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Metropolitan Planning Organization

MPO TAC Meeting #3
July 10th, 2019
ODOT Region 4 Office

BEND AREA TRANSPORTATION SAFETY ACTION PLAN (TSAP)

KITTELSON & ASSOCIATES

MEETING AGENDA

- Introductions
- Meeting Goals
- Review of Draft TSAP
  - Policies and Goals
  - TSAP Emphasis Areas
  - MPO Performance Measures
  - Location Specific Recommendations
  - Non-Infrastructure Recommendations
- Next Steps

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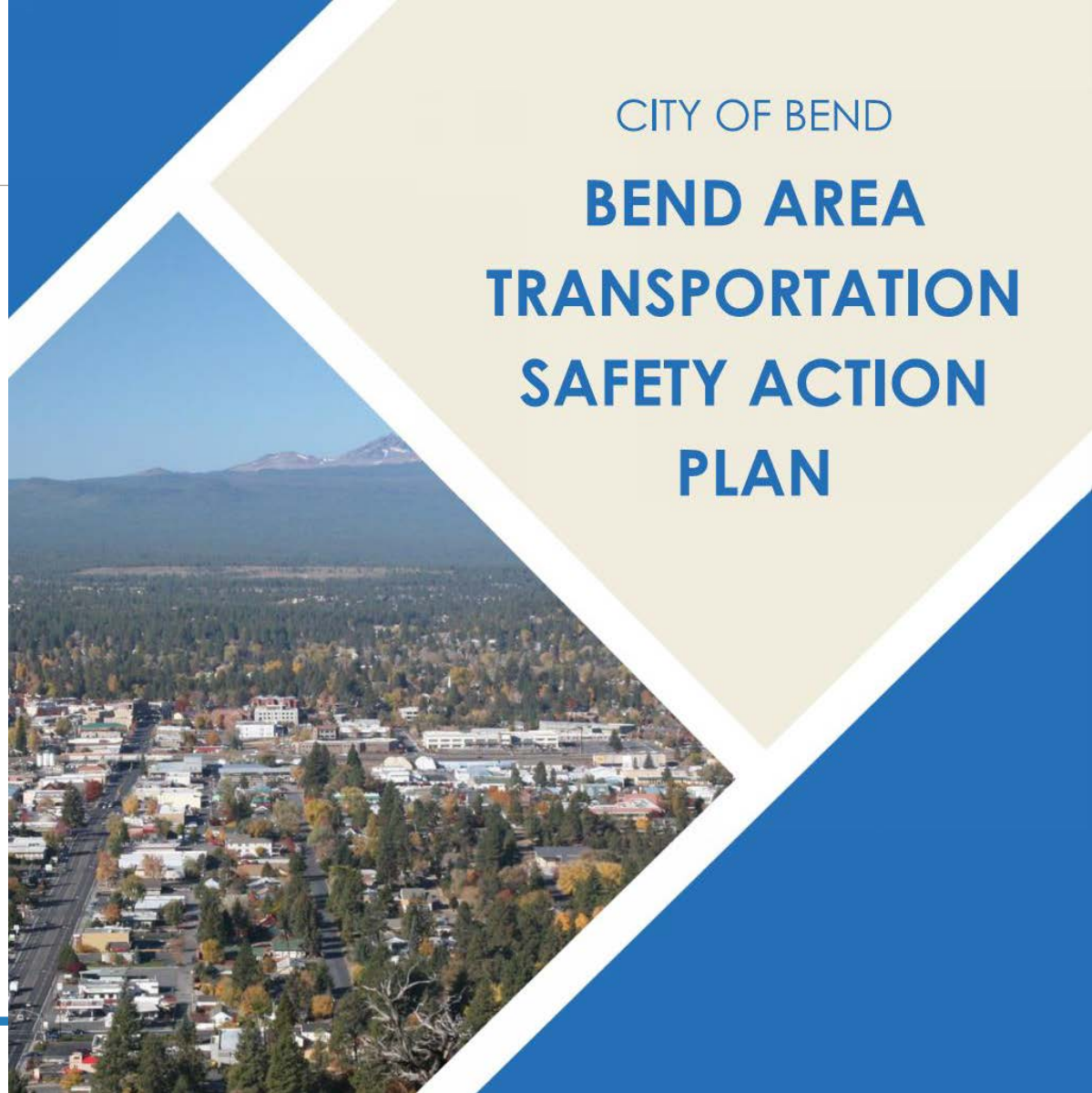
WELCOME & INTRODUCTIONS

- Project status
- Coordination with TSP & MTP Updates
- Coordination with Deschutes County TSAP

MEETING GOALS

- Review Draft TSAP content
- Obtain feedback on draft recommendations prior to developing Final TSAP
  - Any major concerns/comments?
  - Comments by 7/19

REVIEW OF DRAFT TSAP



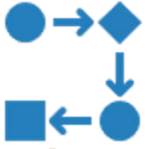
WHAT'S IN THE TSAP?

Section 1

- Introduction
  - Policies and Goals

Section 2

- Crash Data Summary
  - Emphasis Areas



Section 3

- Systemic Solutions

Section 4

- Speed management Toolbox

Section 5

- Location Specific Applications

Section 6

- Non-Infrastructure Measures

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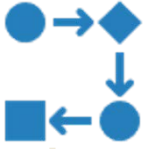

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TSP SAFETY DRAFT GOALS, POLICIES, & ACTION ITEMS

- **Goal:** The City of Bend aspires to have zero serious injuries or fatal crashes on its transportation system. The City recognizes that we must design and manage our transportation system with this goal in mind.

Section 1.3 of the Draft TSAP

TSP SAFETY DRAFT GOALS, POLICIES, & ACTION ITEMS

- **Policy:** The City will balance safety, connectivity, and travel time reliability for all modes of transportation in design and construction of transportation projects and in transportation program implementation.
- **Actions:**
  - Adopt and implement the 2019 TSAP, including mapping identified emphasis areas.
  - Amend the Bend Development Code to ensure that safety mitigation is included as part of development.

TSP SAFETY DRAFT GOALS, POLICIES, & ACTION ITEMS

- **Policy:** The City aspires to have no transportation-related fatalities or serious injuries by reducing the number and severity of crashes through design, operations, maintenance, and enforcement.
- **Actions:**
  - By 2021, the City will develop and adopt an action plan to move the City towards zero traffic deaths or serious injuries (e.g. Vision Zero). The plan will set a clear goal of eliminating traffic deaths and serious injuries among all road users within an explicit timeframe (i.e. 10 years) and actively engage key City departments.

TSP SAFETY DRAFT GOALS, POLICIES, & ACTION ITEMS

- **Policy:** The City will consider the needs and safety for all users in transportation projects, programs, and funding decisions, to improve safety for vulnerable users. Vulnerable users are transportation system users most at risk in traffic, such as pedestrians, cyclists, and public transportation users – children, older people, and disabled people may be in this category.
- **Actions:**
  - The City will plan for, design, construct, and/or reconstruct streets to achieve consistency between motorists' speeds and target speed limits, and prioritize speeding and reckless driving enforcement programs on problematic routes.
  - Identify, prioritize, and/or allocate funding for projects and programs to improve safety for vulnerable users.

TSP SAFETY DRAFT GOALS, POLICIES, & ACTION ITEMS

- **Policy:** The City's policy is to achieve consistency between motorists' speeds and target speed limits.
- **Actions:**
  - Create a citywide speed management program to address safety issues related to speed.
  - Review street design in coordination with emergency services; amend Standards and Specifications accordingly.

TSP SAFETY DRAFT GOALS, POLICIES, & ACTION ITEMS

- **Policy:** The City will provide transparent, easy to understand, and effective communication programs to encourage safe travel on the transportation system.
- **Actions:**
  - Develop a comprehensive public dashboard of data to capture the user experience of the City's Transportation System in a system that integrates data from existing sources, not limited to crash data, with data from new and emerging street monitoring technology and public input.

