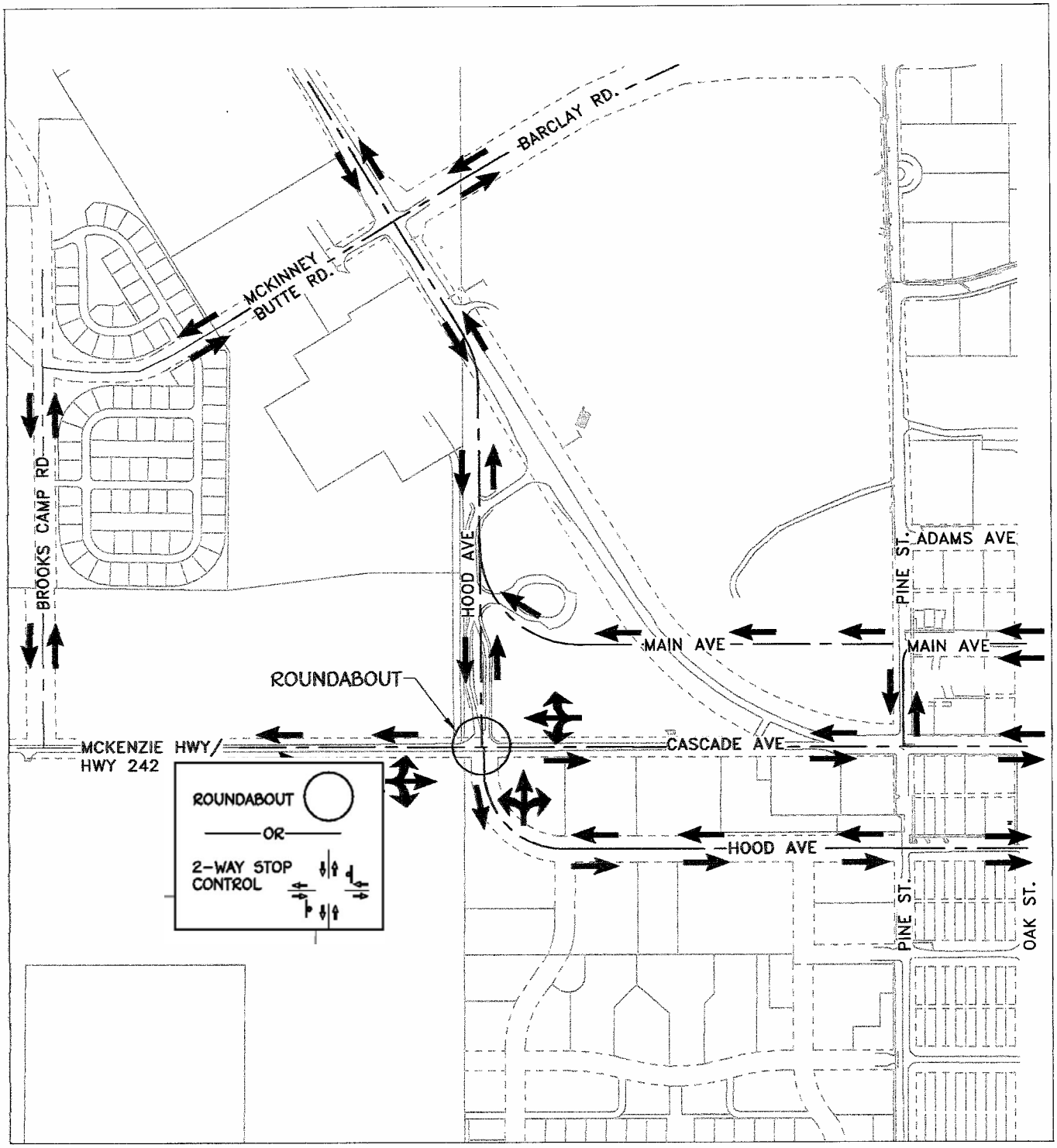


Figure 10. West End Alignment Option B

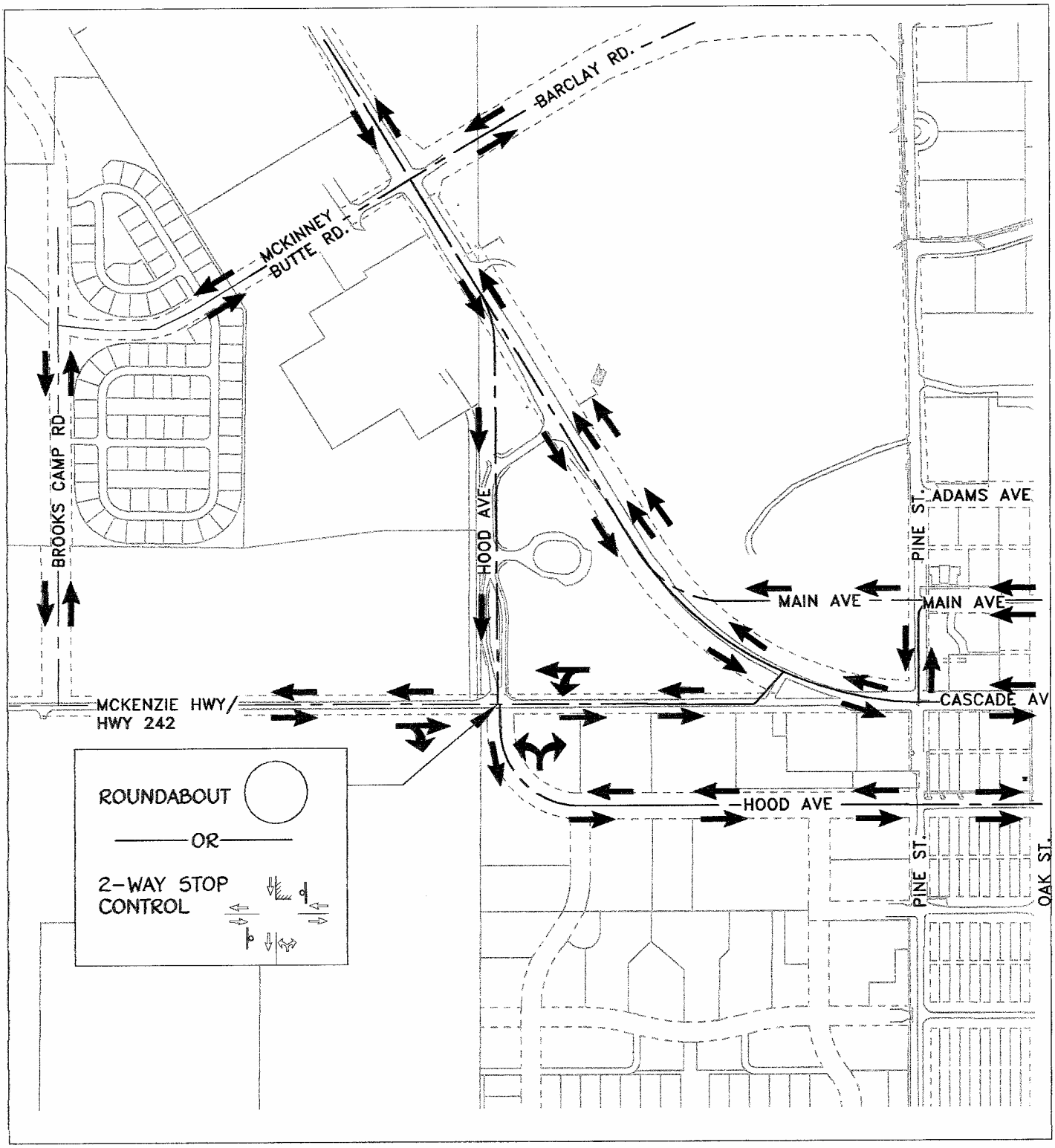
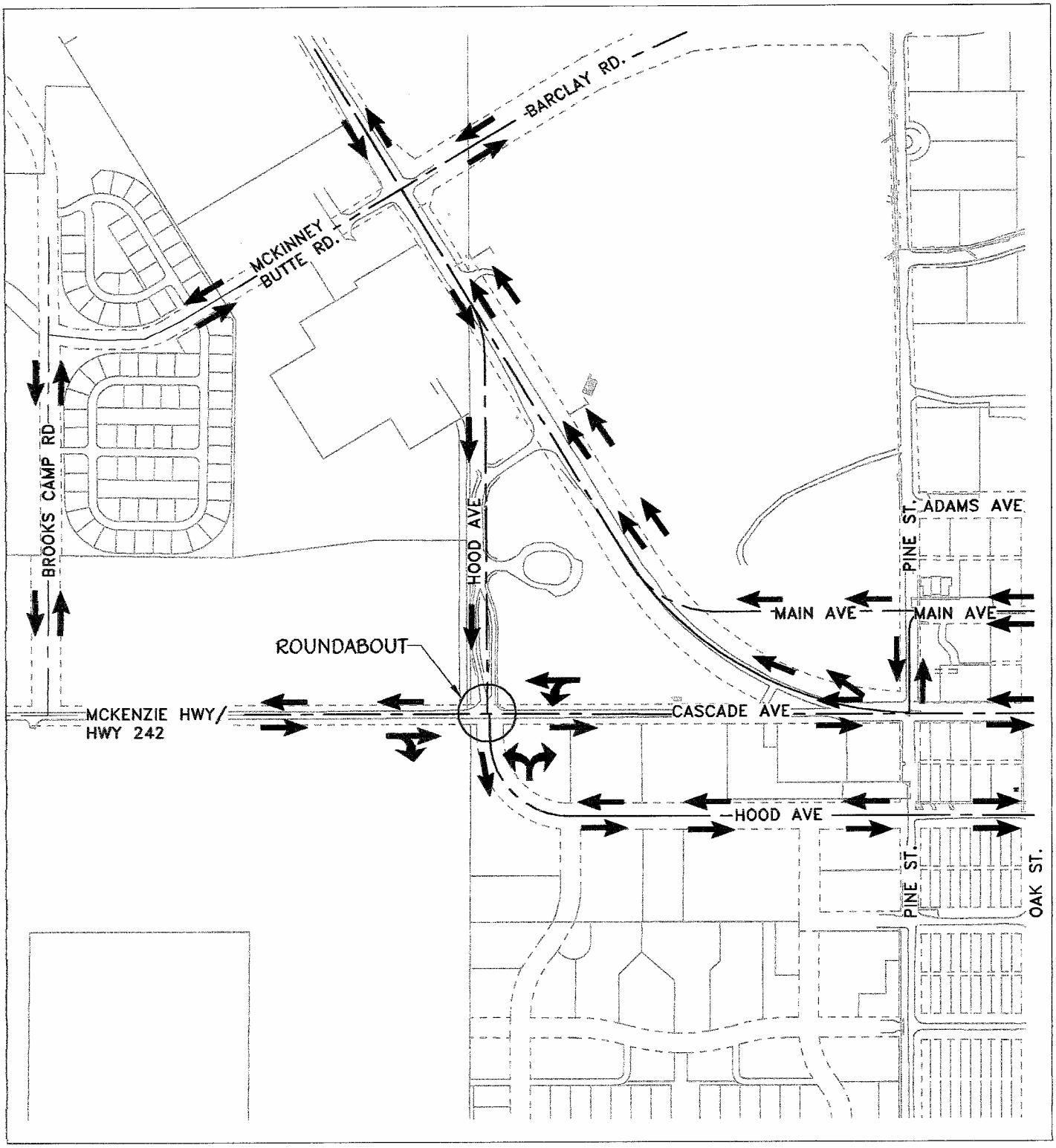


