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TECHNICAL MEMORANDUM #2

April 1, 2026 Project# 32800

To: ODOT Region 3 Traffic
CC: Steve Faust, 3J Consulting
From: Nicholas Gross, Katie Popp, Brandon Tucker, Susan Wright, PE
RE: Kilkich Area Plan TM2 – Methodology and Assumptions (REVISED)

Methodology and Assumptions Memorandum

This memorandum documents the methodology and assumptions to perform technical analysis for the transportation component of the Kilkich Area Plan. This memorandum describes the proposed methodology for the following assessments:

- Operational Analysis
- Safety Analysis
- Multimodal Analysis

The methodologies described herein will be used to evaluate the transportation networks associated with the Kilkich Area Plan. Analyses will be informed by and conducted in accordance with the Oregon Department of Transportation (ODOT) Analysis Procedures Manual (APM)[1], as well as relevant state, regional, and local planning standards.

STUDY AREA

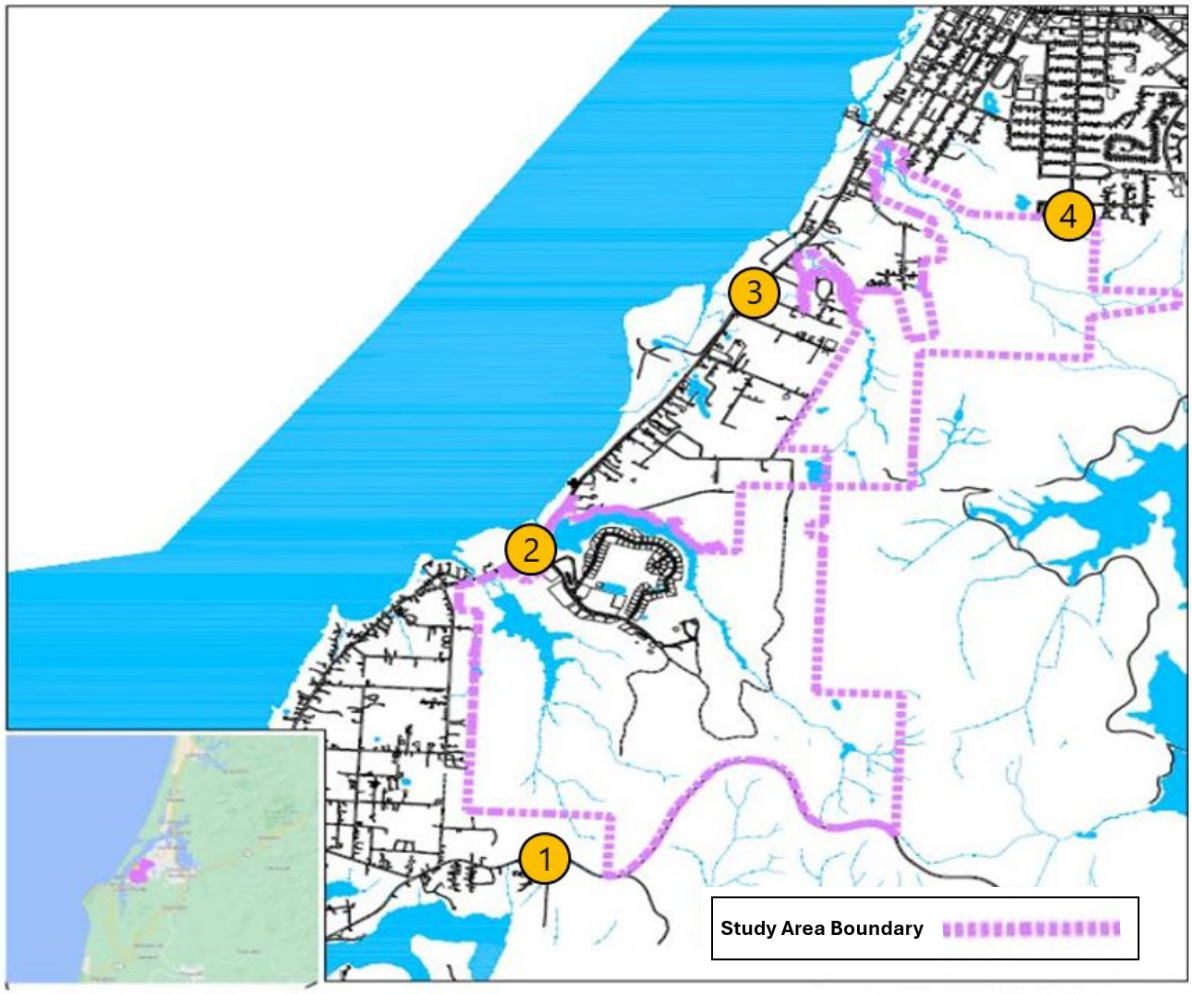
The project study area is the Coquille Indian Tribe (CIT) area described as the "Kilkich" property, a 1,075-acre area that includes the North and the South Empire Parcels. The property is mostly located within unincorporated Coos County, except for the area around First Creek and Wisconsin Avenue, which is within the City of Coos Bay. The study intersections (as confirmed by CIT and ODOT in the project scope of work) for the Kilkich Area Plan include:

