NE Purcell Boulevard-Pettigrew Road / Bear Creek Road Intersection Project Evaluation Report

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DATE: May 6, 2022

Executive Summary

The NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection is identified for improvement through the voter approved 2020 Bend General Obligation Bond (GO Bond). The purpose of this Project Evaluation Report is to analyze possible changes to the intersection form at this location to guide the forthcoming GO Bond improvement project. This executive summary presents key findings and recommendations revealed through this evaluation.

- The Bend Transportation System Plan (TSP) and Transportation Safety Action Plan (TSAP) identify the need for a single-lane roundabout at the study intersection. The Bend TSAP identifies the need for streetscaping along both streets and the Bend TSP establishes Bear Creek Road as a key walking and bicycling route. The Cascades East Transit (CET) 2040 Transit Master Plan (TMP) does not identify transportation infrastructure within the study area needed to support transit.
- Most of the grade around the intersection is generally flat and several utilities and communication services surround the study area (including power lines along both streets). Private residences have driveways within 100 feet of the intersection and the southwest property has driveways accessing both Bear Creek Road and Pettigrew Road.
- Bike lanes and discontinuous, buffered sidewalks are limited to the north and east intersection legs, and no marked crossings are present at the intersection. Fixed-route transit service is not operated in the immediate vicinity of the study area.
- The current intersection is all-way stop-control and both streets are two-lane roads with shared movements (i.e., no turn lanes).
- The current intersection meets City operating standards under existing PM peak hour conditions but exceeds capacity for one or more approaches. The intersection is forecast to exceed standards and capacity by 2040. All intersection approaches have 95th percentile queues that block upstream driveways.
- ODOT reports 37 crashes have occurred at the study intersection between 2015 and 2020 with angle and turning movement crashes accounting for approximately 92 percent. No fatal

or serious injury crashes were reported. The observed intersection crash rate exceeds the applicable statewide 90th percentile crash rate.

- The recommended intersection modification includes a single-lane roundabout, consistent with the Bend TSP and Bend TSAP, with a 130-foot inscribed diameter to minimize right-of-way impacts and accommodate WB-50 trucks. The roundabout would meet City operating standards under existing and future PM peak hour conditions and reduce intersection queuing. The roundabout supports walking and biking connections with marked crossings on all approaches and space for a multi-use path. The Bend TSAP estimated that the intersection modification will cost between $2.5 and $3.5 million. A concept of the roundabout is provided later in this report.
- GO Bond funds for modifying the intersection also support a Key Walking and Biking Route along Bear Creek Road. The intersection recommendations presented in this report are intended to be forward compatible with implementing that future route.

Project Assumptions and Background

This section documents key project assumptions, relevant plans and policies, and other applicable background information for the NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection evaluation.

Study Area

The project evaluation study area is confined to the NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection. Improvements at this intersection are an element of the 2020 Transportation General Obligation Bond (GO Bond) 1GB27 project (Bear Creek Road and 27th Street Improvements). The GO Bond also funds modifications to Bear Creek Road that include a Key Walking and Biking Route along the facility. Outcomes of this evaluation are intended to be forward compatible with the implementation of that route which will be considered by future City of Bend design efforts. No specific evaluation or recommendations of the Key Walking and Biking Route are included in this report. The NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection and its location within Bend are shown in Figure 1.

Figure 1: Study Area

Relevant Planning Document Review

This section summarizes information contained in relevant planning documents that pertains to the study area. Incorporating transportation infrastructure and services that are planned for the study area establishes consistency among planning documents and works toward achieving their goals.

Bend Transportation System Plan (TSP)

The Bend TSP establishes transportation system changes needed to support current and future land uses and anticipated population and employment growth through the year 2040.

Within the Urban Growth Boundary (UGB, study area), the TSP identified these two projects that are relevant to this project evaluation report:

- S-3: Pettigrew Road / Bear Creek Road – construct single-lane roundabout (long-term safety improvement)
- R2-E: Bear Creek Rd from Cessna Ave to east UGB (key walking and bicycling route/key route project) – shared use path adjacent to roadway; close sidewalk gap and create low-stress bikeway extending to 170 new affordable house units

This report recommends specific modifications to the NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection and considers forward compatibility with the future design and implementation of the Key Walking and Biking Route along Bear Creek Road.

Bend Transportation Safety Action Plan (TSAP)

The Bend TSAP provides long-term goals, policies, and strategies and near-term actions to eliminate deaths and life-changing injuries on the transportation system within Bend's UGB.

The TSAP identified these near- and long-term improvements at the NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection that are relevant to this project evaluation report:

- Near Term (Low Cost): implement FHWA low-cost proven safety counter measure intersection improvements (enhanced signing and street markings, transverse rumble strips, property spaced stop bar, improved sight lines); provide illumination along Bear Creek Road (from Rawhide Drive to east side of intersection) and Pettigrew Road (from north of Pettigrew Court to north side of intersection)
- Long Term: install curb and gutter along Bear Creek Road (from Rawhide Drive to east side of intersection) and Pettigrew Road (from north of Pettigrew Court to north side of intersection); complete streetscape improvements (sidewalks, landscape buffer, curbs, illumination) on east side of NE Purcell Boulevard (intersection to NE Twin Knolls Drive) and north side of Bear Creek Road (intersection to east of Janalee Place); install a single-lane roundabout

This report recommends specific modifications to the NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection consistent with the long-term improvements identified within the Bend TSAP.

Deschutes County Intelligent Transportation System (ITS) Plan

The Deschutes County ITS Plan includes ITS projects, such as advanced technologies and management techniques, aimed to improve the safety and efficiency of Deschutes County's transportation system and be deployed over the next 20 years. The plan identifies a fiber communications project for NE Purcell Boulevard that may be relevant to this project evaluation report.

The intersection modifications planned at the NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection should consider installation of conduit through the intersection to provide for future fiber communication along the corridor.

Cascades East Transit (CET) 2040 Transit Master Plan (TMP)

CET's 2040 TMP outlines a framework for providing transit and related services to Central Oregon for the next 20 years. This plan does not identify transportation infrastructure needs to support transit that are relevant to this project evaluation report.

Analysis Methodology

All analyses summarized in this project evaluation report follow the methodology and assumptions detailed in the *Methodology Memorandum*. The *Methodology Memorandum* addresses data collection, traffic, crash, and multimodal analysis procedures, concept design and design vehicle, cost estimates, and phasing and sensitivity analysis for GO Bond project evaluation reports. Relevant elements of that memorandum have been applied to this report. *Appendix A includes the Methodology Memorandum*

Additional Assumptions

The findings and recommendations enclosed in this project evaluation report are based on the following assumptions:

- Traffic operations analyses reflect the PM peak hour as traffic volumes during this period were observed to be substantially higher than the AM peak hour at this location.
- The vacant lot in the northwest corner of the intersection is currently working with the City of Bend on a development application. Specific elements of this report, including the draft intersection concept design, may be modified by findings and outcomes of that application.

- The concept design assumes a WB-50 truck as the design vehicle because heavy truck traffic is not anticipated through the intersection provided more desirable freight routes are available nearby (US 20 to the north and SE 27th Street to the east).
- The concept design does not fully evaluate the function of existing driveways within the intersection influence area. Future design efforts should further consider the appropriate function of each driveway as part of the project development process.
- The concept design was developed based on a field review of existing conditions, including utilities that could be seen above ground.
- Cost estimates were developed from input by the City of Bend based on recent costs for the design and construction of similar facilities.

Infrastructure Review

This section summarizes existing conditions within the study area based on field review and aerial imagery.

Field Review

We conducted a field review on the morning of Friday, January 21, 2022, under partly cloudy and dry conditions. Traffic at the intersection was steady but light and relatively distributed across all intersection approaches. Many of the existing field conditions can be seen in the photo in Figure 2.

As shown, we observed the following:

1. Private residences in the southern corners of the intersection have driveways on Pettigrew Road and Bear Creek Road within 100 feet of the intersection. The current property in the northwest corner also has a driveway on NE Purcell Boulevard within 100 feet of the intersection.
2. Most of the topography around the intersection is generally flat. Moderate slopes away from the intersection exist in the northwest corner and to the south.
3. Infrastructure for several utilities and communication services surround the intersection, including power lines located along the east side of Pettigrew Road-NE Purcell Boulevard and the south side of Bear Creek Road. An underground canal lateral appears to travel from east of the intersection to the northeast intersection quadrant.
    - Utilities include gas, water, power, irrigation, and fire services
    - Communication services include CenturyLink and BendBroadband

The presence and location of all utilities and communication services should be identified and verified through final design.

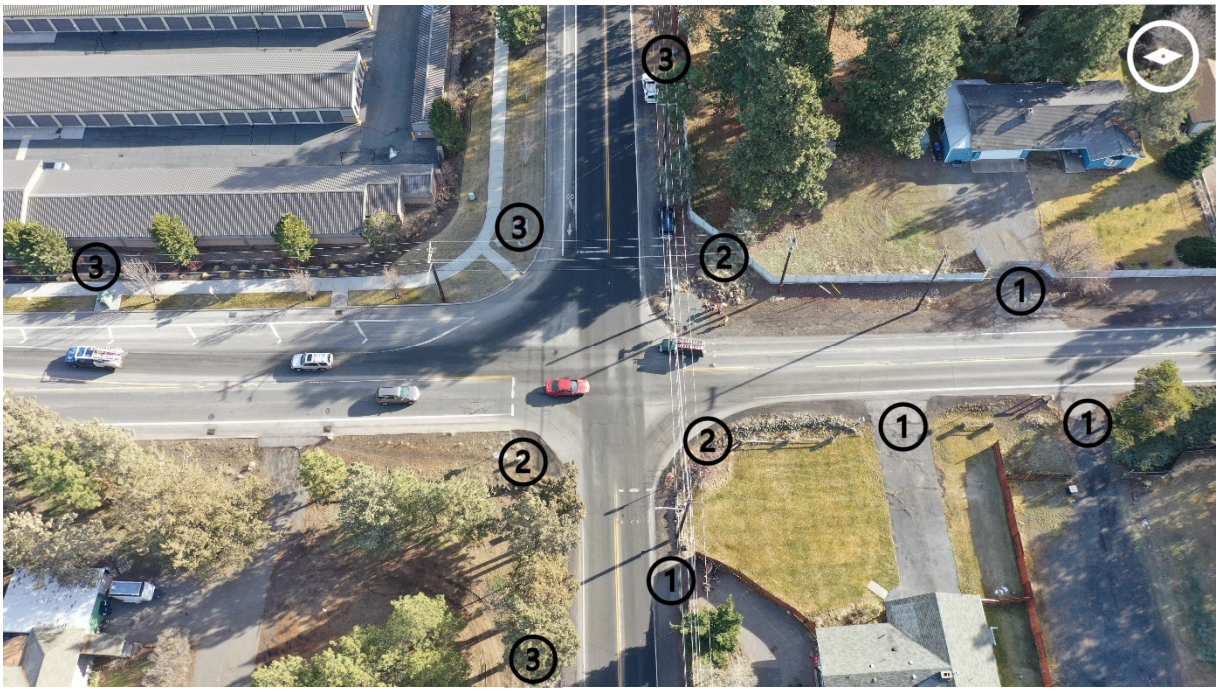


Figure 2: Existing Intersection Conditions (Field Review: January 21, 2022)

Pedestrian and Bicycle Facilities

Bike lanes are provided along both sides of NE Purcell Boulevard, north of the intersection, and along the north side of Bear Creek Road, east of the intersection. Discontinuous, buffered sidewalk is present along the east side of NE Purcell Boulevard, north of the intersection, and along the north side of Bear Creek Road, east of the intersection. A curb ramp is provided at the northeast corner. No marked crossings are present at the intersection. The closest marked crosswalks are located at the SE 27th Street / Bear Creek Road intersection.

Transit Facilities

Fixed-route transit service is not operated in the immediate vicinity of the study area. The transit routes closest to the intersection are Route 6 (Reed Market), which operates along SE 27th Street, and Route 7 (Greenwood), which operates along US 20. These routes are part of the network of primary transit corridors in Bend, but the study intersection is not. Further, no bus stops or other transit facilities are present in the study area (the nearest is located approximately ¼ -mile from the study intersection near SE 27th Street / Bear Creek Road). While CET has plans to provide mobility hubs throughout Bend and intensify Route 6 and 7, there are no plans for transit services and facilities in the immediate vicinity.

Roadway Facilities

The current intersection is all-way stop-controlled. Bear Creek Road and NE Purcell Boulevard-Pettigrew Road are two-lane roads. All approaches have shared movements and do not include turn lanes. The segment of Bear Creek Road east of the intersection has an additional eight feet of pavement along its north side between the bike lane and planter strip that has diagonal pavement striping.

Analysis and Operations Review

This section summarizes the key findings from analyzing existing and future no-build conditions at NE Purcell Boulevard-Pettigrew Road / Bear Creek Road, including traffic operations, crash

history, and existing accesses. The purpose of the analysis is to identify and confirm needs that should be addressed by the preferred alternative.

Existing Intersection Operational Analysis Results

The City of Bend collected AM peak period (7-9 AM) and PM peak period (4-6 PM) traffic counts at the study intersection in October 2021 while school was in session. All counts include the total number of pedestrians, bicyclists, motor vehicles, and percentage of heavy vehicles that entered the intersections in 5-minutes intervals. *Appendix B includes the traffic count worksheets.*

Traffic operations analysis reflects weekday PM peak hour conditions because traffic volumes during this period were observed to be substantially higher than AM peak hour conditions. The traffic counts show that the PM peak hour occurs from 4:40 to 5:40 PM. We analyzed PM peak hour conditions at the study intersection according to *Highway Capacity Manual (HCM) 6th Edition* methodologies using Vistro software. Figure 3 shows the intersection's lane configurations and traffic control devices, PM peak hour volumes, and resultant traffic operations, including the level-of-service (LOS) and delay for the intersection and the volume-to-capacity ratio (v/c) for the intersection critical movement. As shown, the intersection meets the City's all-way stop-control operational standard of an average 80-second intersection delay today but exceeds capacity with one or more approach operating with a v/c ratio over 1.0.

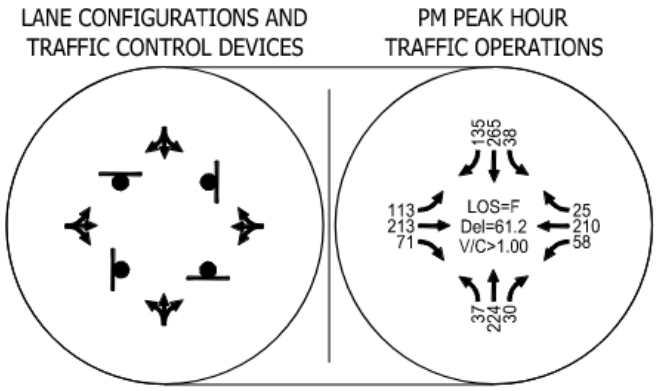


Figure 3: Existing PM Peak Hour Traffic Conditions

Table 1 summarizes the 95th percentile queue lengths at the study intersection. All approaches have 95th percentile queue lengths that block upstream driveways under PM peak hour traffic conditions. However, lane storage is adequate at all approaches and no upstream intersections are impacted by queue spillback. *Appendix C includes the existing traffic analysis worksheets.*

Table 1: Existing PM Peak Hour 95th Percentile Queue Lengths

Movement	Available Storage (Feet)[1]	95th Percentile Queue (Feet)[2]	Fits within Storage[3]
NBLTR	55	175	Yes
SBLTR	90	400	Yes
EBLTR	25	300	Yes
WBLTR	150	175	Yes

[1]Measured from approach stop bar to nearest upstream driveway.

[2]Rounded to the nearest 25 feet.