Figure 11. West End Alignment Option C



East End Alignment Options. Three options were considered, as illustrated in **Figure 12** and summarized in **Table 7**. In addition to Locust, the Larch and Cedar Street options were identified by CAC members to address concerns about the safety of children and other pedestrians in the vicinity of the Sisters Elementary School and the planned new Civic Center site, as well as a desire to maintain access from the northeastern part of Sisters to areas to the south and east.

Locust Street. Two options were evaluated for Locust Avenue (one-way and two-way circulation between Highway 20 and Main Avenue) as described below. Concerns related to the one-way option included lack of access to the elementary school and points east and south from the north, increased traffic along Locust Street, and safety issues for pedestrians traveling to the school and Civic Center. Issues related to the two-way option included impacts on the effectiveness of the Highway 20/Locust Street intersection and design of the Locust Street/Main Avenue intersection. Need for a traffic signal at the Highway 20/Locust Street intersection and design of this intersection also were issues. This option would direct drivers to the couplet earlier in comparison to the Larch and Cedar Street options and result in less congestion at this end of the couplet in relation to those alternatives. It also could be converted to Alternative 2 at some point in the future more easily than them.

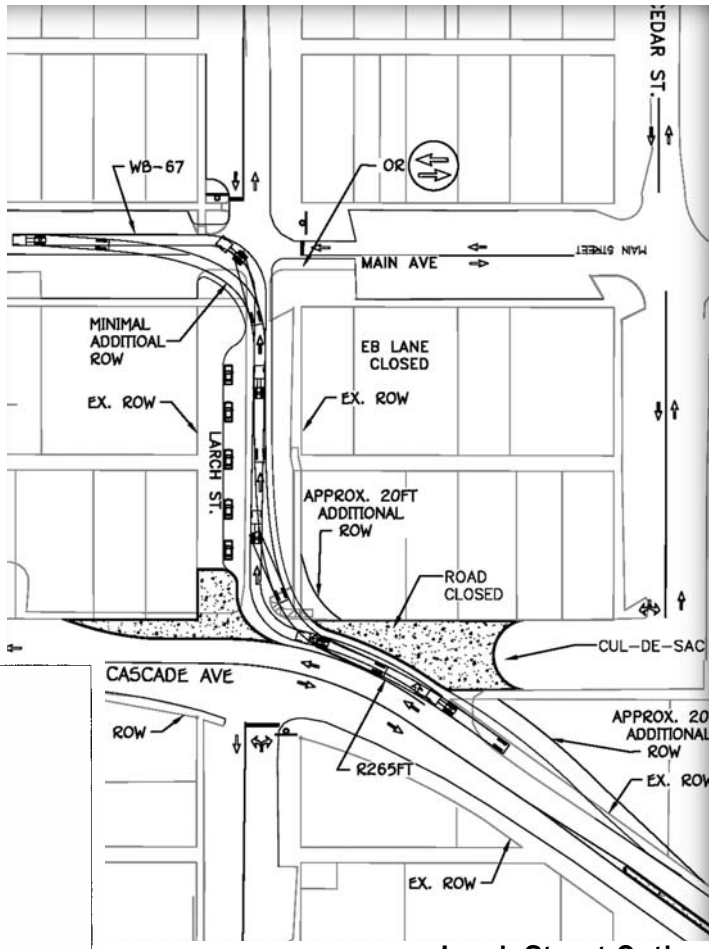
Larch Street. This option retains two-way traffic on Cascade Avenue to Larch Street, where the couplet would begin with Larch Street serving as a one-way northbound connection to Main Avenue, with a single travel lane and on-street parking along the west side. The connection of Cascade Avenue from Larch Street to the east would be eliminated, and replaced by a mid-block cul-de-sac on Cascade Avenue between Larch Street and Cedar Street. It would not be as effective as a pressure relief route because downtown congestion often extends back past Larch, limiting access to this route.

Cedar Street. This option would involve using Cedar as the one-way northbound connection to Main Avenue. It retains two-way traffic on both Locust Street and Larch Street, but has greater right-of-way impacts on developed parcels than either of the other two options. No illustration has been developed for this option, given significant concerns about its impact on access to the Civic Center site and relative lack of advantages in comparison to the other two options. (*Note: This option is not illustrated in Figure 12.*)

Table 7: East End Alignment Options

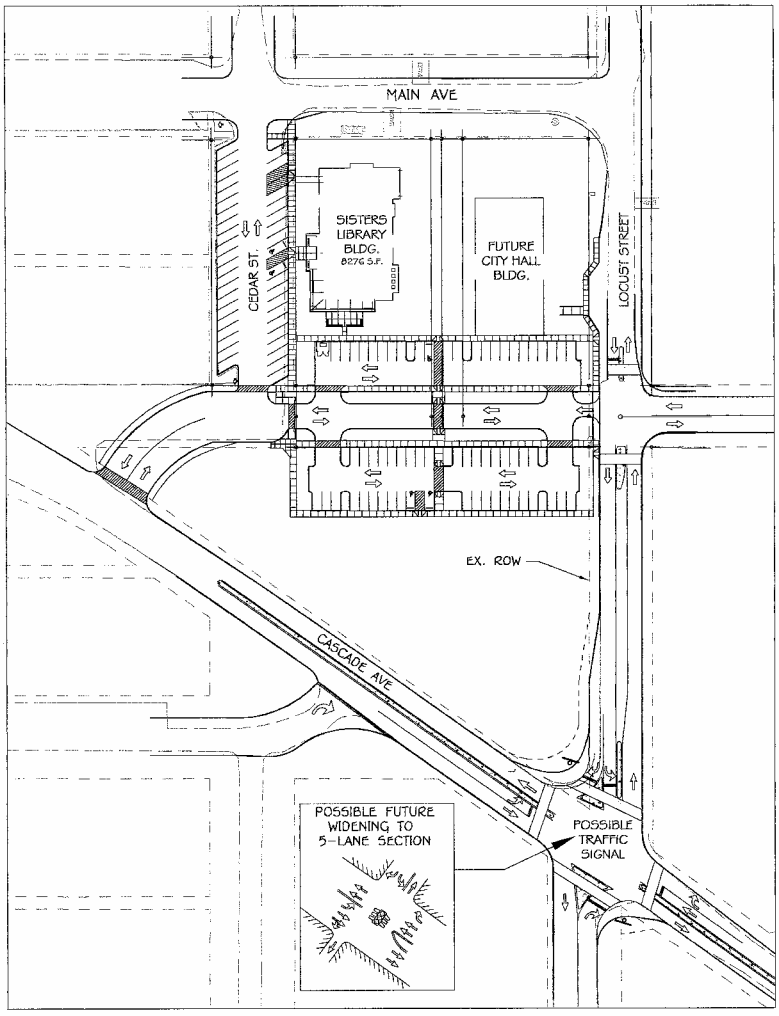
Alternative/Option	Advantages	Disadvantages
East End Alignment Options		
Locust Street Alignment	• Early alternative route for traffic entering Sisters ("pressure relief valve"). • Could be converted to ODOT alternative. • Relatively vacant/underutilized right-of-way. • Best if traffic signal installed on east end. • Most traffic impacts occur when school and City Hall not in use.	• Adds through traffic between existing school and new Civic Center site. • Creates potential conflicts between vehicle traffic on Locust and pedestrian traffic between school and new Civic Center. • Right of way impacts on adjacent uses to accommodate 5-lane cross section.
Larch Street Alignment	• Avoids adding traffic on Locust St. past new Civic Center site and past existing elementary school. • Allows two-way traffic flow on Locust St. north of Cascade Ave., reducing potential cut-through impact on area east of Locust St. • Improves vehicle and pedestrian safety at five-legged Cascade Ave./Larch St./Hwy 20 intersection by closing the east (Cascade Ave.) leg.	• Not effective as "pressure relief valve" when Cascade Ave. queues back up past Locust St. • Right-of-way impacts on adjacent uses to accommodate right turn onto northbound Larch St. and left turn onto Main Ave. • Eliminates two-way travel on Larch St. • Fronting uses may be adversely impacted by added traffic.
Cedar Street Alignment	• Avoids adding traffic on Locust St. past new Civic Center site and past existing elementary school. • Allows two-way traffic flow on Locust St. north of Cascade Ave., reducing potential cut-through impact on area east of Locust St. • Allows two-way traffic on Larch St.	• Not effective as "pressure relief valve" when Cascade Ave. queues back up past Locust St. • Right-of-way impacts on adjacent uses to accommodate right turn onto northbound Cedar St. and left turn onto Main Ave. • Eliminates two-way travel on Cedar St. • Eliminates ability to access Civic Center from the west.

