

JUNE 2024

DRAFT

# SOUTH MADRAS

## Refinement Plan



City of Madras | Oregon Department of Transportation

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# SECTION ONE

## Introduction

# 1

### Creating a Safer, More Functional Highway for Everyone

The City of Madras makes quality of life a priority for residents and visitors alike. Even as the area continues to develop and grow, the City has remained committed to maintaining the character and safety of the community. The South Madras Refinement Plan supports the ongoing economic development surrounding the city while also ensuring that the safety and functionality for all users is not compromised whether they ride, bike, or walk, or drive.

As the largest city in Jefferson County, Madras serves as a critical economic center for the region. To address transportation safety, access, and connectivity issues, the refinement plan focuses on challenges along US 97 and US 26 in southern Madras. The two routes share an alignment through the city with US 97 running north to south and intersecting with US 26, which runs east to west, south of Madras.

Everyone from residents, tourists, and passing-through truck deliveries use these two highways. They serve as focal points for local, regional, and statewide travel, including a significant amount of freight activity.

An area of concern on US 97 in Madras is a lack of east-west access across the highway by vehicles, pedestrians, and bicyclists. High regional and recreational travel often results in a substantial back-up of traffic south of the one-way couplet within city limits. This creates challenges for vehicles turning to and from the highway and inhibits the ability for pedestrians and bicyclists to safely cross.

By improving access to the areas east and west of US 97, it will allow the area to meet the high travel demand more easily and safely.

The City of Madras and the Oregon Department of Transportation (ODOT) are focusing on the segment of US 97 between southern City of Madras limits and the “Southern Y.” This refinement planning effort was recommended in the 2018 update to the City of Madras Transportation System Plan (TSP) and is consistent with the recommendations in that plan.





## Current Function of US 97

As a critical roadway for the City of Madras, US 97 serves a variety of users. It is an important statewide and designated freight route that provides north-south access between northern California and into Canada. It requires efficiency to minimize interruptions to the flow of goods and services. US97 also serves local trips for all travel modes within Madras as well as surrounding Central Oregon areas including Metolius, Redmond, and Bend.

Beyond supply chain demands, it also attracts a high number of recreational travelers due to its proximity to the Cascade Mountain Range. Annual daily traffic (15,000-20,000) on US 97 increases approximately 50% during peak summer months.

In addition, US 97 is a key network for pedestrians, bicyclists, and transit riders. Cascades East Transit provides two fixed-route services to Madras that rely on US 97.

Over recent years, the US97 corridor in South Madras has experienced deferred maintenance and includes uncompliant ADA curb ramps as well as limited crossing opportunities for people walking and biking. ODOT has an existing project in Madras (US97/US26: Earl St to Colfax Ln) that would replace deficient pavement conditions, uncompliant ADA curb ramps, infill sidewalk gaps, and add enhanced pedestrian crossings along the corridor. While the project was intended to extend from Earl Street to Colfax Lane, current funding shortages did not allow the project to complete the full extent of improvements to Colfax Lane. Future implementation of the South Madras Refinement Plan should consider improvements made to the corridor through the current phase or future phases of the US97/US26: Earl St to Colfax Ln project.

## Preparing for Economic Development

Large parcels of vacant lands in South Madras represent a significant opportunity for future residential and economic development within the community. Commercial and residential development will expand the local economy by bringing additional work and opportunities to the area. However, increasing development will also increase travel demands, including turning movements to and from the highway, and will further intensify the challenges users already face.

## Where is This Happening?

The South Madras Refinement Plan evaluates lands and transportation infrastructure within the southern portion of Madras bordered by J Street to the north, Culver Highway to the west, Colfax Lane to the south, and Adams Drive to the east.

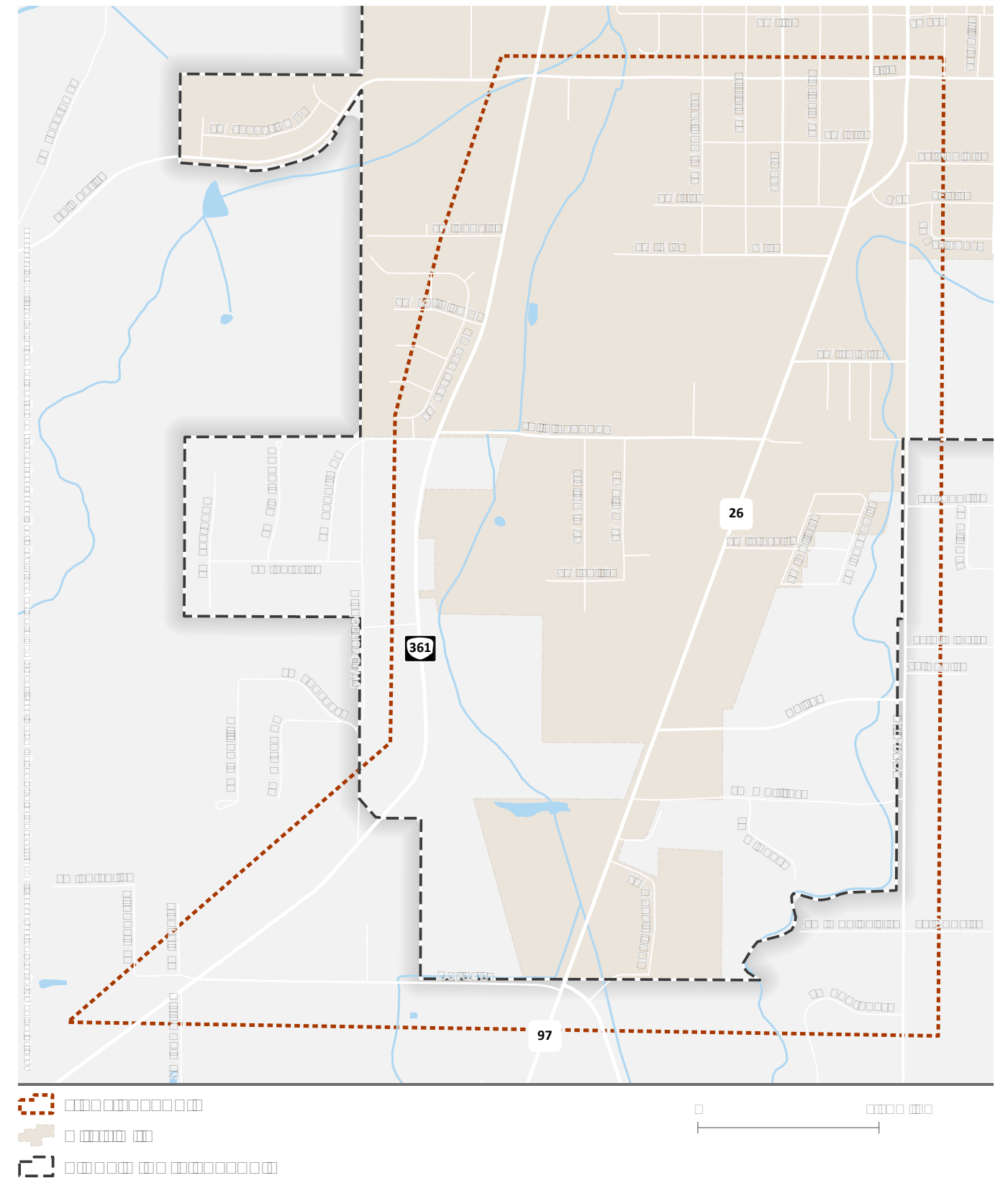


Figure 1. South Madras Study Area

# SECTION TWO

## Purpose & Needs

# 2

### What is the Purpose?

The primary purpose of the South Madras Refinement Plan is to identify how to best improve connectivity and safety for users east and west of US 97.

Central Oregon has experienced exponential recreational, household, and employment growth and is regularly listed as one of the fastest growing areas of the country. The cumulative effect of these realities has been regular and sustained increases in demand on the regional and local transportation system, which has created challenges throughout the Madras community and added barriers for those traveling along or across the highway system. US97, which is a critical north-south route for both regional and local users, has experienced in the past large increases in demand within the Madras community as a result of this growth. These increases are forecasted to continue in the future.

Based on an analysis of the existing and future conditions of the highway, as well as feedback from the public, three primary needs emerged as critical to meet the projected increase in traffic demand and economic development in the study area.

### NEEDS



#### 1. Insufficient side street and long-term mainline capacity on US 97

On an average day, the south end of Madras experiences high levels of traffic on US 97. Times of high travel, such as summer and holiday weekends, increase the number of vehicles on the road even more. The strain on side streets and mainline capacity will only increase with local and regional growth that is anticipated to result in an average 2.6% yearly growth rate on the highway system.



#### 2. Lack of east-west connectivity between J Street and US 26

Without any continuous east-west routes south of J Street that connect Culver Highway to Adams Drive, people must rely on US 97 for local circulation. Since it is already difficult for vehicles to move safely this way, it discourages people from walking or riding a bicycle.

The TSP identifies east-west extensions of Hall Road and Fairgrounds Road to help alleviate this issue.



