clemow
associates LLC

TRANSPORTATION IMPACT STUDY

To
City of Milwaukie

For
Milwaukie Mixed-Use Development
9391 SE 32nd Avenue

Prepared
May 11, 2020

Revised
August 20, 2020

C&A Project Number
20200201.00

City of Milwaukie File Number
VR-2019-013

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I. INTRODUCTION

Property Description and Proposed Land Use Actions

The subject property located at 9391 SE 32nd Avenue is in the northwest corner of SE 32nd Avenue/SE Olsen Street intersection and is specifically described as tax lot 7700 on Clackamas County Assessors Map 11E25BD. The proposed mixed-use development includes 1,295 square feet of ground-floor retail and two floors of residential uses consisting of 18 apartments.

The existing auto repair establishment will be demolished. The existing 32nd site access will be closed, and the existing Olsen accesses will be consolidated into a single entry/exit, serving the proposed development's ground-level parking area. The proposed development is illustrated in the attached site plan and Figure 1 in Appendix A.

Transportation Analysis Description

The proposed development is consistent with the existing Neighborhood Mixed-Use (NMU) zoning. Based on materials contained in the January 23, 2020 City of Milwaukie *Transportation Impact Study (TIS) Checklist* prepared by Amanda Deering of DKS Associates and email correspondence with City staff, a detailed TIS is required to address City requirements. The checklist and email correspondence are included in Appendix B.

Following City review of the May 11, 2020 TIS, this revision also includes access study supporting a modification of the access spacing standard established in Milwaukie Municipal Code (MMC) Section 12.16.040.C.4. This modification allows for the proposed Olsen Street access to be less than the minimum 300-foot spacing from 32nd Avenue.

Analysis Intersections

Per City TIS requirements, specific intersection operations analysis is required. Based on development trip generation and distribution described later in this analysis, the following table presents the relative impacts to the study intersections:

TABLE 1 – STUDY INTERSECTION IMPACTS

Intersection	AM Peak Hour		PM Peak Hour	
	Development Trips	Trip Volume Increase	Development Trips	Trip Volume Increase
SE 32nd Avenue / SE Olsen Street	3	0.5%	2	0.2%
SE 32nd Avenue / SE Harrison Street	2	0.2%	2	0.2%

As identified in the previous table, the proposed development is trip generation is low, resulting in the development causing a <1% intersection traffic volume increase. Because daily traffic fluctuations at these same intersections are typically greater than 5%, the subject development has *de minimus* transportation system impacts that cannot be quantified/measured. Regardless, at City request, intersection operations analysis is performed.

Analysis Scenarios

The proposed development will be constructed in one phase and is anticipated to be occupied by 2022. As such, the following analysis scenarios include:

- 2020 Current (Existing) Conditions
- 2022 Pre-Development Conditions
- 2022 Post-Development Conditions

II. EXISTING CONDITIONS

Existing Site Conditions

The subject property is located in the northwest corner of SE 32nd Avenue/SE Olsen Street intersection and is specifically described as tax lot 7700 on Clackamas County Assessors Map 11E25BD.

The property is currently developed with an existing auto repair establishment that will be demolished. The existing site access to 32nd will be closed and the accesses to Olsen will be consolidated to a single entry/exit, providing access to the ground-level parking area.

Roadway Facilities

The following table summarizes existing roadway classifications and characteristics within the study area.

TABLE 2 – EXISTING ROADWAY CHARACTERISTICS

Roadway	Functional Classification	Lanes	Speed Limit (MPH)	Sidewalks	Bicycle Lanes	On-Street Parking
SE 32nd Avenue	Collector	2	25	Yes	No	No
SE Harrison Street	Arterial	2-3	25	Yes	No	Yes
SE Olsen Street	Neighborhood Route (east of 32nd)	2	25	South Side Only	No	No
SE Olsen Street	Local (west of 32nd)	2	25	No	No	Yes

Safety Analysis

When evaluating intersection safety, consideration is given to the total number and types of crashes occurring and the number of vehicles entering the intersection. This leads to the concept known as "crash rate," typically expressed in terms of the number of crashes occurring per one million vehicles entering the intersection (crashes/mev). A critical crash rate analysis is then performed by comparing the subject intersection to the published statewide 90th percentile intersection crash rates at comparable/reference intersections. Crash rates close to or exceeding 1 crash/mev, or the 90th percentile rates require further analysis.

Crash data for the study area intersections were obtained from the Oregon Department of Transportation (ODOT) for five years from January 1, 2013 through December 31, 2017. The following table presents the study intersection crash rates and critical crash analysis. Crash data and crash rate calculations are provided in Appendix C.

TABLE 3 – INTERSECTION CRASH RATES										
Intersection	2013	2014	2015	2016	2017	Total	Crash Rate (crashes/mev)	Reference Population	90th%ile Crash Rate	Over or under Crash Rate?
SE 32nd Avenue / SE Olsen Street	0	0	1	0	0	1	0.091	Urban 4ST	0.408	Under
SE 32nd Avenue / SE Harrison Street	1	0	2	4	3	10	0.399	Urban 4ST	0.408	Under

All study area intersection crash rates are less than 1.0 crashes/mev, and less than the 90th percentile crash rates of the reference intersections; therefore, the intersections are considered relatively safe and no further evaluation of safety deficiencies is necessary.

Transit Facilities

Tri-Met currently operates one bus route in the immediate project area and is described as follows:

- **Route 75** – Cesar Chavez/Lombard – connects Milwaukie, SE Portland, Hollywood, N/NE Portland, and St. Johns, via Harrison, 32nd, Johnson Creek, 45th, Cesar E Chavez Blvd, 42nd, Columbia, Dekum, and Lombard. The route operates with frequent service, i.e., headways of 15 minutes or less most of the day, every day.

Intersection Traffic Volumes

Because it is not currently possible to obtain typical/average intersection traffic count data, the City of Milwaukie provided 2018 count data for the SE 32nd Avenue/SE Harrison Street and SE 32nd Avenue/SE Johnson Creek Boulevard intersections with instruction to apply an annual background growth rate to estimate current year traffic volumes. A copy of this data is included in Appendix D.

Background Growth

Consistent with City recommendations, and assumptions contained within the intersection traffic volume data provided by the City, a 2% annual background traffic growth rate was applied to the 2018 volumes to obtain 2020 (Existing) and 2022 (Development year) volumes which are illustrated in Figures 2 and 3 in Appendix A for the AM and PM peak hours.

III. SITE DEVELOPMENT

Development Trip Generation

Trip generation for the proposed mixed-use development and existing auto repair facility was estimated using the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition, and practices from the ITE *Trip Generation Handbook*, 3rd Edition and is presented in the following table.

TABLE 4 – DEVELOPMENT TRIP GENERATION

Land Use	ITE Code	Size	Daily	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
Proposed Development									
Multifamily Housing (Mid-Rise)	221	18 DU	98	1	5	6	5	3	8
Shopping Center	820	1,295 SF	49	1	0	1	2	3	5
Total Proposed Development Trip Generation			**147**	**2**	**5**	**7**	**7**	**6**	**13**
Existing Development									
Automobile Care Center	942	2,550 SF	60 [1]	*(4)*	*(2)*	*(6)*	*(4)*	*(4)*	*(8)*
New Trip Generation (Proposed Uses – Existing Uses)			**87 [2]**	**(2)**	**3**	**1**	**3**	**2**	**5**

[1] *Weekday* daily trip generation data not provided. Data presented for a *Saturday*.
[2] Considers *Saturday* daily trip generation for ITE Land Use 942.

As identified in the table above, the proposed development generates an additional 87 daily, 1 AM, and 5 PM peak hour trips over the existing development.

Trip Distribution and Traffic Assignment

Development trip distribution is based on existing traffic patterns, surrounding land uses, and engineering judgment.

The resulting trip distribution and traffic assignment are illustrated in the attached Figures 2 and 3 in Appendix A for the AM and PM peak hours.

IV. INTERSECTION ANALYSIS

Analysis Scope

Based on City TIS requirements, operations analysis is performed at the following intersections:

- SE 32nd Avenue/SE Olsen Street
- SE 32nd Avenue/SE Harrison Street

The existing site access to 32nd will be closed and the accesses to Olsen will be consolidated to a single entry/exit.

Analysis Description

Intersection peak hour factors (PHFs) were not included in the summarized traffic count data provided by the City. As such a 0.90 PHF is assumed for all intersections in all scenarios.

Intersection operation characteristics are generally defined by two mobility standards: volume-to-capacity (v/c) ratio and level-of-service (LOS). At signalized intersections, the v/c ratio is a measurement of an intersection's ability to accommodate the critical movements, while LOS is based on the average control delay per vehicle for the entire intersection. At unsignalized intersections, the v/c ratio and LOS are calculated for intersection approach movements yielding right-of-way.

Referring to the City of Milwaukie TSP materials, the Milwaukie Municipal Code (MMC), Section 19.1407.4(A) identifies a minimum operating standard of LOS D during peak operating conditions for all intersections. A review of the current MMC does not find this code section; however, MMC Section 19.704.1 contains a reference to *"intersection level of service (LOS)"* but no operating standards are identified. Notwithstanding there does not appear to be a currently identified operating standard, LOS D is assumed.

Operations Analysis

Intersection operations analyses were performed per the Transportation Research Board's *Highway Capacity Manual 6th Edition* methodologies using Trafficware's *Synchro* software (Version 11).

The proposed mixed-use development is an allowed use in the current zone designation. The development will be constructed in one phase and is anticipated to be occupied by 2022. As such, the following analysis scenarios include:

- 2020 Current (Existing) Conditions
- 2022 Pre-Development Conditions
- 2022 Post-Development Conditions

The following table summarizes weekday peak hour operation analysis results. Data output sheets from all operations calculations are in Appendix E.

TABLE 5 – INTERSECTION OPERATIONS ANALYSIS

Intersection	Critical Movement Lane Group	Mobility Target	Operations					
			2020 30HV Existing		2022 30HV Pre-Development		2022 30HV Post-Development	
			AM	PM	AM	PM	AM	PM
SE 32nd Avenue / SE Olsen Street	NB L/T/R	LOS D	A	A	A	A	A	A
	SB L/T/R	LOS D	A	A	A	A	A	A
	EB L/T/R	LOS D	B	B	B	B	B	B
	WB L/T/R	LOS D	B	B	B	B	B	B
SE 32nd Avenue / SE Harrison Street	Intersection	LOS D	B	B	C	B	C	B

As identified in the table above, all intersections are anticipated to operate within agency mobility standards in all analysis scenarios. As previously noted, the proposed development is trip generation is low, resulting in the development causing a <1% intersection traffic volume increase. Because daily traffic fluctuations at these same intersections are typically greater than 5%, the subject development has *de minimus* transportation system impacts that cannot be quantified/measured.

V. TRANSPORTATION ANALYSIS

The following addresses specific items from the January 23, 2020 City of Milwaukie *Transportation Impact Study Checklist* in italics followed by the applicant's response in plain text.

Checklist Item: *Demonstrate compliance with applicable access spacing standards for any proposed driveways. If access spacing standards cannot be met, access restrictions should be recommended.*

Applicant Response: The existing site access to 32nd will be closed and the accesses to Olsen will be consolidated to a single entry/exit, providing access to the ground-level parking area. The proposed Olsen access is located as far away from 32nd as practical, as illustrated on the attached site plan in Appendix A. Noting the access is 50 feet (measured edge to edge) from 32nd, the applicant is requesting a modification of the access spacing standard established in Milwaukie Municipal Code (MMC) Section 12.16.040.C.4 which is presented in the following section of this analysis.

Checklist Item: *Analysis of sight distance at the site access point(s).*

Applicant Response: The proposed access to Olsen is located in an area where there is no horizontal or vertical roadway curvature. As such there are no sight distance obstructions. Further, the proposed site design provides the necessary clear vision areas.

Checklist Item: *Evaluate safe-routes-to-school for the site (generally ½ to 1-mile walking radius) and identify any necessary pedestrian facility improvements. Identify any nearby school bus stops (Contact the school district).*

Applicant Response: Ardenwald Elementary School, located at 8950 SE 36th Avenue, is within a 1-mile walking distance of the subject site. Except for 32nd, all roadways between the school and the subject site are functionally classified as a *Neighborhood Route* or a *Local* roadway. All roadways have sidewalks, and striped crosswalks are provided along the route-to-school.

It is further noted the Milwaukie TSP Pedestrian Element identifies Project "R" as a low priority project to fill in the sidewalk gaps on the north side of Olsen from 32nd to 42nd. This project is not funded. Refer to the Milwaukie TSP Pedestrian Master Plan map in Appendix F.

Checklist Item: *Analysis of public facility adequacy for pedestrians, bicycles, and public transportation access to the site and identification of the nearest transit stop (if within 1/2 mile of the project site).*

Applicant Response: The Milwaukie TSP Pedestrian Element identifies numerous locations adjacent 32nd, Harrison, and Olsen as having sidewalks less than 5 feet wide. The TSP also identifies Project "R" as a low priority project to fill in the sidewalk gaps on the north side of Olsen from 32nd to 42nd. This project is not funded.

The Milwaukie TSP Bicycle Element identifies Project "L" as a low priority project to fill in bike lane gaps on Harrison from Hwy 224 to 42nd. This project is not funded. The TSP also identifies Project "AU" to provide a bicycle crossing at Harrison/31st. No project priority is identified, and it is unfunded.

The Milwaukie TSP Public Transit Element identifies Tri-Met Route 75 as operating on 32nd. The route operates with frequent service, i.e., headways of 15 minutes or less most of the day, every day. There are transit stops on both sides of 32nd at Olsen.

Refer to the Milwaukie TSP Pedestrian, Bicycle, and Public Transit Master Plan maps in Appendix F.

Checklist Item: *Identify accessibility to public transit.*

Applicant Response: Tri-Met Route 75 operates on 32nd with frequent service, i.e., headways of 15 minutes or less most of the day, every day. There are transit stops on both sides of 32nd at Olsen.

