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SUBJECT: **Technical Memo #3, Future Deficiencies**
Exit 27 IMSA, South Medford

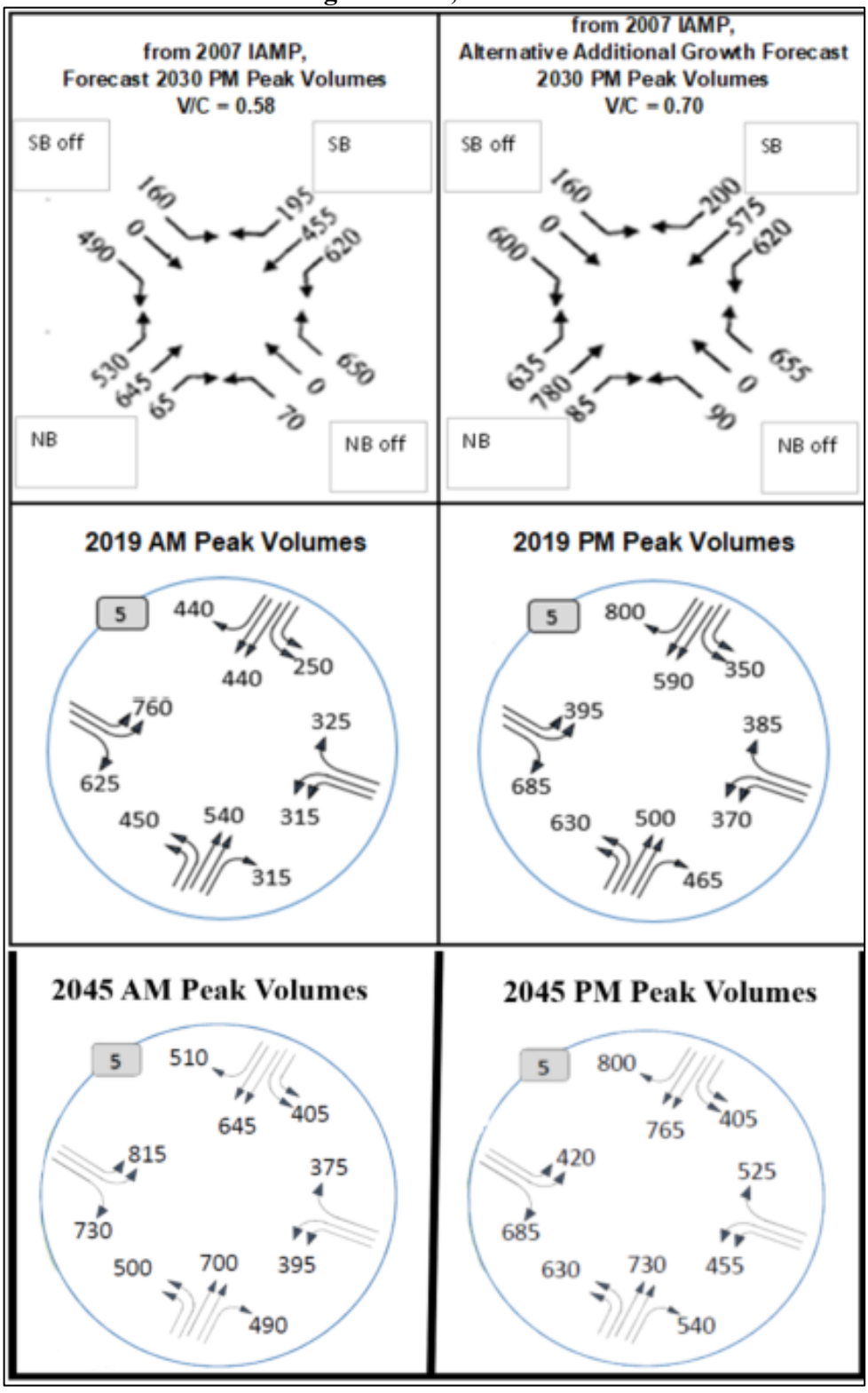
ODOT Region 3, in collaboration with the City of Medford, is analyzing traffic operations to identify Solutions within the Interstate 5 ("I-5") Exit 27 (South Medford) Interchange Management Study Area (IMSA) supported by Alternative Mobility Targets for the South Medford Interchange. This memorandum summarizes deficiencies gathered from the Future No Build Analysis which can be found in TM# 3 Appendix A, with supporting work in Appendices B (Select Link Analysis), C (MMLOS) and D (Operations Analysis).