1. Terramar Road and Barview Charleston Area Park at Libby Lane
2. Miluk Drive at Cape Arago Highway
3. Spaw Lane at Cape Arago Highway
4. S Morrison Street at Marshall Avenue

Figure 1 illustrates the study area and study area intersections.

[1] Oregon Department of Transportation, Analysis Procedures Manual (2025 update)

Figure 1. Study Area and Intersections



Intersection 2: Miluk Drive at Cape Arago Highway is primary access point to the Kilkich property South Parcel including Tribal Headquarters. Intersections 1, 3, and 4 are within close proximity to anticipated future access points to the Kilkich property. Intersections 1, 2, and 3 are stop-controlled on the minor street, whereas intersection 4 is on neighborhood streets and does not have any traffic control devices.

VOLUME DEVELOPMENT

The following sections describe how existing volumes will be estimated at the study intersections and how they will be used to evaluate existing and future traffic conditions in the project study area. The 30th Highest Hour Volumes (30HV) for the Kilkich Area Plan will be developed based on the traffic counts collected at the study intersections and the application of historical and seasonal adjustment factors consistent with the methodology identified in the APM.

Traffic Counts

Sixteen-hour traffic counts for the four study intersections were obtained from the ODOT MS2 database and post-processed by Quality Counts (Attachment A). Traffic counts for Miluk Drive at Cape Arago

Highway (intersection 2) were collected on October 29, 2024, from 6 AM to 10 PM. Traffic counts at intersection 1, 3 and 4 were collected on October 15, 2025, from 6 AM to 10 PM. Counts include pedestrians, bicyclists, motor vehicles, and heavy vehicles that entered the intersection in 15-minute intervals.

Historical Adjustment

The traffic counts conducted at the Cape Arago Highway/ Miluk Drive study intersection in 2024 will require an adjustment to 2025 to reflect existing traffic conditions. From the APM Chapter 5, historical adjustments are determined from information provided in ODOT's Future Volume Tables (FVT). Using the current FVTs, the annual growth rate for this study intersection was calculated based on the existing (2024) and forecast (2044) traffic volumes along Cape Arago Highway near this intersection, consistent with the information in the Coos Bay/ North Bend travel demand model. The resultant annual growth rate is approximately 0.11 percent. This will be applied to the historical traffic counts for all movements of the intersection the existing traffic analysis.

Historical adjustment calculations are displayed in Table 1, with an example calculation provided below.

Table 1. Historical Adjustment Information

Site ID	MP	Description	Existing Daily Volumes (2024)	Future Daily Volumes (2044)	20-Year Growth Factor	Annual Growth Rate
3946	340	At south city limits of Coos Bay	10,000	10,300	1.03	0.15%
3947	5.09	South of Spaw Lane [0.02 mile]	9,400	9,600	1.02	0.11%
3948	5.95	South of Tarheel Lane [0.02 mile]	8,000	8,100	1.01	0.06%
				Average Annual Growth Rate		***0.11%***

Example Calculation for Site ID 3948:

20-Year Growth Factor = 8,100/ 8,000 = 1.01

Annual Growth Rate = (1.01 – 1) / 20 = 0.06%

SEASONAL ADJUSTMENT METHODS

The APM identifies three methods for identifying seasonal adjustment factors for highway traffic volumes. All three methods utilize information provided by Automatic Traffic Recorders (ATR) located in select locations throughout the State Highway System that collect traffic data 24-hours a day, 365 days a year. Each method was evaluated to determine the most appropriate method for the study intersections.