Checklist Item: *Identify any access deficiencies (including transit/pedestrian/bicycle connections).*

Applicant Response: There are no access deficiencies immediately adjacent to the project site. Within the larger study area, there are pedestrian and bicycle system deficiencies as identified above.

Checklist Item: *Identify any TDM measures.*

Applicant Response: Due to the residential, and small commercial nature of the project, the applicant is not proposing any TDM measures.

Checklist Item: *Parking Supply Analysis.*

Applicant Response: The applicant is proposing to construct 17 on-site parking spaces. On-street parking is available in the project area on both sides of Olsen.

VI. MODIFICATION OF THE ACCESS SPACING STANDARD

Specific to site access improvements, per MMC 12.16.040.B.2 criteria presented below, the Applicant is requesting a modification of the *Accessway Location* criteria contained in MMC 12.16.040.C.4, also presented below, to provide less than the minimum 300-foot access spacing from a collector roadway.

The following presents the applicable MMC approval criteria followed by the Applicant's modification request and supporting access study findings.

MMC 12.16.040.B.2 *– Modification of Access Spacing*

Access spacing may be modified with submission of an access study prepared and certified by a registered professional traffic engineer in the State of Oregon. The access study shall assess transportation impacts adjacent to the project frontage within a distance equal to the access spacing requirement established in Subsection 12.16.040.B.1. For example, for a site with arterial access, the access study would include evaluation of site access and capacity along the project frontage plus capacity and access issues within six hundred (600) feet of the adjacent property. The access study shall include the following:

a. Review of site access spacing and design;

b. Evaluation of traffic impacts adjacent to the site within a distance equal to the access spacing distance from the project site;

c. Review of all modes of transportation to the site;

d. Mitigation measures where access spacing standards are not met that include, but are not limited to, assessment of medians, consolidation of accessways, shared accessways, temporary access, provision of future consolidated accessways, or other measures that would be acceptable to the Engineering Director.

MMC 12.16.040.C.4 *– Accessway Location – Distance from Intersection*

To protect the safety and capacity of street intersections, the following minimum distance from the nearest intersecting street face of curb to the nearest edge of driveway apron shall be maintained. Where intersecting streets do not have curbs, the distance shall be measured from the nearest intersecting street edge of pavement. Distance from intersection may be modified with a modification as described in MMC Section 12.16.040.B.2.

a. At least forty-five (45) feet for single-family residential properties accessing local and neighborhood streets. Where the distance cannot be met on existing lots, the driveway apron shall be located as far from the nearest intersection street face of curb as practicable.

b. At least one hundred (100) feet for multifamily residential properties and all other uses accessing local and neighborhood streets.

c. At least three hundred (300) feet for collectors, or beyond the end of queue of traffic during peak hour conditions, whichever is greater.

d. At least six hundred (600) feet for arterials, or beyond the end of queue of traffic during peak hour conditions, whichever is greater.

Applicant Response: The existing 32nd site access will be closed, and the existing Olsen accesses will be consolidated into a single entry/exit, serving the proposed development's ground-level parking area.

The proposed Olsen access is 50 feet (measured edge to edge) from 32nd, which is less than the MMC-required 300-foot minimum from a *Collector* roadway. The proposed access location is illustrated on the attached site plan in Appendix A.

The subject property has frontage on both 32nd and Olsen. Consistent with MMC 12.16.040.C.1, the proposed Olsen access is on the roadway with the lowest functional classification, i.e., *Local* versus *Collector*.

The property frontage on Olsen is less than 300 feet; therefore, it is not possible to meet the access spacing standard. As such, the proposed Olsen access is located as far away from 32nd as practical, and is located in an area where there is no horizontal or vertical roadway curvature, or resulting sight distance obstructions. Further, the proposed site design provides the necessary clear vision areas.

The proposed access to Olsen is located (approximately) directly across from the Milwaukie Café and Bottle Shop access. As such, there are not anticipated to be any overlapping motor vehicle left-turning conflicts.

Based on the weekday peak hour operation analysis results, the westbound 95th-percentile queue length is 0.2 vehicles (approximately 5 feet) during the AM peak hour and 0.1 vehicles (approximately 3 feet) during the PM peak hour. As such, the proposed access location is not anticipated to conflict with the westbound queue. Data output sheets from all operations calculations are in Appendix E

Overall, the proposed Olsen access is located in the best practical location and is anticipated to operate safely and efficiently. As such, the Applicant's requested modification of the *Accessway Location* criteria contained in MMC 12.16.040.C.4 can be approved.

VII. CONCLUSION

The following summary and recommendations are based on the materials contained in this analysis.

1. The subject property located at 9391 SE 32nd Avenue is in the northwest corner of SE 32nd Avenue/SE Olsen Street intersection and is specifically described as tax lot 7700 on Clackamas County Assessors Map 11E25BD.

2. The proposed mixed-use development includes 1,295 square feet of ground-floor retail and two floors of residential uses consisting of 18 apartments. The existing auto repair establishment will be demolished. The existing 32nd site access will be closed, and the existing Olsen accesses will be consolidated into a single entry/exit, serving the proposed development's ground-level parking area.

3. The proposed development is trip generation is low, resulting in the development causing a <1% intersection traffic volume increase. Because daily traffic fluctuations at these same intersections are typically greater than 5%, the subject development has *de minimus* transportation system impacts that cannot be quantified/measured.

4. All study area intersection crash rates are less than 1.0 crashes/mev, and less than the 90th percentile crash rates of the reference intersections; therefore, the intersections are considered relatively safe and no further evaluation of safety deficiencies is necessary.

5. The proposed development generates an additional 87 daily, 1 AM, and 5 PM peak hour trips over the existing development.

6. All intersections are anticipated to operate within agency mobility standards in all analysis scenarios. The subject development has *de minimus* transportation system impacts that cannot be quantified/measured.

7. There are no transportation system deficiencies immediately adjacent to the project site. Within the larger study area, there are pedestrian and bicycle system deficiencies and the City of Milwaukie TSP identifies mitigating projects.

8. The proposed Olsen access is 50 feet (measured edge to edge) from 32nd, which is less than the MMC-required 300-foot minimum from a *Collector* roadway. Based on analysis findings, the proposed Olsen access is located in the best practical location and is anticipated to operate safely and efficiently. As such, the Applicant's requested modification of the *Accessway Location* criteria contained in MMC 12.16.040.C.4 can be approved.

VIII. APPENDICES

A. Figures

B. Agency Correspondence

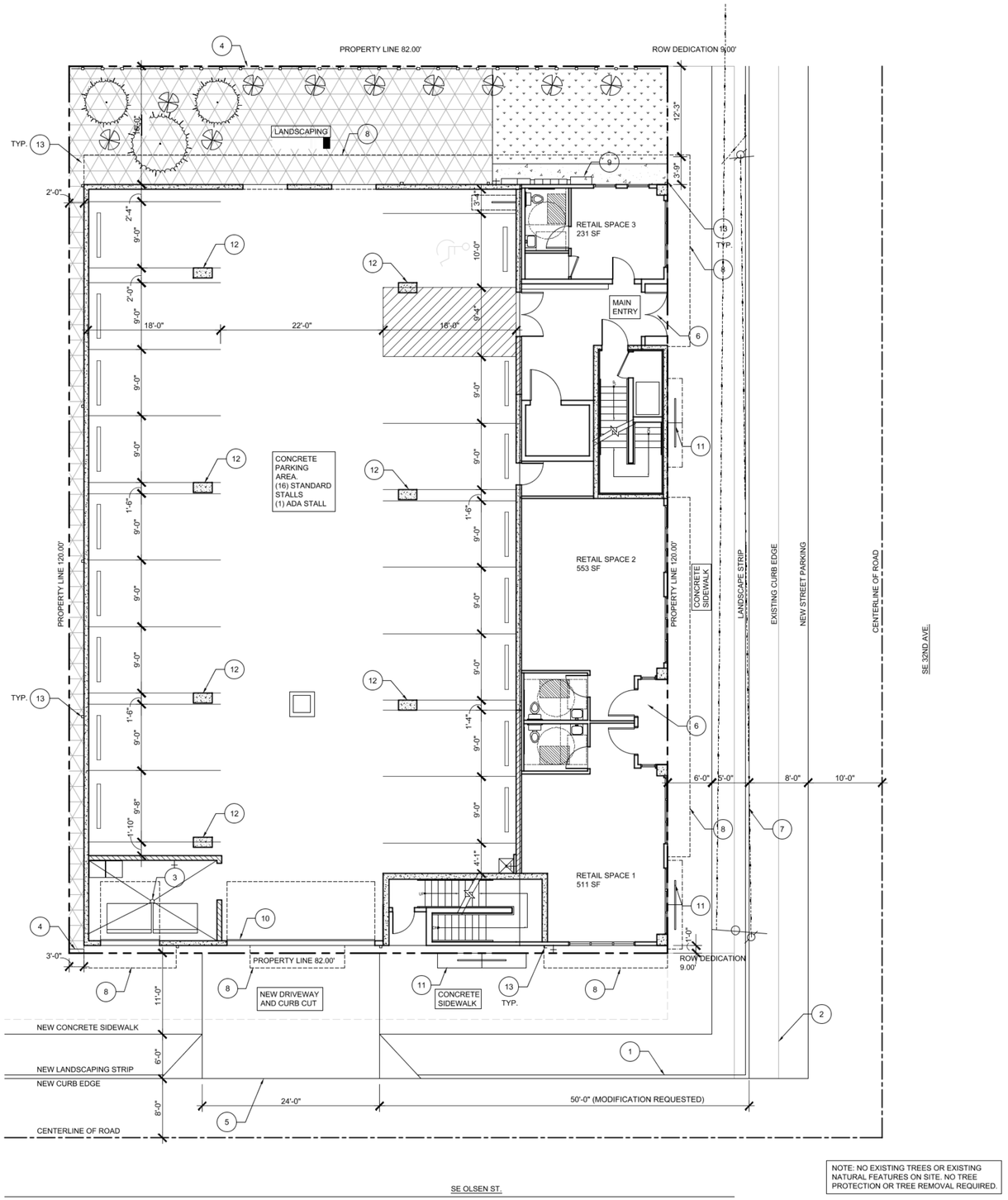
C. Crash Data

D. Traffic Count Summaries

E. Operation Analyses

F. TSP System Maps

Appendix A



NOTE: NO EXISTING TREES OR EXISTING NATURAL FEATURES ON SITE. NO TREE PROTECTION OR TREE REMOVAL REQUIRED.

TRUE NORTH

1 SD1.1 SITE PLAN

SCALE: 1/8" = 1'-0"

SITE PLAN LEGEND

PROPERTY LINE

NEW FENCE. SEE DETAIL 1/SD2.1

PROPERTY INFORMATION

ADDRESS: 9391 SE 32ND AVE. MILWAUKIE, OR 97222

PROJECT: 1,295 SF RETAIL AND PARKING ON FIRST FLOOR, WITH 18 APARTMENT UNITS LESS THAN 800 SF.

LEGAL DESCRIPTION

LEGAL DESCRIPTIONS: ARDENWALD, BLOCK 5, LOT 21 AND 22

TAX LOT ID: 11E25BD07700

PARCEL NUMBER: 00008547

ZONING CODE INFORMATION

BASE ZONE: NMU (NEIGHBORHOOD MIXED USE)

SITE AREA: 0.24 ACRES (10,800 SF)

PROPOSED SITE INFORMATION:

PLOT: 9,720 SF

BUILDING FOOTPRINT: 8,140 SF (84%)

EXTERIOR CONCRETE PAVING: 80 SF (0.5%)

PROPOSED LANDSCAPING: 1,500 SF (15.5%)

MINIMUM FAR ALLOWED: 0.5:1

BUILDING HEIGHT:

MAXIMUM ALLOWABLE HEIGHT (TABLE 19.303.3):	45'-0"
ACTUAL HEIGHT:	45'-0"

MAX SETBACKS ALLOWED:

MAXIMUM STREET SETBACK: 10'-0"
ACTUAL STREET SETBACK: 1'-0"

AUTOMOBILE PARKING REQUIREMENTS (TABLE 19.605.1):

MULTI-FAMILY HOUSING (1:UNIT): 18
COMMERCIAL (2:1000 SF): 3
SUBTOTAL: 21
PROXIMITY TO MASS TRANSIT (20% REDUCTION): -4
TOTAL REQUIRED: 17

BICYCLE PARKING REQUIREMENTS (TABLE 266-6):

BIKE PARKING MIN. OF 22 REQUIRED, 22 TO BE PROVIDED.
LOCATED IN UNITS, SEE FLOOR PLANS. 1 IN EACH UNIT, 1 IN PARKING FOR RETAIL

STANDARD BIKE PARKING (MIN OF 1 SPACE REQUIRED).

ENCLOSED BIKE PARKING (1 PER UNIT, 50% MINIMUM OF REQUIRED)

SEE SECTION: 19.609.2

FLOOR AND BUILDING COVERAGE AREA:

FIRST FLOOR COVERED PARKING AREA/RETAIL:	8,066 SF
SECOND FLOOR BUILDING AREA:	8,682 SF
THIRD FLOOR BUILDING AREA:	8,682 SF
TOTAL AREA (INCLUDING COVERED PARKING):	25,430 SF

SITE PLAN GENERAL NOTES

EXISTING INFORMATION IS BASED ON DRAWINGS PROVIDED BY AKS.

DIMENSIONS ARE TO FACE OF CURB, FACE OF BUILDING, PROPERTY LINE, OR CENTER OF PAINT STRIPING UNLESS NOTED OTHERWISE.

WHERE ACCESS TO OR WITHIN A STRUCTURE OR AN AREA IS RESTRICTED BECAUSE OF SECURED OPENINGS OR WHERE IMMEDIATE ACCESS IS NECCESARY FOR LIFE-SAVING OR FIRE FIGHTING PURPOSES A "KNOXBOX" KEY BOX SHALL BE INSTALLED IN AN APPROVED LOCATION.

