City Council Study Session

Agenda

October 12, 2017
6:00 p.m.
City Hall, Medford Room
411 W. 8th Street, Medford, Oregon

1. Transportation System Plan – Policy Discussion

City of Medford

Planning Department

Working with the community to shape a vibrant and exceptional city

MEMORANDUM

Subject	Transportation System Plan – Policy Discussion	
File no.	CP-16-036	
To	Mayor & City Council	*for 10/12/2017 Study Session*
From	Matt Brinkley, AICP CFM, Planning Director Karl H. MacNair, Transportation Manager, P.E. and Carla Angeli Paladino, CFM, Principal Planner	
Date	October 5, 2017	

TSP PROGRESS UPDATE & BACKGROUND

The Transportation System Plan provides guidance for development and operation of the City's transportation network over a 20 year planning period and beyond. It provides for the strategic and deliberate investment of limited financial resources into an array of public infrastructure that directly bears upon the community's capacity to provide an appealing place to live and work.

As such, the TSP is both influenced by and influences broader policy issues. Staff has identified 4 critical policy issues that should be addressed by City Council and other decision makers and stakeholders through the TSP update process. While this list may not be exhaustive, staff believes that it is essential for decision makers to understand these issues in order to make informed decisions that could have profound consequences. These issues have been identified by Staff due to the reach and breadth of their impact as well as their complexity and inter-relatedness to other policy issues. The 4 issue areas are:

1. Level of Service (LOS) and Concurrency
2. Transportation Planning Rule (TPR)
3. Roadway Design and Implementation
4. Very Significant Projects—South Stage Overcrossing

This memo and accompanying presentation address the first issue: Level of Service (LOS) and Concurrency. As explained in greater detail below, LOS is the operational standard to which we build our intersections; Concurrency is the policy that implements that standard. Application of our current LOS has substantial implications for development as well as the long term operational viability of our road network. While it is designed to preserve the adequate function of intersections, it can constrain the very

development that generates System Development Charges that enable the City to pay for improvements to our road network that provide needed capacity.

COUNCIL DIRECTION

Staff is asking Council to review the materials and provide direction on the City's Level of Service (LOS) standard. The current Transportation System Plan and development code regulations use LOS D as the standard and do not allow development to proceed if this standard is not met. Council is being asked if the TSP update should maintain the current standard, implement the standard in a different way, and/or use a different standard altogether. The issue is framed for the Council below and has been discussed in a series of meetings with Councilors and citizen appointed ward representatives.

PRESENTATION OUTLINE

Introduction and Presentation –

Matt Brinkley, TSP progress update;
Cory Crebbin, Level of Service (LOS) and Concurrency

Discussion and Direction – Mayor and City Council

OVERVIEW

Functional Classification Map

All of the streets within the City are categorized as a specific type of street (e.g. arterial, collector, commercial/industrial, residential) based on traffic movement and access functions. Higher order streets (arterials and collectors) are identified on the City's Functional Classification map which was provided to the Council in September (***Exhibit A).*** The arterials and collectors are further separated into major and minor designations. Each designation relates to a specific cross section which enables the City to determine right-of-way and improvements needed over time. All existing and proposed streets are classified using this classification structure.

Chapter 10.427 of the Municipal Code states, "the intent of the street classification system is to:

1) Promote the safety and convenience of vehicular, pedestrian, and bicycle traffic;
2) Protect the safety of neighborhood residents;
3) Protect the residential character of neighborhoods by limiting traffic volume, speed, noise, and fumes and;
4) Encourage the efficient use of land."

Streets are designated and cross sections are provided in order to direct how a street will build out when it is constructed or (for existing streets) as it is improved. The major and minor street classifications identify all of the elements necessary to accommodate the various modes. The built and natural environment and their inherent constraints require some level of flexibility when deciding on the final design of a street.

What is Level of Service? What is the City's current standard? What is concurrency?
Simply put, LOS is a standard that measures or designates the level of operation of an intersection. LOS is identified on a graduated scale and represented as a grade from A to F. It is measured in seconds and defines the average maximum amount of time a vehicle must wait at a stopped controlled intersection (e.g. a traffic signal or stop sign) before proceeding. LOS is based on intersection operation during a specific point in time–the morning or evening peak or "rush hour"–when heavily trafficked roads and intersections experience greatest demand. A grade of 'A' represents minimal delays while 'F' represents more auto delays. Currently, the City's standard is LOS D. (Note: State highways are evaluated for deficiencies using a different standard known as volume–to-capacity ratios, or "v/c ratio".)

Section 10.462 of the Municipal Code provides the description of Level of Service for arterials and collectors (shown in the left-hand columns). The right-hand columns are added to show the specific measurement in seconds.

TABLE IV-2
SERVICE LEVELS FOR ARTERIAL AND COLLECTOR STREETS

Typical Traffic Flow Conditions		Average Control Delay per Vehicle (seconds) for a Signalized Intersection[1]	Average Control Delay per Vehicle (seconds) for a Stop Controlled Intersection[1]
Service Level A	Relatively free flow of traffic with some stops at signalized or stop sign controlled intersections. Average speeds would be at least 30 miles per hour.	10.0 or less	10.0 or less

[1] Source: Transportation Research Board, Highway Capacity Manual, 6th Edition (Washington, D.C. 2016)

Typical Traffic Flow Conditions		Average Control Delay per Vehicle (seconds) for a Signalized Intersection[1]	Average Control Delay per Vehicle (seconds) for a Stop Controlled Intersection[1]
Service Level B	Stable traffic flow with slight delays at signalized or stop sign controlled intersections. Average speed would vary between 25 and 30 miles per hour.	10.1 to 20.0	10.1 to 15.0
Service Level C	Stable traffic flow but with delays at signalized or stop sign controlled intersections to be greater than at Level B but yet acceptable to the motorist. The average speeds would vary between 20 and 25 miles per hour.	20.1 to 35.0	15.1 to 25.0
Service Level D	Traffic flow would approach unstable operating conditions. Delays at signalized or stop sign controlled intersections would be tolerable and could include waiting through several signal cycles for some motorists. The average speeds would vary between 15 and 20 miles per hour.	35.1 to 55.0	25.1 to 35.0
Service Level E	Traffic flow would be unstable with congestion and intolerable delays to motorists. The average speed would be approximately 15 miles per hour.	55.1 to 80.0	35.1 to 50.0
Service Level F	Traffic flow would be forced and jammed with stop and go operating conditions and intolerable delays. The average speed would be less than 15 miles per hour.	Greater than 80.0	Greater than 50.0

If the LOS D standard is not met for arterials or collectors, new development is not permitted to occur unless the developer makes the necessary improvements to meet the standard. Knowing the requirement and associated cost to construct the necessary improvements, the developer must decide on whether to abandon the project (because the improvements are too costly), reduce the scope of the project in order to fall below the threshold that requires improvements, or build the improvements. The impacts to

the City if the project is abandoned results in a missed opportunity for additional development within the City and associated fees and charges that would have been collected to help support the overall transportation and utility systems. It also may mean development occurs farther out from the core or in a different city altogether. If the project is only partially developed then land is under-utilized and the fees and charges collected are below what was projected to be provided by the development. A different LOS standard at the intersection could mean the project moves forward and the City accepts increased congestion at the intersection for that peak time frame or allows other mitigation measures to offset the congestion. The developer's obligation to provide transportation improvements to mitigate the development's impacts to the system prior to or simultaneously with building construction is known as concurrency.

In 2014, the City of Medford changed code section 10.426 to require a peak hour factor of 1.0 instead of using actual peak hour factors. This change essentially means that LOS is now calculated over the entire peak hour, instead of the worst 15 minutes of the peak hour. This change influences what the calculated level of service is for studied intersections and helps the intersection meet the standard.

Why is it important?
The Level of Service standard is important because it provides a standard to measure roadway facility adequacy. Paired with concurrency, it ensures developments mitigate the additional trips they are adding to the system. Theoretically, this ensures development is served by appropriately sized public infrastructure and that the transportation network overall, or at least in the area affected by development, continues to provide the same operational capacity and experience for users that it did prior to new development. However, as with any policy, there are unintended consequences that result from this requirement.

What is the issue with the current Level of Service standard?
The current Level of Service standard assumes a "one size fits all" approach to the City's transportation system. This involves a very finite evaluation of how the intersection is performing in terms of delay during the worst one hour period of a 24 hour day. This standard does not take into consideration other factors such as actual intersection operation, safety (vehicular, pedestrian or bicycle) or queuing that impact the functionality of the facility.

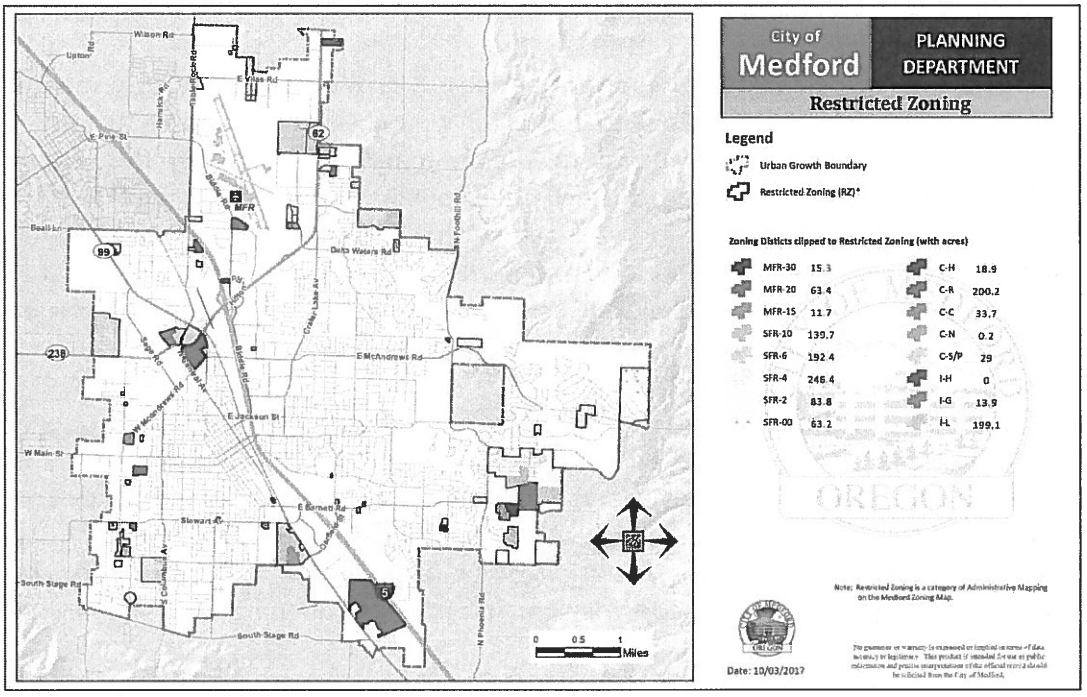
Level of Service plays an important role in how and where development occurs and what restrictions are placed on a particular development site. The City requires a traffic impact analysis at the time of zone change application. These analyses identify where impacts will occur at studied intersections. For those intersections that fall below LOS D in the build year, the applicant may be subject to a number of restrictions (property identified as having a restricted zoning overlay) such as a trip cap (uses proposed cannot

exceed a specified number of average daily trips per day), a restriction on types of uses allowed (e.g. high traffic generators such as fast food restaurant), or infrastructure improvements (e.g. installation of a traffic signal). These types of restrictions place a financial burden on the property owner and limit the overall development potential of a project site. Such restrictions delay when and how these sites build out, thereby impacting issues such as economic development, business operation, and housing.