#### 3. Incomplete pedestrian and bicycle network in current network

The current network makes walking or riding a bicycle difficult and stressful for users. South Madras lacks sufficient facilities to safely support pedestrians and cyclists. There are several gaps on the highway and local systems, including no traffic control devices or median crossings of US 97 in the study area except for an existing rectangular rapid flash beach (RRFB) between Fairgrounds Road and Bard Lane.

As development begins in south Madras and additional destinations are created, these barriers will only be further exacerbated.

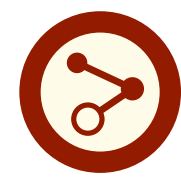
# SECTION THREE

## Goals & Objectives

# 3

### Project Goals

The South Madras Refinement Plan was guided by a set of goals and objectives. These are based on the goals and objectives in the City of Madras Comprehensive Plan and Transportation System Plan, which were developed to guide the City's 20-year vision of transportation system needs.



#### Goal #1: Mobility & Connectivity

Promote a transportation system that provides efficient connections for all users within Madras and meets existing and future mobility needs.



#### Goal #2: Economic Development

Provide a transportation system that supports existing industry and encourages economic development and job creation in the City, especially within key development areas. Improve short- and long-term transportation infrastructure to support local and regional travel and livability.



#### Goal #3: Safety

Provide a transportation system that improves safety and multimodal accessibility throughout the city and especially within the downtown core.



#### Goal #4: Multimodal Users

Provide a multimodal transportation system that permits the safe and efficient transport of people and goods through active modes.



#### Goal #5: Environmental

Provide a transportation system that balances transportation services with the need to protect the environment.



#### Goal #6: Planning & Funding

Maintain the safety, physical integrity, and function of the City's multimodal transportation network.

Want more details?  
See Technical Memorandum #1: Goals and Objectives

# SECTION FOUR

## Engaging the Public

# 4

### How We Engaged the Public

Community voices informed every step of the study process, from initial fact-finding to selection of the final, preferred design concept.

To capture a representative sample of all voices in a community, the project team connected with people in several different ways. Here's how the project team reached out to members of the public.



#### Project Advisory Committee

The project advisory committee (PAC) advised the project team at set milestones. It was made up of representatives from the City of Madras, ODOT, Jefferson County Public Works, and local businesses. They reviewed draft documents, including technical memos and planning concepts. A full listing of the PAC can be found at the beginning of this study in the acknowledgments section. The PAC met four times between the summer of 2023 and spring of 2024.

#### Public Meetings

There were several opportunities for members of the public to engage with the project team and provide their input. Three public meetings were held between the summer of 2023 and spring of 2024. Attendees were presented with information and had the opportunity to provide oral and written feedback.

**PAC 1**



**PAC 2**



**PAC 3**



**PAC 4**



**Public Meeting 1**



**Public Meeting 2**



**Public Meeting 3**



Figure 2. PAC/Public Meeting Involvement

# Key Takeaways from Public Engagement

*Tell us your thoughts regarding traffic and safety improvements on US97/US26 in South Madras.*

Numerous intersections that would benefit from signals, design changes, and/or restriping.

Be aware of traffic impact on businesses in the south of Madras. In that area, access in and out of parking lots can be very hazardous.

Be aware of traffic impact on businesses in the south of Madras. In that area, access in and out of parking lots can be very hazardous.

Providing a well-connected network for all users is a primary goal.

We need to slow the flow of traffic and prevent traffic back up.

In developing the design to facilitate driver ease, utilize human factors engineering.

For pedestrians crossing the highway, crossings need to be installed instead of traffic lights at Hall and Brush.

**The solution needs to focus on the relationship between traffic volume, speed, and safety.**

Remember that many housing units are being constructed this year, so it will be important to build in phases.

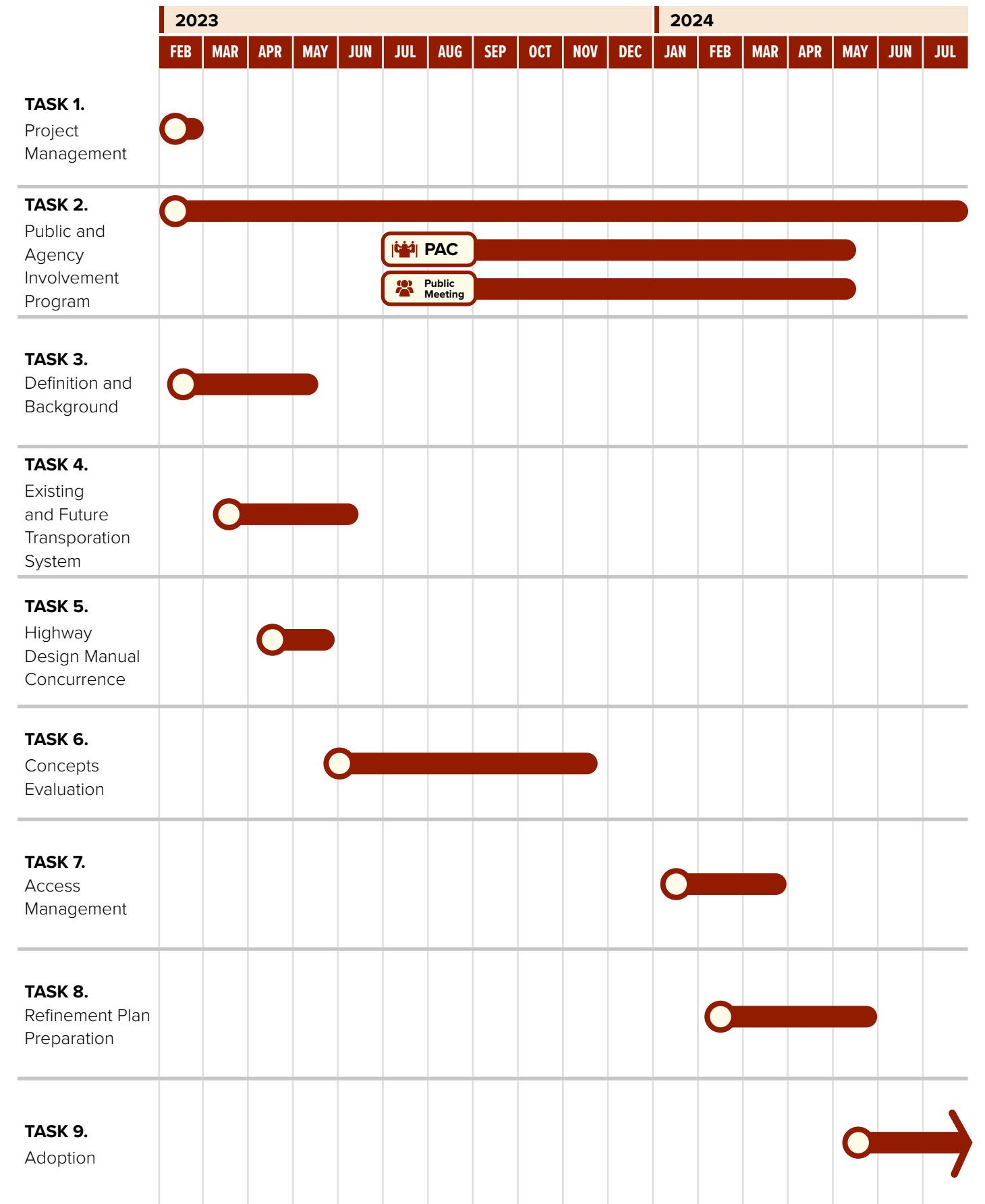
The mainline enhancement concept is less disruptive, doesn't divert traffic away from existing businesses, and allows for traffic breaks.

J Street must be changed to alleviate the bottle neck and back ups during weekend traffic.

The people and families living between J Street and Dover Lane need southbound access onto the highway



# Study Schedule





# SECTION FIVE

## Existing & Future Conditions

# 5

### Land Use Context

The developable land within the study area is filled with potential to advance the economy of the city and support the community. Currently, the land use in the area is zoned for a variety of purposes: commercial, residential, parks, and open spaces, including the Jefferson County Fairgrounds.

Due to its versatility and proximity to highway systems, the City has identified the South Madras study area as critical for future economic development. As development progresses, the demand on the local and regional transportation infrastructure will increase.

The study area represents a combination of land both inside and outside of the City limits, as well as inside the Urban Growth Boundary (UGB). The study roadway segments and intersections include locations along key corridors including US 97, Culver Highway, and Adams Drive.

### Demographics

The study area in Madras has a higher percentage of underserved populations than the state of Oregon. This includes youth, people below the federal poverty level, with low English proficiency, people with disabilities, and zero vehicle households.