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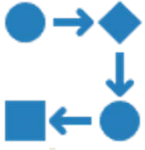

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FEDERAL MPO PERFORMANCE MEASURES

Section 7 of the Draft TSAP

Effectiveness

- Performance Measures track the **results** of a program or activity. For example, they track how many fatalities or injuries occurred, or number of non-motorist fatalities

Efficiency

- Performance Measures track **effort and output**. For example, they track how many activities were conducted, or miles of treatment were installed

Base Period	Fatalities (People)	Fatality Rate (People per 100 Million VMT)	Serious Injuries (People)	Serious Injury Rate (People per 100 Million VMT)	Non-motorized Fatalities and Serious Injuries
Bend UGB Area					
2012-2016	12	0.45	88	3.31	19
Bend MPO Area					
2012-2016	13	0.49	102	3.84	20
Oregon Performance Targets					
2013-2017		0.94		4.42	

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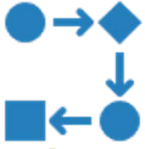

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TSAP EMPHASIS AREAS

Section 2 of the Draft TSAP

CRASH DATA

Crash Type

Most frequent crash types associated with fatal/incapacitating injuries: **Turning movement, rear-end, angle, pedestrian, fixed object, and bicyclist crashes**.

Intersections

Among fatal/incapacitating crashes at intersections, 49% occurred at **stop-controlled intersections**, and 28% occurred at **traffic signals**.

TSAP EMPHASIS AREAS

Roadway Segments

- 32% of fatal/incapacitating crashes occurred on **five-lane roadways**
- 58% of fatal/incapacitating crashes occurred on **arterial roadways** or at intersections with arterial roadways.

Pedestrians

- **Severe outcomes**: 94% of pedestrian collisions resulted in injury or death. 24% resulted in death or incapacitating injury.
- Fatal and incapacitating pedestrian collisions predominantly occurred in the **evening/nighttime hours**

PEDESTRIAN INVOLVED CRASHES

TSAP EMPHASIS AREAS

BICYCLE INVOLVED CRASHES

Bicyclists

- Bicycle crashes accounted for two percent of reported crashes and **9% of fatal/incapacitating crashes**.
- 70% of bicyclist crashes occurred on roadways with **level of traffic stress (LTS) 3 or 4**, or at an intersection including such a street.

Road User Behavior

- 13% of fatal/incapacitating crashes involved; **excessive speeds**
- **Alcohol/drug involvement** was reported in 6% of crashes but in 20% of the fatal/incapacitating subset of collisions.

MOTOR VEHICLE INVOLVED CRASHES

TSAP EMPHASIS AREAS

Lighting

22% of fatal/incapacitating crashes occurred in dark, unlit conditions.

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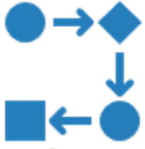

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LOCATION SPECIFIC RECOMMENDATIONS: SITE-SPECIFIC CONCEPTS

Section 5.2 of the Draft TSAP

Implemented two network screening approaches to identify priority locations for recommendations.

Equivalent Property Damage Only (EPDO) Screening → *Site-Specific Concepts*

- The performance measures identify locations with high collision frequency and severity.

EPDO performance measure assigns weighting factors to collisions by severity to account for the societal costs of fatal/incapacitating crashes compared to less severe injury crashes. Fatal/incapacitating crashes were given 100 points; moderate and minor injury crashes were given 10 points; and property damage only crashes were given 1 point.

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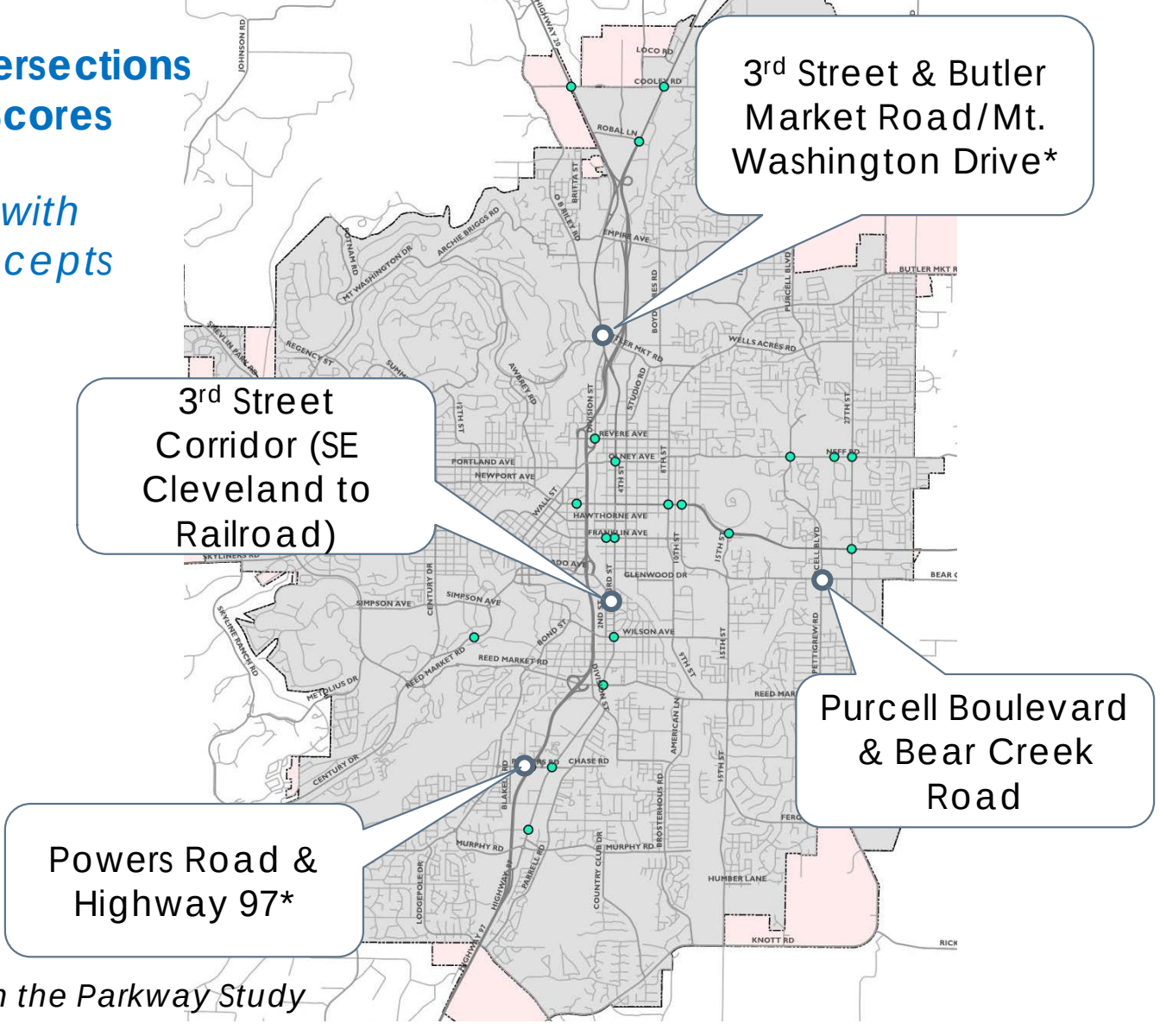
Figure 7 in TSAP: Intersections with Highest EPDO Scores