PLANT KEY

SYMBOL	LANDSCAPING TYPE	SIZE	COUNT
TREES			
	MEDIUM SIZED DECIDUOUS TREE PER OWNER AND MARKET AVAILABILITY *NOTE: MUST PROVIDE 3'X3' MIN PLANTING AREA	2" CAL 4' ABOVE GRADE	3
SHRUBS			
	LANDSCAPE SHRUBS PER OWNER AND MARKET AVAILABILITY	1 GAL. 3' O.C.	10
GROUND COVER			
	MULCH PER OWNER		
	GRASS PER OWNER		

SITE PLAN KEYNOTES

1. EXISTING CONCRETE CURB TO REMAIN.
2. EXISTING CURB TO BE REMOVED.
3. TRASH AND RECYCLING ROOM. PROVIDE DRAIN THAT CONNECTS TO A SANITARY SEWER WASTE LINE. SEE PLUMBING DRAWINGS FOR ADDITIONAL INFORMATION.
4. NEW 6' HIGH CHAIN LINK FENCE WITH PRIVACY SLATS. PAINTED BLACK PER OWNER. SEE 1/SD2.1
5. NEW CONCRETE OR ASPHALT DRIVEWAY WITH NEW CURB EDGE. SEE CIVIL DRAWINGS.
6. NEW CONCRETE PAVING. SEE STRUCTURAL DRAWINGS
7. NEW DEDICATION AND FRONTAGE IMPROVEMENTS. SEE CIVIL DRAWINGS.
8. FACE OF BUILDING ABOVE
9. ELECTRICAL GEAR. SEE DRAWINGS BY ELECTRICAL AND COORDINATE WITH PGE. PROVIDE CONCRETE PAD
10. 20' WIDE CONTROLLED ACCESS ENTRY GATE. SEE ELECTRICAL. PROVIDE KEYBOX FOR EMERGENCY ACCESS.
11. SHORT TERM BICYCLE PARKING AREA 2'x6' EACH, FOUR TOTAL. SEE DETAIL 10/SD2.1.
12. CONCRETE POST. SEE STRUCTURAL.
13. DOWNSPOUT, SEE ROOF PLANS A1.5 & A1.6.

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REGISTERED ARCHITECT · STATE OF OREGON ·
MILDRED WHITE
PORTLAND, OREGON
EXPIRES 12/31/2021

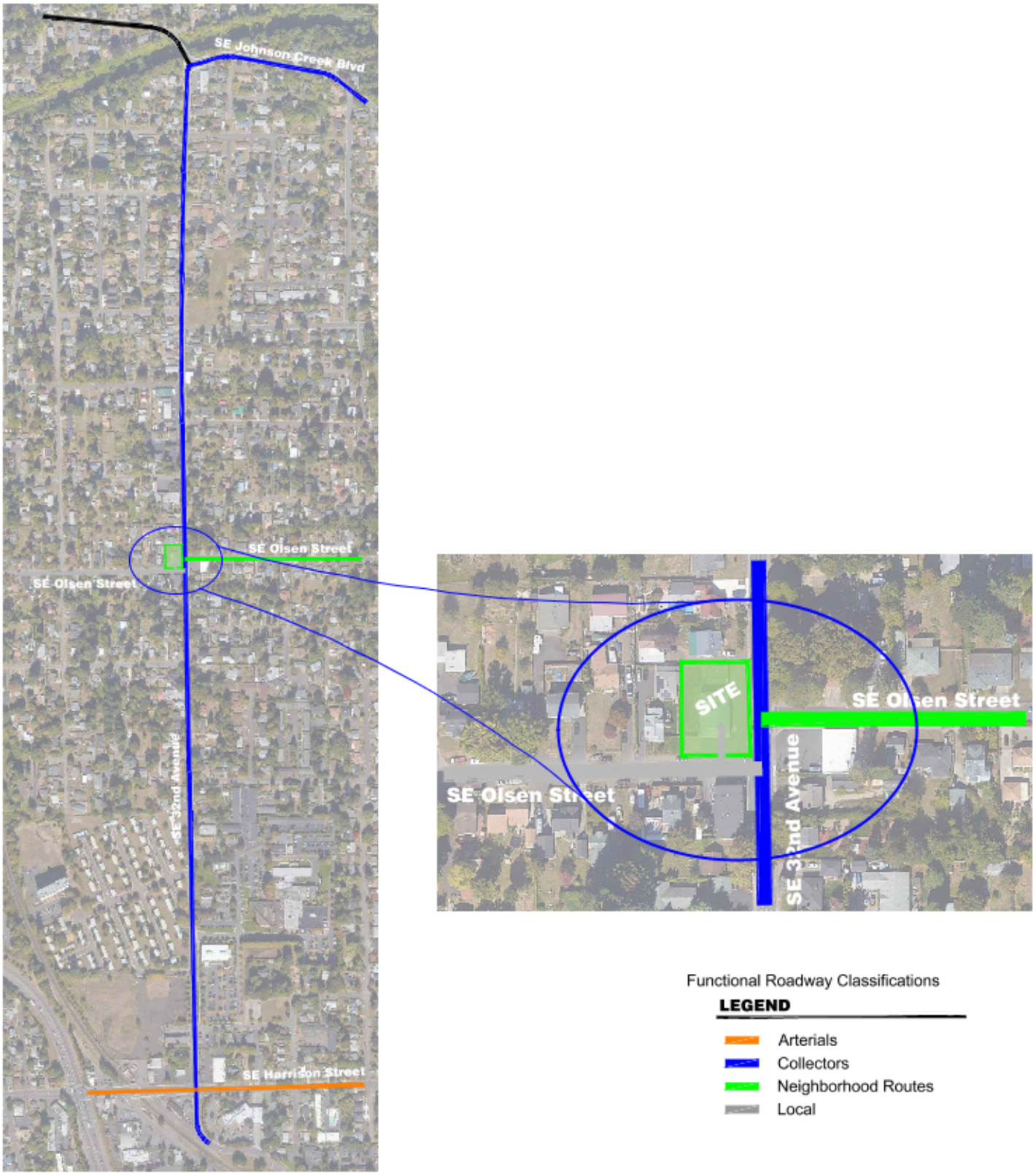
9391 SE 32nd Ave. Mixed-Use

9391 SE 32ND AVE,
MILWAUKIE, OR 97222

Proj # 201931

REVISIONS:
1 OWNER REVISION:04/28/20
2 OWNER REVISION:05/25/20

BUILDING PERMIT:
DATE: 4-16-20
SHEET NO.
SD1.1
SITE PLAN



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SITE AREA

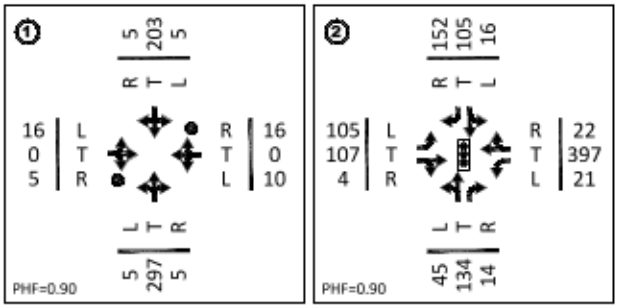
Milwaukie Mixed-Use Development - Milwaukie, Oregon

C&A Project No. 20200201.00

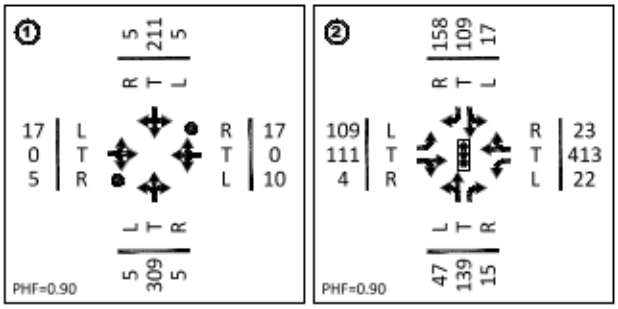
FIGURE 1

AM Peak Hour

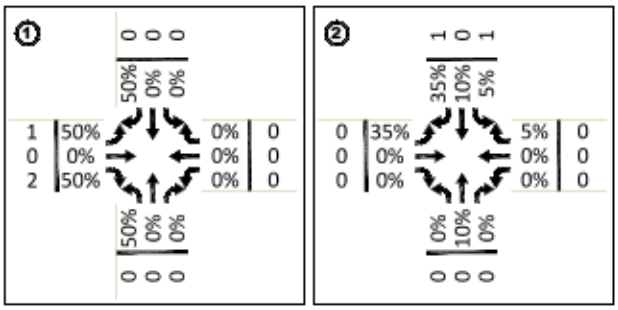
2020 Existing Traffic



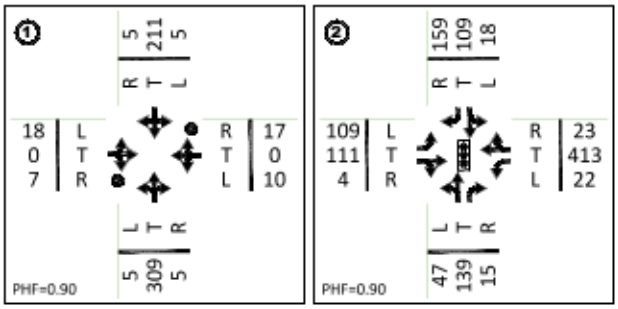
2022 Pre-Development Traffic



Development Trips



2022 Post-Development Traffic



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AM PEAK HOUR TRAFFIC VOLUMES

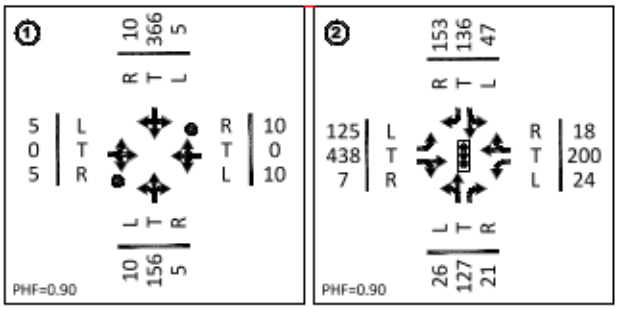
Milwaukie Mixed-Use Development - Milwaukie, Oregon

C&A Project No. 20200201.00

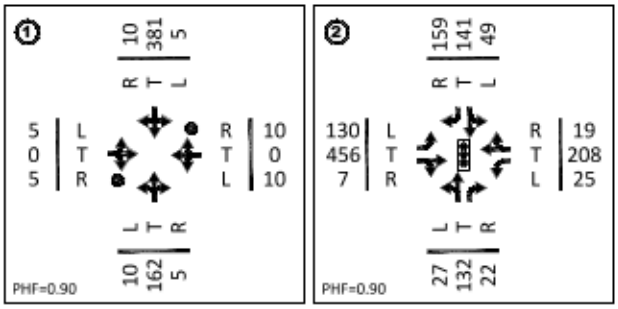
FIGURE 2

PM Peak Hour

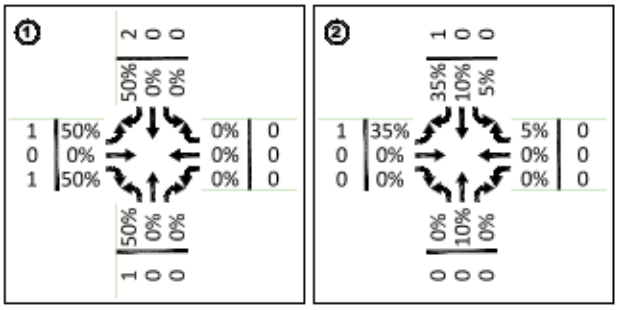
2020 Existing Traffic



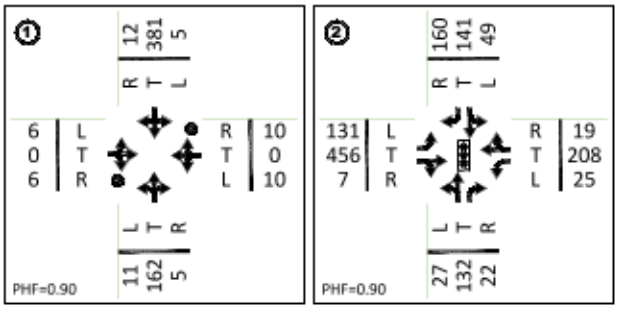
2022 Pre-Development Traffic



Development Trips



2022 Post-Development Traffic



clemow associates LLC
1582 Fetters Loop
Eugene, Oregon 97402
541-579-8315
cclemow@clemow-associates.com

PM PEAK HOUR TRAFFIC VOLUMES

Milwaukie Mixed-Use Development - Milwaukie, Oregon

C&A Project No. 20200201.00

FIGURE 3

Appendix B

Table 4: TRANSPORTATION IMPACT STUDY CHECKLIST

Project Name: 32nd Avenue Mixed Use_____
City Reference Code: _____

Score

THRESHOLD SCORING

Transportation Impact Study Required with score of 99 or greater

☒ Yes ❒ No Study Required Comment: _____ Date: _____

BACKGROUND INFORMATION ☒

☒ Yes ❒ No Oregon PE Stamp and Signature ❒

☒ Yes ❒ No **INTRODUCTION AND SUMMARY ☒**

EXISTING CONDITIONS ☒

☒ Yes ❒ No Roadway Network - summary of roadway classifications and description of study area
☒ Yes ❒ No Analysis Periods Correct (☒AM, ❒ Mid-day, ☒ PM, ❒ Afternoon (when classes let out), ❒ Saturday_____,❒ Sunday Church Peak , ❒ Weekday evening peak (for evening services)
☒ Yes ❒ No Existing Traffic Operations (☒ Existing Level of Service, ☒ traffic volumes, ❒speeds, ☒ accident data)

