

TECHNICAL MEMORANDUM

DATE: May 8, 2020

TO: Julie Warncke, Transportation Planning Manager | City of Salem

FROM: Scott Mansur, P.E., PTOE | DKS Associates
Lacy Brown, Ph.D., P.E. | DKS Associates
Jenna Bogert, E.I. | DKS Associates

SUBJECT: Salem McGilchrist Street SE Traffic Analysis Update

Project #P17069-004

PROJECT BACKGROUND

The City of Salem is planning improvements to the McGilchrist Street SE corridor between 12th Street SE and 25th Street SE in Salem, Oregon (see Figure 1). There have been two previous reports completed for this study area: the 2007 Traffic Analysis memo and the 2016 Traffic Analysis memo. This report serves as a comprehensive update to the 2016 Traffic Analysis memo and will make new recommendations based on a 2024 year of opening and a 2044 horizon year (the previous study evaluated a 2018 year of opening and a 2040 horizon year).

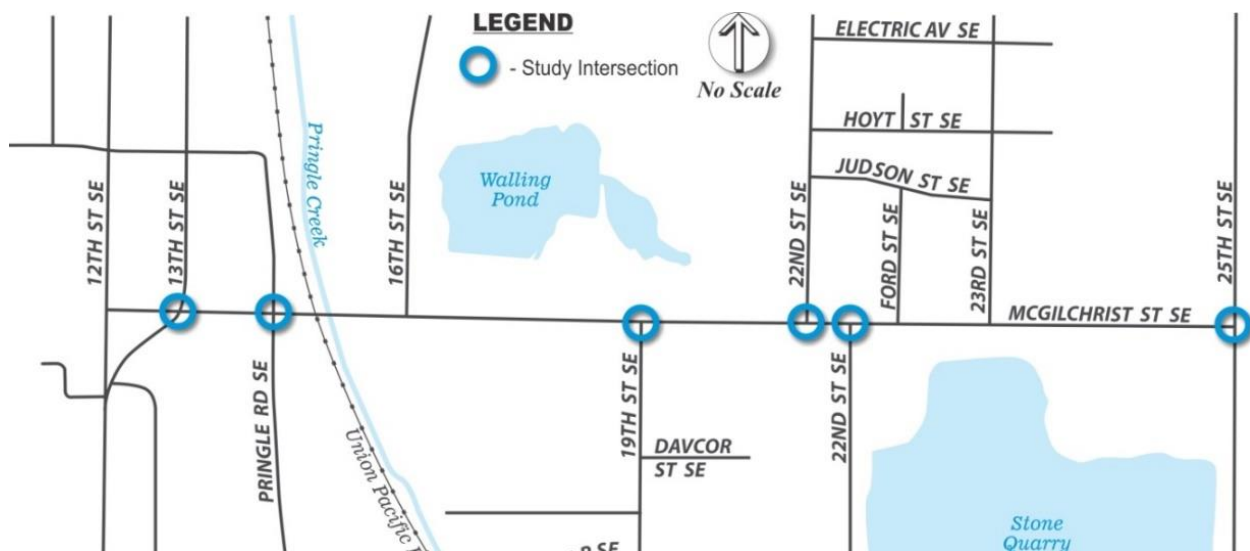


FIGURE 1: STUDY AREA

The following sections of this memorandum document an overview of the prior McGilchrist transportation analysis and findings, updated collision analysis, planned improvements, future operating conditions, and a summary of findings for the 2020 analysis update.

2007 TRAFFIC ANALYSIS FINDINGS

The 2007 Traffic Analysis analyzed the existing and future transportation conditions and needs of McGilchrist Street SE between 12th Street SE and 25th Street SE. This study analyzed 2030 horizon year operations, helped identify the future cross-section for McGilchrist Street SE, and provided the recommended lane configuration throughout the corridor, as shown in Figure 2.

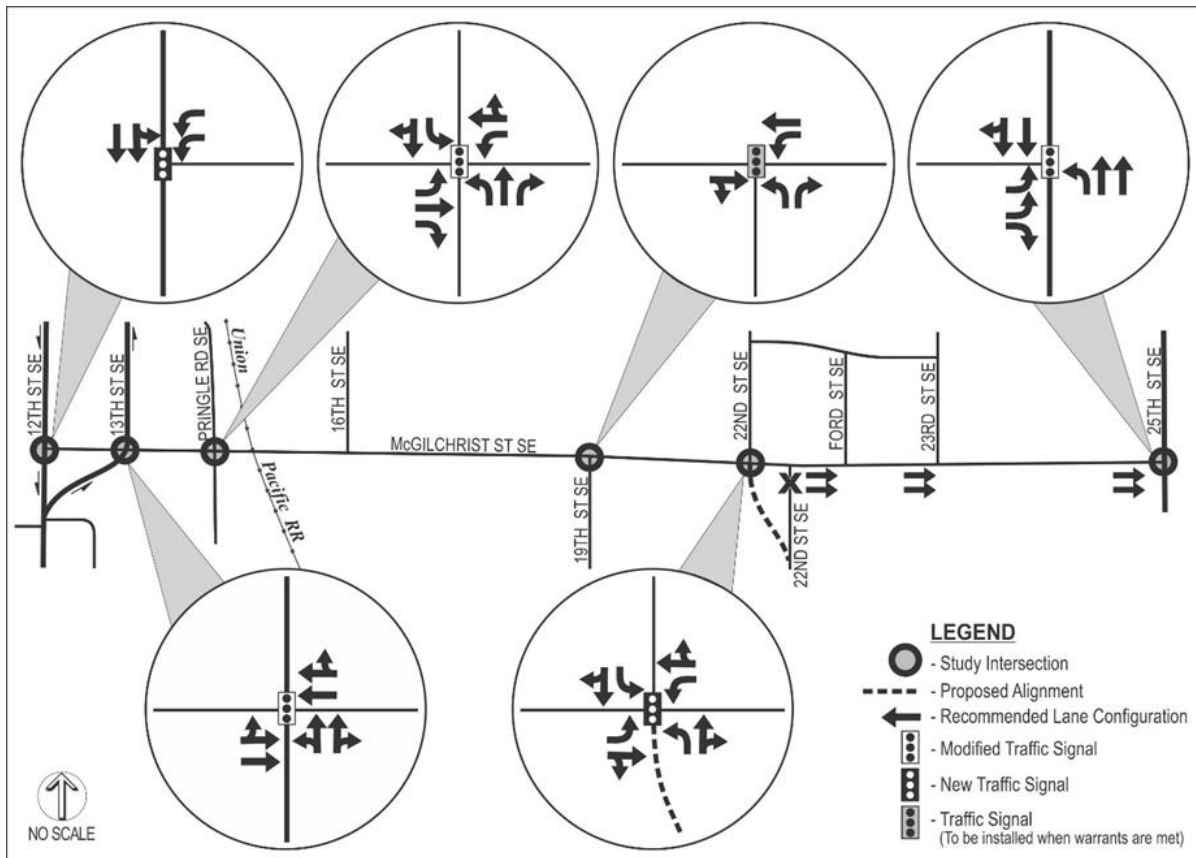


FIGURE 2: 2007 TRAFFIC ANALYSIS RECOMMENDED LANE CONFIGURATION

The recommended improvements included:

- Provide a second eastbound through lane on McGilchrist Street SE between 12th Street SE and Pringle Road SE to provide additional vehicle storage to meet queuing needs. The second through lane would drop into a right turn lane at Pringle Road SE.
- Provide two northbound approach lanes on 19th Street SE and install a westbound left-turn pocket on McGilchrist Street SE.

- Realign 22nd Street (south leg) to align with 22nd Street (north leg) to form a four-leg intersection. Signalize the intersection.
- Provide two eastbound through lanes between 22nd Street SE and 25th Street SE.

2016 TRAFFIC ANALYSIS FINDINGS

The 2016 Traffic Analysis was an update of the existing and future transportation conditions and needs of McGilchrist Street SE between 12th Street SE and 25th Street SE. This study analyzed 2040 horizon year operations, helped identify the future cross-section for McGilchrist Street SE, and recommended improvement projects that address both safety and operations. The recommended lane configuration is shown in Figure 3 below.

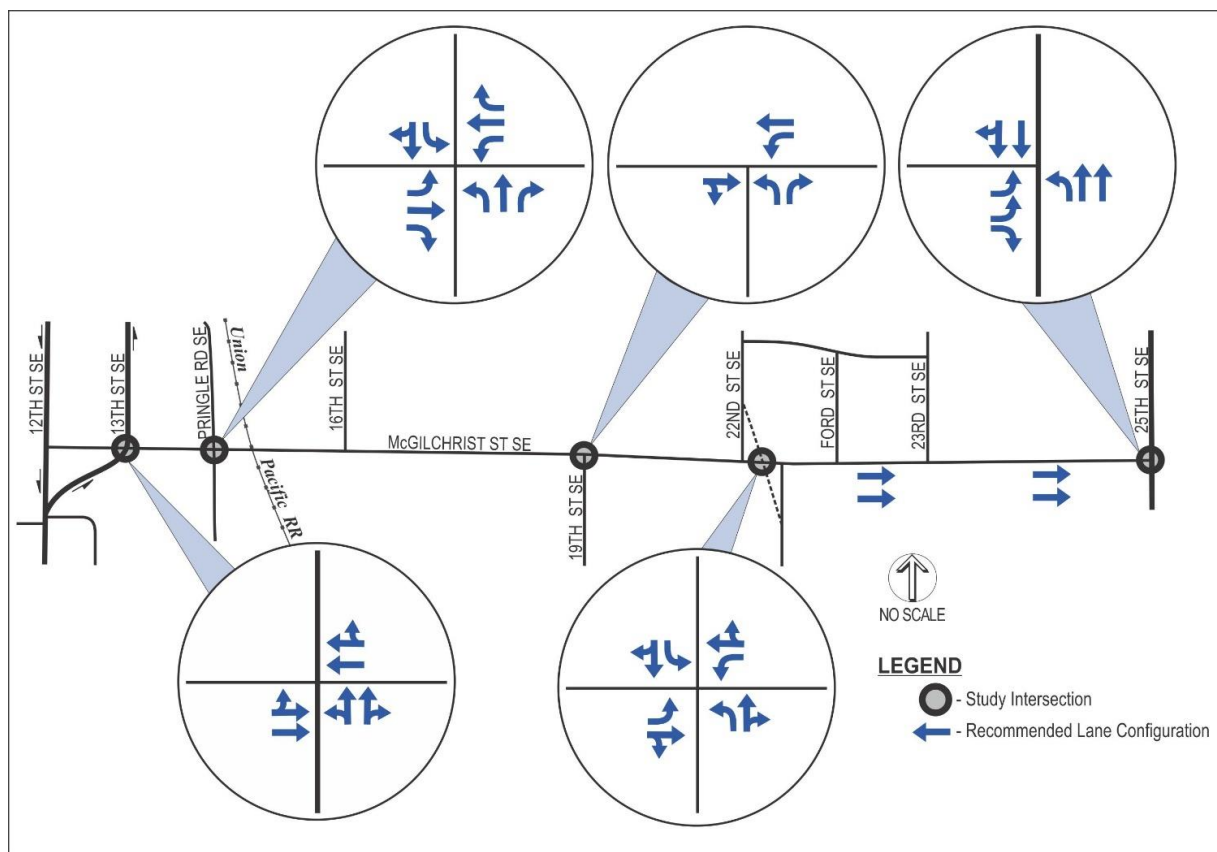


FIGURE 3: 2016 TRAFFIC ANALYSIS RECOMMENDED LANE CONFIGURATION

The following information is a summary of the findings of this report:

- The recommended cross sections from the 2007 traffic analysis were determined to still be needed to accommodate future intersection operations, with the addition of the modification of the westbound approach (east leg) at Pringle Road to include a through, right, and left turn lane.
- A MUTCD signal warrant analysis for the projected 2018 traffic volumes indicated sufficient warrants are met for the proposed 22nd Street SE and McGilchrist Street SE intersection.

- The design of the McGilchrist Street SE railroad crossing and the Pringle Road intersection should be coordinated with ODOT Rail Safety and UPRR since the existing crossing will have to be widened.

EXISTING CONDITIONS

Most of the existing conditions information is unchanged since the 2016 Traffic Analysis. That report (included in the appendix) can be referenced for the following information.

- Street Network Summary
- Adjacent Land Use
- Bicycle, Pedestrian, and Transit Facilities
- Traffic Volumes
- Required Operating Standards
- Existing Operating Conditions (2015)

The one component of existing conditions that has changed is collision history. The following section describes the updated collision data and analysis.

COLLISION ANALYSIS

A collision analysis for the study area considered the most recent five years (March 2015 – March 2020) of collision data. Collision data was obtained from the ODOT Crash Analysis Reporting Unit for 2015 through 2018. Fatal crash data from the years 2019 and 2020 were provided by the City of Salem. It should be noted that the total number of collisions in 2019 and 2020 will increase once all crash data is available from ODOT. As shown in Figure 4, there were a total of 65 collisions, including two fatalities that occurred within the study area during the five year period.

The first fatality occurred in August of 2019 in the early morning and involved one vehicle and one motorcycle at the intersection of 19th Street SE. The motorcycle was traveling eastbound when the westbound vehicle turned left in front of the motorcycle. The second fatality occurred in March of 2020 in the late evening around 11:00 pm. A vehicle was traveling on McGilchrist Street SE between 22nd Street SE and Ford Street SE when the driver ran off the road and struck a pedestrian walking on the side of the roadway.



FIGURE 4: COLLISION MAP BY SEVERITY

Table 1 summarizes the collision data for each intersection and the McGilchrist Street SE segment between 13th Street and 25th Street.

Because the collision data from 2019 and 2020 only included fatal crashes, the collision rates shown in the table below are based on *three* years of crash data (March 2015 – March 2018). The collision rates were calculated for each of the study intersections and segment. Intersection collision rates higher than the published 90th percentile rates provided in ODOT's Analysis Procedures Manual (APM) or segment collision rates higher than statewide averages for similar facilities indicate that the intersection or segment should be flagged for further review.^{1,2}

TABLE 1: 2015-2020 ODOT COLLISION SEVERITY BY LOCATION

INTERSECTION	COLLISIONS BY SEVERITY (5-YEAR)						COLLISIONS PER YEAR	3-YEAR COLLISION RATE ^{a,b}	90TH PERCENTILE COLLISION RATE
	FATAL	INJ. A	INJ. B	INJ. C	PDO	TOTAL			
13th Street	0	1	2	6	4	13	2.6	0.74	0.860
Pringle Road	0	0	0	7	9	16	3.2	0.71	0.860
19th Street	1	0	2	1	2	6	1.2	0.36	0.293
22nd Street ^c	0	0	0	3	3	6	1.2	0.32	0.408
25th Street	0	0	0	4	7	11	2.2	0.34	0.509
SEGMENT									STATEWIDE AVERAGE
McGilchrist Street ^d	1	0	1	8	3	13	2.6	0.93	0.98

^a Rate Calculation = Collisions / (Average Daily Traffic x 365 days x Number of Years / 1 million) – [units: crashes per million entering vehicles]

^b Rate Calculation = (Collisions x 1 million) / (365 days x Number of Years x ADT x Segment Length) – [units: crashes per million vehicles miles traveled]

^c 22nd Street includes both the west intersection and east intersection.

^d McGilchrist Street SE segment includes 13th Street SE to 25th Street SE.

As shown above, only the intersection at 19th Street exceeds the 90th percentile collision rate. The proposed improvements along the entire segment of McGilchrist Street SE are anticipated to improve safety along the corridor, including intersection safety. The segment collision rate does not exceed the statewide average rate.

¹ Exhibit 4-1: Intersections Crash Rates per MEV by Land Type and Traffic Control. Analysis Procedures Manual, Oregon Department of Transportation, November 2015.

² ODOT Five-Year Comparison of State Highway Crash Rates, Table II

PLANNED IMPROVEMENTS

Classified as a major arterial, McGilchrist Street SE provides a major east-west connection between inner Southeast Salem, the industrial properties, and the Salem Airport. The City of Salem's Transportation System Plan shows that a standard major arterial requires five travel lanes (two travel lanes in each direction and a center turn lane) and 14 feet of sidewalks and landscaping on each side as shown in Figure 5 on the following page.³

However, the five-lane cross-section may be excessive for future traffic volumes and alternatives with smaller cross-sections should be considered. Based on the results of the *2016 McGilchrist Transportation Analysis*, a three-lane cross section has been identified from 12th Street SE to 22nd Street SE, and a four-lane cross-section from 22nd Street SE to 25th Street SE. Details for the landscape strips and sidewalk corridors for the recommended three-lane cross-section will be determined in the design phase of this project. Other planned improvements include a realignment of 22nd Street SE at McGilchrist Street SE.

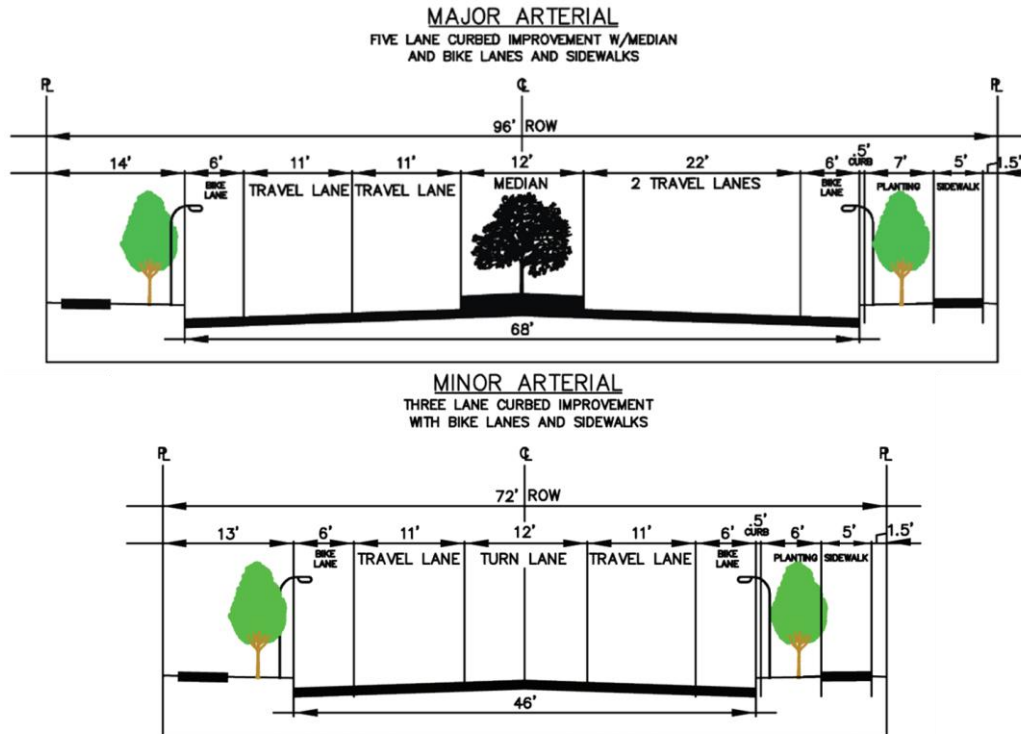


FIGURE 5: MAJOR AND MINOR ARTERIAL STREET STANDARDS (FROM CITY OF SALEM'S TSP)

³ City of Salem Administrative Rules, Division 006-Street Design Standards, pg. 109-006, January 2014

FUTURE OPERATING CONDITIONS

Future operating conditions were evaluated for the 2024 year of completion and the 2044 horizon year. The 2044 horizon year was selected based on federal requirements to evaluate future transportation operations 20 years after the planned year of completion.

The following scenarios were evaluated:

- 2024 No Build AM and PM peak periods
- 2024 Build AM and PM peak periods
- 2044 No Build PM peak period
- 2044 Build PM peak period

The “Build” scenario assumes the following improvements to the study area:

- Realign 22nd Street SE into a four-leg intersection and install a traffic signal.
- Build a three-lane cross section from 12th Street SE to 22nd Street SE. Install an additional eastbound through lane between 12th Street and Pringle Road.
- Build a four-lane cross-section from 22nd Street SE to 25th Street SE.

Based on previous modeling work completed for the *2016 McGilchrist Traffic Analysis Study*, an annual growth rate of 2% was used to estimate the 2024 and 2044 future volumes in the study area. Volumes figures of the 2024 No Build and Build volumes and the 2044 No Build and Build volumes can be found in the appendix.

FUTURE OPERATING CONDITIONS – YEAR OF COMPLETION (2024)

Future traffic operations at the study intersections were analyzed for the AM and PM peak hours based on the 2000 and 2010 Highway Capacity Manual methodology.^{4, 5}

Table 2 shows the estimated delay, LOS, and v/c ratio for each study intersection for the No Build and Build scenarios for the PM peak hour. The AM and PM peak hour HCM reports can be found in the appendix.

⁴ 2010 Highway Capacity Manual, Transportation Research Board, Washington DC, 2010

⁵ 2010 Highway Capacity Manual, Transportation Research Board, Washington DC, 2010

TABLE 2: FUTURE (2024) STUDY INTERSECTION OPERATIONS –PM PEAK HOUR NO BUILD AND BUILD

INTERSECTION	OPERATING STANDARD	PM PEAK HOUR No Build			PM PEAK HOUR Build		
		DELAY	LOS	V/C	DELAY	LOS	V/C
SIGNALIZED							
13 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	14.2	B	0.57	24.6	C	0.42
Pringle Road SE & McGilchrist Street SE	LOS E v/c 0.90	60.3	E	1.14	21.3	C	0.76
22nd Street SE & McGilchrist (Build Only)	LOS E v/c 0.90	Not Applicable			30.9	C	0.61
25 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	22.3	C	0.91	17.6	B	0.60
UNSIGNALIZED							
19 th Street SE & McGilchrist Street SE	LOS E	69.5	A/F	0.88	24.1	A/C	0.33
22 nd Street SE & McGilchrist Street SE (West)	LOS E	47.3	A/E	0.73	Not Applicable		
22 nd Street SE & McGilchrist Street SE (East)	LOS E	51.8	A/F	0.76			

SIGNALIZED INTERSECTION:

Delay = Average Intersection Delay (sec.)
v/c = Volume-to-Capacity Ratio
LOS = Level of Service

Unsignalized Intersection:

Delay = Critical Movement Approach Delay (sec.)
v/c = Critical Movement Volume-to-Capacity Ratio
LOS = Level of Service (Major/Minor Road)

BOLD/HIGHLIGHTED: Does not meet City Operating Standards

As shown in the table above, four of the six intersections fail to meet the operating standards under No Build conditions. After the Build improvements have been implemented, all intersections meet the operating standards in 2024, the estimated year of opening.

Table 3 shows the estimated delay, LOS, and v/c ratio for each study intersection for the No Build and Build scenarios for the AM peak hour. The AM and PM peak hour HCM reports can be found in the appendix.

TABLE 3: FUTURE (2024) STUDY INTERSECTION OPERATIONS –AM PEAK HOUR NO BUILD AND BUILD

INTERSECTION	OPERATING STANDARD	AM PEAK HOUR No Build			AM PEAK HOUR Build		
		DELAY	LOS	V/C	DELAY	LOS	V/C
SIGNALIZED							
13 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	16.3	B	0.57	14.4	B	0.51
Pringle Road SE & McGilchrist Street SE	LOS E v/c 0.90	20.2	C	0.79	16.5	B	0.56
22nd Street SE & McGilchrist (Build Only)	LOS E v/c 0.90	Not Applicable			26.8	C	0.46
25 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	12.3	B	0.66	11.6	B	0.53
UNSIGNALIZED							
19 th Street SE & McGilchrist Street SE	LOS E	21.5	A/C	0.34	19.2	A/C	0.15
22 nd Street SE & McGilchrist Street SE (West)	LOS E	22.7	A/C	0.50	Not Applicable		
22 nd Street SE & McGilchrist Street SE (East)	LOS E	29.2	A/D	0.46			

SIGNALIZED INTERSECTION:

Delay = Average Intersection Delay (sec.)
v/c = Volume-to-Capacity Ratio
LOS = Level of Service

Unsignalized Intersection:

Delay = Critical Movement Approach Delay (sec.)
v/c = Critical Movement Volume-to-Capacity Ratio
LOS = Level of Service (Major/Minor Road)

BOLD/HIGHLIGHTED: Does not meet City Operating Standards

As shown in the table above, all of the intersections meet the operating standards under No Build and Build conditions.