Figure 12. East End Alignment Options (Locust and Larch)



Larch Street Option

Locust Street Option



Locust Street Circulation. The following two options were considered (illustrated in **Figure 13** and summarized in **Table 9**):

One-way Street (Northbound). This option could be implemented if a Locust Street alignment were implemented as part of Alternative 1. It also would be implemented as part of Alternatives 2, 3 or 4. Creating a one-way street would simplify and eliminate selected turning options at the intersection of Locust Street and Highway 20, which would significantly improve traffic operations of this intersection, increase its capacity, and improve traffic flow through Sisters. However, these benefits are measured against the impact to local residents who would not have a direct route to travel eastbound onto Highways 20 or 126 and their added travel through downtown Sisters. This would be particularly inconvenient during the majority of the year when congestion in Sisters is not an issue in this area.

Two-way Street. This option could be implemented as part of Alternative 1 in conjunction with any of the east end alignment options, though initially it was recommended only in conjunction with the Cedar Street or Larch Street options. This was identified by CAC members as a way to improve access to local streets at the east end of the couplet and address safety concerns in the vicinity of the Sisters Elementary School and the new Civic Center.

Table 9: Locust Street Circulation Options

Alternative/Option	Advantages	Disadvantages
Locust Street between Highway 20 and Main Avenue		
Locust St 1-way northbound north of Cascade	• Compatible with Alternative 2 if highway designation is contemplated. • Perceived safer crossing between new Civic Center site and elementary school. • Allows left turn lane for access to new Civic Center site to be provided within existing right-of-way.	• Southbound Locust St. traffic would have to be accommodated elsewhere. • Complicates access to new City Hall/Library site. • Hinders access to highway by future commercial development area north of Main Ave. • Additional right-of-way would be required for westbound right turn.
Locust St 2-way north of Cascade	• Reduces potential impacts on neighborhood east of Locust St. • Improves access for new City Hall/Library site. • Better accommodates future development area north of Main Ave. • Better traffic operations if signal installed at Highway 20.	• Increases conflicts for pedestrians crossing Locust St. • Reduces capacity of Hwy 20/Locust St. intersection. • Not compatible with ODOT ultimate Hood Ave./Main Ave. couplet (would require future change in circulation). • Could require additional right-of-way for northbound left turn lane into City Hall/library site.

East Cascade Avenue between Locust and Cedar Streets. The following two options were considered, as summarized in **Table 8**:

One-way Street. This option was considered if a Locust Street alignment were implemented as part of Alternative 1. It also could be implemented as part of Alternatives 2, 3 or 4. Creating a one-way street here improves the traffic operation and safety pedestrians and vehicles at the intersection of E. Cascade Avenue and Locust Street.

Two-Way Street. This option could be implemented as part of Alternative 1 or in conjunction with a Cedar Street or Larch Street alignment at the east end of the couplet. It was identified by CAC members as a way to improve access to local streets at the east end of the couplet and improve access to and from the Sisters Elementary School, and new Civic Center.

Locust Street/Highway 20 Intersection Channelization. Two primary alternatives for channeling traffic through this intersection were considered, a roundabout and traditional channelization, as shown in **Figure 14** and summarized in **Table 10.** A variety of options for a channelized intersection were identified.

Table 8: East Cascade Avenue Options

Alternative/Option	Advantages	Disadvantages
East Cascade Avenue between Locust and Cedar Streets		
East Cascade Ave 1-way westbound through new Civic Center site	• Reduces potential conflicts for pedestrians crossing Locust St. • Reduces conflicts at Larch St./Cascade Ave intersection.	• Limits access and connectivity to elementary school/area to east. • Short one-way segments are confusing to drivers, which could increase potential for accidents.
East Cascade Ave 2- way through new Civic Center site	• Increases access to new Civic Center site. • Improves access to elementary school.	• Increases conflicts for pedestrians crossing Locust St. • Could increase pedestrian traffic across Locust St. due to passenger loading activity.

Roundabout. Initially, CAC and consulting team members considered a roundabout as an attractive opportunity to create a gateway feature at the east entrance to Sisters and avoid having traffic signals in Sisters. Relatively small-diameter designs were considered under the assumption that few if any drivers would need to go completely around the roundabout. However, further review by ODOT indicated that a larger radius would be needed to account for all possible traffic movements in the design. Furthermore, the updated TSP traffic analysis revealed that a two-lane roundabout probably would be required. As a result of the required two-lane, large radius requirements and the non-perpendicular angle of the intersection, a roundabout would require a substantial amount of right-of-way that would be difficult and/or very costly to obtain. It also would

eliminate or restrict access to the businesses along Cascade in the immediate vicinity of this intersection, and would result in concerns about safety due to unbalanced approach volumes in combination with the level of truck traffic using Highway 20. If desirable, a gateway feature could be constructed as an entrance median island along Highway 20 to the east of Locust Street, rather than as part of a roundabout.

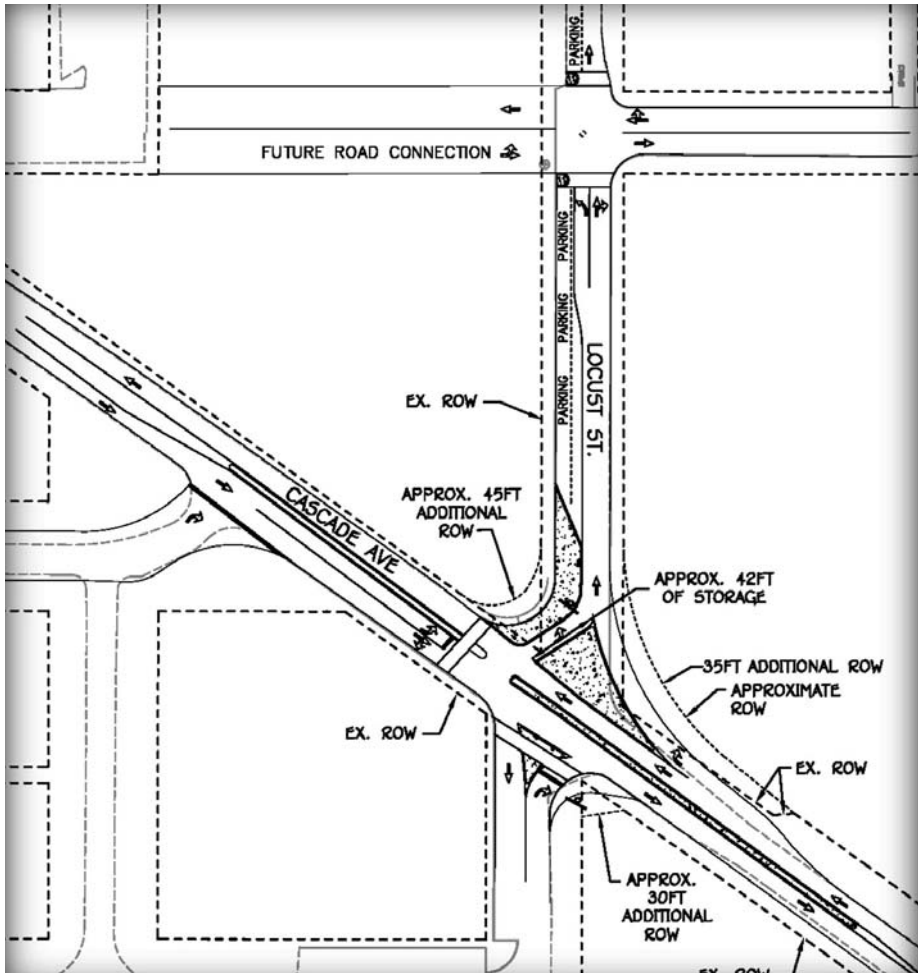
Channelized Intersection. With the channelized option access to businesses along Cascade in the immediate vicinity would also be eliminated or restricted. The south leg of Locust Street would be restricted to right-in/right-out only (RIRO), eliminating two conflicting left turn movements and improving traffic operations and safety for the overall intersection. Once a traffic signal is installed, this will have to be further limited to right-in turns only. Left turning traffic from the south leg of Locust would be rerouted to Jefferson Street or other local streets to the west, which would impact these streets and residents.

On the north leg of the intersection, several improvements would be made to improve traffic flow, operations and safety. A right turn lane from Highway 20 westbound to Locust Street northbound to would improve access to the couplet significantly. Highway 20 already contains an eastbound left turn lane that would be extended further back, thus eliminating the left turn movement from westbound Highway 20 to westbound Hood Avenue. A center island would be added to the north leg of Locust to both improve traffic flow for drivers turning right (westbound) onto Highway 20 and to provide a pedestrian refuge.

During peak summer hours, long delays for Locust southbound left turning traffic would still remain as long as the intersection continues to be stop-controlled. Based on the 30th highest design hour volume (30th DHV), this intersection would meet traffic signal warrants in the near term, particularly if a major commercial development occurs north of Main Avenue or Locust Street. The Highway 20/Locust Street intersection is more appropriate for a traffic signal (compared to Larch Street) because vehicle queues southbound on Locust and westbound on Highway 20 could occur without compromising the role of Main Avenue as a pressure relief valve route for the couplet. A traffic signal would provide protected access onto the highway, less delays and shorter queues for the southbound left turn.

Additional analysis was performed to update the TSP's long range 2020 analysis of this intersection, considering recent traffic trends, the construction of the new City Civic Center, and potential development of parcels to the north of this intersection. This analysis found that to meet ODOT's volume to capacity ratio criteria (V/C ratio= 0.80), a five-lane cross-section on Cascade/Highway 20 would be required at Locust Street (i.e., two through lanes in each direction, eastbound left turn lane, plus a westbound right turn lane). Currently, this section of Highway 20 is about 50 feet wide, and a five-lane section would require between 55-60 feet plus additional ROW for medians. Thus, 10-15 feet of additional ROW would have to be obtained along Highway 20 between Locust and Larch Streets, as well as to the east (which would require additional ROW for the westbound right turn lane) Those impacts are reflected in right-of-way needs and cost estimates described on pages 43 through 46 and Table 11. These issues also are discussed in Section 4 (Preferred Alternative).

