

TECHNICAL MEMORANDUM

DATE: April 12, 2021
TO: ODOT
FROM: Ryan LeProwse, PE
Emily Welter
SUBJECT: Cannon Beach TSP Analysis Methodology and Assumptions
CC:
PROJECT NUMBER: 274-2395-113
PROJECT NAME: Cannon Beach TSP

This memorandum establishes the methods and assumptions that will be used to develop the existing conditions, future conditions, and alternatives transportation analysis for the Cannon Beach Transportation System Plan (TSP). This memorandum summarizes the methodology and assumptions developed for the traffic operations analyses, safety analyses, and the multimodal operational analyses. The ODOT Analysis Procedures Manual (APM)¹ will guide the methodologies and assumptions used for these analyses.

STUDY AREA

The Cannon Beach TSP will focus on 14 study intersections located within Cannon Beach. The study intersection locations are shown in Figure 1.

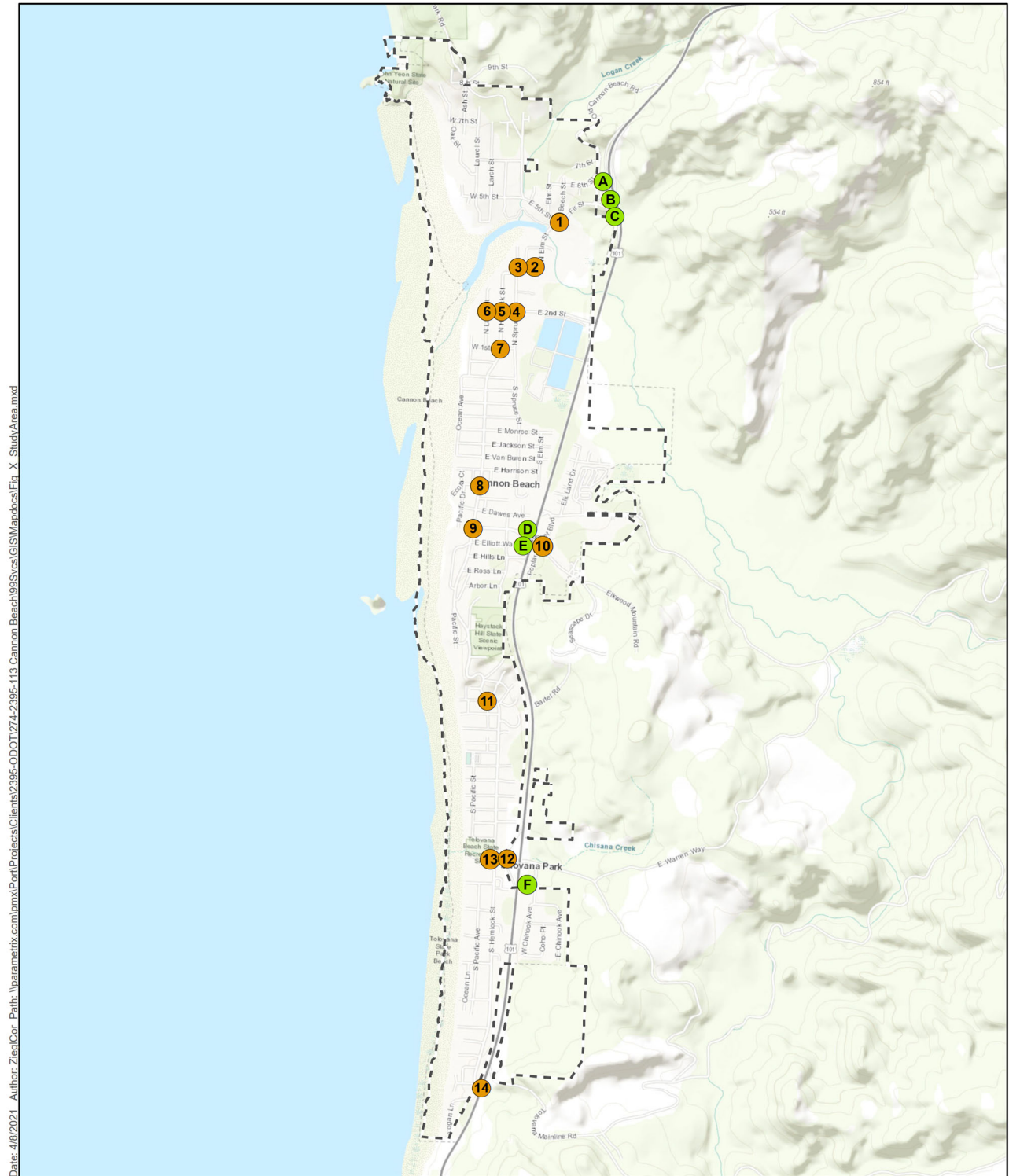
TRAFFIC VOLUME DEVELOPMENT

Existing Traffic Volumes

Existing conditions traffic operations will be analyzed for the study intersections using 2020 volumes. Following the ODOT APM, the traffic operations will be analyzed using estimated 2020 30th highest annual hour of traffic (30 HV) conditions. The 30 HV development process for existing conditions includes determination of the system peak and seasonal adjustments.

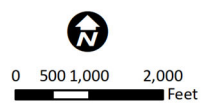
The existing count date, type (turning movement or tube count), and durations are summarized in Table 1. ODOT collected the turning movement counts (TMCs) at the 14 study intersections and tube counts at six locations in July 2020.

¹ Analysis Procedures Manual Version 2, Oregon Department of Transportation, March 2016.



Date: 4/8/2021 Author: Ziegler, Path: \\parametrix.com\pmx\Port\Projects\Clients\2395-ODOT\274-2395-113 Cannon Beach\99Svcs\GIS\Mapdocs\Fig_X_StudyArea.mxd

Source: ESRI, © OpenStreetMap, Clatsop County, Parametrix



- Study Intersections