A Geographical Information Services (GIS) calculation of how many acres of land within the City limits are subject to some form of restricted zoning is 1,310 acres (note some of these sites are restricted based on sewer or water inadequacy). The breakdown of these acres by land use category is:

- Single Family Residential (SFR) zones (725 acres)
- Multi-Family Residential (MFR) zones (90 acres)
- Commercial zones (282 acres)
- Industrial zones (213 acres)

The map showing the restricted zoning locations is below.



The topic of Level of Service is important to discuss in terms of what the appropriate standard is and where it applies, but also when is the appropriate time to evaluate and regulate the adopted standard. As mentioned above, Level of Service is evaluated at the time of zone change application in Medford. In some jurisdictions, Level of Service and a development's impacts are regulated at the time of site review. This distinction is

important as no buildings are typically built at the time of zone change and may not be built for many years following such application. Therefore, identifying impacts at the time of zone change may be premature or not necessarily reflective of the impacts that may be relevant at the time of site construction. A review of project impacts on the transportation system may be better served with a traffic impact analysis at the time of site development. *Staff has been discussing this alternative and thinks it is an important discussion topic that needs to be addressed as we make necessary regulatory changes in conjunction with the Transportation System Plan update*.

The other consideration about Level of Service relates to project prioritization and funding. The example of the intersection of Sunrise and Jackson Street provides a good illustration. This intersection will fail in 2038, as modeling shows this intersection will operate at LOS E. In other words, more vehicles pass through this intersection at its peak hour than it can accommodate without causing operational degradation. An aerial of this intersection is provided below.

Jackson Street runs east/west while Sunrise runs north/south. The intersection is signalized with dedicated turn lanes in all directions, sidewalk and bicycle lanes on Jackson and along portions of Sunrise Avenue. One possible mitigation tool to maintain LOS D in the planning horizon is to install a dedicated right turn lane on the west bound approach on Jackson (red circled area). Such an improvement would impact the two adjacent property owners on the northeast side of the intersection significantly. The

mitigation will improve the Level of Service to C but is it worth the impacts to the surrounding property owners? Does the intersection function well enough? Are there other streets that could be improved that would reduce congestion at this location and where funding could be provided? The Level of Service standard raises all of these questions. If flexibility or other options were built into the LOS standard then alternative mitigation measures could be considered and implemented. Some examples of other mitigation measures may include:

- Adjust the Level of Service standard in high traffic areas. Reduce the standard to LOS E or LOS F in designated areas (such as Downtown)
- Adjust the LOS based on the intersection (stop controlled vs. signalized)
- Developments to pay a pro-rata share of future improvements so last development in does not trigger and have to pay for the full improvement
- Provide an improvement in a different location that alters traffic flow and /or reduces demand on the failing intersection

There are likely situations where no improvements can be provided to meet the standard so other forms of mitigation could be beneficial in order to move a project forward. More detailed examples are provided in the memorandum from Kittelson & Associates dated June 28, 2013 ***Exhibit B.***

Many jurisdictions require that developers pay a pro-rata share of planned improvements to avoid the development that triggers the improvement from being responsible for the entire cost. For example, there were several zone changes in the Southeast area that were all conditioned to install a signal at Pierce Rd. and Hillcrest Ave. After McAndrews was built east of Foothill, the traffic patterns changed and this improvement was no longer needed. The modeling for the TSP update is showing that the signal will be needed by 2038. If a pro-rata share arrangement were used, developments that contribute trips to that intersection would share the cost.

How do other cities handle Level of Service?

Bend and Eugene have multiple categories of standards ***Exhibits C and D.*** In Bend, there are different standards defined for two-way stop control (TWSC), all-way stop control (AWSC), 95th percentile queues, and signals or roundabouts. Eugene's TSP identifies different standards geographically. For example, while the citywide standard is LOS E, Eugene's downtown is identified as a Traffic Impact Analysis Exempt Area where LOS F is acceptable, and alternative targets were proposed on several ODOT intersections.

ODOT uses a measure known as Volume-to-Capacity (V/C) Ratio. Bend uses maximum delay, akin to LOS, for stop controlled intersections, but uses V/C ratio for signal and roundabout evaluation. V/C represents a facility's level of congestion. V/C values range from 0.01 to 1.00. Lower numbers indicate the intersection has low congestion. Values

closer to 1.00 indicate more congestion. V/C ratio standards may be a more appropriate measure for signalized intersections because it's measuring against the calculated capacity of the intersection as opposed to how much delay is experienced on average.

The City of Medford code defines the study area of a Traffic Impact Analysis (TIA) to include any intersection impacted by at least 25 peak hour trips. Bend limits their study area to intersections within one mile of the proposed development impacted by at least 15 peak hour trips. The distance limitation prevents large developments from being limited or being required to mitigate intersections that are farther from the development.

The Cities of Bend, Portland, and others allow for alternative mitigation measures. Oregon's Transportation Planning Rule (the TPR) was updated in 2012 to allow local governments to use alternative mitigations. Some of the alternative mitigation measures allowed include: mitigating with improvements that benefit other modes, improvements to other facilities, or improvements at other locations that provide balancing system wide benefits; allowing development where there is an already failing facility if the development can be shown to prevent further degradation of the failing facility; exempt a "multi-modal mixed use area" from vehicle traffic congestion performance standards; and allowing partial mitigation for "Industrial" or "Traded Sector" jobs provided certain requirements are met. The TPR does not require any of these measures be implemented; it only allows them as options for local governments. Because Medford's code currently requires that LOS D be maintained, these alternative mitigations are not currently available in Medford.

Another change to the TPR in 2012 allows local governments to approve zone changes as long as the proposed zoning is consistent with the comprehensive plan map designation and the local government's acknowledged TSP. This means that the City of Medford does not have to require Traffic Impact Analysis (TIA), and concurrency, at the time of zone change, which is the current code requirement. The City of Medford could instead require a TIA, and concurrency, at the time of site plan or land division. Any changes to the comprehensive plan would still require a TIA to determine the impacts at the end of the planning period (2038). Moving the concurrency requirement to later in the development process would mean that there is more certainty about what development is being proposed and how many vehicle trips it is expected to generate. This could allow the TIA to be more useful to staff and developers in identifying mitigation measures and alternative mitigation measures, if implemented. Given the range of potential trip generations in commercial development (i.e. offices compared to fast food) this could help with the problem of both over-estimating and under-estimating trips for a specific development.

The City of Bend recently updated their TSP and development code for Transportation Analysis to incorporate many of these ideas. It places limitations on roadway widening to accommodate travel lanes for mitigation when improvements may result in unacceptable trade-offs to other modes of travel or no physical mitigation is available to improve intersection operations to the performance standard. They also prohibit widening to accommodate travel lanes within their downtown or historic district and along certain streets identified in their TSP as "not being authorized for lane expansion." Further, the City Manager has the ability to suspend the mobility standard for a particular intersection where widening might result in unacceptable trade-offs to other modes of travel.

STAFF RECOMMENDATION

Traffic Congestion Performance Measures

- Distinguish between intersection control types and incorporate intersection capacity (V/C ratio) in vehicle traffic congestion mobility standards similar to the City of Bend standards.
- Distinguish between built-out and developing areas by establishing different mobility standards for different parts of the City, similar to the City of Eugene standards. Consider including a TIA exempt area in the vicinity of downtown Medford.
- Incorporate limitations on roadway widening to accommodate additional travel lanes when improvements may result in unacceptable trade-offs to other modes of travel similar to the City of Bend. Consider granting the City Manager, Planning Commission, or City Council the ability to suspend or alter Traffic Congestion Performance Measures for a particular intersection.