Figure 13. Locust One-Way vs. Two-Way Options



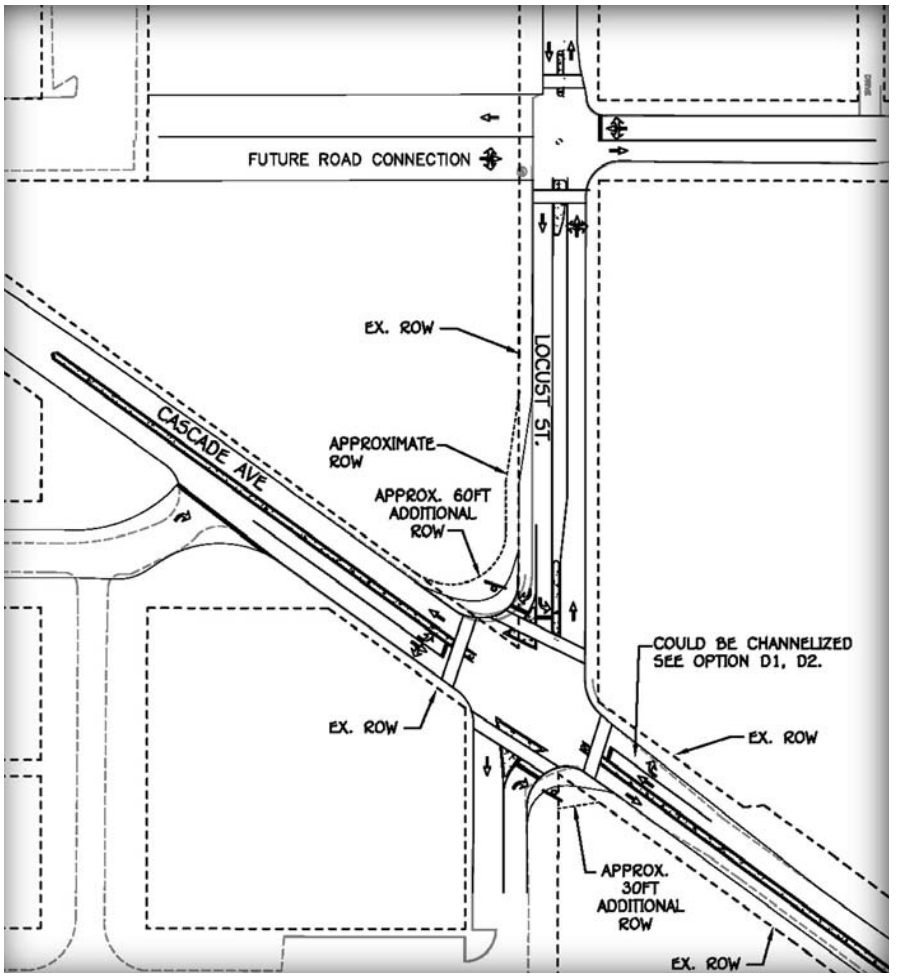
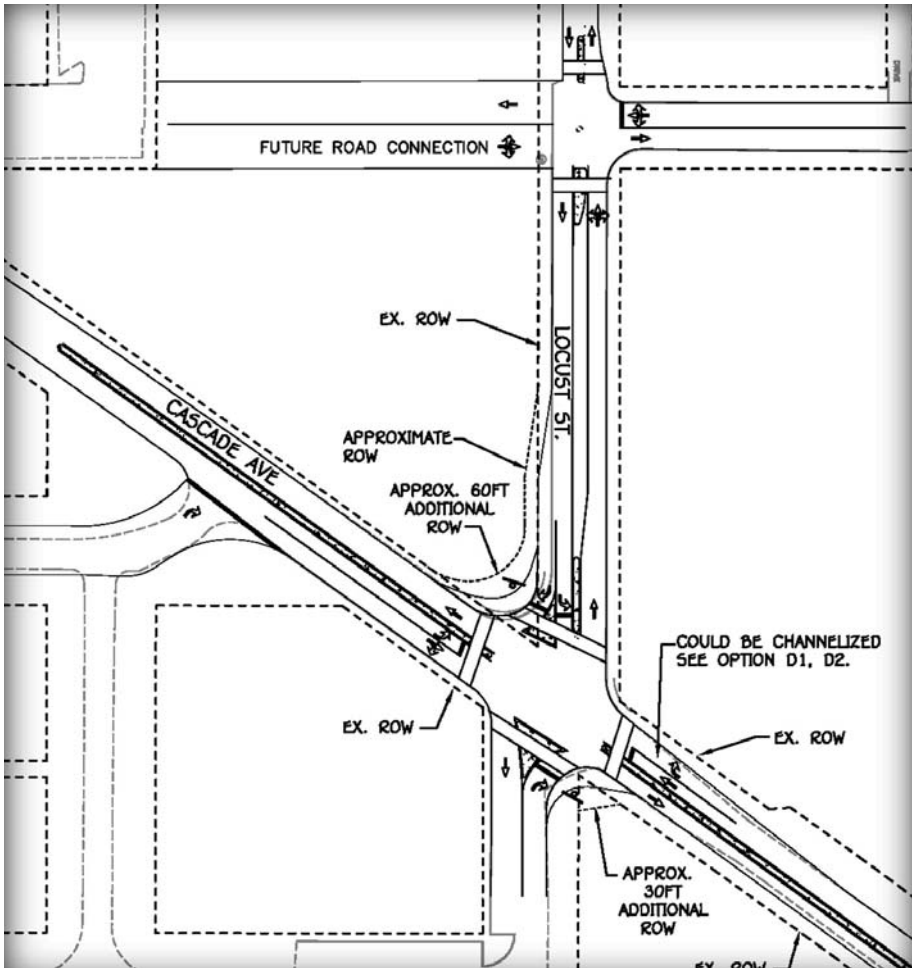


Figure 14. Locust Street Alignment Roundabout vs. Channelization



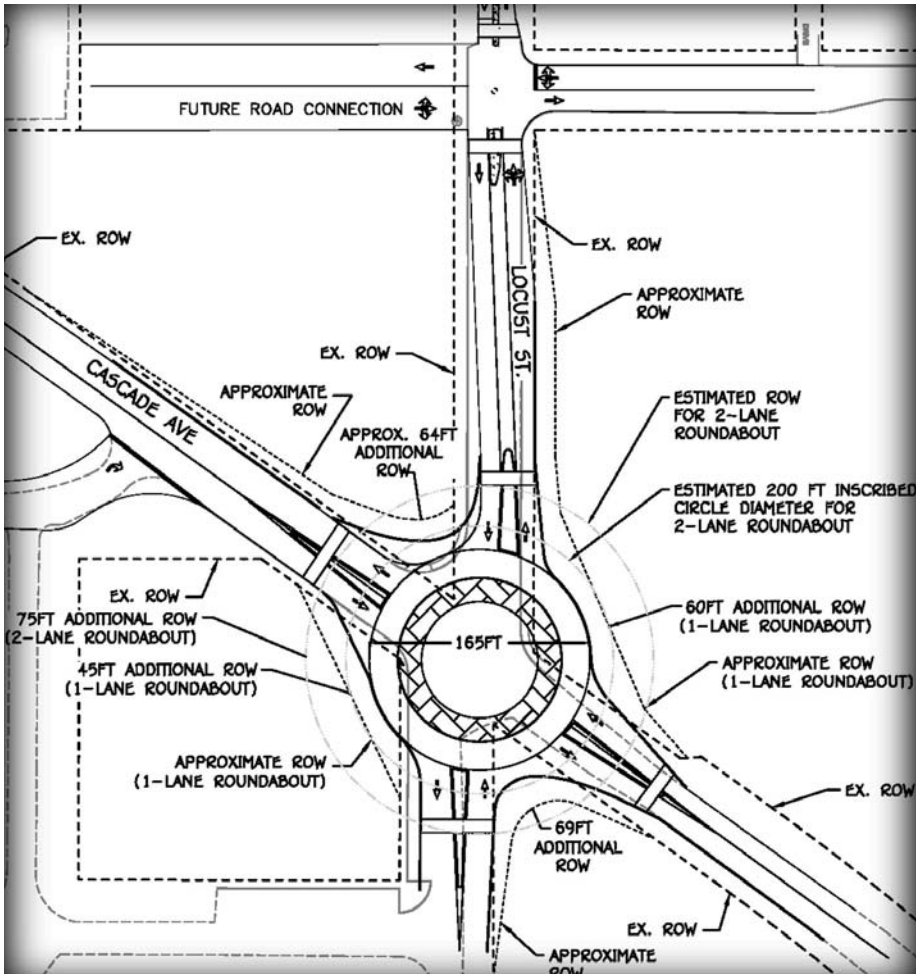


Table 10: Locust Street/Highway 20 Design Options

Alternative/Option	Advantages	Disadvantages
Locust Street/Highway 20 Intersection Design		
Channelization with south leg RIRO (right in/right out)	• No added delay to through traffic on Hwy 20-Cascade Ave. • Would be closer to ODOT v/c standards with future traffic (and separate southbound turn lanes) • Less costly to construct/less right-of-way needed. • Could be upgraded in future. • Center median on Cascade Ave. could provide opportunity for a gateway feature.	• Future traffic signal and five-lane Hwy 20 configuration may be needed to meet ODOT v/c standards for 2024 design hour volume. • Locust southbound access eliminated • Could increase use of Jefferson Ave as alternative local access to Hwy 20-Cascade Ave into Sisters.
Roundabout	• Addresses desire to use non-signalized intersection traffic control in Sisters • Preserves some gaps for southbound left turns. (This advantage applies only for the alternatives that retain two-way circulation on Locust St. north of Cascade Ave). • Creates opportunity to display a distinctive gateway feature.	• Safety concerns for eastbound traffic circulating to go northbound on Locust. • More delay/queuing for east-west traffic because approaching vehicles have to yield to vehicles in roundabout. • Two-lane roundabout with significant right-of-way impacts likely to be needed to meet ODOT v/c standards. • Truck traffic along Hwy 20-Cascade Ave could have difficulty negotiating/slowing for roundabout. • More costly to modify if operation is poor. • Substantial right-of-way requirements.