[3]Lane storage is adequate, but queue blocks upstream driveways.

Safety Evaluation

The safety evaluation summarized in this section is based on the most recent available six years of reported crash data (January 1, 2015 through December 31, 2020) obtained from the Oregon Department of Transportation's (ODOT) Crash Analysis and Reporting Unit. The data include the location, type, and severity of all crashes reported at the intersection during the study period. A total of 37 crashes were reported between 2015 and 2020. Table 2 summarizes these crashes by their type and severity. Note that only two crashes were reported in year 2020 (accounting for only five percent of the total) likely due to changes in travel patterns related to stay-at-home orders during the COVID-19 pandemic. *Appendix D includes the crash data worksheets.*

Table 2 : Intersection Crashes by Type and Severity (2015-2020)

Collision Type	Severity					
	Fatal	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage Only	Total
Fixed-Object	-	-	-	-	2	2
Rear-End	-	-	-	-	1	1
Angle	-	-	4	11	14	29
Turning Movement	-	-	1	3	1	5
Total	**-**	**-**	**5**	**14**	**18**	**37**

As shown in Table 2, no fatal or serious injury crashes were reported during the study period. Angle and turning movement crashes account for approximately 92 percent of all reported crashes.

Provided that only 2 of the 37 reported crashes at the intersection occurred in, suggesting an anomaly in crash patterns for that year likely due to the COVID-19 pandemic – we used the five years of crash data recorded between 2015 and 2019 (and existing traffic volumes) to compare the intersection's crash rate against the applicable statewide 90th percentile crash rate. The 90th percentile crash rate performance standard is used to identify intersections exhibiting more crashes than expected based on traffic volume and intersection type. Table 3 shows the observed crash rate at the intersection and how it compares to the applicable statewide 90th percentile crash rate.

Table 3: 90th Percentile Crash Rate Comparison (2015-2019)

Total Crashes	90th Percentile Crash Rate	Observed Crash Rate	Observed > 90th Rate?
35	0.408	1.352	Yes

As shown, the observed intersection crash rate exceeds the applicable statewide 90th percentile crash rate. *Appendix D includes the crash analysis worksheet.*

Stated previously, the Bend TSAP, which was based on 2012 to 2016 reported crash data, also identified this intersection as a high priority location for improvement due to observed crash histories. Based on findings and recommendations from that report, the Bend TSP identifies a single-lane roundabout at this location to improve safety conditions.

Access Analysis

As described in previous sections, existing driveways to private residences are located within 100 feet of the intersection. Of note, the property southwest of the intersection has driveways accessing both Bear Creek Road and Pettigrew Road.

According to Bend Development Code Section 3.1.400.F, lots and parcels in all zones and all uses may have one access point and if a property has more than one permitted access, the City may require that existing accesses be closed. If a lot has frontage on two or more streets of different street classifications, the property must access the street with the lowest classification. Bear Creek Road is designated as a Minor Arterial and Pettigrew Road is designated as a Collector, indicating an access would be preferred on Pettigrew Road.

Future Volume Evaluation [2040 No Build Conditions]

Per the *Methodology Memorandum*, the Bend Redmond Travel Demand Model (BRM) was used to develop year 2040 turn movement volumes at the study intersection. The raw link level volumes from the BRM were post-processed using methodologies outlined in the National Cooperative Highway Research Program (NCHRP) *Report 765 Highway Traffic Data for Urbanized Area Project Planning and Design*, consistent with the ODOT Analysis Procedures Manual (APM).

Like the existing intersection operational analysis, we evaluated year 2040 PM peak hour traffic volumes at the study intersection according to *HCM 6th Edition* methodologies using Vistro software. Figure 4 shows the intersection's no-build lane configurations and traffic control devices and the forecast 2040 PM peak hour volumes and resultant traffic operations. As shown, the intersection does not meet the City's all-way stop-control operational standard of an average 80-second intersection delay and operates with a v/c ratio exceeding 1.0.

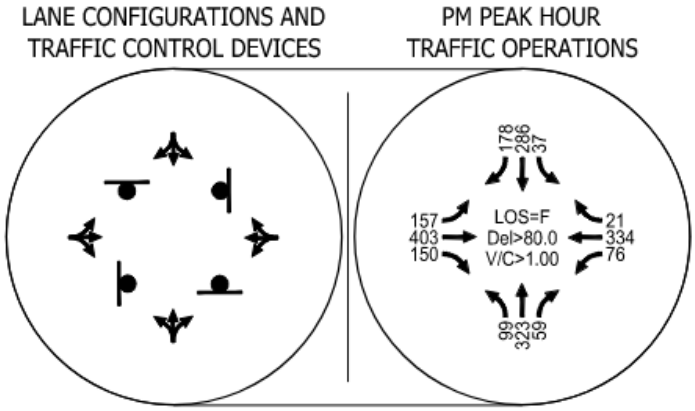


Figure 4: Future 2040 PM Peak Hour Traffic Conditions

Table 4 summarizes the 95th percentile queue lengths at the study intersection. All approaches have 95th percentile queue lengths that block upstream driveways and/or side streets under PM peak hour traffic conditions. Queuing during the PM peak hour is expected to grow significantly compared to conditions observed today, especially for eastbound movements. *Appendix E includes the future traffic analysis worksheets.*

Table 4: Future 2040 PM Peak Hour 95th Percentile Queue Lengths

Movement	Available Storage (Feet)[1]	95th Percentile Queue (Feet)[2]	Fits within Storage[3]
NBLTR	55	600	Yes
SBLTR	90	650	Yes
EBLTR	25	1,300	Yes[4]
WBLTR	150	475	Yes

[1]Measured from approach stop bar to nearest upstream driveway.

[2]Rounded to the nearest 25 feet.

[3]Lane storage is adequate, but traffic volumes block upstream driveways and/or side streets.

[4]Would extend past lower order side-street intersections on Bear Creek Drive.

Equity Evaluation

The Bend Transportation Bond Oversight Committee (TBOC) has Project Evaluation Criteria, including an evaluation for equity. The following scores listed in Table 5 were provided for the equity evaluation criteria for the entire Bear Creek Road and 27th Street improvement project, including the planned Key Walking and Biking Route. As noted, this evaluation report considers the intersection modification only, which provides for but does not complete the planned walking and biking route.

Table 5: Equity Evaluation Results

Equity Evaluation Criteria	Score	Notes
Transportation Access for Underserved Populations	◒	Scored by TBOC
Transportation impacts on the community	◒	Scored by TBOC
Reduce pollution of Bend's air and water, with a focus on the impacts to vulnerable populations	◒	Low-stress bike route
Access to key destinations	●	Improves access to Bear Creek Elementary (Title I) and Ponderosa Park for bikes and pedestrians.

● The project clearly supports the criterion and/or makes substantial improvements in the criteria category

◒ The project partially supports the criterion and/or makes moderate improvements in the criteria category.

○ The project does not support the intent of, provides minor or incidental benefit and/or negatively impacts the criteria category.

Summary of Needs

The following summarizes key needs from the field review of multimodal facilities as well as the safety and operations analysis:

- Future year 2040 intersection operations do not meet the City's all-way stop-control operational standard.
- ODOT has reported 37 crashes at the intersection between 2015 and 2020.
  - 92 percent were angle and turning movement crashes.
  - No reported crash resulted in serious or fatal injuries.
- The Bend TSP and TSAP identified the need for a roundabout at the intersection.
- The Bend TSP established Bear Creek Road as a key walking and bicycling route and identified the need to implement a shared use path along the corridor.
- Residential properties immediately south of the intersection have driveways on Pettigrew Road within 100 feet or less of the intersection.

Alternative Evaluation

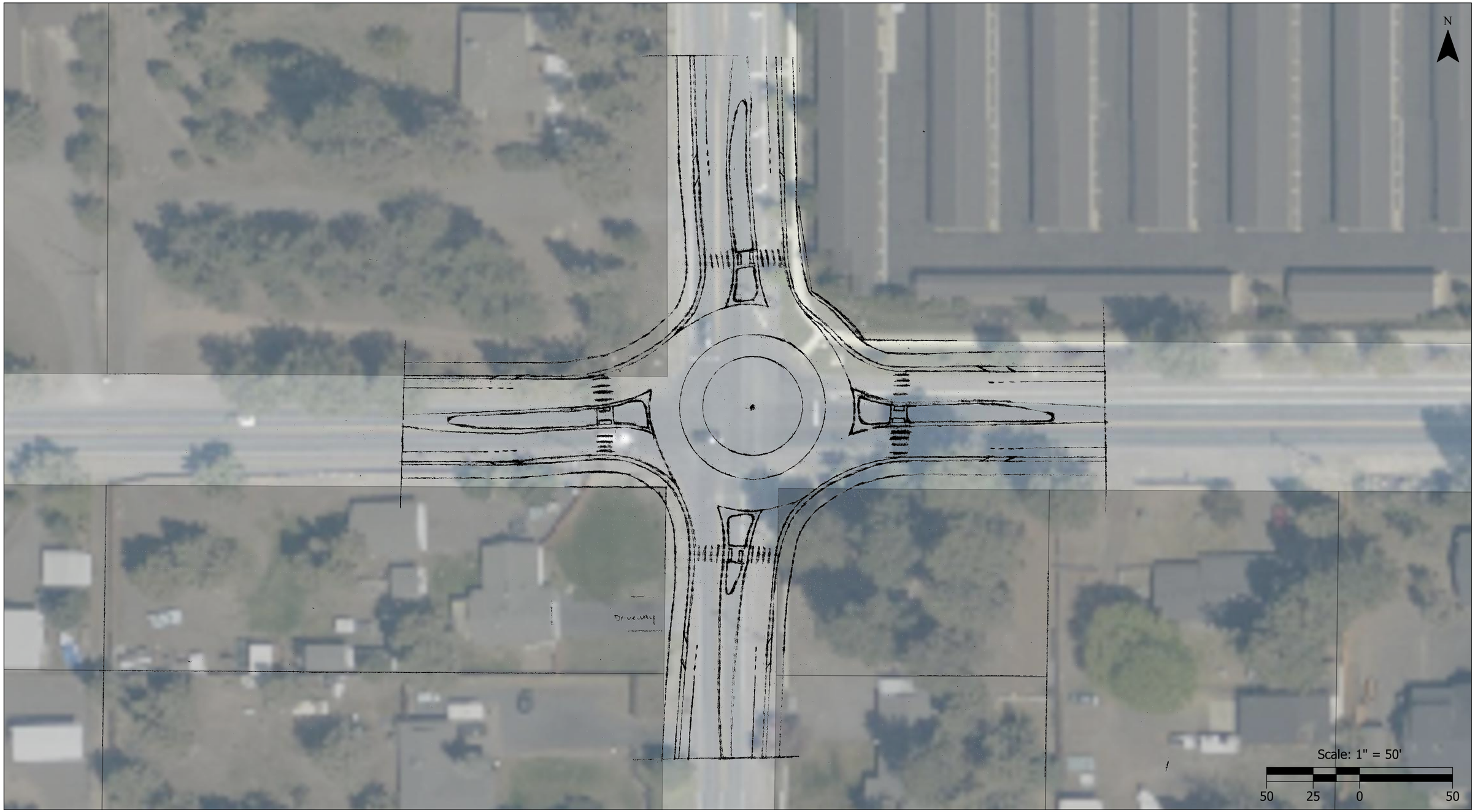
This section evaluates the implementation of a single-lane roundabout at the NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection consistent with recommendations within the Bend TSP and Bend TSAP. Presented herein is a concept design, safety and operational evaluation, multimodal accommodations, environmental impacts, and cost estimate for a single-lane roundabout at this location.

Concept Design

The single-lane roundabout shown in Figure 5 is a concept design illustrating an intersection layout that balances environmental impacts with operational and safety needs. The roundabout has a 130-foot inscribed circular diameter intended to minimize right-of-way impacts and accommodate WB-50 trucks. The center of the roundabout is offset northeast from the existing intersection to fit within existing right-of-way boundaries (shaded in gray). Although shifted, the center of the roundabout aligns with the existing west and east leg roadway centerlines.

Conversely, the center of the roundabout is offset right of the existing south leg centerline by approximately 15 feet but realigns approximately 170 feet south of the intersection. Further, the center of the roundabout is offset left of the existing north leg centerline by approximately 10 feet but realigns approximately 160 feet north of the intersection. The splitter islands range from 50 to 120 feet in length depending on proximity of existing driveways to the intersection so that all residences have full access.

Future design efforts should modify and expand on this concept as needed based on more detailed field review, design considerations, and incorporation of the preferred walking and biking route along Bear Creek Road.



NE Purcell Boulevard-Pettigrew Road / Bear Creek Road
Single-Lane Roundabout Concept
Bend, Oregon

Figure
5

KITTELSON & ASSOCIATES

Safety Review

As described in the safety evaluation, 37 crashes have been reported at the intersection between 2015 and 2020 (92 percent were angle and turning movement crashes). The 32 reported crashes between 2015 and 2019 exceed what is expected as compared with statewide 90th percentile crash rates. The Bend TSAP also identified this intersection as a specific location needing safety treatment. The plan demonstrates that converting the existing intersection into a roundabout has the potential to reduce all crash types by 19 to 82 percent, based on ODOT's list of approved Crash Reduction Factors (CRFs) and the Highway Capacity Manual (HSM), respectively.

Operations Analysis

We analyzed a single-lane roundabout under the existing and future 2040 PM traffic conditions described in previous sections according to *HCM 6th Edition* methodologies using Vistro software. Figure 6 shows the roundabout lane configurations, PM peak hour volumes, and resultant traffic operations (including the LOS, delay, and v/c for the intersection critical movement) under existing and future conditions. As shown, the intersection meets the City's roundabout operational standard of a 1.0 critical movement v/c now and in 20 years.

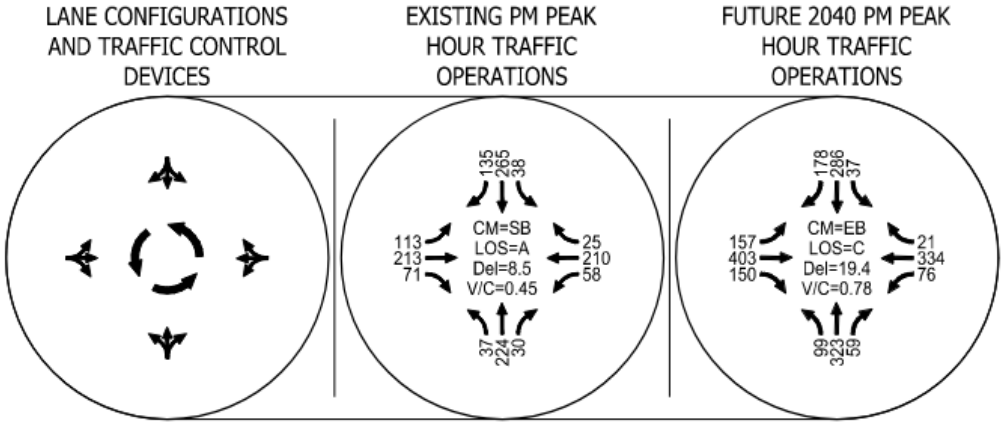


Figure 6: Existing and Future PM Peak Hour Traffic Conditions for a Single-Lane Roundabout

Table 6 summarizes the existing and future 95th percentile queue lengths for the roundabout.

Similar to no-build conditions, all approaches have projected 95th percentile queue lengths that block upstream driveways under PM peak hour traffic conditions. However, expected queuing is substantially reduced from no-build 2040 conditions. *Appendix F includes the existing and future traffic analysis worksheets for the single-lane roundabout.*

Table 6: Existing and Future PM Peak Hour 95th Percentile Queue Lengths for a Single-Lane Roundabout

Movement	Available Storage (Feet)[1]	95th Percentile Queue (Feet)[2]		Fits within Storage[3]	
		Existing	Future	Existing	Future
NBLTR	55	50	125	Yes	Yes
SBLTR	90	75	125	Yes	Yes
EBLTR	25	75	225	Yes	Yes
WBLTR	150	50	100	Yes	Yes

[1]Measured from approach stop bar to nearest upstream driveway.