Four locations with site-specific concepts

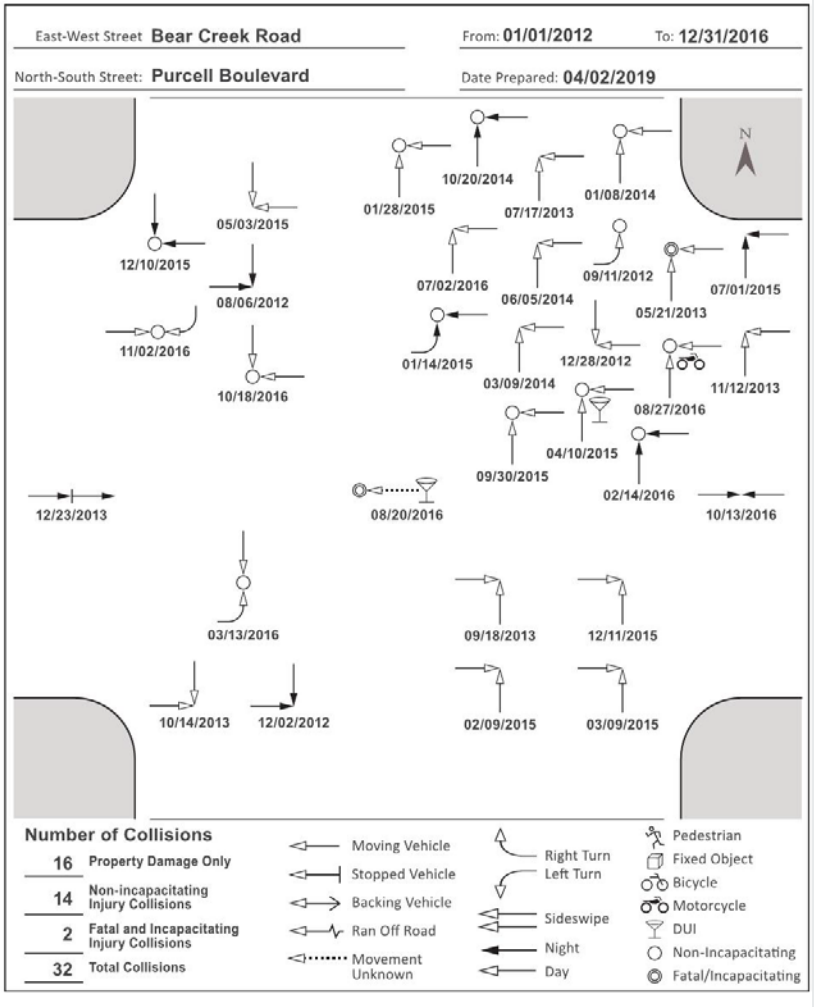


**Work will be covered through the Parkway Study*

Purcell Boulevard/Bear Creek Road

Crash Data Overview

- Approximately 78% of crashes reported at this intersection were **angle crashes**.
- Half of all crashes resulted in some level of injury.
- 28% of all crashes occurred in dark, dusk, or dawn lighting conditions.

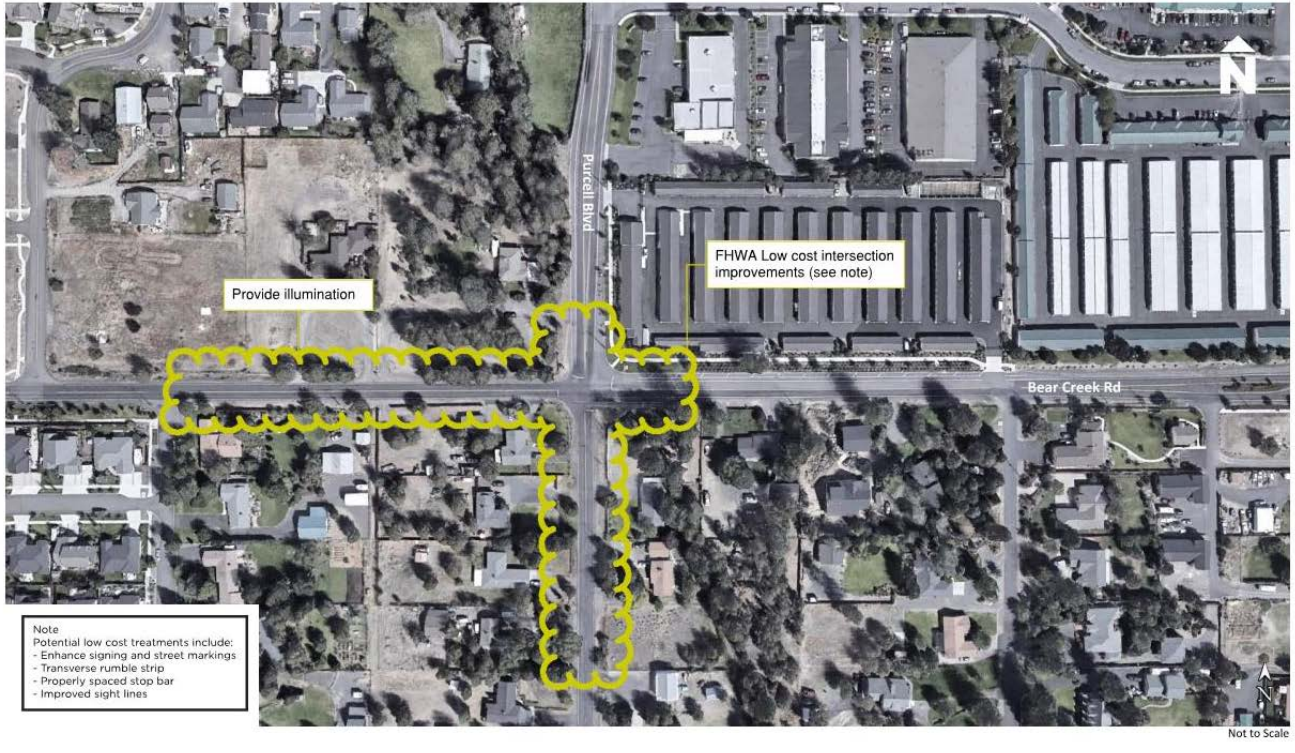


City of Bend, Deschutes County, Oregon
DUI represents a collision where alcohol and/or drugs were reported

Figure 8
Crash Diagram

Purcell Boulevard/Bear Creek Road

Near Term Concepts



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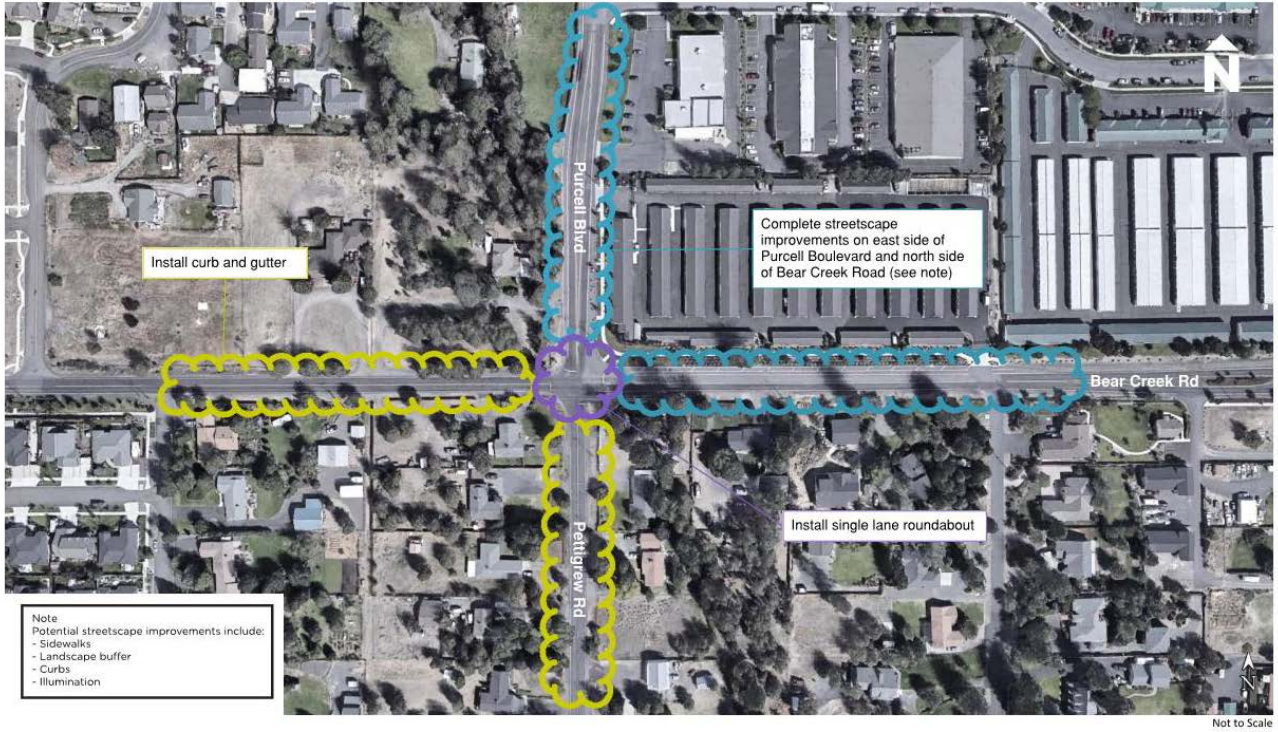
Location-Specific Concept
Bear Creek & Purcell Blvd
Near Term: Low Cost

Figure 9

- Properly placing stop bars.
- Enhancing signing by doubling up and/or installing larger signs.
- Assessing sight lines.