4. Preferred Alternative

The primary objective of this project has been to identify a preferred conceptual design for a Hood/Main couplet. This section describes the process used to identify the Preferred Alternative, the benefits and advantages of the Preferred Alternative in comparison to other alternatives, impacts and possible mitigation measures, approximate costs and right-of-way needs, and potential phasing of a couplet.

Description and Selection Process

The Preferred Alternative has the following elements and is illustrated in **Figure 15**:

- Uses the "pressure relief valve" concept (Alternative 1), allowing for continued direct access to Highway 20 for traffic entering Sisters from both the east and west.
- Assumes Cascade Avenue between Pine and Larch Streets will continue to be designated as the state highway through Sisters, with Hood and Main Avenues designated as local streets.

West Intersection

- Extends Main Street to Hwy 20 at the west end of the couplet, and retains two-way traffic along Highway 20 as it approaches Sisters from the west (Option B). Also allows for two-way traffic along Hood Avenue between Highway 242 and Pine Street to facilitate north/south and east/west access for residents north of Hood. Uses Locust Street to connect westbound traffic along Highway 20 to the Main Street portion of couplet at its east end.

East Intersection

- Allows for Locust Avenue to remain a two-way street between Highway 20 and Main Street.
  - Create a channelized intersection and future traffic signal.
  - Allows for only right-in/right-out access to the section of Locust Street south of Highway 20. (Would be further limited to right-in access once signal installed.)
  - Extend eastbound left turn lane along Highway 20 (eastbound) to Locust (northbound) and remove left turn lane from Highway 20 (westbound) to Hood Avenue.
  - Add a right turn lane from Highway 20 (westbound) to Locust (northbound).
- Assumes East Cascade Avenue will eventually be a two-way street and realigned to tee into Highway 20 between Cedar and Larch Street. However, the Findings and Decision for the new Sisters Library site plan, part of the new Civic Center, includes a requirement that East Cascade be closed to eastbound traffic until a signal is installed at Highway 20 and Locust. Within the site, traffic is permitted to flow two-way, but access to Locust via the site will be restricted until the signal is installed. The new intersection will improve the operational character and safety at the intersection of East Cascade Avenue with the state highway at Larch Street, which today is a poorly defined 5-legged intersection.
- Signage will notify travelers of the couplet streets as an alternative route and to direct drivers to on or off-street parking areas. Preliminary design concepts for signs have been developed with a recommendation that signs ultimately be consistent with a city-wide design theme or concept.

- Diagonal parking along both sides of Hood and Main Avenues will be preserved, consistent with the City's established parking orientation. A city-wide parking study is recommended to identify the potential need to develop off-street parking areas, particularly if a jurisdictional change is contemplated and Alternative 2 is implemented. If developed, they should be well-signed, located adjacent to Hood and Main Streets, and designed to be pedestrian-friendly (e.g. with safe pedestrian accessways, minimal curb cuts, landscaped islands, etc.) Designated parking areas for recreational vehicles and shared use of large parking areas (e.g., schools) for special events on weekends also are recommended.
- Streetscape improvements along Hood and Main Streets should be consistent with recommendations in the City's Urban Renewal Plan and future Special Transportation Area (STA) Management Plan. Improvements include clearly delineated cross-walks with special treatments such as stamped asphalt or pavers, street trees, benches and other amenities.

This alternative was developed after review and discussion of all alternatives by the CAC, as well as by members of the general public at two public workshops. CAC members recommended most of the elements described above prior to the first public meeting, though they did not have a consensus recommendation about the west end alignment for the couplet, Locust Street between Highway 20 and Main Avenue, or the design of the Locust Street/Highway 20 intersection. Recommendations related to parking, signage and streetscape improvements also were developed after the first public meeting and were refined at the second public meeting.

A significant number of participants at both public meetings recommended that no couplet be developed, citing a variety of concerns about its impact on safety, mobility and access within the community and questioning the need for the couplet, given the seasonal nature of congestion problems in Sisters. Suggested alternatives to a couplet are described in the next section of this plan. When asked to recommend a Preferred Alternative, if one were to be implemented, the majority of participants at the first workshop supported the elements of the Preferred Alternative described above. Members of the CAC further reviewed and refined the Preferred Alternative at their seventh meeting between the first and second public workshops. Participants in the second public workshop further reviewed the Preferred Alternative.

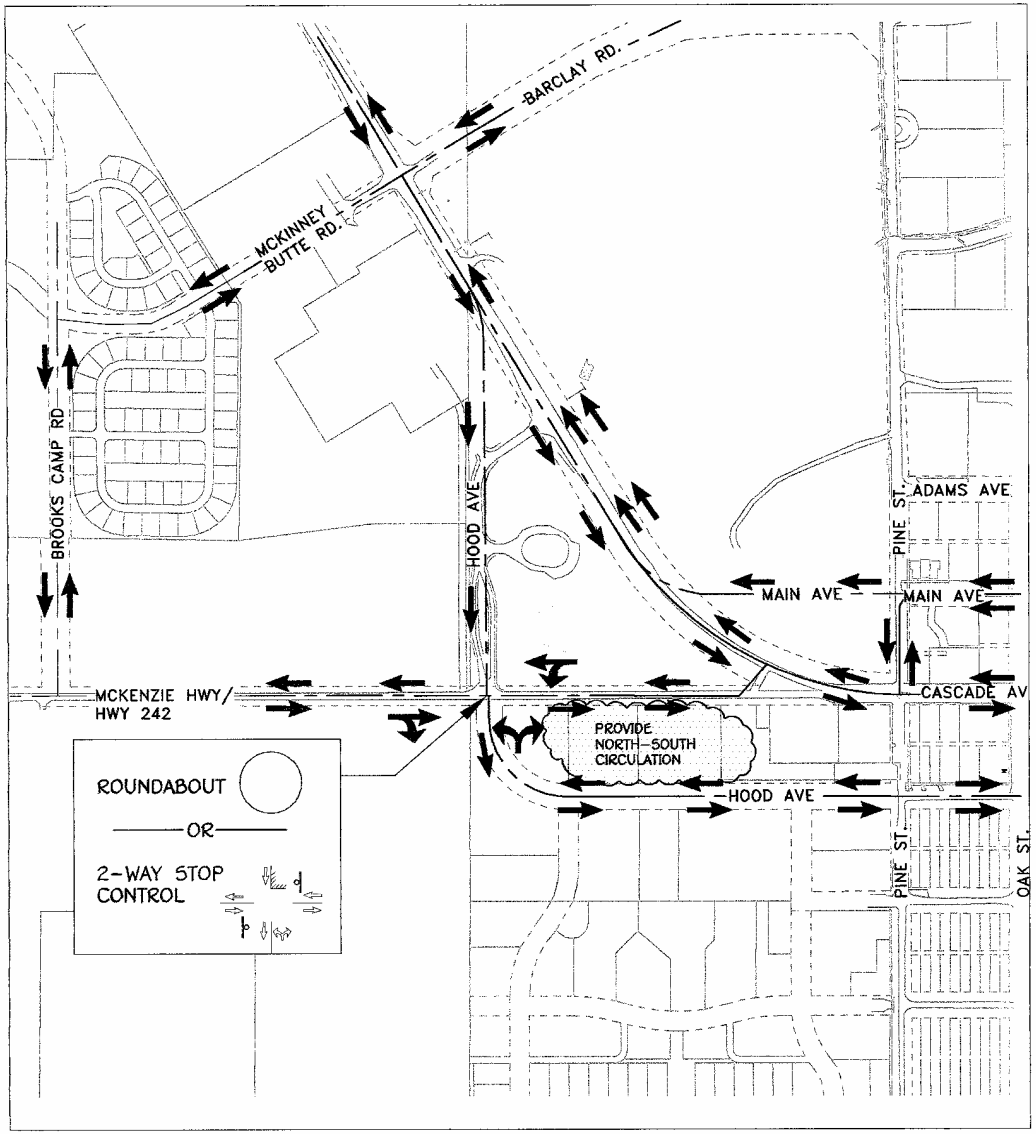
The CAC further modified the Preferred Alternative after the second public meeting after further evaluating the two-way section of Hood Avenue between Pine Street and Highway 242. This was a direct result of citizen comments and recommendations at the public meeting.

