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July 13, 2012 Project #: 12222

Matt Oyen
PacTrust
15350 SW Sequoia Pkwy Ste. 300
Portland, Oregon 97224-7157

RE: Transportation Impact Analysis for the PacTrust Kuebler Development

Dear Matt,

This letter report presents the results of the transportation impact analysis prepared for Phase 1 of the proposed PacTrust Kuebler development in Salem, Oregon. This study is a supplement to the September 2006 *PacTrust Kuebler Project Transportation Impact Analysis* (Reference 1) and was prepared to evaluate the traffic impacts of the first development phase of the overall PacTrust Kuebler development. This study concludes that the proposed development can be completed while maintaining acceptable traffic operations and safety at the study intersections. Additional details of the methodology, findings and recommendations are provided herein.

INTRODUCTION

In September 2006, Kittelson & Associates, Inc. prepared a transportation impact analysis (TIA) for the proposed PacTrust Kuebler project that was approved by the City of Salem. As stated in the September 2006 TIA, PacTrust is proposing a multi-purpose commercial development on approximately 28.4 acres of vacant land located on the south side of Kuebler Boulevard between Battle Creek Road and 27th Avenue in Salem, Oregon. A reasonable "worst-case" development scenario was assumed in the estimate of the potential traffic impact the development would have on the surrounding transportation system. This "worst-case" estimate consisted of 290,000 square feet of shopping center space and 24,000 square feet of medical office space. The September 2006 TIA also identified the need for several off-site improvements to accommodate full build-out of the site. These improvements are identified in the conditions of approval summarized in the December 2007 staff report.

As part of the first development phase, PacTrust is proposing to construct two medical/dental office buildings on a portion of the western half of the site. The preliminary site plan proposes two separate buildings, totaling approximately 38,700 square-feet. Estimated full build-out of the development is expected by 2013. Access to the site is proposed via a single full movement driveway on Boone Road, west of Cultus Avenue, and is consistent with the approved September 2006 TIA. Figure 1 shows the site vicinity map and Figure 2 shows the proposed development plan and access location.

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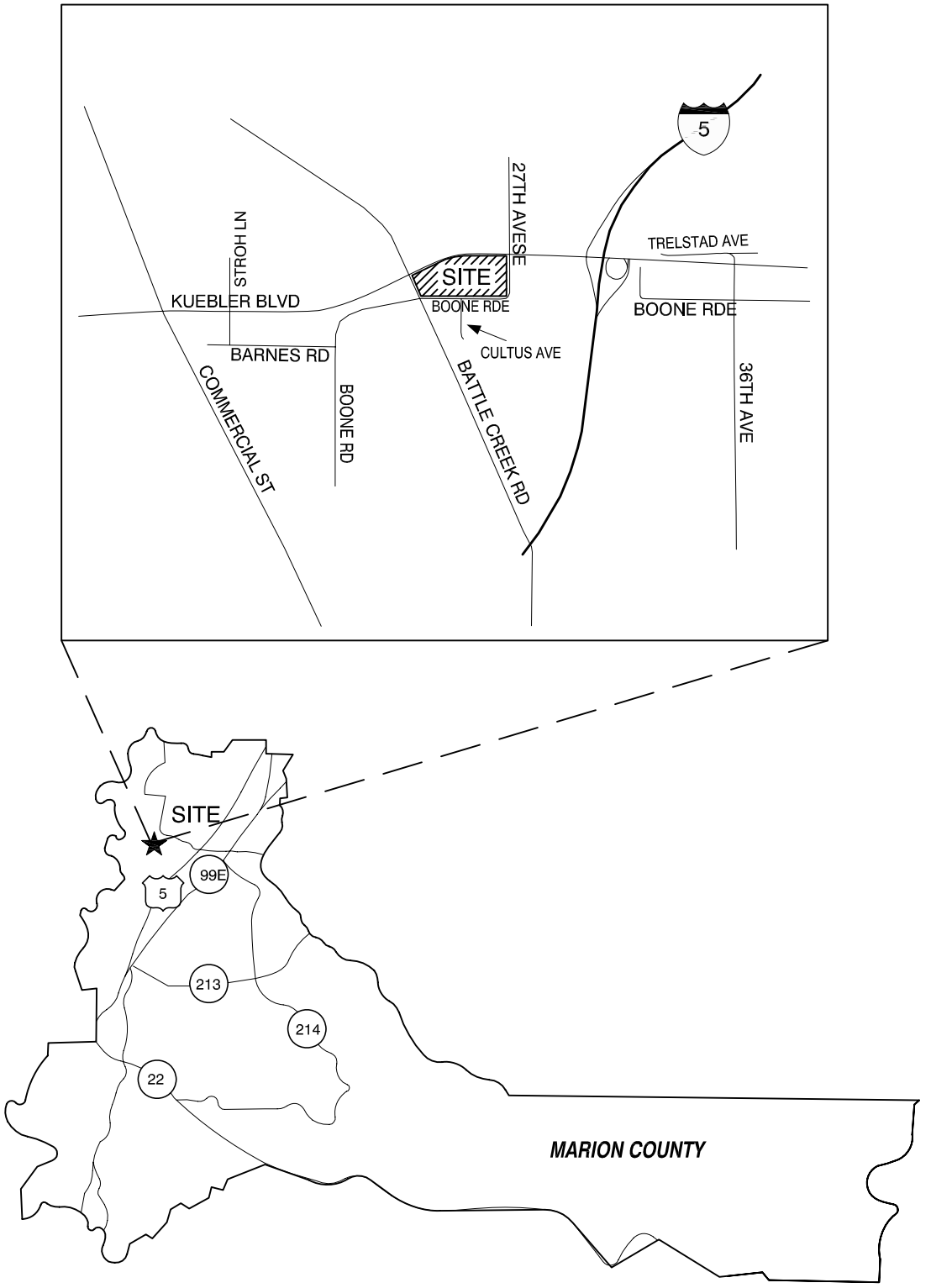
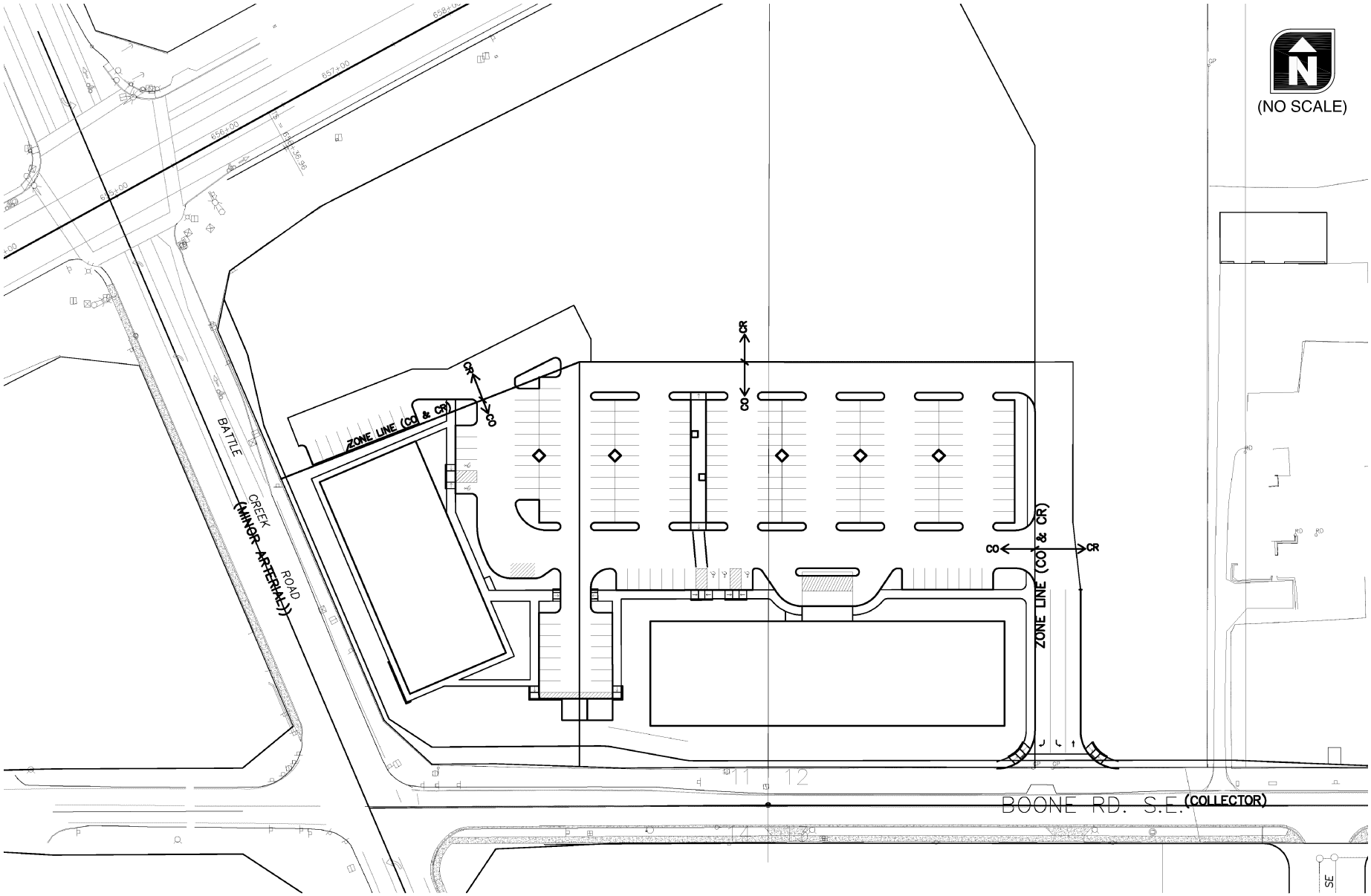


SITE VICINITY MAP
SALEM, OREGON

FIGURE
1



PROPOSED SITE PLAN
SALEM, OREGON

FIGURE **2**

SCOPE OF THE LETTER

This analysis determines the transportation-related impacts associated with the proposed development. The study intersections and overall project scope were developed based on discussions with City of Salem staff. Operational analyses were performed at the following intersections:

- Kuebler Boulevard/Battle Creek Road
- Kuebler Boulevard/27th Avenue
- Boone Road/Battle Creek Road

This report addresses the following transportation issues:

- Existing year 2012 traffic conditions during the weekday p.m. peak hour;
- Crash data analysis for a 5-year period within the study area;
- Trip generation and distribution estimates for the proposed development;
- Year 2013 background traffic conditions during the weekday p.m. peak hour, including traffic from expected regional growth in the site vicinity and any other in-process/approved developments but not the proposed development.
- Build-out year 2013 total traffic conditions, including traffic from the proposed development and expected regional growth in the site vicinity during the weekday p.m. peak hour;
- Identify deficiencies and recommend mitigation measures at the three (3) study intersections, as needed.