IMPACTS ☒

☒ Yes ❒ No ☒ Trip Generation - Daily, peak hour trips generated by site development: ITE Trip Generation Manual ❒Survey
☒ Yes ❒ No Level of Service Analysis - projected LOS with site build out, existing traffic, and background traffic growth
❒ Yes ☒ No Future year 20 year analysis *(Note: Assumes proposed used conforms with adopted zoning.)*
☒ Yes ❒ No Signal Warrant Analysis (peak hour warrants, if needed for capacity mitigation)
☒ Yes ❒ No Turn Lane Warrant Analysis (where applicable)
☒ Yes ❒ No Access Spacing Standards
☒ Yes ❒ No Analysis of sight distance at frontage road access point(s)
❒ Yes ☒ No Neighborhood Traffic Analysis
☒ Yes ❒ No Identify safe route to school or school bus stop (Contact with school district)
☒ Yes ❒ No Analysis of safe pedestrian/bicycle access to nearest transit stop (if within 1/2 mile of project site)
☒ Yes ❒ No Identify accessibility to public transit
☒ Yes ❒ No Parking Supply Analysis

MITIGATION ☒

☒ Yes ❒ No Identify need for right/left turn lanes, storage capacity and length
☒ Yes ❒ No Identify possible corrections of any LOS deficiencies
☒ Yes ❒ No Identify any access deficiencies (including transit/pedestrian/bicycle connections)
☒ Yes ❒ No Identify any TDM measures

FIGURES ☒

☒ Yes ❒ No Vicinity Map
☒ Yes ❒ No Site Plan
☒ Yes ❒ No Existing peak hour turn movement volumes (counts conducted within previous 12 months)
☒ Yes ❒ No Trip Distribution (%) including Added Project Peak Hour Traffic Volumes (see sample)
☒ Yes ❒ No Approved Projects Peak Hour Traffic Volumes (land use to be provided by the City)
❒ Yes ☒ No TSP Future Year turn movement volumes comparison
☒ Yes ❒ No Programmed transportation improvements and transportation mitigation outlined in study

TABLES ☒

☒ Yes ❒ No Intersection Performance Existing Conditions
☒ Yes ❒ No Project Trip Generation
☒ Yes ❒ No Intersection Level of Service

OTHER ☒

☒ Yes ❒ No Technical appendix - sufficient material to convey complete understanding of traffic issues (e.g. HCM analyses, trip generation calculations, signal warrant analyses, turn lane warrant analyses, etc.) ❒Include site survey information for trip generation and parking observations
☒ Yes ❒ No Additional Comments Attached☒

Completed By: Amanda Deering (DKS Associates)
Date: January 23, 2020

Additional TIS Comments

Project Name: 32nd Avenue Mixed Use _____
City Reference Code: _____

- The proposed project would construct a four-story building with 21 residential apartment units with 3 commercial tenant spaces (approx. 2,500 sq. ft. commercial) on the northwest corner of SE 32nd Avenue and SE Olsen Street. The existing auto repair establishment would be demolished.
- The proposed project would include first floor covered parking.
- The existing site driveway on SE 32nd Avenue will be closed and the driveway on SE Olsen Street will be consolidated to a single entry, providing access to the ground level parking.
- The proposed development is consistent with existing zoning.
- Study intersection turn movement counts shall be conducted during typical weekday conditions while school is in full operation.
- Study intersections should include at a minimum:
    - SE 32nd Avenue/SE Olsen Street (both legs)
    - SE 32nd Avenue/SE Johnson Creek Boulevard
    - SE 32nd Avenue/SE Harrison Street
    - Site access/SE Olsen Street
- ITE trip generation rates should be used as the basis for estimation of vehicle trip generation potential of the site.
- Trip distribution/assignment should consider the existing travel patterns at the site.
- Background growth should include any approved developments in the study area (approved land uses to be provided by the City), as well as a background growth rate on study area roadways. Growth rates may be determined by comparing existing volumes at study area intersections with the historical traffic count data documented in the City's Transportation System Plan (TSP), representative future traffic growth rates documented in the TSP, or growth based on the Metro regional travel demand forecast model.
- Adequate public facilities for pedestrians, bicycles, and public transportation access for the site should be analyzed.
- The study should evaluate safe-routes-to-school for the site (generally ½ mile to 1 mile walking radius) and identify any necessary pedestrian facility improvements.
- The study must address compliance with applicable access spacing standards for any proposed driveways. If access spacing standards cannot be met, access restrictions should be recommended.
- The study must address if existing and proposed (if any) roadways are consistent with applicable roadway standard cross-sections.
- Documentation of sight distance measurements should be included for all access points (existing and proposed) and compared to sight distance standards where applicable.
- TIA scope development must be coordinated with appropriate Clackamas County and ODOT staff.

Gmail by Google

Chris Clemow <cclemow@clemow-associates.com>

RE: Milwaukie Mixed-Use Development - Transportation Analysis

1 message

Steve Adams <AdamsS@milwaukieoregon.gov> Thu, May 7, 2020 a
To: Chris Clemow <cclemow@clemow-associates.com>
Cc: Vera Kolias <KoliasV@milwaukieoregon.gov>, Valerie Hunter <vhproperty@gmail.com>, Mildred White <mildred@bamadesign.com>, Auryn White <auryn@bamadesign.com>, Dennis Egner <EgnerD@milwaukieoregon.gov>, Dalton Vodden <VoddenD@milwaukieoregon.gov>, "Reah Flisakowski (rlf@dksassociates.com)" <rlf@dksassociates.com>

Good morning,

Sorry, yes, ITE Code 820 with no pass-by/diverted-link reductions.

Yes, interpolating the known traffic data at 32nd/Harrison and 32nd/Johnson Creek intersections, and adding a background growth factor to it is acceptable.

Thanks, Steve

Steve R. Adams, PE

City Engineer

he • him • his

City of Milwaukie

o 503-786-7605, ce 971-978-7435

6101 SE Johnson Creek Blvd • Milwaukie, OR 97206

From: Chris Clemow <cclemow@clemow-associates.com>
Sent: Tuesday, May 5, 2020 1:25 PM
To: Steve Adams <AdamsS@milwaukieoregon.gov>
Cc: Vera Kolias <KoliasV@milwaukieoregon.gov>; Valerie Hunter <vhproperty@gmail.com>; Mildred White <mildred@bamadesign.com>; Auryn White <auryn@bamadesign.com>; Dennis Egner <EgnerD@milwaukieoregon.gov>; Dalton Vodden <VoddenD@milwaukieoregon.gov>; Reah Flisakowski (rlf@dksassociates.com) <rlf@dksassociates.com>
Subject: Re: Milwaukie Mixed-Use Development - Transportation Analysis

This Message originated outside your organization.

Steve,

Several additional questions/comments as we proceed with analysis preparation:

You indicate "*ITE Code 221 and ITE Code 822 best apply to the proposed development*". There does not appear to be an ITE Code 822. Did you mean ITE Code 820 with no pass-by/diverted-link reductions?

You indicate analysis will be required at the "*SE 32nd Ave/SE Olsen and SE 32nd Ave/SE Harrison St intersections using the base traffic counts provided by the City for the Harrison [intersection], and includi background traffic growth rate.*" It is noted the City provided data for the 32nd/Harrison and 32nd/Johnson Creek intersections. Because it is not currently possible to obtain typical/average intersection traffic data at the 32/Olsen intersection, we propose to estimate these turning movement volumes using the data you provided at the other intersections. Is this acceptable?

Thank you,

Chris

Christopher M. Clemow PE, PTOE

Transportation Engineer

cclemow@clemow-associates.com

541-579-8315

PORTLAND | EUGENE | BEND

On Tue, Apr 28, 2020 at 4:04 PM Steve Adams <AdamsS@milwaukieoregon.gov> wrote:

> Good day,
>
> My thoughts on this development and traffic study:
>
> - With understanding the recent changes in the ITE 10th Edition, I feel that ITE Code 221 and ITE Code 822 best apply to the proposed development.
> - Without knowing the tenants in the commercial area of the project, I feel that Pass-By/Diverted Trips cannot be applied to the project.

- While I feel trips for defunct businesses should have a time limit for expiration, City code is silent on both allowing trip credits and expiring trip credits. For this instance we will allow the 8 trip credit f previous use as an automobile care center.
- Net New AM Peak Hour trips remain at 3; Net New PM Peak Hour trips are adjusted to 5.
- A traffic memo is required as we stated previously. The TIS will evaluate the SE 32nd Ave/SE Olsen and SE 32nd Ave/SE Harrison St intersections using the base traffic counts provided by the City Harrison, and including a background traffic growth rate.

Please let me know should you have any questions.

Thanks, Steve

Steve R. Adams, PE

City Engineer

he • him • his

City of Milwaukie

o 503-786-7605, ce 971-978-7435

6101 SE Johnson Creek Blvd • Milwaukie, OR 97206

From: Chris Clemow <cclemow@clemow-associates.com>
Sent: Tuesday, April 7, 2020 3:32 PM
To: Vera Kolias <KoliasV@milwaukieoregon.gov>
Cc: Valerie Hunter <vhproperty@gmail.com>; Mildred White <mildred@bamadesign.com>; Auryn White <auryn@bamadesign.com>; Steve Adams <AdamsS@milwaukieoregon.gov>; Alex Roller <RollerA@milwaukieoregon.gov>; Dennis Egner <EgnerD@milwaukieoregon.gov>; Dalton Vodden <VoddenD@milwaukieoregon.gov>; undefined <rlf@dksassociates.com>
Subject: Re: Milwaukie Mixed-Use Development - Transportation Analysis

Vera, et al,

I see I presented some incorrect retail square footage numbers in my previous email; however, the trip generation numbers are correct for the actual retail square footage - 1,085 SF.

The following is the corrected material....

- The TIS will evaluate the SE 32nd Ave/SE Olsen and SE 32nd Ave/SE Harrison St intersections using the base traffic counts you provided and include a background traffic growth rate.

- It is our understanding City staff will provide further clarification of potential trip credits. The TIS will incorporate these materials when received.

- You have indicated a *Shopping Center* (ITE Land Use 820) is not acceptable for the proposed commercial use and have requested we assume more appropriate designations better reflecting the propose uses. We have recently faced this same issue on several other projects in the Portland metro area having a multi-story building with residential over commercial. The following is our response:

Based on the applicant's site plan, there are three (3) commercial spaces totaling 1,085 square feet, resulting in rather small individual spaces. Based on applicant-provided information, the space in the no building corner will be used by the owner for property management purposes. The remaining two spaces are of similar size - and their tenancy is unknown.

Previously, these retail spaces were commonly characterized as *Specialty Retail Center* uses in the ITE Trip Generation Manual (TGM) 9th edition - ITE Land Use 826, and 8th Edition - ITE Land Use 814. However, the current ITE TGM 10th Edition eliminated the *Specialty Retail Center* land use code and includes the statement, "*In an effort to continually provide data that accurately reflects the compositior each land use, some data were reassigned to other land uses, corrected from previous editions, or removed from the database. Several land uses were also renumbered to facilitate a more logical groupin related land uses. The following list summarizes these changes: ...Specialty Retail Center (826) was removed. Data from the land use was reclassified to existing land uses.*"

A review of available TGM 10th Edition land use codes finds a small number of potential uses which are summarized in the table below and in the attached PDF.

Table xx – Potential Land Uses

Land Use	ITE Code	Range of Sizes	Number of Studies	Development Size	AM Peak Hour Trip Generation	PM Peak Hour Trip Generation	ITE Land Use Description
Shopping Center	820	7.42-207.98 KSF	147	1.085 KSF	1	4	A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands. Factory outlet center (Land Use 823) is a related use. Additional Data Shopping centers, including neighborhood centers, community centers, regional centers, and super regional centers, were surveyed for this land use. Some of these centers contained non-merchandising facilities, such as office buildings, movie theaters, restaurants, post offices, banks, health clubs, and recreational facilities (for example, ice skating rinks or indoor miniature golf courses). Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied included peripheral buildings, it can be assumed that some of the data show their effect.
Apparel Store	876	66.4 KSF	1	1.085 KSF	1	4	An apparel store is an individual store specializing in the sale of clothing. Department store (Land Use 875) is a related use

Arts and Crafts Store	879	56.55 KSF	1	1.085 KSF	—	7	An arts and crafts store is a free-standing facility that sells art, framing, wall décor, and seasonal merchandise. These stores may provide in-store arts and crafts classes. Arts and crafts stores are sometimes found as separate parcels within a retail complex, with or without their own dedicated offstreet parking.
Mid-Rise Residential with 1st-Floor Commercial	231	422 DU	1	21 DU	6 [1]	8 [1]	Mid-rise residential with 1st-floor commercial are mixed-use multifamily housing buildings that have between three and 10 levels (floors) and include retail space on the first level. These facilities are typically found in dense multi-use urban and center city core settings. Multifamily housing (midrise) (Land Use 221) and high-rise residential with 1st-floor commercial (Land Use 232) are related land uses.

[1] Trip generation includes both Retail and Residential Land Uses

Discussions with ITE staff regarding this issue resulted in the following recommendations:

- The retail portion of the [applicant's] proposed development is small compared to the ITE data sets, and data for Land Uses 876 and 879 is limited to 1 observation. As such, if retail trip generation is estimated separately, the Shopping Center Land Use is the most similar, and appropriate, land use to use for estimating purposes.
- Consideration should be given to using Land Use 231. While this is a new land use (as of the ITE TGM 10th edition) and there is only 1 observation, it is based on Oregon data and this is a 'newer' development type, similar to the [applicant's] proposed development. It is further noted the retail trip generation portion of this land use is less than a stand-alone retail trip generation rate.
- Trip generation data can be obtained via data collection at similar developments based on ITE recommended practice, with the additional ITE staff recommendation the data be collected/characteriz ITE Land Use 231. ITE staff further noted that because the [applicant's] proposed development is small, additional data collection is unlikely to yield significantly different results than to simply use La Use 231, or Land Uses 221 and 820.

Based on the above information, we recommend assuming Land Use 231. Alternatively, we can continue to use the trip generation methodology/estimates proposed in our scoping letter assuming Land Us and 820. Please let us know how you wish for us to proceed.