Volume Growth

The Exit 27 Single Point Urban Interchange (SPUI) was built in 2009 with expected lifetime of more than 20 years. Exhibit 1 provides a comparison of the 2030 forecast volumes in the 2007 IAMP to the 2019 existing conditions volumes, and to the forecast 2045 volumes. Traffic volume in the study area, and in particular through the interchange, has increased more quickly than expected. The total entering 30 highest hour volume (TEV) for the SPUI in the IAMP 2030 forecast was 3880 vehicles; the IAMP 2030 additional growth alternative forecast TEV was 4400 vehicles. In 2019, the TEV already exceeded both IAMP 2030 forecasts at 4460 vehicles in the AM peak and at 5170 vehicles for the PM peak hour. The 2045 forecast AM peak TEV is 5565 vehicles, PM peak TEV is 5955 vehicles. Overall, TEV for the SPUI in 2019 already exceeded the forecast TEV at 118% of the IAMP 2030 additional growth forecast while the SPUI in 2045 exceeds the forecast TEV at 135% of the IAMP 2030 additional growth forecast.

Not only were the 2019 volumes higher than expected, they were distributed differently. The 2030 IAMP forecast expected more northbound through traffic on Garfield Street, but 2019 existing volumes and 2045 predicted volumes are much higher for turn movements onto the freeway. Whereas the 2030 IAMP forecast expected the northbound freeway off ramp to be mostly right turns, the 2019 and 2045 volumes are almost an even split between left and right turns. The 2019 southbound volume exiting the freeway at Exit 27 was more than double the IAMP 2030 forecast during the AM peak and during the PM peak it had twice the left turn volume compared to the IAMP 2030 forecast. Recognize that turn storage was sized based on the design volumes; the off-ramps in both directions are carrying heavier loads than they were designed for.

Exhibit 1: Comparison of IAMP 2030 Forecast Volumes, 2019 Existing Volumes, and 2045 Forecast Volumes



Deficiencies Summary

Operational Deficiencies

The following deficiencies will make traffic movement through the study area difficult during the AM peak hour:

- **Exit 27 Interchange, AM peak**
  The major problem in the AM peak is that the interchange will be failing, with V/C of 1.35, which is likely caused by the back-up from northbound right turn (NBR) at Highland Drive and Barnett Road backing all the way to the interchange.
  The southbound off-ramp eastbound left movement vehicles preferentially use the rightmost of the two left-turn lanes, to stage themselves to turn right at Barnett Road. The backup interferes with vehicles trying to make the northbound off-ramp getting adequate gap to make their turn safely. The resulting queues will cause upstream blockages onto the I-5 mainline from both the northbound and southbound off ramps.

- **Local traffic using I-5 rather than local network streets**
  During the AM peak about half of the Exit 27 off ramp traffic volume is forecast to come from short freeway trips of eight miles or less: ~40% of the southbound off- ramp volumes comes from the interchange to the north (Exit 30, three miles away) and another quarter from Exit 33; and northbound roughly half the off-ramp volume comes from the three interchanges to the south (Exit 24, Exit 21, and Exit 19). I-5 is being used for local traffic rather than local network streets due a lack of an efficient arterial system (which leads to longer travel times between points and to drivers utilizing I-5 in an attempt to minimize that travel time).