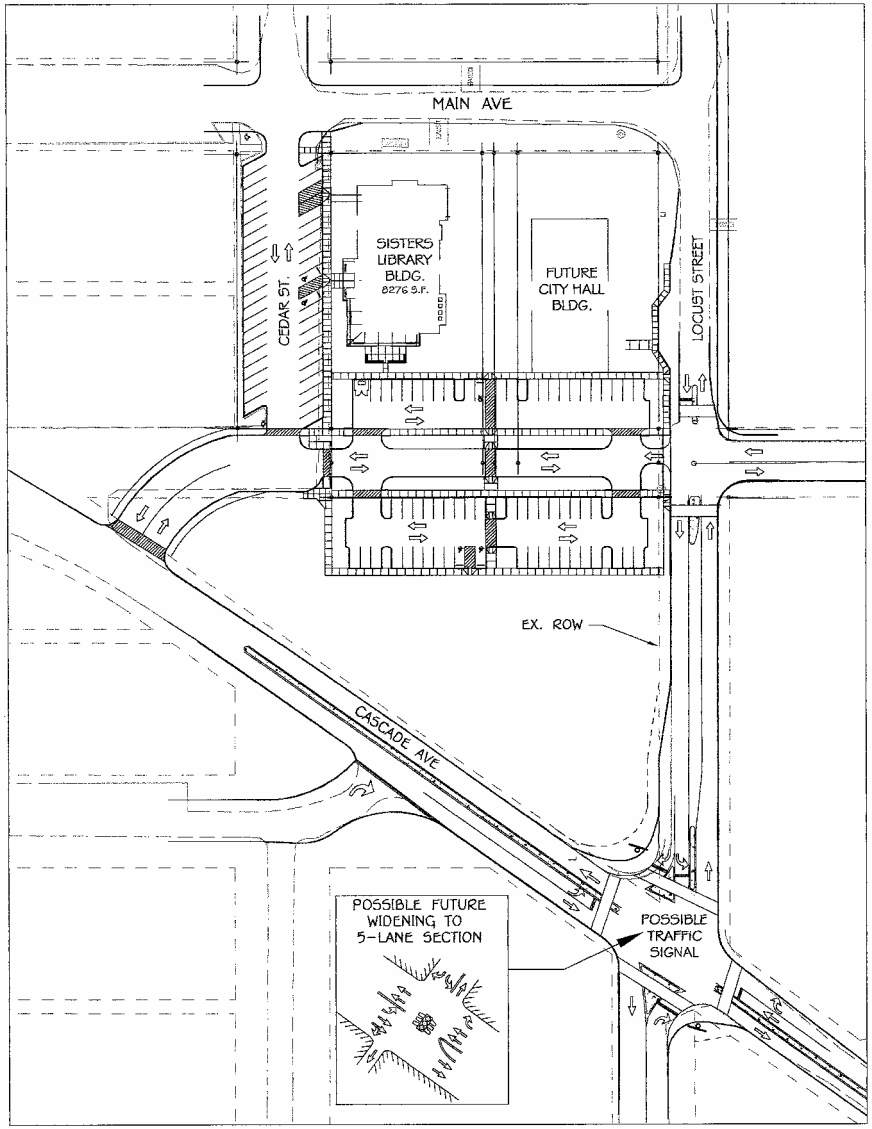
Following the final CAC meeting, the potential future design option for the Locust Street/Highway 20 intersection was modified to address ODOT comments and concerns related to future 20-year performance of this intersection (i.e., ability to meet volume to capacity ratio (V/C ratio) standards of 0.80). This analysis found that Highway 20 may need to be widened to a five-lane section to accommodate two through lanes in each direction including a left turn lane. A preliminary evaluation of this widening found that it would require an additional 10-15 feet of ROW along Highway 20 from Locust Street to Larch Street, but not further into the downtown area.

Figure 15. Recap of Preferred Alternative, East and West End Designs

West End

East End





Benefits/Advantages

Though many community members question the need for a couplet, it would have a number of benefits, both to the local community and travelers passing through Sisters, as well as to statewide freight mobility needs. Expected benefits include the following:

Preserves Cascade as traditional route through Sisters for people traveling from Bend/Redmond to the Willamette Valley.

Reduces congestion and improves mobility along Cascade Avenue during peak traffic periods by spreading out traffic among three streets and providing travelers with several options for traveling through or within Sisters.

Preserves the option of creating a secondary route for special event street closures (e.g., the Quilt Show).

Improves the design and operation of key intersections within Sisters, particularly the Locust Street/Highway 20 intersection. (Improvements will be needed for this intersection even if a one-way couplet is not implemented.)

Allows for continued diagonal parking on Main and Hood Avenues.

Enhances freight mobility through Sisters along a designated Freight Route.

Addresses concerns about the safety of the sprawling, 5-leg Larch Street/East Cascade Avenue/Highway 20 intersection, which will become more of a concern once the new Civic Center complex opens.

Supports the new Forest Service concepts for developing the lands west of Pine Street.

Impacts

As community and CAC members have noted throughout the process, development of a couplet would have a variety of impacts on the community. Many of these impacts can be addressed or lessened through design of the couplet and improvements to adjacent or surrounding streets. Impacts and possible strategies to address or counteract the impacts are described in Table 11.

Table 11: Couplet Impacts and Mitigation Strategies

Impact	*Strategy*
Establishes end point intersections as congestion points, rather than road itself	Use signage, intersection design and improvements to better manage congestion and indicate alternative routes; some congestion inevitable.
Increases traffic along Hood and Main Avenues	Hood and Main have adequate capacity to meet future traffic demands; may improve business vitality along Hood and Main. Improve pedestrian amenities on these streets
Increases north-south cross-circulation between Hood and Main	Improve cross-streets and establish off-street parking facilities along Hood and Main to reduce cross-traffic between them. Enhance visibility of pedestrian crossing locations.
Affects egress from commercial, industrial and residential areas to the northeast	Locust Street retains two-way travel between the highway and Main Avenue, facilitating access and egress from the commercial, industrial and residential areas north and east of Sisters.

Impact	*Strategy*
Impacts right-of-way impact on adjacent downtown uses	The Preferred Alternative retains the possibility of implementing Alternative 2 in the future. Making Hood and Main the state highway requires the curve from northbound Locust Street to westbound Main Avenue to meet State highway standards, with a larger right-of-way requirement (as at the northeast corner of Larch Street/Main Avenue with the Preferred Alternative). This corner at the Locust Street/Main Avenue intersection is currently vacant, but the affected parcel will be the site of the new City Hall. The City Hall project is being designed to accommodate ODOT's curve radius requirements.

Required Rights-of-Way

Right-of-way (ROW) needs will impact a number of specific properties, including the following:
Highway 20/Locust Street intersection properties. All properties abutting this intersection will be affected, though impacts will be minor. Approximately 10 to 15 feet of additional will be needed. They will include the following:
Southwest corner of the elementary school/tennis courts site.
South side of the new Civic Center site west of Locust Street extending toward Larch Street far enough to taper from two northbound lanes to one.
Northeast corner of the gas station property.
Northwest corner of the vacant parcel at the southeast corner of the intersection.
Civic Center site. The northeast corner of this site will be affected as will be the southeast corner (as noted above).
U.S. Forest Service site. A significant amount of right-of-way will be needed across this property in conjunction with the proposed extension of Cascade and Main Avenues.

Right-of-way impacts are illustrated in Figure 15 (page __). Costs are described in the following section.

Approximate Cost Estimates of Preferred Alternative

Preliminary, planning-level cost estimates have been prepared for improvements related to the couplet. They are described below for each end of the couplet. They do not include a full range of pedestrian amenities or other improvements that could be implemented along Main and Hood Avenues. Those improvements will need to be defined in greater detail to develop meaningful estimates and are already anticipated within the context of the City's Urban Renewal Plan.

On the East end of the corridor, recommended improvements include the following:

- Center raised median on Highway 20 at Locust Street, extending west of the intersection to roughly the midpoint between Larch Street and Cedar Street, and about 150 feet east of the intersection.
- Widening the east leg to provide a westbound right turn lane, a second westbound through lane, and a transition for the second eastbound through lane to merge into one eastbound through lane.
- Larger pork chop islands and realigned crosswalks connecting to the islands, such that drivers approaching on Locust Street

would not have to look to their right to see pedestrians crossing Cascade Avenue.

- Short segments of center raised median on Locust Street on either side of the intersection with E. Cascade Avenue.
- Realigning E. Cascade Avenue to intersect Highway 20 at a new stop-controlled "tee" intersection between Larch and Cedar Streets, eliminating the east leg (E. Cascade Avenue) of the existing Highway 20/Cascade Avenue/Larch Street intersection and creating a four-way, stop-controlled intersection.
- Modifying the northwest corner of the Main Avenue/Locust Street intersection to allow a more generous turning radius to accommodate truck traffic and meet ODOT design standards to preserve the ability for converting the Preferred Alternative to Alternative 2, should future conditions warrant the change.
- Installing a traffic signal at the intersection of Highway 20/Locust Street. A signal is needed to provide adequate operations with the 30th highest design hour volumes used by ODOT to evaluate facility operations.

A number of the ROW impacts described above may not be needed, depending on future traffic levels at the Locust Street/Highway 20 intersection. This issue is described in more detail in the *Traffic Control* section on page 51.

On the West end of the corridor, the Preferred Alternative builds on the recently completed Highway 20/242 realignment project. The Preferred Alternative extends Main Avenue from Pine Street to merge with the reconstructed segment of Hood Avenue. This segment was assumed to have curbs, gutters, sidewalks, and bike lanes on both sides, a center turn lane/median, and on-street parking along the west side. The preliminary cost estimates reflect adding a sidewalk along the east side. They also assume replacement of the existing Hood Avenue/Highway 20 "tee" intersection, by extending Hood Avenue north to meet Highway 20.

Unit costs for right-of-way, new roadway, minor roadway improvements, and concrete (curb/gutter/sidewalk) were developed in discussion with the City of Sisters Public Works director and CTS engineering staff. The following dollar values per square foot (s.f.) were assumed. Costs are summarized in Table 11.
Right-of-way (ROW): $20/s.f. This figure is based on real estate values for developed property in downtown Sisters. It is considered to be reasonable for the entire corridor given that while the east end ROW segments are undeveloped, they are small (and thus more expensive per unit). The west end ROW passes through USFS lands, which trigger a more complicated acquisition process than other municipal or private lands.

- Concrete (curb/gutter/sidewalk/center median): $2.50/sf based on recent City projects.
- Base rock/pavement: $30/sf based on recent City projects.
- Design/survey/signage/striping/contingency: 25% of total construction costs.

With these assumptions, the estimated unit cost for these improvements is about $41/square foot if no right-of-way is required, and about $61/square foot including right-of-way.

Costs are summarized in Table 12. The total estimated cost for the Preferred Alternative is approximately $5 million. This includes costs for right-of-way associated with extending roads at the west end of the couplet. It also includes potential costs for improving Highway 20 to five lanes east and west of its intersection with Locust Street.

This improvement will depend on the intensity and type of development north of this intersection. The need for this five-lane improvement is to some degree independent of the couplet plan and may not be needed if alternatives are implemented (e.g., limiting development to the north or creating additional east-west connections to the north).