- Tube Count Locations
- City Limits

Study Area
Cannon Beach TSP

Cannon Beach, OR

Figure 1. Study Area

Table 1. Intersection and Tube Count Locations

#	Location	Count Date	Type	Duration
1	Fir Street/Beech Street & E 5th Street	Friday July 24, 2020	TMC	16 hr
2	N Antler Road & E 3rd Street	Friday July 24, 2020	TMC	16 hr
3	N Spruce Street & E 3rd Street (southern intersection)	Friday July 24, 2020	TMC	16 hr
4	N Spruce Street & 2nd Street	Friday July 24, 2020	TMC	16 hr
5	N Hemlock Street & 2nd Street	Friday July 24, 2020	TMC	16 hr
6	N Larch Street & W 2nd Street	Friday July 24, 2020	TMC	16 hr
7	N Hemlock Street & 1st Street	Friday July 24, 2020	TMC	16 hr
8	S Hemlock Street & Gower Avenue	Friday July 24, 2020	TMC	16 hr
9	S Hemlock Street & Sunset Boulevard	Friday July 24, 2020	TMC	16 hr
10	US 101 & E Sunset Boulevard	Friday July 24, 2020	TMC	16 hr
11	Pacific Avenue & S Hemlock Street/W Gogona Avenue	Friday July 24, 2020	TMC	16 hr
12	US 101 Southbound ramps & Warren Beach Road	Friday July 24, 2020	TMC	16 hr
13	S Hemlock Street & Warren Beach Road	Friday July 24, 2020	TMC	16 hr
14	S Hemlock Street & US 101	Friday July 24, 2020	TMC	16 hr
A	Ramp from US 101 Southbound to Fir Street	Friday July 24, 2020	Tube Count	24 hr
B	Ramp from Fir Street to US 101 Northbound	Friday July 24, 2020	Tube Count	24 hr
C	Ramp from Fir Street to US 101 Southbound	Friday July 24, 2020	Tube Count	24 hr
D	Ramp from US 101 Southbound to Sunset Boulevard	Friday July 24, 2020	Tube Count	24 hr
E	Ramp from Sunset Boulevard to US 101 Southbound	Friday July 24, 2020	Tube Count	24 hr
F	Ramp to/from Warren Way and US 101 Northbound (west of W Chinook Avenue)	Friday July 24, 2020	Tube Count	24 hr

Peak Hour Selection

The system-wide peak will be determined from the maximum hourly total intersection volumes. The system peak hour will be used at each individual intersection to compare to mobility targets for current and future conditions.