Thank you,

Chris

Christopher M. Clemow PE, PTOE

Transportation Engineer

cclemow@clemow-associates.com

541-579-8315

PORTLAND | EUGENE | BEND

On Tue, Apr 7, 2020 at 1:47 PM Chris Clemow <cclemow@clemow-associates.com> wrote:

> Vera,
>
> The following are our comments and additional questions regarding your response:
>
> - The TIS will evaluate the SE 32nd Ave/SE Olsen and SE 32nd Ave/SE Harrison St intersections using the base traffic counts you provided and include a background traffic growth rate.
>
> - It is our understanding City staff will provide further clarification of potential trip credits. The TIS will incorporate these materials when received.
>
> - You have indicated a *Shopping Center* (ITE Land Use 820) is not acceptable for the proposed commercial use and have requested we assume more appropriate designations better reflecting the propo uses. We have recently faced this same issue on several other projects in the Portland metro area having a multi-story building with residential over commercial. The following is our response:
>
> Based on the applicant's site plan, there are three (3) commercial spaces totaling 1,085 square feet, resulting in rather small individual spaces. Based on applicant-provided information, the space in the northeast building corner will be used by the owner for property management purposes. The remaining two spaces total approximately 1,150 SF and are of similar size - approximately 575 SF each and tenancy is unknown.
>
> Previously, these retail spaces were commonly characterized as *Specialty Retail Center* uses in the ITE Trip Generation Manual (TGM) 9th edition - ITE Land Use 826, and 8th Edition - ITE Land Use 81 However, the current ITE TGM 10th Edition eliminated the *Specialty Retail Center* land use code and includes the statement, "*In an effort to continually provide data that accurately reflects the composit each land use, some data were reassigned to other land uses, corrected from previous editions, or removed from the database. Several land uses were also renumbered to facilitate a more logical grou related land uses. The following list summarizes these changes: ...Specialty Retail Center (826) was removed. Data from the land use was reclassified to existing land uses.*"
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[1] Trip generation includes both Retail and Residential Land Uses

Discussions with ITE staff regarding this issue resulted in the following recommendations:

- The retail portion of the [applicant's] proposed development is small compared to the ITE data sets, and data for Land Uses 876 and 879 is limited to 1 observation. As such, if retail trip generatio estimated separately, the Shopping Center Land Use is the most similar, and appropriate, land use to use for estimating purposes.
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Based on the above information, we recommend assuming Land Use 231. Alternatively, we can continue to use the trip generation methodology/estimates proposed in our scoping letter assuming Land 221 and 820. Please let us know how you wish for us to proceed.

Thank you,

Chris

Christopher M. Clemow PE, PTOE

Transportation Engineer

cclemow@clemow-associates.com

541-579-8315

PORTLAND | EUGENE | BEND

On Mon, Apr 6, 2020 at 8:36 AM Vera Kolias <KoliasV@milwaukieoregon.gov> wrote:

> Good morning Valerie,
>
> One of the engineers will respond to your question so you have a specific answer from the Engineering Department.
>
> Thank you,
>
> Vera
>
> **VERA KOLIAS, AICP**
>
> Associate Planner
>
> she • her • hers
>
> 503.786.7653
>
> City of Milwaukie
>
> 6101 SE Johnson Creek Blvd • Milwaukie, OR 97206
>
> ---
>
> **From:** Valerie Hunter <vhproperty@gmail.com>
> **Sent:** Monday, April 6, 2020 8:14
> **To:** Vera Kolias <KoliasV@milwaukieoregon.gov>
> **Cc:** Mildred White <mildred@BAMAdesign.com>; Chris Clemow <cclemow@clemow-associates.com>; Auryn White <auryn@bamadesign.com>; Steve Adams <AdamsS@milwaukieoregon.gov>; Al Roller <RollerA@milwaukieoregon.gov>; Dennis Egner <EgnerD@milwaukieoregon.gov>; Dalton Vodden <VoddenD@milwaukieoregon.gov>; undefined <rlf@dksassociates.com>
> **Subject:** Re: Milwaukie Mixed-Use Development - Transportation Analysis
>
> **This Message originated outside your organization.**
>
> ---
>
> Good Morning Vera,
>
> Thank you for your response my team is working on all the items.. but I do have one question about the credits… Can you send me where in your code that it explains them please.. I really find it not a viable option not to give credits for a business that was so long standing and never replaced with another business. I hope to have everything turned into you today from Chris & Mildred.

Valerie S Hunter
Certified REO Specialist-CREO, AREO
ABR, CRS, GRI, E-PRO
H&H Preferred Real Estate

Cell: 541-419-7253
email: vhproperty@gmail.com

https://www.oregon.gov/rea/licensing/Documents/Initial-Agency-Disclosure-Pamphlet.pdf

On Apr 3, 2020, at 2:51 PM, Vera Kolias <KoliasV@milwaukieoregon.gov> wrote:

Hello Mildred and Chris,

We have discussed the March 4 scoping letter that was submitted, which provided an argument for a limited TIS scope for the proposed project. The following summarizes our discussion:

The required TIS must address the full scope that was provided by the city. However:

- Study intersections to include only: SE 32nd Ave/SE Olsen and SE 32nd Ave/SE Harrison St
- Attached please find a preliminary traffic study completed in October 2018. Please use this document as a source for trip counts, but they should be modified by the standard 2-3% increase per year to bring them up to date.
- You propose to claim trip credits for the prior use on the site. However, it has been closed for more than 2 years, so those credits are not available.
- You propose to use ITE code 820 (shopping center) for the commercial uses on the site. This is not an acceptable land use code for the proposed development. Please use a more appropriate designation that better reflects the proposed uses in the development.

Please let me know if you have any questions.

Stay healthy and safe,

Vera

Vera Kolias, AICP

Associate Planner

she/her/hers

503.786.7653

City of Milwaukie

6101 SE Johnson Creek Blvd., Milwaukie, OR 97206

From: Mildred White <mildred@BAMAdesign.com>
Sent: Tuesday, March 24, 2020 8:09 PM
To: Vera Kolias <KoliasV@milwaukieoregon.gov>; 'Chris Clemow' <cclemow@clemow-associates.com>; Alex Roller <RollerA@milwaukieoregon.gov>; Steve Adams <AdamsS@milwaukieoregon.gov>
Cc: 'Auryn White' <auryn@bamadesign.com>; 'Valerie Hunter' <vhproperty@gmail.com>
Subject: RE: Milwaukie Mixed-Use Development - Transportation Analysis

This Message originated outside your organization.

Good evening Vera,

I hope you are doing well and staying healthy. Just wanted to reach out to you and see if there's been an update on this project from the engineering department over the last week.

Thanks for your assistance,

Mildred

Mildred White, AIA, NCARB

Principal
BAMA Architecture and Design, LLC

7350 SE Milwaukie Avenue

Portland, Oregon 97202
office: 503-253-4283

Cell: 503-380-2852
Mildred@BAMAdesign.com

WBE and ESB Certified

*Licensed in Oregon, Washington, Hawaii, Alaska and Colorado

From: Vera Kolias
Sent: Tuesday, March 17, 2020 1:41 PM
To: Chris Clemow <cclemow@clemow-associates.com>; Alex Roller <RollerA@milwaukieoregon.gov>; Steve Adams <AdamsS@milwaukieoregon.gov>
Cc: Auryn White <auryn@bamadesign.com>; Mildred White <mildred@bamadesign.com>; Valerie Hunter <vhproperty@gmail.com>
Subject: Re: Milwaukie Mixed-Use Development - Transportation Analysis

Hello Chris,

Given the Coronavirus situation I just wanted to check in with you and let you know that the Engineering Department is reviewing the scoping letter and we will respond soon.

-Vera

Vera Kolias, AICP

Associate Planner

she/her/hers

503.786.7653

City of Milwaukie

6101 SE Johnson Creek Blvd., Milwaukie, OR 97206

From: Chris Clemow <cclemow@clemow-associates.com>
Sent: Thursday, March 5, 2020 10:22 AM
To: Vera Kolias <KoliasV@milwaukieoregon.gov>; Alex Roller <RollerA@milwaukieoregon.gov>
Cc: Auryn White <auryn@bamadesign.com>; Mildred White <mildred@bamadesign.com>; Valerie Hunter <vhproperty@gmail.com>
Subject: Milwaukie Mixed-Use Development - Transportation Analysis

Vera and Alex,

Attached is a copy of our Transportation Impact Study (TIS) scoping letter supporting the proposed Milwaukie Mixed-Use development that addresses the January 23, 2020 City of Milwaukie Transportation Impact Study Checklist prepared by Amanda Deering of DKS Associates.

Please note, the development size has decreased from that contemplated by the City checklist, resulting in decreased transportation system impacts and a decreased scope of work.

Please review the attached materials and provide necessary comments so that we can prepare the TIS.

Thank you,

Chris

Christopher M. Clemow PE, PTOE

Transportation Engineer

cclemow@clemow-associates.com

541-579-8315

PORTLAND | EUGENE | BEND

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<Hillside Master Plan Draft 10-8.pdf>

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Appendix C

January 1, 2013 through December 31, 2017

INTERSECTION CRASH RATES

Intersection	Crashes						PM Entering Volume	ADT (10xPM)	AADT (365xADT)	Annual Crashes	Crash Rate (crashes/MEV)	Reference Population	90th%ile Crash Rate	Over or Under Crash
	2013	2014	2015	2016	2017	Total								
SE 32nd Avenue / SE Olsen Street	0	0	1	0	0	1	603	6,030	2,200,950	0.20	0.091	Urban 4SG	0.860	Under
SE 32nd Avenue / SE Harrison Street	1	0	2	4	3	10	1,375	13,750	5,018,750	2.00	0.399	Urban 4ST	0.408	Under

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SE 32nd Ave & SE Olsen St
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2015														
FIXED / OTHER OBJECT	0	0	1	1	0	0	0	1	0	1	0	1	0	1
2015 TOTAL	0	0	1	1	0	0	0	1	0	1	0	1	0	1
FINAL TOTAL	0	0	1	1	0	0	0	1	0	1	0	1	0	1

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

SE 32nd Ave & SE Harrison St
January 1, 2013 through December 31, 2017

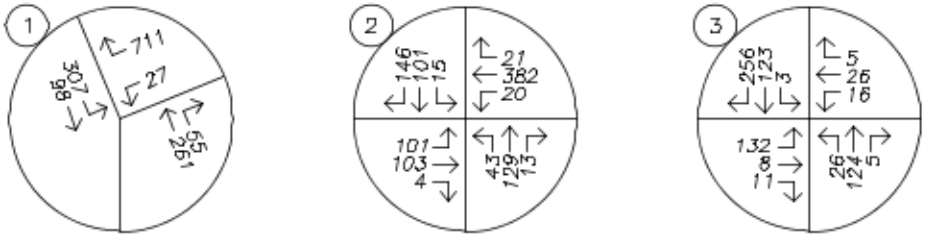
COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
FIXED / OTHER OBJECT	0	0	1	1	0	0	0	0	1	1	0	1	0	1
PEDESTRIAN	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2017 TOTAL	0	1	1	2	0	1	0	1	1	2	0	2	0	1
YEAR: 2016														
ANGLE	0	2	0	2	0	5	0	1	1	1	1	2	0	0
TURNING MOVEMENTS	0	2	0	2	0	2	0	1	1	2	0	2	0	0
2016 TOTAL	0	4	0	4	0	7	0	2	2	3	1	4	0	0
YEAR: 2015														
TURNING MOVEMENTS	0	0	2	2	0	0	0	2	0	1	1	2	0	0
2015 TOTAL	0	0	2	2	0	0	0	2	0	1	1	2	0	0
YEAR: 2014														
REAR-END	0	1	0	1	0	1	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	1	0	1	0	1	0	0	1	0	1	1	0	0
2014 TOTAL	0	2	0	2	0	2	0	1	1	1	1	2	0	0
YEAR: 2013														
FIXED / OTHER OBJECT	0	0	1	1	0	0	0	1	0	1	0	1	0	1
TURNING MOVEMENTS	0	1	1	2	0	3	0	2	0	2	0	2	0	0
2013 TOTAL	0	1	2	3	0	3	0	3	0	3	0	3	0	1
FINAL TOTAL	0	8	5	13	0	13	0	9	4	10	3	13	0	2

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

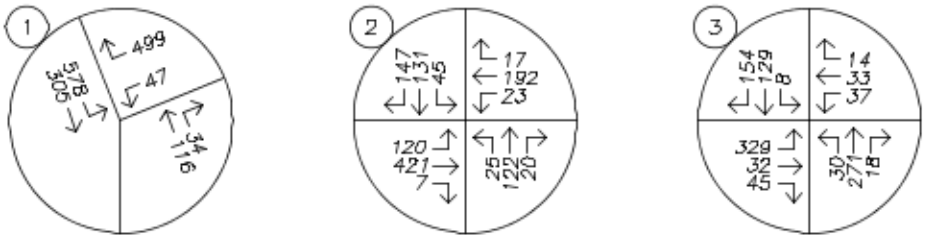
A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