2012 EXISTING TRAFFIC CONDITIONS

The 2012 existing traffic conditions analysis identifies site conditions and the current operational and geometric characteristics of roadways within the study area. The purpose of this section is to establish a base condition to compare with future conditions.

Site Conditions and Adjacent Land Uses

The site is currently vacant and is bordered by Kuebler Boulevard to the north, Battle Creek Road to the west, 27th Avenue to the east, and Boone Road to the south. The Abiqua School building, which currently houses a private school and offices, is located west of the site. Residential land uses are also west and south of the site. A church is also located immediately south of the site. To the north across Kuebler Boulevard is a church, and vacant land that is designated for residential development.

Transportation Facilities

Table 1 provides a summary of adjacent roadway facilities and regional roadway facilities that are specifically included in the operations analysis of this report.

Table 1 Existing Transportation Facilities and Roadway Designations

Roadway	Classification[1]	Cross Section	Posted Speed	Side-walks?	Bicycle Lanes?	On-Street Parking?
Kuebler Boulevard	Principal Arterial	4 lanes	45 mph	Partial (north side)	Yes	No
Battle Creek Road	Minor Arterial	2 lanes	35 mph	Partial (west side)	Yes	No
27th Avenue	Collector	2 lanes	30 mph	No	No	No
Boone Road	Collector	2 lanes	30 mph	Partial (south side)	No	No

[1] Per Salem Transportation System Plan, 2007 – Table 3-1 City of Salem Street Classification System and Basic Design Guidelines (Reference 2)

Figure 3 illustrates the location of the study intersections, as well as existing lane configurations and traffic control devices.

Pedestrian and Bicycle Facilities

Sidewalks are available on the north side of Kuebler Boulevard, on the west side of Battle Creek Road, and on the south side of Boone Road throughout the study area. Bicycle lanes are present on Kuebler Boulevard, Battle Creek Road, and 27th Avenue throughout the study area. Bicycle lanes are not provided on Boone Road within the study area.

Transit Service

Cherriots is the bus transit system serving the Salem-Kaizer metropolitan area and currently offers service to the site by the 6-12th/Battle Creek bus route serving south Salem and downtown. Within the site vicinity, service is provided along Battle Creek Road, adjacent to the site, and along Boone Road, to the west of the Battle Creek Road/Boone Road study intersection. This service is provided on weekdays from approximately 5:45 a.m. until 9:30 p.m., with 30 minute headways. No service is provided on Saturdays, Sundays, or holidays.

Traffic Volumes and Peak Hour Operations

Based on available traffic information, the types of land uses in the area, and typical commuter traffic patterns, the weekday p.m. peak time periods represent the most critical time periods for analysis. The traffic operations analysis focused on the average weekday p.m. peak hour of commuter traffic on the adjacent street system.

To evaluate the current transportation system conditions within the site vicinity, manual turning movement counts were obtained for the study intersections on a mid-week day in April 2012. These counts were conducted during the weekday evening (4:00 - 6:00 p.m.) hours. The turning movement counts from the weekday p.m. peak hours were summarized and the evening peak hour was found to occur between 4:45 and 5:45 p.m. *Attachment "A" contains the traffic count worksheets used in this study*

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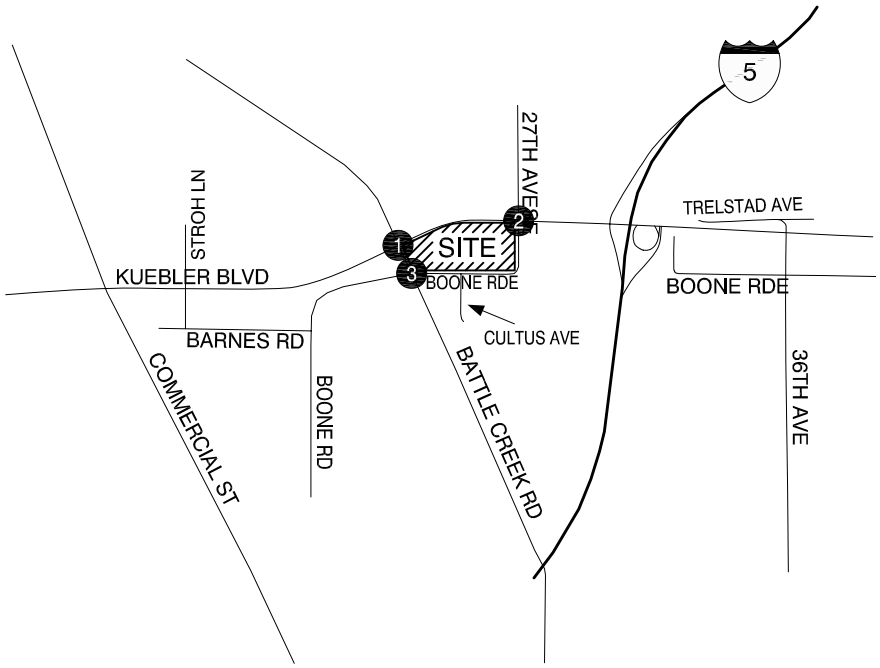
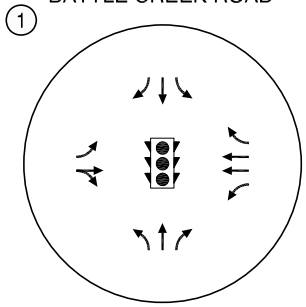
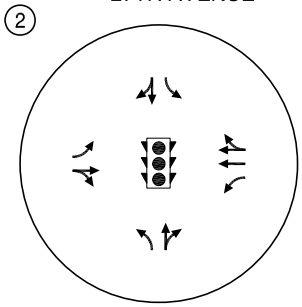


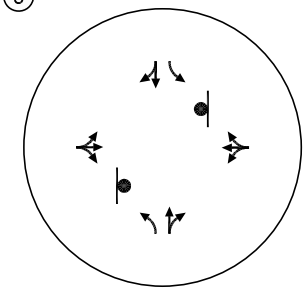
KUEBLER BOULEVARD/
BATTLE CREEK ROAD



KUEBLER BOULEVARD/
27TH AVENUE



BOONE ROAD/
BATTLE CREEK ROAD



LEGEND

- STOP SIGN
- TRAFFIC SIGNAL

2012 EXISTING LANE CONFIGURATIONS
TRAFFIC CONTROL DEVICES
SALEM, OREGON

FIGURE **3**

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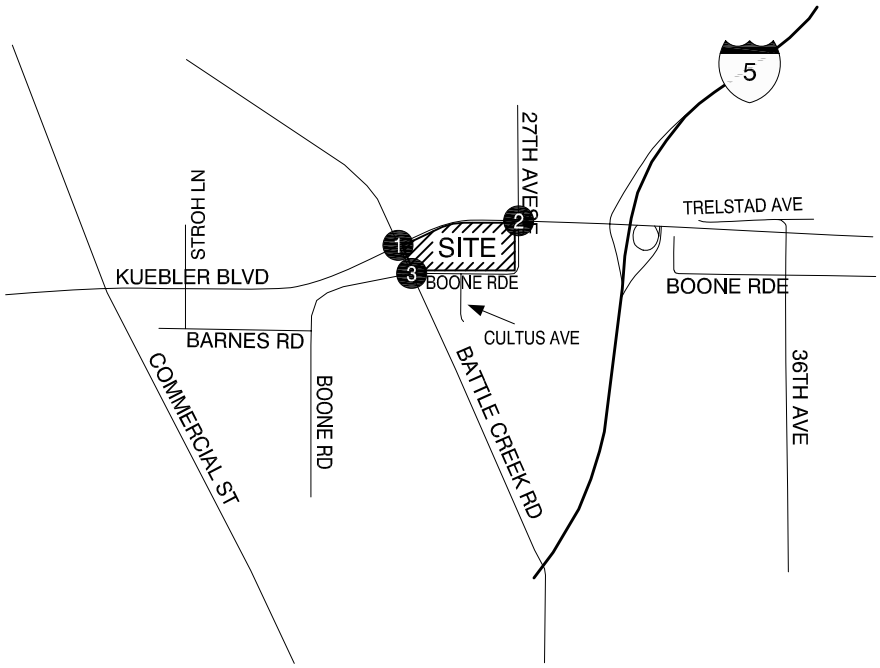
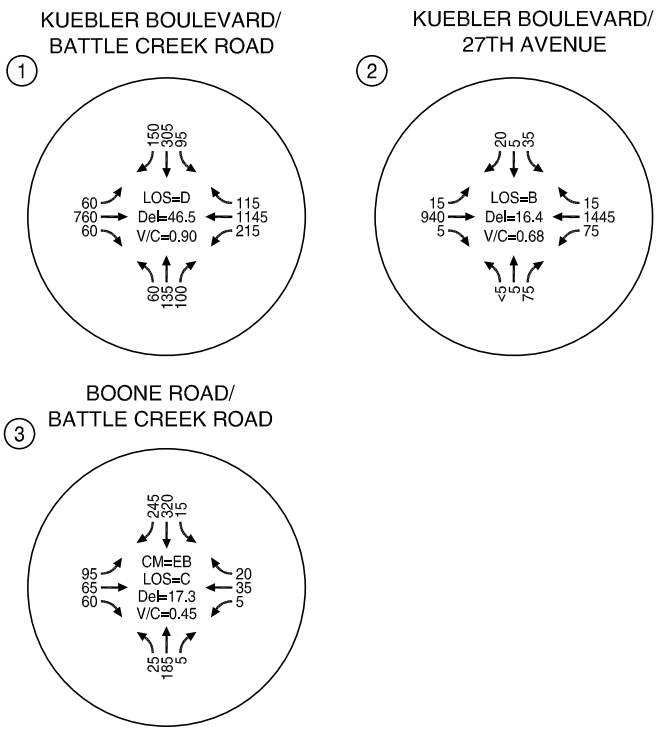
Current Levels of Service

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the 2000 *Highway Capacity Manual* (Reference 3). A description of level of service and the criteria by which they are determined is presented in *Attachment "B."* Attachment "B" also indicates how level of service is measured and what is generally considered the acceptable range of level of service.

