GLOBAL Transportation Engineering

MEMORANDUM

DATE: October 28, 2020

TO: Jennifer Hoffman, Opsis Architecture, LLP

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SUBJECT: Gladstone Library TIA Methodology Memorandum P19-062

This memorandum summarizes the methodology that will be employed in developing the traffic impact analysis associated with the proposed Gladstone Library to be located at 525 Portland Avenue in Gladstone, Oregon. The purpose of this analysis will be to identify potential impacts to the transportation network for the year of opening for the site, based on the standards established by the City of Gladstone.

The following intersections will be evaluated as part of the analysis:

- OR 99E at W Dartmouth Street
- Portland Avenue at E Dartmouth Street
- Oatfield Road at E Dartmouth Street

The methodologies included in this memorandum will be used to analyze the transportation facilities directly impacted by this project and will be based on the ODOT Analysis Procedures Manual Version-2 (APM V-2) and the City of Gladstone Public Works Design Standards.

PROJECT DESCRIPTION

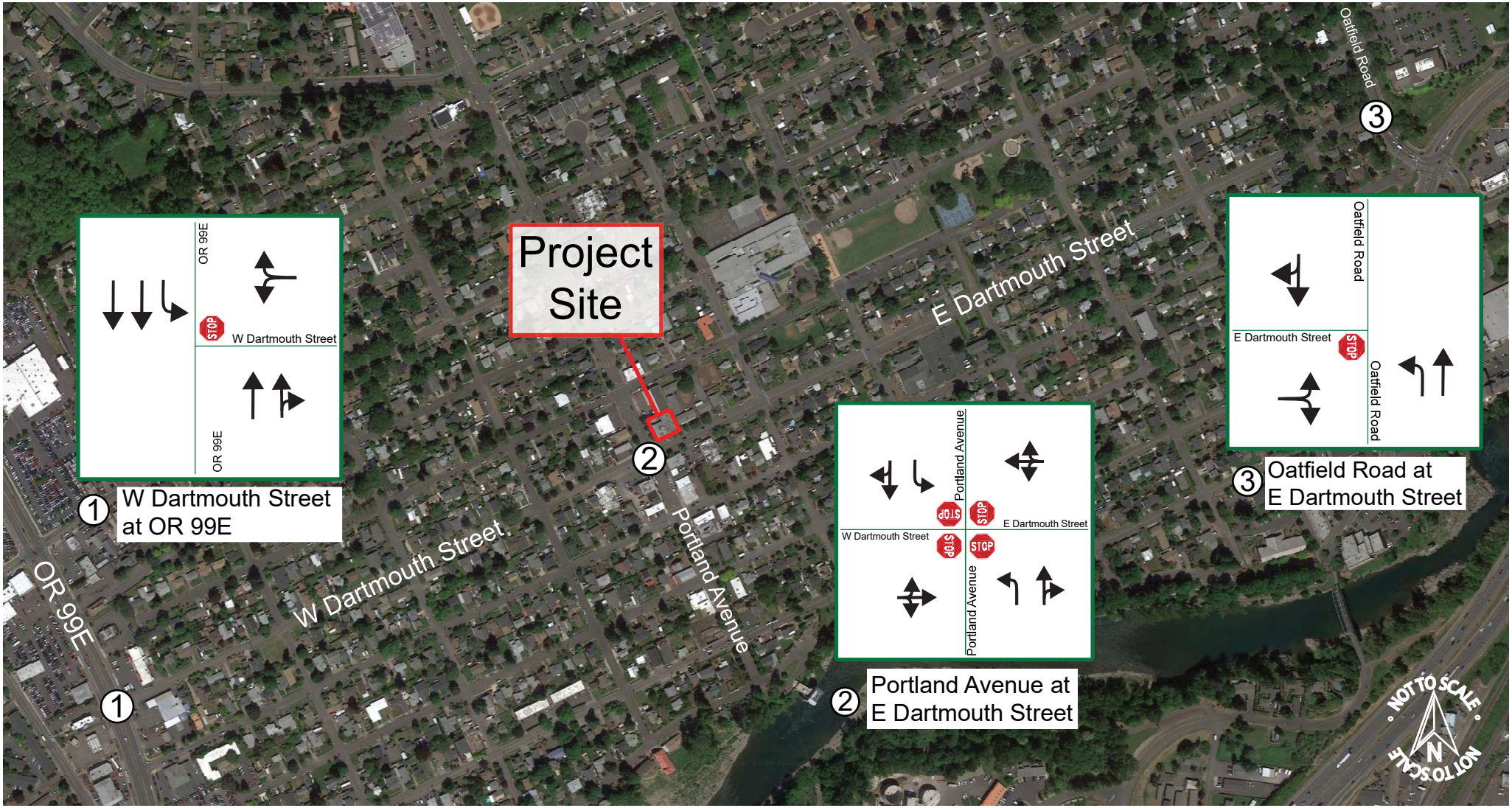
The proposed Gladstone Library will be located at 525 Portland Avenue in Gladstone, Oregon. The site fronts Portland Avenue to the west and E Dartmouth Street to the south. The site will consist of a 6,000 square foot library and replaces the former Gladstone City Hall building. Figure 1 provides a vicinity map that shows the project site and the study intersections. Figure 2 shows a preliminary site plan.