Table 12: Preferred Alternative Order of Magnitude Cost Estimates and Assumptions

	Medians/sidewalks		New Pavement				Right-of-way		
Design Assumptions	**Sq. Yds.**	**Cost**	**Sq. Yds.**	**Cost**	**Subtotal, Construction**	**Design/ Traffic Control**	**Sq. Yds.**	**Cost**	**TOTAL COST**
East End: 2-way Locust, separate SB left and right turn lanes, larger "porkchop" islands in north and south legs; realigned crosswalks across Cascade Avenue; 150' WB right turn lane.	675	$16,000	620	$168,000	$184,000	$46,000	640	$115,000	**$345,000**
Traffic signal at Locust/Hwy 20						$250,000			**$250,000**
5-lane segment on Hwy 20 with 2nd EB lane beginning at Larch and extending 500' east of Locust, 2nd WB lane beginning 500' east of Locust and extending to Larch.	2,070	$48,000	3,215	$868,000	$916,000	$229,000	1,615	$291,000	**$1,436,000**
Hood Avenue: Extend recent ODOT reconstruction of Hood Avenue to provide 70' r/w, 2-way link w/ single lane, BL, SW each way, parallel parking along W side only, 14' LS median. New construction~ 350 feet from the end of recent ODOT reconstruction. SW assumed needed for the east side over entire length, ~ 1100 feet.	770	$18,000	1400	$378,000	$396,000	$99,000	2780	$501,000	**$996,000**
Roundabout at Hood Avenue/Cascade Avenue						$250,000			**$250,000**
Main Avenue Extension to existing US 20-OR 126: 60' paved right-of-way, 1-way link on Main, extended from Pine to existing highway, 1 lane + bike lane on one side, sidewalk each side, no median/left turn lane, all new construction, ~ 600 feet	800	$19,000	2000	$540,000	$559,000	$140,000	4000	$720,000	**$1,419,000**
TOTALS:		**$101,000**		**$1,954,000**	**$2,055,000**	**$1,014,000**		**$1,627,000**	**$4,969,000**

Parking, Signage and Traffic Control

Off-Street Parking

It is recommended that the City avoid construction of new off-street surface parking lots unless a need is demonstrated through a parking analysis. Alternatives to off-street parking may include better utilization of and signage directing drivers to on-street diagonal parking on side streets between Hood, Cascade and Main. If a need for new off-street parking area is demonstrated, recommendations for constructing off-street parking include:

- Locate parking near one or both ends of the couplet or midway between the couplet ends, depending on how many sites are needed and location of available site. Locate parking adjacent to Hood and Main Avenues on the interior side of the couplet (closer to Cascade) to reduce pedestrian traffic across the couplet streets.
- Use clear, consistent directional signs to direct people to parking areas. Directional signs should incorporate a consistent look, including an easily recognizable symbol that is consistent with the City's character and design themes.
- Provide signs directing drivers to off-street parking areas well in advance, giving drivers adequate time to make decisions about the appropriate route to parking areas.
- Ensure that parking area designs promote pedestrian safety.

The City can use its urban renewal funds to develop parking. It has just begun collecting urban

renewal revenues and can start borrowing against future revenues within the next year.

For event parking, the City and/or event sponsors should consider formalizing the designation and use of large parking facilities (i.e. elementary school or new Civic Center.)

On-Street Parking

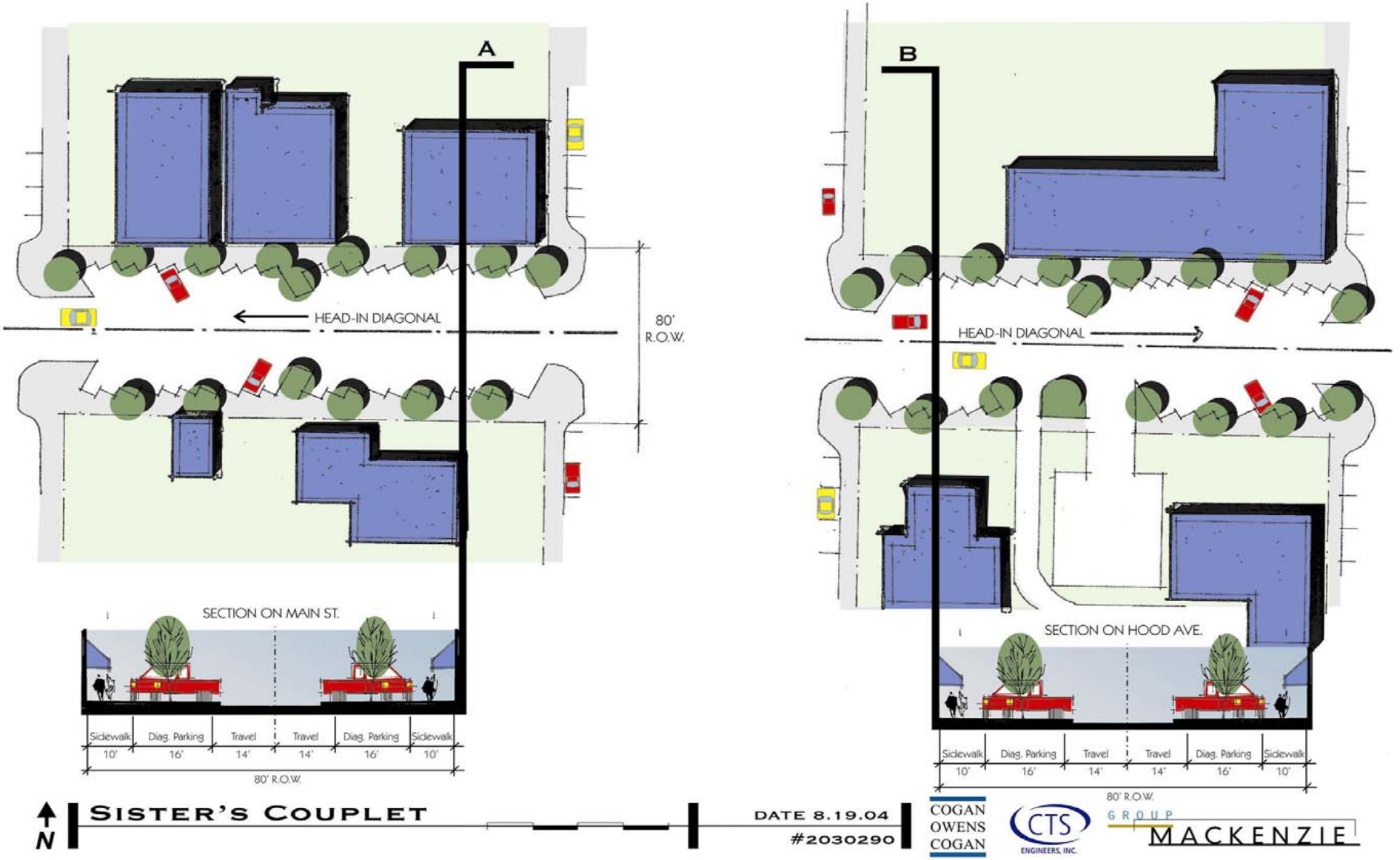
Recommendations related to on-street parking included the following:

- Diagonal parking on both sides of the street on Main and Hood Avenues is possible and recommended, given that these will be local streets under the Preferred Alternative.
- Complete plans to construction additional diagonal parking on side streets such as Oak, Elm, Fir and Larch Streets through the City's Parking District as funds are available.
- Identify and designate specific areas for recreational and other large vehicles (RVs) to park (e.g., north and south of Hood and Main). This will help prevent RVs from using unimproved areas along Hood and Main and help people on other streets get used to RVs using them for parking.
- Reverse diagonal parking may be an option though a number of disadvantages have been

identified, particularly in Central and Eastern Oregon where many people drive large vehicles. For example, when backed in, these vehicles have a tendency to extend over the sidewalk, blocking the right-of-way and affecting pedestrians with exhaust fumes.

Proposed cross-sectional standards for Hood and Main Avenues, including diagonal parking on both sides of the street are shown in **Figure 16**

Figure 16. Proposed Cross-Sectional Street Design Standards for Hood and Main Avenues

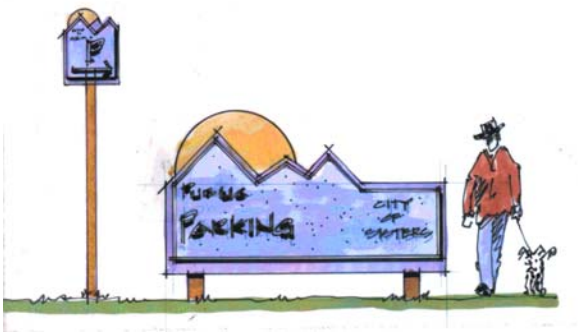


Signage

Two types of signage will be needed to improve the function of the couplet: 1) Highway signage identifying the Couplet and directing people from the Couplet streets back to Highway 20; and 2) Signs directing people to parking areas, public facilities and gathering places. Overall objectives for signs include:

- Design couplet intersections to provide easy access to the couplet, reducing the need for signage. (Channelized intersections will facilitate this.)
- Locate signs far enough in advance to provide drivers with adequate time to make a decision about whether to use Cascade Avenue or the couplet.
- Design signs to be clear and unambiguous.
- Direct or encourage most traffic to use Cascade Avenue during non-peak traffic periods.

Highway signs will need to conform to state guidelines in terms of their appearance, location and construction. Signs directing drivers to the couplet could be permanent or temporary (i.e., used only on days when traffic is heaviest). Options for changeable signs could include electronic signs, reader boards (non-electronic), or other easily changeable options. If signs are temporary, they should be placed in locations that



are predictable and easy for drivers to see and remember. A permanent structure may be needed or recommended for temporary signage.

In addition to highway signs, several other types of signs and objectives are recommended, including the following:

- Use consistent and unique signage indicating availability of parking on side streets leading to Cascade Avenue, as well as off-street parking areas if they are developed (see parking recommendations).
- Use a consistent design theme for signage but try and differentiate it from the surrounding environment so that it is easier see and recognize.
- Use multiple signs to direct people to parking or other areas, as needed. However, do not oversign the community. Too many signs create a sense of visual clutter. Balance signing with education and enforcement.

- Consider using more pedestrian-oriented signs, as well as signs or other means to direct people to use crosswalks so that they do not cross at mid-block. Mid-block crossings create safety hazards and traffic congestion. Signs alerting drivers to stop for pedestrians may also be considered.