All intersection level-of-service evaluations used the peak 15-minute flow rate during the weekday a.m. and p.m. peak hours. Using the peak 15-minute flow rate ensures that this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are only likely to occur for fifteen minutes out of each average peak hour. The traffic conditions during all other weekday hours will likely operate under better conditions than those described in this report.

Figure 4 summarizes the level-of-service analysis for the study intersections under the weekday p.m. peak hour existing traffic condition. For City of Salem controlled intersections, the *2007 Salem Transportation System Plan* requires a LOS D or better, signifying for the City a v/c ratio between 0.81 and 0.90. As indicated in the figure, all of the study intersections currently operate within the City of Salem LOS Standards during the weekday p.m. peak hour. The intersections at Kuebler Boulevard/27th Avenue and Boone Road/Battle Creek Road intersections are both currently operating below the City of Salem LOS standards, with a level of service of B and C, respectively. The Kuebler Boulevard/Battle Creek Road intersection is at the standard with a LOS D and a v/c ratio of 0.90. *Attachment "C" includes the existing conditions traffic operations worksheets.*





LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2012 EXISTING TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

FIGURE **4**

Traffic Safety

Crash data from each of the study intersections was reviewed in an effort to identify potential intersection safety issues. Crash records from January 1, 2006 to December 31, 2010 were obtained from the Oregon Department of Transportation (ODOT). A summary of the crash data is provided in Table 2.

Table 2 Study Intersection Crash Histories (2006-2010)

Intersection	Number of Crashes	Collision Type				Severity	
		Turn/Side-Swipe	Angle	Rear End	Fixed Object/ Other	Property Damage Only	Personal Injury
Kuebler Blvd./Battle Creek Rd.	24	1	3	20	0	13	11
Kuebler Blvd./27th Ave.	0	0	0	0	0	0	0
Boone Rd./Battle Creek Rd.	12	3	8	1	0	7	5

Based on review of the data, no crash trends were identified at the study intersections that require mitigation in conjunction with site development. *Attachment "D" includes the crash data summary worksheets.*

TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area's transportation system will operate with buildout of the proposed development. The impact of traffic generated by the proposed development during the typical weekday p.m. peak hour was examined as follows:

- Planned developments and transportation improvements planned in the site vicinity were identified;
- Year 2013 (build-out year) background traffic conditions were analyzed at each of the study intersections during the weekday p.m. hour;
- Site-generated trips were estimated for build-out of the site;
- Site trip-distribution patterns were determined based on a review of the existing transportation network and the nature of the proposed development; and,
- Year 2013 (build-out year) total traffic conditions were analyzed at each of the study intersections and site-access driveway during the weekday p.m. peak hour.

Planned Developments and Transportation Improvements

City of Salem staff was contacted to identify any in-process developments or transportation improvements that may affect the roadway network in the vicinity of the proposed project. No projects were identified to occur before the buildout year of the proposed development.

2013 BACKGROUND TRAFFIC CONDITIONS

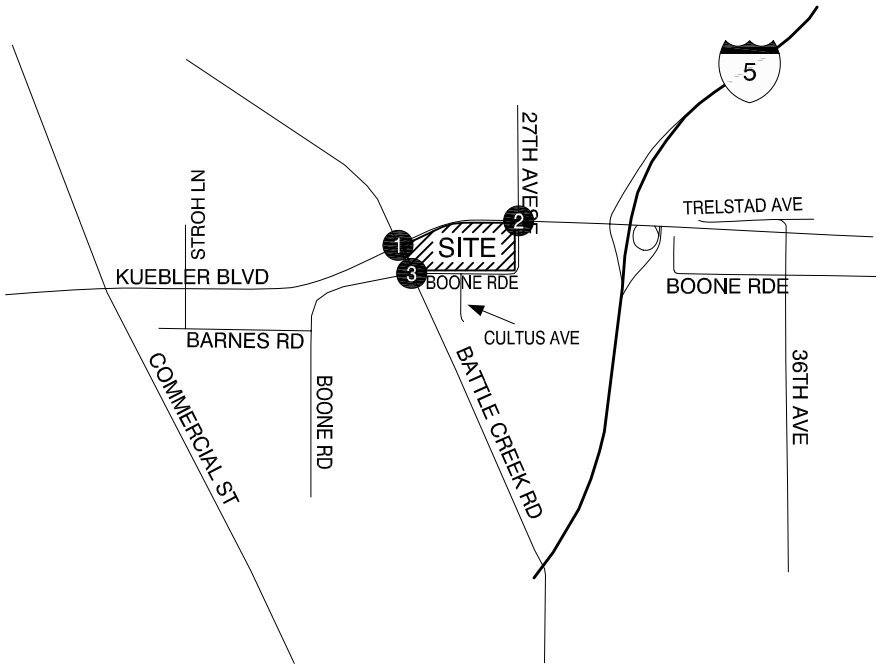
The background traffic analysis identifies how the study area's transportation system will operate in the year the development is expected to be completed and occupied. This analysis includes traffic growth due to development within the study area and from general growth in the region, but does not include traffic from the proposed medical/dental office buildings.

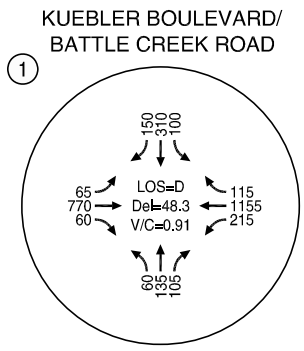
Traffic Volumes

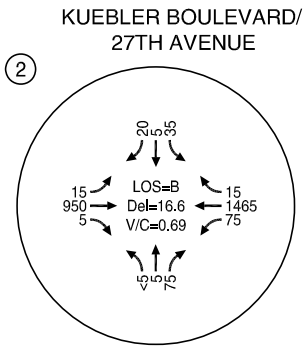
Year 2013 background traffic volumes were developed by applying an annual growth factor to the 2012 base traffic volumes. A projected average annual growth rate of 1.1% percent was applied to the study area intersection. As such, base year 2012 volumes were grown by 1.1% percent to arrive at 2013 background traffic volumes.

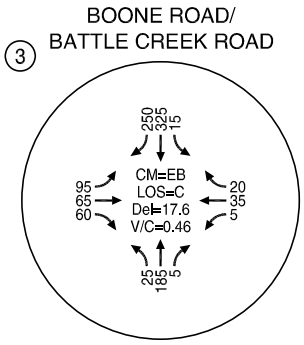
Level of Service Analysis

Figure 5 illustrates the year 2013 background traffic operations at each study intersection. During the 2013 background traffic conditions, the Kuebler Boulevard/Battle Creek Road intersection is forecast to operate at LOS D with a v/c ratio of 0.91, which does not meet the City of Salem LOS Standards for a minimum acceptable v/c ratio of 0.90. The other two study intersections operate within the acceptable LOS Standards. *Attachment "E" contains the year 2013 background traffic conditions analysis worksheets.*









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V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2013 BACKGROUND TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

FIGURE **5**

PROPOSED DEVELOPMENT PLAN

PacTrust is proposing to build 38,700 square feet of medical/dental office buildings on the western side of the site. The site plan shown in Figure 2 illustrates the proposed layout with the proposed site driveway location.

Trip Generation

The trip generation for the proposed development is based on empirical data from the standard reference manual *Trip Generation, 8th Edition,* published by the Institute of Transportation Engineers (ITE) (Reference 4). Table 3 summarizes the estimated site trip generation of the proposed development plan during a typical weekday, as well as a typical weekday p.m. peak hour (all trip ends have been rounded to the nearest five vehicles).

Table 3 Estimated Trip Generation

Land Use	ITE Code	Size (Sq. ft.)	Daily Total	PM Peak Hour Trips Total	In	Out
Medical/Dental Office Building	720	38,700	1,365	135	35	100

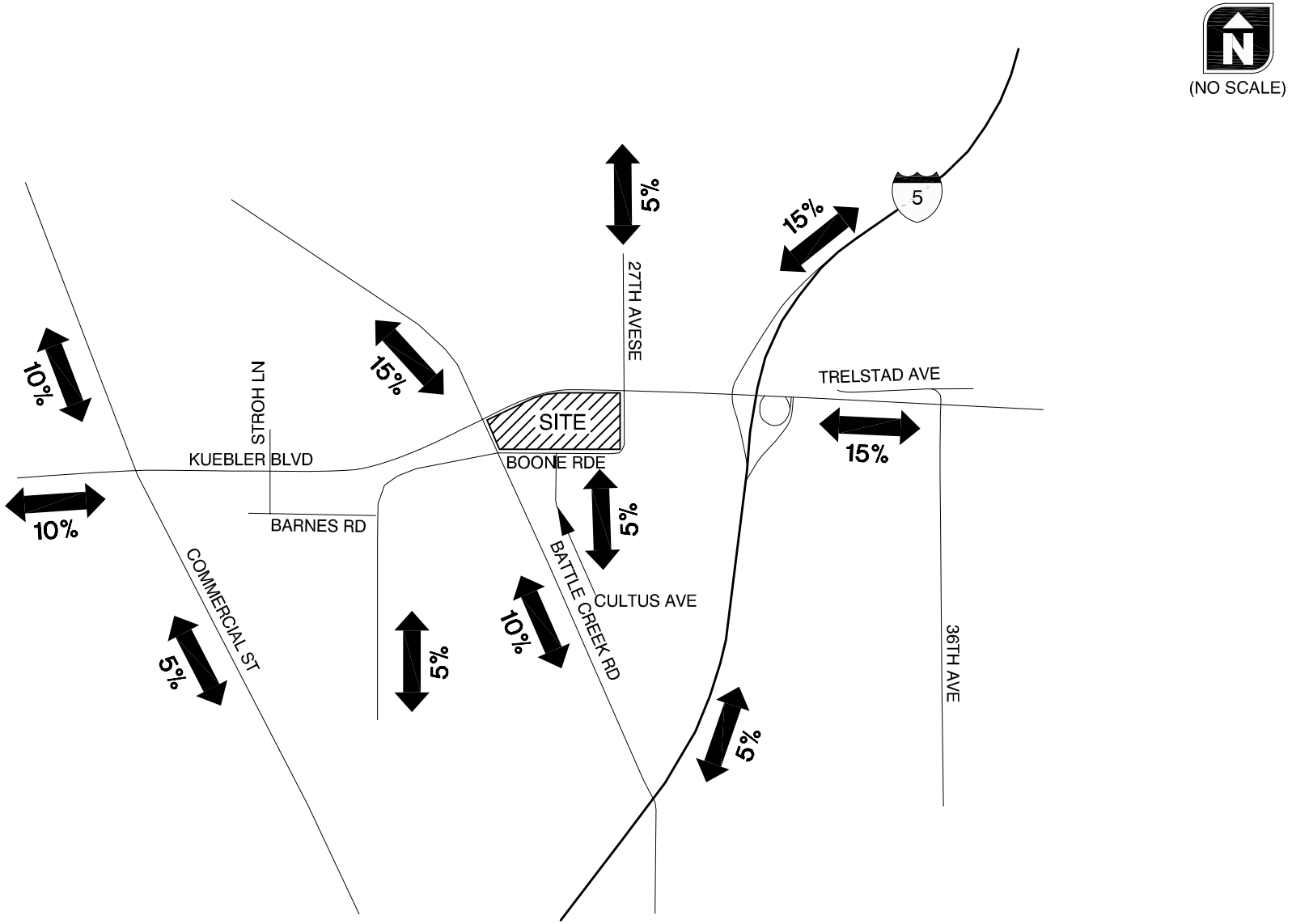
Site Trip Distribution / Trip Assignment

The same trip distribution pattern used in the 2006 TIA was applied to this study. The distribution of site-generated trips onto the study area roadway system was estimated based on an examination of the transportation facilities within the site vicinity, existing peak hour directional travel characteristics, an understanding of the surrounding roadway network, and select zone model plots from the Salem-Keizer Area Transportation Study (SKATS). The resulting estimated trip distribution pattern is illustrated in Figure 6.