[2]Rounded to the nearest 25 feet.

[3]Lane storage is adequate but traffic volumes block upstream driveway.

Multimodal Accommodations

The concept design improves multimodal connectivity at the intersection by providing walking and biking facilities and improved crossing locations via the roundabout. The wide path that would be constructed adjacent to the roundabout will support various designs of the future Key Walking and Biking Route planned along Bear Creek Road. Although no fixed-route transit service or transit facilities are planned in the immediate vicinity of the study intersection, the concept design improves walking, rolling, and biking connections for riders accessing transit on US 20 and SE 27th Street.

Environmental Impact

Although the roundabout is sized to reduce environmental impacts, it will require right-of-way acquisition to be appropriately sized to facilitate normal roundabout operations for vehicles and people, including walking and biking facilities, and the typical design vehicle (WB-50 truck). Figure 5 generally illustrates the expected right-of-way impacts of this specific concept.

Class 5 Cost Estimate

The Bend TSAP estimated that a single-lane roundabout at this location would cost between $2.5 and $3.5 million. Cost estimates were developed based on input from the City of Bend on recent costs for the design and construction of similar facilities.

Findings and Recommendations

This section summarizes key findings revealed through this Project Evaluation Report and the recommendations for the NE Purcell Boulevard-Pettigrew Road / Bear Creek Road intersection.

- The Bend Transportation System Plan (TSP) and Transportation Safety Action Plan (TSAP) identify the need for a single-lane roundabout at the study intersection. The Bend TSAP identifies the need for streetscaping along both streets and the Bend TSP establishes Bear Creek Road as a key walking and bicycling route. The Cascades East Transit (CET) 2040 Transit Master Plan (TMP) does not identify transportation infrastructure within the study area needed to support transit.
- Most of the grade around the intersection is generally flat and several utilities and communication services surround the study area (including power lines along both streets). Private residences have driveways within 100 feet of the intersection and the southwest property has driveways accessing both Bear Creek Road and Pettigrew Road (non-compliant with City Code).

- Bike lanes and discontinuous, buffered sidewalks are limited to the north and east intersection legs, and no marked crossings are present at the intersection. Fixed-route transit service is not operated in the immediate vicinity of the study area.
- The current intersection is all-way stop-control and both streets are two-lane roads with shared movements (no turn lanes).
- The current intersection meets City operating standards under existing PM peak hour conditions but exceeds capacity for one or more approaches. The intersection is forecast to exceed standards and capacity by 2040. All intersection approaches have 95th percentile queues that block upstream driveways.
- ODOT reports 37 crashes have occurred at the study intersection between 2015 and 2020 with angle and turning movement crashes accounting for approximately 92 percent. No fatal or serious injury crashes were reported. The observed intersection crash rate exceeds the applicable statewide 90th percentile crash rate.
- The recommended intersection modification includes a single-lane roundabout, consistent with the Bend TSP and Bend TSAP, with a 130-foot inscribed diameter (to minimize right-of-way impacts and accommodate WB-50 trucks). The roundabout would meet City operating standards under existing and future PM peak hour conditions and reduce intersection queuing. The roundabout supports walking and biking connections with marked crossings on all approaches and space for a multi-use path. The Bend TSAP estimated that the intersection modification will cost between $2.5 and $3.5 million.
- GO Bond funds for modifying the intersection also support a Key Walking and Biking Route along Bear Creek Road. The intersection recommendations presented in this report are intended to be forward compatible with implementing that future route.

Appendix A – Methodology Memorandum

Methodology Memorandum

PREPARED FOR: Sinclair Burr & Ryan Oster

PREPARED BY: Matt Kittelson & Chris Maciejewski

DATE: January 17, 2022

Introduction

This memorandum provides details of the methodology and assumptions to perform technical analyses for General Obligation Bond (GO Bond) traffic engineering studies (Project Evaluation Reports) for the City of Bend. The methodology and assumptions include:

- Data collection and volume development;
- Traffic analysis procedure for the study intersections under existing year and planning horizon (year 2040) traffic conditions;
- Crash analysis procedure for the study intersections;
- Multimodal analysis;
- Concept design and design vehicle;
- Cost estimates; and
- Phasing and sensitivity analysis.

The following sections provide an overview of the Project Evaluation Reports and their purpose along with technical assumptions and approaches that will guide each report.

Project Evaluation Reports

As part of the GO Bond implementation, Kittelson & Associate and DKS Associates have been retained by the City of Bend to evaluate various transportation projects identified within the GO Bond program. The purpose of these reports is to help inform intersection form, sizing, and multimodal features needed to support the long-term vision for the transportation network. Outcomes of the Project Evaluation Reports will include conceptual designs of intersection form and key roadway features, including multimodal facilities, planning level cost estimates, and other information intended to inform a future design effort for each project. The reports are intended to be useful to City Staff, the Transportation Bond Oversight Committee (TBOC), and City Council as projects are further refined and prioritized through the GO Bond program.

Project Evaluation Reports are currently anticipated for the following projects:

- Portland Avenue Corridor improvements
- Colorado Avenue Capacity improvements

- Intersection Improvements at:
  - Olney/8th
  - Revere/8th
  - Pettigrew/Bear Creek
  - Revere/4th
  - Olney/4th
  - Ferguson/15th
  - O.B. Riley/Empire
  - Chase/Powers/Purcell

Additional projects may be evaluated if requested by the City.

Methodology Assumptions

The following sections detail specific methodology assumptions and approaches to be included in each Project Evaluation Report.

Volume Development

The following sections describe how traffic volumes were collected at the study intersections and how they will be used to evaluate existing and future traffic conditions for each project evaluation.

Traffic Counts

AM peak period (7-9 AM) and PM peak period (4-6 PM) traffic counts at the study intersections were collected by the City of Bend in October 2021, while school was in session. All counts include the total number of pedestrians, bicyclists, motor vehicles, and percentage of heavy vehicles that entered the intersections in 5-minutes intervals.

At the time of the traffic counts, effects of the COVID-19 pandemic on typical travel patterns were minimal based on regular monitoring from the Bend Metropolitan Planning Organization (MPO). As such, no adjustments to account for the COVID-19 pandemic are recommended for these evaluations.

However, ongoing construction during Fall 2021 may have affected traffic conditions at one or more study locations. Notably, construction along the Newport Avenue corridor resulted in significant detours along the Portland Avenue corridor, making traffic conditions non-typical. Where this and other events are noted that could have affected typical travel patterns when traffic counts were collected, historical data will be utilized and adjusted to current conditions. If no such data are available, alternative methods will be discussed with the City to develop reasonable traffic condition estimates.

In addition, the Murphy Extension between Brosterhous Road and SE 15th Street opened in November 2021 after traffic counts were collected. Intersections where travel patterns may be affected by this new facility, such as SE 15th Street/Ferguson Road, will be reviewed to identify appropriate adjustment factors to account for this change.

Traffic data collected were AM and PM peak period turning movement counts. Daily counts, which may be necessary for pavement design, were not collected and should be coordinated as part of future design efforts.

Peak Hour Identification

Existing and future traffic operations analyses will reflect weekday PM peak hour conditions. AM peak hour conditions may also be evaluated if traffic count data shows notably different travel patterns, such as heavy school traffic. Each Project Evaluation Report will identify an appropriate peak hour based on observed data at applicable study intersections. Per City of Bend analysis standards, a peak hour factor (PHF) of 1.0 will be used for intersection evaluation during existing and future conditions.

Forecast Traffic Volumes

The Bend Redmond Regional Travel Demand Model (BRM) tool will be used to estimate year 2040 turn movement volumes at all study intersections. The latest approved base year and future year model scenario will be used for each Project Evaluation Report. The BRM tool links land use, demographics, travel demand management strategies (such as parking pricing), and the transportation network to forecast/predict how much people will travel, by which mode, and by which route, including sensitivity to system operational factors such as travel time due to congestion.

The land use included in the 2040 model will be consistent with the Bend Transportation System Plan (TSP) land use, which includes over 50 percent growth in housing and employment in Bend. This growth is spread throughout vacant lands, specific opportunity areas, and expansion areas identified through the 2016 Urban Growth Boundary update. This includes strategies identified through integrated transportation and land use planning to reduce vehicle miles travelled (VMT) per capita, such as increase in mixed-use, dense land uses, consistent with the land use designations shown in the adopted Bend Comprehensive Plan.

The future transportation network will include all projects and programs identified as reasonably likely to be funded in the City's TSP. These improvements include the completed key routes for low-stress walking and bicycling corridors, enhanced transit service including potential mobility hub locations, roadway extensions, and select corridor capacity/widening improvements. The combination of these improvements with the land use growth strategies listed above create area and citywide shifts in mode choice. It is important to note that these modal shifts cannot be isolated to a specific project with the regional travel model.

Raw link level volumes from the BRM will be post-processed using methods consistent with the ODOT APM V2 to develop intersection turn-movement volumes. This approach is derived from methodologies outlined in the National Cooperative Highway Research Program (NCHRP) *Report 765 Highway Traffic Data for Urbanized Area Project Planning and Design*. If needed for certain locations, network refinements be made in the travel model to help evaluate local-street level circulation patterns that are not represented in the regional model framework.

Phasing/Sensitivity Analysis

If applicable, each Project Evaluation Report will consider if project phasing or sensitivity analysis is necessary to inform future or interim project recommendations. Examples of such analysis include:

- Possible phasing of multi-lane roundabouts
- Consideration of future UGB expansion area capacity needs
- Sensitivity analysis of possible network modifications, such as the possible closure of 9th Street at Reed Market Road.
- Policy analysis, such as the monitoring of corridors identified within the TSP for future roadway expansion (Colorado Avenue & 27th Street).

Interim analyses, if necessary, will utilize the year 2028 scenario of the Bend-Redmond Travel Demand Model.

Traffic Analysis

The traffic analysis will evaluate peak hour traffic operations of the study intersections under existing conditions and through the planning horizon of 2040 to identify appropriate improvement alternatives. This section summarizes the traffic analysis methodology including applicable intersection operational standards and analysis parameters and assumptions.

Intersection Operational Standards

All transportation facilities anticipated to be included in the Project Evaluation Reports are owned and operated by the City of Bend. Applicable operating standards will be identified for each intersection based on Bend Development Code (BDC) 4.7.500.B.6.d:

- Two-Way Stop Control. Average delay for the critical lane group for any major intersection with greater than 100 peak hour trips is greater than or equal to 50 seconds during the peak hour.
- All-Way Stop Control. Average delay for any major intersection as a whole is greater than or equal to 80 seconds during the peak hour.
- For signalized intersections, the volume-to-capacity ratio for the intersection as a whole is greater than or equal to 1.0 during the peak hour.
- For roundabout intersections, the volume-to-capacity ratio for the critical movement is greater than or equal to 1.0 during the peak hour.

As applicable, ODOT or Deschutes County mobility standards will be applied to facilities evaluated that are under either jurisdiction's authority.

Traffic operations at the study intersections will be evaluated as outlined above. Project alternatives will consider applicable operating standards as part of the project evaluation process for each study.

Analysis Parameters

The following data sources and methodologies are proposed for conducting traffic analysis.

- **Intersection/Road Geometry** (e.g., number of lanes, lane configurations, cross-section elements, etc.) will be collected through aerial photography and site visits. Available as-built data may also be used to verify existing roadway geometry. The analysis models will be constructed on scaled roadway line work from GIS or aerial photography.
- **Operational Data** (e.g., posted speeds, intersection control, rail crossings, etc.) will be collected through aerial photography and confirmed through site visits.
- **Peak Hour Factors** (PHF) will be 1.0, per City of Bend analysis standards.
- **Traffic Volume Development** is described in previous sections.
- **Traffic Operations**
    - The methodologies identified in the Highway Capacity Manual 6th Edition (HCM – Reference 5) will be used to analyze traffic operations at the study intersections.
    - The team will utilize Vistro or Synchro, both software tools designed to assist with operations analyses in according with HCM 6th Edition methodologies; therefore, these software packages will be used to conduct the traffic operations analyses. Level-of-service (LOS), delay, v/c ratios (critical movement for unsignalized intersections) and 95th percentile queue lengths (note where queues would impact adjacent intersections or access points). Failing unsignalized intersections will be evaluated using Manual on Uniform Traffic Control Devices (MUTCD – Reference 6) traffic signal warrants.

- Roundabout operational analysis will be conducted consistent with roundabout calibration factors developed for Bend and document in the Bend Roundabout Evaluation and Design Guidelines.
- Current signal timing data will be requested from ODOT for analysis of all existing traffic signals.

Traffic Analysis Software & Input Assumptions

Table 1 summarizes the software and input assumptions for the traffic analysis.

Table 1: Traffic Analysis Assumptions

Intersection Parameters	Existing Conditions Assumptions
Peak Hour Factor	From traffic counts
Conflicting Bikes and Pedestrians per Hour	From traffic counts (as available)
Area Type	Based on local conditions
Ideal Saturation Flow Rate (All Movements)	1,750 passenger cars per hour per lane
Lane Width	12 feet (unless field observations suggest otherwise)
Percent Heavy Vehicles (All Movements)	From traffic counts (as available)
Percent Grade	Estimated based on field observations
95th-Percentile & Average Vehicle Queues	Traffic analysis summary output

Crash Analysis

The crash analysis will review the most recent five years of reported crash data at the study intersections, obtained from ODOT's Crash Analysis & Reporting Unit. Possible crash patterns that may include location, type, characteristics, and/or severity will be identified. Intersection crash rates will be developed and compared with statewide crash rates (ODOT Analysis Procedures Manual [APM] Exhibit 4-1). Specific emphasis will be given to crashes involving people walking, biking, or rolling.

The recently completed Bend Transportation Safety Action Plan (TSAP) and City of Bend All Roads Transportation Safety (ARTS) project list will be reviewed for each study intersection and any relevant findings will be incorporated into Project Evaluation Report analysis and recommendations as appropriate.

Multimodal Analysis

The multimodal analysis will review the following elements of the active transportation network to identify potential facility and service alternatives for people walking, rolling, biking, and taking transit within each Project Evaluation Report:

- Availability of facilities and services (including transit) within the analysis area of each Project Evaluation Report;
- Level of Traffic Stress (LTS) ratings for crossings or, if applicable, pedestrian and bicycle facilities along a corridor; and

- The context of each project within the planned walking and biking network within the City (discussed further in the following section).

The LTS analyses will be performed in accordance with the methodologies identified in Chapter 14 of the APM. Pedestrian and Bicycle LTS have unique criteria that are used to determine a facilities LTS score (e.g., number of travel lanes, bike lane widths, adjacent parking, roadway functional classification, daily volume, posted speed limits, sidewalk conditions and widths, illumination presence, etc.). LTS scores range from little traffic stress (LTS 1) to high traffic stress (LTS 4) and are based on the perceived safety issue of being in close proximity to vehicles.

Walking and Biking Network

Each Project Evaluation Report will provide a description of the regional walking and biking network planned for the study area, including facilities contemplated within the Bend TSP and BPRD master plan. Particular emphasis will be given to how the project should support the identified Low Street Bicycle Network and Key Walking and Biking Routes identified within the Bend TSP.

As part of the project evaluation, each report will coordinate with the City of Bend to identify appropriate walking and biking facilities that should be provided. The purpose of this exercise will be to identify possible right-of-way needs and allocations that could be necessary to provide the necessary multimodal facilities. Recommendations documented within each Project Evaluation Report will be further refined by future design teams.