Study Area

The study area includes Pacific Highway East (OR 99E), Dartmouth Street, Oatfield Road and Portland Avenue. Figure 1 shows the extents of the study area. The intersections directly impacted by the proposed development will be analyzed per the Oregon Department of Transportation's APM V-2. Intersections will be evaluated for operations and safety using current methodologies detailed in the Analysis Procedure Manual Version-2 (APM V-2).

The study intersections were determined to be necessary for analysis through preliminary coordination with ODOT and the City of Gladstone. Only the intersection of SW Dartmouth Road at OR 99E is expected to meet the ODOT minimum requirements for analysis[1] based on preliminary trip generation. Table 1 shows the existing roadway characteristics for study roadways.

[1] ODOT Development Review Guidelines, Table 3.2: TIA Thresholds and Analysis Areas
https://www.oregon.gov/ODOT/Planning/Documents/Development-Review-Guidelines.pdf



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Traffic Signal | STOP Stop Sign | = Existing Lane Configuration

= Study Intersection | LT TH RT = Left / Through / Right Turn

Figure 1: Vicinity Map

Figure 2: Preliminary Site Plan

Table 1: Roadway Characteristics

Roadway	Functional Classification[1]	Posted Speed Limit	Sidewalks	Transit	Bike Lanes	Lane Geometry	On-Street Parking
OR 99E	Arterial	40 mph	Both Sides	Trimet Lines 33 and 99	Both Sides	Two 11'-12' lane in each direction and a two-way left-turn lane	None
Dartmouth Street	Collector	25 mph	Both Sides	Trimet Line 31	None	One 14'-15' lane in each direction	Both Sides
Portland Avenue	Arterial	20 mph	Both Sides	Trimet Lines 31 and 34	None	One 11'-12' lane in each direction and a two-way left-turn lane	Both Sides
Oatfield Road	Arterial	35 mph	Both Sides	Trimet Lines 31 and 32	Both Sides	One 10-11' lane in each direction and a two-way left-turn lane	None

Notes: [1]Based on the Gladstone TSP

VOLUME DEVELOPMENT

2020 Base Year Volumes

Traffic counts at the study intersections will be gathered during the typical AM and PM peak traffic periods of 6:30 AM to 8:30 AM and 4:00 PM to 6:00 PM in November 2020. The 2020 base year volumes will be developed using these traffic counts and adjustment factors determined in coordination with the City and ODOT regarding traffic pattern disruptions due to COVID-19.

Seasonal Adjustment Factor

The collected count data will be seasonally adjusted to represent the 30th Highest Hour Volume (30HV) for existing conditions per Chapter 5 of the APM-V2. There is one permanent traffic recorder station (ATR) just south of SE Concord Road on OR 99E. A seasonal adjustment factor will be developed based on rates for this intersection in The ATR Characteristic Table. For the vicinity ATR, the peak month was determined to be August. The following formula will be used to convert the existing traffic data to the 30HV:

30HV = (November PHV) x (Peak Month Percent of ADT/Count Month Percent of ADT).