Appendix D

AM PEAK HOUR



PM PEAK HOUR



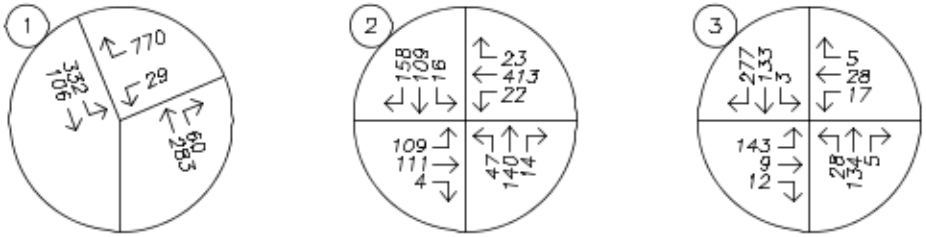
TRAFFIC VOLUMES
Existing Conditions
AM & PM Peak Hours

no scale

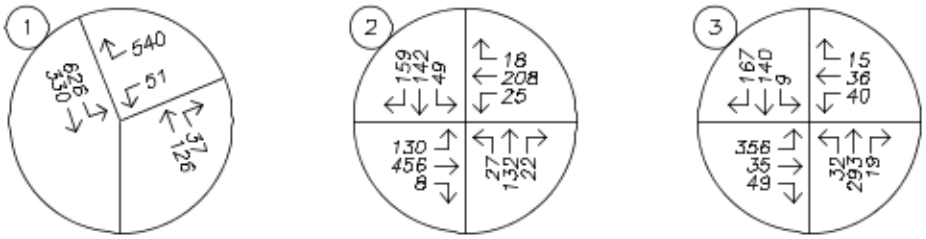
FIGURE 5

GROWTH RATE: 2.0 PERCENT PER YEAR COMPOUNDED

AM PEAK HOUR



PM PEAK HOUR



TRAFFIC VOLUMES
2022 Background Conditions
AM & PM Peak Hours

no scale

FIGURE 6

Appendix E

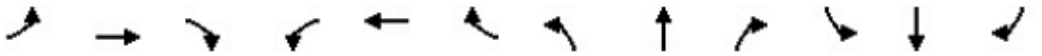
Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	16	0	5	10	0	16	5	297	5	5	203	5
Future Vol, veh/h	16	0	5	10	0	16	5	297	5	5	203	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	0	6	11	0	18	6	330	6	6	226	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	595	589	229	589	589	333	232	0	0	336	0	0
Stage 1	241	241	-	345	345	-	-	-	-	-	-	-
Stage 2	354	348	-	244	244	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	416	421	810	420	421	709	1336	-	-	1223	-	-
Stage 1	762	706	-	671	636	-	-	-	-	-	-	-
Stage 2	663	634	-	760	704	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	402	416	810	413	416	709	1336	-	-	1223	-	-
Mov Cap-2 Maneuver	402	416	-	413	416	-	-	-	-	-	-	-
Stage 1	757	702	-	667	632	-	-	-	-	-	-	-
Stage 2	642	630	-	750	700	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.3	11.8	0.1	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1336	-	-	457	556	1223	-	-
HCM Lane V/C Ratio	0.004	-	-	0.051	0.052	0.005	-	-
HCM Control Delay (s)	7.7	0	-	13.3	11.8	8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	107	4	21	397	22	45	134	14	16	105	152
Future Volume (veh/h)	105	107	4	21	397	22	45	134	14	16	105	152
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	117	119	4	23	441	24	50	149	16	18	117	169
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	151	646	22	48	529	29	196	530	608	123	648	608
Arrive On Green	0.08	0.36	0.36	0.03	0.30	0.30	0.38	0.38	0.38	0.38	0.38	0.38
Sat Flow, veh/h	1781	1799	60	1781	1757	96	286	1380	1585	118	1690	1585
Grp Volume(v), veh/h	117	0	123	23	0	465	199	0	16	135	0	169
Grp Sat Flow(s),veh/h/ln	1781	0	1859	1781	0	1853	1667	0	1585	1808	0	1585
Q Serve(g_s), s	3.4	0.0	2.4	0.7	0.0	12.2	0.0	0.0	0.3	0.0	0.0	3.8
Cycle Q Clear(g_c), s	3.4	0.0	2.4	0.7	0.0	12.2	3.8	0.0	0.3	2.5	0.0	3.8
Prop In Lane	1.00		0.03	1.00		0.05	0.25		1.00	0.13		1.00
Lane Grp Cap(c), veh/h	151	0	667	48	0	558	726	0	608	772	0	608
V/C Ratio(X)	0.77	0.00	0.18	0.48	0.00	0.83	0.27	0.00	0.03	0.17	0.00	0.28
Avail Cap(c_a), veh/h	273	0	803	188	0	711	726	0	608	772	0	608
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.4	0.0	11.5	25.0	0.0	17.0	11.1	0.0	10.0	10.7	0.0	11.1
Incr Delay (d2), s/veh	8.2	0.0	0.1	7.1	0.0	6.7	0.9	0.0	0.1	0.5	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.9	0.4	0.0	5.7	1.6	0.0	0.1	1.0	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.5	0.0	11.6	32.1	0.0	23.7	12.0	0.0	10.1	11.2	0.0	12.2
LnGrp LOS	C	A	B	C	A	C	B	A	B	B	A	B
Approach Vol, veh/h		240			488			215			304	
Approach Delay, s/veh		21.3			24.1			11.9			11.7	
Approach LOS		C			C			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		24.0	5.4	22.7		24.0	8.4	19.7				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		20.0	5.5	22.5		20.0	8.0	20.0				
Max Q Clear Time (g_c+I1), s		5.8	2.7	4.4		5.8	5.4	14.2				
Green Ext Time (p_c), s		1.0	0.0	0.6		1.1	0.1	1.5				

Intersection Summary	
HCM 6th Ctrl Delay	18.5
HCM 6th LOS	B

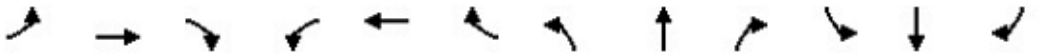
Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	0	5	10	0	17	5	309	5	5	211	5
Future Vol, veh/h	17	0	5	10	0	17	5	309	5	5	211	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	0	6	11	0	19	6	343	6	6	234	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	617	610	237	610	610	346	240	0	0	349	0	0
Stage 1	249	249	-	358	358	-	-	-	-	-	-	-
Stage 2	368	361	-	252	252	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	402	409	802	407	409	697	1327	-	-	1210	-	-
Stage 1	755	701	-	660	628	-	-	-	-	-	-	-
Stage 2	652	626	-	752	698	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	388	404	802	400	404	697	1327	-	-	1210	-	-
Mov Cap-2 Maneuver	388	404	-	400	404	-	-	-	-	-	-	-
Stage 1	750	697	-	656	624	-	-	-	-	-	-	-
Stage 2	631	622	-	742	694	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.7	12	0.1	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1327	-	-	440	547	1210	-	-
HCM Lane V/C Ratio	0.004	-	-	0.056	0.055	0.005	-	-
HCM Control Delay (s)	7.7	0	-	13.7	12	8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	109	111	4	22	413	23	47	139	15	17	109	158
Future Volume (veh/h)	109	111	4	22	413	23	47	139	15	17	109	158
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	121	123	4	24	459	26	52	154	17	19	121	176
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	660	21	50	538	30	195	527	611	123	647	611
Arrive On Green	0.09	0.37	0.37	0.03	0.31	0.31	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1781	1801	59	1781	1753	99	292	1366	1585	124	1679	1585
Grp Volume(v), veh/h	121	0	127	24	0	485	206	0	17	140	0	176
Grp Sat Flow(s),veh/h/ln	1781	0	1860	1781	0	1852	1658	0	1585	1803	0	1585
Q Serve(g_s), s	3.6	0.0	2.5	0.7	0.0	13.4	0.0	0.0	0.4	0.0	0.0	4.2
Cycle Q Clear(g_c), s	3.6	0.0	2.5	0.7	0.0	13.4	4.1	0.0	0.4	2.7	0.0	4.2
Prop In Lane	1.00		0.03	1.00		0.05	0.25		1.00	0.14		1.00
Lane Grp Cap(c), veh/h	155	0	681	50	0	568	722	0	611	770	0	611
V/C Ratio(X)	0.78	0.00	0.19	0.48	0.00	0.85	0.29	0.00	0.03	0.18	0.00	0.29
Avail Cap(c_a), veh/h	229	0	734	180	0	680	722	0	611	770	0	611
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.3	0.0	11.7	26.1	0.0	17.7	11.6	0.0	10.4	11.1	0.0	11.6
Incr Delay (d2), s/veh	9.7	0.0	0.1	7.1	0.0	8.9	1.0	0.0	0.1	0.5	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	1.0	0.4	0.0	6.6	1.7	0.0	0.1	1.1	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	0.0	11.9	33.1	0.0	26.6	12.5	0.0	10.5	11.6	0.0	12.8
LnGrp LOS	C	A	B	C	A	C	B	A	B	B	A	B
Approach Vol, veh/h		248			509			223			316	
Approach Delay, s/veh		22.7			26.9			12.4			12.3	
Approach LOS		C			C			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		25.0	5.5	23.9		25.0	8.8	20.7				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		21.0	5.5	21.5		21.0	7.0	20.0				
Max Q Clear Time (g_c+I1), s		6.1	2.7	4.5		6.2	5.6	15.4				
Green Ext Time (p_c), s		1.1	0.0	0.6		1.2	0.0	1.3				

Intersection Summary	
HCM 6th Ctrl Delay	20.0
HCM 6th LOS	C

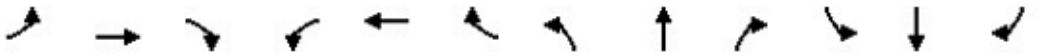
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	19	0	7	10	0	17	5	309	5	5	211	5
Future Vol, veh/h	19	0	7	10	0	17	5	309	5	5	211	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	0	8	11	0	19	6	343	6	6	234	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	617	610	237	611	610	346	240	0	0	349	0	0
Stage 1	249	249	-	358	358	-	-	-	-	-	-	-
Stage 2	368	361	-	253	252	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	402	409	802	406	409	697	1327	-	-	1210	-	-
Stage 1	755	701	-	660	628	-	-	-	-	-	-	-
Stage 2	652	626	-	751	698	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	388	404	802	398	404	697	1327	-	-	1210	-	-
Mov Cap-2 Maneuver	388	404	-	398	404	-	-	-	-	-	-	-
Stage 1	750	697	-	656	624	-	-	-	-	-	-	-
Stage 2	631	622	-	739	694	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.5	12	0.1	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1327	-	-	451	545	1210	-	-
HCM Lane V/C Ratio	0.004	-	-	0.064	0.055	0.005	-	-
HCM Control Delay (s)	7.7	0	-	13.5	12	8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	109	111	4	22	413	23	47	139	15	18	109	159
Future Volume (veh/h)	109	111	4	22	413	23	47	139	15	18	109	159
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	121	123	4	24	459	26	52	154	17	20	121	177
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	660	21	50	538	30	195	527	611	127	642	611
Arrive On Green	0.09	0.37	0.37	0.03	0.31	0.31	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1781	1801	59	1781	1753	99	292	1366	1585	133	1666	1585
Grp Volume(v), veh/h	121	0	127	24	0	485	206	0	17	141	0	177
Grp Sat Flow(s),veh/h/ln	1781	0	1860	1781	0	1852	1658	0	1585	1799	0	1585
Q Serve(g_s), s	3.6	0.0	2.5	0.7	0.0	13.4	0.0	0.0	0.4	0.0	0.0	4.2
Cycle Q Clear(g_c), s	3.6	0.0	2.5	0.7	0.0	13.4	4.1	0.0	0.4	2.7	0.0	4.2
Prop In Lane	1.00		0.03	1.00		0.05	0.25		1.00	0.14		1.00
Lane Grp Cap(c), veh/h	155	0	681	50	0	568	722	0	611	769	0	611
V/C Ratio(X)	0.78	0.00	0.19	0.48	0.00	0.85	0.29	0.00	0.03	0.18	0.00	0.29
Avail Cap(c_a), veh/h	229	0	734	180	0	680	722	0	611	769	0	611
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.3	0.0	11.7	26.1	0.0	17.7	11.6	0.0	10.4	11.1	0.0	11.6
Incr Delay (d2), s/veh	9.7	0.0	0.1	7.1	0.0	8.9	1.0	0.0	0.1	0.5	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	1.0	0.4	0.0	6.6	1.7	0.0	0.1	1.1	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	0.0	11.9	33.1	0.0	26.6	12.5	0.0	10.5	11.6	0.0	12.8
LnGrp LOS	C	A	B	C	A	C	B	A	B	B	A	B
Approach Vol, veh/h		248			509			223			318	
Approach Delay, s/veh		22.7			26.9			12.4			12.3	
Approach LOS		C			C			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		25.0	5.5	23.9		25.0	8.8	20.7				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		21.0	5.5	21.5		21.0	7.0	20.0				
Max Q Clear Time (g_c+I1), s		6.1	2.7	4.5		6.2	5.6	15.4				
Green Ext Time (p_c), s		1.1	0.0	0.6		1.2	0.0	1.3				

Intersection Summary	
HCM 6th Ctrl Delay	20.0
HCM 6th LOS	C

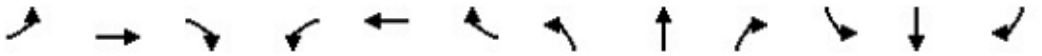
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	0	5	10	0	10	10	156	5	5	366	10
Future Vol, veh/h	5	0	5	10	0	10	10	156	5	5	366	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	0	6	11	0	11	11	173	6	6	407	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	629	626	413	626	628	176	418	0	0	179	0	0
Stage 1	425	425	-	198	198	-	-	-	-	-	-	-
Stage 2	204	201	-	428	430	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	395	401	639	397	400	867	1141	-	-	1397	-	-
Stage 1	607	586	-	804	737	-	-	-	-	-	-	-
Stage 2	798	735	-	605	583	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	385	394	639	388	393	867	1141	-	-	1397	-	-
Mov Cap-2 Maneuver	385	394	-	388	393	-	-	-	-	-	-	-
Stage 1	600	582	-	795	729	-	-	-	-	-	-	-
Stage 2	779	727	-	596	580	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.7	12	0.5	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1141	-	-	480	536	1397	-	-
HCM Lane V/C Ratio	0.01	-	-	0.023	0.041	0.004	-	-
HCM Control Delay (s)	8.2	0	-	12.7	12	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	438	7	24	200	18	26	127	21	47	136	153
Future Volume (veh/h)	125	438	7	24	200	18	26	127	21	47	136	153
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	139	487	8	27	222	20	29	141	23	52	151	170
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	602	10	56	437	39	151	626	628	212	557	628
Arrive On Green	0.10	0.33	0.33	0.03	0.26	0.26	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1781	1835	30	1781	1691	152	164	1580	1585	303	1406	1585
Grp Volume(v), veh/h	139	0	495	27	0	242	170	0	23	203	0	170
Grp Sat Flow(s),veh/h/ln	1781	0	1865	1781	0	1843	1745	0	1585	1709	0	1585
Q Serve(g_s), s	3.7	0.0	11.9	0.7	0.0	5.5	0.0	0.0	0.4	0.0	0.0	3.6
Cycle Q Clear(g_c), s	3.7	0.0	11.9	0.7	0.0	5.5	3.0	0.0	0.4	3.6	0.0	3.6
Prop In Lane	1.00		0.02	1.00		0.08	0.17		1.00	0.26		1.00
Lane Grp Cap(c), veh/h	180	0	612	56	0	477	777	0	628	769	0	628
V/C Ratio(X)	0.77	0.00	0.81	0.48	0.00	0.51	0.22	0.00	0.04	0.26	0.00	0.27
Avail Cap(c_a), veh/h	326	0	872	199	0	730	777	0	628	769	0	628
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.6	0.0	15.1	23.4	0.0	15.6	9.9	0.0	9.1	10.1	0.0	10.0
Incr Delay (d2), s/veh	6.9	0.0	3.8	6.3	0.0	0.8	0.6	0.0	0.1	0.8	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	5.0	0.4	0.0	2.2	1.2	0.0	0.1	1.4	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.4	0.0	18.9	29.8	0.0	16.4	10.5	0.0	9.2	10.9	0.0	11.1
LnGrp LOS	C	A	B	C	A	B	B	A	A	B	A	B
Approach Vol, veh/h		634			269			193			373	
Approach Delay, s/veh		21.0			17.7			10.4			11.0	
Approach LOS		C			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		23.5	5.5	20.2		23.5	9.0	16.7				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		19.5	5.5	23.0		19.5	9.0	19.5				
Max Q Clear Time (g_c+I1), s		5.0	2.7	13.9		5.6	5.7	7.5				
Green Ext Time (p_c), s		0.9	0.0	2.2		1.5	0.1	1.1				