Purcell Boulevard/Bear Creek Road
Long Term Concepts



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Location-Specific Concept
Bear Creek & Purcell Blvd
Long Term

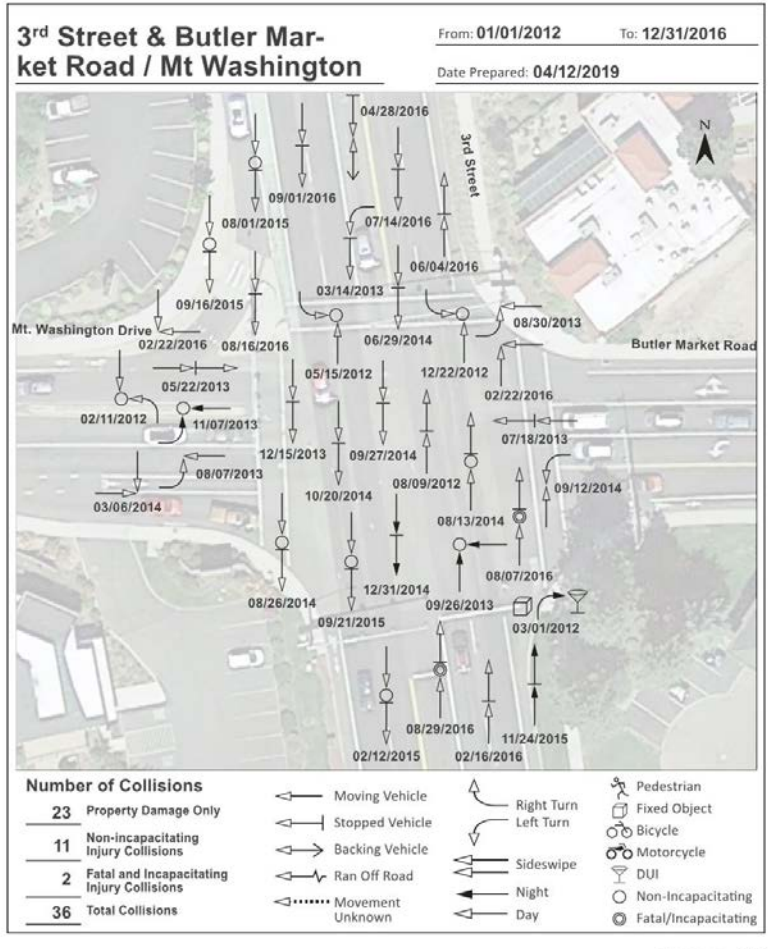
Figure 10

- Control crossing and turning movements with a single lane roundabout as well as reduce conflict points between road users.
- Complete streetscape treatments and include storm water management.

3rd Street & Butler Market Road/Mount Washington Dr Area

Crash Data Overview

- 49% of reported crashes in this area were reported as **rear-end crashes**.
- 36% of reported crashes were **turning movement crashes**.

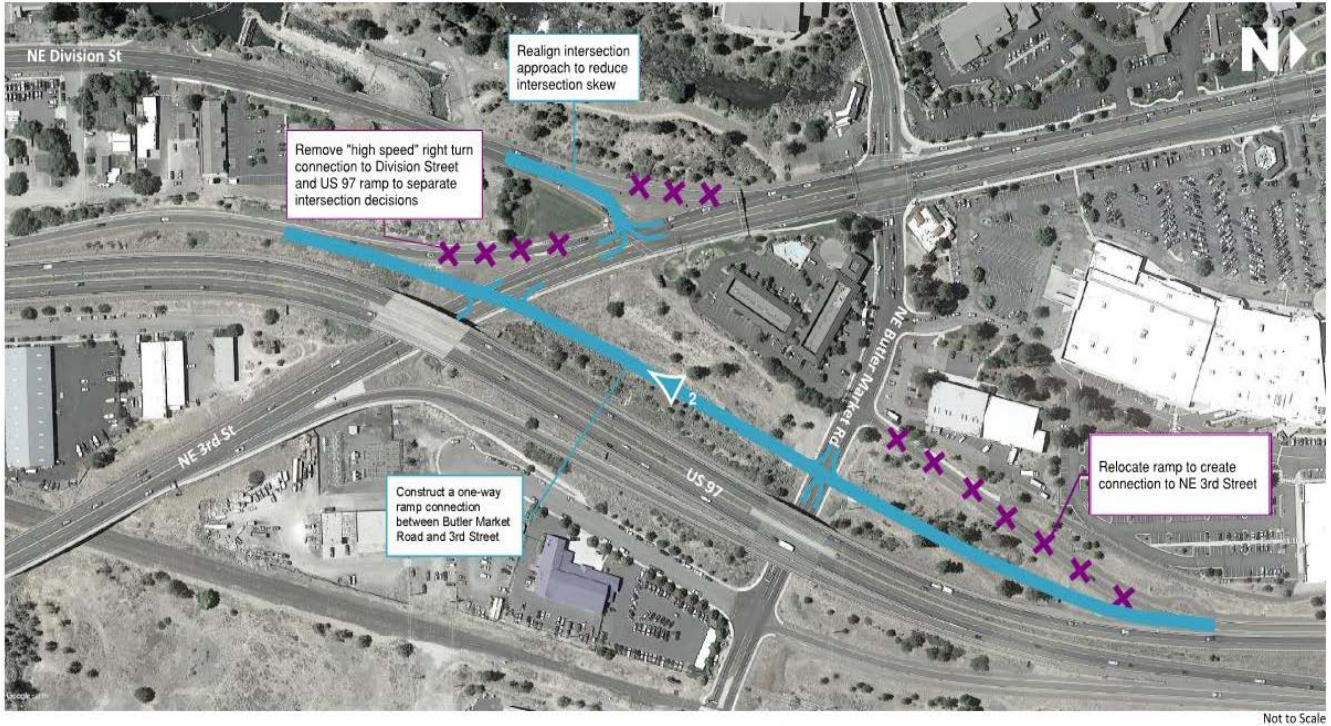


City of Bend, Deschutes County, Oregon
DUI represents a collision where alcohol and/or drugs were reported
*Not to scale

Figure 13
Crash Diagram

3rd Street & Butler Market Road/Mount Washington Dr Area

System Concept 1: One-Way Connector



Increases overall network connectivity to provide more and direct route choices.

Provide a one-way direct connection from Butler Market Road to 3rd Street.

Realign the US 97 southbound exit ramp from 3rdStreet onto Division Street and Highway 97.

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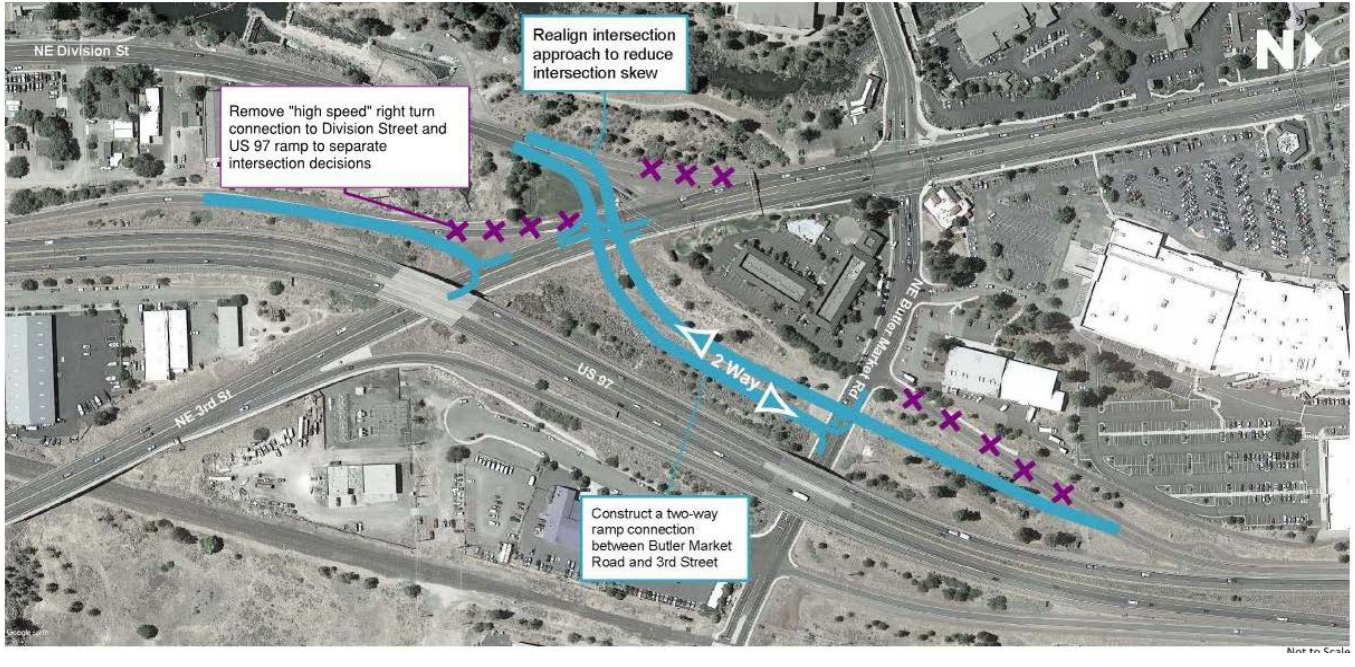
Location-Specific Concepts
Bend Pkwy & NE Butler Market Rd
System Concept 1: One-Way Connector