2023 Future Year Volumes

Future 2023 volumes will be based on the 30HV and developed per Chapter 6 of the APM-V2. Coordination will be conducted with City of Gladstone ODOT staff to identify volume adjustments that should be made for in-process development traffic volumes. The 2023 total traffic volumes will be comprised of the 30HV volumes plus background growth and in-process volumes. A background growth rate of 2% per year will be used.

Site Trip Generation and Distribution

The Institute of Transportation Engineer's (ITE) *Trip Generation Manual, 10th Edition* will be used to identify appropriate trip generation rates for the proposed development based on the land use. Rated average or fitted curve equations as recommended by Chapter 4 of the ITE *Trip Generation Handbook* will be utilized in the trip generation development. Estimates will be developed for AM peak hour, PM peak hour, and Average Daily Trips (ADT).

The proposed development will be a 6,000 square foot library. The library will replace a 5,000 square foot City Hall. In review of ITE land use codes, the trips generated by the new development will most closely be represented by the ITE Land Use Code 590 (Library) and trips previously generated by Gladstone City Hall will most closely be represented by Code 730 (Government Office Building). Table 2 summarizes an estimate of the average rates per 1000 square feet of gross floor area:

Table 2: Gladstone Library Trip Generation Summary

ITE Land Use Code	Size (ksf)	Peak Hour Rate		AM Peak Hour			PM Peak Hour			Weekday Daily Total
		AM	PM	Total	In	Out	Total	In	Out	
Proposed										
590	6	1.0	8.16	6	4	2	49	24	25	432
Existing										
730	5	3.34	1.17	17	13	4	9	2	7	113
Net New Site Trips										
				-11	-9	-2	40	22	18	319

The peak hour turning movement counts obtained at study intersections will be used to distribute site generated vehicle traffic to the transportation network.

TRAFFIC ANALYSIS

Intersection Operational Standards

The intersection operational analysis will follow ODOT and City of Gladstone requirements for peak hour operating conditions. The Volume-to-Capacity (v/c) ratio will be used as the standard measure of intersection operations. The analysis will be conducted utilizing the Synchro analysis software. Existing signal timing will be acquired from ODOT and/or the City of Gladstone for all study area signalized intersections for use in the analysis. Standards and Targets to be used in the analysis are listed in Table 3.

Table 3: LOS Standards and V/C ratio Targets

Jurisdiction	Roadway Types	Standards and Targets	
		LOS	V/C
City of Gladstone	All signalized and Unsignalized Roadways	E or better[2]	-
ODOT	Non-MPO Outside of STAs where nonfreeway posted speed <= 35 mph, or a Designated UBA	D and above	0.90

Analysis Parameters

Parameters for use in the traffic analysis will be gathered using varying sources and methodologies. Parameters listed in *Table 5: Synchro Operations Parameters/Assumptions* of the Gladstone TSP[3] will be used as the main source. Data needed that is not available in the TSP will be gathered via aerial photos and site visits. Table 4 lists the various data sources.

Operational Analysis

Both existing and future conditions will be analyzed using Synchro 9 analysis software. Queues determined by SimTraffic will be 95th percentile queues and volume to capacity (v/c) ratios calculated will be reported as the average v/c for the intersection.

Existing Conditions (2020)

For existing 2020 conditions, information identified in Table 4 will be gathered from field visits and historical data. This information along with 30HV traffic volumes will be used in developing the baseline operations for study intersections.

Year of Opening (2023)

The 2023 year of opening operational analysis will include any state and local transportation improvements that will be affected by the proposed site development. Default values for the Synchro

[2] https://www.ci.gladstone.or.us/sites/default/files/fileattachments/public_works/page/149/2017_transportation_system_safety_plan_with_appendices.pdf; Page 5.

[3] https://www.ci.gladstone.or.us/sites/default/files/fileattachments/public_works/page/149/2017_transportation_system_safety_plan_with_appendices.pdf; Page 7.

and SimTraffic analyses will follow the requirements of Section 7.3.5 of the APM-V1. For all un-signalized intersections with v/c ratios meeting or exceeding mobility targets, traffic signal warrants will be evaluated to determine if any intersection control improvements are recommended. The need for two-way stop, all-way stop, right/left turn channelization, signals, and roundabouts will be explored based on analysis results and traffic signal warrant analysis.