Concept Development

10 percent improvement concepts will be developed for each recommended project alternative. These concepts are intended to convey recommended intersection control, lane configurations, multi-modal elements, and other geometric features that may influence future design efforts. As applicable, concepts may consider future phasing alternatives if projects require.

In coordination with the City, the appropriate design vehicle for each alternative will be identified and considered within the concept development.

As applicable, challenges that should be further explored during the design phases will be noted. In all cases, additional refinements will be required during the design phase of each project based on further investigation and project refinement.

Cost Estimates

Planning level cost estimates (Class V) will be developed for each recommended project alternative in coordination with the City of Bend.

Equity Evaluation

The City of Bend and TBOC conducted an equity evaluation for each project as part of the GO Bond project sequencing efforts. These efforts relied upon City of Bend equity mapping and input from the TBOC committee to assess how well each project addressed the following criteria:

- Transportation access for underserved populations
- Transportation impacts on the community
- Reduce pollution of Bend’s air and water, with a focus on impacts to vulnerable populations
- Access to key destination

Each Project Evaluation Report will incorporate the equity evaluation done for each project and include key findings in the report recommendations.

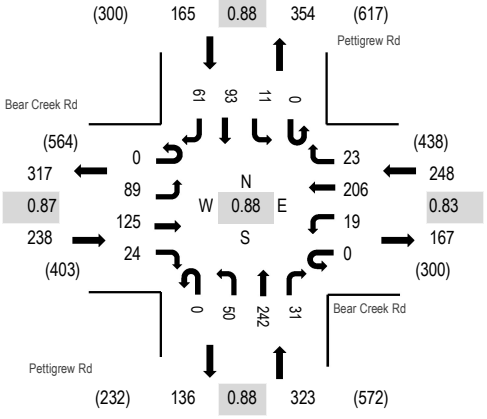
Appendix B – Traffic Count Worksheets

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

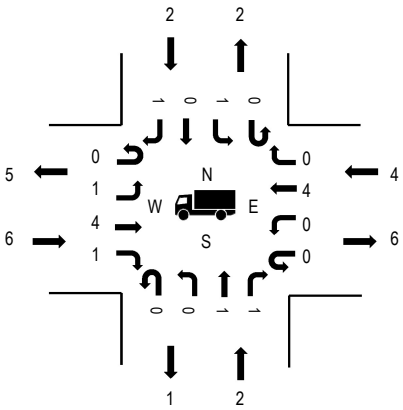
Location: 19 Pettigrew Rd & Bear Creek Rd AM
Date: Tuesday, October 12, 2021
Peak Hour: 07:35 AM - 08:35 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour

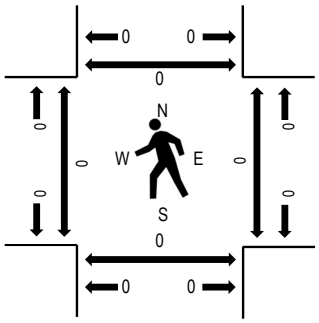
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	2.5%	0.87
WB	1.6%	0.83
NB	0.6%	0.88
SB	1.2%	0.88
All	1.4%	0.88

Traffic Counts - Motorized Vehicles

Interval Start Time	Bear Creek Rd Eastbound				Bear Creek Rd Westbound				Pettigrew Rd Northbound				Pettigrew Rd Southbound					Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	
7:00 AM	0	0	4	1	0	0	13	0	0	1	11	0	0	1	3	1	35	822
7:05 AM	0	3	4	1	0	1	6	2	0	4	11	3	0	0	4	5	44	877
7:10 AM	0	5	5	0	0	1	10	0	0	3	14	2	0	0	9	4	53	915
7:15 AM	0	7	5	1	0	2	11	2	0	3	14	1	0	0	5	2	53	914
7:20 AM	0	1	8	0	0	0	14	2	0	7	18	4	0	1	6	7	68	947
7:25 AM	0	4	6	2	0	1	12	4	0	6	21	5	0	0	6	3	70	968
7:30 AM	0	7	8	2	0	0	20	2	0	3	16	2	0	1	7	2	70	973
7:35 AM	0	8	17	5	0	0	11	2	0	5	15	1	0	2	10	5	81	974
7:40 AM	0	6	8	3	0	0	15	2	0	5	18	5	0	1	6	2	71	958
7:45 AM	0	12	10	1	0	0	23	3	0	3	25	2	0	0	5	10	94	948
7:50 AM	0	8	11	2	0	4	19	2	0	3	27	3	0	2	9	5	95	924
7:55 AM	0	11	6	2	0	0	21	2	0	7	18	4	0	1	8	8	88	919
8:00 AM	0	5	13	4	0	3	21	4	0	4	20	4	0	1	5	6	90	891
8:05 AM	0	7	8	2	0	2	19	4	0	6	13	4	0	1	13	3	82	
8:10 AM	0	1	11	0	0	2	13	2	0	5	8	1	0	2	6	1	52	
8:15 AM	0	8	12	2	0	1	19	1	0	2	30	2	0	0	5	4	86	
8:20 AM	0	11	11	1	0	5	13	0	0	6	29	1	0	0	7	5	89	
8:25 AM	0	9	10	1	0	1	13	1	0	2	20	2	0	1	9	6	75	
8:30 AM	0	3	8	1	0	1	19	0	0	2	19	2	0	0	10	6	71	
8:35 AM	0	9	7	2	0	1	10	3	0	4	10	3	0	3	7	6	65	
8:40 AM	0	4	12	1	0	1	15	0	0	1	12	1	0	1	8	5	61	
8:45 AM	0	8	7	1	0	1	20	3	0	3	13	5	0	0	5	4	70	
8:50 AM	0	9	18	1	0	0	14	2	0	5	20	6	0	2	8	5	90	
8:55 AM	0	9	2	1	0	2	11	4	0	3	13	1	0	5	5	4	60	
Count Total	0	155	211	37	0	29	362	47	0	93	415	64	0	25	166	109	1,713	
Peak Hour	0	89	125	24	0	19	206	23	0	50	242	31	0	11	93	61	974	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	1	0	1	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	0	1	0	1	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	0	0	0	1	1	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	1	0	0	1	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	0	0	1	1	2	7:30 AM	0	1	0	0	1	7:30 AM	0	0	0	0	0
7:35 AM	0	0	0	1	1	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	1	1	0	0	2	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	0	3	0	3	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	2	0	0	0	2	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	0	0	1	0	1	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	1	0	0	1	2	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	1	0	0	0	1	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	1	1	8:20 AM	0	0	0	0	0
8:25 AM	0	1	0	0	1	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	1	0	0	0	1	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	0	1	0	1	2	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	0	0	1	0	1	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	0	0	0	1	1	8:45 AM	0	1	0	0	1	8:45 AM	0	0	0	0	0
8:50 AM	1	0	0	0	1	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	1	1
8:55 AM	0	0	0	1	1	8:55 AM	0	0	0	0	0	8:55 AM	1	0	0	0	1
Count Total	7	4	8	7	26	Count Total	0	2	0	1	3	Count Total	1	0	0	1	2
Peak Hour	6	2	4	2	14	Peak Hour	0	0	0	1	1	Peak Hour	0	0	0	0	0

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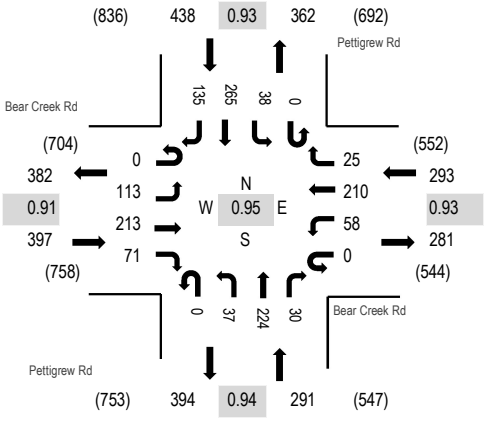
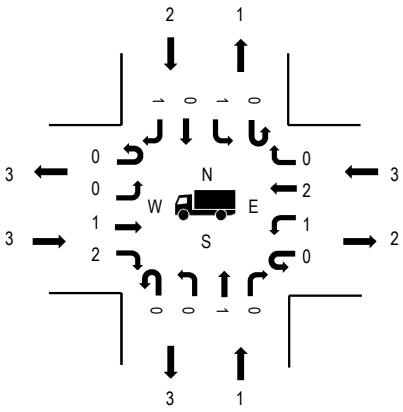
Location: 19 Pettigrew Rd & Bear Creek Rd PM
Date: Tuesday, October 12, 2021
Peak Hour: 04:40 PM - 05:40 PM
Peak 15-Minutes: 05:10 PM - 05:25 PM

Peak Hour

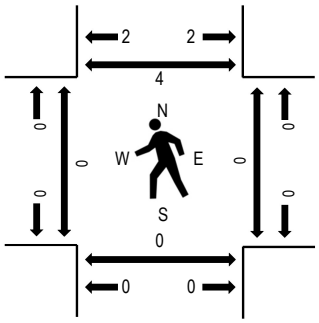
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.8%	0.91
WB	1.0%	0.93
NB	0.3%	0.94
SB	0.5%	0.93
All	0.6%	0.95

Traffic Counts - Motorized Vehicles

Interval Start Time	Bear Creek Rd Eastbound				Bear Creek Rd Westbound				Pettigrew Rd Northbound				Pettigrew Rd Southbound					Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	
4:00 PM	0	10	17	5	0	5	18	0	0	1	17	1	0	2	15	13	104	1,372
4:05 PM	0	10	22	9	0	7	11	2	0	2	23	2	0	4	27	10	129	1,379
4:10 PM	0	7	17	5	0	6	21	6	0	2	13	4	0	1	18	11	111	1,361
4:15 PM	0	5	19	1	0	4	16	3	0	3	18	2	0	4	20	9	104	1,372
4:20 PM	0	12	10	7	0	2	18	2	0	0	25	0	0	4	22	11	113	1,397
4:25 PM	0	9	15	7	0	4	13	3	0	1	9	2	0	3	29	10	105	1,405
4:30 PM	0	6	12	2	0	4	22	5	0	2	13	3	0	3	24	11	107	1,413
4:35 PM	0	13	21	0	0	5	18	2	0	5	19	1	0	2	18	11	115	1,418
4:40 PM	0	10	22	6	0	7	16	3	0	4	22	3	0	3	20	14	130	1,419
4:45 PM	0	10	19	4	0	4	16	1	0	5	9	2	0	4	18	12	104	1,388
4:50 PM	0	15	15	4	0	5	18	1	0	3	20	5	0	2	28	4	120	1,377
4:55 PM	0	12	17	6	0	3	25	2	0	3	22	3	0	1	23	13	130	1,359
5:00 PM	0	10	19	6	0	9	15	0	0	3	17	1	0	3	19	9	111	1,321
5:05 PM	0	7	18	4	0	8	11	3	0	3	16	4	0	3	20	14	111	
5:10 PM	0	9	23	6	0	1	24	2	0	0	21	0	0	2	27	7	122	
5:15 PM	0	7	21	10	0	6	20	0	0	4	22	2	0	3	20	14	129	
5:20 PM	0	10	17	7	0	5	15	5	0	3	16	6	0	6	20	11	121	
5:25 PM	0	6	16	8	0	2	17	4	0	4	16	1	0	5	19	15	113	
5:30 PM	0	8	11	5	0	3	18	3	0	4	16	3	0	2	28	11	112	
5:35 PM	0	9	15	5	0	5	15	1	0	1	27	0	0	4	23	11	116	
5:40 PM	0	7	18	4	0	5	8	1	0	2	19	2	0	2	21	10	99	
5:45 PM	0	4	22	7	0	3	12	2	0	0	11	2	0	2	22	6	93	
5:50 PM	0	5	22	7	0	4	16	1	0	2	20	1	0	0	18	6	102	
5:55 PM	0	5	14	5	0	1	7	2	0	5	21	3	0	4	16	9	92	
Count Total	0	206	422	130	0	108	390	54	0	62	432	53	0	69	515	252	2,693	
Peak Hour	0	113	213	71	0	58	210	25	0	37	224	30	0	38	265	135	1,419	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	2	0	0	0	2	4:00 PM	0	0	0	1	1	4:00 PM	0	0	0	0	0
4:05 PM	0	0	1	1	2	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	1	0	1	0	2	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	1	0	0	0	1	4:20 PM	0	0	0	2	2	4:20 PM	0	0	0	0	0
4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	1	0	1	0	2	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:35 PM	0	0	1	1	2	4:35 PM	2	0	0	0	2	4:35 PM	0	0	0	0	0
4:40 PM	1	0	1	0	2	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0
4:45 PM	1	0	0	0	1	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	2	2
4:50 PM	0	0	0	1	1	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	0	1	0	1	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0
5:00 PM	0	0	1	0	1	5:00 PM	2	0	2	0	4	5:00 PM	0	0	0	0	0
5:05 PM	0	0	0	1	1	5:05 PM	1	0	0	0	1	5:05 PM	0	0	0	1	1
5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	1	1
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	1	0	0	0	1	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	0	1	0	0	1	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	1	1	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	1	1	5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	8	1	7	5	21	Count Total	5	0	2	4	11	Count Total	0	0	0	4	4
Peak Hour	3	1	3	2	9	Peak Hour	3	0	2	0	5	Peak Hour	0	0	0	4	4

Appendix C – Existing Traffic Analysis Worksheets

Intersection Level Of Service Report
Intersection 1: NE Purcell Blvd-Pettigrew Rd / Bear Creek Rd

Control Type:	All-way stop	Delay (sec / veh):	61.2
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.070

Intersection Setup

Name	Pettigrew Road			NE Purcell Boulevard			Bear Creek Road			Bear Creek Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			35.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Pettigrew Road			NE Purcell Boulevard			Bear Creek Road			Bear Creek Road		
Base Volume Input [veh/h]	37	224	30	38	265	135	113	213	71	58	210	25
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	3.00	0.00	1.00	0.00	0.00	3.00	2.00	1.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	37	224	30	38	265	135	113	213	71	58	210	25
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	59	8	10	70	36	30	56	19	15	55	7
Total Analysis Volume [veh/h]	39	236	32	40	279	142	119	224	75	61	221	26
Pedestrian Volume [ped/h]	0			4			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	406	461	431	405
Degree of Utilization, x	0.76	1.07	0.97	0.76

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	6.20	15.16	11.76	6.28
95th-Percentile Queue Length [ft]	155.06	378.89	294.11	156.90
Approach Delay [s/veh]	34.67	92.32	65.64	35.11
Approach LOS	D	F	F	E
Intersection Delay [s/veh]	61.21			
Intersection LOS	F			