Traffic Control

With the exception of the Locust Street/Highway 20 intersection, unsignalized traffic control will remain adequate through the downtown Sisters area for the intersections along Cascade Avenue-, Main Avenue and Hood Avenue, with the north-south side streets stop-controlled, and east-west traffic uncontrolled.

However, stop sign control is projected to be inadequate to accommodate the 30th DHV with two-way traffic on Locust Street at the east end of the corridor, which is recommended in the Preferred Alternative. A traffic signal would be needed to accommodate projected traffic volumes, which include additional commercial development in north/northeast Sisters that was not considered in the City's Transportation System Plan. A signal at Locust Street would create gaps in westbound Cascade Avenue traffic flow through downtown Sisters, benefiting pedestrian and vehicular traffic crossing Cascade Avenue. Hwy 20 at Locust Street is east of the downtown grid system. As a result, there is more room to accommodate the westbound queue before it would block the upstream intersection, and also more room on Locust Street to accommodate side street queues than there is downtown. The proposed design for the westbound Hwy 20 approach includes an exclusive right turn lane to accommodate northbound travel along Locust Street. This turn lane would permit direct access to Locust as the "pressure-relief route" as vehicles making the right turn would have minimal delays.

The south leg of the Hwy 20/Locust Street intersection is recommended to be limited to right-in/right-out access only, and may need to be further restricted in the future to right-in only once a traffic signal is installed at this intersection. Finally, it should be noted that many of the improvements at this intersection will be driven by traffic generated by new developments in this section of Sisters.

CTS Engineers conducted additional long term 2024 analysis for this intersection and found that this intersection would fail with development of commercial areas north of Main Avenue. Even with construction of a traffic signal, significant intersection improvements would be required if land north of the intersection were developed for intense commercial (i.e., retail) uses. As described previously, worst-case scenario analysis indicated that Highway 20 would need to be widened to five-lanes for a distance of 400-600 feet both east and west of its intersection with Locust Street. Alternatives to widening Highway 20 could include the following:

- Rezone land north of the intersection to decrease potential density and traffic levels.
- Create local street connections to the west to divert southbound traffic away from the Locus/Highway 20 intersection.
- Create local street connection to the east (i.e., bridge crossing Squaw Creek proposed as part of Timber Creek Subdivision to permit connecting with Hwy 126
- Seek approval for lower mobility standards for this intersection from ODOT to allow higher levels of congestion/delay.

Related to the couplet project, although not included in the scope of work, is a proposed traffic signal at Barclay Drive/McKinney Butte Road and Highway 20. Likewise to the Highway 20/Locust signal, this signal is included in the City's TSP. This signal will facilitate gaps in traffic that will also affect traffic flow on Cascade Avenue and the couplet.

Possible Phasing Approaches

The Sisters Couplet Refinement Plan builds on improvements recently completed by ODOT on the west end, and recommends additional improvements through downtown Sisters and the east end of the City. Throughout the development of this plan, it has been assumed that this project would be undertaken as a modernization of the state highway system. However, the Preferred Alternative assumes the couplet streets will be local and thus be the responsibility of the City of Sisters. However, City and ODOT staff should continue discussing the benefit of this project to improved highway mobility, as couplet improvements that improve the mobility of the state highway may be eligible for state funding.

Two approaches can be taken for proceeding with making the improvements identified in this plan. The couplet project can be undertaken as one complete project or improvements can be phased, depending on funding availability and sources. This section describes possible phasing for of recommended transportation improvements that could be undertaken as stand alone projects.

As private development proceeds in the Preferred Alternative area of influence, the City should strive to adopt conditions of development approval that reflect the recommended improvements and avoid increasing the need to acquire, condemn, or design around developed parcels.

As an initial prioritization effort, potential improvements have been sorted into short-term and long-term measures as follows.

Short-term Measures (0 - 5 years)

- Continue working with ODOT on the formation of a Special Transportation Area (STA) Management Plan for Cascade Avenue.
- Retain right-of-way necessary to accommodate ODOT standard design as part of the new Civic Center project, at the intersection of Locust Street/Main Avenue.
- Work with ODOT to get recommended couplet improvements on the state highway intersections listed in the STIP.
- Adopt street standards and streetscape plans for the Main Avenue and Hood Avenue portions of the couplet.
- Evaluate potential local funding options (improvement district, impact fees, utility fees, development exactions, etc.)
- Design and implement a westbound right turn lane at the Hwy 20/Locust Street intersection to facilitate the "pressure relief valve" concept.
- Design and implement improvements to limit the south leg of the Hwy 20/Locust Street intersection to right-turn only (right-in/right-out access), and potentially close this approach.
- Evaluate downtown parking needs, including conducting a downtown inventory, develop strategies for more effective use of existing on-street parking,

evaluate the need to develop City-owned off-street parking in the downtown area.

- Install variable/changeable message signs at each end of town directing drivers to use the "pressure relief valve" during times of downtown congestion and queuing.
- Design and install distinct "Parking" signs for both on-street and off-street parking throughout the downtown area.
- Update long range traffic analysis in the TSP to incorporate information and ideas developed as part of this project including a more detailed analysis of 20-year horizon traffic volumes based on development potential of specific parcels.
- Design and install destination signage along the couplet route to direct drivers to local shops and businesses.

Long-term Measures (greater than 5 years)

- Design a traffic signal for the Hwy 20/Locust Street intersection incorporating improvements that may be needed for five-lane section of Highway 20 from Larch to Locust and to the east of this intersection.
- Coordinate with the U.S. Forest Service during planning for the USFS lands at the west end of the City.
- Monitor traffic operations at the intersection of Hood Avenue/Highway 242, and develop intersection improvements in the event traffic volumes exceed the capacity of the intersection improvements recently completed by ODOT.
- Monitor traffic operations at the Hwy 20/Locust Street intersection. Consider signalizing the intersection when traffic volumes meet applicable traffic signal warrants. Coordinate traffic monitoring with the permitting process for new development in the north/northeast area of the City, and consider requiring contribution of a proportionate share of intersection improvements as a condition of development approval. (Note: This could be a short-term project if warranted by traffic levels and available funding.)

Other (non-couplet) alternatives suggested by CAC and members of the public but not evaluated as part of this process

As noted above, many members of the community questioned the need for a couplet and recommended a variety of alternatives for consideration. They questioned whether the impacts of a couplet justify its implementation to address heavy congestion that occurs on a limited number of days each year. Table 13 summarizes a list of suggestions from community members, along with a brief description of associated issues and constraints identified by the City, consulting team and CAC members. Resources were not available to evaluate any of these proposals in more detail as part of this project, though some were assessed as part of the City's TSP update process.

Table 13: Approaches Suggested as Alternative to Implementing a Couplet

Alternative	*Issues/Opportunities/Constraints*
Highway Bypass	• More effective at reducing congestion – heavy truck traffic will use bypass, so will RV's and through travelers. • Reduces impacts of increased traffic. • Significantly more costly. • Not supported by ODOT within the TSP 20 year planning horizon. • Will/may create development pressure in rural areas. • Possible adverse impacts on local businesses. • State funding likely limited or unavailable. • Needs to be addressed by County's TSP update process.
Alternative Route using Barclay Road	• Reduces traffic impacts on Cascade. • Relatively few advantages over Couplet, except reduction in impacts on Hood and Main. • Shifts traffic from downtown commercial core to residential areas. • Diverts potential impulse shoppers away from downtown. • Creates additional pressure on southbound Locust to eastbound Highway 20 and will necessitate traffic signal.
Changes to Cascade Avenue, including removal of parking and addition of left turn lanes	• Could reduce impacts on Main, Hood, Larch, Pine and Locust in comparison to a Couplet. • Likely to impact businesses along Cascade. • Does not address pedestrian-related congestion on Cascade. • Does not promote a pedestrian friendly environment on Cascade. • Less effective than couplet in long-term.

Alternative	*Issues/Opportunities/Constraints*
Implement proposed couplet intersection improvements but do not implement one-way streets along Hood and Main	• Intersection improvements are needed; allows City to further assess need for couplet over time. • Would not address primary capacity issues. • Would delay potential state funding for couplet. • Creates potential for more turning movement conflicts. • Not a viable solution in the long term to address congestion issues. Two-way traffic along the length of Hood and Main Avenues would not provide adequate capacity to accommodate long-term traffic growth.
Create a couplet using Cascade and Hood Avenues. Designate Main Avenue as the state highway with two-way traffic.	• Would eliminate significant amount of parking along Main Avenue (no diagonal parking allowed). • Would create similar circulation concerns as proposed Preferred Alternative. • Would impact businesses along Cascade (one direction of traffic only). • Would create even more significant congestion at couplet ends than Hood/Main couplet.

5. Proposed Comprehensive Plan and Zoning Ordinance Amendments

The City's Transportation System Plan (TSP) will need to be updated to refine and add improvement projects related to the couplet, update the analysis of the couplet previously provided in the TSP, and identify the cost and timing for improvement projects related to the couplet. Draft amendments to the TSP are included in Appendix 4 of this Plan. They include the following types of changes to Chapters 6 and 7 of the TSP.

- **Revised description of the proposed couplet.** The current description of the couplet in both chapters will be replaced with an abbreviated summary of the couplet options evaluated in 1999 and a new description of the proposed couplet identified as the Preferred Alternative in this Plan. The new couplet description will include a level of detail similar to the old couplet description.
- **Updated description of the Locust Street/Highway 20 improvement**. This section of the TSP in both chapters will be revised to incorporate new findings and analysis from this planning process, including new planning level cost estimates and a general description of right-of-way needs.
- **Updated Summary of Transportation Improvements (Tables 6-1, 7-3 and 7-6).** These tables will be updated to include the preferred couplet alternative and associated improvements.
- **Update Bicycle and Pedestrian Plan elements of Chapter 7**. These sections will be updated to include brief descriptions of improvements related to the couplet plan.

Appendices will be available in a separate volume.

Appendix 1. Summaries of CAC Meetings

Appendix 2. Summary of Public Workshops

Appendix 3. Technical Memoranda

Appendix 4. Proposed Transportation System Plan (TSP) Amendments