Figure 17

3rd Street & Butler Market Road/Mount Washington Dr Area

System Concept 2: Division Street Connection



- Increases overall network connectivity to provide more and direct route choices.
- Provide a two-way direct connection from Division Street to Butler Market Road.
- Realign the US 97 southbound exit ramp from 3rdStreet onto Division Street and Highway 97.

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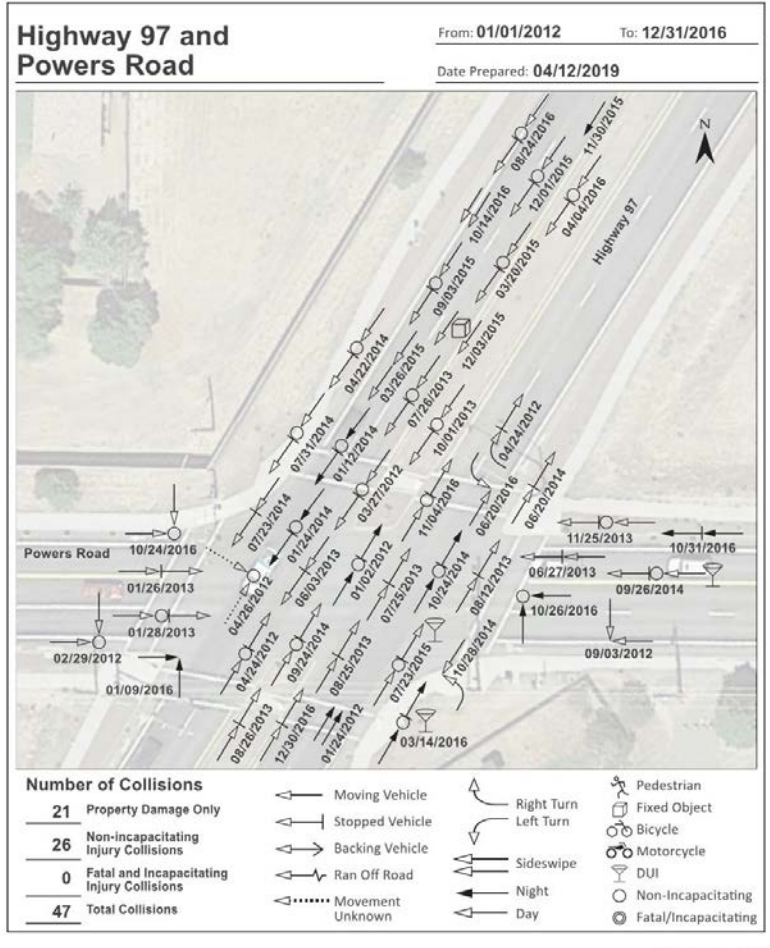
Location-Specific Concepts
Bend Pkwy & NE Butler Market Rd
System Concept 2: Division Street Connection

Figure 18

Highway 97 & Powers Road Area

Crash Data Overview

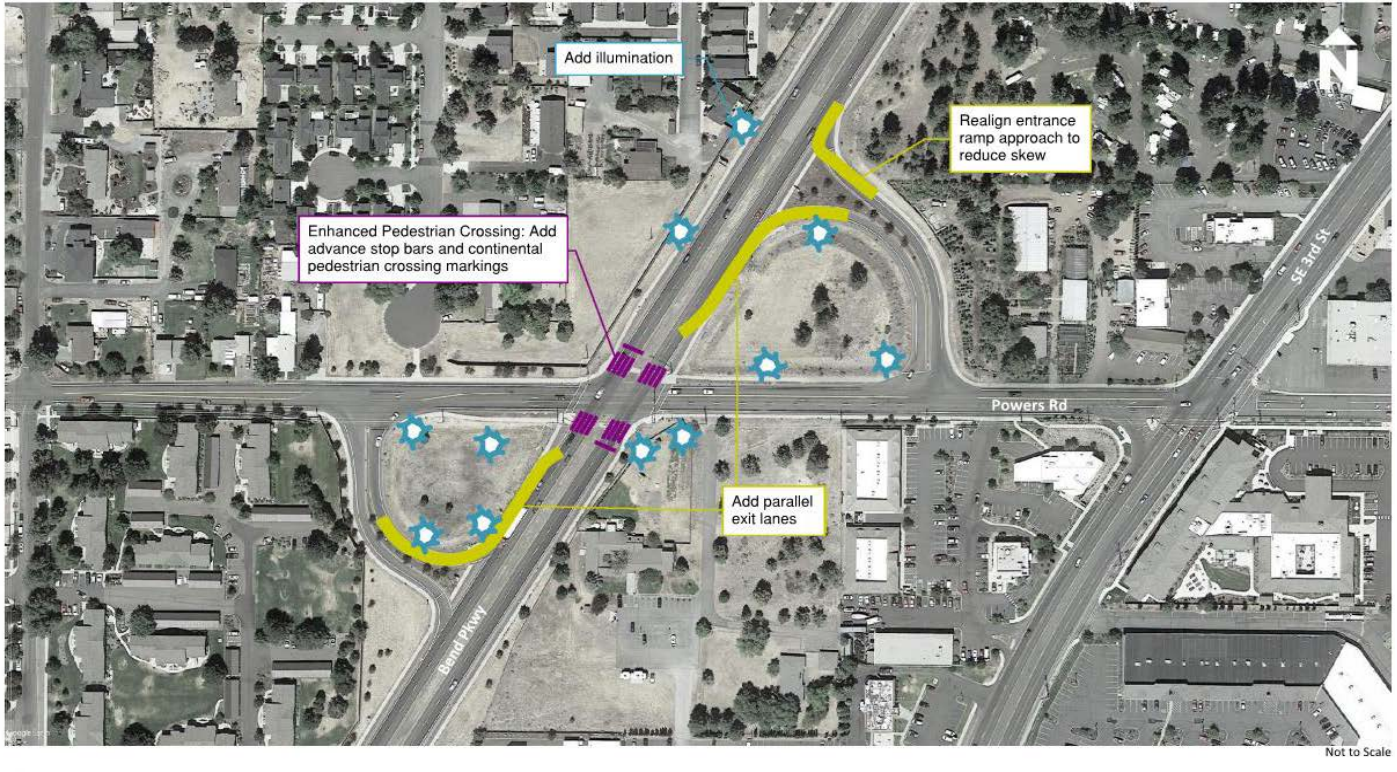
- The highest concentration of crashes were reported at or near the **northbound on-ramp to Highway 97.**
- 78 % of reported intersection crashes are **rear-end crashes**.
- 51% of the reported crashes in the Highway 97 & Powers Road Area resulted in some level of injury.



City of Bend, Deschutes County, Oregon
DUI represents a collision where alcohol and/or drugs were reported
*Not to scale

Figure 20
Crash Diagram

Highway 97 & Powers Road Area
Concepts



Install a deceleration lane.

Realign the entrance ramp to reduce intersection skew and improve sight distance

Evaluate additional illumination levels.