Appendix D – Crash Data and Analysis Worksheets

CITY OF BEND, DESCHUTES COUNTY

Intersectional Crashes at Bear Creek Rd & Purcell Blvd / Pettigrew Rd

January 1, 2015 through December 31, 2015

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
01434	N	N	N	N	N	09/30/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 1	STRGHT											03
CITY			N			Wed 9A	0	PETTIGREW RD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	02	0			N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	52	M	OR-Y OR<25		021	000		03
															02	NONE 0	STRGHT											
																PRVTE	S N									000		00
																PSNGR CAR		01	DRVR	INJC	42	M	OR-Y OR<25		000	000		00
00304	N	N	N			02/09/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	UNK	ANGL-OTH	01	NONE 0	STRGHT												02
NO RPT			N			Mon 2P	0	PETTIGREW RD	CN		STOP SIGN	N	UNK	ANGL		PRVTE	W E									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	04	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	42	F	OR-Y OR<25		028	000		02
															02	NONE 0	STRGHT											
																PRVTE	S N									000		00
																PSNGR CAR		01	DRVR	NONE	64	F	OR-Y OR<25		000	000		00
00300	N	N	N			03/09/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT												03
CITY			N			Mon 2P	0	PETTIGREW RD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	S N									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	04	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	34	F	UNK OR<25		097	000		00
															02	NONE 0	STRGHT											
																PRVTE	W E									000		00
																PSNGR CAR		01	DRVR	NONE	42	F	OR-Y OR<25		097	000		00
02004	N	N	N			12/11/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 0	STRGHT												04
NO RPT			N			Fri 3P	0	PETTIGREW RD	CN		STOP SIGN	N	WET	ANGL		PRVTE	S N									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	04	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	72	F	OR-Y OR<25		020	000		04
															02	NONE 0	STRGHT											
																PRVTE	W E									000		00
																PSNGR CAR		01	DRVR	NONE	42	F	OR-Y OR<25		000	000		00
00569	N	N	N			05/03/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	UNK	ANGL-OTH	01	NONE 0	STRGHT												03
NO RPT			N			Sun 7P	0	PURCELL BLVD	CN		STOP SIGN	N	UNK	ANGL		PRVTE	E W									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	01	0			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	35	F	OR-Y OR>25		021	000		03
															02	NONE 0	STRGHT											
																PRVTE	N S									015		00
																PSNGR CAR		01	DRVR	NONE	84	F	OR-Y OR<25		000	000		00

CITY OF BEND, DESCHUTES COUNTY

Intersectional Crashes at Bear Creek Rd & Purcell Blvd / Pettigrew Rd
January 1, 2015 through December 31, 2015

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
01996	N	N	N			12/10/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT											02
NO RPT			N			Thu 5P	0	PURCELL BLVD	CN		STOP SIGN	N	WET	ANGL		PRVTE	N S									015		00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*	1		01	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJC	83	M	OR-Y OR<25		028	000		02
															02	NONE 0	STRGHT											
																PRVTE	E W									015		00
																PSNGR CAR		01	DRVR	INJC	37	M	OR-Y OR<25		000	000		00
00069	N	N	N			01/14/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	O-1 L-TURN	01	NONE 0	TURN-L											02
NO RPT			N			Wed 5P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	TURN		PRVTE	W N									015		00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*	1		02	0		N	DARK	INJ		PSNGR CAR		01	DRVR	INJB	18	F	NONE OR<25		004,028	000		02
																		02	PSNG	NO<5	02	F			000	000		00
															02	NONE 0	STRGHT											
																PRVTE	E W									015		00
																PSNGR CAR		01	DRVR	NONE	68	F	OR-Y OR<25		000	000		00
00124	N	N	N			01/28/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										013	03
NO RPT			N			Wed 9A	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	S N									000		00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*	1		02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	46	F	OR-Y OR<25		000	000		00
															02	NONE 0	STRGHT											
																PRVTE	E W									000	013	00
																PSNGR CAR		01	DRVR	INJC	90	F	OR-Y OR<25		021	000		03
															03	NONE 0	STOP											
																UNKN	W E									022		00
																PSNGR CAR		01	DRVR	NONE	38	F	OR-Y OR<25		000	000		00
00452	Y	Y	N	N	N	04/10/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										057,053	03,30
CITY			N			Fri 10A	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W									000	057,053	00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*	1		02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJB	23	M	OR-Y OR<25		021,050	000		03,30
															02	NONE 0	STRGHT											
																PRVTE	S N									015		00
																PSNGR CAR		01	DRVR	NONE	67	F	OR-Y OR<25		000	000		00
00926	N	N	N			07/01/2015	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT											03
NONE			N			Wed 9P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W									000		00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*	1		02	0		N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	21	F	OR-Y OR<25		021	000		03

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															02	NONE 0 PRVTE	STRGHT S N									000		00
																PSNGR CAR		01	DRVR	NONE	17	F	OR-Y OR<25		000	000		00

CITY OF BEND, DESCHUTES COUNTY

Intersectional Crashes at Bear Creek Rd & Purcell Blvd / Pettigrew Rd
January 1, 2011 through December 31, 2020

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
02137	N	N	N			11/14/2017	16	BEAR CREEK RD	INTER	CROSS	N	Y	CLR	FIX OBJ	01	NONE 9	STRGHT										126,121,092	03
CITY			N			Tue 6P	0	PETTIGREW RD	S		STOP SIGN	N	DRY	FIX		N/A	E W								007		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1		05	0		N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01573	N	N	N	N	N	11/08/2020	17	BEAR CREEK RD	INTER	CROSS	N	N	CLR	S-1STOP	01	NONE 9	STRGHT											07
CITY			N			Sun 1P	0	PETTIGREW RD	S		STOP SIGN	N	DRY	REAR		N/A	S N								088		00
No	*44*	*3*	*4.66*			*-121 16 7.08*	1		06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STOP											
																N/A	S N								012		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
00258	N	N	N			01/29/2017	16	BEAR CREEK RD	INTER	CROSS	N	Y	CLR	FIX OBJ	01	NONE 9	STRGHT										126,121,092	03
CITY			N			Sun 3P	0	PETTIGREW RD	W		STOP SIGN	N	WET	FIX		N/A	E W								007		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1		06	0		N	DUSK	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
00948	N	Y	N			05/18/2017	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 9	STRGHT										013	33,03
NO RPT			N			Thu 8P	0	PETTIGREW RD	CN		STOP SIGN	N	DRY	ANGL		N/A	S N								000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1		02	0		N	DUSK	PDO		UNKNOWN		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STRGHT											
																N/A	E W								000		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
02315	N	N	N	N	N	12/10/2017	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 9	STRGHT											02
CITY			N			Sun 2P	0	PETTIGREW RD	CN		STOP SIGN	N	DRY	ANGL		N/A	E W								015		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1		02	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STRGHT											
																N/A	S N								015		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01509	N	N	N			08/27/2019	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE	STRGHT											03,32,02
CITY			N			Tue 7P	0	PETTIGREW RD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	S N								015		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1		02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	72	M	OR-Y OR<25		000	000		00
																		02	PSNG	INJC	72	F			000	000		00
															02	NONE	STRGHT											
																PRVTE	E W								000		00
																PSNGR CAR		01	DRVR	NONE	30	F	OR-Y OR<25		021,052,028	000		03,32,02

CITY OF BEND, DESCHUTES COUNTY

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January 1, 2011 through December 31, 2020

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
00652	N	N	N	N	N	03/31/2017	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT											03,40
CITY			N			Fri 7A	0	PETTIGREW RD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	W E									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*		1	03	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	46	F	OR-Y OR>25		021		026	03,40
															02	NONE 0	STRGHT											
																PRVTE	N S									015		00
																PSNGR CAR		01	DRVR	INJC	28	F	OR-Y OR<25		000	000		00
01711	N	N	N			09/11/2017	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 9	STRGHT											03,02
NO RPT			N			Mon 8A	0	PETTIGREW RD	CN		STOP SIGN	N	DRY	ANGL		N/A	N S									015		00
No	*44*	*3*	*4.90*			*-121 16 7.07*		1	03	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STRGHT											
																N/A	W E									000		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
00379	N	N	N			02/25/2018	16	BEAR CREEK RD	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 0	STRGHT											03
NO RPT			N			Sun 3P	0	PETTIGREW RD	CN		STOP SIGN	N	WET	ANGL		PRVTE	N S									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*		1	03	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	16	M	OR-Y OR<25		021	000		03
															02	NONE 0	STRGHT											
																PRVTE	W E									000		00
																PSNGR CAR		01	DRVR	NONE	65	M	OR-Y OR<25		000	000		00
																		02	PSNG	INJC	55	F			000	000		00
01343	N	N	N	N	N	10/01/2020	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 9	STRGHT											02
CITY			N			Thu 11A	0	PETTIGREW RD	CN		STOP SIGN	N	DRY	ANGL		N/A	S N									015		00
No	*44*	*3*	*4.92*			*-121 16 7.08*		1	04	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STRGHT											
																N/A	W E									015		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01781	N	N	N	N	N	10/18/2016	16	BEAR CREEK RD	INTER	CROSS	N	N	CLD	ANGL-OTH	01	NONE 0	STRGHT											03,27
CITY			N			Tue 10A	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*		1	01	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	38	F	OR-Y OR>25		021,016		038	03,27
															02	NONE 0	STRGHT											
																PRVTE	N S									015		00
																PSNGR CAR		01	DRVR	INJC	29	M	OR-Y OR<25		000	000		00

CITY OF BEND, DESCHUTES COUNTY

Intersectional Crashes at Bear Creek Rd & Purcell Blvd / Pettigrew Rd

January 1, 2011 through December 31, 2020

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
01909	N	N	N			11/02/2016	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										03
CITY			N			Wed 12P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	TURN		PRVTE	E W									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	1	01	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	39	F	OR-Y OR>25		021	000		03
															02	NONE 0	TURN-R											
																PRVTE	N W									015		00
																PSNGR CAR		01	DRVR	INJC	23	F	OR-Y OR<25		000	000		00
01353	Y	N	N			07/16/2017	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										013	03,01,27
CITY			N			Sun 2P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	1	01	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	28	M	OR-Y OR<25		021,047,016	000		03,01,27
															02	NONE 0	STRGHT											
																PRVTE	N S									000	013	00
																PSNGR CAR		01	DRVR	INJC	35	F	NONE OR<25		000	000		00
															03	NONE 0	STOP											
																PRVTE	W E									022		00
																PSNGR CAR		01	DRVR	NONE	57	M	OR-Y OR<25		000	000		00
00162	N	N	N			01/29/2019	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE	TURN-L											03
NO RPT			N			Tue 5P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	TURN		PRVTE	S W									015		00
No	*44*	*3*	*4.93*			*-121 16 7.07*	1	1	01	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJC	35	F	OR-Y OR<25		000	000		00
															02	NONE	STRGHT											
																PRVTE	E W									000		00
																PSNGR CAR		01	DRVR	NONE	16	F	OR-Y OR<25		021	000		03
00259	Y	N	N	N	N	02/14/2016	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT											03,27
CITY			N			Sun 6P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	1	02	0		N	DLIT	INJ		PSNGR CAR		01	DRVR	INJB	18	M	OR-Y OR<25		021,016	038		03,27
															02	NONE 0	STRGHT											
																PRVTE	S N									000		00
																PSNGR CAR		01	DRVR	INJB	16	M	OR-Y OR<25		000	000		00
																		02	PSNG	INJB	61	M			000	000		00
01059	N	N	N			07/02/2016	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 9	STRGHT											03
CITY			N			Sat 7P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		N/A	E W									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*	1	1	02	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00

CITY OF BEND, DESCHUTES COUNTY

Intersectional Crashes at Bear Creek Rd & Purcell Blvd / Pettigrew Rd
January 1, 2011 through December 31, 2020

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
															02	NONE 9 N/A	STRGHT S N									015		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01459	N	N	N	N	N	08/27/2016	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										011,001		03
CITY			N			Sat 11A	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W								000	011		00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*		1	02	0		N	DAY	INJ		MTRCYCLE		01	DRVR	INJC	31	M	OR-Y OR>25		021	000	001	03
															02	NONE 0 PRVTE	STRGHT S N									000		00
																PSNGR CAR		01	DRVR	NONE	62	F	OR-Y OR<25		000	000		00
00428	N	N	N			02/23/2017	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT												02
CITY			N			Thu 5P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W								015			00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*		1	02	0		N	DARK	INJ		PSNGR CAR		01	DRVR	NONE	22	F	OR-Y OR<25		028	000		02
															02	NONE 0 PRVTE	STRGHT S N									015		00
																PSNGR CAR		01	DRVR	INJC	22	F	OR-Y OR<25		000	000		00
																		02	PSNG	NO<5	01	F			000	000		00
00648	N	N	N	N	N	03/30/2017	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT												02
CITY			N			Thu 1P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	E W								015			00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*		1	02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	48	F	OR-Y OR>25		000	000		00
															02	NONE 0 PRVTE	STRGHT S N									015		00
																PSNGR CAR		01	DRVR	NONE	74	F	OR-Y OR<25		028	000		02
01839	N	N	N			09/30/2017	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 9	STRGHT												02,27
NO RPT			N			Sat 7P	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		N/A	E W								000			00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*		1	02	0		N	DUSK	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9 N/A	STRGHT S N									015		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
00677	N	N	N	N	N	04/21/2018	16	BEAR CREEK RD	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE 0	STRGHT										013		03
CITY			N			Sat 9A	0	PURCELL BLVD	CN		STOP SIGN	N	DRY	ANGL		PRVTE	S N								000			00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*		1	02	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	86	M	OR-Y OR<25		021	000		03

CITY OF BEND, DESCHUTES COUNTY

Intersectional Crashes at Bear Creek Rd & Purcell Blvd / Pettigrew Rd

January 1, 2011 through December 31, 2020

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
															02	NONE 0 PRVTE	STRGHT E W								015	013	00
																PSNGR CAR		01	DRVR	INJC	23	F	OR-Y OR<25		000	000		00
															03	NONE 0 PRVTE	STOP N S								022		00
																PSNGR CAR		01	DRVR	INJB	66	M	OR-Y OR<25		000	000		00
00974	N	N	Y	N	N	06/04/2019	17	BEAR CREEK RD	INTER	CROSS	N		N	CLR	ANGL-OTH	01	NONE 9	STRGHT									010	33,03,10
CITY		N				Tue 6P	0	PURCELL BLVD	CN		STOP SIGN		N	DRY	ANGL		N/A	S N								000		00
No	*44*	*3*	*4.91*	*-121*	*16*	*7.08*	1	02	0				N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9 N/A	STRGHT E W								015		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01612	N	Y	N	N	N	09/13/2019	16	BEAR CREEK RD	INTER	CROSS	N		N	CLR	O-1 L-TURN	01	NONE 9	STRGHT										03
CITY		N				Fri 9P	0	PURCELL BLVD	CN		STOP SIGN		N	DRY	TURN		N/A	E W								000		00
No	*44*	*3*	*4.92*	*-121*	*16*	*7.08*	1	02	0				N	DLIT	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9 N/A	TURN-L W N								015		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01684	N	N	N	N		09/23/2019	17	BEAR CREEK RD	INTER	CROSS	N		N	CLR	ANGL-OTH	01	NONE 9	STRGHT										03
NO RPT		N				Mon 8P	0	PURCELL BLVD	CN		SLOW SIGN		N	DRY	ANGL		N/A	S N								015		00
No	*44*	*3*	*4.92*	*-121*	*16*	*7.08*	1	02	0				N	DLIT	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9 N/A	STRGHT E W								000		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
01763	N	N	N			10/04/2019	16	BEAR CREEK RD	INTER	CROSS	N		N	CLD	ANGL-OTH	01	NONE	STRGHT										02,27
CITY		N				Fri 1P	0	PURCELL BLVD	CN		STOP SIGN		N	DRY	ANGL		PRVTE	E W								015		00
No	*44*	*3*	*4.90*	*-121*	*16*	*7.07*	1	02	0				N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	24	F	OR-Y OR<25		028	000		02,27
															02	NONE PRVTE	STRGHT S N								015		00
																PSNGR CAR		01	DRVR	NONE	43	M	OR-Y OR<25		000	000		00
																		02	PSNG	INJB	67	F			000	000		00