Transportation Analysis Requirements

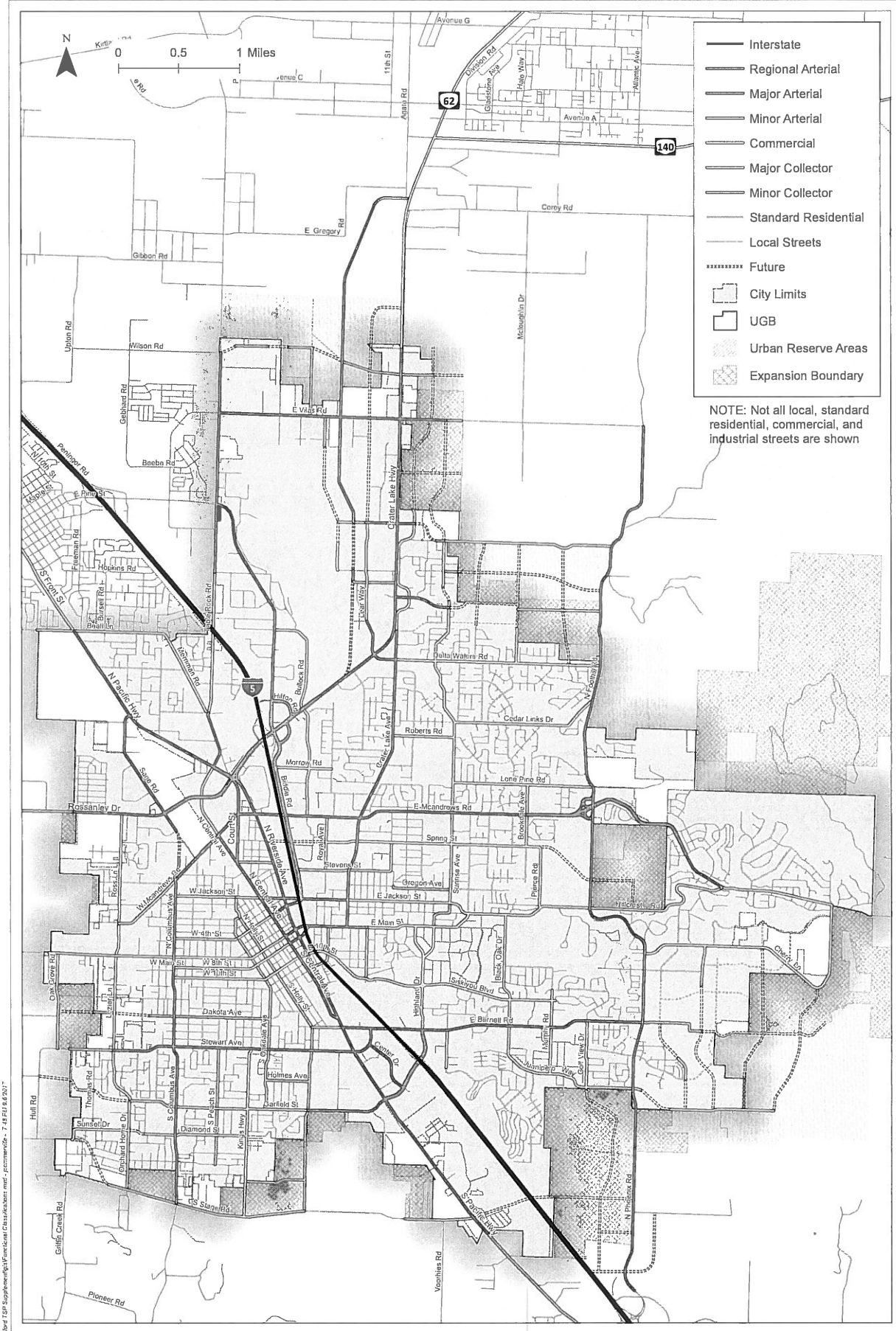
- Implement a specific safety review and mitigation requirement to ensure that additional congestion is not creating an unsafe environment.
- Implement a specific pedestrian, bicycle, and transit review and mitigation requirement to ensure that developments provide mobility for all modes.
- Review the TIA study area definition and consider a specific distance limitation.
- Consider making residences constructed above ground-floor commercial exempt from the trip generation calculations.
- Consider adopting a roundabout first policy

Development Mitigation Options

- Allow alternative mitigation strategies to be used by developments.
- Consider moving the requirement for concurrency to the time of development application.
- Consider implementing proportional share requirements for needed improvements as identified within the City's adopted TSP

EXHIBITS

A: Functional Classification Map
B: Kittelson & Associates memorandum dated June 28, 2013
C: City of Bend Transportation Analysis regulations
D: City of Eugene Performance Measurements



Roadway Functional Classifications
Medford, Oregon

Figure **1**

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet

KITTELSON & ASSOCIATES

H:\21321255 - City of Medford TSP Supplement\gis\Functional Classifications.mxd - jcommander - 7:48 PM 8/8/2017

Exhibit B

Task 4.4: Performance Measures Review

Date:	June 28, 2013	Project #: 10771
To:	Alex Georgevitch, City of Medford	
From:	Joe Bessman, Julia Kuhn, and Matt Kittelson	
Project:	City of Medford TSP/UGB Amendment	
Subject:	Performance Measures Review	

This memorandum presents a comparison of the performance measures being applied in other jurisdictions and on corridors. This effort identifies how other agencies manage their transportation system, particularly within urban environments. This also includes consideration of how a balance between multi-modal goals and development of parallel routes can be incorporated.

PERFORMANCE MEASURE REVIEW

To inform this process, performance measures of other agencies within Oregon and Washington were reviewed. The following items were reviewed:

- ODOT alternative mobility targets
- Draft TRIP97 performance metrics
- City of Eugene, Oregon
- City of Portland, Oregon
- City of Bend, Oregon
- City of Vancouver, Washington
- Downtown Vancouver multi-modal reductions

A review of each of these policies and approaches, and how they pertain or could be applied to Medford, is summarized below.

ODOT Alternative Mobility Targets

ODOT has historically relied on a volume-to-capacity ratio as a singular metric for highway performance. Within the 1999 Oregon Highway Plan, Policy 1F.6 describes the mobility standards for State Highway Facilities. This was prepared as two separate standards, one within the Portland-Metro Region to account for the higher congestion, and a second standard for all other areas of the State. The mobility standard varies based on whether or not the location is within an Urban Growth Boundary, a Metropolitan Planning Organization (MPO), the posted speed, the

State classification of the highway, and whether special highway designations have been applied. The Policy does not explicitly distinguish between signalized and unsignalized intersections, though regional interpretations may make this distinction by applying the minor street classification to stop-controlled intersections in considering the appropriate standard.

The framework for application of ODOT mobility targets is as follows:

- Assess the 30th highest annual hour
- Consider conditions during the peak fifteen minutes of this hour
- Include an 8-percent capacity reduction (ideal saturation flow rate reduction) at traffic signals in areas outside of the Portland-Metro area to account for reduced driver attentiveness in less congested areas.
- Consider conditions during the controlling period of the adopted Transportation System Plan(s), which requires analysis of 15-years (for compliance with the State Transportation System Plan) or more depending on City or County plans.

The application of these stringent mobility targets, particularly with less available funding, was considered through a joint committee meeting between the Land Conservation Development Commission and the Oregon Transportation Commission in 2011. This joint session led to the creation of Senate Bill 795, which required revisions to the mobility targets and to policies governing plan amendments to address the unintended consequences of these policies.

Changes that were subsequently implemented include revision of ODOT "mobility standards" to "mobility targets." This maintained the same overall structure and application of the v/c ratio, but increased the mobility threshold across all classifications. At the same time, the OHP revisions now allow performance measures other than a v/c ratio so that agencies can better balance the economic, multi-modal, urban density, or community goals with automobile throughput.

While other measures and considerations are allowed, ODOT has provided additional guidance on ways that the existing v/c ratio can be modified as a surrogate for these other goals. Following guidance from ODOT's December 30, 2009 interoffice memo[1], the following steps are provided for setting alternative mobility targets:

1. Identify all feasible improvements (based on reasonable expectations of funding likely through the planning horizon).
2. If the intersection meets the mobility target with improvements, no changes are needed.
3. If the intersection is greater than the mobility target but less than a v/c ratio of 1.0, establish the standard based on the projected performance.
4. Identify whether the overall hour (versus the 15 minute peak) can remain below a v/c ratio of 1.0.

[1] December 30, 2009 interoffice memo *Methodology for OHP Alternate Mobility Standards in Region 2,* written by Erik Havig.

5. Consider the average annual v/c ratio rather than the 30th highest design hour.
6. Consider an alternative analysis period (such as second highest hour).
7. All changes to highway mobility targets need to request adoption from the OTC.

These same steps are identified within the Planning Business draft for Alternative Mobility Targets[2], and continue to remain centered on the v/c ratio, but with changes to how it is applied, the hourly period it is applied within, and the seasonal period.

TRIP97 Performance Measures

Transportation Reinvestment Innovation and Planning (TRIP) US 97 is a multi-agency partnership established to develop a set of performance measures, funding mechanisms, and a governance structure to manage the US 97 corridor through Deschutes and Jefferson Counties in Central Oregon. The project was developed to fundamentally alter the "point" based analysis of each intersection on the highway, considering only automobile mobility during the peak-fifteen minutes of the 30th highest hour at the end of the planning horizon, and instead assessing the highway at a corridor level. This approach allows the partnership to prioritize investments based on where they could provide the greatest benefit to the system, and to better inform and balance the safety, mobility, and context tradeoffs being made.

The performance measures for TRIP97 encompass a range of metrics that allow the Partnership to assess how projects or growth affects the overall corridor vision. This vision identifies the overarching goals for the corridor, which includes an emphasis on safety, continued highway mobility, limiting impacts to the built and natural environment, improved local/supporting system connectivity and access to the highway, supporting job growth, and promoting alternative travel modes.

As the US 97 corridor includes both urban and rural segments, and "Main Street" as well as urban expressway segments, the performance measures could not be applied uniformly as different measures have varying degrees of importance depending on the context. To address this, performance measures were divided into two categories: 1) corridor metrics, that holistically evaluate the entire highway section between Deschutes and Jefferson Counties; and 2) segment metrics, that assess individual sections of the highway.

Corridor metrics are entirely monetizable, and lend themselves to a cost/benefit ratio. These measures provide a system perspective, and include the following metrics:

- Average Travel Time
- Travel Time Reliability
- Change in Job Potential

[2] Pre-dated draft 2013 Planning Business Line Item Operational Notice, *Alternative Mobility Targets,* number PB-02.

- Expected Crash Frequency
- Greenhouse Gas Emissions

Segment metrics include various units of measures, and cannot be readily combined. They are measured as a percent change relative to a standard or normalized value, and scored between +3 and -3. These values are then given a weighting by the managing agencies for each individual segment. These are then combined into a numeric score for each individual corridor segment. Segment metrics include the following:

- Average Travel Time
- Travel Time Reliability
- Side Street Delay
- Expected Crash Frequency
- Turning Movement Opportunities per Mile
- Percent of North-South traffic on US 97
- Multi-modal Level of Service

Analysis of these performance measures is provided by existing software programs, ODOT Travel Demand Models, and adaptation of tools that were constructed through national research efforts. It is expected that the tools will be simplified as software fully incorporates the Highway Capacity Manual 2010 methodologies.