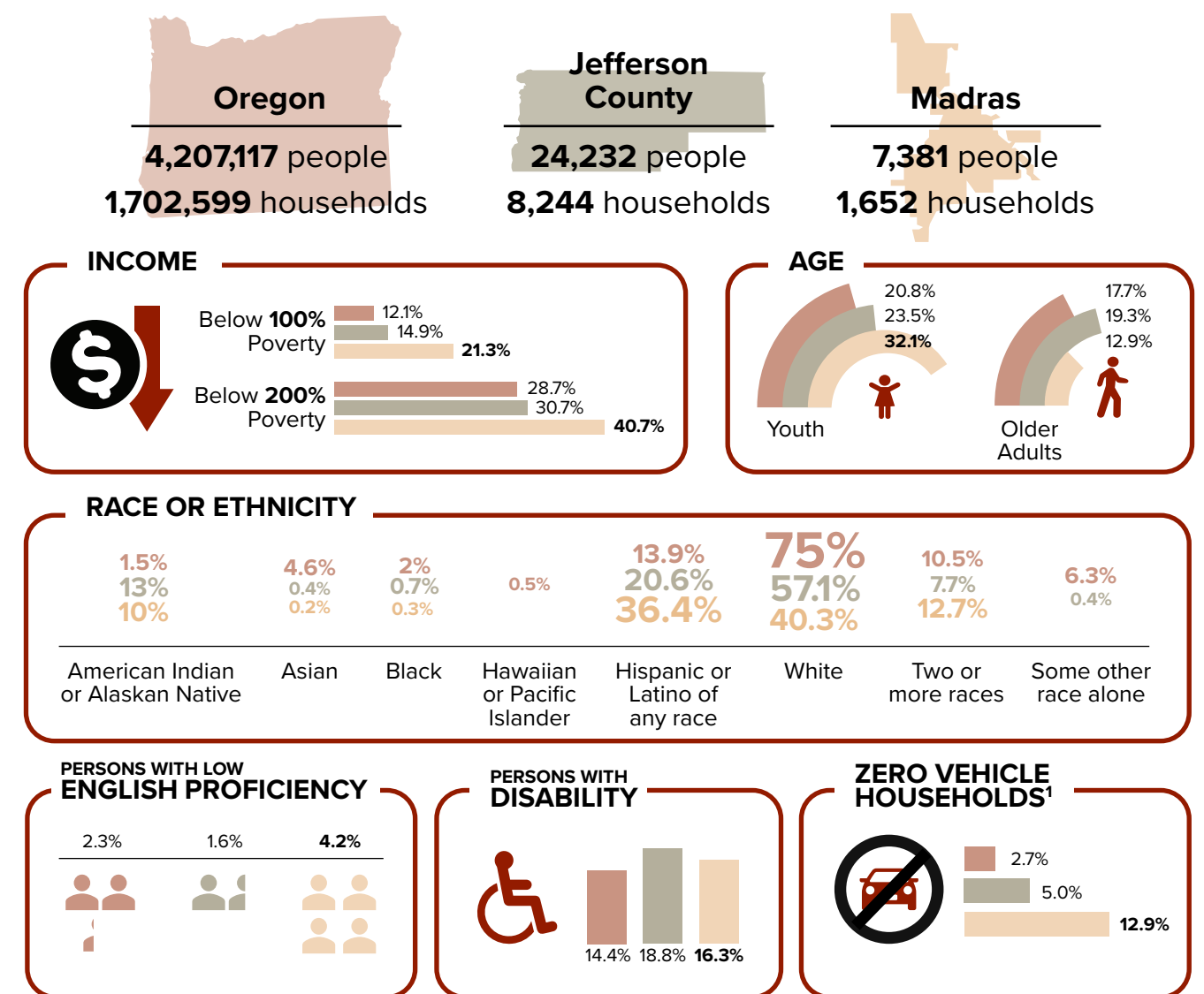


Figure 4. Study Area Demographics

American Community Survey 2017–2021 5-Year Estimates; Tables B01003; B11016; S1602, C17002, B03002, B25044, B01001.

<sup>1</sup> A percent of households. All other proportions calculated as a percent of total population.

## Environment

In the study area, there are natural and cultural resources to take into consideration as the project moves forward. There are several water and wetland features including two canal/ditches, an intermittent stream, and two manmade freshwater ponds. One of the unnamed streams has an approximate 100-year floodplain according to the Federal Emergency Management Agency's Flood Insurance Rate Map.

The Jefferson County Fair Complex is also located in the study area, which is considered a public recreation area. Within the fairgrounds, the "pioneer homestead on fairgrounds" is listed as a historical structure in the City of Madras Comprehensive Plan.



## Pedestrian Connectivity

When a street has no sidewalks or intermittent sidewalks, pedestrians are forced to walk along the edge of the road or use the shoulder if available. These types of barriers can deter someone from walking in the first place. A lack of safe and accessible sidewalk facilities can increase the number of vehicles on the road when people choose to drive short distance trips instead of walking or other forms of multimodal transportation, such as riding a bicycle.

In the study area, there are several noticeable gaps and deficiencies in the pedestrian network:

Study Area	Deficiencies
US 97	Disconnected sidewalks or no sidewalks are provided between Colfax Lane and Hall Road.
Culver Highway	No sidewalks are provided. The nearest sidewalk is north of the study area at Madison Street.
Adams Drive	No sidewalks are provided except for the approximately 250-foot segment between Tracie Street and L Street on the north side of the study area.
J Street	Disconnected sidewalks or no sidewalks are provided between Culver Highway and US 97 SB.

Table 1. Pedestrian Network Deficiencies

While the existing sidewalks facilities in the study area appear to be in good condition, most of them operate with moderate or high stress for pedestrians.

## Bicycle Connectivity

Bicycle facilities are provided in the study area through partial bike lanes on segments of US 97, Hall Road, and J Street and a shared-use path on the north side of Fairgrounds Road.

Segments on all roads in the study area except Fairgrounds Road either rely on shoulders for bicycle travel or do not have any shoulders, including:

Study Area	Deficiencies
US 97	6-foot shoulders are provided between Colfax Lane and Hall Road. Striped bike lanes are provided from Hall Road to J Street, but there are no striped lanes provided south of Hall Road.
Culver Highway	4-foot shoulders are provided between Colfax Lane and J Street.
Colfax Lane	No shoulders or bicycle facilities are provided.
Adams Drive	No shoulders or bicycle facilities are provided.
Bard Lane	No shoulders or bicycle facilities are provided.
Hall Road	6-foot shoulders are provided east of US 97.
J Street	10-foot combined shoulder/parking lane provided between Culver Highway and US 97 southbound.

Table 2. Bicycle Network Deficiencies

Most bicycle facilities within the study area operate with moderate or high stress for bicycle riders.

## Safety

During the five-year study period between 2016 and 2020, zero fatal crashes occurred in the study area. However, raw ODOT crash data from 2021 includes a crash that resulted in a pedestrian fatality at a mid-block location with no marked crosswalk on US 97. The pedestrian and the driver were found to be under the influence of drugs and/or alcohol.

At key intersections and segments throughout the project area, more than 140 crashes were recorded in the project area between 2016 and 2020. More than half of these crashes resulted in property damage or minor injuries only. Three of the reported crashes involved bicyclists and pedestrians.

Two intersections in the study area exceed ODOT's critical crash rate, which is used to assess the safety of roadways in the state:

- US 97 SB and J Street
- US 97 NB and J Street

The Safety Priority Index System (SPIS) was developed by ODOT to identify sites along state and local roads where potential safety issues warrant further investigation. The most recent SPIS list from 2022 shows a top 15 percent SPIS site on a horizontal curve on Culver Highway between Fairgrounds Road and Colfax Lane.

## Operations

The intersection at US 97 Southbound and J Street is currently not meeting applicable Oregon Highway Plan performance standards in the weekday PM peak hour. All other study intersections meet applicable standards today. However, as noted previously, the study area experiences heavy demand during holiday and seasonal periods where queuing and delays exceed standards.

## Regional Economic Growth Potential

With development in the study area, traffic volumes along US 97 are expected to increase by approximately 16.4 percent south of the study area and increase by approximately 17.2 percent along Culver Highway south of the study area by 2045. This brings the cumulative growth over the 22-year period to approximately 0.75% per year for US 97 and 0.78% per year for Culver Highway.

Part of what drives this traffic increase will be the growing population. The most recent population forecast report from Portland State University's Population Research Center expects the population of Madras will grow at a rate of 1.4% per year between 2020 and 2045 with the number of households growing at the same rate.

Regardless of development in the study area, the population and number of households will increase; however, employment is not projected to grow at the same rate. This poses potential problems for residents who are looking for local employment. For this reason, providing for increased local economic development, which this plan strives to support, is critical for the community's continued growth.