CITY OF BEND, DESCHUTES COUNTY

Intersectional Crashes at Bear Creek Rd & Purcell Blvd / Pettigrew Rd

January 1, 2011 through December 31, 2020

SER# / INVEST / UNLOC?	SPED	ALC	DRUG/MJ	SCHL	WORK	DATE / DAY/TIME / *LAT/LONG*	FC / DISTNC	CITY STREET / FIRST STREET / SECOND STREET / INTERSECTION SEQ #	RD CHAR / DIRECT / LOCTN	INT-TYP (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFF-RD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH TYP / COLL TYP / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	AGE	SEX	LICNS RES	PED LOC	ERROR	ACTN	EVENT	CAUSE
00402	N	N	N	N	N	03/13/2016	16	BEAR CREEK RD	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE 0	STRGHT										132	03
CITY			N			Sun 10A	0	PURCELL BLVD	CN		STOP SIGN	N	WET	TURN		PRVTE	N S									000		00
No	*44*	*3*	*4.90*			*-121 16 7.07*		1	03	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	21	F	OR-Y OR>25		021	000	132	03
															02	NONE 0	TURN-L											
																PRVTE	W N									000		00
																PSNGR CAR		01	DRVR	INJC	77	F	OR-Y OR<25		000	000		00
00287	Y	N	N	N	N	02/09/2019	16	BEAR CREEK RD	INTER	CROSS	N	N	SNOW	ANGL-OTH	01	NONE 9	STRGHT										124	01,03
CITY			N			Sat 2P	0	PURCELL BLVD	CN		STOP SIGN	N	ICE	ANGL		N/A	S N									001		00
No	*44*	*3*	*4.92*			*-121 16 7.06*		1	04	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00
															02	NONE 9	STRGHT											
																N/A	W E									000		00
																PSNGR CAR		01	DRVR	NONE	00	U	UNK UNK		000	000		00

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
000	NONE	NO ACTION OR NON-WARRANTED
001	SKIDDED	SKIDDED
002	ON/OFF V	GETTING ON OR OFF STOPPED OR PARKED VEHICLE
003	LOAD OVR	OVERHANGING LOAD STRUCK ANOTHER VEHICLE, ETC.
006	SLOW DN	SLOWED DOWN
007	AVOIDING	AVOIDING MANEUVER
008	PAR PARK	PARALLEL PARKING
009	ANG PARK	ANGLE PARKING
010	INTERFERE	PASSENGER INTERFERING WITH DRIVER
011	STOPPED	STOPPED IN TRAFFIC NOT WAITING TO MAKE A LEFT TURN
012	STP/L TRN	STOPPED BECAUSE OF LEFT TURN SIGNAL OR WAITING, ETC.
013	STP TURN	STOPPED WHILE EXECUTING A TURN
014	EMR V PKD	EMERGENCY VEHICLE LEGALLY PARKED IN THE ROADWAY
015	GO A/STOP	PROCEED AFTER STOPPING FOR A STOP SIGN/FLASHING RED.
016	TRN A/RED	TURNED ON RED AFTER STOPPING
017	LOSTCTRL	LOST CONTROL OF VEHICLE
018	EXIT DWY	ENTERING STREET OR HIGHWAY FROM ALLEY OR DRIVEWAY
019	ENTR DWY	ENTERING ALLEY OR DRIVEWAY FROM STREET OR HIGHWAY
020	STR ENTR	BEFORE ENTERING ROADWAY, STRUCK PEDESTRIAN, ETC. ON SIDEWALK OR SHOULDER
021	NO DRVR	CAR RAN AWAY - NO DRIVER
022	PREV COL	STRUCK, OR WAS STRUCK BY, VEHICLE OR PEDESTRIAN IN PRIOR COLLISION BEFORE ACC. STABILIZED
023	STALLED	VEHICLE STALLED OR DISABLED
024	DRVR DEAD	DEAD BY UNASSOCIATED CAUSE
025	FATIGUE	FATIGUED, SLEEPY, ASLEEP
026	SUN	DRIVER BLINDED BY SUN
027	HDLGHTS	DRIVER BLINDED BY HEADLIGHTS
028	ILLNESS	PHYSICALLY ILL
029	THRU MED	VEHICLE CROSSED, PLUNGED OVER, OR THROUGH MEDIAN BARRIER
030	PURSUIT	PURSUING OR ATTEMPTING TO STOP A VEHICLE
031	PASSING	PASSING SITUATION
032	PRKOFFRD	VEHICLE PARKED BEYOND CURB OR SHOULDER
033	CROS MED	VEHICLE CROSSED EARTH OR GRASS MEDIAN
034	X N/SGNL	CROSSING AT INTERSECTION - NO TRAFFIC SIGNAL PRESENT
035	X W/ SGNL	CROSSING AT INTERSECTION - TRAFFIC SIGNAL PRESENT
036	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
037	BTWN INT	CROSSING BETWEEN INTERSECTIONS
038	DISTRACT	DRIVER'S ATTENTION DISTRACTED
039	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
040	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
041	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
042	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
043	PLAYINRD	PLAYING IN STREET OR ROAD
044	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
045	WORK ON	WORKING IN ROADWAY OR ALONG SHOULDER
046	W/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. WITH TRAFFIC
047	A/ TRAFIC	NON-MOTORIST WALKING, RUNNING, RIDING, ETC. FACING TRAFFIC
050	LAY ON RD	STANDING OR LYING IN ROADWAY
051	ENT OFFRD	ENTERING / STARTING IN TRAFFIC LANE FROM OFF ROAD
052	MERGING	MERGING

ACTION CODE TRANSLATION LIST

ACTION CODE	SHORT DESCRIPTION	LONG DESCRIPTION
055	SPRAY	BLINDED BY WATER SPRAY
088	OTHER	OTHER ACTION
099	UNK	UNKNOWN ACTION

CAUSE CODE TRANSLATION LIST

CAUSE CODE	SHORT DESCRIPTION	LONG DESCRIPTION
00	NO CODE	NO CAUSE ASSOCIATED AT THIS LEVEL
01	TOO-FAST	TOO FAST FOR CONDITIONS (NOT EXCEED POSTED SPEED
02	NO-YIELD	DID NOT YIELD RIGHT-OF-WAY
03	PAS-STOP	PASSED STOP SIGN OR RED FLASHER
04	DIS SIG	DISREGARDED TRAFFIC SIGNAL
05	LEFT-CTR	DROVE LEFT OF CENTER ON TWO-WAY ROAD; STRADDLING
06	IMP-OVER	IMPROPER OVERTAKING
07	TOO-CLOS	FOLLOWED TOO CLOSELY
08	IMP-TURN	MADE IMPROPER TURN
09	DRINKING	ALCOHOL OR DRUG INVOLVED
10	OTHR-IMP	OTHER IMPROPER DRIVING
11	MECH-DEF	MECHANICAL DEFECT
12	OTHER	OTHER (NOT IMPROPER DRIVING)
13	IMP LN C	IMPROPER CHANGE OF TRAFFIC LANES
14	DIS TCD	DISREGARDED OTHER TRAFFIC CONTROL DEVICE
15	WRNG WAY	WRONG WAY ON ONE-WAY ROAD; WRONG SIDE DIVIDED RO
16	FATIGUE	DRIVER DROWSY/FATIGUED/SLEEPY
17	ILLNESS	PHYSICAL ILLNESS
18	IN RDWY	NON-MOTORIST ILLEGALLY IN ROADWAY
19	NT VISBL	NON-MOTORIST NOT VISIBLE; NON-REFLECTIVE CLOTHIN
20	IMP PKNG	VEHICLE IMPROPERLY PARKED
21	DEF STER	DEFECTIVE STEERING MECHANISM
22	DEF BRKE	INADEQUATE OR NO BRAKES
24	LOADSHFT	VEHICLE LOST LOAD OR LOAD SHIFTED
25	TIREFAIL	TIRE FAILURE
26	PHANTOM	PHANTOM / NON-CONTACT VEHICLE
27	INATTENT	INATTENTION
28	NM INATT	NON-MOTORIST INATTENTION
29	F AVOID	FAILED TO AVOID VEHICLE AHEAD
30	SPEED	DRIVING IN EXCESS OF POSTED SPEED
31	RACING	SPEED RACING (PER PAR)
32	CARELESS	CARELESS DRIVING (PER PAR)
33	RECKLESS	RECKLESS DRIVING (PER PAR)
34	AGGRESV	AGGRESSIVE DRIVING (PER PAR)
35	RD RAGE	ROAD RAGE (PER PAR)
40	VIEW OBS	VIEW OBSCURED
50	USED MDN	IMPROPER USE OF MEDIAN OR SHOULDER
51	FAIL LN	FAILED TO MAINTAIN LANE
52	OFF RD	RAN OFF ROAD

COLLISION TYPE CODE TRANSLATION LIST

COLL CODE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OTH	MISCELLANEOUS
-	BACK	BACKING
0	PED	PEDESTRIAN
1	ANGL	ANGLE
2	HEAD	HEAD-ON
3	REAR	REAR-END
4	SS-M	SIDESWIPE - MEETING
5	SS-O	SIDESWIPE - OVERTAKING
6	TURN	TURNING MOVEMENT
7	PARK	PARKING MANEUVER
8	NCOL	NON-COLLISION
9	FIX	FIXED OBJECT OR OTHER OBJECT

CRASH TYPE CODE TRANSLATION LIST

CRASH TYPE	SHORT DESCRIPTION	LONG DESCRIPTION
&	OVERTURN	OVERTURNED
0	NON-COLL	OTHER NON-COLLISION
1	OTH RDWY	MOTOR VEHICLE ON OTHER ROADWAY
2	PRKD MV	PARKED MOTOR VEHICLE
3	PED	PEDESTRIAN
4	TRAIN	RAILWAY TRAIN
6	BIKE	PEDALCYCLIST
7	ANIMAL	ANIMAL
8	FIX OBJ	FIXED OBJECT
9	OTH OBJ	OTHER OBJECT
A	ANGL-STP	ENTERING AT ANGLE - ONE VEHICLE STOPPED
B	ANGL-OTH	ENTERING AT ANGLE - ALL OTHERS
C	S-STRGHT	FROM SAME DIRECTION - BOTH GOING STRAIGHT
D	S-1TURN	FROM SAME DIRECTION - ONE TURN, ONE STRAIGHT
E	S-1STOP	FROM SAME DIRECTION - ONE STOPPED
F	S-OTHER	FROM SAME DIRECTION-ALL OTHERS, INCLUDING PARKING
G	O-STRGHT	FROM OPPOSITE DIRECTION - BOTH GOING STRAIGHT
H	O-1 L-TURN	FROM OPPOSITE DIRECTION-ONE LEFT TURN,ONE STRAIGHT
I	O-1STOP	FROM OPPOSITE DIRECTION - ONE STOPPED
J	O-OTHER	FROM OPPOSITE DIRECTION-ALL OTHERS INCL. PARKING

DRIVER LICENSE CODE TRANSLATION LIST

LIC CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NOT LICENSED (HAD NEVER BEEN LICENSED)
1	OR-Y	VALID OREGON LICENSE
2	OTH-Y	VALID LICENSE, OTHER STATE OR COUNTRY
3	SUSP	SUSPENDED/REVOKED
4	EXP	EXPIRED
8	N-VAL	OTHER NON-VALID LICENSE
9	UNK	UNKNOWN IF DRIVER WAS LICENSED AT TIME OF CRASH

DRIVER RESIDENCE CODE TRANSLATION LIST

RES CODE	SHORT DESC	LONG DESCRIPTION
1	OR<25	OREGON RESIDENT WITHIN 25 MILE OF HOME
2	OR>25	OREGON RESIDENT 25 OR MORE MILES FROM HOME
3	OR-?	OREGON RESIDENT - UNKNOWN DISTANCE FROM HOME
4	N-RES	NON-RESIDENT
9	UNK	UNKNOWN IF OREGON RESIDENT

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
000	NONE	NO ERROR
001	WIDE TRN	WIDE TURN
002	CUT CORN	CUT CORNER ON TURN
003	FAIL TRN	FAILED TO OBEY MANDATORY TRAFFIC TURN SIGNAL, SIGN OR LANE MARKINGS
004	L IN TRF	LEFT TURN IN FRONT OF ONCOMING TRAFFIC
005	L PROHIB	LEFT TURN WHERE PROHIBITED
006	FRM WRNG	TURNED FROM WRONG LANE
007	TO WRONG	TURNED INTO WRONG LANE
008	ILLEG U	U-TURNED ILLEGALLY
009	IMP STOP	IMPROPERLY STOPPED IN TRAFFIC LANE
010	IMP SIG	IMPROPER SIGNAL OR FAILURE TO SIGNAL
011	IMP BACK	BACKING IMPROPERLY (NOT PARKING)
012	IMP PARK	IMPROPERLY PARKED
013	UNPARK	IMPROPER START LEAVING PARKED POSITION
014	IMP STRT	IMPROPER START FROM STOPPED POSITION
015	IMP LGHT	IMPROPER OR NO LIGHTS (VEHICLE IN TRAFFIC)
016	INATTENT	INATTENTION (FAILURE TO DIM LIGHTS PRIOR TO 4/1/97)
017	UNSF VEH	DRIVING UNSAFE VEHICLE (NO OTHER ERROR APPARENT)
018	OTH PARK	ENTERING/EXITING PARKED POSITION W/ INSUFFICIENT CLEARANCE; OTHER IMPROPER PARKING MANEUVER
019	DIS DRIV	DISREGARDED OTHER DRIVER'S SIGNAL
020	DIS SGNL	DISREGARDED TRAFFIC SIGNAL
021	RAN STOP	DISREGARDED STOP SIGN OR FLASHING RED
022	DIS SIGN	DISREGARDED WARNING SIGN, FLARES OR FLASHING AMBER
023	DIS OFCR	DISREGARDED POLICE OFFICER OR FLAGMAN
024	DIS EMER	DISREGARDED SIREN OR WARNING OF EMERGENCY VEHICLE
025	DIS RR	DISREGARDED RR SIGNAL, RR SIGN, OR RR FLAGMAN
026	REAR-END	FAILED TO AVOID STOPPED OR PARKED VEHICLE AHEAD OTHER THAN SCHOOL BUS
027	BIKE ROW	DID NOT HAVE RIGHT-OF-WAY OVER PEDALCYCLIST
028	NO ROW	DID NOT HAVE RIGHT-OF-WAY
029	PED ROW	FAILED TO YIELD RIGHT-OF-WAY TO PEDESTRIAN
030	PAS CURV	PASSING ON A CURVE
031	PAS WRNG	PASSING ON THE WRONG SIDE
032	PAS TANG	PASSING ON STRAIGHT ROAD UNDER UNSAFE CONDITIONS
033	PAS X-WK	PASSED VEHICLE STOPPED AT CROSSWALK FOR PEDESTRIAN
034	PAS INTR	PASSING AT INTERSECTION
035	PAS HILL	PASSING ON CREST OF HILL
036	N/PAS ZN	PASSING IN "NO PASSING" ZONE
037	PAS TRAF	PASSING IN FRONT OF ONCOMING TRAFFIC
038	CUT-IN	CUTTING IN (TWO LANES - TWO WAY ONLY)
039	WRNGSIDE	DRIVING ON WRONG SIDE OF THE ROAD (2-WAY UNDIVIDED ROADWAYS)