The estimated site-generated trips were assigned to the network by distributing the trips shown in Table 3 according to the trip distribution pattern shown in Figure 6. Figure 7 illustrates the site-generated trips that are expected to use the roadway system during the weekday p.m. peak hour.

YEAR 2013 TOTAL TRAFFIC CONDITIONS

The total traffic conditions analysis forecasts how the study area's transportation system will operate with the traffic generated by the proposed development. The year 2013 total traffic volumes include traffic from the development of the proposed medical/dental office buildings. The estimated site-generated traffic shown in Figure 7 were added to the 2013 background traffic shown in Figure 5, to arrive at the year 2013 total traffic volumes shown in Figure 8.



ESTIMATED TRIP DISTRIBUTION PATTERN
SALEM, OREGON

FIGURE 6

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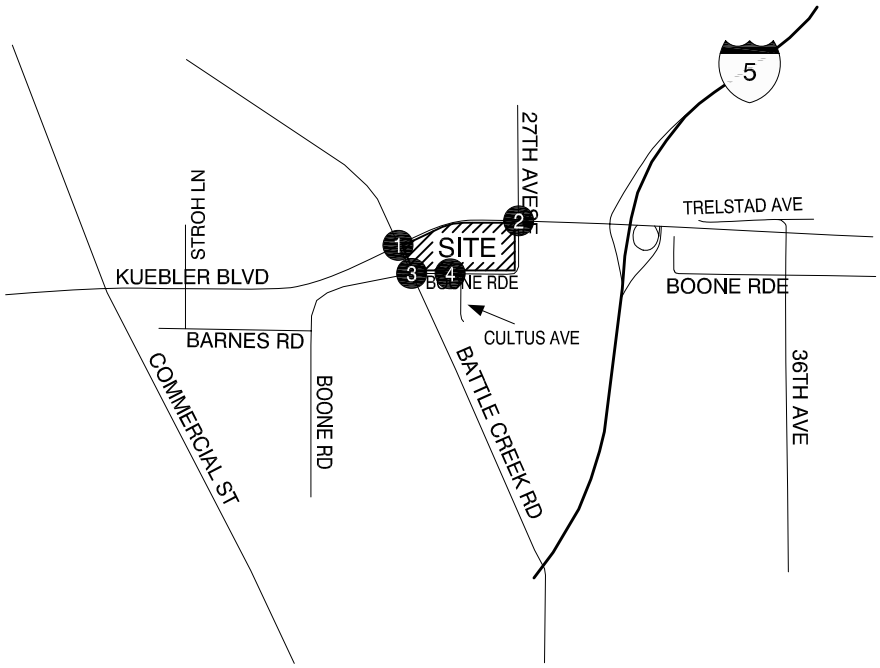
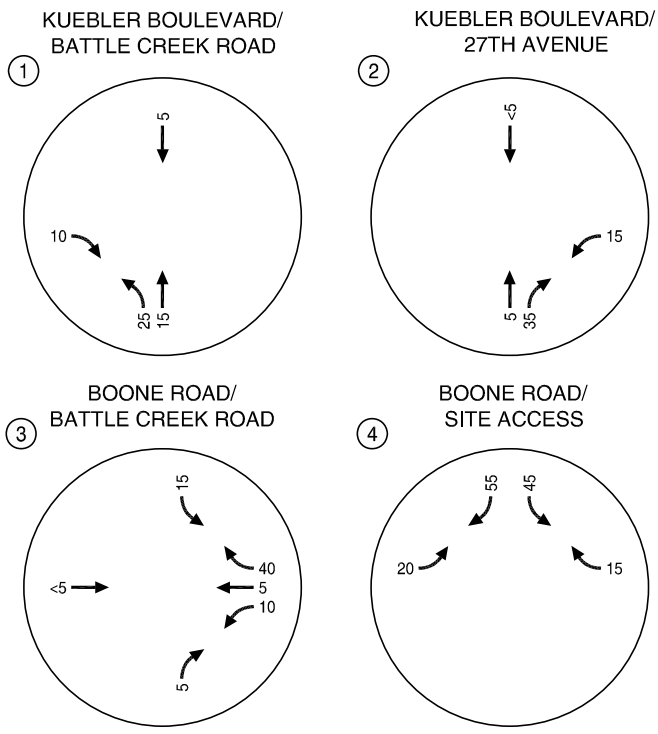
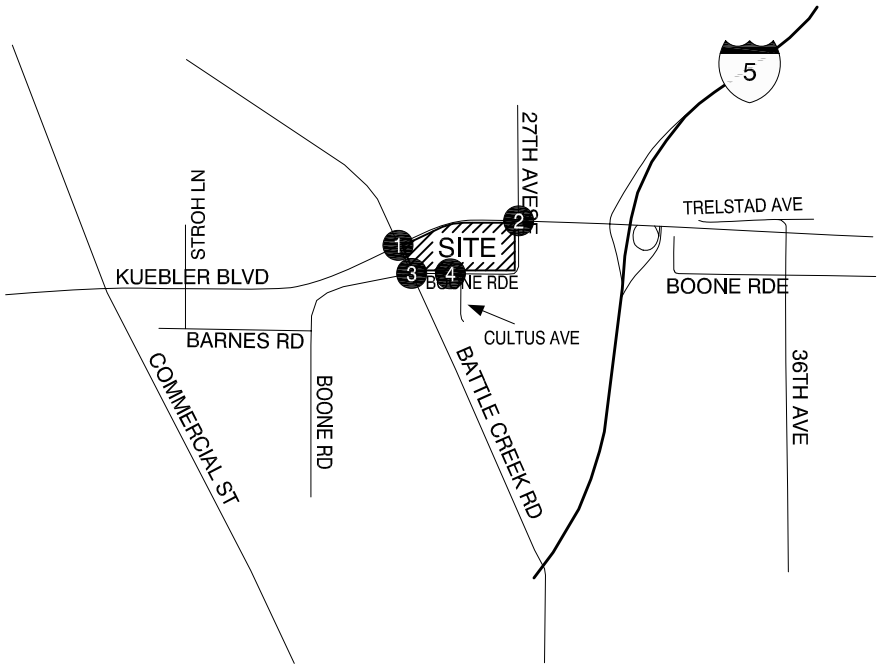
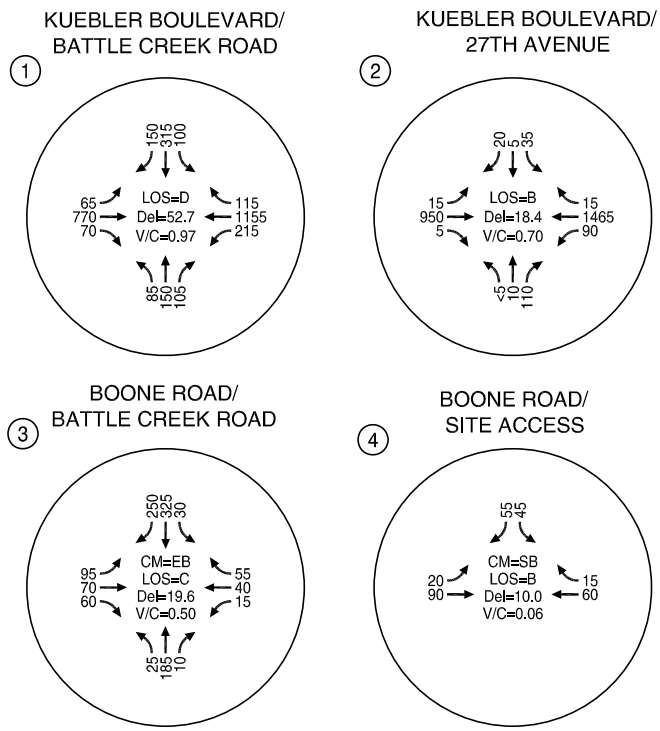




NET NEW SITE GENERATED TRAFFIC
WEEKDAY PM PEAK HOUR
SALEM, OREGON

FIGURE **7**





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V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2013 TOTAL TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
SALEM, OREGON

FIGURE **8**

Figure 8 summarizes the operational analysis results for the study intersections during the 2013 total weekday p.m. peak hour. As shown in the figure, the Kuebler Boulevard/Battle Creek Road intersection is forecast to continue to operate outside of the City of Salem LOS standards during the weekday p.m. peak hour (LOS D with a v/c ratio of 0.97), with inclusion of the medical/dental office buildings. *Attachment "F" contains the year 2012 total traffic conditions analysis worksheets.*

To maintain consistency with the improvements identified in the December 2007 conditions of approval, an option to improve the Kuebler Boulevard/Battle Creek Road intersection is to add an interim eastbound right-turn lane. With full build-out of the site, the eastbound right-turn lane would be converted to the second eastbound through lane as identified in the conditions of approval. With this addition of an eastbound right-turn lane at the existing Kuebler Boulevard/Battle Creek Road intersection, the v/c ratio will decrease to 0.88, which meets the City of Salem operating standard.

CONCLUSIONS AND RECOMMENDATIONS

The results of the traffic impact analysis indicate that the proposed development can be constructed while maintaining acceptable levels of service and safety on the surrounding transportation system assuming implementation of the study recommendations. The findings of this analysis and our recommendations are discussed below.