FUTURE OPERATING CONDITIONS – HORIZON YEAR (2044)

Table 4 shows the estimated delay, LOS, and v/c ratio for each study intersection for the No Build and Build scenarios for the PM peak hour. The HCM reports can be found in the appendix. As shown, all study intersections are expected to meet the operating standards under the 2044 Build scenario with the exception of the Pringle Road SE/McGilchrist Street SE intersection.

The 2016 *McGilchrist Traffic Analysis* also reported that this intersection failed to meet standards under 2040 Build conditions. The recommended improvement from the 2016 Report was to widen the westbound approach to three approach lanes (left, through, and right). Applying the same recommended improvement to the 2044 analysis will allow the Pringle Road intersection to meet operating standards. There are no additional intersection improvement recommendations beyond what was recommended in the 2016 Report.

TABLE 4: FUTURE (2044) STUDY INTERSECTION OPERATIONS – PM PEAK HOUR NO BUILD AND BUILD

INTERSECTION	OPERATING STANDARD	PM PEAK HOUR No Build			PM PEAK HOUR Build		
		DELAY	LOS	V/C	DELAY	LOS	V/C
SIGNALIZED							
13 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	29.0	C	0.73	25.5	C	0.59
Pringle Road SE & McGilchrist Street SE	LOS E v/c 0.90	>80.0	F	>1.20	44.3	D	0.96
22nd Street SE & McGilchrist (Build Only)	LOS E v/c 0.90	Not Applicable			41.3	D	0.84
25 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	>80.0	F	>1.20	25	C	0.84
UNSIGNALIZED							
19 th Street SE & McGilchrist Street SE	LOS E	>80.0	B/F	>1.20	40.4	B/E	0.56
22 nd Street SE & McGilchrist Street SE (West)	LOS E	>80.0	A/F	>1.20	Not Applicable		
22 nd Street SE & McGilchrist Street SE (East)	LOS E	>80.0	B/F	>1.20			

Signalized Intersection:

Delay = Average Intersection Delay (sec.)

v/c = Volume-to-Capacity Ratio

LOS = Level of Service

Unsignalized Intersection:

Delay = Critical Movement Approach Delay (sec.)

v/c = Critical Movement Volume-to-Capacity Ratio

LOS = Level of Service (Major/Minor Road)

Bold/Highlighted: Does not meet City Operating Standards

CORRIDOR TRAVEL TIMES

Corridor travel times were estimated using SimTraffic™ for the future scenarios in order to estimate the travel time savings associated with the Build improvements. The SimTraffic™ models were calibrated based on 2018 travel time data from Oregon iPeMS.⁶ The iPeMS travel time data was used to create a calibrated 2018 travel time model in SimTraffic™. Then the 2024 and 2044 SimTraffic™ travel time models were projected from the 2018 model.

The 2024 and 2044 travel times are shown in Table 5 below and are for the PM peak hour.

TABLE 5: TRAVEL TIMES ON MCGILCHRIST STREET SE (BETWEEN 13TH ST AND 25TH ST)

Direction	2024 No Build	2024 Build	Net Change	2044 No Build	2044 Build	Net Change
Westbound	9:38 mins	2:35 mins	-7:03	17:55 mins	2:51 mins	-15:04
Eastbound	3:55 mins	3:35 mins	-0:20	4:15 mins	4:35 mins	+0:20

The No Build travel time in the westbound direction is notably long and equates to an average travel speed of 6 mph in 2024 and 3 mph in 2044. This due to the heavy northbound volumes at Pringle Road and 13th Street that take green time away from the eastbound-westbound movements on McGilchrist.

The travel times are longer in the westbound direction than the eastbound direction because the westbound traffic volumes are heavier than eastbound volumes in the PM peak hour. Additionally, in the No Build condition the eastbound approach at the Pringle Road intersection has a right turn pocket whereas the westbound approach has a single lane approach for all (left, through, and right turn) movements.

As shown, there is a significant savings in travel time for the westbound direction between the No Build and Build scenario in 2024 and 2044. For the eastbound direction, there is a slight increase (20 seconds) in 2044. This is due to the additional delay associated with new the traffic signal at 22nd Street.

In order to estimate the impact that the McGilchrist roadway construction will have on corridor travel times, a scenario was simulated to reflect the lane configuration changes that will be in-place during construction. The lane configuration changes during the construction of the McGilchrist Street improvements include single travel lanes in each direction (i.e. no turn pockets at intersections). While the project is being constructed (estimated 2-year construction schedule), westbound traffic will have an estimated delay of 39 seconds and eastbound traffic will experience an estimated delay of 38 seconds.

⁶ <https://odot.iteris-pems.com>

FUTURE SAFETY PERFORMANCE

As described in the previous section, the McGilchrist project includes the installation of turn lanes, bicycle lanes, sidewalks, and additional through lanes. These improvements provide safety benefits, some of which can be quantified with crash reduction factors (CRF). A CRF is the percentage crash reduction that might be expected after implementing a given countermeasure at a specific site or along a segment.

Table 6~~Error! Reference source not found.~~ shows the expected CRFs for each intersection and segment. The CRFs shown here are from the ODOT Highway Safety Improvement Program website.⁷ The table below shows the ODOT CRF countermeasure number and the CRF value for each intersection and the segment. Some intersections have multiple CRF values to account for multiple countermeasures. Also shown are the collisions per year (existing) and the estimated collisions per year after the McGilchrist Street project is constructed.

TABLE 6: CRASH REDUCTION ESTIMATES

INTERSECTION	CRASH REDUCTION FACTORS (CRF)		COLLISIONS PER YEAR (EXISTING)	ESTIMATED TOTAL COLLISIONS PER YEAR (BUILD)	NET TOTAL REDUCTION IN CRASHES PER YEAR
	ODOT CRF NO.	CRF			
13th Street	No Applicable CRF		2.6	2.6	0.0
Pringle Road	H12	0.19	3.2	2.6	0.6
19th Street	H7	0.33	1.2	0.9	0.3
22nd Street	H20	0.67	0.6	0.2	0.1
	H20	-1.43	0.6	0.9	
25th Street	H11	0.07	2.2	2.0	0.2
McGilchrist Street SE	H29	0.39	1.2	0.7	0.6
	H26	0.28	0.2	0.1	
	BP18	0.36	0	0	
TOTAL ESTIMATED CRASH REDUCTION OF PROJECT: 1.8 CRASHES/YEAR (15%)					

- **H12:** Install left turn lanes on both major road approaches at a 4-leg signalized intersection. The CRF applies to all crash types and severities. There were 16 crashes (3.2 crashes per year) at the Pringle Road intersection according to the crash data.
- **H7:** Install a left turn lane on a single major road approach at a 3-leg unsignalized intersection. The CRF applies to all crash types and all severities. There were 6 crashes that occurred at the 19th Street SE intersection.

⁷ <https://www.oregon.gov/odot/Engineering/Pages/ARTS.aspx>

- **H20:** Install a signal. The CRF of 0.67 applies to all angle crashes of all crash severities. There were three angle crashes at the 22nd Street intersection.
The CRF of 1.43 applies to all rear end crashes of all severities. There were three rear-end crashes at the 22nd Street intersection. The negative CRF means that rear-end crashes are expected to increase with the installation of a traffic signal. Overall, this intersection has a net reduction of 0.1 crashes per year.
- **H11:** Install a left turn lane on a single major road approach at a 3-leg signalized intersection. The CRF applies to all crash types and all severities. There were 11 crashes that occurred at the 25th Street SE intersection.
- **H29:** Install a two-way center turn lane on a two-lane road. The CRF of 0.39 applies to only rear-end crashes of all severities. There were six rear-end crashes along the McGilchrist Street SE segment.
- **H26:** Install new lighting on a roadway segment. The CRF of 0.28 applies to only nighttime crashes of all injury types (no PDOs). There was one nighttime crash along the McGilchrist Street SE segment, which was a fatal pedestrian crash.
- **BP18:** Install bicycle lanes along a segment. The CRF of 0.36 applies to bicycle crashes only of all severities. There were no bicycle crashes along the McGilchrist Street SE segment.

SUMMARY

The following are key findings of the transportation impact analysis of McGilchrist Street corridor:

Planned Improvements

- Realign 22nd Street SE into a four-leg intersection and install a traffic signal.
- Build a three-lane cross section from 12th Street SE to 22nd Street SE. Install an additional eastbound through lane between 12th Street and Pringle Road.
- Build a four-lane cross-section from 22nd Street SE to 25th Street SE.

Expected Operations Benefits:

- There is a significant savings (-7:03 minutes) in travel time for the westbound direction between the No Build and Build scenario in 2024. For the eastbound direction, there is a travel time savings (-0:20 seconds) as well.
- There is a significant savings (-15:04 minutes) in travel time for the westbound direction between the No Build and Build scenario in 2044. For the eastbound direction, there is actually a slight increase (+0:20 seconds).
- However, while the project is being constructed (estimated 2-year construction schedule starting in 2024), westbound traffic will have an estimated additional delay of 39 seconds and eastbound traffic will experience an estimated additional delay of 38 seconds.

Expected Safety Benefits:

- Four of the study intersections are expected to have reduced number of crashes after the construction of the planned improvements.
- The overall McGilchrist project corridor (between 13th Street and 25th Street) is expected to see an overall reduction of 1.8 crashes/year (15%) due to the planned improvements.



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APPENDIX



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TECHNICAL MEMORANDUM

DATE: December 5, 2016

TO: Aaron Kimsey, PE, City of Salem
Ken Ackerman, PE, OTAK

FROM: Scott Mansur PE, PTOE *Sm*
Jordin Ketelsen, EIT
Rachel Vogt, EIT



SUBJECT: Salem McGilchrist Street SE Corridor Improvements Traffic Analysis

P15238-000

The City of Salem is planning improvements to the McGilchrist Street SE corridor between 12th Street SE and 25th Street SE in Salem, Oregon (see Figure 1). While a previous report was completed for the study area in the 2007 Traffic Analysis, nine years have passed since the prior recommendations were made. This report serves as a comprehensive update to the previous analysis and will make new recommendations based on a 2040 horizon year (the previous study only evaluated a 2030 horizon year). Key assumptions include:

- The McGilchrist Street SE/12th Street SE intersection will include a signal to be built by others prior to the McGilchrist Corridor Improvement.
- This document provides updated analysis for the 13th Street SE, Pringle Road SE, 22nd Street SE, and 25th Street SE intersections.
- 22nd Street SE will be extended and realigned with Madrona Avenue SE to the south of the study area.

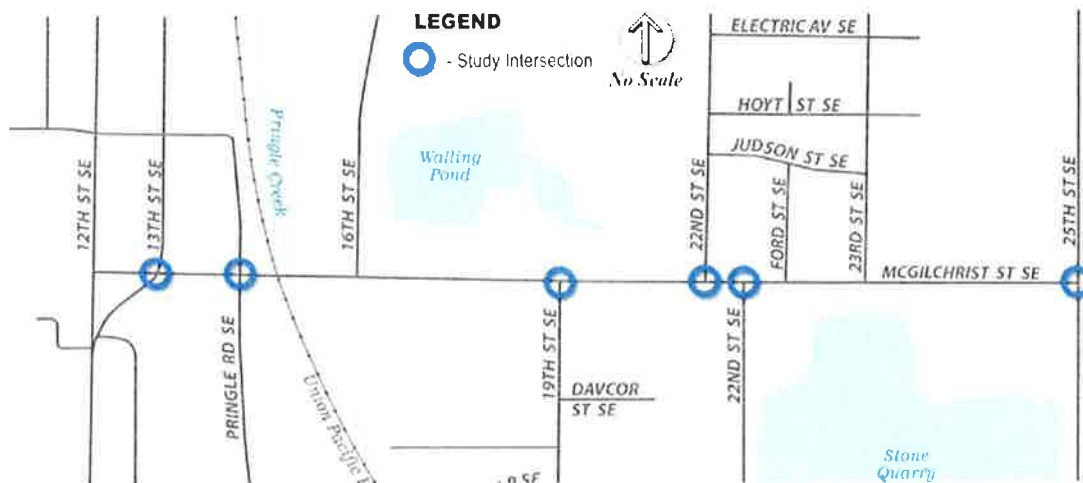


Figure 1: Study Area

The following sections of this memorandum document an overview of the prior McGilchrist transportation analysis and findings, existing conditions, future traffic volumes, operating conditions, and recommended improvements.

Prior McGilchrist Street SE Transportation Analysis and Findings

The 2007 Traffic Analysis analyzed the existing and future transportation conditions and needs of McGilchrist Street SE between 12th Street SE and 25th Street SE.¹ This study analyzed 2030 horizon year operations, helped identify the future cross-section for McGilchrist Street SE, and provided the recommended lane configuration throughout the corridor, as shown in Figure 2. Northbound turning movement at 19th Street SE and McGilchrist Street SE required separate left and right turn lanes and a shared through-right lane for the eastbound movement. In addition, a second eastbound through lane would be needed on McGilchrist Street SE between 12th Street SE and Pringle Road SE to provide additional vehicle storage. The second through lane would drop into a right turn lane at Pringle Road SE. Two eastbound through lanes were also recommended between 22nd Street SE and 25th Street SE.



McGilchrist Street SE West of 22nd Street SE

¹ Salem McGilchrist Improvement Project Traffic Analysis, 2007, DKS Associates

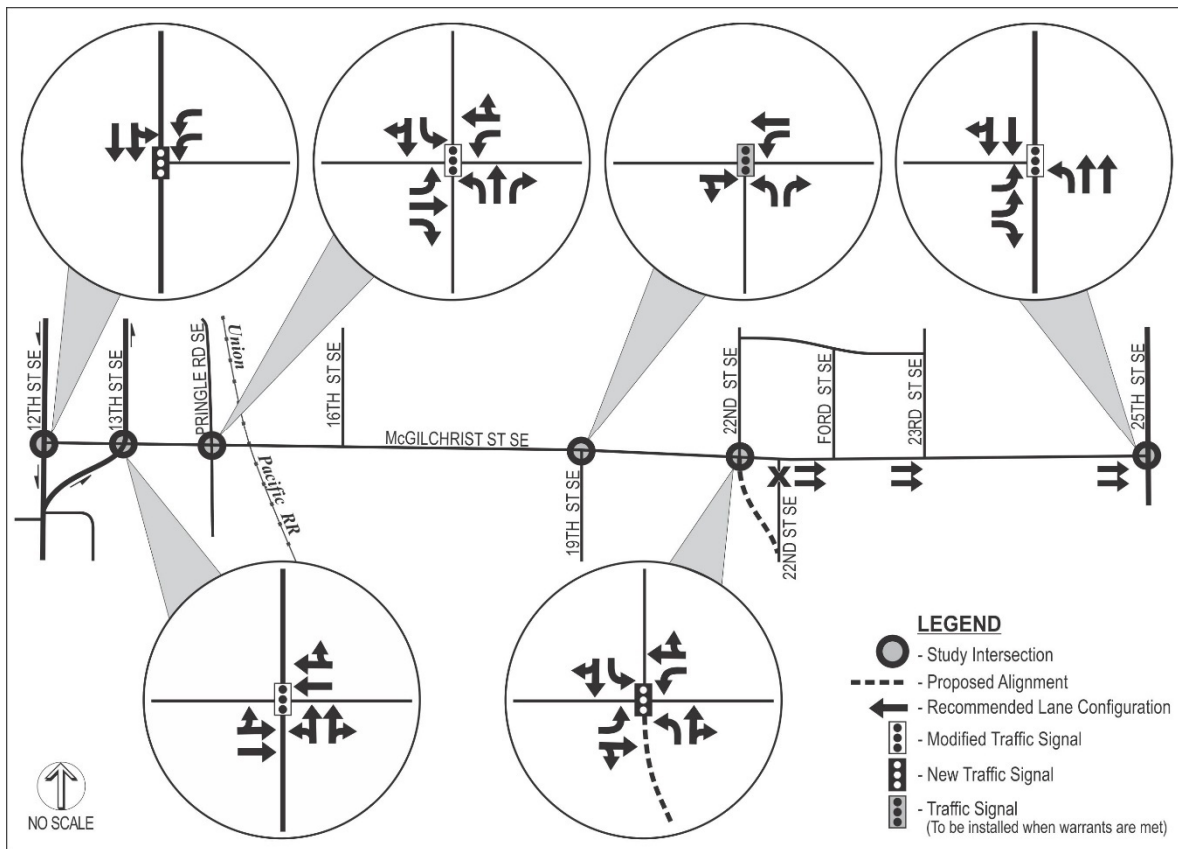


Figure 2: 2007 Traffic Analysis Recommended Lane Configuration

Due to the nine-year time difference between the previous study and the current study, the analysis of the road design and lane geometry will be updated for a 2040 future horizon year (approximately 20 years out from the estimated completion year 2018). The current analysis will use the 2030 recommended corridor outline in the previous study. The purpose of this additional analysis is to determine if any further improvements are necessary to meet City of Salem operating standards.

The planned improvements include widening the McGilchrist Street SE corridor from an unimproved two-lane roadway to a three-lane facility with sidewalks on both sides, bike lanes, turn lanes at specific locations. Other improvements include an additional eastbound travel lane east of 22nd Street SE. Additionally, the improvements would include a realignment of 22nd Street SE to create one intersection (currently 22nd Street is two offset intersections). New traffic signals or modified traffic signals will be required at the 13th Street SE, Pringle Road SE, 22nd Street SE, and 25th Street SE intersections. Furthermore, the McGilchrist Street SE grade crossing at the Union Pacific Railroad SE (UPRR) racks will need to be widened due to the cross-section expansion, which will require a Railroad Crossing Application and approval by UPRR.



Existing Conditions

This section presents of the existing conditions of the study area which includes a street network summary, a discussion of the surrounding land-use, bicycle, pedestrian, and transit facilities, existing traffic volumes, existing intersection operations, and collision analysis.

Street Network Summary

McGilchrist Street SE is classified as a major arterial² and Table 1 shows the key roadway characteristics for the corridor and the key adjacent roadways.

Table 1: Key Roadway Characteristics

<i>Roadway</i>	<i>Classification</i>	<i>Number of Lanes</i>	<i>Posted Speed</i>	<i>Sidewalks</i>	<i>Bicycle Lanes</i>
McGilchrist Street SE	Major Arterial	2	40	Partial	No
13 th Street SE (One-way)	Major Arterial	2	30	Both Sides	Yes
Pringle Road SE	Minor Arterial	2	35	Partial	Yes
19 th Street SE	Local	2	25	Partial	No
22 nd Street SE	Collector	2	30	Partial	No
25 th Street SE	Major Arterial	4	45	Partial	No

Adjacent Land Use

The primary land use along McGilchrist Street SE is industrial and commercial business. Figure 3 shows the existing zoning of the surrounding land area as primarily general industrial and industrial commercial; west of 13th Street SE is zoned as general commercial.³

General Industrial (IG) zone generally allows a wide range of manufacturing, distribution, and storage uses, and prohibits uses that are incompatible with industrial development. (Ord No. 31-13)⁴

Industrial Commercial (IC) zone generally allows a wide variety of retail, office, heavy commercial, light manufacturing, and warehousing activities. (Ord No. 31-13)

² City of Salem Transportation System Plan, Street SE System Element Section

³ Online *City of Salem Zoning Maps*; Accessed 01/12/2016

⁴ *City of Salem Revised Codes; Section 10 - Zoning*

General Commercial (CG) zone generally allows a wide variety of commercial uses, including the sale of commodities, performance of services, repair facilities, motor vehicle sales and services, offices, and general wholesaling. (Ord No. 31-13)

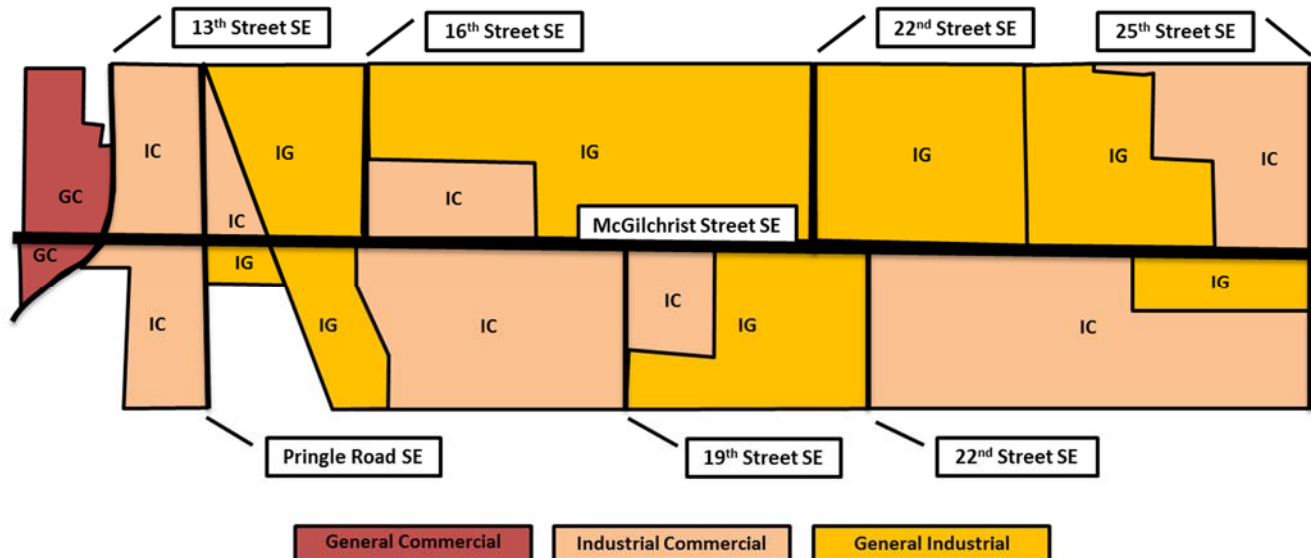


Figure 3: Existing Zoning and Land-use adjacent to McGilchrist Street SE⁵

Bicycle, Pedestrian, and Transit Facilities

There are no bicycle lanes and the width of the shoulder is not adequate for bicyclists (less than four feet). Along Pringle Road SE there is a six-foot bicycle lane traveling southbound and along 13th Street SE there is a five foot bicycle lane traveling northbound.



Sidewalk north of McGilchrist Street SE

Pedestrian facilities are not present along the majority of McGilchrist Street SE, east of Pringle Road. There are sidewalks along both sides of McGilchrist Street SE from Pringle Road SE to 13th Street SE (continuing to 12th Street SE), along the north side of McGilchrist Street SE from 16th Street SE to Pringle Road SE, and from 16th Street SE to the Salmon Run Offices located south of McGilchrist Street SE at 16th Street SE. At 16th Street SE there is a marked crosswalk. The sidewalk does not continue past the Salmon Run Offices and the remainder of the corridor is gravel with access to driveways or parking lots.