ERROR CODE TRANSLATION LIST

ERROR CODE	SHORT DESCRIPTION	FULL DESCRIPTION
040	THRU MED	DRIVING THROUGH SAFETY ZONE OR OVER ISLAND
041	F/ST BUS	FAILED TO STOP FOR SCHOOL BUS
042	F/SLO MV	FAILED TO DECREASE SPEED FOR SLOWER MOVING VEHICLE
043	TOO CLOSE	FOLLOWING TOO CLOSELY (MUST BE ON OFFICER'S REPORT)
044	STRDL LN	STRADDLING OR DRIVING ON WRONG LANES
045	IMP CHG	IMPROPER CHANGE OF TRAFFIC LANES
046	WRNG WAY	WRONG WAY ON ONE-WAY ROADWAY; WRONG SIDE DIVIDED ROAD
047	BASCRULE	DRIVING TOO FAST FOR CONDITIONS (NOT EXCEEDING POSTED SPEED)
048	OPN DOOR	OPENED DOOR INTO ADJACENT TRAFFIC LANE
049	IMPEDING	IMPEDING TRAFFIC
050	SPEED	DRIVING IN EXCESS OF POSTED SPEED
051	RECKLESS	RECKLESS DRIVING (PER PAR)
052	CARELESS	CARELESS DRIVING (PER PAR)
053	RACING	SPEED RACING (PER PAR)
054	X N/SGNL	CROSSING AT INTERSECTION, NO TRAFFIC SIGNAL PRESENT
055	X W/SGNL	CROSSING AT INTERSECTION, TRAFFIC SIGNAL PRESENT
056	DIAGONAL	CROSSING AT INTERSECTION - DIAGONALLY
057	BTWN INT	CROSSING BETWEEN INTERSECTIONS
059	W/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER WITH TRAFFIC
060	A/TRAF-S	WALKING, RUNNING, RIDING, ETC., ON SHOULDER FACING TRAFFIC
061	W/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT WITH TRAFFIC
062	A/TRAF-P	WALKING, RUNNING, RIDING, ETC., ON PAVEMENT FACING TRAFFIC
063	PLAYINRD	PLAYING IN STREET OR ROAD
064	PUSH MV	PUSHING OR WORKING ON VEHICLE IN ROAD OR ON SHOULDER
065	WORK IN RD	WORKING IN ROADWAY OR ALONG SHOULDER
070	LAY ON RD	STANDING OR LYING IN ROADWAY
071	NM IMP USE	IMPROPER USE OF TRAFFIC LANE BY NON-MOTORIST
073	ELUDING	ELUDING / ATTEMPT TO ELUDE
079	F NEG CURV	FAILED TO NEGOTIATE A CURVE
080	FAIL LN	FAILED TO MAINTAIN LANE
081	OFF RD	RAN OFF ROAD
082	NO CLEAR	DRIVER MISJUDGED CLEARANCE
083	OVRSTEER	OVER-CORRECTING
084	NOT USED	CODE NOT IN USE
085	OVRLOAD	OVERLOADING OR IMPROPER LOADING OF VEHICLE WITH CARGO OR PASSENGERS
097	UNA DIS TC	UNABLE TO DETERMINE WHICH DRIVER DISREGARDED TRAFFIC CONTROL DEVICE

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
001	FEL/JUMP	OCCUPANT FELL, JUMPED OR WAS EJECTED FROM MOVING VEHICLE
002	INTERFER	PASSENGER INTERFERED WITH DRIVER
003	BUG INTF	ANIMAL OR INSECT IN VEHICLE INTERFERED WITH DRIVER
004	INDRCT PED	PEDESTRIAN INDIRECTLY INVOLVED (NOT STRUCK)
005	SUB-PED	"SUB-PED": PEDESTRIAN INJURED SUBSEQUENT TO COLLISION, ETC.
006	INDRCT BIK	PEDALCYCLIST INDIRECTLY INVOLVED (NOT STRUCK)
007	HITCHIKR	HITCHHIKER (SOLICITING A RIDE)
008	PSNGR TOW	PASSENGER OR NON-MOTORIST BEING TOWED OR PUSHED ON CONVEYANCE
009	ON/OFF V	GETTING ON/OFF STOPPED/PARKED VEHICLE (OCCUPANTS ONLY; MUST HAVE PHYSICAL CONTACT W/ VEHIC
010	SUB OTRN	OVERTURNED AFTER FIRST HARMFUL EVENT
011	MV PUSHD	VEHICLE BEING PUSHED
012	MV TOWED	VEHICLE TOWED OR HAD BEEN TOWING ANOTHER VEHICLE
013	FORCED	VEHICLE FORCED BY IMPACT INTO ANOTHER VEHICLE, PEDALCYCLIST OR PEDESTRIAN
014	SET MOTN	VEHICLE SET IN MOTION BY NON-DRIVER (CHILD RELEASED BRAKES, ETC.)
015	RR ROW	AT OR ON RAILROAD RIGHT-OF-WAY (NOT LIGHT RAIL)
016	LT RL ROW	AT OR ON LIGHT-RAIL RIGHT-OF-WAY
017	RR HIT V	TRAIN STRUCK VEHICLE
018	V HIT RR	VEHICLE STRUCK TRAIN
019	HIT RR CAR	VEHICLE STRUCK RAILROAD CAR ON ROADWAY
020	JACKNIFE	JACKKNIFE; TRAILER OR TOWED VEHICLE STRUCK TOWING VEHICLE
021	TRL OTRN	TRAILER OR TOWED VEHICLE OVERTURNED
022	CN BROKE	TRAILER CONNECTION BROKE
023	DETACH TRL	DETACHED TRAILING OBJECT STRUCK OTHER VEHICLE, NON-MOTORIST, OR OBJECT
024	V DOOR OPN	VEHICLE DOOR OPENED INTO ADJACENT TRAFFIC LANE
025	WHEELOFF	WHEEL CAME OFF
026	HOOD UP	HOOD FLEW UP
028	LOAD SHIFT	LOST LOAD, LOAD MOVED OR SHIFTED
029	TIREFAIL	TIRE FAILURE
030	PET	PET: CAT, DOG AND SIMILAR
031	LVSTOCK	STOCK: COW, CALF, BULL, STEER, SHEEP, ETC.
032	HORSE	HORSE, MULE, OR DONKEY
033	HRSE&RID	HORSE AND RIDER
034	GAME	WILD ANIMAL, GAME (INCLUDES BIRDS; NOT DEER OR ELK)
035	DEER ELK	DEER OR ELK, WAPITI
036	ANML VEH	ANIMAL-DRAWN VEHICLE
037	CULVERT	CULVERT, OPEN LOW OR HIGH MANHOLE
038	ATENUATN	IMPACT ATTENUATOR
039	PK METER	PARKING METER
040	CURB	CURB (ALSO NARROW SIDEWALKS ON BRIDGES)
041	JIGGLE	JIGGLE BAR OR TRAFFIC SNAKE FOR CHANNELIZATION
042	GDRL END	LEADING EDGE OF GUARDRAIL
043	GARDRAIL	GUARD RAIL (NOT METAL MEDIAN BARRIER)
044	BARRIER	MEDIAN BARRIER (RAISED OR METAL)
045	WALL	RETAINING WALL OR TUNNEL WALL
046	BR RAIL	BRIDGE RAILING OR PARAPET (ON BRIDGE OR APPROACH)
047	BR ABUTMNT	BRIDGE ABUTMENT (INCLUDED "APPROACH END" THRU 2013)
048	BR COLMN	BRIDGE PILLAR OR COLUMN
049	BR GIRDR	BRIDGE GIRDER (HORIZONTAL BRIDGE STRUCTURE OVERHEAD)
050	ISLAND	TRAFFIC RAISED ISLAND
051	GORE	GORE
052	POLE UNK	POLE - TYPE UNKNOWN
053	POLE UTL	POLE - POWER OR TELEPHONE
054	ST LIGHT	POLE - STREET LIGHT ONLY
055	TRF SGNL	POLE - TRAFFIC SIGNAL AND PED SIGNAL ONLY
056	SGN BRDG	POLE - SIGN BRIDGE
057	STOPSIGN	STOP OR YIELD SIGN

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
058	OTH SIGN	OTHER SIGN, INCLUDING STREET SIGNS
059	HYDRANT	HYDRANT
060	MARKER	DELINEATOR OR MARKER (REFLECTOR POSTS)
061	MAILBOX	MAILBOX
062	TREE	TREE, STUMP OR SHRUBS
063	VEG OHED	TREE BRANCH OR OTHER VEGETATION OVERHEAD, ETC.
064	WIRE/CBL	WIRE OR CABLE ACROSS OR OVER THE ROAD
065	TEMP SGN	TEMPORARY SIGN OR BARRICADE IN ROAD, ETC.
066	PERM SGN	PERMANENT SIGN OR BARRICADE IN/OFF ROAD
067	SLIDE	SLIDES, FALLEN OR FALLING ROCKS
068	FRGN OBJ	FOREIGN OBSTRUCTION/DEBRIS IN ROAD (NOT GRAVEL)
069	EQP WORK	EQUIPMENT WORKING IN/OFF ROAD
070	OTH EQP	OTHER EQUIPMENT IN OR OFF ROAD (INCLUDES PARKED TRAILER, BOAT)
071	MAIN EQP	WRECKER, STREET SWEEPER, SNOW PLOW OR SANDING EQUIPMENT
072	OTHER WALL	ROCK, BRICK OR OTHER SOLID WALL
073	IRRGL PVMT	OTHER BUMP (NOT SPEED BUMP), POTHOLE OR PAVEMENT IRREGULARITY (PER PAR)
074	OVERHD OBJ	OTHER OVERHEAD OBJECT (HIGHWAY SIGN, SIGNAL HEAD, ETC.); NOT BRIDGE
075	CAVE IN	BRIDGE OR ROAD CAVE IN
076	HI WATER	HIGH WATER
077	SNO BANK	SNOW BANK
078	LO-HI EDGE	LOW OR HIGH SHOULDER AT PAVEMENT EDGE
079	DITCH	CUT SLOPE OR DITCH EMBANKMENT
080	OBJ FRM MV	STRUCK BY ROCK OR OTHER OBJECT SET IN MOTION BY OTHER VEHICLE (INCL. LOST LOADS)
081	FLY-OBJ	STRUCK BY ROCK OR OTHER MOVING OR FLYING OBJECT (NOT SET IN MOTION BY VEHICLE)
082	VEH HID	VEHICLE OBSCURED VIEW
083	VEG HID	VEGETATION OBSCURED VIEW
084	BLDG HID	VIEW OBSCURED BY FENCE, SIGN, PHONE BOOTH, ETC.
085	WIND GUST	WIND GUST
086	IMMERSED	VEHICLE IMMERSED IN BODY OF WATER
087	FIRE/EXP	FIRE OR EXPLOSION
088	FENC/BLD	FENCE OR BUILDING, ETC.
089	OTHR CRASH	CRASH RELATED TO ANOTHER SEPARATE CRASH
090	TO 1 SIDE	TWO-WAY TRAFFIC ON DIVIDED ROADWAY ALL ROUTED TO ONE SIDE
091	BUILDING	BUILDING OR OTHER STRUCTURE
092	PHANTOM	OTHER (PHANTOM) NON-CONTACT VEHICLE
093	CELL PHONE	CELL PHONE (ON PAR OR DRIVER IN USE)
094	VIOL GDL	TEENAGE DRIVER IN VIOLATION OF GRADUATED LICENSE PGM
095	GUY WIRE	GUY WIRE
096	BERM	BERM (EARTHEN OR GRAVEL MOUND)
097	GRAVEL	GRAVEL IN ROADWAY
098	ABR EDGE	ABRUPT EDGE
099	CELL WTNSD	CELL PHONE USE WITNESSED BY OTHER PARTICIPANT
100	UNK FIXD	FIXED OBJECT, UNKNOWN TYPE.
101	OTHER OBJ	NON-FIXED OBJECT, OTHER OR UNKNOWN TYPE
102	TEXTING	TEXTING
103	WZ WORKER	WORK ZONE WORKER
104	ON VEHICLE	PASSENGER RIDING ON VEHICLE EXTERIOR
105	PEDAL PSGR	PASSENGER RIDING ON PEDALCYCLE
106	MAN WHLCHR	PEDESTRIAN IN NON-MOTORIZED WHEELCHAIR
107	MTR WHLCHR	PEDESTRIAN IN MOTORIZED WHEELCHAIR
108	OFFICER	LAW ENFORCEMENT / POLICE OFFICER
109	SUB-BIKE	"SUB-BIKE": PEDALCYCLIST INJURED SUBSEQUENT TO COLLISION, ETC.
110	N-MTR	NON-MOTORIST STRUCK VEHICLE
111	S CAR VS V	STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM) STRUCK VEHICLE
112	V VS S CAR	VEHICLE STRUCK STREET CAR/TROLLEY (ON RAILS OR OVERHEAD WIRE SYSTEM)
113	S CAR ROW	AT OR ON STREET CAR OR TROLLEY RIGHT-OF-WAY

EVENT CODE TRANSLATION LIST

EVENT CODE	SHORT DESCRIPTION	LONG DESCRIPTION
114	RR EQUIP	VEHICLE STRUCK RAILROAD EQUIPMENT (NOT TRAIN) ON TRACKS
115	DSTRCT GPS	DISTRACTED BY NAVIGATION SYSTEM OR GPS DEVICE
116	DSTRCT OTH	DISTRACTED BY OTHER ELECTRONIC DEVICE
117	RR GATE	RAIL CROSSING DROP-ARM GATE
118	EXPNSN JNT	EXPANSION JOINT
119	JERSEY BAR	JERSEY BARRIER
120	WIRE BAR	WIRE OR CABLE MEDIAN BARRIER
121	FENCE	FENCE
123	OBJ IN VEH	LOOSE OBJECT IN VEHICLE STRUCK OCCUPANT
124	SLIPPERY	SLIDING OR SWERVING DUE TO WET, ICY, SLIPPERY OR LOOSE SURFACE (NOT GRAVEL)
125	SHLDR	SHOULDER GAVE WAY
126	BOULDER	ROCK(S), BOULDER (NOT GRAVEL; NOT ROCK SLIDE)
127	LAND SLIDE	ROCK SLIDE OR LAND SLIDE
128	CURVE INV	CURVE PRESENT AT CRASH LOCATION
129	HILL INV	VERTICAL GRADE / HILL PRESENT AT CRASH LOCATION
130	CURVE HID	VIEW OBSCURED BY CURVE
131	HILL HID	VIEW OBSCURED BY VERTICAL GRADE / HILL
132	WINDOW HID	VIEW OBSCURED BY VEHICLE WINDOW CONDITIONS
133	SPRAY HID	VIEW OBSCURED BY WATER SPRAY
134	TORRENTIAL	TORRENTIAL RAIN (EXCEPTIONALLY HEAVY RAIN)
135	RAIL OCC	INJURED OCCUPANT OF RAILWAY TRAIN, LIGHT RAIL, STREET CAR OR CABLE CAR

FUNCTIONAL CLASSIFICATION TRANSLATION LIST

FUNC CLASS	DESCRIPTION
01	RURAL PRINCIPAL ARTERIAL - INTERSTATE
02	RURAL PRINCIPAL ARTERIAL - OTHER
06	RURAL MINOR ARTERIAL
07	RURAL MAJOR COLLECTOR
08	RURAL MINOR COLLECTOR
09	RURAL LOCAL
11	URBAN PRINCIPAL ARTERIAL - INTERSTATE
12	URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXP
14	URBAN PRINCIPAL ARTERIAL - OTHER
16	URBAN MINOR ARTERIAL
17	URBAN MAJOR COLLECTOR
18	URBAN MINOR COLLECTOR
19	URBAN LOCAL
78	UNKNOWN RURAL SYSTEM
79	UNKNOWN RURAL NON-SYSTEM
98	UNKNOWN URBAN SYSTEM
99	UNKNOWN URBAN NON-SYSTEM

HIGHWAY COMPONENT TRANSLATION LIST

CODE	DESCRIPTION
0	MAINLINE STATE HIGHWAY
1	COUPLET
3	FRONTAGE ROAD
6	CONNECTION
8	HIGHWAY - OTHER

INJURY SEVERITY CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
1	KILL	FATAL INJURY (K)
2	INJA	SUSPECTED SERIOUS INJURY (A)
3	INJB	SUSPECTED MINOR INJURY (B)
4	INJC	POSSIBLE INJURY (C)
5	PRI	DIED PRIOR TO CRASH
7	NO<5	NO INJURY - 0 TO 4 YEARS OF AGE
9	NONE	NO APPARENT INJURY (O)