Table 4: Analysis Parameters

Parameter	Descriptions	Source
Intersection and roadway geometry	Number of lanes, lane configuration and cross-sectional information	TSP, Aerial photos and field measurements
Operational Data	Existing sight distance, posted speed limits, intersection control	TSP, GIS data, aerial photos, and field visit
Traffic Volumes	Peak hour volumes, AADT	Obtained from new AM and PM Peak Hour Turn Movement Volume
Traffic Operations	v/c, LOS	Synchro 9 analysis using HCM 2000 for signalized intersection and HCM 2010 for unsignalized intersections.
Peak Hour Factor		From traffic counts
Conflicting bikes and pedestrians per hour		From traffic counts, as available
Ideal Saturation Flow Rate (for all movements)		1,750 passenger cars per hour green per lane
Lane Width		12 feet unless field observations suggest otherwise
Percent Heavy Vehicles		From traffic counts by movement, as available
Percent Grade		Estimated based on field observation
Parking Maneuvers per Hour		Estimated based on field observation
Bus Blockages		Estimated based on frequency of service
Intersection signal phasing and coordination		From ODOT/County/City
Intersection signal timing optimization limits		Maximum cycle length = 120 seconds
Minimum Green time		From timing plans
Yellow and all-red time		From timing plans
95th percentile vehicle queues		Synchro HCM summary output

SAFETY EVALUATION

Sight Distance Evaluation

An evaluation of intersection and stopping sight distance for each approach of the proposed driveway will be conducted to identify any safety concerns due to vertical or horizontal alignments of roadway approaches to study intersections. Evaluation criteria will follow the appropriate intersection sight distance conditions as outlined in the American Association of State Highway and Transportation Official's (AASHTO), *A Policy on Geometric Design of Highway and Streets.*

Crash Analysis

Traffic safety analysis will be conducted for state and non-state roadways as part of the existing conditions summary. The most recent five years of available crash data will be reviewed and analyzed for potential crash patterns. Average Daily Traffic volumes developed for traffic analysis will be used in the crash analysis calculations. The following analysis will be conducted:

- An overall assessment of crash types, severities, and trends will be reviewed and documented.
- The safety analysis will be conducted based on the Highway Safety Manual (HSM) predictive methods. Locations flagged by the HSM method will be flagged as a potential safety issue.
- The last three years of the Safety Priority Index System (SPIS) will be analyzed to determine if any Top 5% or 10% sites exist within the project area. Locations within the Top 5% or 10% SPIS sites will be flagged as a potential safety issue.
- Intersection crash rates will be compared to the published intersection 90th percentile crash rates in APM-V2 Exhibit 4-1. Rates that are close to the 90th percentile rate will be further analyzed for crash patterns and contributing factors. Locations exceeding the 90th percentile crash rate for intersections, will be flagged as a potential safety issue.
- Segment crash rates will be compared to Table II of the currently published statewide crash rates for similar facilities, summarized in the ODOT State Highway Crash Rate Tables. This analysis will be conducted over a ¼ mile roadway segment from the project site. Locations exceeding Table II rates for segments will be flagged as a potential safety issue.

Identified safety issues and ODOT SPIS sites will be mapped and crash patterns will be identified and mitigation measures recommended as applicable.

Parking Evaluation

A parking evaluation will be performed to determine the needs of the library parking in comparison to the previous City Hall parking. The latest editing of the ITE Parking Generation Manual will be used to determine any changes in parking demand for the site. A parking occupancy study is not anticipated, but can be added if required by the City of Gladstone.

SUMMARY

This traffic impact analysis will consist of the following elements as outlined in Section 5.0014 of the City of Gladstone Public Works Standards:

- Study Purpose and Objectives
- Executive Summary
- Description of Site and Study Area Streets
    - Project Site Description
    - Off-Site Inventory and Existing Conditions Analysis
        - Off-Site Inventory
        - Crash Analysis
        - Sight Distance evaluations.
- Off-Site Traffic Analysis
    - Project Travel Demand Analysis
        - Trip Generation
        - Trip Distribution
    - Off-Site Traffic Impact Analysis
- Parking Evaluation
- Access Standards
- Conclusions and Recommendations
- Appendix

Each element will be evaluated as detailed in either this Methodology Memorandum or Section 5.0014 of the Public Works Standards and will comply with the requirements of ODOT and the City of Gladstone.