⁵ SalemMaps Online – Zoning:

<http://www.cityofsalem.net/Departments/CommunityDevelopment/Planning/Zoning/ZoningMaps/Pages/SalemMapsOnline-Zoning.aspx>

Transit facilities include two Cherriots lines (routes 6 and 8) that run north to south; one along Pringle Road SE/13th Street SE and one along 25th Street SE.⁶ The routes and stops within the study area are shown on Figure 4. Route 8 runs from 6:30 a.m. to 9:30 p.m., Monday through Friday. Route 6 runs from 5:30 a.m. to 9:30 p.m., Monday through Friday. Typical ridership at the study area stops ranges from 0 to 10 people per day.⁷

Other transit vehicles that travel along McGilchrist Street SE or adjacent roads in the study area include the CherryLift service, which is an origin-to-destination transportation service for people whose disability prevents them from using the Cherriots buses. Services are provided Monday through Friday, 6 a.m. to 7 p.m. and Saturday, 10 a.m. to 4 p.m.⁸

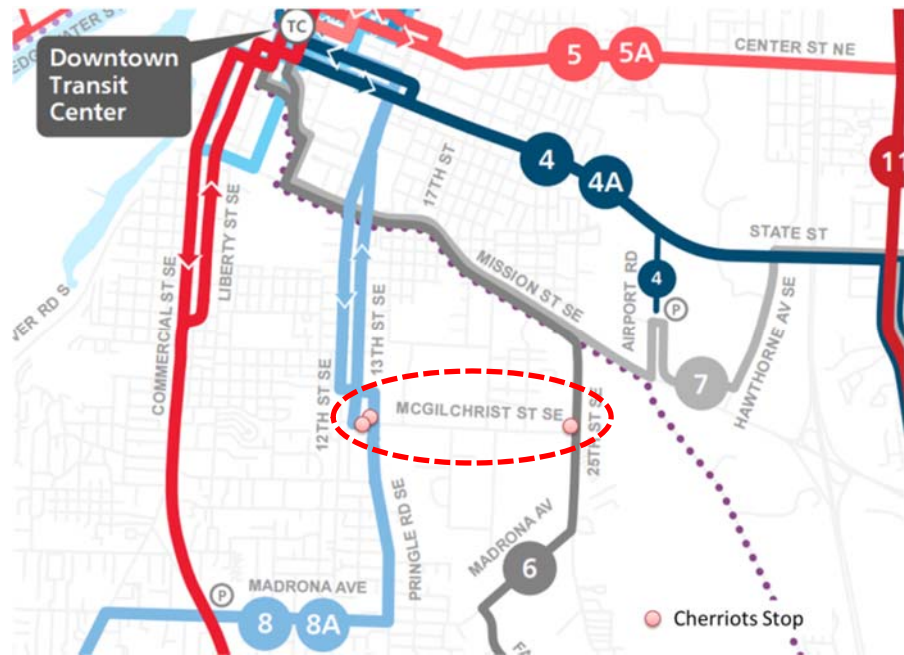


Figure 4: Cherriots Bus Routes and Stops near McGilchrist Street SE

Traffic Volumes

Recent 24-hour traffic counts were collected to capture the existing vehicle volumes traveling on McGilchrist Street SE during a typical weekday.⁹ These counts were also necessary to evaluate the Manual on Uniform Traffic Devices (MUTCD) traffic volume warrants for unsignalized intersections.¹⁰ The resulting 24-hour traffic volumes trends along McGilchrist Street SE (as shown in the Appendix) show that the peak hour on McGilchrist Street SE occurs from 4:00 p.m. to 5:00 p.m. and carries approximately 940 vehicles in both directions. Vehicle types and speeds were also recorded during the 24-hour counts for each direction as shown Table 2. Truck traffic percentages range between 12 and 15 percent, which is typical in an industrial area.

⁶ Source: Cherriots Website cherriots.org route information; accessed Jan. 12, 2016

⁷ Source: 2011 SKATS Model, Ridership by Stop Map

⁸ CherryLift information based on cherriots.org CherryLift information; accessed Jan. 12, 2016

⁹ Quality Counts collected data on November 12, 2015.

¹⁰ Chapter 4, Section C, *Manual on Uniform Traffic Control Devices*, 2003 Edition.

Table 2: Average Daily Volumes, Heavy Vehicle Percentage, and Speeds (24-hour)

Surveyed Data	McGilchrist Street SE between 16 th Street SE and 19th Street SE				
	Average Daily Traffic		Truck Traffic Percentage*	Posted Speed	85th Percentile Speed
Eastbound	5,776	53%	15.0%	40 mph	40 mph
Westbound	5,125	47%	12.1%	40 mph	39 mph
Total	10,901		13.5%	-	-

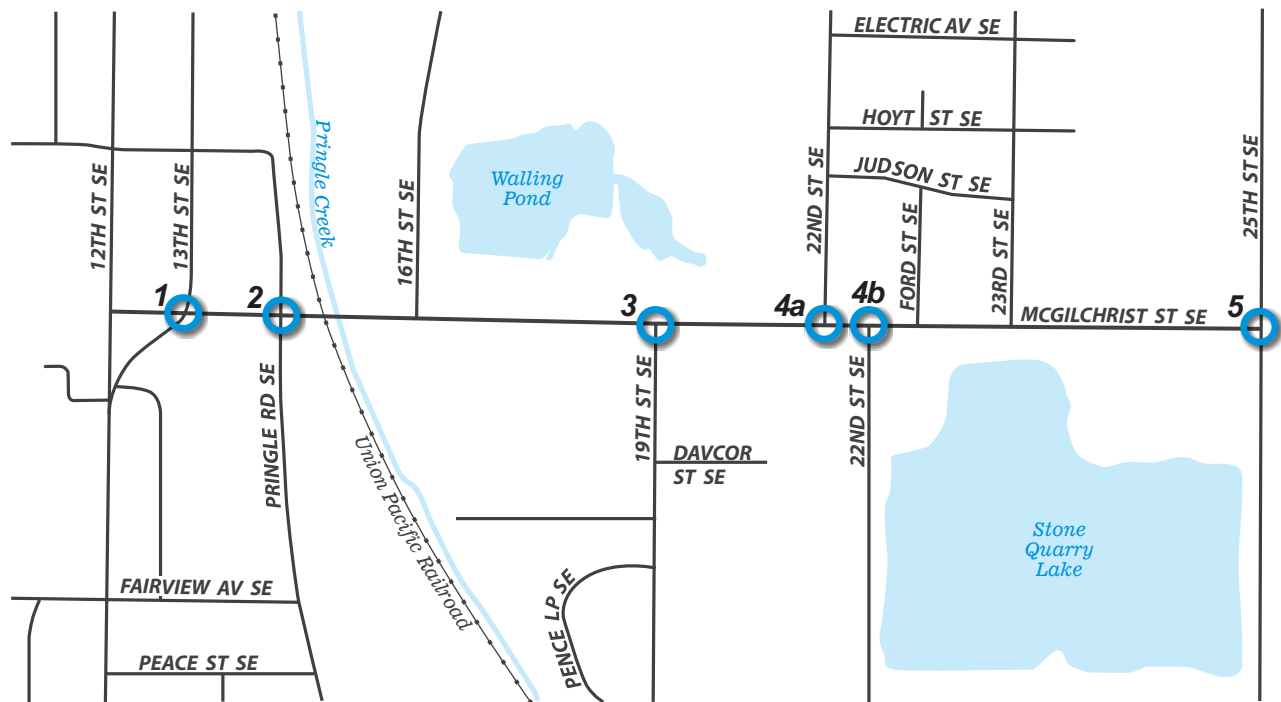
*Specified as buses and vehicles with three or more axles

Existing a.m. and p.m. peak hour traffic operations were analyzed at each of the key intersections:

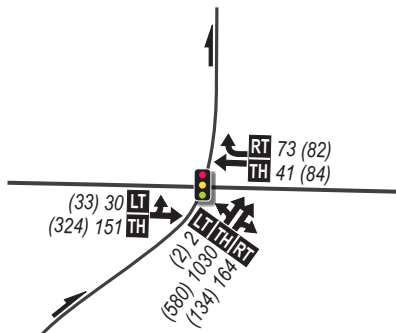
- 13th Street SE/McGilchrist Street SE
- Pringle Road SE/McGilchrist Street SE
- 19th Street SE/McGilchrist Street SE
- 22nd Street SE/McGilchrist Street SE (both offset approaches)
- 25th Street SE/McGilchrist Street SE

Traffic counts were collected on November 12, 2015 at each intersection with the exception of Pringle Road SE and McGilchrist Street SE. Data at this intersection was collected on December 1, 2015 due to a 20 minute delay on the initial data collection day caused by train operations on the tracks located just east of this intersection. The traffic volumes used for the existing conditions analysis are shown on Figure 5 and the existing bicycle and pedestrian volumes are shown on Figure 6.

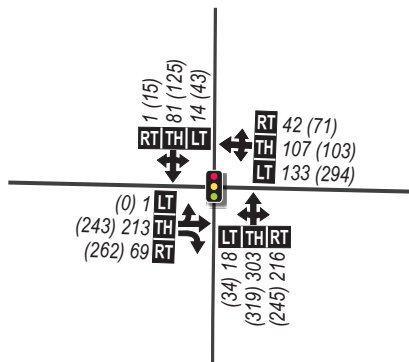
**McGilchrist Street SE Existing Conditions**



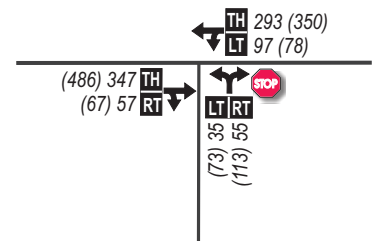
1. 13th St. @ McGilchrist St.



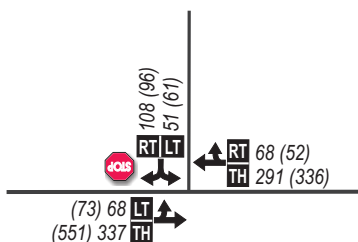
2. Pringle Rd. @ McGilchrist St.



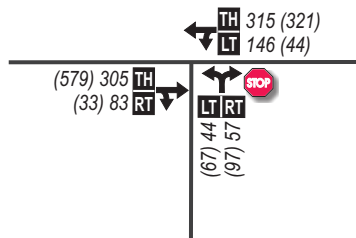
3. 19th St. & McGilchrist St.



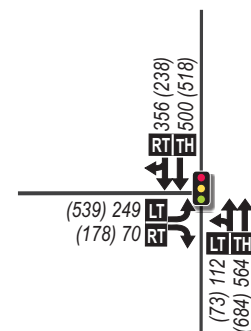
4a. 22nd St. (West) @ McGilchrist St.



4b. 22nd St. (East) @ McGilchrist St.



5. 25th St. @ McGilchrist St.



LEGEND

- Study Intersection
- Stop Sign
- Traffic Signal
- Existing Lane Configuration
- AM (PM) - Peak Hour Traffic Volumes
- LT TH RT - Volume Turn Movement
Left • Thru • Right

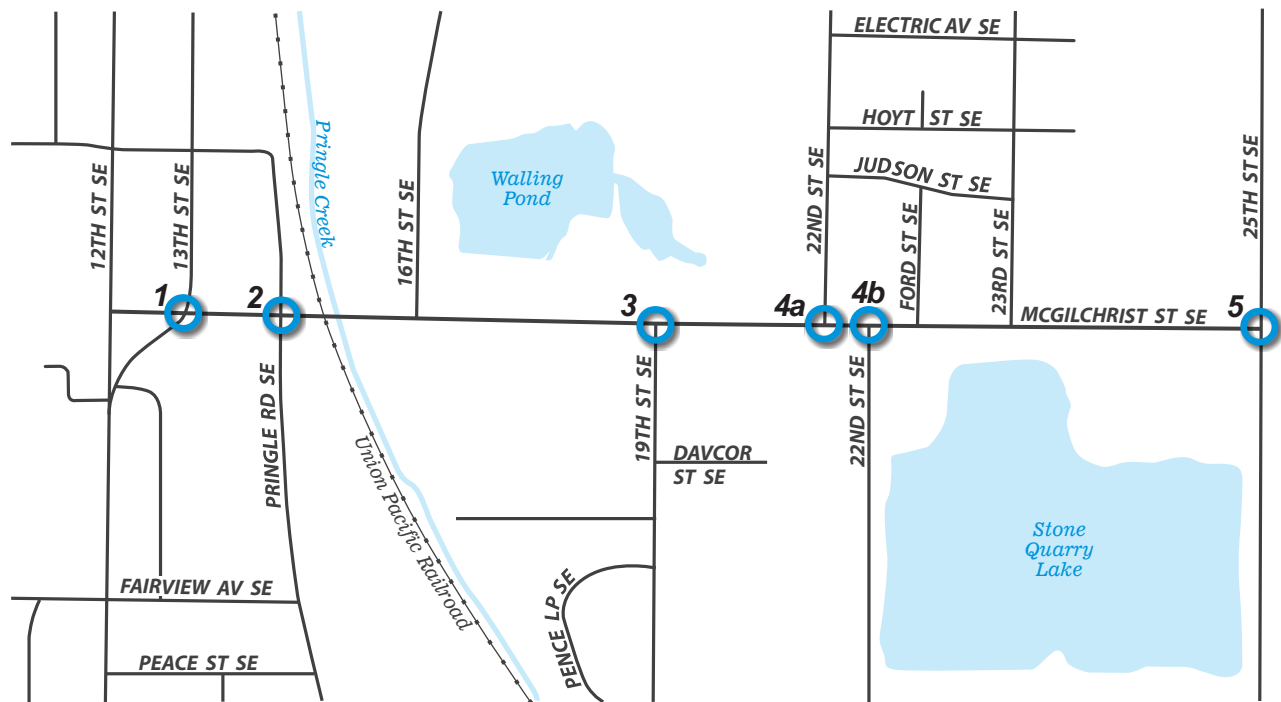
DKS



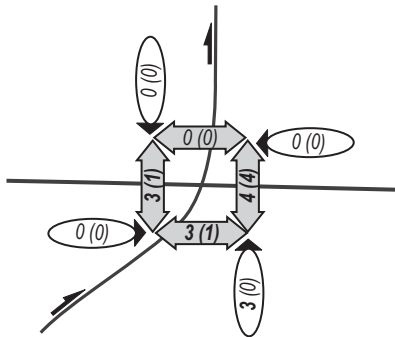
No Scale

Figure 5

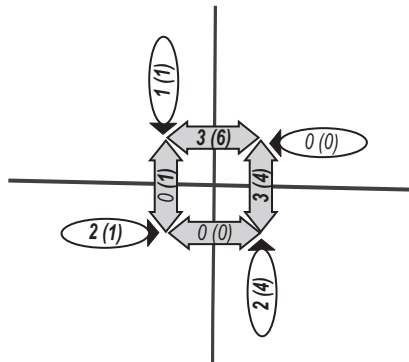
2015 Existing Conditions



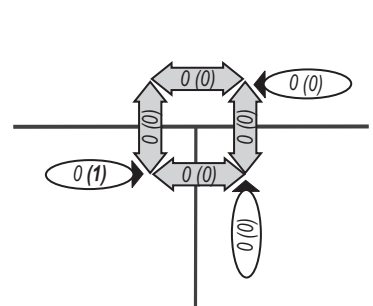
1. 13th St. @ McGilchrist St.



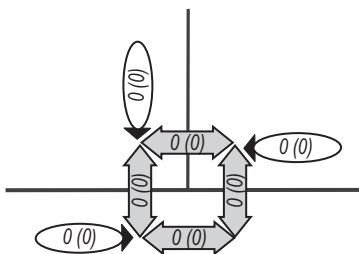
2. Pringle Rd. @ McGilchrist St.



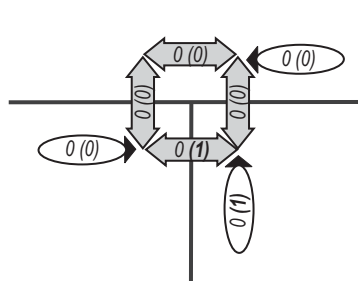
3. 19th St. & McGilchrist St.



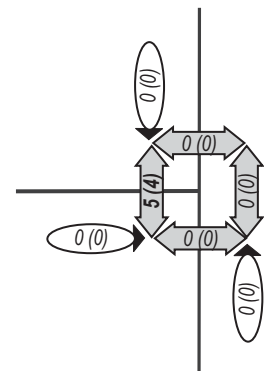
4a. 22nd St. (West) @ McGilchrist St.



4b. 22nd St. (East) @ McGilchrist St.



5. 25th St. @ McGilchrist St.



LEGEND



- Study Intersection



- Pedestrian Peak Hour Volume



- Bicycle Peak Hour Volume

DKS



No Scale

Figure 6

Existing Bicycle and Pedestrian Volumes



Required Operating Standards

To understand the utilization and potential for capacity issues along major roadways, the City of Salem compares peak roadway volumes to the maximum throughput of the facilities. Level of service (LOS) ratings and volume-to-capacity (v/c) ratios are two commonly used performance measures that provide a good understanding of intersection operations.

- **Level of service (LOS):** A “report card” rating (A through F) based on the average delay experienced by vehicles at the intersection.¹¹ LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays.
- **Volume-to-capacity (v/c) ratio:** A decimal representation (typically between 0.00 and 1.00) of the proportion of capacity that is being used at a turn movement, approach leg, or intersection. It is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and usually results in excessive queues and long delays.

The City of Salem’s minimum performance standard for signalized intersections is LOS E and a v/c ratio of 0.90. For two-way and all-way stop-controlled intersections, the minimum performance standard is LOS E.¹²

Existing Operating Conditions

The existing traffic operations at the study intersections were determined for the a.m. and p.m. peak hours based on the 2000 Highway Capacity Manual methodology for signalized intersections and the 2010 Highway Capacity Manual methodology for the unsignalized intersections.¹³ The estimated LOS and v/c ratio for each study intersection is shown in Table 3. As shown, all of the study intersections operate at acceptable levels during both peak hours. However, the Pringle Road SE and McGilchrist Street SE intersection operates at the threshold (v/c of 0.90) during the p.m. peak hour.

¹¹ A description of Level of Service (LOS) is provided in the appendix and includes a list of the delay values (in seconds) that correspond to each LOS designation.

¹² City of Salem Administrative Rules, Section 6.32 (a).

¹³ 2000 and 2010 Highway Capacity Manual, Transportation Research Board, Washington DC, 2000/2010

Table 3: Existing (2015) Study Intersection Operations

Intersection	Operating Standard	A.M. Peak Hour			P.M. Peak Hour		
		Delay	LOS	v/c	Delay	LOS	v/c
Signalized							
13th Street SE & McGilchrist Street SE (One-way N to S)	LOS E v/c 0.90	15.3	B	0.51	24.5	C	0.46
Pringle Road SE & McGilchrist Street SE	LOS E v/c 0.90	13.8	B	0.71	24.8	C	0.90
25 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	10.6	B	0.55	20.8	C	0.71
Unsignalized							
19 th Street SE & McGilchrist Street SE	LOS E	25.2	A/D	0.41	30.8	A/D	0.60
22 nd Street SE & McGilchrist Street SE (West)	LOS E	24.4	A/C	0.53	25.2	A/D	0.49
22 nd Street SE & McGilchrist Street SE (East)	LOS E	34.0	A/D	0.52	29.2	A/D	0.55
<u>Signalized intersection:</u>		<u>Unsignalized intersection:</u>					
Delay = Average Intersection Delay (sec.)		Delay = Critical Movement Approach Delay (sec.)					
v/c = Volume-to-Capacity Ratio		v/c = Critical Movement Volume-to-Capacity Ratio					
LOS = Level of Service		LOS = Level of Service (Major/Minor Road)					

Collision Analysis

A collision analysis for the study area considered the most recent five years (2010-2014) of collision data obtained from the ODOT Crash Analysis Reporting Unit. As shown on Figure 7, there were a total of 89 collisions that occurred within the study area during the five year period.

**Figure 7: Collision Map by Severity (2010-2014)**



Table 4 summarizes the collision data for each intersection and segment along McGilchrist Street SE. Collision rates were calculated for each of the study intersections and segments. Intersection collision rates higher than the published 90th percentile rates provided in ODOT's Analysis Procedures Manual (APM) or segment collision rates higher than statewide averages for similar facilities indicate that the intersection or segment should be flagged for further review.^{14,15}

All intersection collision rates were below the published 90th percentile for similar intersections and all segment collision rates were lower than statewide averages for similar facilities.¹⁶

Table 4: 2010-2014 ODOT Collision Severity by Location

Intersection	Collisions by Severity						Collisions per Year	Collision Rate ^b
	Fatal	Injury A	Injury B	Injury C	PDO ^a	Total		
13th & McGilchrist Street SE	0	1	0	2	7	10	2	0.26
Pringle & McGilchrist Street SE	0	0	2	3	11	16	3.2	0.64
19th & McGilchrist Street SE	0	0	3	1	3	7	1.4	0.27
22nd & McGilchrist Street SE	0	0	0	3	2	5	1	0.20
25th & McGilchrist Street SE	0	0	4	8	6	18	3.6	0.37
Segment (Distance)^d								
McGilchrist Street SE (1.00 mi.)	0	2	1	5	12	20	4	0.61
13th Street SE (0.1 mi.)	0	0	0	2	0	2	0.4	0.55
Pringle Road SE (0.2 mi.)	0	0	1	2	0	3	0.6	0.64
25th Street SE (0.2 mi.)	0	0	1	2	5	8	1.6	0.86

^a PDO = Property Damage Only.

^b Rate Calculation = Collisions per year / (Average Daily Traffic x 365 days / 1 million) – [units: crashes per million entering vehicles]

^c Rate Calculation = (Collisions per year x 1 million) / (365 days x ADT x Segment Length) – [units: crashes per million vehicles miles traveled]

^d McGilchrist Street SE segment includes 13th Street SE to 25th Street SE; adjacent streets segments were centered around McGilchrist Street SE

Figure 8 shows the location of the bicycle collisions that occurred along McGilchrist Street SE during the five year period. One collision resulted in a severe injury of the cyclist and was located just west of McGilchrist Street SE and Pringle Road SE. The collision was an angle type crash caused by the bicyclist not yielding and not being visible during rainy conditions. There were no reported pedestrian collisions within the study area.

¹⁴ Exhibit 4-1: Intersections Crash Rates per MEV by Land Type and Traffic Control. *Analysis Procedures Manual*, Oregon Department of Transportation, November 2015.

¹⁵ *ODOT Five-Year Comparison of State Highway Crash Rates*, Table II

¹⁶ *ODOT Analysis Procedures Manual Chapter 4*. October 2015



Figure 8: Bicycle Collisions by Severity (2010-2014)

Planned Improvements

Classified as a major arterial, McGilchrist Street SE provides a major east-west connection between inner Southeast Salem, the industrial properties, and the Salem Airport. The City of Salem's TSP shows that a standard major arterial requires five travel lanes (two travel lanes in each direction and a center turn lane) and 14 feet of sidewalks and landscaping on each side as shown in Figure 9 on the following page.¹⁷ However, the five-lane cross-section may be excessive for future traffic volumes and alternatives with smaller cross-sections should be considered. Based on the results of the prior *McGilchrist Street Transportation Analysis*, a three-lane cross section has been identified from 12th Street SE to 22nd Street SE, and a four-lane cross-section from 22nd Street SE to 25th Street SE (see Figure 9 on the following page). Details for the landscape strips and sidewalk corridors for the recommended three-lane cross-section will be determined in the design phase of this project.

Other planned improvements include a realignment of 22nd Street SE at McGilchrist Street SE. Potential realignment alternatives are included in the appendix.