TRIP97 Relevance to the City of Medford

The performance measures within TRIP97 provide a holistic assessment of the US 97 corridor, but the additional complexity would not be appropriate to apply on a citywide basis within the City of Medford. TRIP97 was intended to address larger-scale planning issues (such as UGB amendments or major employment centers) where the additional analysis effort is warranted. Within Medford, this construct would be best suited toward managing critical corridor segments, particularly those with changing characteristics or management goals, or of a regional importance.

City of Bend, Oregon

The City of Bend performance measures are intersection based, and vary by intersection control type. All operational analysis within the City of Bend is focused on the overall hour, though the City experiences sharp peaking characteristics around 5:00 p.m. A summary of performance measure by control type is provided below:

- Two-way stop-controlled intersections: The City of Bend does not have a performance standard for low-volume intersections. At stop-controlled intersections serving more than

100 peak hour trips on the minor (stop-controlled) approach the City requires that the approach operate better than Level of Service "F" (less than 50 seconds of delay).

- All-way stop-controlled intersections require that the overall average delay is less than 80 seconds (Level of Service "E" or better).
- The analysis of roundabouts is conducted based on the overall intersection, and requires that it operate below capacity (v/c ratio less than 1.0).
- Signalized intersections are required to operate with a v/c ratio of less than 1.0 (below capacity). Intersections that are located within historic areas, or built-out to its master-planned size must operate with a v/c ratio of less than 1.0 during the hour preceding or following the peak hour.

In addition to these standards, the City of Bend has a concurrency requirement to ensure transportation facilities are provided when needed. The City also contains a pro-rata contribution requirement, which allows the City to collect fees toward intersections that are currently operating acceptably where master-planned improvements are not in place. The pro-rata system is intended to avoid the "last man in" construct where the developer that exceeds the performance measure is required to pay the entire mitigation costs.

The City of Bend actively considers intersection safety in its mitigation needs. The City requires that intersection crash records be reviewed at all intersections, and actively enforces sight distance and clear zone requirements. The City places a high emphasis on pedestrian, transit, and bicycle connectivity during the site plan review phase of development projects, and actively looks to limit individual or direct property access where feasible.

Relevance to the City of Medford

The City of Medford's performance standard is based on the peak 15-minute period and applies universally to all control types. As delay is defined differently for various control forms, Medford's Level of Service "D" standard applies a more conservative requirement to minor stop-controlled intersections, where infrastructure improvements may be undesirable or unnecessary. The City of Bend assesses all of its intersections during the peak hour (rather than fifteen-minute period) and generally accepts all operations short of failure.

City of Eugene Performance Measures

Performance measures for the City of Eugene can be found within 9.9650 of the City's Development Code. The City of Eugene (and Lane County) base intersection operations on level-of-service (LOS). Both jurisdictions currently specify the maintenance of LOS "D" at signalized intersections. This performance standard is used to ensure reliable and acceptable roadway system performance, and is applied to private developments, zone changes, and system planning.

As exception to this policy is within Eugene's Central Area Transportation Study (CATS) area boundary (primarily downtown and near the University of Oregon campus), where the city allows LOS "E" for intersection operations. The City code also notes that while service levels may be substandard, improvements may not be feasible. Where safety is not being compromised the City may accept the deficiency temporarily while system constraints (such as environmental, public agency financial resources, or land use constraints) are overcome or addressed through alternative strategies (such as Transportation Demand Management, land use changes, or short-term safety improvements).

The City of Eugene also provides requirements for transit, bicycle, and pedestrian modes. These are generally to increase the attractiveness, connectivity, and convenience of these travel modes. New bikeways are required as part of new or reconstructed arterial and major collector streets, and sidewalks are required along all arterial and collector roadways.

Relevance to the City of Medford

A similar approach to the City of Eugene's adopted CATS boundary could be applied to specific areas in Medford where higher tolerance for congestion would be allowed. This could include areas such as the identified Transit Oriented Districts, downtown area, or built-out areas where further widening would not be desirable. The City of Medford also provides general requirements for other travel modes so that system adequacy can be considered for all users.

City of Portland Performance Measures

Detailed analysis is typically required only for rezones, conditional uses, parking reviews, master plans, and impact mitigation plans. New development zoned outright typically is required only to assess the general safety and circulation needs at the access points, as system impacts are assumed to be accounted for within the City's adopted transportation plans.

Where assessment of facilities is required, the City of Portland typically uses a Level of Service "D" standard when assessing system adequacy per City Policy 11.13. The City allows alternative measures to be applied in mixed-use areas, areas with mode splits consistent with the established targets, areas with maximum parking ratios, or where adequate street connectivity exists.

Areas that currently exceed the performance standards, but are expected to meet the alternative requirements in the future must develop an action plan. This plan must assess future impacts of motor vehicle traffic on multimodal travel, establish mitigation strategies, and establish a performance standard and monitoring system to implement the action plan.

Relevance to Medford

The City of Portland maintains a similar Level of Service "D" approach, but is selective as to what development review processes this standard is applied to. The City also provides alternative performance measures, largely based on increasing modal splits or development/monitoring of action plans, where this standard cannot be met.

City of Bend Performance Measures

The City of Bend performance measures are intersection based, and vary by intersection control type. All operational analysis within the City of Bend is focused on the overall hour, though the City experiences sharp peaking characteristics around 5:00 p.m. A summary of performance measure by control type is provided below:

- Two-way stop-controlled intersections: The City of Bend does not have a performance standard for low-volume intersections. At stop-controlled intersections serving more than 100 peak hour trips on the minor (stop-controlled) approach the City requires that the approach operate better than Level of Service "F" (less than 50 seconds of delay).
- All-way stop-controlled intersections require that the overall average delay is less than 80 seconds (Level of Service "E" or better).
- The analysis of roundabouts is conducted based on the overall intersection, and requires that it operate below capacity (v/c ratio less than 1.0).
- Signalized intersections are required to operate with a v/c ratio of less than 1.0 (below capacity). Intersections that are located within historic areas, or built-out to its master-planned size must operate with a v/c ratio of less than 1.0 during the hour preceding or following the peak hour.

In addition to these standards, the City of Bend has a concurrency requirement to ensure transportation facilities are provided when needed. The City also contains a pro-rata contribution requirement, which allows the City to collect fees toward intersections that are currently operating acceptably where master-planned improvements are not in place. The pro-rata system is intended to avoid the "last man in" construct where the developer that exceeds the performance measure is required to pay the entire mitigation costs.

The City of Bend actively considers intersection safety in its mitigation needs. The City requires that intersection crash records be reviewed at all intersections, and actively enforces sight distance and clear zone requirements. The City places a high emphasis on pedestrian, transit, and bicycle connectivity during the site plan review phase of development projects, and actively looks to limit individual or direct property access where feasible.

Relevance to the City of Medford

The City of Medford's performance standard is based on the peak 15-minute period and applies universally to all control types. As delay is defined differently for various control forms, Medford's Level of Service "D" standard applies a more conservative requirement to minor stop-controlled intersections, where infrastructure improvements may be undesirable or unnecessary. The City of Bend assesses all of its intersections during the peak hour (rather than fifteen-minute period) and generally accepts all operations short of failure.

City of Vancouver, Washington Performance Measures

The City of Vancouver contains performance measures along with a concurrency requirement, similar to the City of Medford. The intersection performance measures are separated by intersection control type, distinguish between fully built-out areas (with an adopted corridor management plan), and provide exceptions to the adopted standards when significant safety hazards would be created or worsened with a proposed development.

The City performance standards, as identified in Vancouver Municipal Code Section 11.90.020(e)(2) are as follows:

- Signalized intersections must operate better than LOS "F"
- Signalized intersections at LOS "E" must have a v/c ratio less than 0.95.
- Unsignalized intersections must operate with a v/c ratio of less than 0.95 on any lane/approach.

Concurrency, defined as provision of adequate transportation facilities to serve demand, is measured by the City in terms of corridor travel speeds along the City's defined concurrency corridors. These corridors are comprised of City-managed arterials, which are further divided into smaller segments. Concurrency modeling is completed periodically by the City, and is based on traffic counts, expected regional growth, and trip information submitted by development projects. Corridor operating speeds are calculated using posted operating speeds, with travel times supplemented with signalized intersection delays. Corridor targets in the City range between 10 and 15 miles per hour, varying by roadway and by the individual segments.

When corridor service level deficiencies occur, pro-rata fees, minor intersection improvements, or capital improvement projects are identified for mitigation. These improvements supplement Transportation System Development Charges (Traffic Impact Fees in Vancouver) and other mitigation that may be needed.

Relevance to the City of Medford

The City of Vancouver distinguishes between intersection control types and generally accepts operations short of intersection failure. The City's concurrency process, while adding a degree of

difficulty to manage and assess, also includes a review of corridor travel speeds. The use of pro-rata fees to fund major infrastructure needs that are beyond the scope of a single developer helps the City maintain its concurrency policies while avoiding development moratoriums.

Downtown Vancouver Trip Reduction

The City of Vancouver downtown trip reduction methodology was an effort to refine the City's concurrency policies within their downtown. Growth within the area, and application of suburban trip generation rates was conflicting with the City's urbanization and density goals, while over-projecting traffic impacts. This analysis considered area-wide factors, mixed-use factors, and transportation demand management programs.

Area Factors

To calibrate the standard trip generation rates, which are based on drive-alone trends, information was obtained from census data within the affected downtown block groups, and compared to citywide census data to provide a relative comparison. This showed those living within the downtown made 10.7 percent fewer drive-alone commute trips, 68 percent more transit commute trips, and 3.8 times as many walking or bicycling commute trips. Overall, this showed approximately 20 percent fewer driving trips to the downtown than would be estimated using standard trip generation rates.

Mixed-Use Development

The location of various uses within close proximity results in interaction between uses, and within a downtown environment these trips are increasingly by walking or bicycling. The Vancouver methodology recommended internal reductions within the downtown area based on the methodologies and information compiled through National Cooperative Highway Research Program (NCHRP) 8-51. The project methodology avoids duplication of the area-wide adjustments in this process.

Transportation Demand Management

Florida Department of Transportation (FDOT) and the Environmental Protection Agency (EPA) have developed models to predict the level of automobile trip reductions through various combinations of Transportation Demand Management (TDM) strategies. These agencies created spreadsheet models to simplify this process. Through testing the EPA model (COMMUTER) was found most responsive to a wide range of program measures, and allowed testing of a range of typical to exemplary measures.