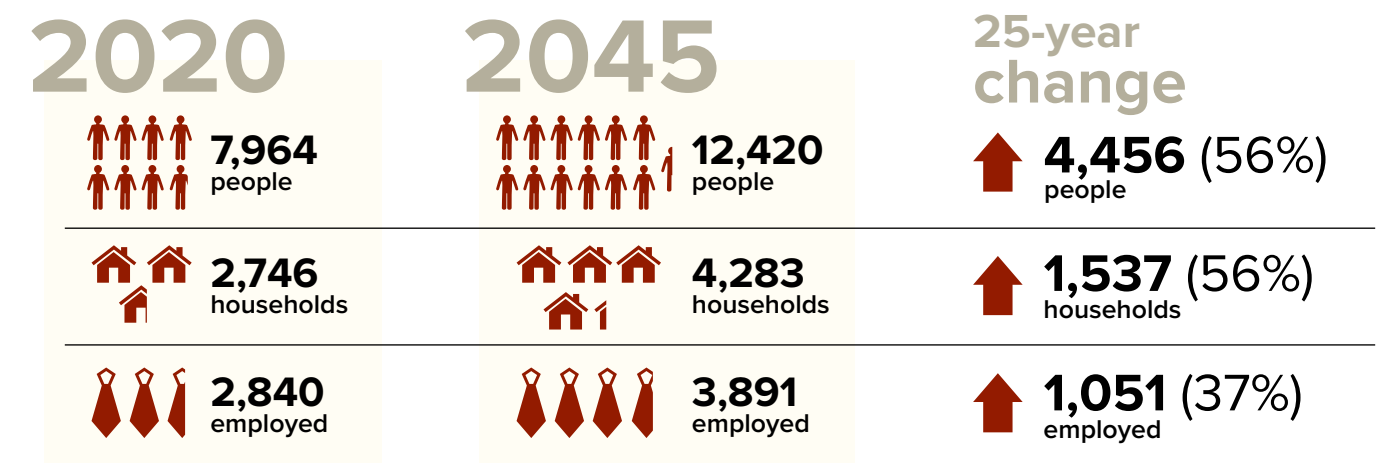


Figure 5. Population, Household, and Employment Summary

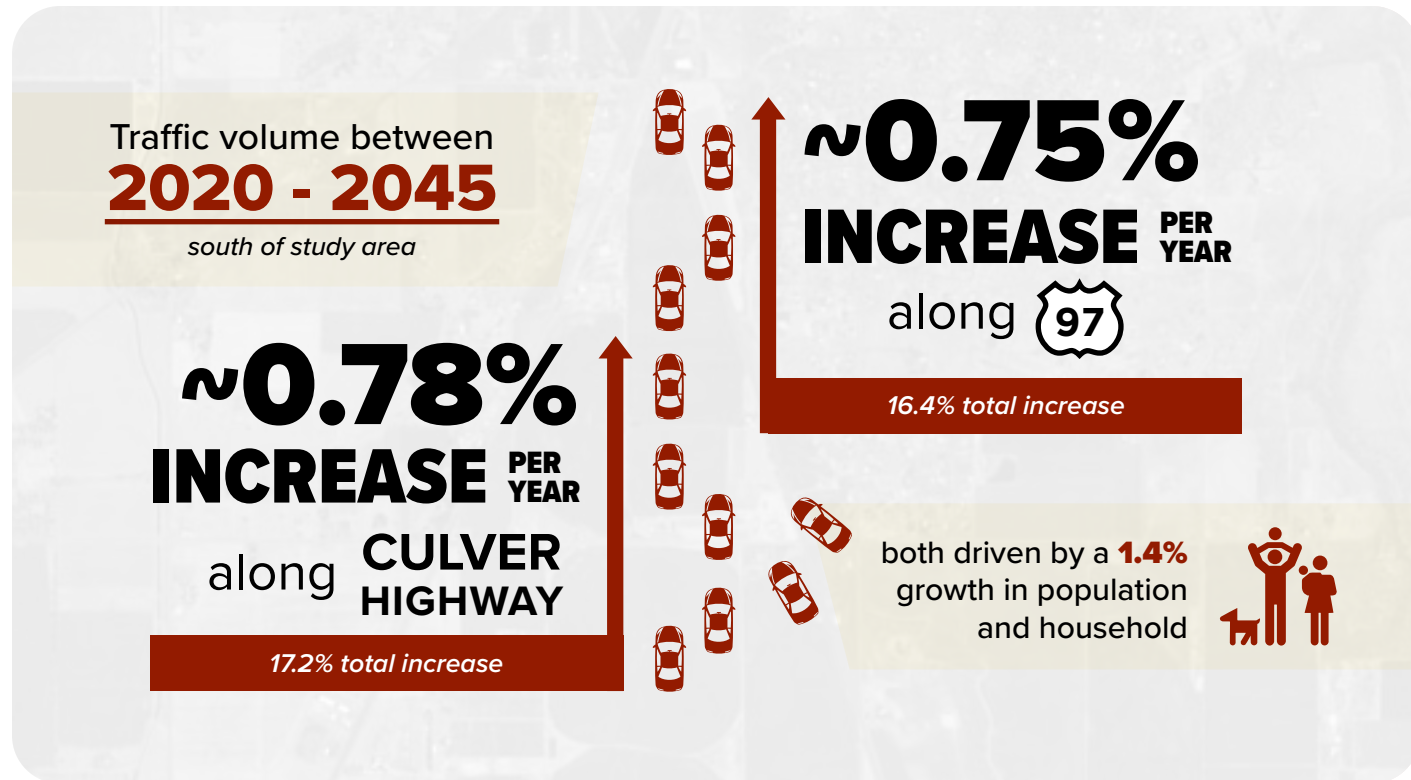


Figure 6. Traffic Volume Increase Between 2020-2045.

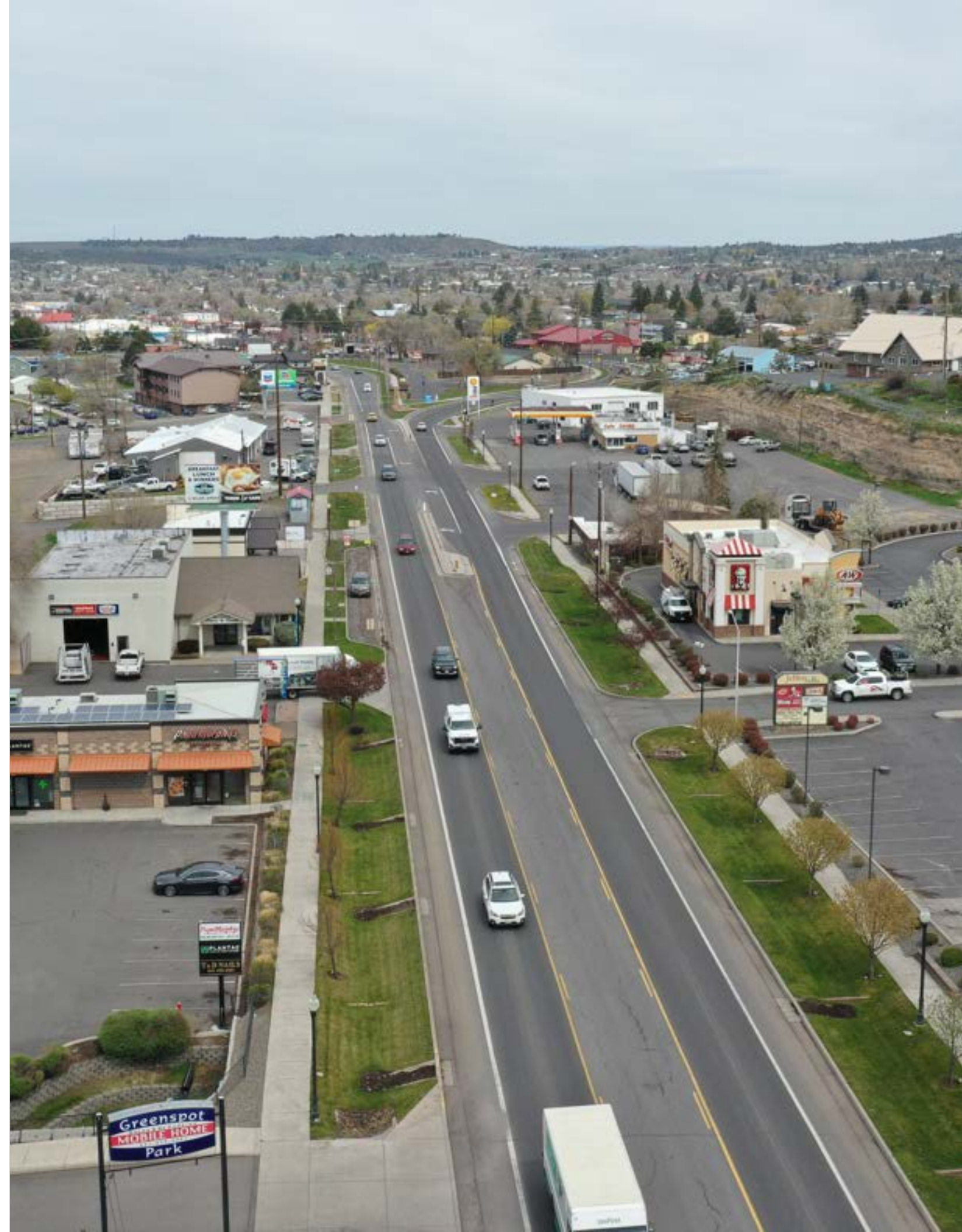
## Future Operations

Future analysis in the study indicates that stop-controlled intersections at side streets are not sufficient to support the future travel demands, demonstrating the need for more efficient east-west connections and access across US 97.

If no changes are made to the infrastructure in the study area, travelers will face even more stressful conditions. Given current traffic volumes and considering projected population growth, US 97 would operate near capacity in the study area by 2045.