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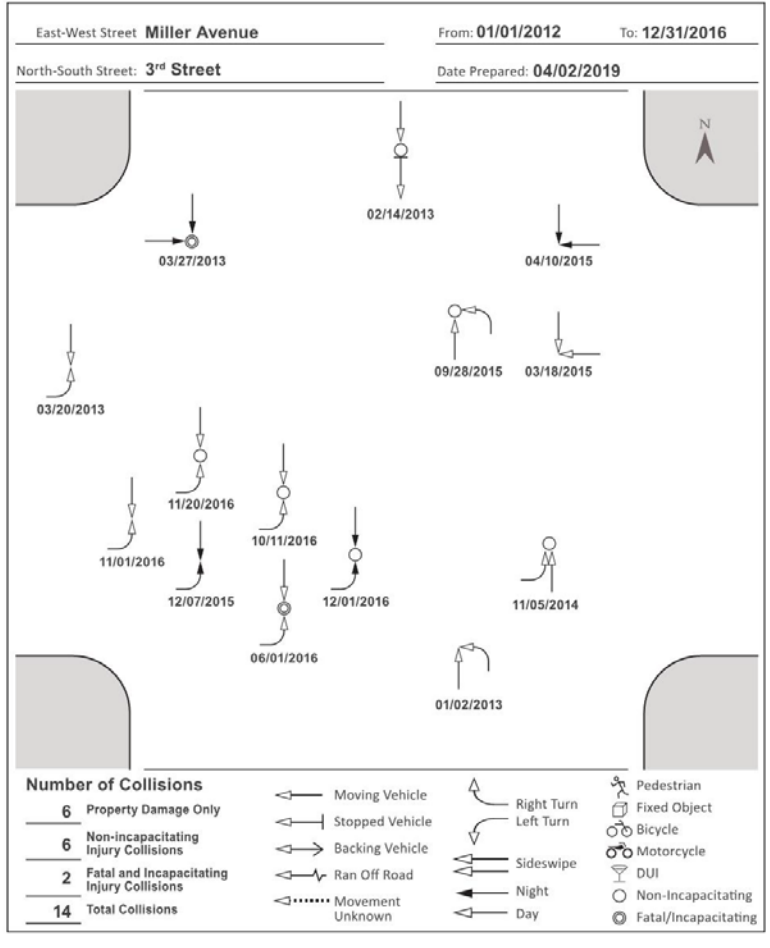
Location-Specific Concepts
Powers Rd & Bend Pkwy

Figure 23

3rd Street Corridor
Crash Data Overview

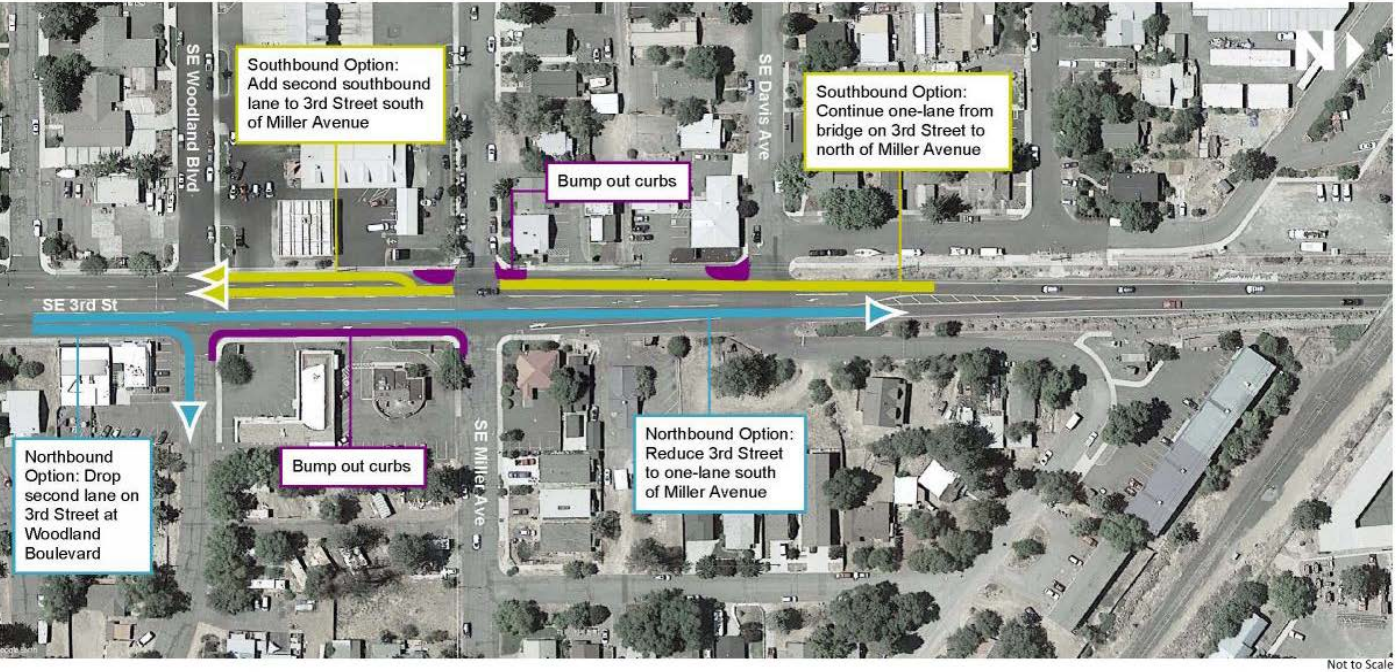
- 71% of reported crashes at 3rd Street and Miller Avenue and 56% of crashes at Woodland Boulevard and 3rd Street were **turning movement crashes.**
- 57% of all reported crashes at 3rd Street and Miller Avenue resulted in some level of injury, two of which resulted in a fatal/incapacitating injury.
- 33% of reported crashes at Woodland Boulevard and 3rd Street were **angle crashes**.



City of Bend, Deschutes County, Oregon
DUI represents a collision where alcohol and/or drugs were reported

Figure 24
Crash Diagram

3rd Street Corridor
Localized Hybrid Concept



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Location-Specific Concepts
SE 3rd & SE Miller Ave
Hybrid Example: One Lane SB & NB at Miller

Figure 29

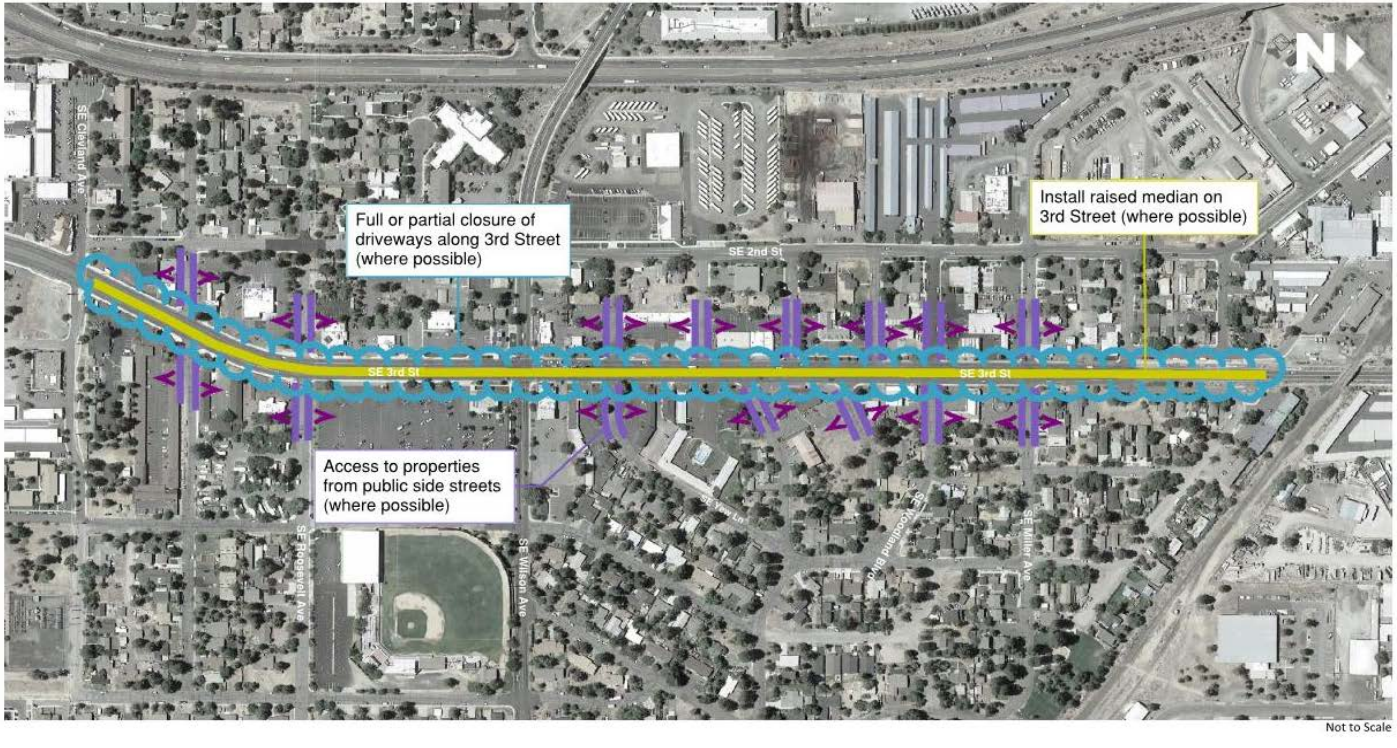
Maximizes potential safety benefits by reducing the number of potential conflict points and reducing the crossing distance of 3rd Street for pedestrians.