Taken as a whole, these three elements would allow development or the downtown to more realistically assess its impacts within the surrounding context, and would provide options for development to invest in TDM program elements in lieu of infrastructure improvements.

Relevance to the City of Medford

The outcome of this project resulted in a white paper and a spreadsheet calculator for City demonstration purposes and has not been adopted. However, the idea of calibrating travel patterns (particularly in Transit Oriented Development or within the downtown area) can be used to encourage density, more realistically reflect impacts (which can further reduce conflicts with the City's performance/concurrency requirements), or allow investment in demand management programs, infrastructure, or strategies.

CITY OF MEDFORD PERFORMANCE MEASURE RECOMMENDATIONS

Based on review of performance standards in other urban communities it is recommended that the City of Medford performance standards be revised to incorporate the following:

- Distinguish between intersection control types to reflect the changes in how level of service is defined for these different intersection types. Consider a system such as that within the City of Bend where low-volume unsignalized intersections may not have a specific standard (or include a standard that ensures secondary/parallel access routes and safety review).

- Distinguish between built-out and developing areas. Require higher reserve capacity in new areas, or areas built below the ultimate facility plans, and increased emphasis on parallel routes or multi-modal improvements in built environments.

- Implement a specific safety review/mitigation requirement. This will ensure that additional congestion is not creating an unsafe environment.

- Consider an hourly analysis versus a fifteen-minute peak. This will avoid infrastructure investments for temporary conditions that can be more readily planned around.

- Incorporate intersection capacity within the City performance measures. Capacity refers to the physical ability of an intersection to process travelers, whereas level of service refers to the delays that are experienced. Both measures are readily available from the same analysis software without additional effort.

In addition to the measures above that describe the framework of how the City assesses adequacy, further testing will be needed to assess whether Level of Service "D" is an appropriate standard. Acceptance of Level of Service "E" is likely needed in more developed urban areas, whereas Level of Service "D" can remain for construction projects or within developing areas.

Following review and discussion with City of Medford and ODOT staff, this memorandum will be incorporated into Technical Memorandum #4, with additional testing of the recommended performance measures. Please let us know if you have any questions or comments regarding this qualitative comparison of UGB scenarios.

Chapter 4.7
TRANSPORTATION ANALYSIS Revised 6/16 Revised 12/16 Revised 5/17

Sections:

Prior legislation: Ord. NS-2016.

4.7.100 Purpose. Revised 6/16 Revised 12/16

The City will review new development to ensure the transportation system provides for:

- Consistency with the Bend Comprehensive Plan.
- Orderly construction of the Bend Urban Area Transportation System Plan network of streets and walking, biking and transit facilities.
- Safety and operations.

Therefore, the City requires applicants to complete an assessment of the transportation system within the study area of the development for adequacy to serve the new development and to assess the impacts of the development on the nearby transportation system. The City will use these assessments to ensure safety and operations of the transportation system are met for vehicle, biking, walking and transit and may impose reasonable conditions and mitigation requirements on development in proportion to its impacts. [Ord. NS-2271, 2016; Ord. NS-2263, 2016]

4.7.200 Authority. Revised 6/16

The City Engineer may modify or waive the required information upon written request by the applicant if, in the City Engineer's determination, the requested modification(s) or waiver(s) are consistent with the purpose and intent of this chapter. The written request must identify the special circumstances that apply to the particular situation and explain how this chapter's purpose and intent are still fulfilled without the required information.

The City Engineer may expand the transportation study requirements and/or study area to address existing operational issues and/or any issue identified after the initial approval of a scope of work. [Ord. NS-2263, 2016]

4.7.300 Process. Revised 6/16 Revised 5/17

A. The following steps describe the process for assessing the transportation system:

Step 1. The applicant must prepare and submit a Transportation Facilities Report in accordance to BDC 4.7.400 containing the following information organized as follows:

a. Description of the development;

b. Trip generation;

c. Transportation and parking demand management (TPDM) plan;

d. Major intersections;

e. Trip distribution;

f. Transportation facilities evaluation.

Step 2. The City Engineer will review and evaluate the Transportation Facilities Report in accordance to BDC 4.7.400(D) to determine if a Transportation Impact Analysis is required. If a Transportation Impact Analysis is not required, the applicant may submit a development application including the Transportation Facilities Report. If a Transportation Impact Analysis is required, see Step 3. Step 1 and Step 3 may be combined.

Step 3. If required after Step 2 or if the applicant chooses do so concurrently with Step 1, the applicant must prepare and submit a Transportation Impact Analysis in accordance with BDC 4.7.500 containing the following information organized as follows:

a. Study area;

b. Study analysis years;

c. Study time periods;

d. Traffic counts;

e. Future traffic forecasts;

f. Operations analysis methodology;

g. Arterial and collector left turn, median refuge, and right turn lane assessment;

h. Safety review;

i. Walking, biking and transit friendly developments;

j. Proportionate share contribution.

Step 4. If no significant impacts are identified, the applicant may submit a development application including the Transportation Impact Analysis and may also have to pay a proportionate share contribution if required under BDC 4.7.700, Proportionate Share Contribution. Development with significant impacts will be required to propose mitigation in compliance with BDC 4.7.600, Significant Impacts and Mitigation Measures, as part of the development application and may also have to pay a proportionate share contribution if required under BDC 4.7.700, Proportionate Share Contribution. If mitigation measures have been determined for any significant impacts, then the applicant must include the Transportation Impact Analysis with the mitigation measures identified as part of a development application. [Ord. NS-2289, 2017; Ord. NS-2263, 2016]

4.7.400 Transportation Facilities Report. Revised 6/16 Revised 12/16 Revised 5/17

A. Applicability. A Transportation Facilities Report will be required when a development involves one or more of the following:

1. Land division application;

2. Site Plan Review application;

3. Master Plan;

4. Bend Comprehensive Plan map amendment;

5. Other development proposals as determined by the City Engineer.

B. Preparation. The Transportation Facilities Report must be prepared by a licensed Professional Engineer especially qualified in civil or traffic engineering by the State of Oregon. It is the responsibility of the Engineer to provide enough detailed information for the City Engineer to determine if a Transportation Impact Analysis is required.

C. Contents of the Transportation Facilities Report.

1. Description of the Development. Provide a description of the development sufficient to understand the proposed development's size, uses, operations, and interaction with the transportation system. At a minimum, the description must include both qualitative and quantitative descriptions, such as scale of development, day-to-day operations, deliveries, staffing, customer base (visitors, patients, employees, students, etc.), peak hours of operation, and identification of site access and on-site circulation needs.

2. Trip Generation. Provide a trip generation description for the proposal with the following applicable information:

a. Trip Credits and Vested Trips. If trip credits are being utilized from the existing on-site development or from a separate development approval, the trip generation description shall provide supporting documentation of those trip credits, and documentation of the authority to use those trip credits for the development proposal.

b. Base Trip Generation Rates. The City Engineer will determine which of the following to use for the base trip generation rates:

i. Local data;

ii. Average trip generation rates from the latest edition of the publication Trip Generation by the Institute of Transportation Engineers (ITE); or

iii. Other method approved by the City.

The procedure for identifying local trip generation rates shall comply with the guidelines for "Conducting a Trip Generation Study" in the ITE Trip Generation document.

c. Bend Comprehensive Plan Amendments. For Bend Comprehensive Plan amendment applications, the trip generation shall represent a reasonable build-out scenario supported through citation of nearby existing site trip generation rates and densities in order to ensure reasonable trip generation comparisons. If the Bend Comprehensive Plan amendment is accompanied by a concurrent Site Plan Review application, the trip generation for the site plan review application may be utilized instead. The amendment must comply with the Transportation Planning Rule, OAR 660-012-0060.

d. Pass-by Trips. Adjustments for pass-by trips may be applied depending on the adjacent transportation facility and City Engineer approval. The published average pass-by rate will typically be allowed for those land use categories that are provided in the ITE Trip Generation publication. Pass-by trips must always be accounted for in the site access analyses and sufficiently documented. Pass-by trip maps must be created for each pass-by route separately rather than a single combined map.

e. Site Internalization/Trip Sharing. Demonstrate how the site reduces vehicle trips through site design, including parking supply, land use mixes, and densities that promote reduced rates based upon those elements. City review of the proposal based on guidance from the state's Transportation Planning Rule may result in trip generation reductions.

3. Transportation and Parking Demand Management (TPDM) Plan. In compliance with BDC Chapter 4.5, Master Planning and Development Alternatives, institutional and employment master plans must develop a TPDM plan. All other development applications may choose to develop a TPDM plan. The proposed measures of the TPDM plan will be evaluated to determine trip generation reduction rates. See BDC Chapter 4.8, Transportation and Parking Demand Management (TPDM) Plan.

4. Major Intersections. From each access point (driveway or street) of the development onto and along the transportation system for a distance of one mile, identify the major (collector and arterial) intersections on a map.

5. Trip Distribution. Provide a trip distribution description and map that contains the following information:

a. Trip distribution assignments that replicate overall origin/destination patterns, including the major intersections identified in subsection (C)(4) of this section. Existing field count turning movement patterns are to be used as a guide for trip assignments as appropriate. The assignment should be adjusted to reflect future funded transportation facilities, improvements or services that are authorized in the Transportation System Plan and for which funding is in the City's approved Capital Improvements Program (CIP), the Statewide Transportation Improvement Program (STIP) or other approved funding plan.

b. Description of truck delivery routes, including over-dimensional loads if applicable, of travel to and from the site for a distance of one mile. The distance may be extended to identify freight routes for freight-intensive sites or those that generate over-dimensional loads.