Conclusions

- Under year 2012 existing traffic conditions, all of the study intersections operate within City of Salem LOS standards during the weekday p.m. peak hour.
- Under year 2013 background traffic conditions, the Kuebler Boulevard/Battle Creek Road intersection is forecast to exceed the City of Salem minimum acceptable volume-to capacity threshold of 0.90 during the weekday p.m. peak hour due to background regional traffic growth in the study area.
- The proposed development is estimated to generate approximately 1,365 weekday daily trips and 135 weekday p.m. (35 inbound, 100 outbound) peak hour trips.
- Under year 2013 total traffic conditions, the Kuebler Boulevard/Battle Creek Road intersection is forecast to continue to exceed the City of Salem minimum acceptable volume-to-capacity threshold of 0.90 during the weekday p.m. peak hour.

Recommendations

The following list summarizes the mitigation measures recommended as part of this proposed redevelopment. The recommended improvements will mitigate the impact of the proposed development and also provide additional capacity to the transportation system.

- Landscaping, signage and any new above ground utilities along the site frontage be located and maintained to provide a clear sight line to the east and west from the site driveway. Intersection sight distance should be verified once the driveway is constructed.
- Installation of a right-turn lane along the eastbound approach to the Kuebler Boulevard/Battle Creek Road intersection.

We trust this letter adequately addresses the transportation related impact associated with the proposed PacTrust Kuebler development. If you have any questions or comments regarding this letter, please call us at (503) 228-5230.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Dave Daly, P.E.
Engineer

Anthony Yi, P.E.
Associate Engineer

References

1. Kittelson & Associates, Inc., *PacTrust Kuebler Project*. September 2006.
2. City of Salem, 2007 Transportation System Plan. 2007.
3. Transportation Research Board. *Highway Capacity Manual*. 2000.
4. Institute of Transportation Engineers. *Trip Generation, Eighth Edition*. 2008.

Attachments

A. Traffic Count Worksheets
B. Level of Service Description and Criteria
C. 2012 Existing Traffic Conditions Worksheets
D. Crash Data
E. 2013 Background Traffic Conditions Worksheets
F. 2013 Total Traffic Conditions Worksheets

Attachment A
Traffic Count Worksheets

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

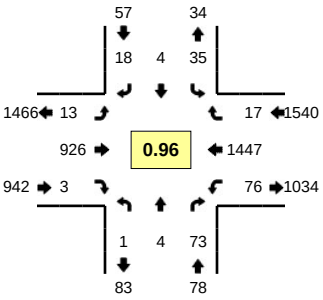
LOCATION: 27th Ave -- Kuebler Blvd

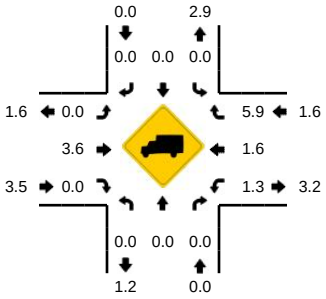
QC JOB #: 10741406

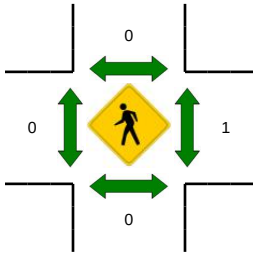
CITY/STATE: Salem, OR

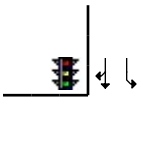
DATE: Tue, Apr 17 2012

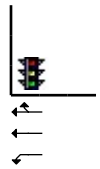
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

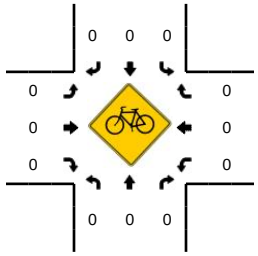


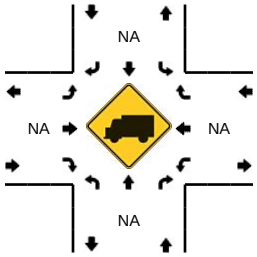


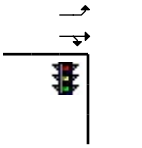


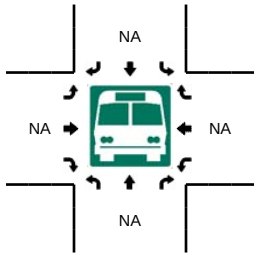












5-Min Count Period Beginning At	27th Ave (Northbound)				27th Ave (Southbound)				Kuebler Blvd (Eastbound)				Kuebler Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	5	0	2	0	1	0	33	77	0	0	4	97	4	0	223	
4:05 PM	0	0	4	0	4	0	1	0	1	66	1	0	5	126	0	0	208	
4:10 PM	0	0	9	0	2	0	0	0	0	79	0	0	0	114	1	0	205	
4:15 PM	0	0	6	0	4	1	1	0	1	89	0	0	2	128	2	0	234	
4:20 PM	0	0	4	0	0	1	2	0	1	78	0	0	5	126	1	0	218	
4:25 PM	0	0	5	0	2	0	0	0	1	68	0	0	7	100	2	0	185	
4:30 PM	0	0	3	0	1	0	3	0	1	90	1	0	5	115	0	0	219	
4:35 PM	0	0	4	0	2	0	0	0	1	70	0	0	8	115	1	0	201	
4:40 PM	0	0	4	0	0	2	3	0	0	67	0	0	9	105	2	0	192	
4:45 PM	0	0	6	0	1	0	2	0	0	76	0	0	8	115	1	0	209	
4:50 PM	1	0	5	0	1	0	1	0	1	63	2	0	6	115	0	0	195	
4:55 PM	0	0	6	0	3	0	3	0	0	71	1	0	4	119	2	0	209	2498
5:00 PM	0	0	7	0	6	1	3	0	1	77	0	0	6	117	1	0	219	2494
5:05 PM	0	0	4	0	1	0	0	0	0	85	0	0	8	132	1	0	231	2517
5:10 PM	0	0	9	0	5	1	0	0	1	79	0	0	6	111	3	0	215	2527
5:15 PM	0	0	4	0	4	2	0	0	1	77	0	0	5	129	2	0	224	2517
5:20 PM	0	1	7	0	1	0	1	0	0	87	0	0	4	127	1	0	229	2528
5:25 PM	0	1	8	0	5	0	0	0	3	75	0	0	10	123	3	0	228	2571
5:30 PM	0	0	6	0	2	0	3	0	4	70	0	0	7	116	1	0	209	2561
5:35 PM	0	0	4	0	3	0	1	0	2	84	0	0	4	126	1	0	225	2585
5:40 PM	0	2	7	0	3	0	4	0	0	82	0	0	8	117	1	0	224	2617
5:45 PM	0	0	13	0	0	0	1	0	1	75	0	0	0	124	4	0	218	2626
5:50 PM	0	0	3	0	1	0	3	0	1	75	0	0	4	123	0	0	210	2641
5:55 PM	0	0	5	0	1	0	0	0	6	72	0	0	3	101	6	0	194	2626

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	8	76	0	40	8	4	0	16	956	0	0	76	1516	24	0	2724
Heavy Trucks	0	0	0		0	0	0		0	32	0		0	28	0		60
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/13/2012 1:20 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: Battle Creek Rd -- Boone Rd