Intersection Summary	
HCM 6th Ctrl Delay	16.5
HCM 6th LOS	B

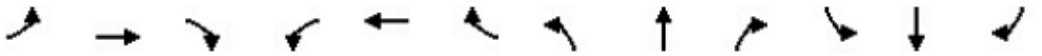
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	0	5	10	0	10	10	162	5	5	381	10
Future Vol, veh/h	5	0	5	10	0	10	10	162	5	5	381	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	0	6	11	0	11	11	180	6	6	423	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	652	649	429	649	651	183	434	0	0	186	0	0
Stage 1	441	441	-	205	205	-	-	-	-	-	-	-
Stage 2	211	208	-	444	446	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	381	389	626	383	388	859	1126	-	-	1388	-	-
Stage 1	595	577	-	797	732	-	-	-	-	-	-	-
Stage 2	791	730	-	593	574	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	371	382	626	375	381	859	1126	-	-	1388	-	-
Mov Cap-2 Maneuver	371	382	-	375	381	-	-	-	-	-	-	-
Stage 1	588	574	-	788	724	-	-	-	-	-	-	-
Stage 2	772	722	-	584	571	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.9	12.2	0.5	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1126	-	-	466	522	1388	-	-
HCM Lane V/C Ratio	0.01	-	-	0.024	0.043	0.004	-	-
HCM Control Delay (s)	8.2	0	-	12.9	12.2	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	456	7	25	208	19	27	132	22	49	141	159
Future Volume (veh/h)	130	456	7	25	208	19	27	132	22	49	141	159
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	144	507	8	28	231	21	30	147	24	54	157	177
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	619	10	57	447	41	148	617	619	208	548	619
Arrive On Green	0.10	0.34	0.34	0.03	0.26	0.26	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1781	1836	29	1781	1689	154	162	1581	1585	302	1405	1585
Grp Volume(v), veh/h	144	0	515	28	0	252	177	0	24	211	0	177
Grp Sat Flow(s),veh/h/ln	1781	0	1865	1781	0	1843	1743	0	1585	1707	0	1585
Q Serve(g_s), s	3.9	0.0	12.6	0.8	0.0	5.8	0.0	0.0	0.5	0.0	0.0	3.8
Cycle Q Clear(g_c), s	3.9	0.0	12.6	0.8	0.0	5.8	3.2	0.0	0.5	3.9	0.0	3.8
Prop In Lane	1.00		0.02	1.00		0.08	0.17		1.00	0.26		1.00
Lane Grp Cap(c), veh/h	186	0	629	57	0	488	765	0	619	757	0	619
V/C Ratio(X)	0.77	0.00	0.82	0.49	0.00	0.52	0.23	0.00	0.04	0.28	0.00	0.29
Avail Cap(c_a), veh/h	321	0	859	196	0	719	765	0	619	757	0	619
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.8	0.0	15.2	23.8	0.0	15.6	10.3	0.0	9.4	10.5	0.0	10.4
Incr Delay (d2), s/veh	6.7	0.0	4.6	6.3	0.0	0.8	0.7	0.0	0.1	0.9	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	5.5	0.4	0.0	2.3	1.3	0.0	0.2	1.6	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.5	0.0	19.7	30.0	0.0	16.5	11.0	0.0	9.5	11.4	0.0	11.6
LnGrp LOS	C	A	B	C	A	B	B	A	A	B	A	B
Approach Vol, veh/h		659			280			201			388	
Approach Delay, s/veh		21.6			17.8			10.8			11.5	
Approach LOS		C			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		23.5	5.6	20.8		23.5	9.2	17.2				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		19.5	5.5	23.0		19.5	9.0	19.5				
Max Q Clear Time (g_c+I1), s		5.2	2.8	14.6		5.9	5.9	7.8				
Green Ext Time (p_c), s		0.9	0.0	2.2		1.6	0.1	1.1				

Intersection Summary												
HCM 6th Ctrl Delay			16.9									
HCM 6th LOS			B									

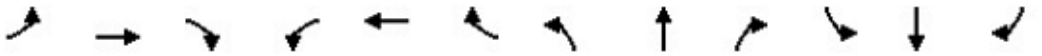
Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	0	6	10	0	10	11	162	5	5	381	12
Future Vol, veh/h	6	0	6	10	0	10	11	162	5	5	381	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	0	7	11	0	11	12	180	6	6	423	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	655	652	430	652	655	183	436	0	0	186	0	0
Stage 1	442	442	-	207	207	-	-	-	-	-	-	-
Stage 2	213	210	-	445	448	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	379	387	625	381	386	859	1124	-	-	1388	-	-
Stage 1	594	576	-	795	731	-	-	-	-	-	-	-
Stage 2	789	728	-	592	573	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	369	380	625	372	379	859	1124	-	-	1388	-	-
Mov Cap-2 Maneuver	369	380	-	372	379	-	-	-	-	-	-	-
Stage 1	587	573	-	785	722	-	-	-	-	-	-	-
Stage 2	769	719	-	582	570	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13	12.2	0.5	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1124	-	-	464	519	1388	-	-
HCM Lane V/C Ratio	0.011	-	-	0.029	0.043	0.004	-	-
HCM Control Delay (s)	8.2	0	-	13	12.2	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

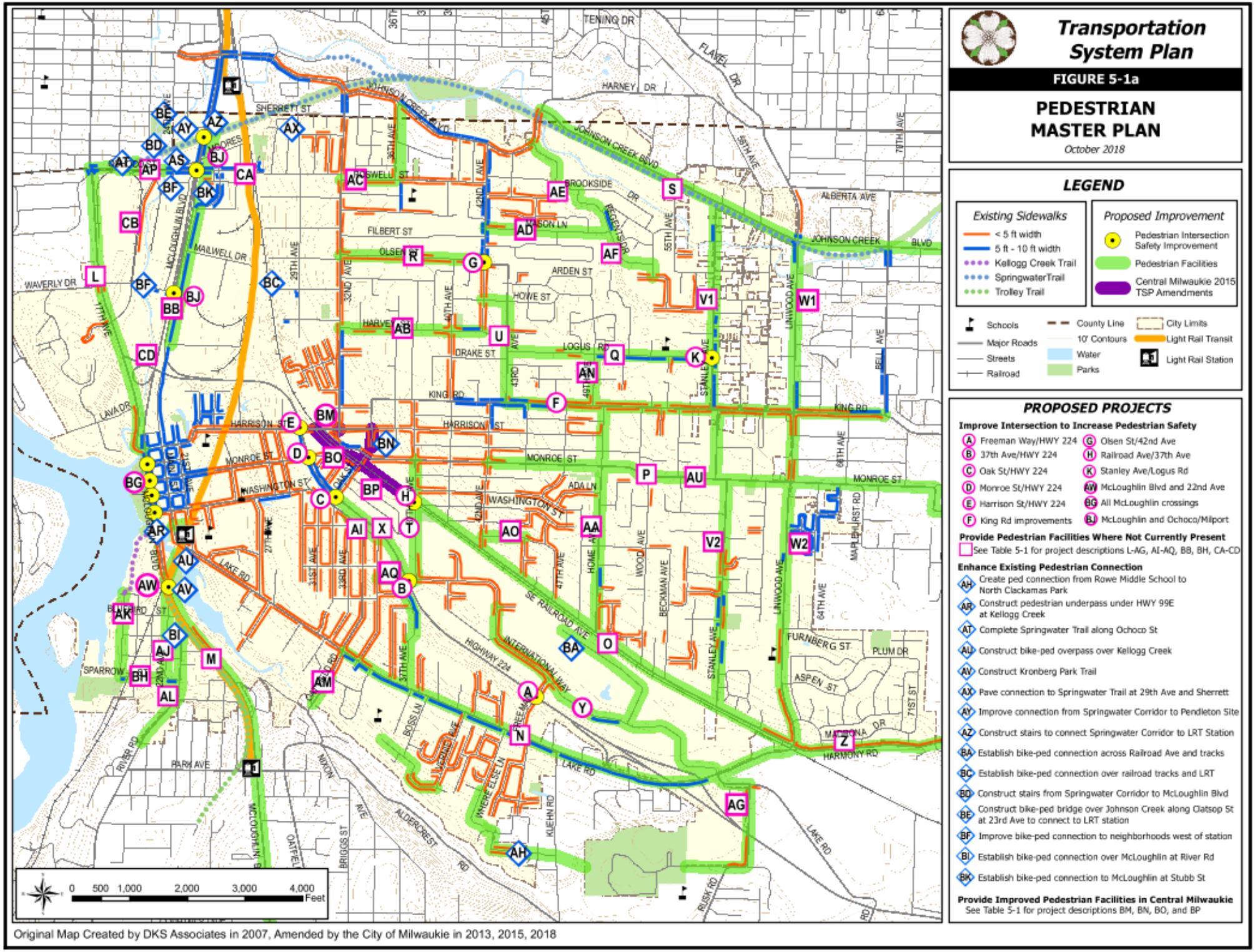


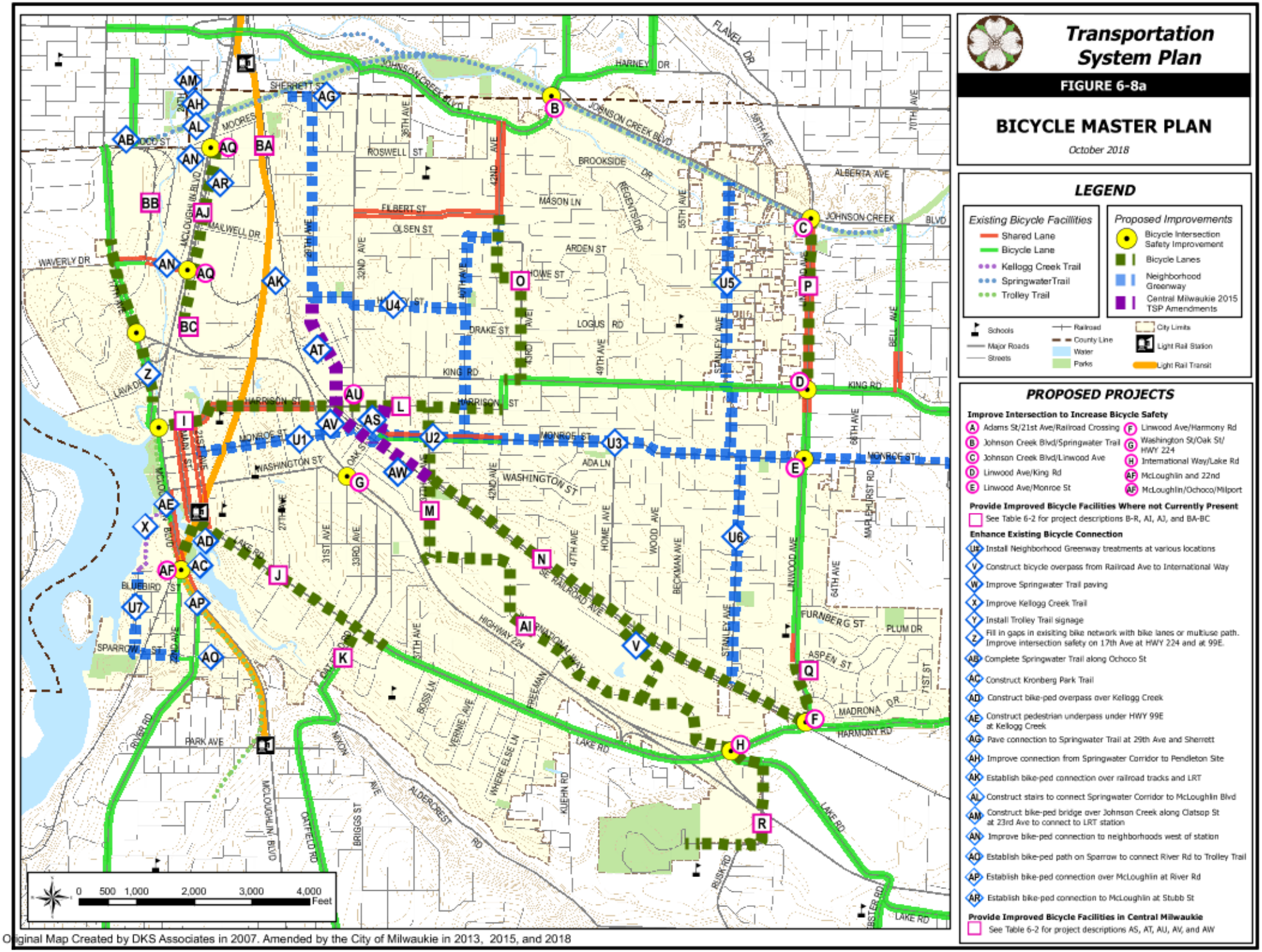
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	131	456	7	25	208	19	27	132	22	49	141	160
Future Volume (veh/h)	131	456	7	25	208	19	27	132	22	49	141	160
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	146	507	8	28	231	21	30	147	24	54	157	178
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	188	619	10	57	445	40	148	617	619	208	548	619
Arrive On Green	0.11	0.34	0.34	0.03	0.26	0.26	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1781	1836	29	1781	1689	154	162	1580	1585	302	1405	1585
Grp Volume(v), veh/h	146	0	515	28	0	252	177	0	24	211	0	178
Grp Sat Flow(s),veh/h/ln	1781	0	1865	1781	0	1843	1742	0	1585	1707	0	1585
Q Serve(g_s), s	4.0	0.0	12.6	0.8	0.0	5.8	0.0	0.0	0.5	0.0	0.0	3.9
Cycle Q Clear(g_c), s	4.0	0.0	12.6	0.8	0.0	5.8	3.2	0.0	0.5	3.9	0.0	3.9
Prop In Lane	1.00		0.02	1.00		0.08	0.17		1.00	0.26		1.00
Lane Grp Cap(c), veh/h	188	0	629	57	0	486	765	0	619	757	0	619
V/C Ratio(X)	0.77	0.00	0.82	0.49	0.00	0.52	0.23	0.00	0.04	0.28	0.00	0.29
Avail Cap(c_a), veh/h	321	0	859	196	0	719	765	0	619	757	0	619
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.8	0.0	15.2	23.8	0.0	15.7	10.3	0.0	9.4	10.5	0.0	10.5
Incr Delay (d2), s/veh	6.7	0.0	4.6	6.3	0.0	0.9	0.7	0.0	0.1	0.9	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	5.5	0.4	0.0	2.3	1.3	0.0	0.2	1.6	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.4	0.0	19.7	30.0	0.0	16.6	11.0	0.0	9.5	11.4	0.0	11.6
LnGrp LOS	C	A	B	C	A	B	B	A	A	B	A	B
Approach Vol, veh/h		661			280			201			389	
Approach Delay, s/veh		21.6			17.9			10.8			11.5	
Approach LOS		C			B			B			B	