6. Transportation Facilities Evaluation. The report must evaluate and document the following for compliance with this code, the Transportation System Plan and the City of Bend Standards and Specifications:

a. The existing transportation system infrastructure serving the site within the study area. The evaluation must include any future funded transportation system elements included in the City's approved five-year Capital Improvement Program, Statewide Transportation Improvement Program or other approved funding plan.

b. The following right-of-way information along the frontage of the proposed development:

i. Compliance with the required right-of-way width for the roadway classification.

ii. Compliance with the required street widths.

iii. Compliance with the required right-of-way or easement width for all trail and access corridors.

iv. Compliance with the required street frontage elements including curbs, bike facilities, park strips, sidewalks, driveways and driveway aprons, as well as curb ramps. All applicable elements shall be accessible per the City of Bend Standards and Specifications.

c. The following access information:

i. Legal access and recorded easements for all driveway and access systems serving the site. For all driveways and new intersections created by the development, intersection sight distance measurements must be provided for all movements into and out of the proposed accesses. Field measurements should be used wherever possible, although plan measurements from civil drawings may be utilized, particularly for planned intersections or driveways. Measurements need to account for vertical and horizontal curvature, grades, landscaping, and right-of-way limitations. Sight

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distance measurements shall comply with City of Bend Standards and Specifications for the posted speed of the road or as approved by the City Engineer.

ii. For arterial and collector street accesses and new street connections document the location of all existing driveways and street connecting points within 300 feet of the frontage of the property. Provide a driveway conflicting movement diagram and assessment showing overlapping conflicts with nearby existing driveways and street intersections.

d. The following on-site circulation and/or street plan access information:

i. The proposed street layout and determine if it matches the Transportation System Plan and if it matches into abutting and nearby approved development street layouts, abutting and nearby master plans or special planned areas and requirements of this code and provides for logical orderly development of adjoining properties.

ii. Truck circulation and entry/egress assessment including routing, turning movement, and delivery needs for all truck and emergency service vehicles. Identify any proposed special truck accommodations for freight service.

iii. Necessary public access, shared access, and shared parking easements are in place or will be required to be in place.

e. The following existing and planned walking, biking and transit facilities and infrastructure serving the site from each access point (driveway or street) of the proposed development onto and along the transportation system for a distance of one-quarter mile:

i. Location of all sidewalks, curb ramps, bike lanes, paths, crosswalks, pedestrian signal heads, push buttons, related signage, striping, and transit facilities along with pedestrian paths of travel between the transit facility and the site and to the buildings on the site.

ii. Barriers, deficiencies and high-pedestrian demand land uses including schools, parks, parking, senior housing facilities, and transit facilities.

f. Truck circulation and entry/egress including routing, turning movement, and delivery needs for all truck and emergency service vehicles. Identify any proposed special truck accommodations for freight service.

D. City Review and Evaluation.

1. If it is determined that any of the infrastructure or facilities are missing or substandard as identified in the Transportation Facilities Report, then the applicant will be required to comply with BDC Title 3, Design Standards, and with the City of Bend Standards and Specifications.

2. Based on information provided in the Transportation Facilities Report, the City Engineer will notify the applicant in writing if the Report is complete, and if not, what additional evaluation information is required. If no additional information is needed, the City Engineer will notify the applicant whether a Transportation Impact Analysis is required. The City Engineer will determine if a Transportation Impact Analysis is required by considering the following criteria:

a. Operations.

i. Poor roadway configuration and/or alignment, or capacity deficiencies that are likely to be compounded as a result of the proposed development;

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ii. Proposed street design creates inadequate circulation and does not minimize cut-through traffic or accommodate orderly development of adjacent properties;

iii. It is anticipated that the current or projected increase in trip generation of the roadway system in the vicinity of the proposed development will exceed the minimum operational criteria in BDC 4.7.500(B)(6); and

iv. Potential improvements to accommodate freight.

b. Safety.

i. Existing safety issues;

ii. Projected increase in trip generation that may have the potential to impact the safety of the existing transportation system; and

iii. A traffic safety hazard is created or exacerbated on any street, roadway segment, or intersection within the study area as a direct result of the proposed development.

c. Walking, Biking and Transit Facilities.

i. Potential impacts to priority walking and biking routes, school routes, transit connectivity and multimodal street improvements identified in the Transportation System Plan;

ii. Bike access to site has gaps and/or the bike lane is dropped, missing, or otherwise unusable; and

iii. Identified transit facilities and/or their pedestrian paths of travel between the transit facility and the site and to the buildings on site are not complete and additional analysis may be required.

3. In all instances, a Transportation Impact Analysis must be submitted for any proposed development that:

a. Considers modification, installation, or removal of any traffic control device; or

b. Forecasts net increase in site traffic volumes greater than 100 average daily vehicle trips or off-site major intersections are impacted by 15 or more peak-hour vehicle trips per lane group within one mile. [Ord. NS-2289, 2017; Ord. NS-2271, 2016; Ord. NS-2263, 2016]

4.7.500 Transportation Impact Analysis. Revised 6/16 Revised 12/16

A. Preparation. If the City Engineer determines that a Transportation Impact Analysis is required, it must be prepared by a licensed professional engineer especially qualified in traffic engineering by the state of Oregon. The applicant's engineer shall consult with the City Engineer prior to preparing the Transportation Impact Analysis to determine the level of details to be included in the analysis.

B. Contents of the Transportation Impact Analysis Report.

1. Study Area. The study area must include all site access and adjacent roadways and intersections. The study area must also include all off-site major intersections impacted by 15 or more peak-hour vehicle trips per lane group within one mile of the site. The City Engineer must approve the defined study area prior to commencement of the Transportation Impact Analysis. The City Engineer may choose to waive the study of certain intersections if deemed unnecessary.

2. Study Analysis Years. The analysis shall be performed for all study roadways and intersections for the following years with and without the proposed development:

a. Existing conditions (current year);

b. Year of completion of the final phase (for phased projects, intermediate phases may be required to be analyzed); and

c. For an amendment to a functional plan, the Bend Comprehensive Plan, or a land use regulation the analysis year shall reflect the Transportation Planning Rule OAR 660-012-0060 requirements but in no case shall the analysis year be less than 10 years from the date of the preparation of the Transportation Impact Analysis. An analysis for an amendment to a functional plan, the Bend Comprehensive Plan or land use regulation must use the City of Bend's model as determined by the City Engineer.

3. Study Time Periods. Within each study year, an analysis must be performed for the following time periods:

a. Weekday p.m. peak hour (i.e., one hour between 4:00 p.m. and 6:00 p.m.); and

b. Additional time periods may be required based on City Engineer direction for the following:

i. Peak hour of the generator (i.e., peak hour for the proposed development);

ii. Peak hour of nearby generator sites (e.g., a non-school site may study a nearby school's peak hour); and

iii. Peak hour of cumulative nearby generators.

4. Traffic Counts. Once the study periods have been determined traffic counts must be done as follows:

a. Counts must be taken Tuesday through Thursday;

b. Counts may need to be adjusted as required by the City Engineer to reflect seasonal, schools, or other variations in traffic;

c. Unless approved by the City Engineer, counts must be no more than 12 months old from the date of development application submittal;

d. Additional hours of classified turning movement counts may be required based on City Engineer direction for the following:

i. To determine compliance with traffic signal or all-way stop warrants; or

ii. To determine the extent of over-capacity conditions.

e. Counts must include passenger cars, trucks, bikes and pedestrians. If high pedestrian and/or bike traffic is expected to be generated by the proposed development, as determined by the City Engineer, the Transportation Impact Analysis must consider improvements and connectivity to existing and proposed facilities.

5. Future Traffic Forecasts.

a. Traffic Forecast for Projects and Project Phasing.

i. Traffic forecast shall include all projects within the study area that have received approvals for development (master plans, land divisions, site plans, conditional use permits, and similar

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approvals). They shall be identified, and their traffic generation included as cumulative traffic in the study. Proposed projects in the study area that have been submitted to the City for processing, but not yet approved, may also be included at the discretion of the City Engineer. The City Engineer will also specify an annual growth rate to be applied to existing volumes to account for other general traffic growth in and around the study area.

ii. For phased developments, the traffic forecasts for the year of completion of each phase shall be calculated to be field counts plus traffic from projects within the study area that have received approvals for development (approved master plans, land divisions, site plans, conditional use permits, and similar approvals), plus an annual growth factor which would factor the existing counts up to the analysis year.

b. Build-Out Studies for Bend Comprehensive Plan Amendments and Zone Changes.

i. Traffic projections for build-out scenarios must utilize the current transportation model used by the City or other approved model as approved by the City Engineer. The applicant's Engineer shall use the model projections post processed using NCHRP 255 as the basis for determining turning-movement volumes for the required intersection analysis. A manual assignment of the project traffic added to the build-out traffic may typically be used to determine total future traffic, as approved by the City Engineer.

6. Operations Analysis Methodology.

a. The operations analysis must include the following:

i. Software inputs must utilize field conditions (e.g., measured field peak hour factor, saturation flow rates, lane utilization percentages, lane configurations, actual signal phasing and timing, and truck percentages). Other references and the City of Bend Standards and Specifications may be required to be utilized as approved by the City Engineer;

ii. An operations analysis for roundabouts performed in conformance with the City's Roundabout Operational Analysis Guidelines;

iii. An operations analysis for traffic signal and stop controlled intersections performed in conformance with the most recent version of the Highway Capacity Manual (HCM), the City of Bend Standards and Specifications or other reference approved by the City Engineer;

iv. Identify intersection operations in a table including volume to capacity ratios, delay, and queuing for critical movements as well as for the intersection as a whole including the following:

(A) Delays for two-way and four-way stop controlled study intersections including delays for lane groups, approaches, and intersections as a whole;

(B) Ninety-fifth percentile queue projected to block nearby critical system elements such as adjacent traffic signals, roundabouts, or at-grade rail crossings, or such that line of sight safety issues are identifiable; and

(C) Volume to capacity ratio for any approach or for the intersection as a whole for signalized and roundabout controlled study intersections.

v. Microsimulation modeling and analysis using a calibrated model for the transportation corridor as defined must be performed for interconnected traffic signals. Calibration must include field

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measured saturation flow rates, existing timing and phasing rotations, peak hour factors, available queue storage and queuing; and

b. The operations analysis must use existing transportation system conditions (intersection control type and street roadway geometry). Committed funded transportation facilities may also be considered in the analyses. Committed funded transportation facilities means future funded transportation facilities, improvements or services that are authorized in a local transportation system plan and for which funding is in the approved Capital Improvements Program (CIP), the Statewide Transportation Improvement Program (STIP) or other approved funding plan.