¹⁷ City of Salem Administrative Rules, Division 006-Street Design Standards, pg. 109-006, January 2014

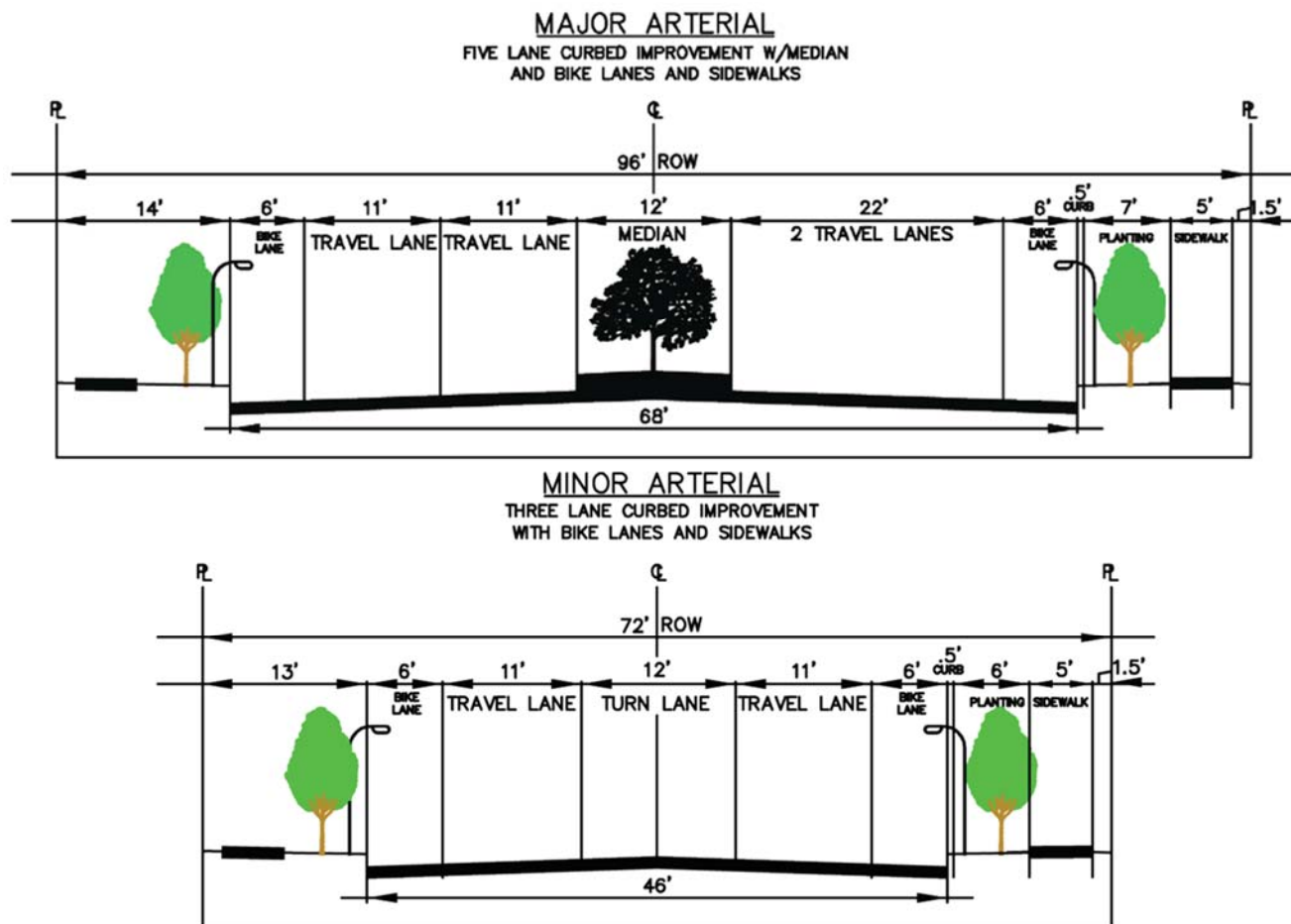


Figure 9: Major and Minor Arterial Street Standards (from City of Salem's TSP)

Future Operating Conditions

Future operating conditions were evaluated to estimate the future build completion year of 2018 and the future 2040 horizon year. The 2040 horizon year was selected based on federal requirements to evaluate future transportation operations 20 years after the planned year of completion. The 2035 Salem/Keizer Area Transportation System (SKATS) travel demand model developed by the Mid-Willamette Valley Council of Governments (MWVCOG) was used to estimate growth in the project area. It should be noted that at the time of this analysis, the 2035 MWVCOG model was their future horizon year. An annual growth rate of 2% was used to extend the 2035 model results to the 2040 planning year.

The following scenarios were evaluated:

- 2018 No Build a.m. and p.m. peak periods
- 2018 Build a.m. and p.m. peak periods
- 2040 No Build p.m. peak period
- 2040 Build p.m. peak period



Future Operating Conditions – Year of Completion (2018)

Future traffic operations at the study intersections were analyzed for the p.m. peak hours based on the Highway Capacity Manual methodology.¹⁸ The volumes used to analyze the 2018 No-Build and Build operations are shown on Figure 10. Table 5 displays the estimated LOS and v/c ratio for each study intersection for the existing conditions and for the planned roadway improvements. As shown, all study intersections are expected to meet the applicable operating standards with the exception of the Pringle Road SE/McGilchrist Street SE intersection during the p.m. peak hour of the No Build scenario.

Table 5: Future (2018) Study Intersection Operations – No Build and Build Scenarios

Intersection	Operating Standard	P.M. Peak Hour No Build			P.M. Peak Hour Build		
		Delay	LOS	v/c	Delay	LOS	v/c
Signalized							
13th Street SE & McGilchrist Street SE (One-way N to S)	LOS E v/c 0.90	24.6	C	0.48	24.5	C	0.38
Pringle Road SE & McGilchrist Street SE	LOS E v/c 0.90	35.5	D	0.96	19.7	B	0.66
22 nd Street SE & McGilchrist Street SE (Build Only)	LOS E v/c 0.90	-	-	-	28.8	C	0.56
25 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	22.7	C	0.75	16.5	B	0.54
Unsignalized							
19 th Street SE & McGilchrist Street SE	LOS E	37.0	A/E	0.67	19.4	A/C	0.25
22 nd Street SE & McGilchrist Street SE (West)	LOS E	29.5	A/D	0.55	Intersection realigned and signalized; see above		
22 nd Street SE & McGilchrist Street SE (East)	LOS E	31.7	A/D	0.59			

Signalized intersection:

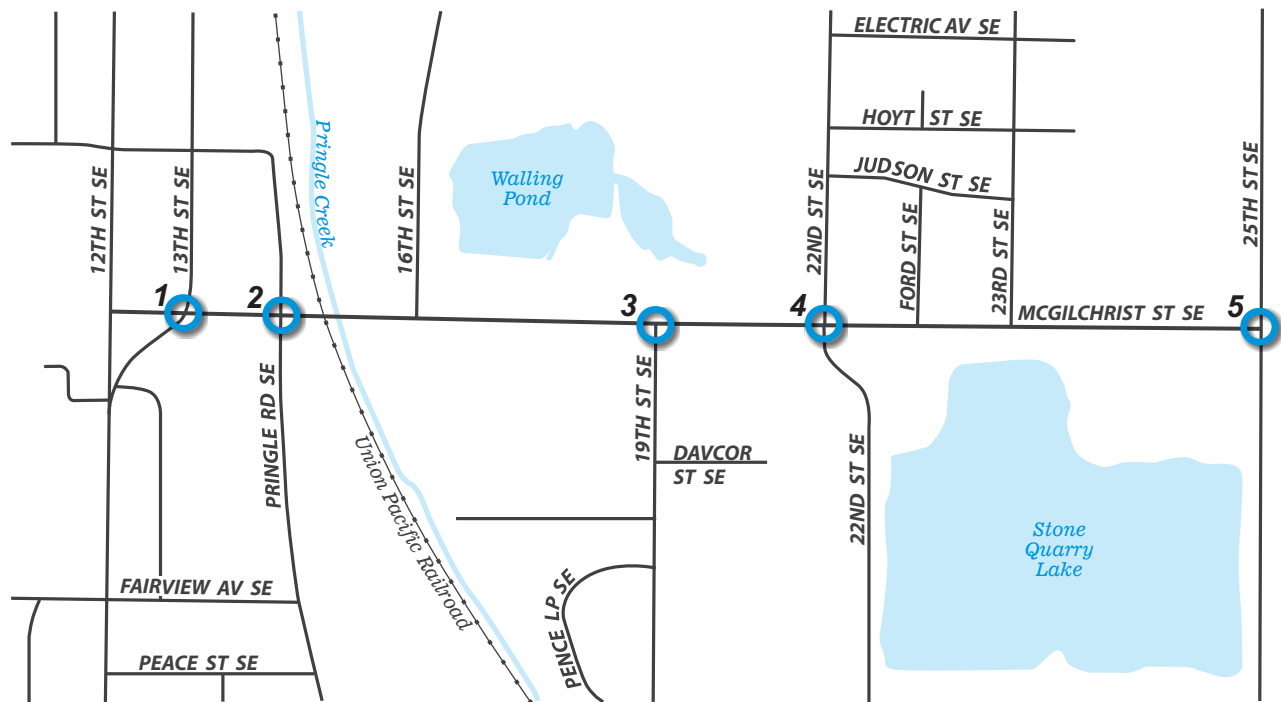
Delay = Average Intersection Delay (sec.)
v/c = Volume-to-Capacity Ratio
LOS = Level of Service

Unsignalized intersection:

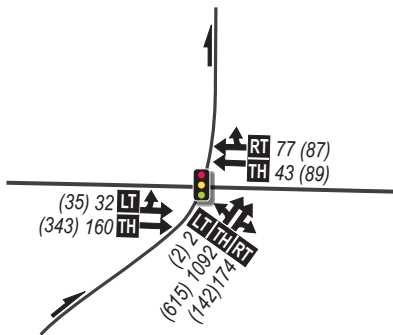
Delay = Critical Movement Approach Delay (sec.)
v/c = Critical Movement Volume-to-Capacity Ratio
LOS = Level of Service (Major/Minor Road)

Bold/Italicized: Does not meet City Operating Standards

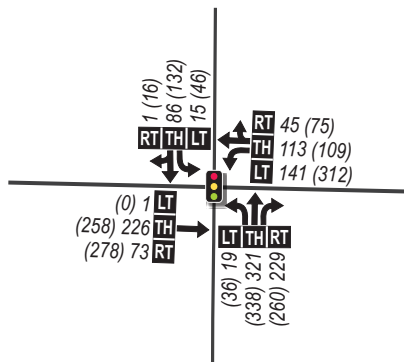
¹⁸ 2010 Highway Capacity Manual, Transportation Research Board, Washington DC, 2010



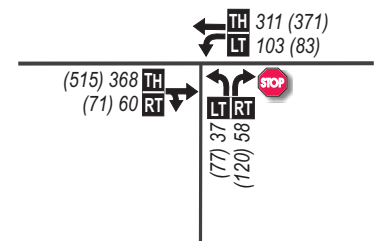
1. 13th St. @ McGilchrist St.



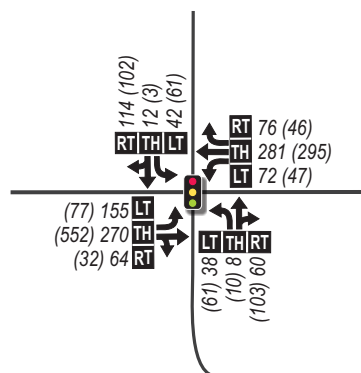
2. Pringle Rd. @ McGilchrist St.



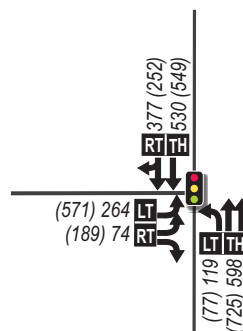
3. 19th St. & McGilchrist St.



4. 22nd St. @ McGilchrist St.



5. 25th St. @ McGilchrist St.



LEGEND

- Study Intersection
- Planned Lane Configuration
- Stop Sign
- Traffic Signal
- AM (PM) - Peak Hour Traffic Volumes
- LT TH RT - Volume Turn Movement
Left • Thru • Right

DKS



No Scale

Figure 12

2018 AM/PM
Future Volumes



Signal Warrant Analysis

A signal warrant analysis was completed for the unsignalized intersections at 19th Street SE and 22nd Street SE. The MUTCD specifies “an engineering study of traffic conditions, pedestrian characteristics, and physical characteristics . . . shall be performed to determine whether installation of a traffic control signal is justified at a particular location.”

The traffic volumes used to perform the vehicular volume warrants were based on the existing 24-hour tube counts (with a 2% growth rate to the 2018 build year) west of 19th Street SE. Only peak hour traffic volumes were collected for the minor street approaches, therefore the traffic volumes during the off-peak hours on the minor streets (19th Street SE and 22nd Street SE) were estimated based on the 24-hour traffic data. Given the estimated 2018 traffic volumes, signal warrants were met for 22nd Street SE realigned intersection, but not for 19th Street SE. The following MUTCD warrants were considered for the 22nd Street SE and McGilchrist Street SE intersection:

- **Warrant 1 – Eight Hour Vehicular Volumes**
- **Warrant 2 – Four Hour Vehicular Volumes**
- **Warrant 3 – Peak Hour Volumes**
- **Warrant 7 – Collision History**

Warrants 1 through 3 have minimum volumes for major and minor street approaches that must be met for the specified number of hours. The traffic signal warrant analysis was performed using the ODOT Signal Warrant Worksheet. For the analysis, it was assumed that there were two lanes on the major roadway and one lane on the minor roadway. Additionally, because McGilchrist Street SE has a 40 mph speed limit, a 70% reduction factor was applied when considering volumes.¹⁹

Given these conditions, Warrants 1 and 2 were met. The eight-hour vehicle volumes warrant were met for eleven hours and the four-hour vehicle volumes warrant were met for seven hours. However, the peak hour warrant was not met. There were a total of five collisions from 2010-2014, none of which were severe injuries, and therefore warrant 7 is not met.

22nd Street SE was recently extended south and connects with Madrona Avenue SE as part of a recent project. This extension increases the number of vehicles traveling through the 22nd Street SE/McGilchrist Street SE intersection and may increase the need for a signal at this location.

Future Operating Conditions – Horizon Year (2040)

Future traffic operations at the study intersections were analyzed for the p.m. peak hours based on the Highway Capacity Manual methodology.²⁰ The horizon year (2040) volumes used to analyze intersection operations are shown on Figure 11. The estimated LOS and v/c ratio for each study intersection given the existing, no build and

¹⁹ *Manual on Uniform Traffic Control Devices; Section 4C-02.* 2009.

²⁰ *2010 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2010



build scenario are shown in Table 6. The build scenario included the lane configurations that the City has planned as a result of the previous analysis.²¹ With the exception of 13th Street SE/McGilchrist Street SE, all of the study intersections exceed the maximum operating standards for the No Build condition. Given the Build condition, all intersections with the exception of Pringle Road SE & McGilchrist Street SE, are expected to meet the applicable operating standards. This intersection is estimated to fail at about the year 2035.

Table 6: Future (2040) Study Intersection Operations

Intersection	Operating Standard	P.M. Peak Hour No Build			P.M. Peak Hour Build		
		Delay	LOS	v/c	Delay	LOS	v/c
Signalized							
13th Street SE & McGilchrist Street SE (One-way N to S)	LOS E v/c 0.90	28.3	C	0.70	25.3	C	0.56
Pringle Road SE & McGilchrist Street SE	LOS E v/c 0.90	>80.0	F	>1.0	39.1	D	0.97
22 nd Street SE & McGilchrist Street SE (Build Only)	LOS E v/c 0.90	-	-	-	35.4	D	0.81
25 th Street SE & McGilchrist Street SE	LOS E v/c 0.90	>80.0	F	>1.0	22.9	C	0.79
Unsignalized							
19 th Street SE & McGilchrist Street SE	LOS E	>80.0	B/F	>1.0	38.2	B/E	0.53
22 nd Street SE & McGilchrist Street SE (West)	LOS E	>80.0	A/F	>1.0	Intersection realigned and signalized; see above		
22 nd Street SE & McGilchrist Street SE (East)	LOS E	>80.0	B/F	>1.0			

Signalized intersection:

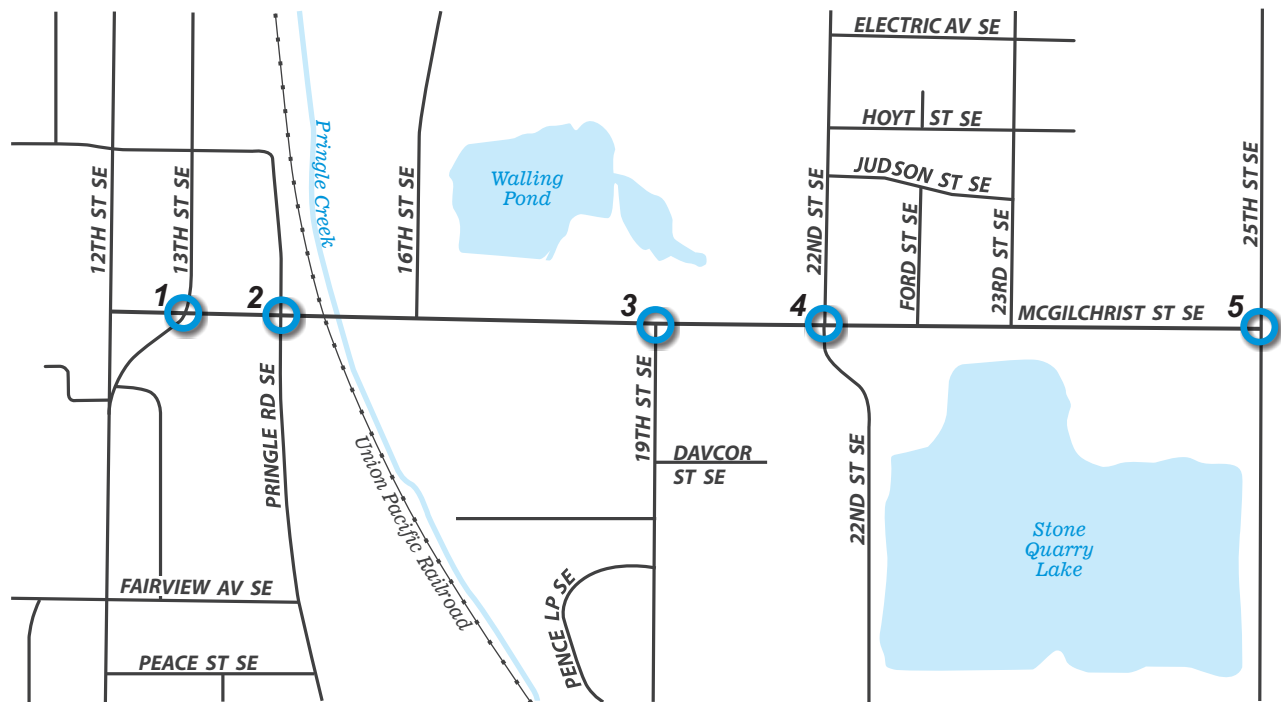
Delay = Average Intersection Delay (sec.)
v/c = Volume-to-Capacity Ratio
LOS = Level of Service

Unsignalized intersection:

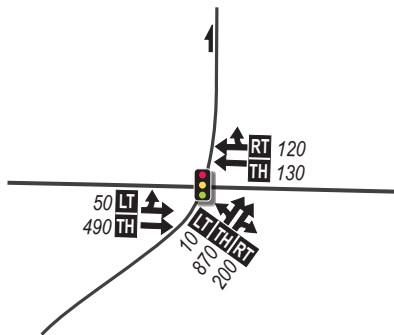
Delay = Critical Movement Approach Delay (sec.)
v/c = Critical Movement Volume-to-Capacity Ratio
LOS = Level of Service (Major/Minor Road)

Bold/Italicized: Does not meet City Operating Standards

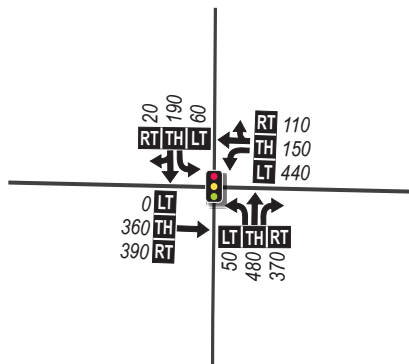
²¹ Salem McGilchrist Improvement Project Traffic Analysis, 2007, DKS Associates



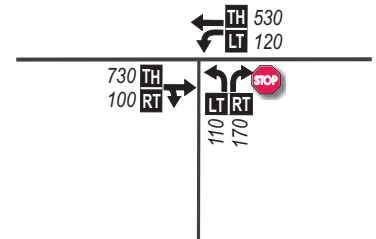
1. 13th St. @ McGilchrist St.



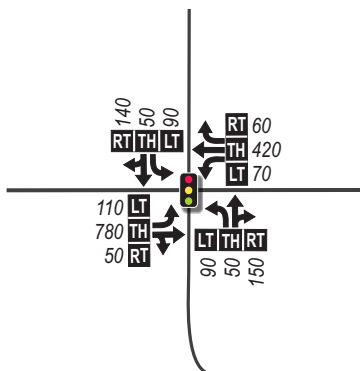
2. Pringle Rd. @ McGilchrist St.



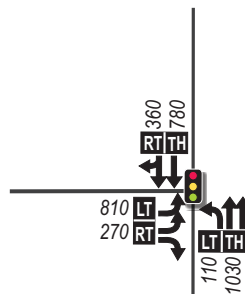
3. 19th St. & McGilchrist St.



4. 22nd St. @ McGilchrist St.



5. 25th St. @ McGilchrist St.



LEGEND

- Study Intersection
- Stop Sign
- Traffic Signal
- Planned Lane Configuration
- 000 - PM Peak Hour Traffic Volumes
- Volume Turn Movement
Left • Thru • Right

DKS



No Scale

Figure 11

2040 PM Peak
Future Volumes

Recommended Improvements

Figure 12 shows the recommended lane geometry to mitigate this intersection to allow it to continue to operate within standards in 2040. It is recommended to modify the westbound approach (east leg) to include a through, right, and left turn lane. This, coupled with the assumption that approximately 100 westbound, left-turning vehicles will choose to go straight through the Pringle Road SE intersection and instead turn left at the traffic signal at 12th Street (currently under design and planned for a 2017 construction). The resulting intersection operations at the Pringle Road SE/McGilchrist Street SE intersection is LOS C and the v/c ratio is 0.89 for the intersection. This lane configuration will require that the new additional westbound turn lane extends across widening at the Union Pacific Railroad (UPRR) crossing located approximately 150 feet east of the intersection.