Based on this evaluation, the ATR Trend Summary method will be used to develop a seasonal adjustment factor. This method is appropriate because there is no ATR located within the immediate study area. A review of historical count data from the broader project vicinity indicates that August is generally the peak traffic month, and the traffic pattern most closely aligns with a Commuter trend.

Although two ATRs share the Commuter trend classification and have AADTs within ±10% of the average AADT for sites in the project vicinity, their peak months vary based on 2020–2024 ATR data and do not consistently align with August. For this reason, the ATR Trend Summary was used to determine a seasonal adjustment factor for each location.

Table 1 summarizes the seasonal trend table factors from the 2024 Seasonal Trend Table used to calculate the seasonal adjustment factor. Seasonal adjustment factors were calculated for the Commuter trend for both 15-Oct and 1-Nov, as three of the intersection sites counts were collected on October 15th, and one was collected on October 29th.

Table 1. Commuter Trend Table Calculations

Date	Factor	Seasonal Trend Peak Period Factor	Seasonal Adjustment Factor
October 15	0.9565	0.9388	1.02
November 1	0.9968	0.9388	1.06
October 29*			1.05

*Interpolated based on October 15 and November 1 factors.

Example Calculation for October 15:

Seasonal Adjustment Factor = 0.9565/ 0.9388 = 1.02

Based on the data shown in Table 1, a seasonal adjustment factor of 1.02 will be applied to all movements for the traffic counts conducted along Cape Arago Highway on October 15th, and a seasonal adjustment factor of 1.05 will be applied to counts conducted on October 29th.

PEAK HOUR SELECTION

Based on review of the traffic count data, Miluk Drive at Cape Arago Highway intersection (686 total entering vehicles) and the Spaw Lane at Cape Arago Highway intersection (873 total entering vehicles) have a consistent peak hour occurring between 3:30 – 4:30 PM.

In comparison to the local street study intersections, the peak hour at Terramar Road/Barview Charleston Area/Libby Lane was identified as 4:30-5:30 PM (173 total vehicles) and the peak hour at Marshall Avenue and S Morrison Street was identified as 7:00 – 8:00 AM (36 total vehicles).

Due to the consistency of Cape Arago Highway study intersections peak hour occurring between 3:30 – 4:30 PM, a similar peak hour period for Terramar Road/Barview Charleston Area/Libby Lane occurring

between 4:30 – 5:30 PM, and the comparatively lower traffic volumes recorded Marshall Avenue and S Morrison Street, the project team has selected a system peak hour of 3:30 – 4:30 PM for evaluating the study intersections.

Forecast Traffic Volumes

Consistent with guidance provided in Chapter 6 of the APM and based on the available model outputs from the Coos Bay/ North Bend Travel Demand Model (TDM), the year 2045 was selected as the future analysis year. This reflects typical 20-year planning horizon from the base year of 2025, and is aligned with the future output year for the Coos Bay/ North Bend travel demand model.

Forecast traffic volumes for the 2045 analysis year will be developed in accordance with Chapter 6 of the APM, which outlines procedures and guidance for applying methodology identified in the National Cooperative Highway Research Program (NCHRP) Report 765 *Analytical Travel Forecasting Approaches for Project-Level Planning and Design*. As part of the NCHRP 765 methodology, the 2025 30HV volumes will serve as the basis for forecasting, and growth between 2025 and 2045 will be derived from TDM base and future year outputs. Growth may be applied using the appropriate method based on guidance from Chapter 6 of the APM (i.e., growth method, difference method, or weighted growth method), depending on the observed difference between base and forecast model link volumes.

Because the TDM base year corresponds to the year of the developed 30HV for the existing analysis year, no interim base-year adjustment of link volumes is anticipated. Model base year volumes will be compared to 30HV volume data to confirm reasonable alignment. Any significant discrepancies between observed counts and model volumes will be reviewed, documented, and coordinated with the ODOT modeling team as necessary to confirm analysis assumptions.

OPERATIONAL ANALYSIS

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

Intersection Mobility Targets

The study intersections include state, county, and city-owned and maintained facilities. As such, mobility targets were determined from the applicable jurisdiction.

STATE FACILITIES

Analysis of intersections on Cape Arago Highway (OR 540) will be evaluated based on ODOT Mobility Targets provided in the ODOT Oregon Highway Plan (OHP)[2] and Highway Design Manual (HDM)[3], as applicable.