c. Operations Standards. The intersection analyses provided in the Transportation Impact Analysis will be evaluated for safety deficiencies and queuing deficiencies and compliance with this code, the Transportation Planning Rule, the Bend Urban Area Transportation System Plan, any applicable development agreements, and regional transportation system plans. Intersections under the jurisdiction of the Oregon Department of Transportation shall also be evaluated using the ODOT Analysis Procedures Manual for compliance with the Oregon Highway Plan. Intersections under the jurisdiction of Deschutes County that are outside the Urban Growth Boundary shall also be evaluated for compliance with Deschutes County Code. Intersections that do not comply with the criteria listed in those documents will be considered to have significant impacts for purposes of BDC 4.7.600.

d. Projects are considered to have significant impacts on the arterial-collector system for purposes of BDC 4.7.600 as identified below:

i. Two-Way Stop Control. Average delay for the critical lane group for approaches of an arterial or collector to another arterial or collector with greater than 100 peak hour trips is greater than or equal to 50 seconds during the peak hour;

ii. All-Way Stop Control. Average delay for the collector to collector and higher order intersection as a whole is greater than or equal to 80 seconds during the peak hour;

iii. If the ninety-fifth percentile queue exceeds the existing available storage or is projected to block nearby critical system elements such as adjacent traffic signals, roundabouts, or at-grade rail crossings, or such that line of sight safety issues are identifiable; or

iv. For signalized and roundabout collector to collector and higher order intersections under the jurisdiction of the City, the volume-to-capacity ratio for the intersection as a whole is greater than or equal to 1.0 during the peak hour.

e. Intersections under ODOT Jurisdiction.

i. In addition to the City operations standards, intersections on ODOT facilities will also be required to comply with ODOT mobility targets. Coordination with ODOT is required in the study process.

7. Arterial and Collector Left Turn, Median Refuge, and Right Turn Lane Assessment. Meeting the following criteria does not automatically require a pedestrian refuge or a turn lane to be installed. The City Engineer has the final determination during the review of proposed mitigation on the installation of a pedestrian refuge or a turn lane based on safety and operations of the system.

a. A median refuge assessment and a left and right turn lane assessment on arterial and collector streets must include the following information:

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i. An assessment using Table 11 of the Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Final Report and Recommended Guidelines (FHWA Publication Number HRT-04-100, September, 2005);

ii. An assessment using the Left and Right Turn Lane Criteria in the ODOT Analysis Procedures Manual (APM); and

iii. Provide the ninety-fifth percentile queue length for left, right and through turning vehicles.

b. Projects are considered to have significant impacts for purposes of BDC 4.7.600 if Table 11 of the Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Final Report and Recommended Guidelines identifies a candidate site(s) for the installation of a marked crosswalk or other needed pedestrian improvements at uncontrolled locations.

c. If the proposed development meets the criteria in the APM or exceeds the ninety-fifth percentile queue length for left or right turning vehicles, then the City Engineer has the final determination whether it is a significant impact for purposes of BDC 4.7.600.

8. Safety Review.

a. For the study area or those locations required by the City Engineer, document and review crash data from the ODOT Crash Analysis and Reporting Section (ODOT-CARS). Crash data can be requested directly from ODOT or the Bend Urban Area Metropolitan Planning Organization. Crash data must provide a five-year history of ODOT reported crashes and must be presented in tabular and crash diagram form. Crash data must include the following information:

i. Crash histories and a calculated crash rate;

ii. Crash patterns (was there an identifiable pattern to the crashes), crash types, and crash patterns affecting proposed development trips; and

iii. Whether any location within the study area is included within published safety studies, such as the Oregon Department of Transportation Safety Priority Index System lists, ODOT Safety Action Plan, or the City's Arterial and Collector Multimodal Safety Study.

b. Projects are considered to have significant impacts for purposes of BDC 4.7.600 if there is a crash pattern, one or more fatalities or severe injury crashes, one or more reported crashes per 1,000,000 entering vehicles, or if it is included within a published safety study.

9. Walking, Biking and Transit Friendly Developments.

a. Public and Private Schools (K-12), Colleges and Universities. Provide an analysis of walking, biking and transit facilities along and across arterial and collector roadways which accommodate safe, accessible and convenient access to and from the school. Elementary schools shall analyze the facilities within one mile of the school. All other schools, colleges and universities shall analyze the facilities within 1.5 miles of the school.

b. All Other Uses. Provide an analysis of walking, biking and transit facilities, including street crossings and access ways, which accommodate safe, accessible and convenient access from within new residential areas, planned developments, shopping centers, and commercial districts and residential areas, parks, shopping centers and transit facilities within one-quarter of a mile of the development. Residential developments must also provide the analysis to elementary schools within one mile and all other schools, colleges and universities within 1.5 miles of the development.

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c. Projects are considered to have significant impacts for purposes of BDC 4.7.600 if:

i. A project fails to provide accessible and safe pedestrian and bike connections (i.e., curb extensions, pedestrian refuges, striping and/or signage) to schools, residential areas, parks, shopping areas, transit facilities and adjacent streets; or

ii. The project disrupts existing or planned biking or walking facilities or conflicts with the adopted Bend Urban Area Bicycle and Pedestrian System Plan.

10. Proportionate Share Contribution. Provided proportionate share calculations in compliance with BDC 4.7.700, Proportionate Share Contribution. [Ord. NS-2271, 2016; Ord. NS-2263, 2016]

4.7.600 Significant Impacts and Mitigation Measures. Revised 6/16 Revised 5/17

A. Applicability. When significant impacts are identified as part of the Transportation Impact Analysis, mitigation measures must be included to address those impacts.

B. Preparation. Prior to proposing mitigation, the applicant's engineer shall consult with the City Engineer regarding potential mitigation options. The proposed mitigation and a concept-level drawing of the final intersection form must be prepared and submitted prior to a development application being deemed complete, unless approved otherwise by the City Engineer. Mitigation measures may be proposed by the applicant or recommended by ODOT or Deschutes County in circumstances where a state or county facility will be impacted by a proposed development. Deschutes County and/or ODOT must be consulted to determine if improvements proposed for their facilities comply with their standards and are supported by the respective agencies.

C. Intersection Operation Standards. If the Transportation Impact Analysis shows that the operation standards at the intersection will be exceeded or if the intersection already exceeds the standards, the applicant will be required to provide mitigation measures in compliance with subsection (F) of this section impacts.

D. Unique Situations.

1. Development proposals within Master Planned Developments or Special Planned Areas, as described in BDC Chapter 4.5, Master Planning and Development Alternatives, where a Transportation Mitigation Plan has been approved, may exceed the operation standards at affected intersections as long as the proposed development is consistent with the approved Transportation Mitigation Plan.

2. Widening to accommodate additional travel lanes will not be permitted in the following situations:

a. Intersections and streets that are already constructed consistent with the Bend Urban Area Transportation System Plan (TSP) including streets identified by the TSP as "not being authorized for lane expansion";

b. Intersections and streets located within or directly adjoining the City's Central Business District or historic district;

c. Where no physical mitigation is available to improve intersection operations to the performance standard; or

d. Where improvements may result in unacceptable tradeoffs to other modes of travel.

E. Timing of Improvements.

1. Unless a unique situation is identified in subsection (D) of this section, Unique Situations, mitigation shall be in place at the time of final platting of a land division, or at the time of final occupancy for

Exhibit C

commercial, industrial, institutional, mixed use, multi-family housing, triplex buildings and all other development. Mitigation for phased developments must be in place at the time specified in the approved decision.

Exception: Construction of emergency services access requirements may be needed earlier.

2. Development proposals within Master Planned Developments or Special Planned Areas, as described in BDC Chapter 4.5, Master Planning and Development Alternatives, where a Transportation Mitigation Plan has been approved, shall refer to the Plan for the extent and timing of improvements.

F. Mitigation Measures. Mitigation measures must consider all users and include all or a combination of the following mitigation measures as approved at the discretion of the City Engineer, to mitigate the impacts of the proposed development:

1. Construct Transportation Mitigation.

a. The intersection form will be determined through the City's Intersection Form Evaluation Framework located in the City's Roundabout Evaluation and Design Guidelines document.

b. Mitigation must include the construction of the full intersection infrastructure and control required to bring the intersection into compliance with this code, the Bend Urban Area Transportation System Plan, and the City of Bend Standards and Specifications. Final intersection improvements, including type and geometry, will be determined by the City Engineer.

c. Intersection improvements must improve corridor operations in terms of progression and reduced corridor delay, and must be shown to cause no significant adverse impact to the corridor during integrated corridor operations.

d. Mitigation in the form of street widening must be constructed in conformance with the street classification of the Bend Urban Area Transportation System Plan and the cross-sections contained in this code or the City of Bend Standards and Specifications. As part of the development review process, the City Engineer may approve an alternate cross section if it meets operations standards.

e. Intersection and street improvements must balance operations and safety for all modes of travel. Walking and biking accommodations must be considered as part of any improvement.

2. Construct Interim Transportation Mitigation.

a. Construct Interim Mitigations. Interim mitigation measures may include but are not limited to upgraded operations controls, interconnected signals, signage, striping, pedestrian refuge, etc.

b. Improved signal timing and phasing may be achieved by installing the necessary communications and field equipment that would provide the increased capacity necessary to achieve the operation standards. For this to be acceptable as an interim measure, the applicant shall demonstrate through a field calibrated corridor operations model approved by the City Engineer that the proposed signal timing and phasing will provide the additional capacity necessary to meet the concurrency standards. Timing and phasing communications and field equipment are subject to approval of the City Engineer and/or ODOT.

3. Transportation and Parking Demand Management (TPDM) Plan. Implement an approved TPDM plan in compliance with BDC 4.7.400(C)(3), Transportation and Parking Demand Management (TPDM) Plan, and BDC Chapter 4.8, Transportation and Parking Demand Management (TPDM) Plan.

Exhibit C

4. Walking, Biking and Transit. In addition to accommodating walking and biking as part of the intersection and street improvement mitigation, walking, biking and transit improvements may be considered as potential mitigation measures, particularly when they reduce the number of study area generated vehicle trips. Mitigation improvements may include accessible sidewalks, pedestrian refuges, bike lanes, curb extensions, traffic control devices, curb ramps, striping, signage and other elements. Negative impacts of intersection and street mitigation measures on walking and biking infrastructure, such as on crosswalks and roadway shoulders, must be avoided, minimized, and/or mitigated themselves. The City may require accessibility improvements, including compliant curb ramps along the proposed development and including safe and accessible paths of travel to and from the development, depending on the type and impacts of the development.