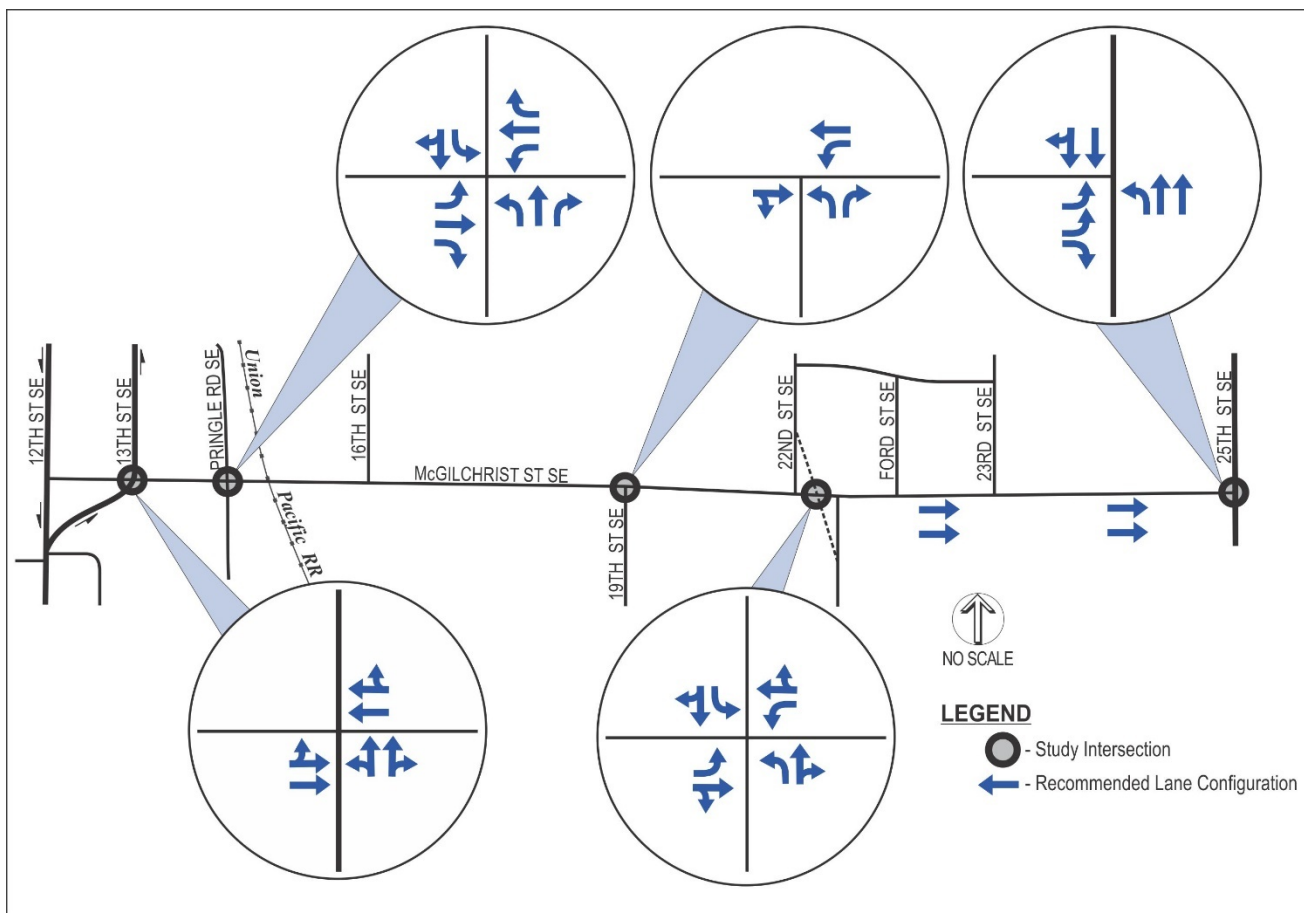


Figure 12: McGilchrist Street SE Recommended Lane Configuration

Queuing Analysis

Queuing analysis was performed for the p.m. peak hours based on the 2040 traffic volumes to determine the 95th percentile queues and recommended turn bay storage lengths. The queuing analysis was based on traffic simulations performed in SimTraffic™ and included the estimation of 95th percentile queues for each turn movement. The 95th percentile queue is the queue length for a given intersection movement that has only a 5%



chance of being exceeded during the peak traffic hour, and it is standard engineering practice to use the 95th percentile queue length for sizing storage lanes. The 95th percentile queues and recommended storage lengths are summarized in Table 7.

Table 7: 95th Percentile Queues and Recommended Storage Lengths

Intersection	Movement	Number of Lanes	Horizon Year (2040)		
			95 th Percentile Queue Length	Recommended Storage Length	Exceeds Available Storage
13th Street SE & McGilchrist Street SE	WBTR	1	160	175	No
	EBTL	1	350	350	No
Pringle Road SE & McGilchrist Street SE	EBL*	1	100	100	No
	WBL	1	450	450	No**
	WBR	1	75	150	No
	NBL	1	60	75	No
	NBR	1	140	150	No
	SBL	1	70	75	No
19 th Street SE & McGilchrist Street SE	WBL	1	170	175	No
22 nd Street SE & McGilchrist Street SE	EBL	1	290	300	No
	WBL	1	90	100	No
	NBL	1	100	100	No
	SBL	1	160	175	No
25 th Street SE & McGilchrist Street SE	EBL	2	240	250	No

* Eastbound left movement did not have any reported volumes, storage lane estimated based on geometric constraints

** Storage lanes would extend past the Union Pacific Railroad crossing

Based on the 95th percentile queue lengths, the westbound left turn lane at Pringle Road SE and McGilchrist Street SE is recommended to have 450 feet of storage which would extend past the UPRR crossing. It is recommended to stripe a 50-foot left turn lane at 16th Street, a 60-foot transition, an 80-foot two-way left turn lane and the remaining distance to the McGilchrist Street SE/Pringle Street SE intersection (approximately 410 feet) as left turn lane storage (see Figure 13 at the top of the next page).

The design of the McGilchrist Street SE railroad crossing and the Pringle Road intersection should be coordinated with ODOT Rail Safety and UPRR since the existing crossing will have to be widened. Additional interconnect and intelligent transportation systems (ITS) signage and flashers (queue activated “do not stop on tracks” message) will be necessary to discourage vehicles from interfering with the railroad crossing.

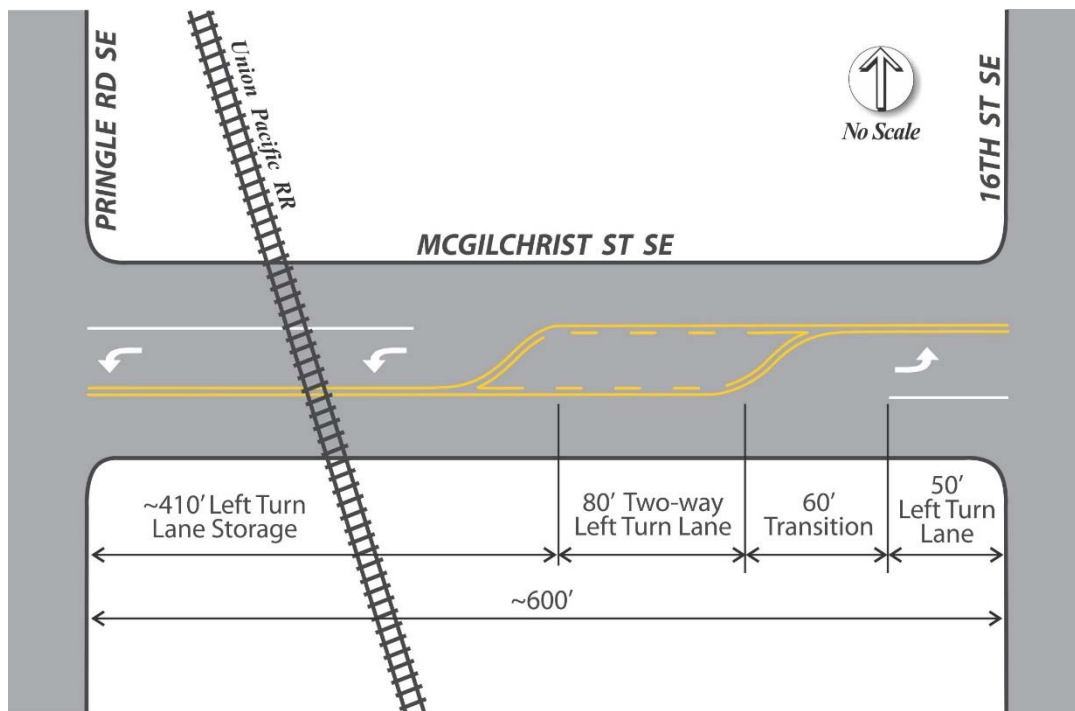
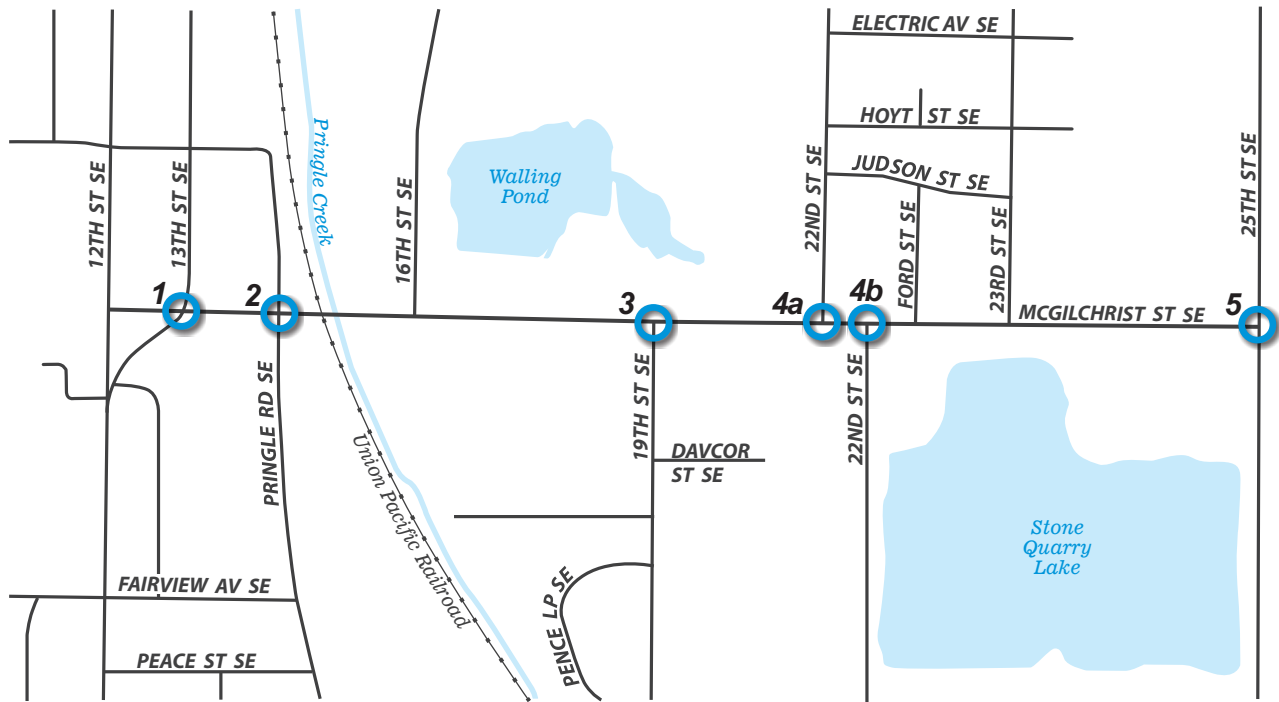


Figure 13: Left Turn Lane Striping Recommendations between Pringle Street and 16th Street

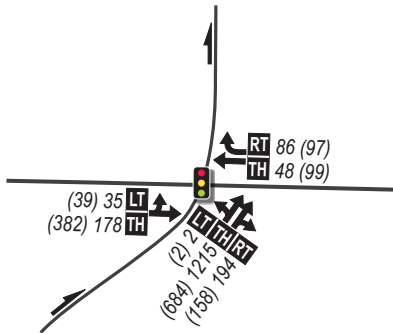
Summary

The key findings of the transportation impact analysis performed in this study include the following:

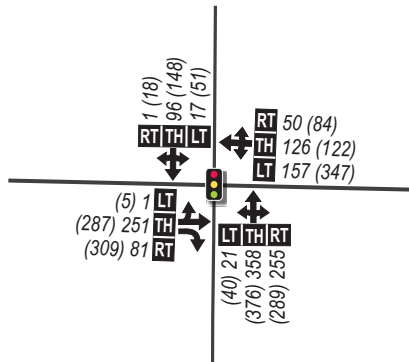
- McGilchrist Street SE is currently classified as a major arterial; however it is unimproved and lacks adequate facilities for all modes of travel.
- The 24-hour directional volumes east of 16th Street SE currently carries approximately 10,900 vehicles per day, the 85th percentile speed is 40 mph, and the truck percentages are approximately 12 to 15 percent.
- A MUTCD signal warrant analysis for the projected 2018 traffic volumes indicated sufficient warrants are met for the proposed 22nd Street SE and McGilchrist Street SE intersection.
- For the Build 2040 Future scenario, the Pringle Road SE/McGilchrist Street SE intersection does not meet LOS and v/c operating standards. The recommended improvement includes modifying the westbound approach (east leg) to include a through, right, and left turn lane.
- The design of the McGilchrist Street SE railroad crossing and the Pringle Road intersection should be coordinated with ODOT Rail Safety and UPRR since the existing crossing will have to be widened.
- Additional interconnect and intelligent transportation systems (ITS) signage and flashers (queue activated “do not stop on tracks” message) will be necessary to discourage vehicles from interfering with the railroad crossing.



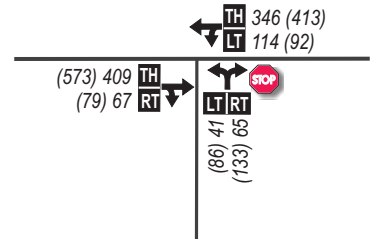
1. 13th St. @ McGilchrist St.



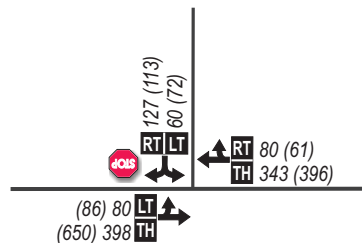
2. Pringle Rd. @ McGilchrist St.



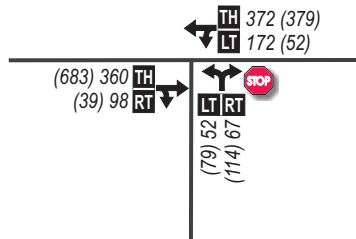
3. 19th St. & McGilchrist St.



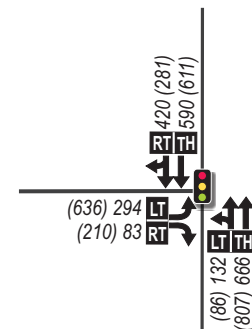
4a. 22nd St. (West) @ McGilchrist St.



4b. 22nd St. (East) @ McGilchrist St.



5. 25th St. @ McGilchrist St.



LEGEND

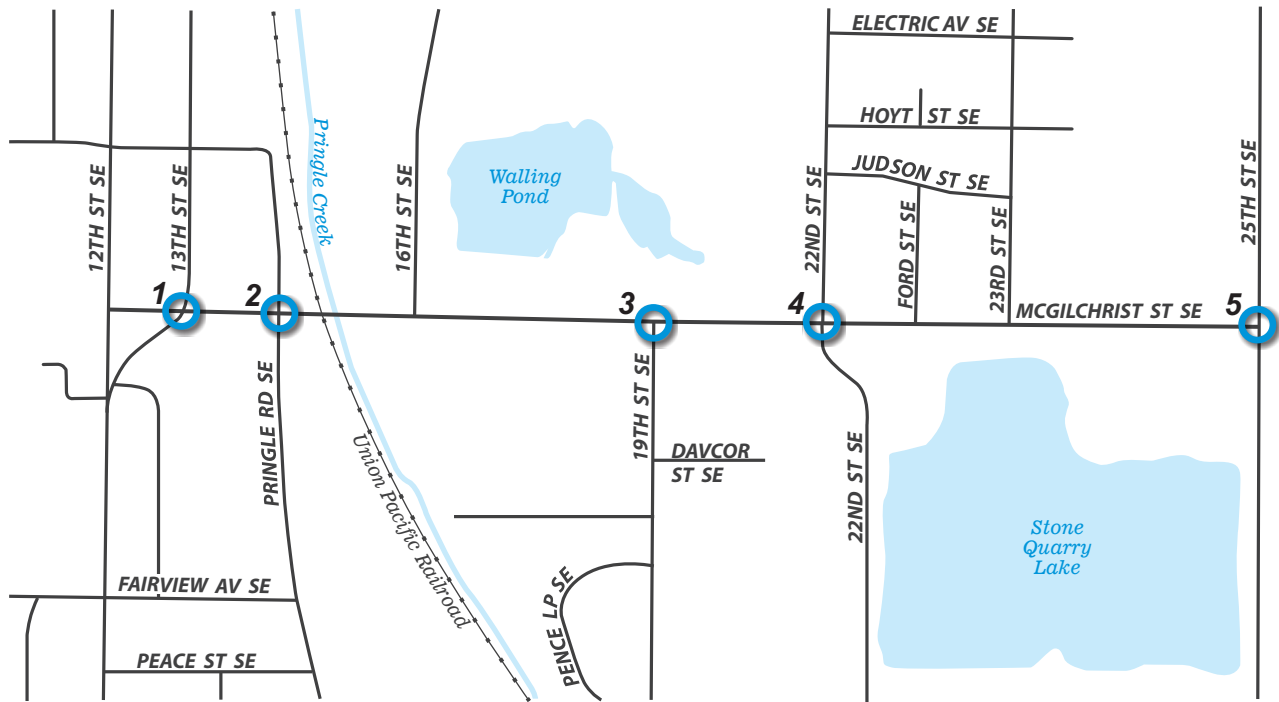
- Study Intersection
- Stop Sign
- Traffic Signal
- Existing Lane Configuration
- AM (PM) - Peak Hour Traffic Volumes
- Volume Turn Movement
Left • Thru • Right

DKS

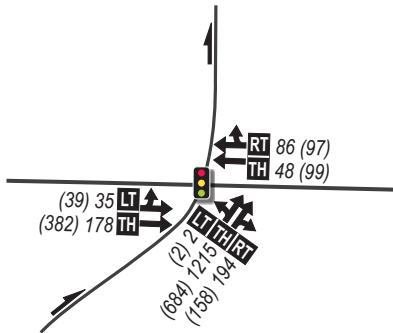


No Scale

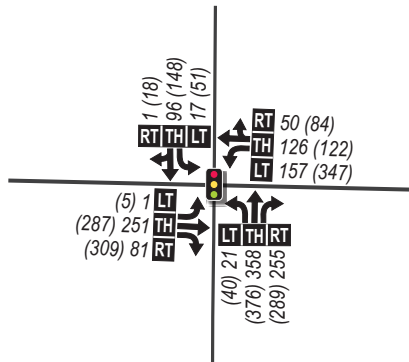
**2024 AM/PM
Future No Build Volumes**



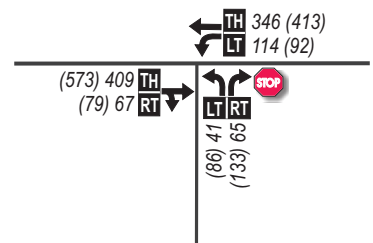
1. 13th St. @ McGilchrist St.



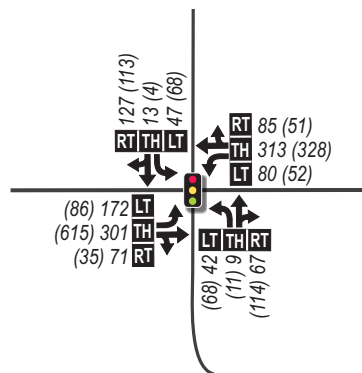
2. Pringle Rd. @ McGilchrist St.



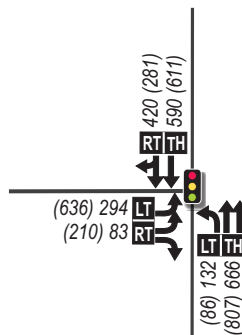
3. 19th St. & McGilchrist St.



4. 22nd St. @ McGilchrist St.



5. 25th St. @ McGilchrist St.



LEGEND

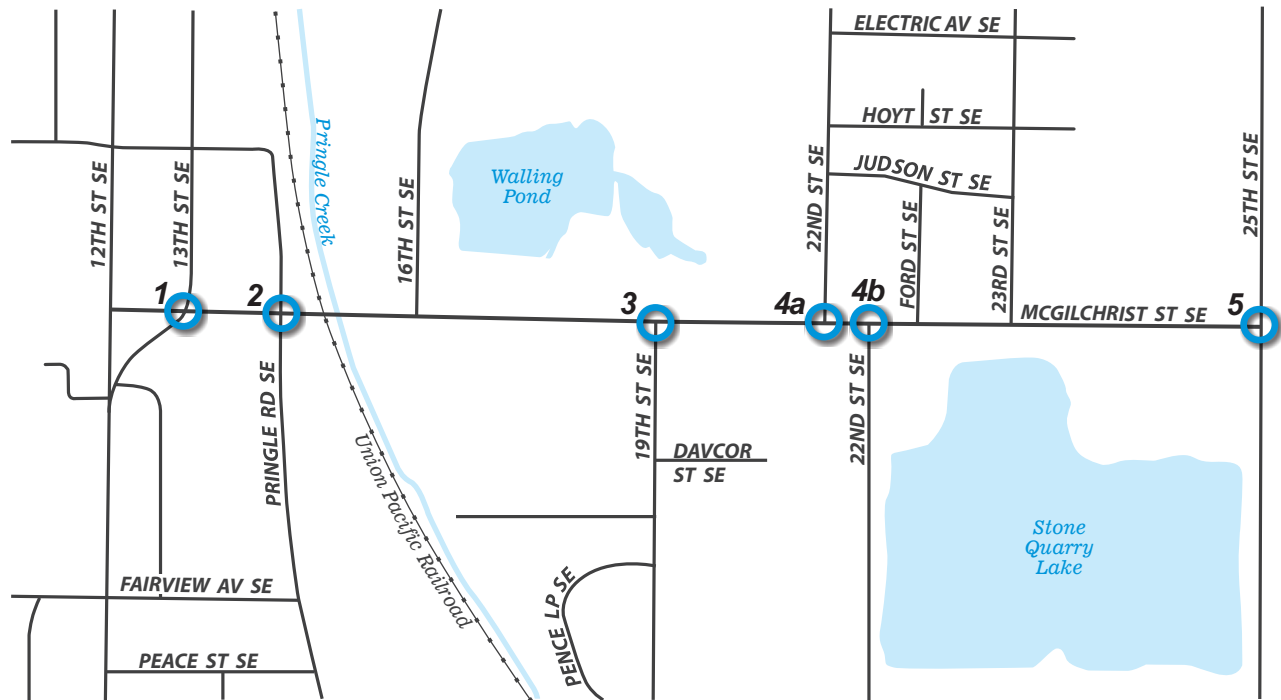
- Study Intersection
- Stop Sign
- Traffic Signal
- Planned Lane Configuration
- AM (PM) - Peak Hour Traffic Volumes
- LT TH RT - Volume Turn Movement
Left • Thru • Right

DKS

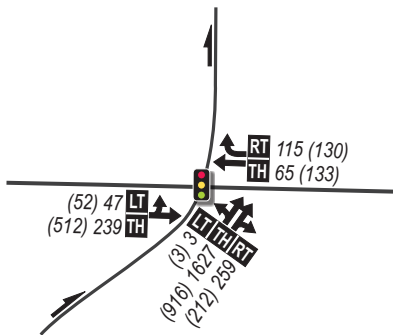


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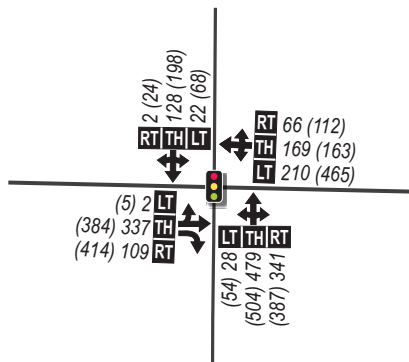
2024 AM/PM
Future Build Volumes



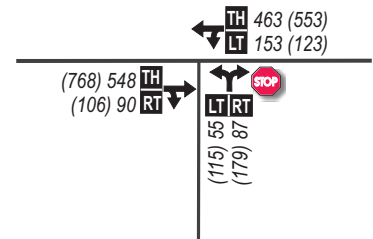
1. 13th St. @ McGilchrist St.