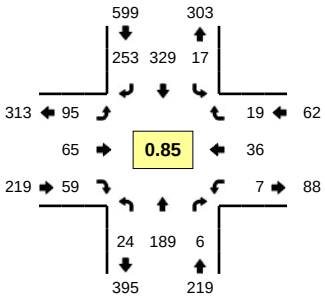
QC JOB #: 10741404

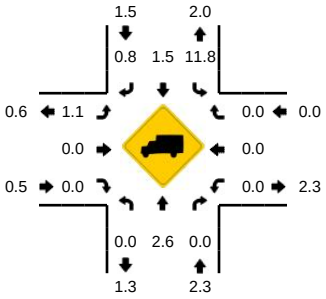
CITY/STATE: Salem, OR

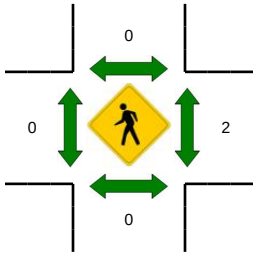
DATE: Tue, Apr 17 2012

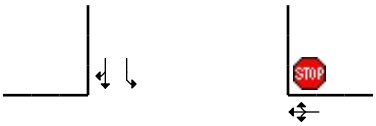
Peak-Hour: 4:45 PM -- 5:45 PM

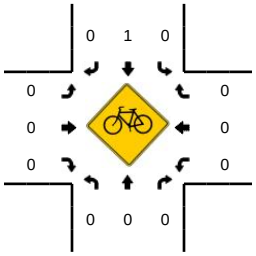
Peak 15-Min: 5:30 PM -- 5:45 PM

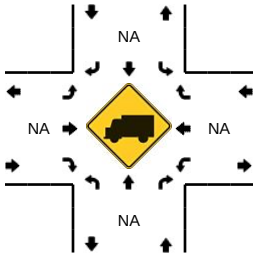


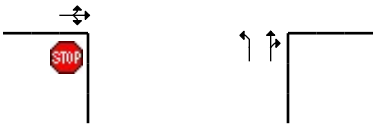


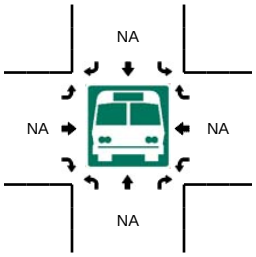












5-Min Count Period Beginning At	Battle Creek Rd (Northbound)				Battle Creek Rd (Southbound)				Boone Rd (Eastbound)				Boone Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	18	0	0	3	18	14	0	8	5	4	0	0	2	4	0	78	
4:05 PM	2	15	0	0	1	24	19	0	16	2	1	0	0	2	2	0	84	
4:10 PM	3	20	2	0	1	23	15	0	9	3	4	0	0	2	1	0	83	
4:15 PM	2	16	2	0	1	13	12	0	8	3	3	0	0	1	1	0	62	
4:20 PM	1	16	0	0	2	23	16	0	7	5	6	0	2	2	1	0	81	
4:25 PM	2	11	0	0	0	15	12	0	14	3	1	0	0	2	0	0	60	
4:30 PM	2	20	0	0	0	21	12	0	8	3	4	0	0	3	1	0	74	
4:35 PM	4	16	0	0	2	33	23	0	6	6	1	0	0	2	0	0	93	
4:40 PM	1	11	0	0	0	34	17	0	5	4	4	0	0	2	2	0	80	
4:45 PM	3	18	1	0	1	27	14	0	11	1	3	0	1	4	0	0	84	
4:50 PM	0	20	0	0	1	25	19	0	6	6	5	0	0	3	1	0	86	
4:55 PM	3	9	0	0	0	23	18	0	7	9	7	0	0	1	0	0	77	942
5:00 PM	1	12	0	0	2	19	18	0	5	3	5	0	0	2	2	0	69	933
5:05 PM	1	13	0	0	2	34	20	0	2	4	2	0	0	2	1	0	81	930
5:10 PM	6	14	0	0	0	32	15	0	10	5	6	0	0	3	0	0	91	938
5:15 PM	4	16	0	0	1	27	21	0	7	7	4	0	3	1	1	0	92	968
5:20 PM	1	15	0	0	1	25	27	0	6	4	5	0	0	2	0	0	86	973
5:25 PM	1	12	4	0	3	35	33	0	5	7	7	0	0	2	1	0	110	1023
5:30 PM	2	20	0	0	0	19	29	0	11	4	7	0	0	4	0	0	96	1045
5:35 PM	0	18	0	0	3	24	20	0	10	13	4	0	1	4	5	0	102	1054
5:40 PM	2	22	1	0	3	39	19	0	15	2	4	0	2	8	8	0	125	1099
5:45 PM	0	17	0	0	6	25	16	0	9	6	5	0	0	1	3	0	88	1103
5:50 PM	3	19	0	0	4	21	15	0	8	4	2	0	0	0	1	0	77	1094
5:55 PM	1	12	0	0	3	19	20	0	3	4	3	0	0	2	1	0	68	1085

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	240	4	0	24	328	272	0	144	76	60	0	12	64	52	0	1292
Heavy Trucks	0	4	0		0	8	0		4	0	0		0	0	0		16
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/13/2012 1:20 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: Battle Creek Rd -- Kuebler Blvd

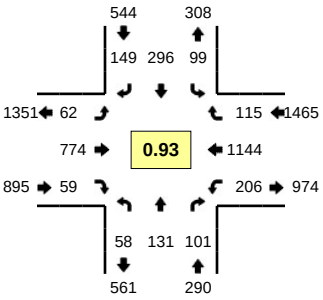
QC JOB #: 10741402

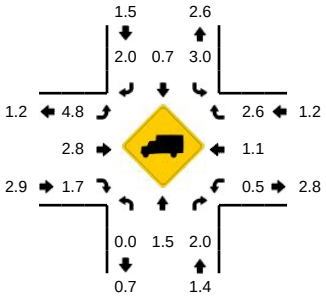
CITY/STATE: Salem, OR

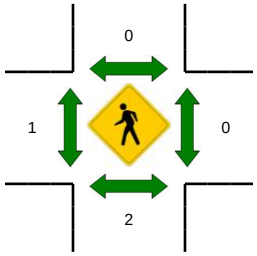
DATE: Wed, Apr 18 2012

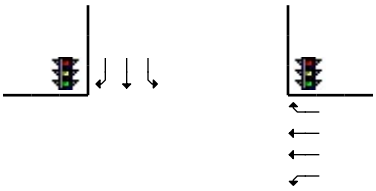
Peak-Hour: 4:45 PM -- 5:45 PM

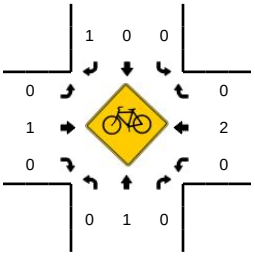
Peak 15-Min: 5:10 PM -- 5:25 PM

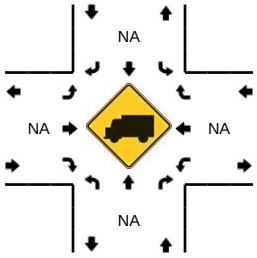


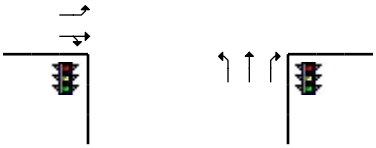


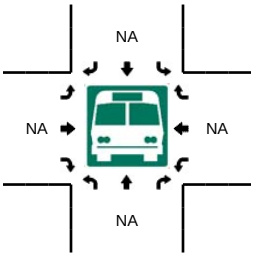












5-Min Count Period Beginning At	Battle Creek Rd (Northbound)				Battle Creek Rd (Southbound)				Kuebler Blvd (Eastbound)				Kuebler Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	8	10	8	0	6	14	10	0	1	65	4	0	5	91	8	0	230	
4:05 PM	5	7	12	0	11	18	13	0	6	60	5	0	6	88	6	0	237	
4:10 PM	8	12	4	0	12	24	14	0	2	50	5	0	17	83	4	0	235	
4:15 PM	3	7	12	0	9	20	8	0	5	63	2	0	17	119	8	0	273	
4:20 PM	5	3	8	0	5	11	9	0	2	75	6	0	9	100	11	0	244	
4:25 PM	3	12	6	0	7	16	5	0	2	62	8	0	8	87	13	0	229	
4:30 PM	4	12	6	0	4	20	6	0	1	59	4	0	13	76	7	0	212	
4:35 PM	5	6	7	0	10	7	14	0	1	81	5	0	15	112	11	0	274	
4:40 PM	7	15	5	0	8	28	10	0	8	61	7	0	18	77	3	0	247	
4:45 PM	5	12	11	0	13	20	9	0	6	58	3	0	20	104	13	0	274	
4:50 PM	2	9	6	0	5	14	8	0	5	77	6	0	13	114	12	0	271	
4:55 PM	5	7	11	0	12	22	9	0	9	67	5	0	5	66	4	0	222	2948
5:00 PM	3	8	13	0	4	35	9	0	3	56	5	0	20	74	6	0	236	2954
5:05 PM	5	7	5	0	7	25	31	0	4	74	3	0	18	75	14	0	268	2985
5:10 PM	7	10	7	0	7	25	15	0	2	65	8	0	17	110	12	0	285	3035
5:15 PM	6	14	6	0	12	42	19	0	4	57	4	0	16	102	11	0	293	3055
5:20 PM	4	8	8	0	7	29	10	0	8	65	1	0	28	99	10	0	277	3088
5:25 PM	9	9	11	0	8	24	9	0	7	67	6	0	16	101	9	0	276	3135
5:30 PM	4	21	9	0	10	23	14	0	9	54	7	0	16	84	8	0	259	3182
5:35 PM	2	14	7	0	7	17	10	0	4	63	3	0	20	100	10	0	257	3165
5:40 PM	6	12	7	0	7	20	6	0	1	71	8	0	17	115	6	0	276	3194
5:45 PM	8	19	13	0	12	27	7	0	4	65	2	0	5	74	6	0	242	3162
5:50 PM	7	10	10	0	10	17	4	0	6	53	4	0	19	73	9	0	222	3113
5:55 PM	4	6	10	0	4	8	2	0	3	87	3	0	11	99	12	0	249	3140

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	68	128	84	0	104	384	176	0	56	748	52	0	244	1244	132	0	3420
Heavy Trucks	0	4	4		4	4	4		0	8	0		0	4	4		36
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	1	0		0	2	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/13/2012 1:20 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Attachment B
Level-of-Service
Description and Criteria

ATTACHMENT B LEVEL-OF-SERVICE AND VOLUME-TO-CAPACITY CONCEPTS

Level-of-Service Concept

Level of service (LOS) is a concept developed to quantify the degree of comfort (including such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles) afforded to drivers as they travel through an intersection or roadway segment. Six grades are used to denote the various level of service from "A" to "F."[1]

Signalized Intersections

The six level-of-service grades are described qualitatively for signalized intersections in Table B1. Additionally, Table B2 identifies the relationship between level of service and average control delay per vehicle. Control delay is defined to include initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Using this definition, Level of Service "D" is generally considered to represent the minimum acceptable design standard.

Table B1 Level-of-Service Definitions (Signalized Intersections)

Level of Service	Average Delay per Vehicle
A	Very low average control delay, less than 10 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Average control delay is greater than 10 seconds per vehicle and less than or equal to 20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for a level of service A, causing higher levels of average delay.
C	Average control delay is greater than 20 seconds per vehicle and less than or equal to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	Average control delay is greater than 35 seconds per vehicle and less than or equal to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Average control delay is greater than 55 seconds per vehicle and less than or equal to 80 seconds per vehicle. This is usually considered to be the limit of acceptable delay. These high delay values generally (but not always) indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences.
F	Average control delay is in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation. It may also occur at high volume/capacity ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such high delay values.

[1]Most of the material in this appendix is adapted from the Transportation Research Board, *Highway Capacity Manual*, 2000.

Table B2 Level-of-Service Criteria for Signalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Unsignalized Intersections

Unsignalized intersections include two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections. The *2000 Highway Capacity Manual* (HCM) provides models for estimating control delay at both TWSC and AWSC intersections. A qualitative description of the various service levels associated with an unsignalized intersection is presented in Table B3. A quantitative definition of level of service for unsignalized intersections is presented in Table B4. Using this definition, Level of Service "E" is generally considered to represent the minimum acceptable design standard.

Table B3 Level-of-Service Definitions (Unsignalized Intersections)

Level of Service	Average Delay per Vehicle to Minor Street
A	• Nearly all drivers find freedom of operation. • Very seldom is there more than one vehicle in queue.
B	• Some drivers begin to consider the delay an inconvenience. • Occasionally there is more than one vehicle in queue.
C	• Many times there is more than one vehicle in queue. • Most drivers feel restricted, but not objectionably so.
D	• Often there is more than one vehicle in queue. • Drivers feel quite restricted.
E	• Represents a condition in which the demand is near or equal to the probable maximum number of vehicles that can be accommodated by the movement. • There is almost always more than one vehicle in queue. • Drivers find the delays approaching intolerable levels.
F	• Forced flow. • Represents an intersection failure condition that is caused by geometric and/or operational constraints external to the intersection.

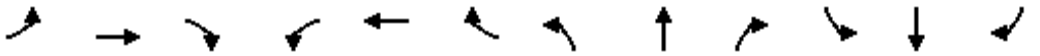
Table B4 Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10.0 and ≤ 15.0
C	>15.0 and ≤ 25.0
D	>25.0 and ≤ 35.0
E	>35.0 and ≤ 50.0
F	>50.0

It should be noted that the level-of-service criteria for unsignalized intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, there are a number of driver behavior considerations that combine to make delays at signalized intersections less galling than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, while drivers on the minor street approaches to TWSC intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections than signalized intersections. For these reasons, it is considered that the control delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. While overall intersection level of service is calculated for AWSC intersections, level of service is only calculated for the minor approaches and the major street left turn movements at TWSC intersections. No delay is assumed to the major street through movements. For TWSC intersections, the overall intersection level of service remains undefined: level of service is only calculated for each minor street lane.