Continue a single southbound lane from Davis Avenue to south of Miller Avenue.

Drop second northbound lane and converted to a right-turn only at Woodland Boulevard.

3rd Street Corridor

Larger Network Corridor Access Management Concept



Not to Scale

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Location-Specific Concepts
SE 3rd Corridor - SE Cleveland Ave to SE Davis Ave
Corridor Concept 1: Corridor Management

Figure 30

Implementation of access management could reduce crash frequency and improve the safety of traffic flow.

Full or partial closure of driveways along 3rd Street.

Install raised medians.

3rd Street Corridor
Larger Network Couplet Concept

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Location-Specific Concepts
SE 3rd Corridor - SE Cleveland Ave to SE Davis Ave
Corridor Concept 2: Couplet

Figure 31

Potential conflicts at side streets are reduced and traffic can flow more uniformly without as many turning conflicts.

Convert 3rd Street and 2nd Street to one-way.

Opportunity to install on-street parking and increase bike lane width.

COORDINATION WITH THE TSP

- Site-Specific Concepts:
  - Incorporated as Projects in the TSP

LOCATION SPECIFIC RECOMMENDATIONS

Section 5.3 of the Draft TSAP

Implemented two network screening approaches to identify priority locations for recommendations.

Excess Proportion Screening → *Systemic Treatments*

- The performance measures identified locations with a high concentration of particular crash types

Excess proportion performance measure quantifies, for a given location, the difference between the observed proportion of a specific collision type and the proportion among the relevant reference population (i.e., all intersections). The excess proportion is the difference between a site's proportion and the chose threshold. For example, if 40% of reported intersection collisions are angle collisions, a site with 70 percent angle collisions would represent a 30 percent excess proportion.

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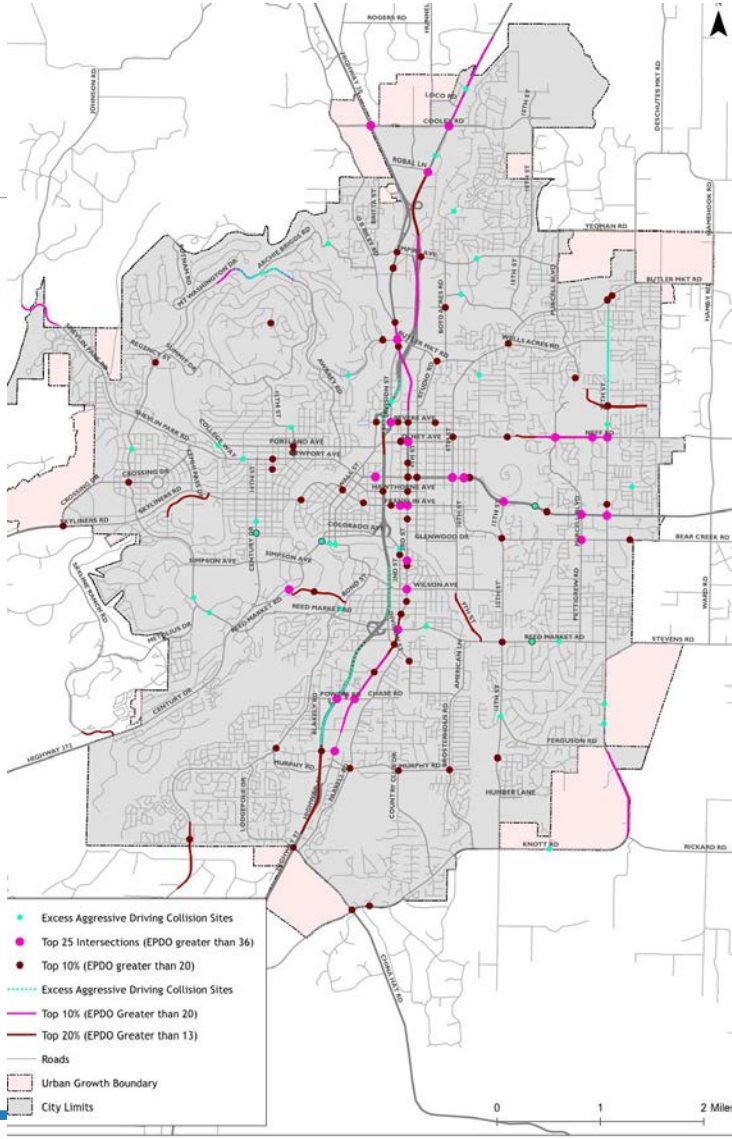
SYSTEMIC RECOMMENDATIONS

- Excess proportions of specific crash type screening conducted for:
  - Aggressive driving
  - Dark conditions without street lights
  - Angle and turning movement collisions
  - Rear-end collisions
  - Head-on collisions
  - Roadway departure collisions
  - Alcohol/drug involved collisions



Equivalent Property Damage Only Scoring and Excess Proportion
Top EPDO Scores and Excess Aggressive Driving Collision Sites
Bend Area, 2012-2016

Figure 32

SYSTEMIC RECOMMENDATIONS

- Section 3 of the TSAP: Systemic Solutions Toolbox
  - Often applied on a wide-scale (same treatment at many different locations) for relatively low-cost
  - Often incorporated into capital projects as well as ongoing maintenance activities to maximize cost-effectiveness
  - Crash Reduction Factors (CRFs) documented, when possible

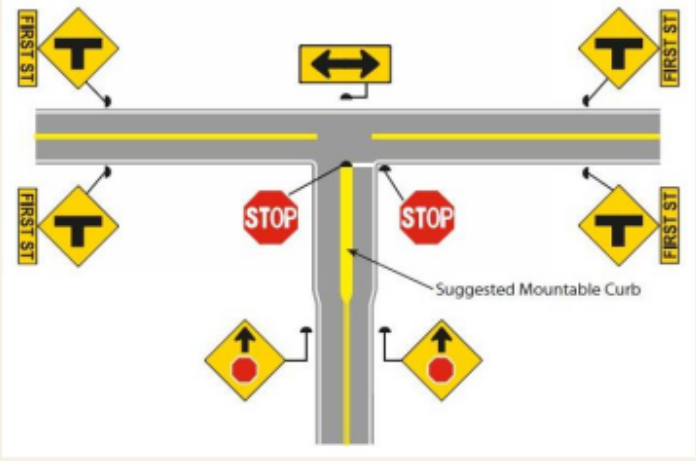
SYSTEMIC RECOMMENDATIONS

- Section 3 presents Systemic Solutions in 5 groups:
  - Spot treatment vehicle countermeasures
  - Systemic intersection countermeasures
  - Roadway departure countermeasures
  - Bicycle or pedestrian countermeasures
  - Enhanced pedestrian crossing treatments

SYSTEMIC RECOMMENDATIONS

- Example treatment from Systemic Toolbox:

Install Raised Divider on Stop Approach (Splitter Island)	
Installing a raised divider (with mountable curb) on a stop-controlled approach to an intersection can increase intersection visibility by adding a left-side stop sign and better delineate vehicle paths at the intersection. Where possible, a minimum width of 6-feet should be used for the splitter island.	
Intersection or Segment	*Intersection (Unsignalized)*
Applicable Collision Types	*All collisions*
Potential Collision Reduction	*15%*
Planning-Level Cost	*$7.55 per sq ft*



Source: FHWA

* *FHWA, "Low-Cost Safety Enhancements for Stop-Controlled and Signalized Intersections," (2014)*

SPEED MANAGEMENT TOOLBOX

- Section 4 of the TSAP: Speed Management Toolbox
- Treatments organized into three categories:
  - Pavement markings
  - Physical roadway improvements
  - Signage

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SPEED MANAGEMENT TOOLBOX

- Example from Speed Management Toolbox:

Transverse Lane Marking

Description: Transverse lane markings are horizontal markings placed on the roadway. There are many types of transverse lane markings including optical bars and chevron marking. They may extend partially into a lane or be placed fully across the lane.

