TECHNICAL MEMORANDUM 3

DATE: May 22, 2023

TO: Project Team

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SUBJECT: US 20 Bend Facility Plan: Future Traffic Forecast Project #22140-000

This memorandum documents the process followed for forecasting traffic volumes for the US 20 Bend Facility Plan to the future year 2042. The forecasted traffic volumes will be used in evaluation of future conditions with and without proposed improvements.

BEND-REDMOND TRAVEL DEMAND MODEL

The Oregon Department of Transportation (ODOT) has developed and maintains a travel demand model that estimates daily and p.m. peak hour demand for the base year (2010) and future year (2040) transportation system. In addition, a 2019 calibrated scenario has been developed to serve as a more recent base year estimate. The travel demand model includes the surrounding communities of Bend and Redmond and is called the Bend-Redmond Model (BRM).

The BRM includes two key structures that help estimate future traffic:

- Transportation Analysis Zones (TAZs): The TAZs for the BRM typically match geographically to either census blocks or census block groups, with some refinement due to geographic constraints such as waterways or roadways. Each TAZ includes 2019 and projected 2040 land use data. The TAZs are used to generate trips by mode (auto, bus, bike, and walk) for the existing year (2019) and future year (2040).
- Transportation Network: The model includes a network of links that generally represents the major transportation system (typically collector roads and above) in the model area. Each link is coded with attributes (e.g., speed and capacity) that approximate the function of existing roadways (for the existing year and future year) and roadway improvements for the future year. Each TAZ is connected to links in the model at points that approximate where travelers are expected to enter the network.

FUTURE TRANSPORTATION NETWORK AND LAND USE

The 2040 Baseline scenario network is based on financially constrained projects listed in the Statewide Transportation Improvement Program, Bend Transportation GO Bond project list and the Bend Capital Improvement Program (CIP) project list. There are no notable improvements in the project list in the vicinity of the study area that are expected to influence traffic volumes. Note that one of the long-term projects in the City of Bend Transportation System Plan (TSP)[1] includes operational improvements from 15th Street to the east urban growth boundary (UGB)[2] (Segment 2 and 3) that identify and construct improvements that enhance mobility along the corridor. This study will be evaluating the improvement options along the study segments.

This scenario will use the 2040 land use assumptions developed for the most recent Bend TSP update with the addition of recent refinements associated with the Stevens Road Tract[3] and Stevens Ranch Tract[4] developments located east of 27th Street between Ferguson Road and Reed Market Road. Additional land use modifications were made in the area in coordination with MPO and ODOT staff to reflect land use corrections that were made to the 2019 scenario and recent refinements to large developments in the area. Household and employment control totals from the 2040 TSP scenario were maintained in the model during the adjustment process. The adjustments made are described below.

- Household Adjustments
  - Significant household growth (1344 households) was shifted from TAZ 126 and 134, located north of Bend outside of the Bend UGB, to TAZ 404, south of SE 3rd Street and NW Colorado Avenue at the KorPine site. This was a refinement based on recent information about development in the area.
  - Moderate household growth (150-200 households) was shifted from TAZ 532 (north of Bend, just outside of the Bend UGB) to TAZ 168 and 180 (near NE Bulter Market Road on the northeast edge of the Bend UGB), TAZ 456 (southwest of Reed Market Road and SE 3rd Street) and TAZ 1529 (west of NE 18th Street, near the Bend UGB).
  - Smaller adjustments (less than 150 households) were made at nine TAZs near the study corridor to account for small differences between the 2019 scenario and 2040 scenario.
- Employment Adjustments
  - Significant employment growth (950 jobs) was shifted from TAZ 227 (north of St. Charles hospital west of NE 27th Street) and TAZ 134 (north of Bend, just outside of the Bend UGB) to TAZ 228 (St. Charles hospital). This was a correction made in the 2019 scenario that needed to be reflected in the 2040 scenario.
  - Smaller adjustments (less than 155 jobs) were made at ten TAZs near the study corridor to account for small differences between the 2019 scenario and 2040 scenario.

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[1] Bend Transportation System Plan, 2020, City of Bend

[2] Project C-62, US 20 Operational Improvements form 15th Street to east UGB, in Bend Transportation System Plan, 2020, City oof Bend

[3] Stevens Road Tract Concept Plan, June 2022

[4] Stevens Ranch Major Community Master Plan, October 2021

MODEL RESULTS COMPARISON

As a point of reference, the 2040 model volumes after the land use adjustments were compared against the 2040 model volumes before adjustments. This resulted primarily in the following changes:

- Along US 20:
  - There were limited changes in demand (less than five percent) on US 20 eastbound and westbound, except for westbound traffic demand approaching 3rd Street, which increased by approximately five percent.
  - Several side street approaches increased or decreased along US 20 due to the shifting density of employment and household growth in the area. This included:
    - Northbound traffic demand on the south leg of 3rd Street decreased by approximately eight percent.
    - On the north leg of 4th Street, northbound traffic demand decreased by 40 percent, but southbound traffic increased by 33 percent.
    - At 8th Street, northbound traffic demand decreased by five percent on the south leg and 12 percent on the north leg.
    - On the south leg of 15th Street, northbound traffic increased by 14 percent and southbound traffic increased by 17 percent.
- Around US 20:
  - Along Bear Creek Road south of US 20,
    - Westbound traffic between 3rd Street and 8th Street increased by six percent.
    - Between 15th Street and Purcell Boulevard, eastbound traffic increased by nine percent and westbound traffic increased by 12 percent.
    - Eastbound traffic from Purcell Boulevard and 27th Street increased by five percent.
  - North of US 20 at 27th Street and Neff Road (east of St. Charles Hospital), southbound traffic decreased by five percent on the north leg.
  - South of US 20, northbound traffic along 3rd Street from Reed Market Road to Wilson Avenue increased by five percent.