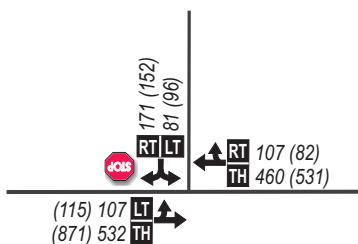
2. Pringle Rd. @ McGilchrist St.



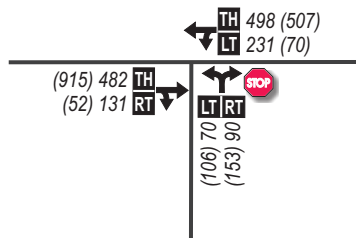
3. 19th St. & McGilchrist St.



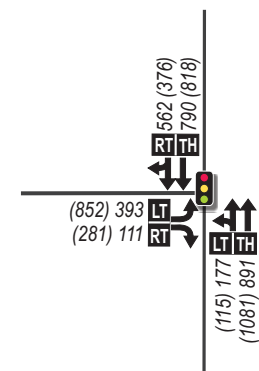
4a. 22nd St. (West) @ McGilchrist St.



4b. 22nd St. (East) @ McGilchrist St.



5. 25th St. @ McGilchrist St.



LEGEND

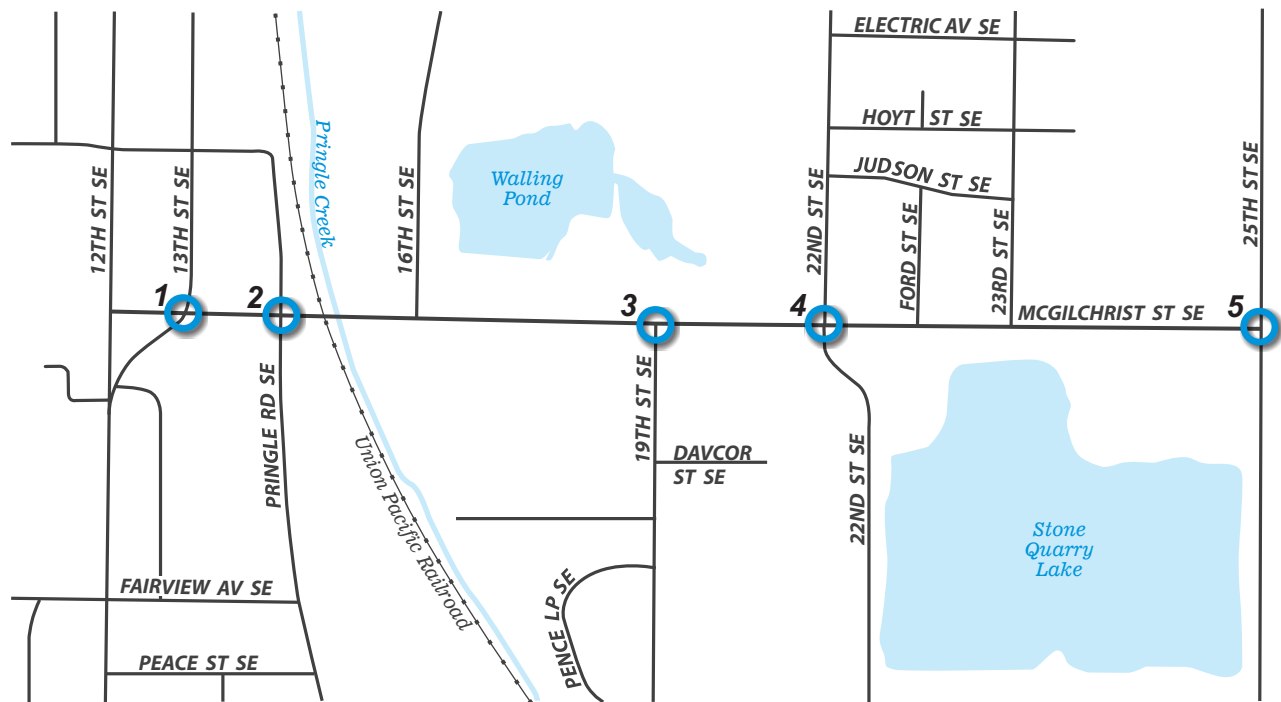
- Study Intersection
- Stop Sign
- Traffic Signal
- Existing Lane Configuration
- AM (PM) - Peak Hour Traffic Volumes
- LT TH RT - Volume Turn Movement
Left • Thru • Right

DKS

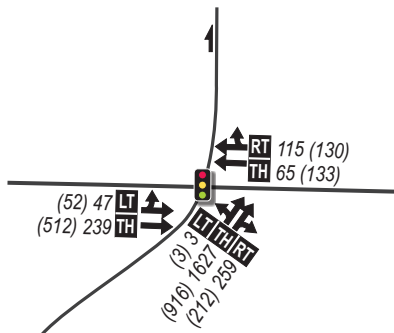


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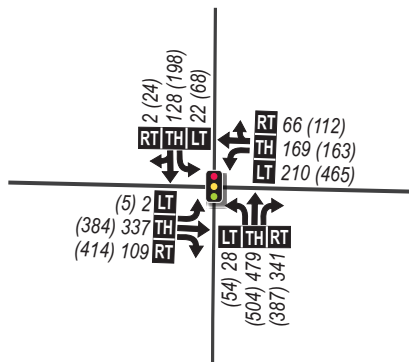
**20 4 AM/PM
Future No Build Volumes**



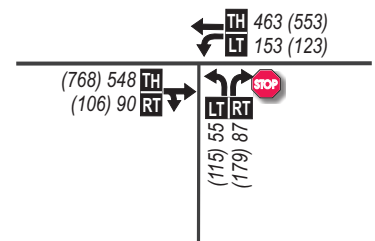
1. 13th St. @ McGilchrist St.



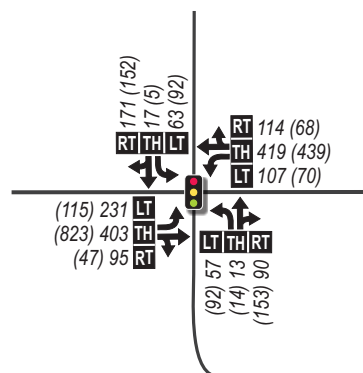
2. Pringle Rd. @ McGilchrist St.



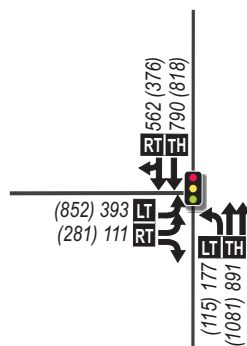
3. 19th St. & McGilchrist St.



4. 22nd St. @ McGilchrist St.



5. 25th St. @ McGilchrist St.



LEGEND

- Study Intersection
- Stop Sign
- Traffic Signal
- Planned Lane Configuration
- AM (PM) - Peak Hour Traffic Volumes
- LT TH RT - Volume Turn Movement
Left • Thru • Right

DKS

No Scale


















**2044 AM/PM
Future Build Volumes**

HCM Signalized Intersection Capacity Analysis

1: 13th St SE & McGilchrist

Salem McGilchrist Analysis



















2024 No Build AM Peak




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	178	0	0	48	86	2	1215	194	0	0	0
Future Volume (vph)	35	178	0	0	48	86	2	1215	194	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11	12	14	12	12	12	12
Total Lost time (s)		4.0			4.0	4.0		4.0				
Lane Util. Factor		1.00			1.00	1.00		0.95				
Frpb, ped/bikes		1.00			1.00	1.00		0.99				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.98				
Flt Protected		0.99			1.00	1.00		1.00				
Satd. Flow (prot)		1824			1473	1446		3642				
Flt Permitted		0.94			1.00	1.00		1.00				
Satd. Flow (perm)		1733			1473	1446		3642				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	37	187	0	0	51	91	2	1279	204	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	14	0	4	0	0	0	0
Lane Group Flow (vph)	0	224	0	0	51	77	0	1481	0	0	0	0
Confl. Peds. (#/hr)			3	3			3		5	5		3
Confl. Bikes (#/hr)									3			
Heavy Vehicles (%)	0%	4%	0%	18%	29%	8%	0%	3%	2%	0%	0%	0%
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)		23.0			23.0	23.0		97.0				
Effective Green, g (s)		24.0			24.0	24.0		98.0				
Actuated g/C Ratio		0.18			0.18	0.18		0.75				
Clearance Time (s)		5.0			5.0	5.0		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		319			271	266		2745				
v/s Ratio Prot					0.03							
v/s Ratio Perm		0.13				0.05		0.41				
v/c Ratio		0.70			0.19	0.29		0.54				
Uniform Delay, d1		49.7			44.8	45.7		6.6				
Progression Factor		1.00			1.00	1.00		1.00				
Incremental Delay, d2		6.8			0.3	0.6		0.8				
Delay (s)		56.5			45.1	46.3		7.4				
Level of Service		E			D	D		A				
Approach Delay (s)		56.5			45.9			7.4			0.0	
Approach LOS		E			D			A			A	
Intersection Summary												
HCM 2000 Control Delay			16.3				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			66.8%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												




HCM Signalized Intersection Capacity Analysis

2: Pringle Rd & McGilchrist

Salem McGilchrist Analysis
2024 No Build AM Peak




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	251	81	157	126	50	21	358	255	17	96	1
Future Volume (vph)	1	251	81	157	126	50	21	358	255	17	96	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	12	12	12	11	12
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.98		1.00			0.99			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		0.98			0.95			1.00	
Flt Protected		1.00	1.00		0.98			1.00			0.99	
Satd. Flow (prot)		1705	1449		1609			1645			1663	
Flt Permitted		1.00	1.00		0.67			0.99			0.90	
Satd. Flow (perm)		1704	1449		1105			1633			1512	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1	264	85	165	133	53	22	377	268	18	101	1
RTOR Reduction (vph)	0	0	50	0	7	0	0	28	0	0	1	0
Lane Group Flow (vph)	0	265	35	0	344	0	0	639	0	0	119	0
Confl. Peds. (#/hr)	4					4			4	4		
Confl. Bikes (#/hr)			2						3			1
Heavy Vehicles (%)	0%	4%	9%	8%	8%	13%	13%	7%	8%	7%	10%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		28.0	28.0		28.0			32.9			32.9	
Effective Green, g (s)		28.0	28.0		28.0			32.9			32.9	
Actuated g/C Ratio		0.41	0.41		0.41			0.48			0.48	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		692	588		449			779			721	
v/s Ratio Prot												
v/s Ratio Perm		0.16	0.02		c0.31			c0.39			0.08	
v/c Ratio		0.38	0.06		0.77			0.82			0.17	
Uniform Delay, d1		14.4	12.4		17.6			15.5			10.2	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.4	0.0		7.6			6.9			0.1	
Delay (s)		14.7	12.5		25.3			22.4			10.3	
Level of Service		B	B		C			C			B	
Approach Delay (s)		14.2			25.3			22.4			10.3	
Approach LOS		B			C			C			B	
Intersection Summary												
HCM 2000 Control Delay			20.2									
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			68.9									
Intersection Capacity Utilization			79.6%									
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	3.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	409	67	114	346	41	65
Future Vol, veh/h	409	67	114	346	41	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	10	1	11	12	15	17
Mvmt Flow	431	71	120	364	43	68
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	502	0	1071	467
Stage 1	-	-	-	-	467	-
Stage 2	-	-	-	-	604	-
Critical Hdwy	-	-	4.21	-	6.55	6.37
Critical Hdwy Stg 1	-	-	-	-	5.55	-
Critical Hdwy Stg 2	-	-	-	-	5.55	-
Follow-up Hdwy	-	-	2.299	-	3.635	3.453
Pot Cap-1 Maneuver	-	-	1018	-	231	566
Stage 1	-	-	-	-	605	-
Stage 2	-	-	-	-	521	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1018	-	197	566
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	521	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.2		21.5	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	328	-	-	1018	-	
HCM Lane V/C Ratio	0.34	-	-	0.118	-	
HCM Control Delay (s)	21.5	-	-	9	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	1.5	-	-	0.4	-	

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	80	398	343	80	60	127
Future Vol, veh/h	80	398	343	80	60	127
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	8	10	7	16	18	23
Mvmt Flow	84	419	361	84	63	134
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	445	0	-	0	990	403
Stage 1	-	-	-	-	403	-
Stage 2	-	-	-	-	587	-
Critical Hdwy	4.18	-	-	-	6.58	6.43
Critical Hdwy Stg 1	-	-	-	-	5.58	-
Critical Hdwy Stg 2	-	-	-	-	5.58	-
Follow-up Hdwy	2.272	-	-	-	3.662	3.507
Pot Cap-1 Maneuver	1084	-	-	-	255	604
Stage 1	-	-	-	-	642	-
Stage 2	-	-	-	-	526	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1084	-	-	-	229	604
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	526	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.4	0		22.7		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1084	-	-	-	396	
HCM Lane V/C Ratio	0.078	-	-	-	0.497	
HCM Control Delay (s)	8.6	0	-	-	22.7	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0.3	-	-	-	2.7	

Intersection

Int Delay, s/veh 4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	360	98	172	372	52	67
Future Vol, veh/h	360	98	172	372	52	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	10	4	5	7	7	19
Mvmt Flow	379	103	181	392	55	71

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	482
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	1065
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1065
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-













Approach	EB	WB	NB
HCM Control Delay, s	0	2.9	29.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	271	-	-	1065	-
HCM Lane V/C Ratio	0.462	-	-	0.17	-
HCM Control Delay (s)	29.2	-	-	9.1	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	2.3	-	-	0.6	-

HCM Signalized Intersection Capacity Analysis

6: 25th St SE & McGilchrist

Salem McGilchrist Analysis
2024 No Build AM Peak


















						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 	 	
Traffic Volume (vph)	294	83	132	666	590	420
Future Volume (vph)	294	83	132	666	590	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1560	1482		3409	3157	
Flt Permitted	0.95	1.00		0.63	1.00	
Satd. Flow (perm)	1560	1482		2166	3157	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	309	87	139	701	621	442
RTOR Reduction (vph)	0	64	0	0	127	0
Lane Group Flow (vph)	309	23	0	840	936	0
Confl. Peds. (#/hr)			6			6
Heavy Vehicles (%)	8%	9%	5%	5%	7%	4%
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	18.4	18.4		41.8	41.8	
Effective Green, g (s)	18.4	18.4		41.8	41.8	
Actuated g/C Ratio	0.27	0.27		0.61	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	420	399		1327	1934	
v/s Ratio Prot	c0.20				0.30	
v/s Ratio Perm		0.02		c0.39		
v/c Ratio	0.74	0.06		0.63	0.48	
Uniform Delay, d1	22.7	18.5		8.3	7.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.6	0.1		2.3	0.9	
Delay (s)	29.3	18.5		10.7	8.1	
Level of Service	C	B		B	A	
Approach Delay (s)	26.9			10.7	8.1	
Approach LOS	C			B	A	
Intersection Summary						
HCM 2000 Control Delay			12.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			68.2		Sum of lost time (s)	8.0
Intersection Capacity Utilization			78.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

1: 13th St SE & McGilchrist

Salem McGilchrist Analysis



















2024 No Build PM Peak




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	382	0	0	99	97	2	684	158	0	0	0
Future Volume (vph)	39	382	0	0	99	97	2	684	158	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11	12	14	12	12	12	12
Total Lost time (s)		4.0			4.0	4.0		4.0				
Lane Util. Factor		1.00			1.00	1.00		0.95				
Frpb, ped/bikes		1.00			1.00	1.00		0.99				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.97				
Flt Protected		1.00			1.00	1.00		1.00				
Satd. Flow (prot)		1825			1863	1561		3579				
Flt Permitted		0.97			1.00	1.00		1.00				
Satd. Flow (perm)		1772			1863	1561		3579				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	41	402	0	0	104	102	2	720	166	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	66	0	28	0	0	0	0
Lane Group Flow (vph)	0	443	0	0	104	36	0	860	0	0	0	0
Confl. Peds. (#/hr)			1	1			1		4	4		1
Heavy Vehicles (%)	0%	4%	0%	103%	2%	0%	0%	4%	4%	0%	0%	0%
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)		20.1			20.1	20.1		29.9				
Effective Green, g (s)		21.1			21.1	21.1		30.9				
Actuated g/C Ratio		0.35			0.35	0.35		0.51				
Clearance Time (s)		5.0			5.0	5.0		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		623			655	548		1843				
v/s Ratio Prot					0.06							
v/s Ratio Perm		0.25				0.02		0.24				
v/c Ratio		0.71			0.16	0.07		0.47				
Uniform Delay, d1		16.8			13.4	12.9		9.3				
Progression Factor		1.00			1.17	1.51		1.00				
Incremental Delay, d2		3.8			0.0	0.0		0.9				
Delay (s)		20.6			15.6	19.5		10.1				
Level of Service		C			B	B		B				
Approach Delay (s)		20.6			17.5			10.1			0.0	
Approach LOS		C			B			B			A	
Intersection Summary												
HCM 2000 Control Delay		14.2			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.57										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		62.4%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												




HCM Signalized Intersection Capacity Analysis




2: Pringle Rd & McGilchrist

Salem McGilchrist Analysis
2024 No Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	287	309	347	122	84	40	376	289	51	148	18
Future Volume (vph)	5	287	309	347	122	84	40	376	289	51	148	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	12	12	12	11	12
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.98		0.99			0.99			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		0.98			0.94			0.99	
Flt Protected		1.00	1.00		0.97			1.00			0.99	
Satd. Flow (prot)		1705	1566		1700			1717			1748	
Flt Permitted		0.99	1.00		0.57			0.97			0.76	
Satd. Flow (perm)		1693	1566		1007			1675			1339	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	302	325	365	128	88	42	396	304	54	156	19
RTOR Reduction (vph)	0	0	179	0	10	0	0	41	0	0	5	0
Lane Group Flow (vph)	0	307	146	0	571	0	0	701	0	0	224	0
Confl. Peds. (#/hr)	6					6	1		4	4		1
Confl. Bikes (#/hr)			1						4			1
Heavy Vehicles (%)	0%	4%	1%	2%	1%	4%	10%	2%	3%	2%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		27.0	27.0		27.0			25.0			25.0	
Effective Green, g (s)		27.0	27.0		27.0			25.0			25.0	
Actuated g/C Ratio		0.45	0.45		0.45			0.42			0.42	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		761	704		453			697			557	
v/s Ratio Prot												
v/s Ratio Perm		0.18	0.09		c0.57			c0.42			0.17	
v/c Ratio		0.40	0.21		1.26			1.01			0.40	
Uniform Delay, d1		11.1	10.0		16.5			17.5			12.3	
Progression Factor		0.57	0.27		0.92			1.00			1.00	
Incremental Delay, d2		0.3	0.1		133.2			35.4			2.2	
Delay (s)		6.6	2.9		148.4			52.9			14.4	
Level of Service		A	A		F			D			B	
Approach Delay (s)		4.7			148.4			52.9			14.4	
Approach LOS		A			F			D			B	
Intersection Summary												
HCM 2000 Control Delay			60.3			HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			98.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	11.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	573	79	92	413	86	133
Future Vol, veh/h	573	79	92	413	86	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	6	9	2	3	6
Mvmt Flow	603	83	97	435	91	140
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	686	0	1274	645
Stage 1	-	-	-	-	645	-
Stage 2	-	-	-	-	629	-
Critical Hdwy	-	-	4.19	-	6.43	6.26
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.281	-	3.527	3.354
Pot Cap-1 Maneuver	-	-	876	-	184	465
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	529	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	876	-	157	465
Mov Cap-2 Maneuver	-	-	-	-	157	-
Stage 1	-	-	-	-	444	-
Stage 2	-	-	-	-	529	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.8		69.5	
HCM LOS					F	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	263	-	-	876	-	
HCM Lane V/C Ratio	0.877	-	-	0.111	-	
HCM Control Delay (s)	69.5	-	-	9.6	0	
HCM Lane LOS	F	-	-	A	A	
HCM 95th %tile Q(veh)	7.5	-	-	0.4	-	












Intersection						
Int Delay, s/veh	6.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	86	650	396	61	72	113
Future Vol, veh/h	86	650	396	61	72	113
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	5	4	4	12	5
Mvmt Flow	91	684	417	64	76	119
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	481	0	-	0	1315	449
Stage 1	-	-	-	-	449	-
Stage 2	-	-	-	-	866	-
Critical Hdwy	4.14	-	-	-	6.52	6.25
Critical Hdwy Stg 1	-	-	-	-	5.52	-
Critical Hdwy Stg 2	-	-	-	-	5.52	-
Follow-up Hdwy	2.236	-	-	-	3.608	3.345
Pot Cap-1 Maneuver	1071	-	-	-	166	604
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	396	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1071	-	-	-	143	604
Mov Cap-2 Maneuver	-	-	-	-	143	-
Stage 1	-	-	-	-	537	-
Stage 2	-	-	-	-	396	-
Approach	EB	WB		SB		
HCM Control Delay, s	1	0		47.3		
HCM LOS	E					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1071	-	-	-	-	268
HCM Lane V/C Ratio	0.085	-	-	-	-	0.727
HCM Control Delay (s)	8.7	0	-	-	-	47.3
HCM Lane LOS	A	A	-	-	-	E
HCM 95th %tile Q(veh)	0.3	-	-	-	-	5.1

Intersection						
Int Delay, s/veh	7.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	683	39	52	379	79	114
Future Vol, veh/h	683	39	52	379	79	114
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	17	2	4	2	2
Mvmt Flow	719	41	55	399	83	120
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	761	0	1250	741
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	509	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	851	-	191	416
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	604	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	850	-	175	416
Mov Cap-2 Maneuver	-	-	-	-	175	-
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	604	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.1		51.8	
HCM LOS					F	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	266	-	-	850	-	
HCM Lane V/C Ratio	0.764	-	-	0.064	-	
HCM Control Delay (s)	51.8	-	-	9.5	0	
HCM Lane LOS	F	-	-	A	A	
HCM 95th %tile Q(veh)	5.6	-	-	0.2	-	

HCM Signalized Intersection Capacity Analysis

6: 25th St SE & McGilchrist

Salem McGilchrist Analysis
2024 No Build PM Peak
















						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	636	210	86	807	611	281
Future Volume (vph)	636	210	86	807	611	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.95	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1652	1468		3454	3267	
Flt Permitted	0.95	1.00		0.71	1.00	
Satd. Flow (perm)	1652	1468		2472	3267	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	669	221	91	849	643	296
RTOR Reduction (vph)	0	78	0	0	88	0
Lane Group Flow (vph)	669	143	0	940	851	0
Confl. Peds. (#/hr)			4			4
Heavy Vehicles (%)	2%	10%	4%	4%	5%	3%
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	26.2	26.2		25.8	25.8	
Effective Green, g (s)	26.2	26.2		25.8	25.8	
Actuated g/C Ratio	0.44	0.44		0.43	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	721	641		1062	1404	
v/s Ratio Prot	c0.41				0.26	
v/s Ratio Perm		0.10		c0.38		
v/c Ratio	0.93	0.22		0.89	0.61	
Uniform Delay, d1	16.0	10.5		15.7	13.2	
Progression Factor	0.86	0.76		1.00	1.00	
Incremental Delay, d2	17.3	0.2		10.8	2.0	
Delay (s)	31.1	8.2		26.5	15.1	
Level of Service	C	A		C	B	
Approach Delay (s)	25.4			26.5	15.1	
Approach LOS	C			C	B	
Intersection Summary						
HCM 2000 Control Delay			22.3		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.91			
Actuated Cycle Length (s)			60.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			96.1%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