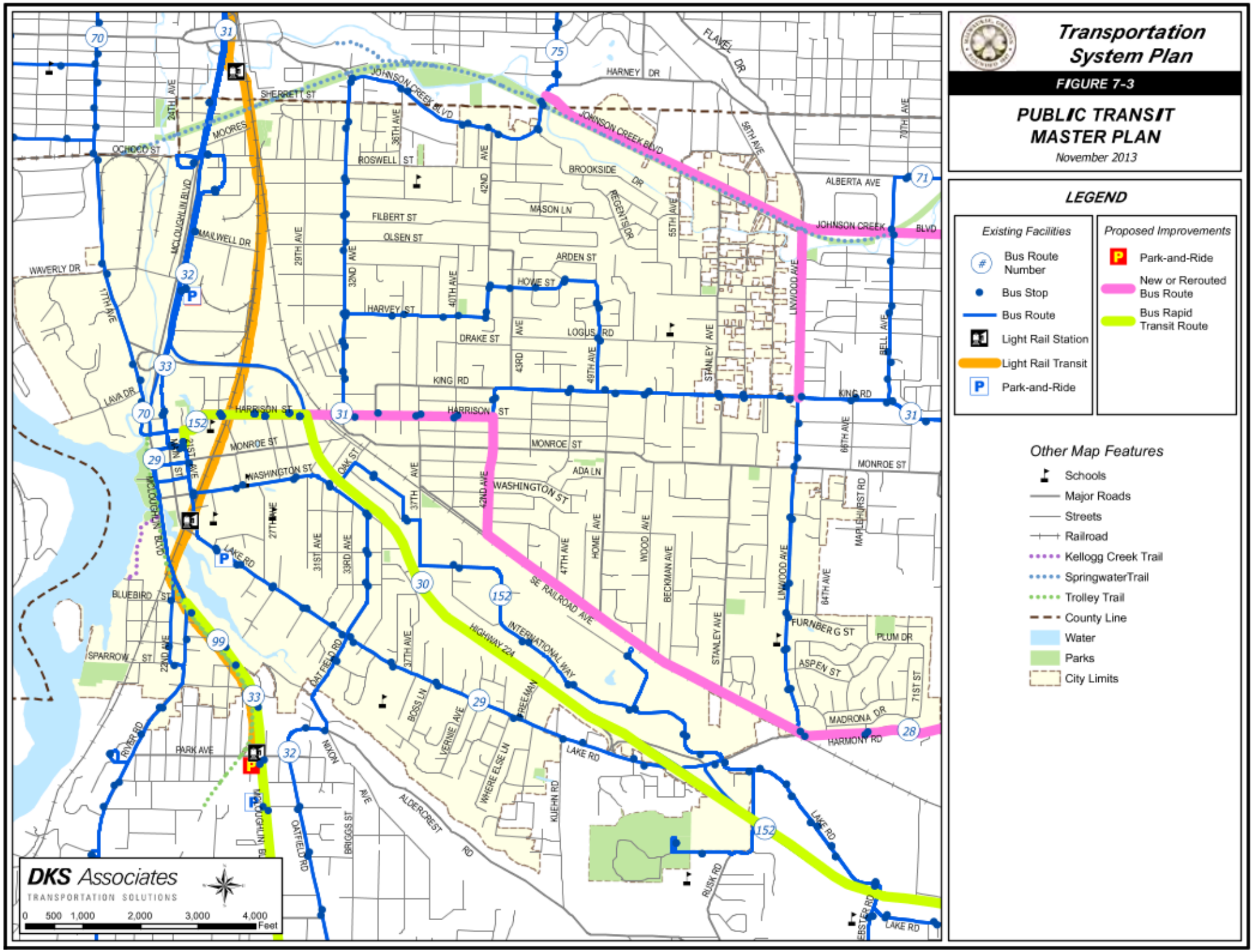
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		23.5	5.6	20.8		23.5	9.3	17.2				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		19.5	5.5	23.0		19.5	9.0	19.5				
Max Q Clear Time (g_c+I1), s		5.2	2.8	14.6		5.9	6.0	7.8				
Green Ext Time (p_c), s		0.9	0.0	2.2		1.6	0.1	1.1				

Intersection Summary												
HCM 6th Ctrl Delay			17.0									
HCM 6th LOS			B									

Appendix F


Transportation System Plan
FIGURE 5-1a
PEDESTRIAN MASTER PLAN
October 2018
LEGEND
Existing Sidewalks
< 5 ft width
5 ft - 10 ft width
Kellogg Creek Trail
SpringwaterTrail
Trolley Trail
Proposed Improvement
Pedestrian Intersection Safety Improvement
Pedestrian Facilities
Central Milwaukie 2015 TSP Amendments
Schools
Major Roads
Streets
Railroad
County Line
10' Contours
Water
Parks
City Limits
Light Rail Transit
Light Rail Station
PROPOSED PROJECTS
Improve Intersection to Increase Pedestrian Safety
A Freeman Way/HWY 224
B 37th Ave/HWY 224
C Oak St/HWY 224
D Monroe St/HWY 224
E Harrison St/HWY 224
F King Rd improvements
G Olsen St/42nd Ave
H Railroad Ave/37th Ave
K Stanley Ave/Logus Rd
AW McLoughlin Blvd and 22nd Ave
BG All McLoughlin crossings
BJ McLoughlin and Ochoco/Milport
Provide Pedestrian Facilities Where Not Currently Present
See Table 5-1 for project descriptions L-AG, AI-AQ, BB, BH, CA-CD
Enhance Existing Pedestrian Connection
AH Create ped connection from Rowe Middle School to North Clackamas Park
AR Construct pedestrian underpass under HWY 99E at Kellogg Creek
AT Complete Springwater Trail along Ochoco St
AU Construct bike-ped overpass over Kellogg Creek
AV Construct Kronberg Park Trail
AX Pave connection to Springwater Trail at 29th Ave and Sherrett
AY Improve connection from Springwater Corridor to Pendleton Site
AZ Construct stairs to connect Springwater Corridor to LRT Station
BA Establish bike-ped connection across Railroad Ave and tracks
BC Establish bike-ped connection over railroad tracks and LRT
BD Construct stairs from Springwater Corridor to McLoughlin Blvd
BE Construct bike-ped bridge over Johnson Creek along Oatsop St at 23rd Ave to connect to LRT station
BF Improve bike-ped connection to neighborhoods west of station
BI Establish bike-ped connection over McLoughlin at River Rd
BK Establish bike-ped connection to McLoughlin at Stubb St
Provide Improved Pedestrian Facilities in Central Milwaukie
See Table 5-1 for project descriptions BM, BN, BO, and BP
0 500 1,000 2,000 3,000 4,000 Feet
Original Map Created by DKS Associates in 2007, Amended by the City of Milwaukie in 2013, 2015, 2018


Transportation System Plan
FIGURE 6-8a
BICYCLE MASTER PLAN
October 2018
LEGEND
Existing Bicycle Facilities
Shared Lane
Bicycle Lane
Kellogg Creek Trail
SpringwaterTrail
Trolley Trail
Proposed Improvements
Bicycle Intersection Safety Improvement
Bicycle Lanes
Neighborhood Greenway
Central Milwaukie 2015 TSP Amendments
Schools
Major Roads
Streets
Railroad
County Line
Water
Parks
City Limits
Light Rail Station
Light Rail Transit
PROPOSED PROJECTS
Improve Intersection to Increase Bicycle Safety
A Adams St/21st Ave/Railroad Crossing
B Johnson Creek Blvd/Springwater Trail
C Johnson Creek Blvd/Linwood Ave
D Linwood Ave/King Rd
E Linwood Ave/Monroe St
F Linwood Ave/Harmony Rd
G Washington St/Oak St/ HWY 224
H International Way/Lake Rd
AF McLoughlin and 22nd
AF McLoughlin/Ochoco/Milport
Provide Improved Bicycle Facilities Where not Currently Present
See Table 6-2 for project descriptions B-R, AI, AJ, and BA-BC
Enhance Existing Bicycle Connection
U Install Neighborhood Greenway treatments at various locations
V Construct bicycle overpass from Railroad Ave to International Way
W Improve Springwater Trail paving
X Improve Kellogg Creek Trail
Y Install Trolley Trail signage
Z Fill in gaps in existing bike network with bike lanes or multiuse path. Improve intersection safety on 17th Ave at HWY 224 and at 99E.
AB Complete Springwater Trail along Ochoco St
AC Construct Kronberg Park Trail
AD Construct bike-ped overpass over Kellogg Creek
AE Construct pedestrian underpass under HWY 99E at Kellogg Creek
AG Pave connection to Springwater Trail at 29th Ave and Sherrett
AH Improve connection from Springwater Corridor to Pendleton Site
AK Establish bike-ped connection over railroad tracks and LRT
AL Construct stairs to connect Springwater Corridor to McLoughlin Blvd
AM Construct bike-ped bridge over Johnson Creek along Clatsop St at 23rd Ave to connect to LRT station
AN Improve bike-ped connection to neighborhoods west of station
AQ Establish bike-ped path on Sparrow to connect River Rd to Trolley Trail
AP Establish bike-ped connection over McLoughlin at River Rd
AR Establish bike-ped connection to McLoughlin at Stubb St
Provide Improved Bicycle Facilities in Central Milwaukie
See Table 6-2 for project descriptions AS, AT, AU, AV, and AW
0 500 1,000 2,000 3,000 4,000 Feet
Original Map Created by DKS Associates in 2007. Amended by the City of Milwaukie in 2013, 2015, and 2018


Transportation System Plan
FIGURE 7-3
PUBLIC TRANSIT MASTER PLAN
November 2013
LEGEND
Existing Facilities
Bus Route Number
Bus Stop
Bus Route
Light Rail Station
Light Rail Transit
Park-and-Ride
Proposed Improvements
Park-and-Ride
New or Rerouted Bus Route
Bus Rapid Transit Route
Other Map Features
Schools
Major Roads
Streets
Railroad
Kellogg Creek Trail
SpringwaterTrail
Trolley Trail
County Line
Water
Parks
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet
JOHNSON CREEK BLVD
SHERRETT ST
HARNEY DR
FLAVEL DR
ROSWELL ST
BROOKSIDE DR
ALBERTA AVE
FILBERT ST
OLSEN ST
MASON LN
ARDEN ST
HOWE ST
HARVEY ST
DRAKE ST
LOGUS RD
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
ADA LN
LAKE RD
BLUEBIRD ST
SPARROW ST
PARK AVE
SE RAILROAD AVE
INTERNATIONAL WAY
HIGHWAY 224
FURNBERG ST
PLUM DR
ASPEN ST
MADRONA DR
HARMONY RD
WAVERLY DR
LAVA DR
MAILWELL DR
MCLOUGHLIN BLVD
OCHOCO ST
MOORES
RIVER RD
OATFIELD RD
ALDERCREST RD
RUSK RD
LAKE RD
BOSS LN
VERNIE AVE
FREEMAN
WHERE ELSE LN
KUEHN RD
BECKMAN AVE
STANLEY AVE
LINWOOD AVE
BELL AVE
MAPLEHURST RD
24TH AVE
29TH AVE
32ND AVE
38TH AVE
42ND AVE
40TH AVE
43RD AVE
49TH AVE
55TH AVE
58TH AVE
66TH AVE
70TH AVE
84TH AVE
71ST ST
17TH AVE
21ST AVE
27TH AVE
31ST AVE
33RD AVE
37TH AVE
47TH AVE
22ND AVE
OAK ST
REGENTS DR
HOME AVE
WOOD AVE
MIXON AVE
BRIGGS ST
CANFIELD RD
70
31
75
71
32
33
152
29
30
99
28