In this scenario, all the side street intersections along US 97 would operate over capacity and turning left onto the highway would become very difficult and time-consuming, especially at the following intersections:

- US 97 NB (5th Street) and J Street
- US 97 SB (4th Street) and J Street
- US 97 and Bard Lane
- US 97 and Fairgrounds Road
- US 97 and Hall Road
- US 97 and Colfax Lane
- Culver Highway and J Street



# SECTION SIX

## Looking at Alternatives

# 6



### How Were the Concepts Developed?

The City of Madras TSP includes several planned roadway and intersection improvements in the study area. As the TSP has a 20-year planning horizon, all projects included in the TSP were included in the three alternative concepts developed.

All concepts were assumed to include the following improvements consistent with the TSP:

- Two roundabouts on Culver Highway at Hall Road and J Street.
- Two traffic signals on US 97 couplet at J Street.
- Additional connections to the local road network as shown in the City TSP.

### CONCEPT 1

### Couplet Extension

*After input by the public and PAC, the couplet option was dropped due to level local impacts and out of direction travel for users.*

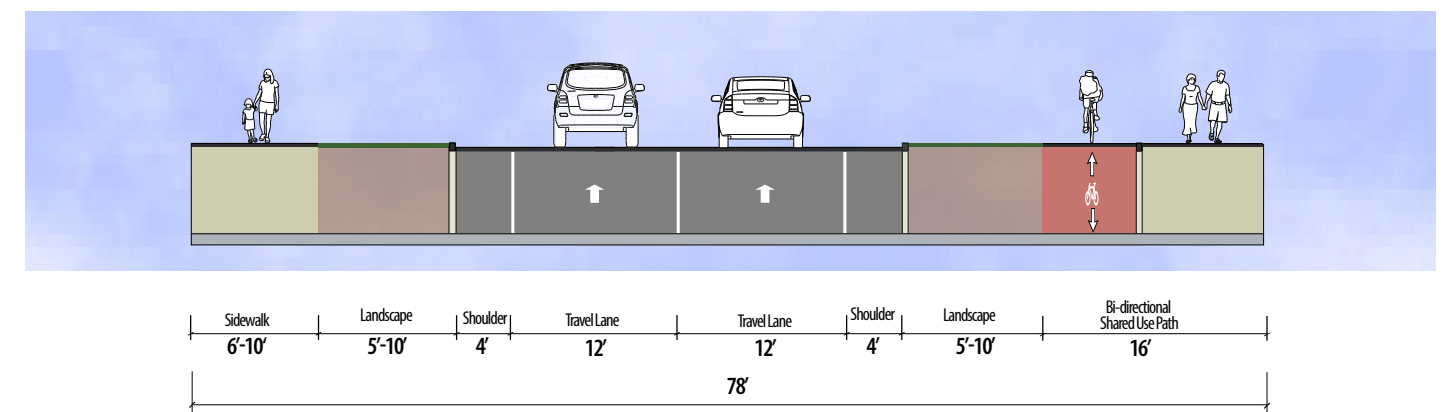


Figure 7. US 97 - Couplet - Northbound & Southbound

Concept 1 would extend the north-south couplet of US 97 from Downtown Madras to the intersection at US 97 and US 26/Colfax Lane. Southbound US 97 would follow the existing US 97 alignment while the northbound would be aligned to connect to Adams Drive north of Hall Road.

## CONCEPT 2

# Grade Separated Interchange at Colfax Lane



The project team's refined cost opinion for Concept 2 is \$80-90 million.

### Want more details?

A further breakdown of the revised cost estimates is provided in Technical Memorandum #7: Preferred Concept

Figure 8. Grade Separated Interchange at Colfax Lane



This concept would construct a grade separated interchange to ODOT standards at the intersection of US 97 and US 26/ Colfax Lane. By creating an efficient connection to Culver Highway from US 97, the interchange would provide for increased connectivity for non-highway movements on side-streets and improve access to development lands within the study area. This would reduce reliance on US 97 and better utilize capacity that is expected to exist on Culver Highway through 2045.

The following subsections correspond to the Goals and Objectives identified for the project and describe how this Concept would help the transportation system move towards each.

## Mobility & Connectivity

A continuous median along US97 would be provided to reduce turning movement conflicts at side streets and driveways. The interchange could be used by southbound vehicles to turn around to access businesses and driveways on the eastside of US97. Northbound vehicles could turn at the recommended traffic signals at J Street to access businesses on westside of US97.

Two different turn-movement restriction alternatives could be considered at the primary intersections of Fairgrounds Road and Hall Road. Both options would require further evaluation to determine if U-turn movements along the corridor are needed to support business access:



### Option 1

All only right-in, right-out, and left-in movement while restricting left-turns from the minor street.



### Option 2

Restrict right-in, right-out at all locations.

Since the interchange concept would reduce travelers' reliance on US 97, intersections along US 97 could continue to operate as side-street stop-control with appropriate turn restrictions to limit conflict points. Two different turn-movement restriction scenarios were evaluated for US 97 intersections as part of this concept:

- **Scenario 1:** Construct a continuous median on US 97 to limit existing and future driveways to right-in, right-out movements. There would be openings at key intersections to provide for left turns from the highway. Left turns and through movements from the side street would be restricted.
- **Scenario 2:** Construct a continuous median on US 97 and limit all intersections to right-in, right-out only. No left turn movements would be allowed.

## Economic Development

The local network within key economic growth areas in the vicinity would be built out according to the roadway system identified in the Madras Transportation System Plan (TSP). In addition, a new road connection would be provided between US97 and Culver Highway north of Colfax Lane to improve circulation and connectivity for the local area and to provide connections to economic opportunity land. This road would require an amendment to the Madras TSP.

## Safety

Crash reduction factors (CRFs) are improvements or countermeasures, such as adding illumination or installing a sidewalk, to decrease the number of crashes on a given roadway. The project team used the CRF table provided by ODOT to select appropriate CRFs for this concept. These indicate that the interchange concept could result in reduced vehicular crashes and reduced crashes involving pedestrians or bicyclists at US 97 and Colfax Lane.

## Multimodal Users

The interchange concept includes bicycle and pedestrian facilities on both sides of US 97, which would address the previously identified needs of the study area by improving connectivity and access for pedestrians and bicyclists. Multimodal facilities such as sidewalks, paths, and bike lanes would be designed to support the urban context consistent with ODOT design practices and the needs of the community. One travel lane in each direction would provide a wide landscape buffer area between the curb and the sidewalk.

## Environmental

The proposed roadway connection between US 97 and Culver Highway in this concept lies on a floodplain and may require additional drainage treatment to mitigate impacts. Additionally, the interchange at the US 97 and U S26/Colfax Lane intersection would require additional right-of-way to construct.

It is necessary to conduct additional review and analysis to fully understand potential environmental impacts. This type of analysis would be completed during future project development and design efforts.

## Planning & Funding

The purpose of this plan is to identify how to best improve connectivity and safety for all users in South Madras through solutions that can be implemented within the next 20 to 25 years. There are currently no funding sources to design or construct improvements within the South Madras study area. The grade separated interchange concept could range from **\$80 million to \$90 million in 2023 dollars.**

The construction cost includes:

- Interchange bridge structure
- Earthwork
- Asphalt pavement
- Aggregate base
- Pedestrian facilities
- Traffic control devices

*Right-of-way costs are not included in the opinion.*

This concept minimizes right-of-way impacts along US 97 by utilizing Culver Highway; however, construction of the interchange is expected to be extensive and have numerous rights-of-way impacts to properties adjacent to the US 97 and US 26/Colfax Lane intersection.

During construction, maintaining traffic along US 97 could be challenging due to the large footprint of the interchange construction and the expected need to elevate US 97 over US26/Colfax Lane. To alleviate some construction phasing challenges, interchange ramps could be constructed first for north-south traffic to use during subsequent construction stages. Construction will likely also impact travel along US 26 and along Colfax Lane.

A primary benefit of the grade separated interchange concept is the construction of the interchange at Colfax Lane to improve safety and connectivity. However, without a large funding package or source to implement this interchange, operational conditions within the South Madras area would remain challenging, especially for access east-west across US97 and to and from the highway itself.

## OPPORTUNITIES

- Creates a more connected roadway network between US 97 and both Adams Drive and Culver Highway.
- Provides a long-term capacity solution at the US 97 and US 26/Colfax Lane intersection.
- Like Yew Avenue in Redmond, an interchange Colfax Lane would serve as the gateway for north-bound vehicles approaching Madras.
- Does not stop mainline freight on US 97.
- Provides shorter crossing distances for pedestrians with one travel lane in each direction.
- Addresses crash history at US 97 and Colfax Lane with grade separation.
- When expanded to two travel lanes in each direction, there would be more capacity on US 97, and the highway would be free flow until reaching the downtown area (*Free flow may be briefly stopped at enhanced pedestrian crossing locations*).