- **Garfield Street, AM peak**
  Center Drive at Garfield Street will have problems with V/C of 1.0. During the AM peak there will be upstream blockages in both north and southbound directions extending the entire length of Garfield Street from Barnett Road to OR 99.

- **Barnett Road at Highland Drive Intersection**
  This intersection will fail, with LOS F, in both AM and PM peak periods. During the AM Peak the northbound volume turning right to get to destinations to the east backs up into the interchange. This also contributes to the southbound and westbound approaches at Highland Drive and Barnett Road experiencing storage bay blockage and upstream queue spillback.

- **Barnett Road, Highland Drive and further east, AM peak**
  The intersection of Barnett Road and Highland Drive will fail with LOS F for the same reasons as stated above. Upstream blockage will be a problem in the entire northeast portion of the study area: Highland Drive headed south into the Barnett Road/ Garfield Street intersection backs up and spills into the intersection with Greenwood Street to the north; Barnett Road from Garfield Street backs up upstream past Ellendale Drive and beyond the study area extent impacting not only Ellendale but all traffic entering the study area.

- **OR 99, AM peak**
  On the western side of the study area, OR 99 southbound from Barnett Road down to Garfield Street is expected to have upstream blockage as well as OR 99 northbound at Garfield Street. Large volumes going north along OR 99 cause blockage to the south past Charlotte Ann Road. Nearly a third of the northbound volume turns right on Garfield Street and likely heads for the interchange; with the remaining two thirds continuing north to the intersection at Stewart Avenue.

In the PM peak, conditions in the study will on average perform better than during the AM peak, but showing some of the same problem areas:

- **Exit 27 Interchange, PM peak**
  The interchange southbound off ramp will be causing upstream blockage onto the I-5 mainline. The southbound off-ramp eastbound left movement vehicles preferentially use the rightmost of the two left-turn lanes, to stage themselves to turn right at Barnett Road. The backup interferes with vehicles trying to make the northbound off-ramp getting adequate gap to make their turn safely. The resulting queues will cause upstream blockages onto the I-5 mainline from both the northbound and southbound off ramps. .

- **Center Drive, PM peak**
  Center Drive will have blockages on the east and north legs. The blockages at Center Drive spillback to the SPUI and contribute to its overall deficiency's.

- **Local traffic using I-5 rather than local network streets**
  During the PM peak, about half of the Exit 27 off ramp traffic volume is forecast to come from short freeway trips of eight miles or less: ~40% of the southbound off- ramp volumes comes from the interchange to the north (Exit 30, three miles away) and another third from Exit 33; and northbound roughly half the off-ramp volume comes from the three interchanges to the south (Exit 24, Exit 21, and Exit 19). I-5 is being used for local traffic rather than local network streets due to a lack of an efficient arterial system that leads to longer travel times between points and to drivers utilizing I-5 in an attempt to minimize travel time.

- **Barnett Road, Highland Drive and further east, PM peak**
  Barnett Road at Highland Drive will be failing the Medford LOS standard, and have upstream blockages on Highland Drive headed south into the Barnett Road/ Garfield Street intersection; and on Barnett Road from Garfield Street upstream past Ellendale Drive and beyond the study area extent. During the PM peak, the southbound and westbound approaches experience extensive storage bay blocking and queue spillback as drivers leave the medical center and school areas.

- **OR 99, PM peak**
  The intersection of OR 99 and Garfield Street will be failing to meet standards with V/C of 1.01. Similar to the conditions seen during the AM peak, large volumes going north along OR99 cause blockage to the south past Charlotte Ann Road. This will cause northbound blockages south of the intersection. OR 99 at the Stewart Avenue intersection there will be long northbound queues, and upstream blockage on eastbound

Stewart Avenue, coming from the direction of the Stewart Meadows housing development and Providence Medical offices.