Cape Arago Highway is owned and maintained by ODOT. Therefore, the intersections of Cape Arago Highway with Spaw Lane and Miluk Drive are subject to ODOT mobility targets. Table 6 of the OHP and table 1200-2 of the Oregon Highway Design Manual (HDM) provide maximum volume-to-capacity ratios for all signalized and unsignalized intersections outside the Portland Metro area. The OHP ratios are used to evaluate existing and future no-build conditions, while the HDM ratios are used in the creation of future TSP alternatives which involve projects along state highways.

Cape Arago Highway is a District Highway that is not a freight route, and both intersections are located outside of the City of Coos Bay UGB with posted speeds of 40 mph. These characteristics were used to determine v/c targets using ODOT guidance described above. Table 2 summarizes the performance targets for the study intersections.

COUNTY FACILITIES

Libby Lane is owned and maintained by Coos County and is subject to County mobility targets. The 2011 Coos County Transportation System Plan (TSP)[4] established a maximum v/c ratio of 0.85 for all County-maintained intersections during a typical weekday peak hour. Therefore, this will be the target for intersection 1, Terramar Road and Barview Charleston Area Park at Libby Lane.

CITY FACILITIES

South Morrison Street and Marshall Avenue are both owned and maintained by the City of Coos Bay and subject to City mobility targets. According to the 2020 Coos Bay Transportation System Plan[5], City streets shall maintain a LOS of "D" during the peak 15 minutes of the day. Therefore, this mobility target will be applied for intersection 4.

Table 3 summarizes intersection mobility targets for ODOT, County, and City facilities.

Table 3. Intersection Mobility Targets

Map ID	Intersection	Jurisdiction	OHP Target	HDM Standard	Local Standard
1	Terramar Road and Park/ Libby Lane	Coos County	N/A	N/A	0.85*
2	Cape Arago Highway/ Miluk Drive	ODOT	0.80	0.75	N/A

[2] Oregon Department of Transportation, Oregon Highway Plan (2024 update)
[3] Oregon Department of Transportation, Highway Design Manual (2025 update)
[4] Coos County Transportation System Plan (2011)
[5] Coos Bay Transportation System Plan (2020)

3	Cape Arago Highway/ Spaw Lane	ODOT	0.80	0.75	N/A
4	S Morrison St/Marshall Avenue	Coos Bay	N/A	N/A	LOS D

*Note that LOS will also be reported for Intersection 1 since it is a secondary measurement for Coos County.

Modeling Software and Parameters. The following data sources and methodologies are proposed for conducting traffic analysis. Analysis of state facilities will be conducted according to the APM, unless otherwise agreed upon by both ODOT's Transportation Planning and Analysis Unit (TPAU) and the consultant team.

- Intersection/Road Geometry (e.g., number of lanes, lane configurations, cross-section elements, etc.) will be collected through aerial photography and site visits. Available as-built data may also be used to verify existing roadway geometry. The analysis models will be constructed on scaled roadway line work from GIS or aerial photography.
- Operational Data (e.g., posted speeds, intersection control, rail crossings, etc.) will be collected through aerial or on-street photography and confirmed through site visits.
- Peak Hour Factors (PHF) will be calculated for each intersection and applied to the existing conditions analyses. Per the APM, the following PHFs will be used for the future conditions assessment.
    - Major arterial: 0.95
    - Collector-collector or lower classification: 0.85
    - At each intersection, the higher facility road PHF will be used. If an existing PHF is greater than the default future values above, the existing PHF will be used.
- Traffic Volume Development is described in previous sections.
- Synchro software, Version 11 will be used for the existing and future intersection analyses. The reported results will be the level of service, intersection delay, and v/c ratios generated by the HCM 7th Edition report. Synchro analysis assumptions are listed in Table 2.

Table 2 summarizes the Synchro software and input assumptions for the traffic analysis.

Table 2. Existing/ Future Synchro Analysis Assumptions

Intersection Parameters	Existing Conditions Assumptions
Peak Hour Factor	From traffic counts (existing conditions); From APM Chapter 5, Section 5.9.3 (future analysis)
Conflicting Bikes and Pedestrians per Hour	From traffic counts (as available)
Area Type	Based on local conditions
Ideal Saturation Flow Rate (All Movements)	1,750 passenger cars per hour per lane
Lane Width	12 feet (unless field observations suggest otherwise)
Percent Heavy Vehicles (All Movements)	From traffic counts (as available)

Percent Grade	Estimated based on field observations
95th-Percentile & Average Vehicle Queues	Synchro HCM summary output

SAFETY ANALYSIS

The safety analysis will review the most recent five years of reported crash data at the study intersections, obtained from ODOT's Crash Analysis & Reporting Unit. The crash data will be analyzed at each intersection for number, type, severity, and location to identify crash patterns. Intersection crash rates will be calculated in terms of crashes per million entering vehicles (MEV), consistent with APM guidance.