1: 13th St SE & McGilchrist

Salem McGilchrist Analysis
























2024 Build AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	178	0	0	48	86	2	1215	194	0	0	0
Future Volume (vph)	35	178	0	0	48	86	2	1215	194	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11	12	14	12	12	12	12
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		0.95			0.95			0.95				
Frpb, ped/bikes		1.00			1.00			1.00				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.90			0.98				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		3465			2766			3687				
Flt Permitted		0.87			1.00			1.00				
Satd. Flow (perm)		3051			2766			3687				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	37	187	0	0	51	91	2	1279	204	0	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	224	0	0	138	0	0	1482	0	0	0	0
Confl. Peds. (#/hr)			4	4			4		5	5		4
Confl. Bikes (#/hr)									4			
Heavy Vehicles (%)	0%	4%	0%	0%	34%	9%	0%	2%	1%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		15.0			15.0			105.0				
Effective Green, g (s)		16.0			16.0			106.0				
Actuated g/C Ratio		0.12			0.12			0.82				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		375			340			3006				
v/s Ratio Prot					0.05							
v/s Ratio Perm		0.07						0.40				
v/c Ratio		0.60			0.40			0.49				
Uniform Delay, d1		54.0			52.6			3.7				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		2.6			0.8			0.6				
Delay (s)		56.5			53.4			4.3				
Level of Service		E			D			A				
Approach Delay (s)		56.5			53.4			4.3			0.0	
Approach LOS		E			D			A			A	
Intersection Summary												
HCM 2000 Control Delay		14.4			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		62.4%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis






2: Pringle Rd & McGilchrist

Salem McGilchrist Analysis
2024 Build AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	251	81	157	126	50	21	358	255	17	96	1
Future Volume (vph)	1	251	81	157	126	50	21	358	255	17	96	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1797	1705	1422	1656	1579		1597	1759	1448	1669	1653	
Flt Permitted	0.64	1.00	1.00	0.40	1.00		0.65	1.00	1.00	0.37	1.00	
Satd. Flow (perm)	1211	1705	1422	689	1579		1097	1759	1448	648	1653	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1	264	85	165	133	53	22	377	268	18	101	1
RTOR Reduction (vph)	0	0	60	0	13	0	0	0	181	0	1	0
Lane Group Flow (vph)	1	264	25	165	173	0	22	377	87	18	101	0
Confl. Peds. (#/hr)	4					4			4	4		
Confl. Bikes (#/hr)			2						2			1
Heavy Vehicles (%)	0%	4%	11%	9%	9%	14%	13%	8%	8%	8%	11%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	18.7	18.0	18.0	28.5	23.8		21.8	19.8	19.8	19.6	18.7	
Effective Green, g (s)	18.7	18.0	18.0	28.5	23.8		21.8	19.8	19.8	19.6	18.7	
Actuated g/C Ratio	0.31	0.29	0.29	0.47	0.39		0.36	0.32	0.32	0.32	0.31	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	376	501	418	423	614		407	569	468	222	505	
v/s Ratio Prot	0.00	c0.15		c0.04	0.11		c0.00	c0.21		0.00	0.06	
v/s Ratio Perm	0.00		0.02	0.14			0.02		0.06	0.02		
v/c Ratio	0.00	0.53	0.06	0.39	0.28		0.05	0.66	0.19	0.08	0.20	
Uniform Delay, d1	14.8	18.0	15.5	10.2	12.8		12.9	17.8	14.9	14.6	15.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	1.0	0.1	0.6	0.3		0.1	2.9	0.2	0.2	0.2	
Delay (s)	14.8	19.0	15.6	10.8	13.1		12.9	20.7	15.1	14.7	15.9	
Level of Service	B	B	B	B	B		B	C	B	B	B	
Approach Delay (s)		18.2			12.0			18.2			15.7	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			61.2			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			50.8%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Int Delay, s/veh 2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	409	67	114	346	41	65
Future Vol, veh/h	409	67	114	346	41	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	11	0	11	14	17	19
Mvmt Flow	431	71	120	364	43	68

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	502
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.21
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.299
Pot Cap-1 Maneuver	-	-	1018
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1018
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-





















Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	296	562	-	-	1018	-
HCM Lane V/C Ratio	0.146	0.122	-	-	0.118	-
HCM Control Delay (s)	19.2	12.3	-	-	9	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	0.4	-	-	0.4	-

HCM Signalized Intersection Capacity Analysis

4: 22nd St SE & McGilchrist















Salem McGilchrist Analysis
2024 Build AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	301	71	80	313	85	42	9	67	47	13	127
Future Volume (vph)	172	301	71	80	313	85	42	9	67	47	13	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	11	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.97		1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1522		1703	1548		1671	1378		1517	1329	
Flt Permitted	0.24	1.00		0.40	1.00		0.66	1.00		0.57	1.00	
Satd. Flow (perm)	420	1522		711	1548		1166	1378		903	1329	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	181	317	75	84	329	89	44	9	71	49	14	134
RTOR Reduction (vph)	0	11	0	0	13	0	0	58	0	0	91	0
Lane Group Flow (vph)	181	381	0	84	405	0	44	22	0	49	57	0
Heavy Vehicles (%)	8%	21%	1%	6%	14%	18%	8%	0%	22%	19%	0%	26%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	44.2	33.9		36.1	29.8		20.8	16.2		37.8	29.2	
Effective Green, g (s)	44.2	33.9		36.1	29.8		20.8	16.2		37.8	29.2	
Actuated g/C Ratio	0.49	0.38		0.40	0.33		0.23	0.18		0.42	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	350	573		354	512		295	248		499	431	
v/s Ratio Prot	c0.06	0.25		0.02	c0.26		c0.01	0.02		0.02	c0.04	
v/s Ratio Perm	0.19			0.08			0.03			0.02		
v/c Ratio	0.52	0.67		0.24	0.79		0.15	0.09		0.10	0.13	
Uniform Delay, d1	15.4	23.3		17.3	27.3		27.3	30.7		15.7	21.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	2.9		0.3	8.2		0.2	0.7		0.4	0.6	
Delay (s)	16.7	26.3		17.7	35.5		27.6	31.4		16.1	22.1	
Level of Service	B	C		B	D		C	C		B	C	
Approach Delay (s)		23.2			32.5			30.1			20.6	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay		26.8			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.46										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		56.4%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: 25th St SE & McGilchrist

Salem McGilchrist Analysis
2024 Build AM Peak
















						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Traffic Volume (vph)	294	83	132	666	590	420
Future Volume (vph)	294	83	132	666	590	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.94	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	2998	1495	1719	3438	3156	
Flt Permitted	0.95	1.00	0.18	1.00	1.00	
Satd. Flow (perm)	2998	1495	335	3438	3156	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	309	87	139	701	621	442
RTOR Reduction (vph)	0	72	0	0	109	0
Lane Group Flow (vph)	309	15	139	701	954	0
Confl. Peds. (#/hr)			6			6
Heavy Vehicles (%)	9%	8%	5%	5%	7%	4%
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	12.8	12.8	53.1	53.1	42.0	
Effective Green, g (s)	12.8	12.8	53.1	53.1	42.0	
Actuated g/C Ratio	0.17	0.17	0.72	0.72	0.57	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	519	258	373	2470	1793	
v/s Ratio Prot	c0.10		c0.04	0.20	c0.30	
v/s Ratio Perm		0.01	0.23			
v/c Ratio	0.60	0.06	0.37	0.28	0.53	
Uniform Delay, d1	28.2	25.5	5.1	3.7	9.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	0.1	0.6	0.3	1.1	
Delay (s)	30.0	25.6	5.8	4.0	11.0	
Level of Service	C	C	A	A	B	
Approach Delay (s)	29.0			4.3	11.0	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay			11.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.53			
Actuated Cycle Length (s)			73.9		Sum of lost time (s)	12.0
Intersection Capacity Utilization			55.7%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

1: 13th St SE & McGilchrist

Salem McGilchrist Analysis
























2024 Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	382	0	0	99	97	2	684	158	0	0	0
Future Volume (vph)	39	382	0	0	99	97	2	684	158	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11	12	14	12	12	12	12
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		0.95			0.95			0.95				
Frpb, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.93			0.97				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		3437			3308			3546				
Flt Permitted		0.90			1.00			1.00				
Satd. Flow (perm)		3104			3308			3546				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	41	402	0	0	104	102	2	720	166	0	0	0
RTOR Reduction (vph)	0	0	0	0	46	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	443	0	0	160	0	0	882	0	0	0	0
Confl. Peds. (#/hr)			1	1			1		5	5		1
Heavy Vehicles (%)	0%	5%	0%	118%	2%	0%	0%	5%	5%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		25.0			25.0			95.0				
Effective Green, g (s)		26.0			26.0			96.0				
Actuated g/C Ratio		0.20			0.20			0.74				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		620			661			2618				
v/s Ratio Prot					0.05							
v/s Ratio Perm		0.14						0.25				
v/c Ratio		0.71			0.24			0.34				
Uniform Delay, d1		48.5			43.7			5.9				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		3.9			0.2			0.3				
Delay (s)		52.4			43.9			6.3				
Level of Service		D			D			A				
Approach Delay (s)		52.4			43.9			6.3			0.0	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay		24.6			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.42										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		53.1%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis






2: Pringle Rd & McGilchrist

Salem McGilchrist Analysis
2024 Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	287	309	347	122	84	40	376	289	51	148	18
Future Volume (vph)	5	287	309	347	122	84	40	376	289	51	148	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1789	1689	1565	1770	1653		1610	1863	1491	1768	1740	
Flt Permitted	0.62	1.00	1.00	0.34	1.00		0.60	1.00	1.00	0.26	1.00	
Satd. Flow (perm)	1173	1689	1565	632	1653		1014	1863	1491	489	1740	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	302	325	365	128	88	42	396	304	54	156	19
RTOR Reduction (vph)	0	0	230	0	22	0	0	0	216	0	6	0
Lane Group Flow (vph)	5	302	95	365	194	0	42	396	88	54	169	0
Confl. Peds. (#/hr)	7					7	1		5	5		1
Confl. Bikes (#/hr)			1						5			1
Heavy Vehicles (%)	0%	5%	1%	2%	1%	5%	12%	2%	4%	2%	4%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	22.2	21.3	21.3	36.1	31.2		24.8	21.1	21.1	24.8	21.1	
Effective Green, g (s)	22.2	21.3	21.3	36.1	31.2		24.8	21.1	21.1	24.8	21.1	
Actuated g/C Ratio	0.30	0.29	0.29	0.50	0.43		0.34	0.29	0.29	0.34	0.29	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	364	493	457	481	707		375	539	431	231	503	
v/s Ratio Prot	0.00	0.18		c0.11	0.12		0.01	c0.21		c0.01	0.10	
v/s Ratio Perm	0.00		0.06	c0.26			0.03		0.06	0.07		
v/c Ratio	0.01	0.61	0.21	0.76	0.27		0.11	0.73	0.20	0.23	0.34	
Uniform Delay, d1	17.7	22.2	19.4	12.8	13.5		16.3	23.4	19.6	17.2	20.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	2.3	0.2	6.8	0.2		0.1	5.2	0.2	0.5	0.4	
Delay (s)	17.7	24.5	19.7	19.6	13.7		16.4	28.5	19.8	17.7	20.8	
Level of Service	B	C	B	B	B		B	C	B	B	C	
Approach Delay (s)		22.0			17.4			24.3			20.1	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			21.3			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			72.9			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			70.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Int Delay, s/veh 3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	573	79	92	413	86	133
Future Vol, veh/h	573	79	92	413	86	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	5	7	11	2	4	7
Mvmt Flow	603	83	97	435	91	140

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	686
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.21
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.299
Pot Cap-1 Maneuver	-	-	867
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	867
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-





















Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	19.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	278	463	-	-	867	-
HCM Lane V/C Ratio	0.326	0.302	-	-	0.112	-
HCM Control Delay (s)	24.1	16.1	-	-	9.7	-
HCM Lane LOS	C	C	-	-	A	-
HCM 95th %tile Q(veh)	1.4	1.3	-	-	0.4	-

HCM Signalized Intersection Capacity Analysis

4: 22nd St SE & McGilchrist















Salem McGilchrist Analysis
2024 Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	615	35	52	328	51	68	11	114	68	4	113
Future Volume (vph)	86	615	35	52	328	51	68	11	114	68	4	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	11	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	1618		1770	1659		1770	1592		1583	1535	
Flt Permitted	0.38	1.00		0.14	1.00		0.68	1.00		0.48	1.00	
Satd. Flow (perm)	690	1618		267	1659		1263	1592		797	1535	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	91	647	37	55	345	54	72	12	120	72	4	119
RTOR Reduction (vph)	0	2	0	0	6	0	0	98	0	0	90	0
Lane Group Flow (vph)	91	682	0	55	393	0	72	34	0	72	33	0
Confl. Peds. (#/hr)			6	6								
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	5%	12%	19%	2%	9%	5%	2%	0%	2%	14%	0%	6%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	46.8	40.4		45.2	39.6		22.4	16.2		32.0	21.8	
Effective Green, g (s)	46.8	40.4		45.2	39.6		22.4	16.2		32.0	21.8	
Actuated g/C Ratio	0.52	0.45		0.50	0.44		0.25	0.18		0.36	0.24	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	431	726		227	729		349	286		386	371	
v/s Ratio Prot	0.01	c0.42		c0.02	0.24		0.01	0.02		c0.02	0.02	
v/s Ratio Perm	0.09			0.11			0.04			c0.04		
v/c Ratio	0.21	0.94		0.24	0.54		0.21	0.12		0.19	0.09	
Uniform Delay, d1	11.7	23.6		15.4	18.5		26.5	30.9		19.8	26.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	19.7		0.6	0.8		0.3	0.8		1.1	0.5	
Delay (s)	12.0	43.4		16.0	19.3		26.8	31.7		20.8	26.9	
Level of Service	B	D		B	B		C	C		C	C	
Approach Delay (s)		39.7			18.9			30.0			24.7	
Approach LOS		D			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			62.6%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: 25th St SE & McGilchrist

Salem McGilchrist Analysis
2024 Build PM Peak


















						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Traffic Volume (vph)	636	210	86	807	611	281
Future Volume (vph)	636	210	86	807	611	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3204	1442	1719	3438	3230	
Flt Permitted	0.95	1.00	0.21	1.00	1.00	
Satd. Flow (perm)	3204	1442	372	3438	3230	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	669	221	91	849	643	296
RTOR Reduction (vph)	0	160	0	0	51	0
Lane Group Flow (vph)	669	61	91	849	888	0
Confl. Peds. (#/hr)			5			5
Heavy Vehicles (%)	2%	12%	5%	5%	6%	4%
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	23.6	23.6	54.1	54.1	44.3	
Effective Green, g (s)	23.6	23.6	54.1	54.1	44.3	
Actuated g/C Ratio	0.28	0.28	0.63	0.63	0.52	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	882	397	325	2170	1669	
v/s Ratio Prot	c0.21		0.02	c0.25	c0.27	
v/s Ratio Perm		0.04	0.16			
v/c Ratio	0.76	0.15	0.28	0.39	0.53	
Uniform Delay, d1	28.4	23.5	7.9	7.7	13.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.8	0.2	0.5	0.5	1.2	
Delay (s)	32.2	23.7	8.3	8.3	15.0	
Level of Service	C	C	A	A	B	
Approach Delay (s)	30.1			8.3	15.0	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay			17.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.60			
Actuated Cycle Length (s)			85.7		Sum of lost time (s)	12.0
Intersection Capacity Utilization			59.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

1: 13th St SE & McGilchrist

Salem McGilchrist Analysis



















2044 No Build AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	239	0	0	65	115	3	1627	259	0	0	0
Future Volume (vph)	47	239	0	0	65	115	3	1627	259	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11	12	14	12	12	12	12
Total Lost time (s)		4.0			4.0	4.0		4.0				
Lane Util. Factor		1.00			1.00	1.00		0.95				
Frpb, ped/bikes		1.00			1.00	1.00		0.99				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.98				
Flt Protected		0.99			1.00	1.00		1.00				
Satd. Flow (prot)		1809			1301	1382		3639				
Flt Permitted		0.94			1.00	1.00		1.00				
Satd. Flow (perm)		1712			1301	1382		3639				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	49	252	0	0	68	121	3	1713	273	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	13	0	5	0	0	0	0
Lane Group Flow (vph)	0	301	0	0	68	108	0	1984	0	0	0	0
Confl. Peds. (#/hr)			5	5			5		6	6		5
Confl. Bikes (#/hr)								5				
Heavy Vehicles (%)	0%	5%	0%	0%	46%	13%	0%	3%	2%	0%	0%	0%
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)		30.1			30.1	30.1		89.9				
Effective Green, g (s)		31.1			31.1	31.1		90.9				
Actuated g/C Ratio		0.24			0.24	0.24		0.70				
Clearance Time (s)		5.0			5.0	5.0		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		409			311	330		2544				
v/s Ratio Prot					0.05							
v/s Ratio Perm		0.18				0.08		0.55				
v/c Ratio		0.74			0.22	0.33		0.78				
Uniform Delay, d1		45.7			39.7	40.8		12.9				
Progression Factor		1.00			1.00	1.00		1.00				
Incremental Delay, d2		6.8			0.4	0.6		2.4				
Delay (s)		52.4			40.1	41.4		15.4				
Level of Service		D			D	D		B				
Approach Delay (s)		52.4			40.9			15.4			0.0	
Approach LOS		D			D			B			A	
Intersection Summary												
HCM 2000 Control Delay		21.8			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.77										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		85.7%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis




2: Pringle Rd & McGilchrist

Salem McGilchrist Analysis
2044 No Build AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	337	109	210	169	66	28	479	341	22	128	2
Future Volume (vph)	2	337	109	210	169	66	28	479	341	22	128	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	12	12	12	11	12
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.98		0.99			0.98			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		0.98			0.95			1.00	
Flt Protected		1.00	1.00		0.98			1.00			0.99	
Satd. Flow (prot)		1689	1385		1536			1588			1605	
Flt Permitted		1.00	1.00		0.51			0.99			0.87	
Satd. Flow (perm)		1687	1385		807			1571			1403	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	355	115	221	178	69	29	504	359	23	135	2
RTOR Reduction (vph)	0	0	59	0	7	0	0	27	0	0	1	0
Lane Group Flow (vph)	0	357	56	0	461	0	0	865	0	0	160	0
Confl. Peds. (#/hr)	5					5			5	5		
Confl. Bikes (#/hr)			3						3			2
Heavy Vehicles (%)	0%	5%	14%	13%	13%	19%	17%	11%	11%	11%	14%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		37.0	37.0		37.0			45.0			45.0	
Effective Green, g (s)		37.0	37.0		37.0			45.0			45.0	
Actuated g/C Ratio		0.41	0.41		0.41			0.50			0.50	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		693	569		331			785			701	
v/s Ratio Prot												
v/s Ratio Perm		0.21	0.04		c0.57			c0.55			0.11	
v/c Ratio		0.52	0.10		1.39			1.10			0.23	
Uniform Delay, d1		19.8	16.3		26.5			22.5			12.7	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.6	0.1		194.2			63.7			0.2	
Delay (s)		20.4	16.3		220.7			86.2			12.9	
Level of Service		C	B		F			F			B	
Approach Delay (s)		19.4			220.7			86.2			12.9	
Approach LOS		B			F			F			B	
Intersection Summary												
HCM 2000 Control Delay			96.1			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.23									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			103.3%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection




Int Delay, s/veh 8.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	548	90	153	463	55	87
Future Vol, veh/h	548	90	153	463	55	87
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	14	0	14	19	22	25
Mvmt Flow	577	95	161	487	58	92

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	672
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.24
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.326
Pot Cap-1 Maneuver	-	-	865
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	865
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-




Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	71.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	189	-	-	865	-
HCM Lane V/C Ratio	0.791	-	-	0.186	-
HCM Control Delay (s)	71.8	-	-	10.1	0
HCM Lane LOS	F	-	-	B	A
HCM 95th %tile Q(veh)	5.4	-	-	0.7	-

Intersection						
Int Delay, s/veh	20.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	107	532	460	107	81	171
Future Vol, veh/h	107	532	460	107	81	171
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	11	14	9	24	25	35
Mvmt Flow	113	560	484	113	85	180
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	597	0	-	0	1327	541
Stage 1	-	-	-	-	541	-
Stage 2	-	-	-	-	786	-
Critical Hdwy	4.21	-	-	-	6.65	6.55
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.299	-	-	-	3.725	3.615
Pot Cap-1 Maneuver	937	-	-	-	153	482
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	411	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	937	-	-	-	126	482
Mov Cap-2 Maneuver	-	-	-	-	126	-
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	411	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.6	0		112.8		
HCM LOS				F		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	937	-	-	-	253	
HCM Lane V/C Ratio	0.12	-	-	-	1.048	
HCM Control Delay (s)	9.4	0	-	-	112.8	
HCM Lane LOS	A	A	-	-	F	
HCM 95th %tile Q(veh)	0.4	-	-	-	10.8	

Intersection

Int Delay, s/veh 24.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	482	131	231	498	70	90
Future Vol, veh/h	482	131	231	498	70	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	14	2	8	9	11	30
Mvmt Flow	507	138	243	524	74	95

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	645
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.18
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.272
Pot Cap-1 Maneuver	-	-	912
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	912
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.3	217.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	136	-	-	912	-
HCM Lane V/C Ratio	1.238	-	-	0.267	-
HCM Control Delay (s)	217.9	-	-	10.4	0
HCM Lane LOS	F	-	-	B	A
HCM 95th %tile Q(veh)	10.2	-	-	1.1	-













Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Signalized Intersection Capacity Analysis

6: 25th St SE & McGilchrist

Salem McGilchrist Analysis
2044 No Build AM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 	 	
Traffic Volume (vph)	393	111	177	891	790	562
Future Volume (vph)	393	111	177	891	790	562
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.94	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1491	1455		3378	3104	
Flt Permitted	0.95	1.00		0.50	1.00	
Satd. Flow (perm)	1491	1455		1716	3104	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	414	117	186	938	832	592
RTOR Reduction (vph)	0	78	0	0	145	0
Lane Group Flow (vph)	414	39	0	1124	1279	0
Confl. Peds. (#/hr)			8			8
Heavy Vehicles (%)	13%	11%	6%	6%	9%	5%
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	24.5	24.5		41.3	41.3	
Effective Green, g (s)	24.5	24.5		41.3	41.3	
Actuated g/C Ratio	0.33	0.33		0.56	0.56	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	494	483		960	1737	
v/s Ratio Prot	c0.28				0.41	
v/s Ratio Perm		0.03		c0.66		
v/c Ratio	0.84	0.08		1.88dl	0.74	
Uniform Delay, d1	22.8	16.9		16.2	12.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.8	0.1		88.1	2.8	
Delay (s)	34.6	17.0		104.3	15.0	
Level of Service	C	B		F	B	
Approach Delay (s)	30.7			104.3	15.0	
Approach LOS	C			F	B	

Intersection Summary


















HCM 2000 Control Delay	50.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	73.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		
dl Defacto Left Lane. Recode with 1 though lane as a left lane.			
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: 13th St SE & McGilchrist