## CHALLENGES

- Full access control would be required between Colfax Lane and Hall Road, and possibly farther to the north, due to the interchange at US 97 and Colfax Lane. A frontage road or alternative local system may be necessary to provide access to businesses that currently have access to US 97 along this segment.
- The interchange could require a partial cloverleaf or other unique ramp design to maximize the distance between the northbound on-ramp and Hall Road to reduce weaving.
- Implementing an interchange at US 97 and Colfax Lane would have more impact to adjacent properties than other concepts.
- Median access control would be necessary throughout the corridor and could necessitate U-turns and out of direction travel for businesses along US 97.
- Would require additional travel lane (two in each direction) on US 97 (beyond 2045) to accommodate regional increase in travel.
- Implementation of this concept could be more difficult to phase due to the high relative cost.

## CONCEPT 3

# US 97 Mainline Enhancement

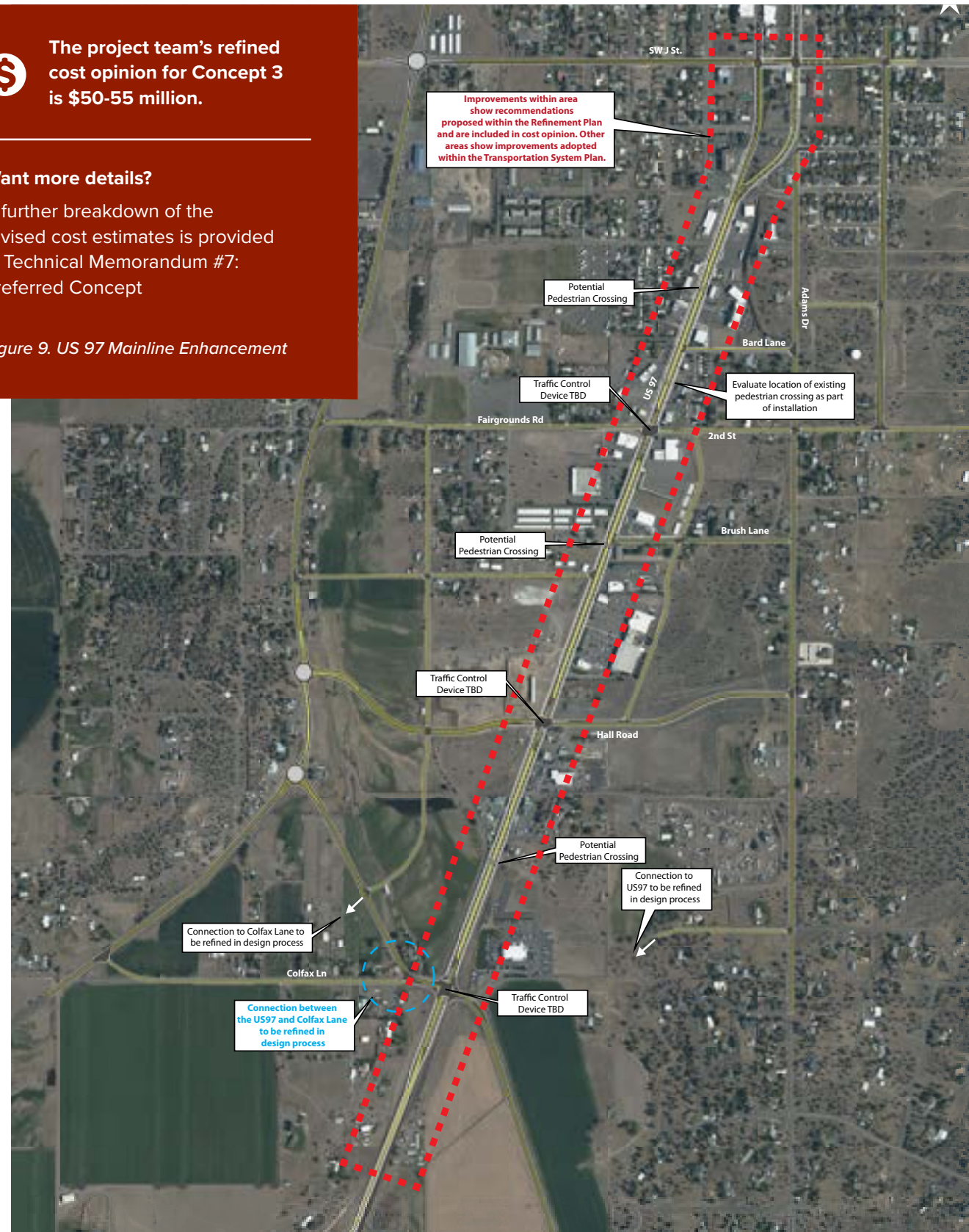


The project team's refined cost opinion for Concept 3 is \$50-55 million.

### Want more details?

A further breakdown of the revised cost estimates is provided in Technical Memorandum #7: Preferred Concept

Figure 9. US 97 Mainline Enhancement



Concept 3 widens US 97 and includes two lanes in each direction with a continuous median along US 97. The existing two-way stop-controlled intersections on US 97 at US 26/Colfax Lane, Hall Road, Fairgrounds Road, and J Street would be improved with traffic control devices, such as a traffic signal. Unlike other concepts, this concept relies primarily on US 97 improvement with minimal changes to other facilities required.

An important aspect of this concept is the provision for future intersection control at key intersections along US 97. For the purposes of this evaluation, traffic signals have been assumed to evaluate the concepts functionality. Future evaluation will be necessary to determine the specific intersection control implemented at each intersection based on applicable ODOT and City of Madras criteria.

The following subsections correspond to the Goals and Objectives identified for the project and describe how this Concept would help the transportation system move towards each.

## Mobility and Connectivity

In this concept, a non-traversable raised median will be constructed on US 97 which would restrict left turns to and from driveways along US 97. Full access movements would be provided at the key intersections (Colfax Lane, Hall Road, Fairground Road, and J Street), where traffic control devices would be implemented. Further evaluation is necessary to determine if U-turn movements are needed to support business access.

With this concept, all intersections in the study area are forecasted to meet the mobility targets outlined in the Oregon Highway Plan for the 20-year planning horizon assuming the following is completed:

- Two travel lanes in each direction on US 97
- Traffic control devices with turn lanes are constructed at the intersection of US 97 and Fairgrounds Road and the intersection of US 97 and Hall Road

However, even with this concept design, vehicle queuing at turn lanes along the US 97 mainline are forecasted to extend beyond some private driveways during periods of high travel, such as seasonal traffic.

## Economic Development

The local network within key economic growth areas in the vicinity would be built out according to the roadway system identified in the Madras Transportation System Plan (TSP). In addition, a new road connection would be provided between US97 and Culver Highway north of Colfax Lane to improve circulation and connectivity for the local area and to provide connections to economic opportunity land. This road would require an amendment to the Madras TSP. Intersection control devices at critical intersections (Colfax Ln, Hall Rd, Fairgrounds Rd, J Street) would support all turning movements in and out of economic areas.

## Safety

As with the other concepts, the project team used the CRF table provided by ODOT to select the appropriate CRFs for this concept, which involves adding traffic signals (for the purposes of evaluating the concept, though specific intersection control will need to be determined through a future ODOT-led process) where there previously were none. In this example, the number of total crashes at the signalized intersections is projected to increase, but the reduction in angle crashes typically decreases the likelihood of crashes involving severe injury. Additionally, the selected typical CRFs suggest a broad reduction in vehicle crashes and crashes involving pedestrians.

## Multimodal Users

The mainline enhancement concept integrates bicycle and pedestrian facilities on either side of US 97. Continuous walking and bicycling facilities along US 97 would improve system connectivity and access to existing and future businesses. Multimodal facilities such as sidewalks, paths, and bike lanes would be designed to support the urban context consistent with ODOT design practices and the needs of the community. The concept includes several midblock crossing locations to reduce travel distances for people walking and biking. The resulting wide cross-section would increase pedestrian crossing distances and exposure across US 97.

## Environmental

The improvements along US97 are expected to largely stay within existing ODOT right-of-way. The proposed roadway connection between US 97 and Culver Highway in this concept lies on a floodplain and may require additional drainage treatment to mitigate impacts. It will be necessary to conduct additional review and analysis to fully understand potential environmental impacts. Such an analysis would be completed during future project development and design efforts.

## Planning & Funding

The mainline enhancement concept creates more opportunities for phased improvements along the US97 corridor as development and growth occurs over the next 20 to 25 years. Intersection control improvements could be constructed at critical intersections as funding and development occurs. Notably, this concept would not require a major investment initially, such as an interchange. The cost opinion for this alternative could range from **\$50 million to \$55 million in 2023 dollars**.

The base construction cost includes:

- Traffic control devices (assumed to be traffic signals)
- Asphalt pavement
- Aggregate base
- Pedestrian facilities

*Right-of-way costs are not included in the opinion.*

The proposed typical section for US 97 is expected to fit within the existing 100-foot right-of-way along the corridor. Widening US 97 would require reconstruction of existing driveways and sidewalks. However, business access could be maintained throughout construction with temporary traffic control measures. Similarly, traffic along US 97 may be impacted but is expected to be maintained with no long-term lane closures or detours anticipated.