Application Guidance: Transverse markings are especially useful for transition zones and can be used in locations where there is an approaching change in roadway character such as an intersection or curve. Markings may be spaced increasingly closer on the approach to an intersection to give the appearance so a driver is more aware of their speed. Transverse lane markings support decreased speeds on intersection approaches or other roadway transition. Optical speed bars are an additional type of transverse marking. MUTCD Section 3B.22 provides guidance on placement of optical speed bars.

Source: FHWA

COORDINATION WITH THE TSP

- Systemic Solutions:
  - Expected to be incorporated in the TSP as an action: review standards and specifications to address safety issues identified

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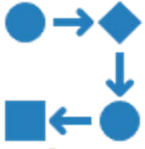

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NON-INFRASTRUCTURE RECOMMENDATIONS

- Comprehensive approach to transportation safety acknowledges that policy, planning, programming, and projects are multidisciplinary and involve “7Es” of safety:
  - Engineering
  - Emergency Medical Services (EMS)
  - Enforcement
  - Education
  - Encouragement
  - Equity
  - Evaluation

Section 6 of the Draft TSAP

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NON-INFRASTRUCTURE RECOMMENDATIONS

- Table 10 in Section 6.2 of the TSAP provides the identified **action items**
- Lead and supporting agencies identified

Action Item	Description	Emphasis Area(s)	Lead Agency	Supporting Agencies	Funding Need
A1	Create and implement a Regional Transportation Safety Committee to coordinate on transportation safety and implement the Action Items identified in the TSAP. Other representatives from various outreach or advocacy groups will also be helpful to help with outreach. City staff participation from various departments such as police, streets, capital projects, engineering, and community development will help promote coordination across departments and the share of resources and data to coordinate transportation safety efforts. Regular meetings should occur at which the committee share data/resources, implements the Deschutes County and Bend Area TSAP Action Items, and identifies new actions needed based on more recent crash history.	Safety Culture	ODOT or City of Bend	Deschutes County, City of Bend, Bend MPO, Redmond, Sisters, La Pine, Police, Sheriff, District Attorney's office, Emergency Services, OLCC, Department of Public Health	$$$

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NON-INFRASTRUCTURE ACTION ITEMS

52 action items identified for the following emphasis areas:

- Safety culture
- Education
- Enforcement
- Emergency response
- Aggressive driving
- Distracted driving
- Impaired driving
- Motorcyclists
- Pedestrians & bicyclists
- Senior drivers
- Young drivers
- Technology
- Monitoring

EXAMPLE ACTION ITEMS: SAFETY CULTURE

- A1: Create a Regional Transportation Safety Committee
- A2: Create a staff position to lead the Committee
- A3: Create a Bend Area Safety Communications Plan
- A4: Develop a Safety Communications Calendar
- A5: Coordinate with the Bend Neighborhood Associations Leadership Alliance for outreach
- A6: Provide educational materials to visitors
- A7: Provide educational materials to residents

EXAMPLE ACTION ITEMS: ENFORCEMENT

- A9: Increase enforcement during highest risk times

- A10: Evaluate options for a pilot study of automated enforcement

EXAMPLE ACTION ITEMS: EMERGENCY RESPONSE

- A11: Provide bystander training courses to the public

- A12: Optimize response time to crashes

EXAMPLE ACTION ITEMS: IMPAIRED DRIVING

- A17: Encourage compliance checks
- A18: Develop an educational campaign to promote sober driving
- A22: Formalize rideshare locations in downtown area and near locations with multiple restaurants, bars, and pubs
- A23: Coordinate with local businesses and rideshare companies to offer a program that provides users with a discount for taking a cab or rideshare to/from drinking establishments

EXAMPLE ACTION ITEMS: PEDESTRIAN & BICYCLISTS

- A28: Continue to provide local educational programs at schools and other venues
- A29: Collaborate with the Department of Public Health to work on active transportation
- A31: Continue and expand the "Friendly Driver" program

COORDINATION WITH THE TSP

- Non-infrastructure actions:
  - Several are expected to be incorporated as programmatic recommendations in the TSP

TSAP QUESTIONS & NEXT STEPS

- Revise the TSAP based on comments from the TAC
  - TAC Provide comments by Friday, 7/19
- Develop efficiency performance measures
- Final TSAP: mid-August
  - Plan will be updated on a regular basis
- Tentative brown bag in August
  - *Topic: TSAP Overview & Next Steps for Implementation*
- *Website: bendoregon.gov/transportationsafety*

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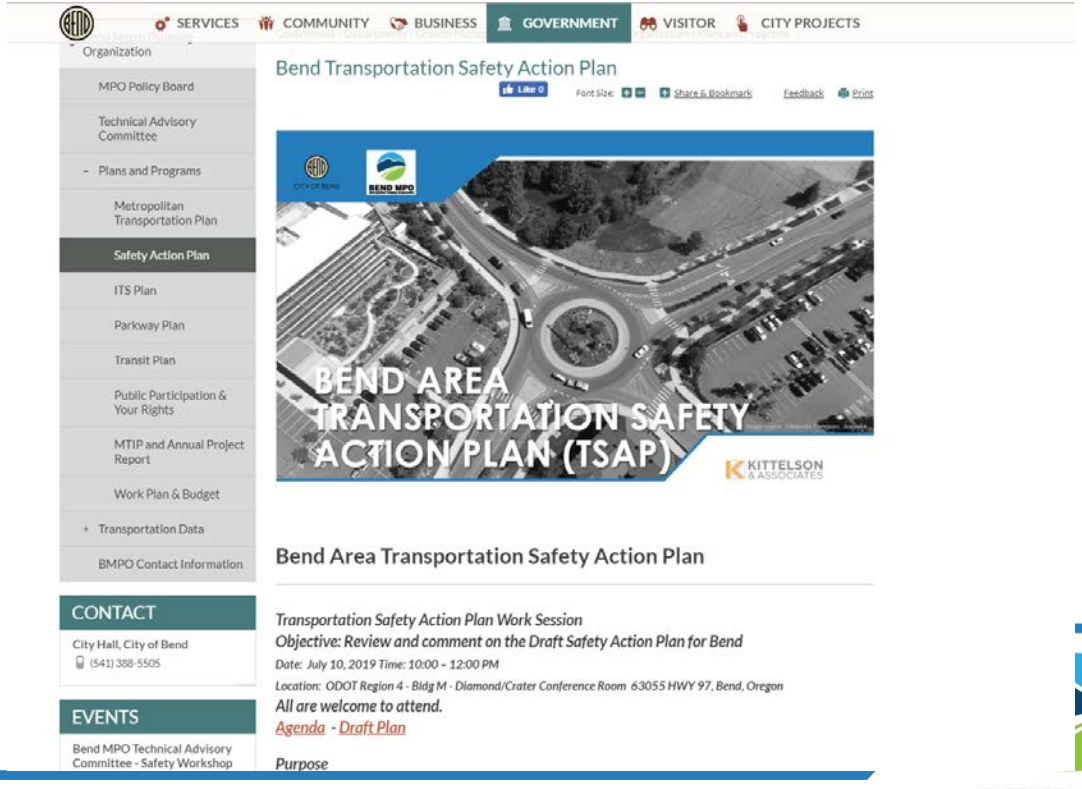
PROJECT WEBSITE

- *bendoregon.gov/transportationsafety*



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