A preliminary review of the available five-year crash dataset indicates that eight total crashes have been reported across the four study intersections, with a maximum of four crashes occurring at a single location (Cape Arago Highway/Miluk Drive). None of these crashes were reported to involve people walking or biking.

In accordance with Chapter 4 of the APM, the Critical Crash Rate and Excess Proportion of Specific Crash Types screening methods will be considered as part of the safety analysis, as appropriate. However, based on the preliminary review of the available crash data, these statistical screening methods are not anticipated to be applicable. The APM indicates that both methods require a minimum reference population of at least five similar intersections to produce statistically valid results. Because this study includes only four intersections, and the reported crash frequencies, both in total and within individual crash types, are too low to meet the minimum sample size requirements necessary for statistically valid application of these methods, application of the Critical Crash Rate and Excess Proportion methods would not meet APM validity thresholds.

Therefore, consistent with the APM, observed Intersection crash rates will be compared to the published 90th percentile crash rates in Exhibit 4.1 of the APM. Intersections that exceed the 90th percentile rates will be further reviewed. These calculations will be provided in Technical Memorandum #3, which will document the safety analysis findings. An example calculation is provided below.

Example Observed Crash Rate Calculation:

Step 1: Calculate the volume in Million Entering Vehicles

$$MEV = \frac{Average\ Annual\ Daily\ Traffic\ (AADT)\ \times 365\ \times\ n}{1{,}000{,}000}$$

$$MEV = Million\ Entering\ Vehicles, n = Number\ of\ Years$$

Step 2: Calculate the crash rate at each intersection

$$R = \frac{Crash\ Total}{MEV_n}$$

$$R = Observed\ Crash\ Rate$$

In addition, ODOT's top 10% ODOT Safety Priority System sites will be reviewed, as appropriate. Any identified potential countermeasures and resulting crash percentage reduction for the intersections on Cape Arago Highway will be taken from the All Roads Transportation Safety (ARTS) Crash Reduction Factors (CRF) listing or the CRF Appendix.

MULTIMODAL ANALYSIS

The multimodal analysis will be performed for collector and arterial roadways within the study area as well as local streets with existing pedestrian, bicycle and transit facilities within the study area. If there are informal walkways or trails along these study areas, these will be noted as a qualitative observation.

Existing facility conditions, such as the presence of bike lanes or sidewalks, paved shoulder widths, physical buffers, or facility conditions will be collected through aerial photography and site visits. Anticipated future facility conditions will be determined through the recommendations developed in the Kilkich Area Plan.

The multimodal analysis in this report consists of two components and will be conducted in accordance with the APM:

- **Qualitative Multimodal Analysis (QMA):** A qualitative multimodal assessment (QMA) will be performed for the public transportation, pedestrian, and bicycle facilities and services in accordance with Chapter 14 of the APM. Roadway segments are assessed using qualitative criteria and assigned ratings of Excellent, Good, Fair, or Poor.
- **Level of Traffic Stress (LTS) Analysis**: A quantitative evaluation for pedestrians and bicyclists consisting of Pedestrian Level of Traffic Stress (PLTS) and Bicycle Level of Traffic Stress (BLTS). Level of Traffic Stress (LTS) analysis will be performed for the pedestrian and bicycle facilities using methods defined in Chapter 14 of the APM.

QMA and LTS findings are based on existing site conditions as reviewed via aerial and street-level imagery. Any findings from this analysis will be compared to data provided in the Oregon Transportation Safety Data Explorer (OTSDE), particularly the Bicycle Level of Traffic Stress and the Vulnerable Road User Assessment Pedestrian and Bicycle Risk scores. Any discrepancies will be described in the analysis and brought to the attention of ODOT, as appropriate.

NEXT STEPS

The details of this memorandum will guide the analysis to be conducted in Technical Memorandum #3: Transportation Assessment, Housing Market, and Energy Resilience Assessment. The findings of Technical Memorandum #3 will be subject to a review period by up to two weeks by the project management team (PMT) and ODOT technical staff including ODOT's Transportation Planning and Analysis Unit (TPAU).

Attachment A. Traffic Counts