At-grade intersection specific improvements at key east-west connections along the corridor create flexibility for the implementation of the mainline enhancement concept. Unlike the grade separated intersection where the majority of the project costs are focused on one location, the cost of improvements for the mainline enhancement are dispersed throughout the corridor at several locations making individual improvements less cost prohibitive and increasing the likelihood of constructing improvements in phases as funding becomes available.



## OPPORTUNITIES

- May be more capable of implementing in phases compared to the Concept 2: Grade Separated Interchange.
- Would provide full turning movements at US 97 intersections at Hall Road, Fairgrounds Road, and Colfax Lane.
- ODOT currently has right-of-way available on US 97 within the study area that may be adequate to implement this concept.
- Forecast to accommodate future highway demand beyond 2045.
- Creates a more connected roadway network between US 97 and both Adams Drive and Culver Highway.
- Two-stage crossing opportunity could be provided at midblock locations for pedestrians due to median installation.

## CHALLENGES

- Traffic control devices would be introduced for all US 97 traffic, including freight, which would increase mainline travel delays along the highway.
- Additional travel lane in each direction on US 97 would increase crossing distance for pedestrians.
- Median access control would be necessary throughout the corridor and could necessitate U-turns and out of direction travel for businesses along US 97.
- If identified as the appropriate intersection control, traffic signals may increase frequency of crashes (particularly rear-end collisions)



# SECTION SEVEN

## Preferred Alternative



Based on the evaluation presented and feedback received, the project team recommends Concept 3: US 97 Mainline Enhancement as the concept design to address the project goals, community needs and ongoing growth. The Mainline Enhancement concept is a solution that can be implemented within the next 20 to 25 years to serve the local community and address safety and capacity challenges on US97.

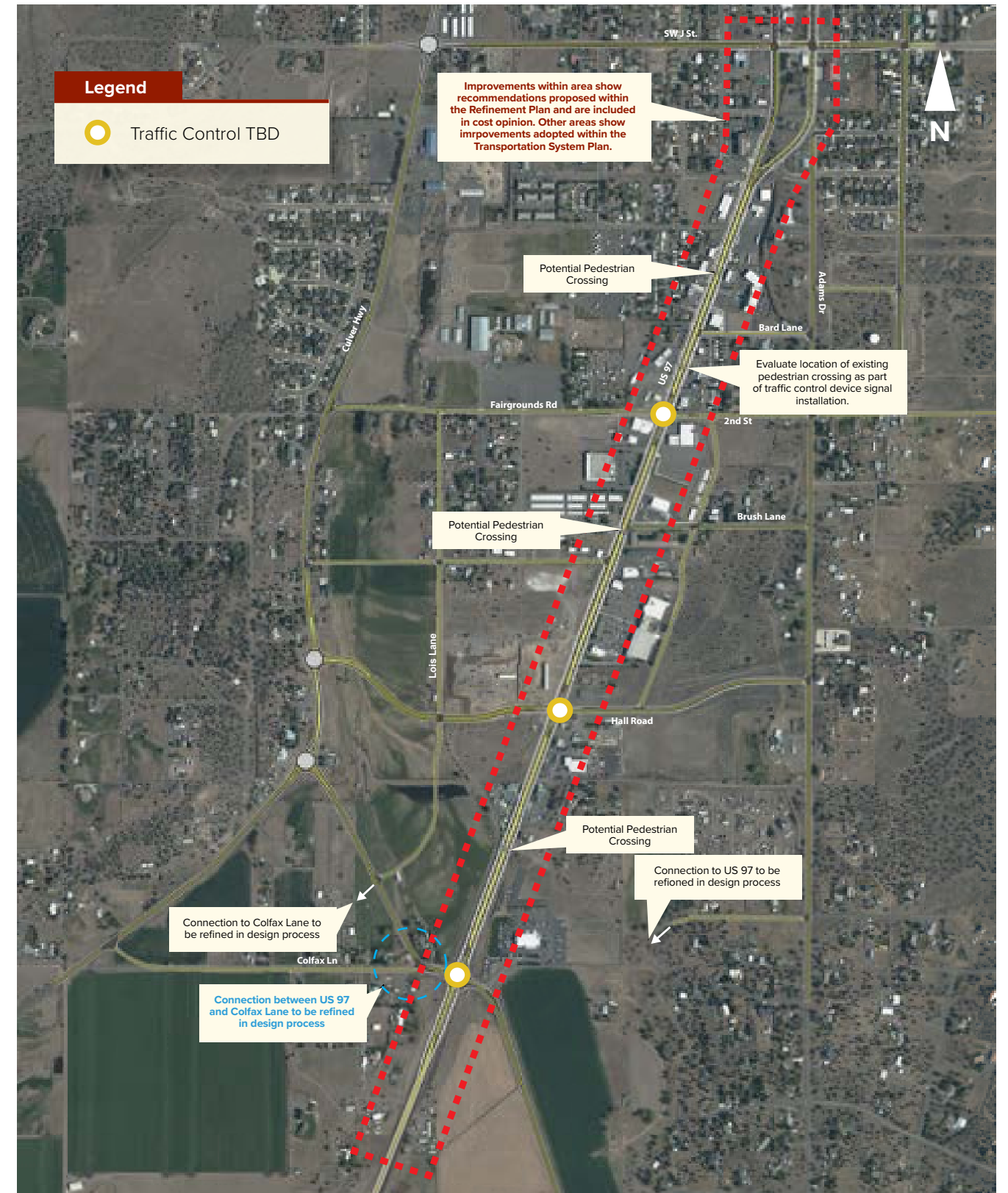
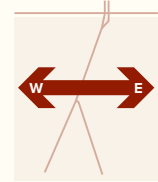


Figure 10. Mainline Enhancement Recommended Alternative Concept

## Why This Concept?

The following summarizes how the Mainline Enhancement concept meets the Goals & Objectives identified for the South Madras Refinement Plan.



### Mobility and Connectivity

The concept would increase east-west connections across the highway by providing traffic control devices at critical east-west intersections (Colfax Lane, Hall Road, Fairgrounds Road, J Street) and provide capacity resiliency for US 97 mainline past year 2045.



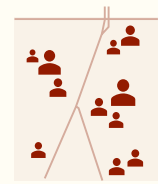
### Economic Development

The concept would provide full access intersection control devices at critical east-west intersections (Colfax Lane, Hall Road, Fairgrounds Road, J Street) that would provide opportunities for connections between the highway and key economic development lands.



### Safety

The concept would implement traffic control devices at currently uncontrolled intersections to address angle and turning movement crashes. The specific intersection form (i.e., what type of traffic control device is provided at these locations) could further improve safety conditions.



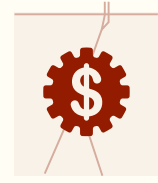
### Multimodal Users

The concept would address sidewalk and bike facility gaps through South Madras and create crossing locations along the corridor. The Refinement Plan recommendations should build upon the US97/US26: Earl St to Colfax Ln project.



### Environmental

The majority of improvements are along US97 are expected to be within existing ODOT right-of-way, which would reduce or minimize potential environmental impacts associated with project implementation.



### Planning & Funding

This concept provides viable phasing and implementation options that maximize the potential for public and private partnership opportunities to construct the necessary infrastructure to future growth.

## What Does This Concept Include?

### Intersection Control Devices

At key intersections (Colfax Lane, Hall Road, Fairgrounds Road, J Street) intersection control devices beyond the existing stop-controlled configurations (examples could include traffic signals, roundabouts, interchanges, alternative intersections, etc.) are installed to improve connectivity and safety.

The type of intersection control will be selected after an Intersection Control Evaluation (ICE) and review process is completed and approved by ODOT.

The US97/US 26/Colfax lane intersection, while not identified as an interchange in this concept, could be considered for such an improvement if future funding becomes available. In this scenario, ODOT, the City, and County would need to further refine improvement assumptions to the north and south to address applicable interchange and intersection spacing requirements.



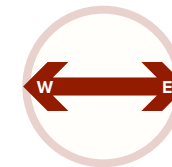
### Pedestrian Crossings

Pedestrian crossing locations will be provided at key intersections (Colfax Lane, Hall Road, Fairgrounds Road, J Street) when the intersection control devices are selected. Midblock crossings will also be provided to create more crossing opportunities for people walking, biking, and rolling. Midblock crossings are proposed north of Bard Lane, south of Brush Lane, and south of Hall Road consistent with the US97/US26: Earl St to Colfax Ln project.



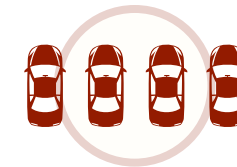
### East/West Connections

A critical project element is the new planned connection between US97 and Culver Highway that would extend northwest from the US 97/US 26/Colfax Lane intersection. This connection would enhance overall system connectivity and route choices for people traveling through Madras. In addition, the planned roads currently in the Madras TSP between US 97 and Culver Highway within the study area would connect to planned intersections improvements along US 97, thereby increasing access between the highway and economic development lands.



### Capacity/Widening

Traffic on US97 in forecast to continue to increase due to regional growth and growth within Madras. Beyond 2045 US97 will require additional lanes in each direction to serve this regional and local traffic. This concept would provide that capacity and allow for storage for vehicles as the approach the intersection control devices at key intersections.