POST PROCESSING AND MODEL APPLICATION

Given peak seasonal traffic in Bend typically occurs in the summer and the existing (2022) traffic counts were collected in October, seasonal adjustments were made to the counts to represent the 30th highest annual hour traffic volumes (30HV) for analysis. The collected counts were seasonally factored by 1.15 based on the methodology included in the ODOT Analysis Procedures Manual (APM) to obtain the 30HV, as detailed in Technical Memorandum #1: Appendix A – Methodology Memorandum.

Raw link level volumes from the BRM were post-processed using methods consistent with the ODOT APM as documented in the methodology memorandum. This approach is derived from methodologies outlined in the National Cooperative Highway Research Program (NCHRP) Report 765 Analytical Travel Forecasting Approaches for Project-Level Planning and Design.

Figure 1 shows the 2042 traffic volumes under No-Build conditions at the study intersections during the future design hour. These traffic volumes will be used for the analysis of future conditions, which will be discussed in *Technical Memorandum #4*.

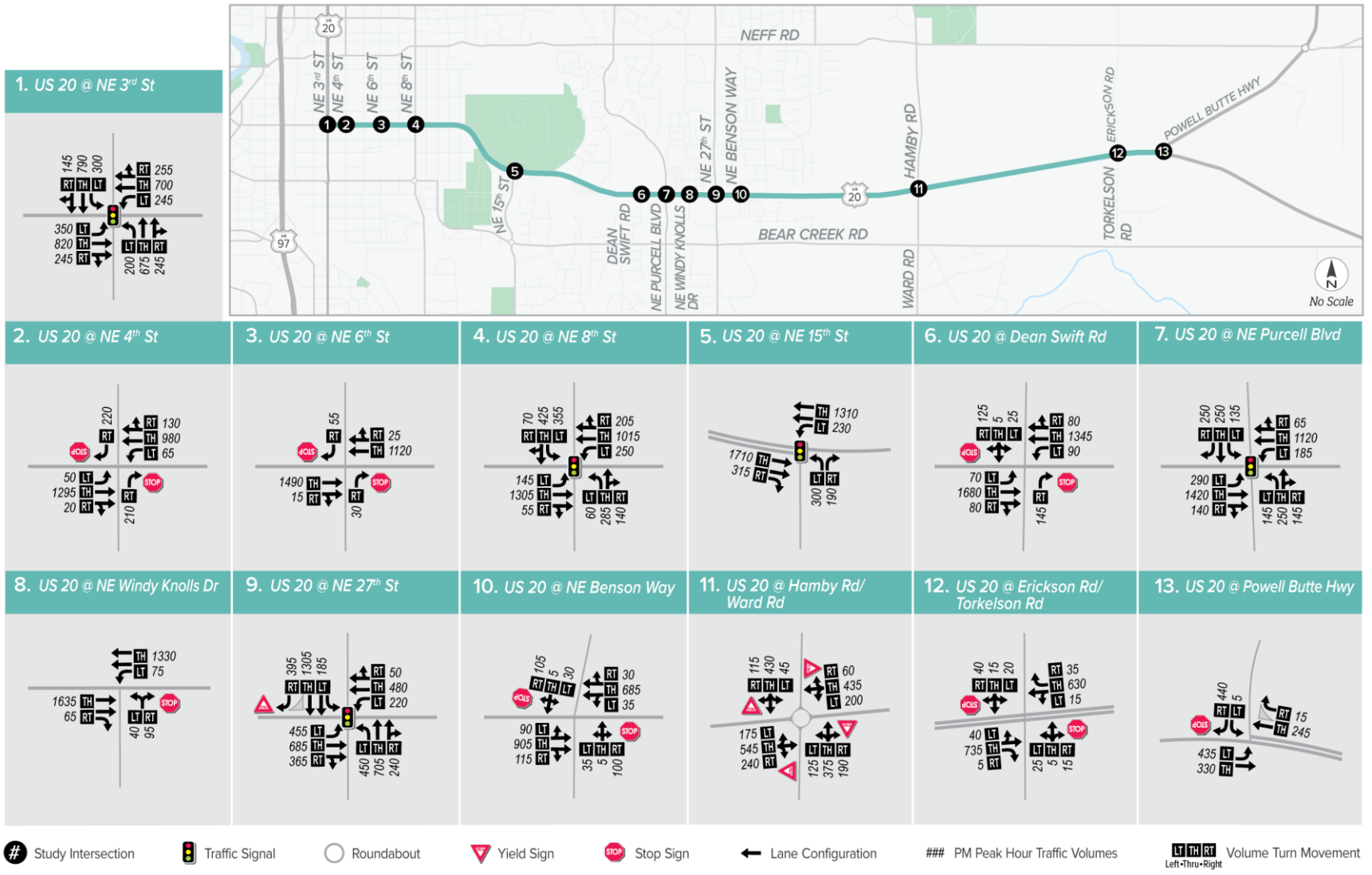

FIGURE 1. FUTURE (YEAR 2024) MOTOR VEHICLE DESIGN HOUR TRAFFIC VOLUME