LIGHT CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	DAY	DAYLIGHT
2	DLIT	DARKNESS - WITH STREET LIGHTS
3	DARK	DARKNESS - NO STREET LIGHTS
4	DAWN	DAWN (TWILIGHT)
5	DUSK	DUSK (TWILIGHT)

MEDIAN TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	NONE	NO MEDIAN
1	RSDMD	SOLID MEDIAN BARRIER
2	DIVMD	EARTH, GRASS OR PAVED MEDIAN

MILEAGE TYPE CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
0	REGULAR MILEAGE
T	TEMPORARY
Y	SPUR
Z	OVERLAPPING

MOVEMENT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	STRGHT	STRAIGHT AHEAD
2	TURN-R	TURNING RIGHT
3	TURN-L	TURNING LEFT
4	U-TURN	MAKING A U-TURN
5	BACK	BACKING
6	STOP	STOPPED IN TRAFFIC
7	PRKD-P	PARKED - PROPERLY
8	PRKD-I	PARKED - IMPROPERLY
9	PARKNG	PARKING MANEUVER

NON-MOTORIST LOCATION CODE TRANSLATION LIST

CODE	LONG DESCRIPTION
00	AT INTERSECTION - NOT IN ROADWAY
01	AT INTERSECTION - INSIDE CROSSWALK
02	AT INTERSECTION - IN ROADWAY, OUTSIDE CROSSWALK
03	AT INTERSECTION - IN ROADWAY, XWALK AVAIL UNKNWN
04	NOT AT INTERSECTION - IN ROADWAY
05	NOT AT INTERSECTION - ON SHOULDER
06	NOT AT INTERSECTION - ON MEDIAN
07	NOT AT INTERSECTION - WITHIN TRAFFIC RIGHT-OF-WAY
08	NOT AT INTERSECTION - IN BIKE PATH OR PARKING LANE
09	NOT-AT INTERSECTION - ON SIDEWALK
10	OUTSIDE TRAFFICWAY BOUNDARIES
13	AT INTERSECTION - IN BIKE LANE
14	NOT AT INTERSECTION - IN BIKE LANE
15	NOT AT INTERSECTION - INSIDE MID-BLOCK CROSSWALK
16	NOT AT INTERSECTION - IN PARKING LANE
18	OTHER, NOT IN ROADWAY
99	UNKNOWN LOCATION

ROAD CHARACTER CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	INTER	INTERSECTION
2	ALLEY	DRIVEWAY OR ALLEY
3	STRGHT	STRAIGHT ROADWAY
4	TRANS	TRANSITION
5	CURVE	CURVE (HORIZONTAL CURVE)
6	OPENAC	OPEN ACCESS OR TURNOUT
7	GRADE	GRADE (VERTICAL CURVE)
8	BRIDGE	BRIDGE STRUCTURE
9	TUNNEL	TUNNEL

PARTICIPANT TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	OCC	UNKNOWN OCCUPANT TYPE
1	DRVR	DRIVER
2	PSNG	PASSENGER
3	PED	PEDESTRIAN
4	CONV	PEDESTRIAN USING A PEDESTRIAN CONVEYA
5	PTOW	PEDESTRIAN TOWING OR TRAILERING AN OB
6	BIKE	PEDALCYCLIST
7	BTOW	PEDALCYCLIST TOWING OR TRAILERING AN
8	PRKD	OCCUPANT OF A PARKED MOTOR VEHICLE
9	OTHR	OTHER TYPE OF NON-MOTORIST

TRAFFIC CONTROL DEVICE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
000	NONE	NO CONTROL
001	TRF SIGNAL	TRAFFIC SIGNALS
002	FLASHBCN-R	FLASHING BEACON - RED (STOP)
003	FLASHBCN-A	FLASHING BEACON - AMBER (SLOW)
004	STOP SIGN	STOP SIGN
005	SLOW SIGN	SLOW SIGN
006	REG-SIGN	REGULATORY SIGN
007	YIELD	YIELD SIGN
008	WARNING	WARNING SIGN
009	CURVE	CURVE SIGN
010	SCHL X-ING	SCHOOL CROSSING SIGN OR SPECIAL SIGNAL
011	OFCR/FLAG	POLICE OFFICER, FLAGMAN - SCHOOL PATROL
012	BRDG-GATE	BRIDGE GATE - BARRIER
013	TEMP-BARR	TEMPORARY BARRIER
014	NO-PASS-ZN	NO PASSING ZONE
015	ONE-WAY	ONE-WAY STREET
016	CHANNEL	CHANNELIZATION
017	MEDIAN BAR	MEDIAN BARRIER
018	PILOT CAR	PILOT CAR
019	SP PED SIG	SPECIAL PEDESTRIAN SIGNAL
020	X-BUCK	CROSSBUCK
021	THR-GN-SIG	THROUGH GREEN ARROW OR SIGNAL
022	L-GRN-SIG	LEFT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
023	R-GRN-SIG	RIGHT TURN GREEN ARROW, LANE MARKINGS, OR SIGNAL
024	WIGWAG	WIGWAG OR FLASHING LIGHTS W/O DROP-ARM GATE
025	X-BUCK WRN	CROSSBUCK AND ADVANCE WARNING
026	WW W/ GATE	FLASHING LIGHTS WITH DROP-ARM GATES
027	OVRHD SGNL	SUPPLEMENTAL OVERHEAD SIGNAL (RR XING ONLY)
028	SP RR STOP	SPECIAL RR STOP SIGN
029	ILUM GRD X	ILLUMINATED GRADE CROSSING
037	RAMP METER	METERED RAMPS
038	RUMBLE STR	RUMBLE STRIP
040	AUTO. FLAG	AUTOMATED FLAGGER ASSISTANCE DEVICE
090	L-TURN REF	LEFT TURN REFUGE (WHEN REFUGE IS INVOLVED)
091	R-TURN ALL	RIGHT TURN AT ALL TIMES SIGN, ETC.
092	EMR SGN/FL	EMERGENCY SIGNS OR FLARES
093	ACCEL LANE	ACCELERATION OR DECELERATION LANES
094	R-TURN PRO	RIGHT TURN PROHIBITED ON RED AFTER STOPPING
095	BUS STPSGN	BUS STOP SIGN AND RED LIGHTS

099 UNKNOWN UNKNOWN OR NOT DEFINITE

VEHICLE TYPE CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
00	PDO	NOT COLLECTED FOR PDO CRASHES
01	PSNGR CAR	PASSENGER CAR, PICKUP, LIGHT DELIVERY, ETC.
02	BOBTAIL	TRUCK TRACTOR WITH NO TRAILERS (BOBTAIL)
03	FARM TRCTR	FARM TRACTOR OR SELF-PROPELLED FARM EQUIPMENT
04	SEMI TOW	TRUCK TRACTOR WITH TRAILER/MOBILE HOME IN TOW
05	TRUCK	TRUCK WITH NON-DETACHABLE BED, PANEL, ETC.
06	MOPED	MOPED, MINIBIKE, SEATED MOTOR SCOOTER, MOTOR BIKE
07	SCHL BUS	SCHOOL BUS (INCLUDES VAN)
08	OTH BUS	OTHER BUS
09	MTRCYCLE	MOTORCYCLE, DIRT BIKE
10	OTHER	OTHER: FORKLIFT, BACKHOE, ETC.
11	MOTRHOME	MOTORHOME
12	TROLLEY	MOTORIZED STREET CAR/TROLLEY (NO RAILS/WIRES)
13	ATV	ATV
14	MTRSCTR	MOTORIZED SCOOTER (STANDING)
15	SNOWMOBILE	SNOWMOBILE
99	UNKNOWN	UNKNOWN VEHICLE TYPE

WEATHER CONDITION CODE TRANSLATION LIST

CODE	SHORT DESC	LONG DESCRIPTION
0	UNK	UNKNOWN
1	CLR	CLEAR
2	CLD	CLOUDY
3	RAIN	RAIN
4	SLT	SLEET
5	FOG	FOG
6	SNOW	SNOW
7	DUST	DUST
8	SMOK	SMOKE
9	ASH	ASH

Location	Collision Type				Severity		Total Crashes	90th Percentile Crash Rate	Observed Crash Rate
	Fixed-Object	Rear-End	Angle	Turning Movement	PDO	Injury			
Bear Creek Rd/Pettigrew Rd	2	0	28	5	16	19	35	0.408	1.352

input required
from ODOT report
excel calculated

Location	PM Peak							Intersection Class	90th Percentile Rate
	Day one	Day Two	Day Three	AVG	EST AADT	EST 5Y TEV	Crash Rate		
Bear Creek Rd/Pettigrew Rd				1419	14190	25896750	1.35	Urban 4ST	0.408

PM Peak hour TEV from network tool

$$Intersection\ Crash\ Rate\ per\ MEV = \frac{Annual\ Number\ of\ Crashes\ x\ 10^6}{(AADT)x\ (365\ days/year)}$$

The values shown in Exhibit 4-1 represent the 90th percentile crash rates from a study of 500 intersections in Oregon. The crash rates are grouped by rural/urban, signalized/unsignalized, and three-leg/four-leg intersections. Intersections with crash rates that exceed the 90th percentile values shown in the table should be flagged for further analysis. For more information on crash rates and using this table, see Section 4.3.4 Critical Crash Rate.

Exhibit 4-1: Intersection Crash Rates per MEV by Land Type and Traffic Control

	Rural				Urban			
	3SG	3ST	4SG	4ST	3SG	3ST	4SG	4ST
No. of Intersections	7	115	20	60	55	77	106	60
Mean Crash Rate	**0.226**	**0.196**	**0.324**	**0.434**	**0.275**	**0.131**	**0.477**	**0.198**
Median Crash Rate	0.163	0.092	0.320	0.267	0.252	0.105	0.420	0.145
Standard Deviation	0.185	0.314	0.223	0.534	0.155	0.121	0.273	0.176
Coefficient of Variation	0.819	1.602	0.688	1.230	0.564	0.924	0.572	0.889
90th Percentile Rate	**0.464**	**0.475**	**0.579**	**1.080**	**0.509**	**0.293**	**0.860**	**0.408**

Source: Assessment of Statewide Intersection Safety Performance, FHWA-OR-RD-18, Portland State University and Oregon State University, June 2011, Table 4.1, p. 47.

Note: Traffic control types include
3SG (three-leg signalized),
3ST (three-leg minor stop-control),
4SG (four-leg signalized),
4ST (four-leg minor stop-control).

Appendix E – Future Traffic Analysis Worksheets

Intersection Level Of Service Report
Intersection 1: NE Purcell Blvd-Pettigrew Rd / Bear Creek Rd

Control Type:	All-way stop	Delay (sec / veh):	279.9
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.970

Intersection Setup

Name	Pettigrew Road			NE Purcell Boulevard			Bear Creek Road			Bear Creek Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			35.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Pettigrew Road			NE Purcell Boulevard			Bear Creek Road			Bear Creek Road		
Base Volume Input [veh/h]	99	323	59	37	286	178	157	403	150	76	334	21
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	3.00	0.00	1.00	0.00	0.00	3.00	2.00	1.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	99	323	59	37	286	178	157	403	150	76	334	21
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	85	16	10	75	47	41	106	39	20	88	6
Total Analysis Volume [veh/h]	104	340	62	39	301	187	165	424	158	80	352	22
Pedestrian Volume [ped/h]	0			4			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	506	527	747	454
Degree of Utilization, x	1.34	1.37	1.97	1.21

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	23.96	25.60	51.42	18.85
95th-Percentile Queue Length [ft]	599.02	640.08	1285.46	471.36
Approach Delay [s/veh]	196.65	209.46	467.38	145.94
Approach LOS	F	F	F	F
Intersection Delay [s/veh]	279.89			
Intersection LOS	F			

Appendix F – Existing and Future Roundabout Traffic Analysis Worksheets

Option 1: Single-Lane Roundabout

Number	1											
Intersection	NE Purcell Blvd-Pettigrew Rd / Bear Creek Rd											
Control Type	Roundabout											
Analysis Method	HCM 6th Edition											
Name	Pettigrew Road			NE Purcell Boulevard			Bear Creek Road			Bear Creek Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	37	224	30	38	265	135	113	213	71	58	210	25
Total Analysis Volume [veh/h]	39	236	32	40	279	142	119	224	75	61	221	26

Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	384			324			382			394		
Exiting Flow Rate [veh/h]	418			381			406			297		
Demand Flow Rate [veh/h]	37	224	30	38	265	135	113	213	71	58	210	25
Adjusted Demand Flow Rate [veh/h]	39	236	32	40	279	142	119	224	75	61	221	26

Lanes

Overwrite Calculated Critical Headway	Yes	Yes	Yes	Yes
User-Defined Critical Headway [s]	4.10	4.10	4.10	4.10
Overwrite Calculated Follow-Up Time	Yes	Yes	Yes	Yes
User-Defined Follow-Up Time [s]	2.70	2.70	2.70	2.70
A (intercept)	1333.33	1333.33	1333.33	1333.33
B (coefficient)	0.00076	0.00076	0.00076	0.00076
HV Adjustment Factor	1.00	0.99	0.99	0.99
Entry Flow Rate [veh/h]	307	464	421	312
Capacity of Entry and Bypass Lanes [veh/h]	995	1041	996	987
Pedestrian Impedance	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	995	1035	991	976
X, volume / capacity	0.31	0.45	0.42	0.32

Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	6.77	8.48	8.37	6.96
Lane LOS	A	A	A	A
95th-Percentile Queue Length [veh]	1.32	2.34	2.13	1.36
95th-Percentile Queue Length [ft]	33.00	58.41	53.19	34.03
Approach Delay [s/veh]	6.77	8.48	8.37	6.96
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	7.79			
Intersection LOS	A			

Option 1: Single-Lane Roundabout

Number	1											
Intersection	NE Purcell Blvd-Pettigrew Rd / Bear Creek Rd											
Control Type	Roundabout											
Analysis Method	HCM 6th Edition											
Name	Pettigrew Road			NE Purcell Boulevard			Bear Creek Road			Bear Creek Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	99	323	59	37	286	178	157	403	150	76	334	21
Total Analysis Volume [veh/h]	104	340	62	39	301	187	165	424	158	80	352	22

Intersection Settings

Number of Conflicting Circulating Lanes	1			1			1			1		
Circulating Flow Rate [veh/h]	629			541			423			609		
Exiting Flow Rate [veh/h]	545			527			648			526		
Demand Flow Rate [veh/h]	99	323	59	37	286	178	157	403	150	76	334	21
Adjusted Demand Flow Rate [veh/h]	104	340	62	39	301	187	165	424	158	80	352	22

Lanes

Overwrite Calculated Critical Headway	Yes	Yes	Yes	Yes
User-Defined Critical Headway [s]	4.10	4.10	4.10	4.10
Overwrite Calculated Follow-Up Time	Yes	Yes	Yes	Yes
User-Defined Follow-Up Time [s]	2.70	2.70	2.70	2.70
A (intercept)	1333.33	1333.33	1333.33	1333.33
B (coefficient)	0.00076	0.00076	0.00076	0.00076
HV Adjustment Factor	1.00	0.99	0.99	0.99
Entry Flow Rate [veh/h]	506	531	752	460
Capacity of Entry and Bypass Lanes [veh/h]	825	882	966	838
Pedestrian Impedance	1.00	1.00	1.00	1.00
Capacity per Entry Lane [veh/h]	825	877	960	829
X, volume / capacity	0.61	0.60	0.78	0.55

Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	14.11	13.11	19.44	12.24
Lane LOS	B	B	C	B
95th-Percentile Queue Length [veh]	4.30	4.13	8.09	3.39
95th-Percentile Queue Length [ft]	107.52	103.34	202.18	84.87
Approach Delay [s/veh]	14.11	13.11	19.44	12.24
Approach LOS	B	B	C	B
Intersection Delay [s/veh]	15.28			
Intersection LOS	C			