Seasonal Factors

As shown in Table 1 above, the traffic counts in the study area were collected in July 2020. This time represents a period where traffic volumes are lower than the 30 HV conditions, so adjustments will be required to develop 30 HV for the traffic analysis, as outlined in the ODOT APM. ODOT does not currently maintain any automatic traffic recorder (ATR) locations within or near the study area of Cannon Beach. Since there are no ATRs within or near the study area, the on-site ATR method for seasonal adjustment is not possible for this analysis. Instead, the ATR characteristic table was used to find one or more ATRs that are similar to the roadways in the study area to develop the 30 HV volumes within Cannon Beach.

Based on the 2019 ODOT Traffic Volume Tables for State Highways, US 101 had an average annual average daily traffic (AADT) of 6,000 between MP 28.40 and MP 31.67. The ATRs listed in Table 2 were selected based on the seasonal traffic trends, number of lanes, and 2019 AADT of these ATRs compared to the characteristics of US 101 near Cannon Beach.

Table 2. ATR Characteristics

ATR Number	ATR Name	2019 Seasonal Traffic Trend	Area Type	# of Lanes	Weekly Traffic Trend	2019 AADT
06-004	Bandon	CO DEST	RURAL POPULATED	2	WEEKDAY	6900
08-005	Winchuck	CO DEST	SMALL URBAN FRINGE	2	WEEKEND	10000
29-001	Rockaway	CO DEST RT	RURAL POPULATED	2	WEEKEND	7200

Between 2015 and 2019, the average peak month for two of these ATRs was July and the third ATR had an average peak month of August. The seasonal adjustment factor was calculated by comparing the percent of AADT for the peak month to the percent of AADT for the count month (July). The seasonal adjustment for all three ATRs was 1.00, so no seasonal adjustment factor will be applied to the July 2020 counts when developing the 2020 30 HV intersection volumes.

COVID-19 Adjustments

Considering the counts were collected for this analysis in 2020, the impacts of COVID-19 on typical traffic volumes were assessed. ODOT provided traffic volumes at the three ATRs listed in Table 2 for a Friday in July 2019 and a Friday in July 2020. Comparing these volumes, the average change in volumes from 2019 to 2020 was -6.7%. To account for this change in volume due to COVID-19, a factor of +6.7% will be applied to the July 2020 counts when developing the 2020 30 HV intersections volumes.

Future Traffic Volumes

Future traffic forecasts for the horizon year 2040 will be developed using a linear growth factor for all movements. This growth factor was calculated using 2018 and 2039 volumes provided in the ODOT Future Highway Volume Table. Based on these volumes along US 101 at MP 29.68, the average annual growth rate for the study area is 1.23%. An overall growth rate of 24.6%, or 1.23% over 20 years, will be applied to all 2020 30 HV intersection volumes to develop the 2040 intersection volumes.

TRAFFIC ANALYSIS METHODOLOGY

Intersection Operations

Traffic operations will be analyzed for all study intersections under existing (2020) and future (2040) conditions using the design hour volumes. Synchro 10 and SimTraffic will be used to analyze all intersections. Results will be reported using Highway Capacity Manual (HCM) 6th Edition methodology. If HCM 6th Edition results cannot be reported due to intersection geometry or other limitations, HCM 2000 will be used. SimTraffic will be used to report queue lengths. Additionally, the SimTraffic static graphics will be used to check percent time blocked for storage lanes.

The reported results will include volume-to-capacity (v/c) ratios, level of service (LOS), delay, and 95th percentile queue lengths. Percent time blocked for storage lanes will also be reported if any issues exist.

Intersection Mobility Targets

State highway mobility targets were developed for the 1999 Oregon Highway Plan (OHP)² as a method to gauge reasonable and consistent targets for traffic flow along state highways. The ODOT v/c targets are based on highway classification and posted speeds. The City of Cannon Beach did not identify mobility targets for its local streets as part of its 2017 Comprehensive Plan, so the ODOT mobility targets for local streets will be applied at all intersections under the City's jurisdiction.

The mobility targets from the OHP will be used in this study for the existing and future no build mobility targets. The future build mobility targets are from Table 10-2 of the Highway Design Manual³ and are considered guidelines, as there is a design exception process.

US 101 (State Highway 009) is classified as a statewide highway with a posted speed limit of 55 mph. US 101 (State Highway 009) is a Reduction Review Route but for purposes of mobility targets, is not classified as a freight route. The City streets being studied are classified as district/local roads with posted speed limits less than 35 mph. All study intersections are within the urban growth boundary.