5. Payment in Lieu of Construction. If infrastructure construction is required above, the City may elect to accept a payment in an amount equal to the cost estimated by the City for the design, right-of-way acquisition, utility relocation and construction cost of the improvements in lieu of actual construction. The City will use these funds on the impacted corridor to improve multi-modal safety, operations and to relieve congestion. Once the City accepts a payment in lieu of construction, the proposed development may proceed even if the impact of the proposed development causes the operation standards to be exceeded.

6. Alternate Location Mitigation. Mitigation strategies at alternative locations or affecting alternative modes of travel may be proposed by the applicant and may be accepted by the City Engineer. At a minimum, the proposed improvements should meet the following criteria:

a. The overall improvements proposed should be proportional to the impacts created by the application;

b. The proposed improvement strategies must address a critical need or issue within the study area such as safety, connectivity, system capacity, and parallel routes;

c. The locations proposed for improvement must be within the study area;

d. The proposed improvements must not already be, or be in the process of being, a condition of approval of another development; and

e. All applicable analysis requirements for the primary locations(s) shall apply to the analysis of the alternative location(s).

7. Suspend the Mobility Standard. The City Manager may suspend the mobility standard for a particular intersection or series of intersections under the City's jurisdiction when the intersection(s) may be in a condition that interim mitigation is not practical due to the large scale of the improvements or the City desires to maintain the current intersection's form. In such cases, developments impacting the intersection(s) do not have to analyze or mitigate impacts on the intersection(s). The City Manager will issue a written statement providing the duration and reason for the suspension of the mobility standard, and will maintain a list of all intersections where the mobility standard has been suspended. Suspending the mobility standard is not a limited land use decision or a land use decision. [Ord. NS-2289, 2017; Ord. NS-2263, 2016]

4.7.700 Proportionate Share Contribution. Revised 6/16

Each proposed development that submits a Transportation Impact Analysis will be required to contribute a proportionate share of the costs of the final improvements to the transportation system that will be required as a result of the cumulative impact that various developments combined will have on the intersections.

Developments must contribute their proportionate share or contribution for all intersections within the analysis area.

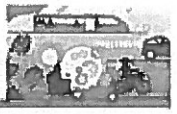
The City may use the proportionate share contributions for multi-modal improvements on the transportation corridor and surrounding system if the improvement project benefits safety and operations and helps to reduce congestion.

Proportionate share calculations must be submitted with the Transportation Impact Analysis. Proportionate share calculations are calculated based on the ratio of development trips to growth trips for the anticipated cost of the full Bend Urban Area Transportation System Plan intersection infrastructure. The formula is provided below:

Proportionate Share Contribution = [Net New Trips/(Planning Period Trips–Existing Trips)] x Estimated Construction Cost

Net new trips are the total entering trips that are proposed to be added to the analysis area intersection by the development.

Exception: Intersections within the analysis area that are included in the City's Capital Improvement Plan or that are on the most current System Development Charge (SDC) fiscally constrained project list are exempt from proportionate share contribution. [Ord. NS-2263, 2016]



Protected Bike Lane	
	A protected bike lane, sometimes called a "cycle track", is an exclusive bicycle facility adjacent to, but separated from, the roadway. Separation is generally achieved using planters, parked cars, curbs, or posts to separate people biking from people driving. They are best on roads with few cross streets and driveways, particularly on roadways with high auto volumes and speeds. A protected bike lane provides a logical extension of a shared use path because it provides the sensation of riding on a path due to the separation from motorized traffic.
Grade Separated Crossings	
	A grade separated crossing occurs where an at-grade crossing is unsafe, such as crossing an interstate highway, or not practical. Grade separation in an urban context generally means that a facility for walking or bicycling is constructed below or above and existing roadway. Bridges across waterways are also considered grade separated crossings in Eugene.

Vehicular Performance Measurement

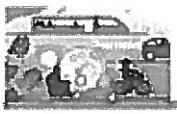
The City uses motor vehicle level of service (LOS) standards to evaluate acceptable vehicular performance on the City's local, collector and arterial streets. LOS standards are presented as grades A (free flow traffic conditions) to F (congested traffic conditions). ODOT uses mobility targets based on volume to capacity (V/C) ratios to evaluate acceptable vehicular performance on state facilities. As V/C ratios approach 1.0, traffic congestion increases.

These standards and targets are used to:

- Identify vehicular capacity deficiencies on the roadway system;
- Evaluate the effects of amendments to transportation plans, acknowledged comprehensive plans and land-use regulations pursuant to the Transportation Planning Rule (TPR; Oregon Administrative Rules [OAR] 660-12-0060) on the city and state roadways;
- Evaluate the traffic impacts of development applications for consistency with the land-use regulations.

In some cases, it may not be possible or desirable to meet the designated mobility target or LOS standard. In those cases, an alternative mix of strategies such as land use, transportation demand management, safety improvements or increased use of active modes may be applied.

Exhibit D



The use of mobility standards for roadways identifies the maximum amount of congestion that an agency has deemed to be acceptable. Such standards are commonly used to assess the impacts of proposed land use actions on vehicular operating conditions and are one measure staff uses to determine transportation improvement needs for project planning. Mobility standards are typically expressed as Volume-to-Capacity (V/C) Ratios and/or Level of Service (LOS), which are defined below.

- **V/C** represents a facility's level of saturation (i.e., what proportion of capacity is being used), with values ranging from 0.01 to 1.00. A lower ratio indicates smooth vehicular operations and minimal delays. As the ratio approaches 1.00, congestion and vehicular delays increase. At a ratio of 1.00, the intersection, travel lane, or automotive movement is saturated resulting in longer queues and delays.

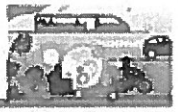
- **LOS** is a performance measure that is similar to a "report card" rating based on average vehicle delay. LOS A, B, and C indicate conditions where traffic moves without significant delays. LOS D and E indicate progressively worse operating conditions and more delay. LOS F represents conditions where average vehicle delay has become excessive and demand is near capacity. This condition is typically evident by long queues and delays, with intersection delays that may be difficult to measure because congestion may extend into and be affected by adjacent intersections. The table shows the average delay value (in seconds) corresponding to each LOS designation.

LOS	Signalized Intersections	Unsignalized Intersections
A	≤10 sec	≤10 sec
B	10–20 sec	10–15 sec
C	20–35 sec	15–25 sec
D	35–55 sec	25–35 sec
E	55–80 sec	35–50 sec
F	>80 sec	>50 sec

Table 4.1 presents mobility targets and LOS standards to be applied in the City of Eugene. Because mobility targets from the Oregon Highway Plan (OHP) are applied on state facilities, the City will seek ODOT amendment of the OHP to include alternative mobility on the identified ODOT facilities. ODOT performance standards are reflected in Table 4.1 for city streets near highway interchanges; this interchange influence area is generally defined as one-quarter mile from a ramp terminal or as the area between the ramp terminal and the first public street intersection.

Table 4.1: City of Eugene Vehicular Performance Measures

Jurisdiction	Roadway	Standard (peak hour, unless noted)
City	Citywide (unless otherwise specified)	LOS E
City	Eugene Downtown Traffic Impact Analysis Exempt Area	LOS F
ODOT	Randy Papé Beltline/Highway 99 ramp termini	1.0 V/C
ODOT	Randy Papé Beltline/Roosevelt Boulevard intersection	1.0 V/C
ODOT	Highway 99/Roosevelt Boulevard intersection	1.0 V/C
ODOT	Highway 99 from Roosevelt Boulevard to 5th Avenue; 6th and 7th Avenues to Garfield Street	1.0 V/C
ODOT	6th Avenue/Garfield Street intersection	1.0 V/C
ODOT	6th Avenue/Madison Street intersection	1.0 V/C



Jurisdiction	Roadway	Standard (peak hour, unless noted)
ODOT	6th Avenue/Chambers Street intersection	1.0 V/C (2 hour)
ODOT	7th Avenue/Chambers Street intersection	1.0 V/C
ODOT	6th and 7th Avenues from Madison Street to Lincoln Street	1.0 V/C
ODOT	Randy Papé Beltline/W 11th Avenue intersection	1.0 V/C (2 hour)
ODOT	River Road from Irving Road to River Avenue (Randy Papé Beltline Highway interchange influence area)	1.0 V/C
ODOT	Delta Highway from Green Acres Road to Goodpasture Island Road	1.0 V/C
ODOT	Coburg Road from Chad Drive to Elysium Avenue (Randy Papé Beltline Highway interchange influence area)	1.0 V/C
ODOT	Franklin Boulevard from Walnut Street to I-5	1.0 V/C

Some of the intersection and corridor locations listed in Table 4.1 are part of ODOT's Beltline Facility Plan and the related National Environmental Policy Act (NEPA) project. At the time the *2035 TSP* was drafted, the Facility Plan was complete but the NEPA project had not commenced. The recommended target threshold for the affected intersections/corridors will be refined to reflect NEPA findings. The *2035 TSP* recognizes the need to coordinate with these efforts and will be updated accordingly.

Truck Routes

Both the *2035 TSP* and the *Oregon Transportation Plan* (OTP, 2006) recognize the important role that an efficient and reliable transportation system plays in supporting the region's economy, growth, and quality of life. Within the Eugene-Springfield area, highways, city streets, airports, pipelines, and railways provide freight mobility. Trucks, rail, and air service must function together to ensure the efficient and timely movement of freight to, within, and through the community.

Discussions with the TCRG, TAC, Lane Area Commission on Transportation (Lane ACT), and other public stakeholders, identified a concern that freight movement would be hindered by delays in traffic congestion.

As part of the needs analysis, changes to the existing freight and truck routes were identified to ensure consistency with state and federal designations and guidance. One way in which this need is being address is an amendment to the Street Classification Map to change the classification of the Northwest Expressway (from the northern UGB to River Road) from a Minor Arterial to a Major Arterial. The *2035 TSP* policies support technological and information systems that will make freight delivery times more reliable.

A map of the state highway freight system from the 1999 Oregon Highway Plan is provided as Attachment E, Figure 1, State Highway Freight System.