### Freight/Mobility

US97 is a critical freight route within Central Oregon, the state, and along the west coast. Intersection control devices at key intersections will create turning opportunities and gaps for all types of vehicles including trucks accessing business on US97 and in the economic development land. As a reduction review route, specific improvements along US97 require coordination with ODOT's Mobility Advisory Committee (MAC).



### Access Control/Safety

Increasing highway traffic makes turning left from side streets or businesses difficult. To improve safety along the corridor, a median will be installed along US97 that will focus left turns and u-turn opportunities along the corridor at key intersection locations. Specific access review and median design should be further evaluated during future design phases.





However, it is also important to note that this concept will introduce up to three traffic control devices on US 97 that could create longer travel times and potential for collisions. This means that the proposed five-lane segment in Concept 3: US 97 Mainline Enhancement will eventually experience conditions similar to those experienced today on the southern segment of the US 97 corridor in Redmond and north segment of US 97 in Bend (which is being mitigated through the Bend North Corridor project).

In addition, specific aspects of this concept will need to be further refined through project development, stakeholder input, and funding availability, including:

- Specific traffic control devices and intersection configurations at the US 97/Fairground Road, US 97/Hall Road, and US 97/US 26/Coflax Lane intersections;-Further refinements to corridor design, including specific crossing locations, access strategies, and roadway cross-section configuration;
- Detailed review of available right-of-way and constraints to further understand possible impacts to specific properties and available mitigation measures;
- More detailed concept layouts and designs to further develop cost estimates and possible phasing to move towards implementation; and
- Coordinated funding strategies, such as a local funding mechanism, to facilitate local development review and build towards the funding needed to implement key elements of the Refinement Plan.

# SECTION EIGHT

## Implementation

# 8

One of the primary benefits of the mainline enhancement concept is the ability to phase intersection and corridor improvements over time as funding becomes available through public or private sources. The sections below describe implementation guidelines for prioritizing improvements as such funding becomes available.

### Intersections

As described in Section 5, the US97 Southbound and J Street intersection is currently not meeting ODOT performance standards. The J Street Couplet intersections have been identified as priority intersection improvement locations through previous City and ODOT planning documents and should be prioritized for addressing both capacity and safety.

Hall Road is identified in the City's Transportation System Plan as a critical east-west local and regional connection to Culver Highway. The truck stop on the northwest corner of the intersection experiences a high turning movement demand for passenger and freight traffic. Additionally, this intersection serves large amounts of undeveloped lands and is centrally located along the corridor. As such, improvements to the US97/Hall Road intersection would provide economic and local circulation benefits, making it a possible high priority location for improvement.

The timing of improvements at other critical east-west connections such as Colfax Lane and Fairgrounds Road are unknown at this time. The intersection of US97 and Colfax Lane (US26) provides critical access between major highways in Central Oregon – particularly for the freight industry. Fairgrounds Road is an important local connection with access to the County Fairgrounds and undeveloped economic growth areas. As development occurs and traffic demand increases, the City and ODOT will coordinate on funding and timing of improvements at these intersections.

### Additional Travel Lanes on US 97

Traffic demand on US97 is increasing for both regional and local trips. If the highway remains free flow (no traffic control devices to yield to or stop at for north-south traffic) there is enough capacity for the highway to function for the next 20 to 25 years. However, as side street turning movements and demand increases and intersection traffic control devices are installed at key intersections, additional lanes on the highway are needed to store vehicles as they stop or slow down.

Balancing the operational and safety needs of the corridor is an important aspect of this Refinement Plan and the vision of US97. The most severe crashes documented along this corridor have been angle, turning movement, and head-on collisions. Adding additional lanes without additional changes to the highway would create more conflict points for all users.

To support both safety and capacity, traffic separators, such as medians, should be installed as widening occurs to restrict left and through movements across the highway. As noted previously, traffic control devices should be installed at key locations to accommodate access to local businesses along US97 and, possibly, U-turn maneuvers (based on future evaluations).

The timing of additional travel lanes along the highway is largely contingent on when intersection improvements occur. Where widening is needed to accommodate the storage of vehicles on the highway, a traffic separator should also be installed. This means that widening and access control along US97 may occur in sections as funding for improvements becomes available.

### Local Connections

The Madras Transportation System Plan identifies several local street connections within the South Madras Refinement Plan area. These connections should be constructed as development occurs and funding becomes available to provide local access and systemwide connectivity to the area. As demonstrated throughout the Refinement Plan process, these locations provide access to the local economic lands and create an overall transportation network that reduces reliance on US97 for local and regional travel. As such, improvements off of US97, including those along Culver Highway, help build towards the overall vision of the plan.

# SECTION NINE

## Next Steps

# 9

The study's proposed projects identified here are in the early stages of development for concept design to address the anticipated impacts of the future growth and development in South Madras.

Following adoption, the City of Madras will seek to secure funding, conduct further environmental reviews, and work collaboratively with ODOT and Jefferson County to design and ultimately construct the identified highway and local system multimodal improvements. Intergovernmental coordination on continued planning, design, and funding initiatives are paramount to addressing local and regional needs within the South Madras area.

Throughout all steps of the implementation process, it is essential to continue to seek input to refine and design the preferred refined improvement package of projects in a manner that respects the local and environmental sensitivity areas.

### Moving Forward with Updates to the TSP

The recommended improvements on the US 97 and Culver Highway alignments are estimated to be within the existing right-of-way along both highways. However, new roadways and intersection upgrades may require additional right-of-way, which will be further explored through future planning efforts.

Most of the new, local road projects shown in Concept 3: US 97 Mainline Enhancement are included in the City of Madras TSP, but it does not include a new road from US 97 near Colfax Lane to Culver Highway. An amendment to the TSP to include the roadway would be required. Additionally, this new roadway would traverse through a designated wetland and would require additional environmental analysis to determine the ultimate roadway alignment and potential mitigation requirements.

Two project recommendations are currently not in the Jefferson County TSP and would also require an amendment. These are located outside of the Madras Urban Growth Area: improving the skew angle at Culver Highway and Colfax Lane and the new roadway from US 97 and Colfax Lane east to Adams Drive

### Identify Funding Source

**Currently, there are currently no funding mechanisms to pay for any of the improvements identified in this study.**

Therefore, the City, Jefferson County, and ODOT will need to seek funding through a combination of federal, state, County, City and/or private/development driven sources. Initial suggestions for possible fundings sources are outlined below.




Jurisdiction	Sources	Comments
 <b>Federal</b>	Infrastructure Investment and Jobs Act (IIJA), Rebuilding American Infrastructure with Sustainability and Equity (RAISE), others	There are currently a variety of federal grant opportunities – particularly for improvements to multimodal infrastructure. The City, County, and ODOT could submit a joint application for federal funding.
 <b>State</b>	Statewide Transportation Improvement Program (STIP), All Roads Transportation Safety (ARTS), Multimodal Active Transportation Fund, Statewide Transportation Improvement Fund (STIF), Transportation and Growth Management (TGM) Grants	ODOT has several programs to support infrastructure improvements. There are currently no projects in South Madras programed into ODOTs most recent STIP cycle.
 <b>County</b>	State Highway Fund, System Development Charges (SDCs), Motor Vehicle Revenue	For improvements outside of the UGB the County may support the plan by implementing portions of the Preferred Concept or leverage funding toward state or federal funding opportunities

Table 3. Funding Sources



Jurisdiction	Sources	Comments
 <b>City</b>	Street Fund, SDCs, Urban Renewal Plan	The City can use local funding sources to implement portions of the Preferred Concept or leverage funding toward state or federal funding opportunities.
 <b>Private/ Development Driven</b>	Developers, private/public partnerships	Economic development is the critical driver for improvement needs throughout the South Madras Area. Through the City's Community Development Department, developer contributions could be included in conditions of approval for developments.

Table 3. Funding Sources

## Environmental Review

As part of the concept takes play in wetlands with accompanying flood plans, an environmental review will need to be conducted.

## Design and Construction

One of the primary benefits of Concept 3: US 97 Mainline Enhancement is the ability to phase improvements over time.

Capacity on the US 97 mainline can be accommodated through 2045 as one-lane in each direction, however, intersection improvements at critical intersections need to be constructed with two travel lanes in each direction to support current backup and traffic flow needs. As the project progresses, intersection improvements and widening could be constructed before widening the full US 97 cross section between Colfax Lane and J Street. This provides flexibility for phasing and construction as location specific improvements could be implemented prior to funding being achieved for the entire project area.

In addition to intersection specific improvements, prioritizing east-west local roads between Culver Highway, US97, and Adams Drive provides alternate routes for users through the study area. Local traffic can be diverted from US 97 and use the local system instead of both regional and local traffic having to use US 97 to circulate.

When widening at intersections or along segments occurs on US97, construction efforts should include installation of a median to support access management strategies. The median builds toward the longevity and safety of U S97 for all users – regardless of if they drive, walk, or ride a bicycle.



# SUPPORTING DOCUMENTS