Salem McGilchrist Analysis



















2044 No Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	512	0	0	133	130	3	916	212	0	0	0
Future Volume (vph)	52	512	0	0	133	130	3	916	212	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11	12	14	12	12	12	12
Total Lost time (s)		4.0			4.0	4.0		4.0				
Lane Util. Factor		1.00			1.00	1.00		0.95				
Frpb, ped/bikes		1.00			1.00	1.00		0.99				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.97				
Flt Protected		1.00			1.00	1.00		1.00				
Satd. Flow (prot)		1794			1845	1561		3496				
Flt Permitted		0.96			1.00	1.00		1.00				
Satd. Flow (perm)		1726			1845	1561		3496				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	55	539	0	0	140	137	3	964	223	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	11	0	12	0	0	0	0
Lane Group Flow (vph)	0	594	0	0	140	126	0	1178	0	0	0	0
Confl. Peds. (#/hr)			2	2			2		6	6		2
Heavy Vehicles (%)	0%	6%	0%	158%	3%	0%	0%	6%	6%	0%	0%	0%
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)		56.9			56.9	56.9		63.1				
Effective Green, g (s)		57.9			57.9	57.9		64.1				
Actuated g/C Ratio		0.45			0.45	0.45		0.49				
Clearance Time (s)		5.0			5.0	5.0		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		768			821	695		1723				
v/s Ratio Prot					0.08							
v/s Ratio Perm		0.34				0.08		0.34				
v/c Ratio		0.77			0.17	0.18		0.68				
Uniform Delay, d1		30.5			21.6	21.7		25.2				
Progression Factor		1.00			1.00	1.00		1.00				
Incremental Delay, d2		4.9			0.1	0.1		2.2				
Delay (s)		35.4			21.7	21.9		27.4				
Level of Service		D			C	C		C				
Approach Delay (s)		35.4			21.8			27.4			0.0	
Approach LOS		D			C			C			A	
Intersection Summary												
HCM 2000 Control Delay		29.0			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.73										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		81.2%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis




2: Pringle Rd & McGilchrist

Salem McGilchrist Analysis
2044 No Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	384	414	465	163	112	54	504	387	68	198	24
Future Volume (vph)	5	384	414	465	163	112	54	504	387	68	198	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	12	12	12	11	12
Total Lost time (s)		4.0	4.0		4.0			4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00			1.00			1.00	
Frpb, ped/bikes		1.00	0.98		0.99			0.98			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		0.98			0.94			0.99	
Flt Protected		1.00	1.00		0.97			1.00			0.99	
Satd. Flow (prot)		1673	1549		1676			1678			1720	
Flt Permitted		0.99	1.00		0.48			0.96			0.49	
Satd. Flow (perm)		1662	1549		833			1622			847	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	404	436	489	172	118	57	531	407	72	208	25
RTOR Reduction (vph)	0	0	177	0	7	0	0	25	0	0	3	0
Lane Group Flow (vph)	0	409	259	0	772	0	0	970	0	0	302	0
Confl. Peds. (#/hr)	9					9	2		6	6		2
Confl. Bikes (#/hr)			2						6			2
Heavy Vehicles (%)	0%	6%	2%	3%	2%	6%	16%	3%	5%	3%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		53.0	53.0		53.0			39.0			39.0	
Effective Green, g (s)		53.0	53.0		53.0			39.0			39.0	
Actuated g/C Ratio		0.53	0.53		0.53			0.39			0.39	
Clearance Time (s)		4.0	4.0		4.0			4.0			4.0	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		880	820		441			632			330	
v/s Ratio Prot												
v/s Ratio Perm		0.25	0.17		c0.93			c0.60			0.36	
v/c Ratio		0.46	0.32		1.75			1.53			0.91	
Uniform Delay, d1		14.7	13.3		23.5			30.5			28.9	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.4	0.2		347.4			248.6			28.7	
Delay (s)		15.0	13.5		370.9			279.1			57.6	
Level of Service		B	B		F			F			E	
Approach Delay (s)		14.2			370.9			279.1			57.6	
Approach LOS		B			F			F			E	
Intersection Summary												
HCM 2000 Control Delay			203.9			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.66									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			128.3%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Int Delay, s/veh 100.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	768	106	123	553	115	179
Future Vol, veh/h	768	106	123	553	115	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	6	9	14	3	5	9
Mvmt Flow	808	112	129	582	121	188




Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	920
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.24
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.326
Pot Cap-1 Maneuver	-	-	695
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	695
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	\$ 626.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	139	-	-	695	-
HCM Lane V/C Ratio	2.226	-	-	0.186	-
HCM Control Delay (s)	\$ 626.4	-	-	11.4	0
HCM Lane LOS	F	-	-	B	A
HCM 95th %tile Q(veh)	25.8	-	-	0.7	-




Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection						
Int Delay, s/veh	70.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	115	871	531	82	96	152
Future Vol, veh/h	115	871	531	82	96	152
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	6	8	6	6	19	8
Mvmt Flow	121	917	559	86	101	160
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	645	0	-	0	1761	602
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	1159	-
Critical Hdwy	4.16	-	-	-	6.59	6.28
Critical Hdwy Stg 1	-	-	-	-	5.59	-
Critical Hdwy Stg 2	-	-	-	-	5.59	-
Follow-up Hdwy	2.254	-	-	-	3.671	3.372
Pot Cap-1 Maneuver	921	-	-	-	~ 84	489
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	276	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	921	-	-	-	~ 61	489
Mov Cap-2 Maneuver	-	-	-	-	~ 61	-
Stage 1	-	-	-	-	377	-
Stage 2	-	-	-	-	276	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.1	0		\$ 521.8		
HCM LOS				F		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	921	-	-	-	132	
HCM Lane V/C Ratio	0.131	-	-	-	1.978	
HCM Control Delay (s)	9.5	0	-	-	\$ 521.8	
HCM Lane LOS	A	A	-	-	F	
HCM 95th %tile Q(veh)	0.5	-	-	-	20.8	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Intersection

Int Delay, s/veh 63.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	915	52	70	507	106	153
Future Vol, veh/h	915	52	70	507	106	153
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	8	25	3	6	3	3
Mvmt Flow	963	55	74	534	112	161

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	1020
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.13
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.227
Pot Cap-1 Maneuver	-	-	676
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	675
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	\$ 438.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	151	-	-	675	-
HCM Lane V/C Ratio	1.806	-	-	0.109	-
HCM Control Delay (s)	\$ 438.6	-	-	11	0
HCM Lane LOS	F	-	-	B	A
HCM 95th %tile Q(veh)	20.3	-	-	0.4	-













Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Signalized Intersection Capacity Analysis

6: 25th St SE & McGilchrist

Salem McGilchrist Analysis
2044 No Build PM Peak
















						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 	 	
Traffic Volume (vph)	852	281	115	1081	818	376
Future Volume (vph)	852	281	115	1081	818	376
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.95	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1636	1392		3389	3178	
Flt Permitted	0.95	1.00		0.59	1.00	
Satd. Flow (perm)	1636	1392		2000	3178	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	897	296	121	1138	861	396
RTOR Reduction (vph)	0	70	0	0	67	0
Lane Group Flow (vph)	897	226	0	1259	1190	0
Confl. Peds. (#/hr)			6			6
Heavy Vehicles (%)	3%	16%	6%	6%	8%	5%
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	31.0	31.0		41.0	41.0	
Effective Green, g (s)	31.0	31.0		41.0	41.0	
Actuated g/C Ratio	0.39	0.39		0.51	0.51	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	633	539		1025	1628	
v/s Ratio Prot	c0.55				0.37	
v/s Ratio Perm		0.16		c0.63		
v/c Ratio	1.42	0.42		1.23	0.73	
Uniform Delay, d1	24.5	17.9		19.5	15.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	196.9	0.5		111.4	2.9	
Delay (s)	221.4	18.5		130.9	18.1	
Level of Service	F	B		F	B	
Approach Delay (s)	171.0			130.9	18.1	
Approach LOS	F			F	B	
Intersection Summary						
HCM 2000 Control Delay			105.6		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.31			
Actuated Cycle Length (s)			80.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			125.3%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

1: 13th St SE & McGilchrist

Salem McGilchrist Analysis
























2044 Build AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	239	0	0	65	115	3	1627	259	0	0	0
Future Volume (vph)	47	239	0	0	65	115	3	1627	259	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11	12	14	12	12	12	12
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		0.95			0.95			0.95				
Frpb, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.90			0.98				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		3410			2444			3615				
Flt Permitted		0.83			1.00			1.00				
Satd. Flow (perm)		2852			2444			3615				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	49	252	0	0	68	121	3	1713	273	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	301	0	0	188	0	0	1986	0	0	0	0
Confl. Peds. (#/hr)			6	6			6		9	9		6
Confl. Bikes (#/hr)									6			
Heavy Vehicles (%)	0%	6%	0%	0%	63%	17%	0%	4%	2%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		19.0			19.0			101.0				
Effective Green, g (s)		20.0			20.0			102.0				
Actuated g/C Ratio		0.15			0.15			0.78				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		438			376			2836				
v/s Ratio Prot					0.08							
v/s Ratio Perm		0.11						0.55				
v/c Ratio		0.69			0.50			0.70				
Uniform Delay, d1		52.0			50.4			6.7				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		4.4			1.1			1.5				
Delay (s)		56.5			51.5			8.2				
Level of Service		E			D			A				
Approach Delay (s)		56.5			51.5			8.2			0.0	
Approach LOS		E			D			A			A	
Intersection Summary												
HCM 2000 Control Delay			17.3				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			80.1%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis






2: Pringle Rd & McGilchrist

Salem McGilchrist Analysis
2044 Build AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	337	109	210	169	66	28	479	341	22	128	2
Future Volume (vph)	2	337	109	210	169	66	28	479	341	22	128	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1791	1673	1323	1543	1457		1456	1652	1345	1570	1543	
Flt Permitted	0.61	1.00	1.00	0.28	1.00		0.66	1.00	1.00	0.19	1.00	
Satd. Flow (perm)	1142	1673	1323	452	1457		1011	1652	1345	320	1543	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	355	115	221	178	69	29	504	359	23	135	2
RTOR Reduction (vph)	0	0	81	0	12	0	0	0	236	0	1	0
Lane Group Flow (vph)	2	355	34	221	235	0	29	504	123	23	136	0
Confl. Peds. (#/hr)	6					6			6	6		
Confl. Bikes (#/hr)			4						4			2
Heavy Vehicles (%)	0%	6%	19%	17%	17%	26%	24%	15%	15%	15%	19%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	24.6	23.6	23.6	37.6	32.6		29.5	27.1	27.1	29.3	27.0	
Effective Green, g (s)	24.6	23.6	23.6	37.6	32.6		29.5	27.1	27.1	29.3	27.0	
Actuated g/C Ratio	0.31	0.30	0.30	0.48	0.41		0.37	0.34	0.34	0.37	0.34	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	363	499	395	353	601		391	566	461	155	527	
v/s Ratio Prot	0.00	c0.21		c0.08	0.16		0.00	c0.31		c0.00	0.09	
v/s Ratio Perm	0.00		0.03	0.22			0.03		0.09	0.05		
v/c Ratio	0.01	0.71	0.09	0.63	0.39		0.07	0.89	0.27	0.15	0.26	
Uniform Delay, d1	18.8	24.7	19.9	14.2	16.2		15.8	24.5	18.8	17.6	18.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	4.8	0.1	3.4	0.4		0.1	16.1	0.3	0.4	0.3	
Delay (s)	18.8	29.4	20.0	17.7	16.7		15.9	40.6	19.1	18.0	19.0	
Level of Service	B	C	C	B	B		B	D	B	B	B	
Approach Delay (s)		27.1			17.1			31.1			18.9	
Approach LOS		C			B			C			B	
Intersection Summary												
HCM 2000 Control Delay			25.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			79.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			64.6%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Int Delay, s/veh 3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	548	90	153	463	55	87
Future Vol, veh/h	548	90	153	463	55	87
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	19	0	19	26	30	35
Mvmt Flow	577	95	161	487	58	92

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	672
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.29
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.371
Pot Cap-1 Maneuver	-	-	844
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	844
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-





















Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	23.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	176	430	-	-	844	-
HCM Lane V/C Ratio	0.329	0.213	-	-	0.191	-
HCM Control Delay (s)	35.2	15.6	-	-	10.3	-
HCM Lane LOS	E	C	-	-	B	-
HCM 95th %tile Q(veh)	1.3	0.8	-	-	0.7	-

HCM Signalized Intersection Capacity Analysis

4: 22nd St SE & McGilchrist

















Salem McGilchrist Analysis
2044 Build AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	403	95	107	419	114	57	13	90	63	17	171
Future Volume (vph)	231	403	95	107	419	114	57	13	90	63	17	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	11	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.97		1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1570	1482		1752	1489		1736	1507		1337	1142	
Flt Permitted	0.18	1.00		0.33	1.00		0.62	1.00		0.52	1.00	
Satd. Flow (perm)	305	1482		601	1489		1127	1507		737	1142	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	243	424	100	113	441	120	60	14	95	66	18	180
RTOR Reduction (vph)	0	9	0	0	11	0	0	78	0	0	139	0
Lane Group Flow (vph)	243	515	0	113	550	0	60	31	0	66	59	0
Heavy Vehicles (%)	15%	25%	1%	3%	16%	32%	4%	0%	11%	35%	0%	48%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	51.7	41.4		43.0	36.7		22.1	16.1		30.3	20.3	
Effective Green, g (s)	51.7	41.4		43.0	36.7		22.1	16.1		30.3	20.3	
Actuated g/C Ratio	0.57	0.46		0.48	0.41		0.25	0.18		0.34	0.23	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	329	681		367	607		317	269		316	257	
v/s Ratio Prot	c0.09	0.35		0.02	c0.37		0.01	0.02		c0.02	c0.05	
v/s Ratio Perm	0.33			0.13			0.03			0.05		
v/c Ratio	0.74	0.76		0.31	0.91		0.19	0.12		0.21	0.23	
Uniform Delay, d1	14.4	20.1		13.9	25.0		26.5	31.0		21.0	28.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.4	4.8		0.5	17.1		0.3	0.9		1.5	2.1	
Delay (s)	22.8	24.9		14.4	42.1		26.8	31.8		22.5	30.5	
Level of Service	C	C		B	D		C	C		C	C	
Approach Delay (s)		24.2			37.4			30.1			28.5	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.1			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			69.9%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: 25th St SE & McGilchrist

Salem McGilchrist Analysis
2044 Build AM Peak
















						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	 
Traffic Volume (vph)	393	111	177	891	790	562
Future Volume (vph)	393	111	177	891	790	562
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.94	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	2793	1404	1656	3312	3016	
Flt Permitted	0.95	1.00	0.09	1.00	1.00	
Satd. Flow (perm)	2793	1404	155	3312	3016	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	414	117	186	938	832	592
RTOR Reduction (vph)	0	92	0	0	119	0
Lane Group Flow (vph)	414	25	186	938	1305	0
Confl. Peds. (#/hr)			11			11
Heavy Vehicles (%)	17%	15%	9%	9%	13%	6%
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	16.7	16.7	53.1	53.1	41.1	
Effective Green, g (s)	16.7	16.7	53.1	53.1	41.1	
Actuated g/C Ratio	0.21	0.21	0.68	0.68	0.53	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	599	301	260	2260	1593	
v/s Ratio Prot	c0.15		c0.07	0.28	c0.43	
v/s Ratio Perm		0.02	0.42			
v/c Ratio	0.69	0.08	0.72	0.42	0.82	
Uniform Delay, d1	28.2	24.4	15.7	5.5	15.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.4	0.1	9.0	0.6	4.8	
Delay (s)	31.6	24.5	24.7	6.0	20.1	
Level of Service	C	C	C	A	C	
Approach Delay (s)	30.1			9.1	20.1	
Approach LOS	C			A	C	
Intersection Summary						
HCM 2000 Control Delay			17.8		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.78			
Actuated Cycle Length (s)			77.8		Sum of lost time (s)	12.0
Intersection Capacity Utilization			71.3%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

1: 13th St SE & McGilchrist

Salem McGilchrist Analysis
























2044 Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	512	0	0	133	130	3	916	212	0	0	0
Future Volume (vph)	52	512	0	0	133	130	3	916	212	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	11	12	14	12	12	12	12
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		0.95			0.95			0.95				
Frpb, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.93			0.97				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		3322			3276			3407				
Flt Permitted		0.88			1.00			1.00				
Satd. Flow (perm)		2939			3276			3407				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	55	539	0	0	140	137	3	964	223	0	0	0
RTOR Reduction (vph)	0	0	0	0	14	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	594	0	0	263	0	0	1182	0	0	0	0
Confl. Peds. (#/hr)			2	2			2		9	9		2
Heavy Vehicles (%)	0%	9%	0%	216%	4%	0%	0%	9%	9%	0%	0%	0%
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		34.3			34.3			85.7				
Effective Green, g (s)		35.3			35.3			86.7				
Actuated g/C Ratio		0.27			0.27			0.67				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		798			889			2272				
v/s Ratio Prot					0.08							
v/s Ratio Perm		0.20						0.35				
v/c Ratio		0.74			0.30			0.52				
Uniform Delay, d1		43.2			37.5			11.0				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		3.8			0.2			0.9				
Delay (s)		47.0			37.7			11.9				
Level of Service		D			D			B				
Approach Delay (s)		47.0			37.7			11.9			0.0	
Approach LOS		D			D			B			A	
Intersection Summary												
HCM 2000 Control Delay		25.5			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		67.9%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis






2: Pringle Rd & McGilchrist

Salem McGilchrist Analysis
2044 Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	384	414	465	163	112	54	504	387	68	198	24
Future Volume (vph)	5	384	414	465	163	112	54	504	387	68	198	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	12	12	12	11	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.97		1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	0.98	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1762	1627	1555	1736	1590		1477	1827	1465	1736	1709	
Flt Permitted	0.58	1.00	1.00	0.18	1.00		0.42	1.00	1.00	0.11	1.00	
Satd. Flow (perm)	1080	1627	1555	327	1590		651	1827	1465	204	1709	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	404	436	489	172	118	57	531	407	72	208	25
RTOR Reduction (vph)	0	0	149	0	16	0	0	0	85	0	3	0
Lane Group Flow (vph)	5	404	287	489	274	0	57	531	322	72	230	0
Confl. Peds. (#/hr)	13					13	2		9	9		2
Confl. Bikes (#/hr)			2						9			2
Heavy Vehicles (%)	0%	9%	2%	4%	2%	9%	22%	4%	6%	4%	6%	0%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4	5	3	8		5	2	3	1	6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	37.2	36.0	44.7	70.4	65.2		47.3	38.6	69.0	41.9	35.9	
Effective Green, g (s)	37.2	36.0	44.7	70.4	65.2		47.3	38.6	69.0	41.9	35.9	
Actuated g/C Ratio	0.29	0.28	0.35	0.55	0.51		0.37	0.30	0.54	0.33	0.28	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	322	461	596	518	816		299	555	842	139	483	
v/s Ratio Prot	0.00	0.25	c0.03	c0.23	0.17		c0.01	c0.29	0.09	0.02	0.13	
v/s Ratio Perm	0.00		0.15	c0.30			0.06		0.13	0.15		
v/c Ratio	0.02	0.88	0.48	0.94	0.34		0.19	0.96	0.38	0.52	0.48	
Uniform Delay, d1	31.8	43.4	32.1	30.9	18.2		26.6	43.4	16.7	33.6	37.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	16.8	0.6	26.0	0.2		0.3	27.4	0.3	3.2	0.7	
Delay (s)	31.9	60.2	32.7	56.9	18.4		27.0	70.8	17.0	36.8	38.5	
Level of Service	C	E	C	E	B		C	E	B	D	D	
Approach Delay (s)		45.9			42.6			46.3			38.1	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			44.3			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			127.0			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			89.6%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Int Delay, s/veh 6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	768	106	123	553	115	179
Future Vol, veh/h	768	106	123	553	115	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	2	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	9	13	19	4	6	13
Mvmt Flow	808	112	129	582	121	188

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	920
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.29
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.371
Pot Cap-1 Maneuver	-	-	676
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	676
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	33
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	218	338	-	-	676	-
HCM Lane V/C Ratio	0.555	0.557	-	-	0.192	-
HCM Control Delay (s)	40.4	28.3	-	-	11.6	-
HCM Lane LOS	E	D	-	-	B	-
HCM 95th %tile Q(veh)	3	3.2	-	-	0.7	-

Notes





















~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Signalized Intersection Capacity Analysis

4: 22nd St SE & McGilchrist

Salem McGilchrist Analysis















2044 Build PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	823	47	70	439	68	92	14	153	92	5	152
Future Volume (vph)	115	823	47	70	439	68	92	14	153	92	5	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	12	12	11	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1656	1598		1787	1625		1787	1604		1433	1467	
Flt Permitted	0.32	1.00		0.08	1.00		0.53	1.00		0.38	1.00	
Satd. Flow (perm)	555	1598		144	1625		1002	1604		581	1467	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	121	866	49	74	462	72	97	15	161	97	5	160
RTOR Reduction (vph)	0	2	0	0	6	0	0	137	0	0	133	0
Lane Group Flow (vph)	121	913	0	74	528	0	97	39	0	97	32	0
Confl. Peds. (#/hr)			9	9								
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	9%	14%	9%	1%	11%	9%	1%	0%	1%	26%	0%	11%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	62.5	55.0		59.1	53.3		21.6	15.2		24.8	16.8	
Effective Green, g (s)	62.5	55.0		59.1	53.3		21.6	15.2		24.8	16.8	
Actuated g/C Ratio	0.62	0.55		0.59	0.53		0.22	0.15		0.25	0.17	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	429	878		180	866		266	243		212	246	
v/s Ratio Prot	c0.02	c0.57		c0.02	0.33		0.02	0.02		c0.04	0.02	
v/s Ratio Perm	0.16			0.22			0.06			c0.08		
v/c Ratio	0.28	1.04		0.41	0.61		0.36	0.16		0.46	0.13	
Uniform Delay, d1	9.4	22.5		18.2	16.2		32.5	36.9		30.6	35.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	41.3		1.5	1.3		0.9	1.4		7.0	1.1	
Delay (s)	9.7	63.8		19.7	17.4		33.4	38.3		37.5	36.5	
Level of Service	A	E		B	B		C	D		D	D	
Approach Delay (s)		57.5			17.7			36.6			36.9	
Approach LOS		E			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.3			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			78.7%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: 25th St SE & McGilchrist

Salem McGilchrist Analysis
2044 Build PM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Traffic Volume (vph)	852	281	115	1081	818	376
Future Volume (vph)	852	281	115	1081	818	376
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.95	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3143	1324	1656	3312	3099	
Flt Permitted	0.95	1.00	0.09	1.00	1.00	
Satd. Flow (perm)	3143	1324	153	3312	3099	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	897	296	121	1138	861	396
RTOR Reduction (vph)	0	165	0	0	57	0
Lane Group Flow (vph)	897	131	121	1138	1200	0
Confl. Peds. (#/hr)			9			9
Heavy Vehicles (%)	4%	22%	9%	9%	11%	6%
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	29.3	29.3	53.1	53.1	41.6	
Effective Green, g (s)	29.3	29.3	53.1	53.1	41.6	
Actuated g/C Ratio	0.32	0.32	0.59	0.59	0.46	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1018	429	214	1945	1426	
v/s Ratio Prot	c0.29		0.05	c0.34	c0.39	
v/s Ratio Perm		0.10	0.28			
v/c Ratio	0.88	0.31	0.57	0.59	0.84	
Uniform Delay, d1	28.9	22.9	14.6	11.7	21.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.1	0.4	3.4	1.3	6.2	
Delay (s)	38.0	23.3	18.0	13.0	27.7	
Level of Service	D	C	B	B	C	
Approach Delay (s)	34.3			13.5	27.7	
Approach LOS	C			B	C	
Intersection Summary						
HCM 2000 Control Delay			25.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			90.4		Sum of lost time (s)	12.0
Intersection Capacity Utilization			75.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						