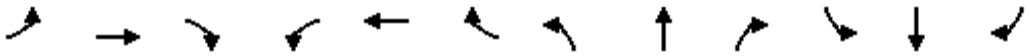
In the performance evaluation of TWSC intersections, it is important to consider other measures of effectiveness (MOEs) in addition to delay, such as v/c ratios for individual movements, average queue lengths, and 95th–percentile queue lengths. By focusing on a single MOE for the worst movement only, such as delay for the minor-street left turn, users may make inappropriate traffic control decisions. The potential for making such inappropriate decisions is likely to be particularly pronounced when the HCM level-of-service thresholds are adopted as legal standards, as is the case in many public agencies.

Attachment C
2012 Existing Traffic
Conditions Worksheets



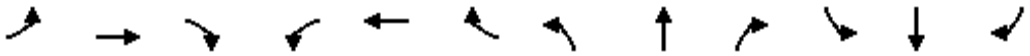
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	762	61	213	1144	115	59	135	102	97	306	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5		3.5	5.5	3.5	3.5	4.5	3.5	3.5	4.5	3.5
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1842		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.15	1.00		0.06	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	284	1842		116	3539	1583	1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	828	66	232	1243	125	64	147	111	105	333	162
RTOR Reduction (vph)	0	2	0	0	0	48	0	0	75	0	0	102
Lane Group Flow (vph)	67	892	0	232	1243	77	64	147	36	105	333	60
Turn Type	pm+pt			pm+pt		pm+ov	Prot		pm+ov	Prot		pm+ov
Protected Phases	1	6		5	2	3	7	4	5	3	8	1
Permitted Phases	6			2		2			4			8
Actuated Green, G (s)	65.4	60.4		78.5	69.5	78.6	6.9	27.4	41.5	9.1	29.6	34.6
Effective Green, g (s)	66.4	60.9		79.0	70.0	79.6	7.4	27.9	42.5	9.6	30.1	35.6
Actuated g/C Ratio	0.51	0.47		0.61	0.54	0.61	0.06	0.21	0.33	0.07	0.23	0.27
Clearance Time (s)	4.0	6.0		4.0	6.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0
Vehicle Extension (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	208	863		256	1906	969	101	400	518	131	431	433
v/s Ratio Prot	0.01	c0.48		c0.10	0.35	0.01	0.04	0.08	0.01	c0.06	c0.18	0.01
v/s Ratio Perm	0.15			0.45		0.04			0.02			0.03
v/c Ratio	0.32	1.03		0.91	0.65	0.08	0.63	0.37	0.07	0.80	0.77	0.14
Uniform Delay, d1	17.9	34.6		42.2	21.3	10.3	60.0	43.5	30.1	59.3	46.7	35.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	39.6		31.8	1.8	0.0	9.2	0.2	0.0	27.2	7.7	0.1
Delay (s)	18.3	74.1		73.9	23.1	10.3	69.1	43.7	30.2	86.5	54.4	35.7
Level of Service	B	E		E	C	B	E	D	C	F	D	D
Approach Delay (s)		70.2			29.5			44.1			55.0	
Approach LOS		E			C			D			D	

Intersection Summary			
HCM Average Control Delay	46.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	942	3	76	1447	17	1	4	73	35	4	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5		3.5	4.5		3.5	3.5		3.5	3.5	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1862		1770	3533		1770	1597		1770	1630	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.38	1.00	
Satd. Flow (perm)	1770	1862		1770	3533		1381	1597		704	1630	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	1024	3	83	1573	18	1	4	79	38	4	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	73	0	0	18	0
Lane Group Flow (vph)	14	1027	0	83	1591	0	1	10	0	38	6	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases							4			8		
Actuated Green, G (s)	2.1	95.9		10.8	104.6		10.1	9.4		18.3	13.6	
Effective Green, g (s)	2.6	96.4		11.3	105.1		11.1	9.9		18.8	14.1	
Actuated g/C Ratio	0.02	0.70		0.08	0.76		0.08	0.07		0.14	0.10	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)	33	1301		145	2691		114	115		138	167	
v/s Ratio Prot	0.01	c0.55		0.05	c0.45		0.00	0.01		c0.01	0.00	
v/s Ratio Perm							0.00			c0.03		
v/c Ratio	0.42	0.79		0.57	0.59		0.01	0.08		0.28	0.04	
Uniform Delay, d1	67.0	14.0		61.0	7.1		58.4	59.8		52.8	55.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	4.9		3.4	1.0		0.0	0.1		0.4	0.0	
Delay (s)	70.1	18.9		64.4	8.1		58.4	59.9		53.1	55.9	
Level of Service	E	B		E	A		E	E		D	E	
Approach Delay (s)		19.6			10.9			59.9			54.2	
Approach LOS		B			B			E			D	

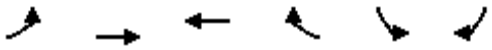
Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	65	59	7	36	18	24	185	6	16	319	245
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	101	71	64	8	39	20	26	201	7	17	347	266
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)											523	
pX, platoon unblocked	0.77	0.77	0.77	0.77	0.77		0.77					
vC, conflicting volume	807	774	480	738	904	204	613			208		
vC1, stage 1 conf vol	515	515		257	257							
vC2, stage 2 conf vol	292	260		481	648							
vCu, unblocked vol	604	562	181	514	730	204	354			208		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	86	90	98	90	98	97			99		
cM capacity (veh/h)	485	488	666	436	405	836	932			1363		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	236	66	26	208	17	613
Volume Left	101	8	26	0	17	0
Volume Right	64	20	0	7	0	266
cSH	525	482	932	1700	1363	1700
Volume to Capacity	0.45	0.14	0.03	0.12	0.01	0.36
Queue Length 95th (ft)	58	12	2	0	1	0
Control Delay (s)	17.3	13.7	9.0	0.0	7.7	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	17.3	13.7	1.0		0.2	
Approach LOS	C	B				

Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	57.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	87	61	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	95	66	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	66				161	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66				161	66
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1535				830	997

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	95	66	0	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1535	1700	1700	1700
Volume to Capacity	0.00	0.04	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS			A	

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	7.9%	ICU Level of Service	A
Analysis Period (min)	15		

Attachment D
Crash Data

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

Boone Road from Battle Creek Road to 27th Avenue excluding the ending intersections
January 1, 2006 through December 31, 2010

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Boone Road from Battle Creek Road to 27th Avenue excluding ending intersections
January 1, 2006 through December 31, 2010

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Battle Creek Road @ Kuebler Boulevard

January 1, 2006 through December 31, 2010

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2010														
ANGLE	0	2	0	2	0	6	0	2	0	2	0	2	0	0
REAR-END	0	0	3	3	0	0	0	2	0	2	1	3	0	0
2010 TOTAL	0	2	3	5	0	6	0	4	0	4	1	5	0	0
YEAR: 2009														
ANGLE	0	1	0	1	0	5	0	1	0	1	0	1	0	0
REAR-END	0	0	2	2	0	0	0	2	0	0	2	2	0	0
2009 TOTAL	0	1	2	3	0	5	0	3	0	1	2	3	0	0
YEAR: 2008														
REAR-END	0	3	5	8	0	6	0	7	1	6	2	8	0	0
2008 TOTAL	0	3	5	8	0	6	0	7	1	6	2	8	0	0
YEAR: 2007														
REAR-END	0	3	2	5	0	4	0	2	3	5	0	5	0	0
2007 TOTAL	0	3	2	5	0	4	0	2	3	5	0	5	0	0
YEAR: 2006														
REAR-END	0	2	0	2	0	3	0	1	1	1	1	2	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2006 TOTAL	0	2	1	3	0	3	0	2	1	2	1	3	0	0
FINAL TOTAL	0	11	13	24	0	24	0	18	5	18	6	24	0	0

Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

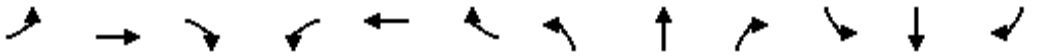
Battle Creek Road @ Boone Road

January 1, 2006 through December 31, 2010

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2010														
ANGLE	0	0	1	1	0	0	0	0	1	0	1	1	0	0
2010 TOTAL	0	0	1	1	0	0	0	0	1	0	1	1	0	0
YEAR: 2009														
ANGLE	0	0	2	2	0	0	0	2	0	2	0	2	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2009 TOTAL	0	0	3	3	0	0	0	3	0	3	0	3	0	0
YEAR: 2008														
ANGLE	0	1	1	2	0	1	0	2	0	2	0	2	0	0
TURNING MOVEMENTS	0	1	0	1	0	2	0	0	1	1	0	1	0	0
2008 TOTAL	0	2	1	3	0	3	0	2	1	3	0	3	0	0
YEAR: 2007														
ANGLE	0	0	1	1	0	0	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2007 TOTAL	0	0	2	2	0	0	0	2	0	2	0	2	0	0
YEAR: 2006														
ANGLE	0	2	0	2	0	2	0	2	0	2	0	2	0	0
REAR-END	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2006 TOTAL	0	3	0	3	0	3	0	3	0	3	0	3	0	0
FINAL TOTAL	0	5	7	12	0	6	0	10	2	11	1	12	0	0

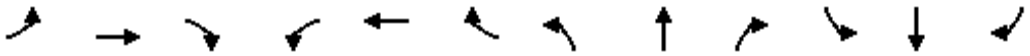
Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