Table 3. Intersection Mobility Targets

#	Location	Jurisdiction	Control ¹	Existing and Future No Build Mobility Target	Future Build Mobility Target
1	Fir Street/Beech Street & E 5th Street	City	AWSC	v/c < 0.95	v/c < 0.80
2	N Antler Road & E 3rd Street	City	TWSC	v/c < 0.95	v/c < 0.80
3	N Spruce Street & E 3rd Street (southern intersection)	City	AWSC	v/c < 0.95	v/c < 0.80
4	N Spruce Street & 2nd Street	City	AWSC	v/c < 0.95	v/c < 0.80
5	N Hemlock Street & 2nd Street	City	TWSC	v/c < 0.95	v/c < 0.80
6	N Larch Street & W 2nd Street	City	TWSC	v/c < 0.95	v/c < 0.80
7	N Hemlock Street & 1st Street	City	TWSC	v/c < 0.95	v/c < 0.80
8	S Hemlock Street & Gower Avenue	City	TWSC	v/c < 0.95	v/c < 0.80
9	S Hemlock Street & Sunset Boulevard	City	TWSC	v/c < 0.95	v/c < 0.80
10	US 101 & E Sunset Boulevard	ODOT/City	TWSC	v/c < 0.80	v/c < 0.70
11	S Hemlock Street & Pacific Avenue	City	TWSC	v/c < 0.95	v/c < 0.80
12	US 101 Southbound ramps & Warren Beach Road	ODOT/City	TWSC	v/c < 0.80	v/c < 0.70
13	S Hemlock Street & Warren Beach Road	City	TWSC	v/c < 0.95	v/c < 0.80
14	S Hemlock Street & US 101	ODOT/City	TWSC	v/c < 0.80	v/c < 0.70

¹AWSC = all-way stop control, TWSC = two-way stop control

Crash Analysis

Collision trends will be identified by analyzing the most recent five years of available crash data (2014-2018) for roadways within Cannon Beach. Analysis will include calculation of critical crash rates and excess proportion of

² 1999 Oregon Highway Plan including amendments November 1999 through May 2015, Oregon Department of Transportation, May 2015.

³ Highway Design Manual, Oregon Department of Transportation, 2012.

specific crash types at all study intersections, as outlined in Chapter 4 of ODOT's APM. Intersection crash rates will be compared to critical crash rates based on the method outlined in Part B of the Highway Safety Manual⁴. If a critical crash rate cannot be calculated due to limited data, the published 90th percentile rates in Table 4-1 of the APM will be used. Project-area K-factors from the counts will be used to convert short duration counts to daily traffic approach volumes. The crash rates will be compared to the 2018 Crash Rate Table II in the State Highway Crash Rate Book to identify locations and intersections with more crashes than other similar facilities in Oregon. Top 10% ODOT Safety Priority Index System (SPIS) sites from 2016, 2017, and 2018 will also be identified for further review.

The collision analysis will be used to identify crash patterns and suggest potential countermeasures at locations that exceed the published intersection or segment crash rates, the calculated critical crash rate, or SPIS sites. Crash modification factors (CMFs) will be identified for each countermeasure to provide an estimate of the potential change in crash frequency based on CMFs from the Highway Safety Manual, the ODOT All Roads Transportation Safety (ARTS) Crash Reduction Factor List, or the Federal Highway Administration' (FHWA) Crash Modification Factors Clearinghouse. When using the FHWA CMF Clearinghouse, it is recommended to select CMFs with a rating of three stars or better.

Multimodal Analysis

The project team will analyze transit, bicycle and pedestrian operations in the study area using the level of traffic stress (LTS) for bicycles and pedestrians and the qualitative multimodal assessment (QMA) for transit as outlined in Chapter 14 of the APM for arterial and collector streets. LTS will be evaluated on arterial and collector streets only. US 101 is an arterial and will be included in the multimodal analysis but it does play a limited role in the bicycle, pedestrian, and transit network and is therefore not a focus. The assessment will also include identification of key origins and destinations (e.g., schools) for cycling and pedestrian trips and a discussion of the quality and comfort of routes between origins and destinations. Analysis will identify safety concerns and barriers such as system gaps or challenging topography.

Transit analysis will use available data and information from the NW Connector and the intercity bus service POINT.

⁴ Highway Safety Manual 1st Edition, American Association of State Highway and Transportation Officials (AASHTO), 2010.