As can be expected, these operational deficiencies are expected to lead to longer travel times and more hours of vehicle delay in the study area. From the 2019 existing conditions to the 2045 future no build conditions, SimTraffic indicates a 3.4 – 4 times increase in travel time; total delay will be expected to increase 5 times.

Safety Deficiencies

Overall, primary safety concerns will be related to the increased queues increasing the risk of rear end crashes.

- **I-5 Interchange**

  Off ramps from I-5 spilling back onto the mainline will be an increased safety risk, creating a safety hazard for freeway vehicles coming up unexpectedly on stopped vehicles approaching the off-ramp queues, leading to higher likelihood of high-speed rear end crashes. I-5 northbound between ramps, southbound approaching, on, and after the off-ramp were all identified as a safety improvement locations from the existing conditions critical crash rate analysis.

- **Top 10% SPIS sites and Non-Freeway Critical Crash Rate Locations**

  Existing conditions crash analysis identified several areas as top 10% SPIS sites or having critical crash rate, see Exhibit 2. All of these had crash patterns of rear end crashes from following too closely; and most also had crash patterns of turning crashes related to not yielding right of way.

- **Exhibit 2 – Top SPIS and Critical Crash Rate Location Crash Trends**

Top 10% SPIS location	Location Identified for		2014 – 2018 Crash Trend Patterns	
	Critical Crash Rate	Top 10% SPIS	Rear end crashes	Turning crashes
Barnett Road at Highland Drive intersection		●	59%	33%
Barnett Road east of Ellendale Drive to Hilldale Avenue	●	●	73%	18%
I-5 southbound off-ramp		●	80%	
Garfield Street, from Center Drive through the interchange to Barnett Road		●	100%	
Barnett Road west of Stewart Avenue	●		48%	43%
Stewart Avenue west of OR 99 to Myers Lane	●		63%	
OR 99 from Barnett Road to Stewart Avenue	●	●	55%	42%

Multi Modal Deficiencies

- **Transit**
  The RVMPO 2042 plan adds additional routes and frequency in the study area, particularly along Barnett Road and OR 99. Transit MMLOS will still be low (E or F) in areas near Center Drive and along Garfield Street going through the Exit 27 interchange.

- **Segment Pedestrian MMLOS**
  Segment pedestrian MMLOS will be low (E) along Barnett Road east of Garfield Street, and Garfield Street from Barnett Road to the interchange, and again west of OR 99. OR 99 pedestrian segment MMLOS is poor from Charlotte Ann Road north to Stewart Avenue. High volumes, speeds, and narrow sidewalks contribute to these poor MMLOS scores.

- **Segment Bicycle MMLOS**
  Segment bicycle MMLOS will be low (E or F) except a few areas. Poor scores are due to higher speed limits, and areas with no bicycle lanes such as OR 99 between Stewart Avenue and Barnett Road; Stewart Avenue from Myers Lane to Center Drive; and Barnett Road from Ellendale Drive to Hilldale Avenue. Note that the City of Medford has designated the Larson Creek Trail as the bicycle facility for Barnett Road from Ellendale Drive east to N. Phoenix Road.

- **Intersection MMLOS**
  The intersection of Barnett Road and Highland Drive scores E for pedestrian MMLOS due to long traffic signal cycle time and lack of median refuges. Garfield Street at OR 99 has an MMLOS score of F, due to long pedestrian delay for the traffic signal cycle length, no median refuges, no leading pedestrian indicator, and high speed along OR 99.. Bicycle intersection MMLOS is low at the OR 99 Stewart Avenue intersection due to long crossing distance and speeds.

Summary

The 2045 forecast increased traffic volumes in the study area will adversely impact operations, safety, and segment MMLOS for bicyclists and pedestrians. Half the Exit 27 off ramp traffic volume is forecast to come from short freeway trips of eight miles or less. Travel time considerations and route desirability are leading to I-5 being used for local traffic, loading increased local volumes through the Exit 27 interchange area.,

Contact Information

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