Attachment E
2013 Background Traffic Conditions Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	770	62	215	1157	116	60	136	103	98	309	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5		3.5	5.5	3.5	3.5	4.5	3.5	3.5	4.5	3.5
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1842		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.15	1.00		0.06	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	271	1842		116	3539	1583	1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	837	67	234	1258	126	65	148	112	107	336	164
RTOR Reduction (vph)	0	2	0	0	0	49	0	0	75	0	0	100
Lane Group Flow (vph)	68	902	0	234	1258	77	65	148	37	107	336	64
Turn Type	pm+pt			pm+pt		pm+ov	Prot		pm+ov	Prot		pm+ov
Protected Phases	1	6		5	2	3	7	4	5	3	8	1
Permitted Phases	6			2		2			4			8
Actuated Green, G (s)	65.1	60.1		78.0	69.0	78.1	7.0	27.9	41.8	9.1	30.0	35.0
Effective Green, g (s)	66.1	60.6		78.5	69.5	79.1	7.5	28.4	42.8	9.6	30.5	36.0
Actuated g/C Ratio	0.51	0.47		0.60	0.53	0.61	0.06	0.22	0.33	0.07	0.23	0.28
Clearance Time (s)	4.0	6.0		4.0	6.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0
Vehicle Extension (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	201	859		253	1892	963	102	407	521	131	437	438
v/s Ratio Prot	0.01	c0.49		c0.10	0.36	0.01	0.04	0.08	0.01	c0.06	c0.18	0.01
v/s Ratio Perm	0.16			0.45		0.04			0.02			0.03
v/c Ratio	0.34	1.05		0.92	0.66	0.08	0.64	0.36	0.07	0.82	0.77	0.15
Uniform Delay, d1	18.3	34.7		42.4	21.8	10.5	59.9	43.1	29.9	59.3	46.5	35.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	44.6		36.2	1.9	0.0	9.2	0.2	0.0	29.6	7.2	0.1
Delay (s)	18.7	79.3		78.6	23.7	10.5	69.1	43.3	30.0	89.0	53.6	35.5
Level of Service	B	E		E	C	B	E	D	C	F	D	D
Approach Delay (s)		75.1			30.6			43.9			55.0	
Approach LOS		E			C			D			D	

Intersection Summary			
HCM Average Control Delay	48.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



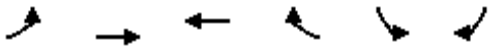
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	952	3	77	1463	17	1	4	74	35	4	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5		3.5	4.5		3.5	3.5		3.5	3.5	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1862		1770	3533		1770	1597		1770	1630	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.37	1.00	
Satd. Flow (perm)	1770	1862		1770	3533		1381	1597		696	1630	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	1035	3	84	1590	18	1	4	80	38	4	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	74	0	0	18	0
Lane Group Flow (vph)	14	1038	0	84	1608	0	1	10	0	38	6	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases							4			8		
Actuated Green, G (s)	2.1	95.9		10.8	104.6		10.1	9.4		18.3	13.6	
Effective Green, g (s)	2.6	96.4		11.3	105.1		11.1	9.9		18.8	14.1	
Actuated g/C Ratio	0.02	0.70		0.08	0.76		0.08	0.07		0.14	0.10	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)	33	1301		145	2691		114	115		137	167	
v/s Ratio Prot	0.01	c0.56		0.05	c0.46		0.00	0.01		c0.01	0.00	
v/s Ratio Perm							0.00			c0.03		
v/c Ratio	0.42	0.80		0.58	0.60		0.01	0.08		0.28	0.04	
Uniform Delay, d1	67.0	14.2		61.1	7.2		58.4	59.8		52.8	55.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	5.2		3.5	1.0		0.0	0.1		0.4	0.0	
Delay (s)	70.1	19.3		64.5	8.2		58.4	59.9		53.2	55.9	
Level of Service	E	B		E	A		E	E		D	E	
Approach Delay (s)		20.0			11.0			59.9			54.2	
Approach LOS		C			B			E			D	

Intersection Summary			
HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	94	66	60	7	36	18	24	187	6	16	323	248
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	102	72	65	8	39	20	26	203	7	17	351	270
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)											523	
pX, platoon unblocked	0.77	0.77	0.77	0.77	0.77		0.77					
vC, conflicting volume	815	783	486	746	914	207	621			210		
vC1, stage 1 conf vol	521	521		259	259							
vC2, stage 2 conf vol	295	262		487	655							
vCu, unblocked vol	611	569	184	521	740	207	359			210		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	85	90	98	90	98	97			99		
cM capacity (veh/h)	482	484	661	430	401	834	925			1361		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	239	66	26	210	17	621
Volume Left	102	8	26	0	17	0
Volume Right	65	20	0	7	0	270
cSH	521	478	925	1700	1361	1700
Volume to Capacity	0.46	0.14	0.03	0.12	0.01	0.37
Queue Length 95th (ft)	60	12	2	0	1	0
Control Delay (s)	17.6	13.7	9.0	0.0	7.7	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	17.6	13.7	1.0		0.2	
Approach LOS	C	B				

Intersection Summary				
Average Delay	4.7			
Intersection Capacity Utilization	57.8%	ICU Level of Service	B	
Analysis Period (min)	15			

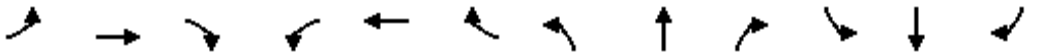


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	88	62	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	96	67	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	67				163	67
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	67				163	67
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1534				828	996

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	96	67	0	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1534	1700	1700	1700
Volume to Capacity	0.00	0.04	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS			A	

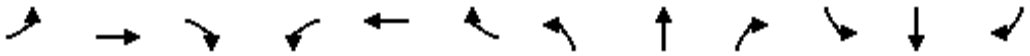
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	8.0%	ICU Level of Service	A
Analysis Period (min)	15		

Attachment F
2013 Total Traffic
Conditions Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	770	71	215	1157	116	85	151	103	98	314	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5		3.5	5.5	3.5	3.5	4.5	3.5	3.5	4.5	3.5
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1839		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.13	1.00		0.06	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	244	1839		115	3539	1583	1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	837	77	234	1258	126	92	164	112	107	341	164
RTOR Reduction (vph)	0	3	0	0	0	51	0	0	76	0	0	82
Lane Group Flow (vph)	68	911	0	234	1258	75	92	164	36	107	341	82
Turn Type	pm+pt			pm+pt		pm+ov	Prot		pm+ov	Prot		pm+ov
Protected Phases	1	6		5	2	3	7	4	5	3	8	1
Permitted Phases	6			2		2			4			8
Actuated Green, G (s)	66.1	61.0		75.9	66.8	75.9	9.7	30.0	40.9	9.1	29.4	34.5
Effective Green, g (s)	67.1	61.5		76.4	67.3	76.9	10.2	30.5	41.9	9.6	29.9	35.5
Actuated g/C Ratio	0.52	0.47		0.59	0.52	0.59	0.08	0.23	0.32	0.07	0.23	0.27
Clearance Time (s)	4.0	6.0		4.0	6.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0
Vehicle Extension (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	192	870		213	1832	936	139	437	510	131	428	432
v/s Ratio Prot	0.02	0.50		c0.10	0.36	0.01	0.05	0.09	0.01	c0.06	c0.18	0.01
v/s Ratio Perm	0.17			c0.55		0.04			0.02			0.04
v/c Ratio	0.35	1.05		1.10	0.69	0.08	0.66	0.38	0.07	0.82	0.80	0.19
Uniform Delay, d1	18.7	34.2		42.8	23.5	11.4	58.2	41.8	30.5	59.3	47.2	36.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	43.7		90.5	2.1	0.0	8.8	0.2	0.0	29.6	9.3	0.1
Delay (s)	19.2	78.0		133.3	25.6	11.4	67.0	42.0	30.6	89.0	56.5	36.3
Level of Service	B	E		F	C	B	E	D	C	F	E	D
Approach Delay (s)		73.9			40.1			44.8			56.7	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM Average Control Delay	52.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



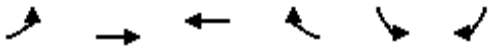
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	952	3	90	1463	17	1	9	108	35	6	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5		3.5	4.5		3.5	3.5		3.5	3.5	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1862		1770	3533		1770	1605		1770	1656	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.30	1.00	
Satd. Flow (perm)	1770	1862		1770	3533		1378	1605		552	1656	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	1035	3	98	1590	18	1	10	117	38	7	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	109	0	0	18	0
Lane Group Flow (vph)	14	1038	0	98	1608	0	1	18	0	38	9	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases							4			8		
Actuated Green, G (s)	2.1	95.2		11.4	104.5		10.2	9.5		18.4	13.7	
Effective Green, g (s)	2.6	95.7		11.9	105.0		11.2	10.0		18.9	14.2	
Actuated g/C Ratio	0.02	0.69		0.09	0.76		0.08	0.07		0.14	0.10	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)	33	1291		153	2688		115	116		123	170	
v/s Ratio Prot	0.01	c0.56		0.06	c0.46		0.00	0.01		c0.01	0.01	
v/s Ratio Perm							0.00			c0.03		
v/c Ratio	0.42	0.80		0.64	0.60		0.01	0.16		0.31	0.05	
Uniform Delay, d1	67.0	14.7		61.0	7.2		58.3	60.1		52.9	55.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	5.4		6.7	1.0		0.0	0.2		0.5	0.0	
Delay (s)	70.1	20.0		67.7	8.2		58.3	60.3		53.4	55.9	
Level of Service	E	C		E	A		E	E		D	E	
Approach Delay (s)		20.7			11.6			60.3			54.4	
Approach LOS		C			B			E			D	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	94	68	60	17	41	57	24	187	10	30	323	248
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	102	74	65	18	45	62	26	203	11	33	351	270
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)											523	
pX, platoon unblocked	0.77	0.77	0.77	0.77	0.77		0.77					
vC, conflicting volume	891	817	486	779	947	209	621			214		
vC1, stage 1 conf vol	551	551		261	261							
vC2, stage 2 conf vol	340	266		518	686							
vCu, unblocked vol	706	611	179	561	779	209	354			214		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	84	90	95	88	93	97			98		
cM capacity (veh/h)	425	461	663	401	381	832	924			1356		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	241	125	26	214	33	621
Volume Left	102	18	26	0	33	0
Volume Right	65	62	0	11	0	270
cSH	484	526	924	1700	1356	1700
Volume to Capacity	0.50	0.24	0.03	0.13	0.02	0.37
Queue Length 95th (ft)	68	23	2	0	2	0
Control Delay (s)	19.6	14.0	9.0	0.0	7.7	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	19.6	14.0	1.0		0.4	
Approach LOS	C	B				

Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	57.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	20	88	62	16	44	54
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	96	67	17	48	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	85				215	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85				215	76
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				94	94
cM capacity (veh/h)	1512				762	985

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	117	85	48	59
Volume Left	22	0	48	0
Volume Right	0	17	0	59
cSH	1512	1700	762	985
Volume to Capacity	0.01	0.05	0.06	0.06
Queue Length 95th (ft)	1	0	5	5
Control Delay (s)	1.5	0.0	10.0	8.9
Lane LOS	A		B	A
Approach Delay (s)	1.5	0.0	9.4	
Approach LOS			A	

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		