SCHAAD ROAD - WEST OF PLEASANT RIDGE ROAD MIXED USE DEVELOPMENT

TRAFFIC IMPACT STUDY

KNOX COUNTY, TENNESSEE

CCI PROJECT NO. 00773-0011

CANNON & CANNON INC
CONSULTING ENGINEERS
FIELD SURVEYORS

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Knoxville, TN 37931

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MAY 31
2018

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EXECUTIVE SUMMARY

This report provides a summary of a traffic impact study that was performed for a proposed mixed-use development to be located in northwest Knox County. The project site is on the north side of Schaad Road, approximately one-half way between Oak Ridge Highway (SR 62) and Pleasant Ridge Road. This is a large site, as it stretches almost 2000 feet along Schaad Road.

The development plan for this project currently proposes a two phase sequence of build-out. Phase 1 will take place on the rear portions of the site, and is currently planned to include up to 160 single family units. This phase is anticipated to begin in 2019, take three years to build-out, with completion and full occupancy anticipated to be in 2022. Phase 2 is currently proposed to include commercial development and multi-family residential, taking place primarily on the front portions of the site. The build-out and full occupancy date for this phase is estimated to be sometime in year 2024.

The purpose of this study was to evaluate the anticipated impacts of newly generated traffic from the proposed development on roadways and intersections in the vicinity of the project site. Of particular interest were the intersections of Schaad Road at Oak Ridge Highway, Schaad Road at Pleasant Ridge Road, Schaad Road at La Christa Way/Hilda Lane, and the two proposed project site entrance intersections. Appropriate evaluations were conducted at these locations for both project phases in order to determine the anticipated impacts and to establish recommended measures to mitigate the impacts.

The primary conclusion of this study is that the traffic generated from the proposed mixed-use development will contribute towards negative level-of-service impacts at several of the study intersections. This is especially true prior to completion of the Schaad Road widening project, which will address many of these issues. The following recommendations are considered appropriate in order to maximize the operations and safety of the study intersections, and thus to minimize the impact of this development on area traffic:

1. All traffic signals in this area should have their signal timing evaluated regularly in order to ensure optimized traffic flow and operations. Given that significant development appears likely for this area over the next several years, these reviews should be conducted every one or two years.
2. The Phase 1 site access intersection should be monitored for side street delays as the project is being built-out, and if delays become intolerable, considered for installation of a temporary traffic signal. It should be noted that in addition to helping the site access intersection, such a signal would create gaps in traffic to reduce side street delays at other nearby intersections such as La Christa Way/Hilda Lane.
3. Knox County should prioritize the Schaad Road widening project, as it is desperately needed for this rapidly developing area. This project should include left-turn lanes and median openings for both project site intersections. The eastbound left-turn storage for the two site intersections should be a minimum length of 125 feet.
4. Right-turn lanes should be added to the two project site intersections, each with a minimum storage length of 75 feet.
5. Both project site intersections should be provided with left and right-turn lanes on their side street southbound approaches. The right-turn lanes for these two approaches should be a minimum of 100 feet at the west site entrance and 150 feet at the east site entrance.

6. A permanent traffic signal will likely need to be installed at the east project site intersection in conjunction with the Schaad Road widening project, assuming that project Phase 2 is on track for development. This signal should include westbound protected-permissive left-turn operation.
7. The intersection of Schaad Road and Oak Ridge Highway should have right-turn lanes constructed on all four intersection approaches. It should be noted that these lanes will be easy to do on the Oak Ridge Highway approaches, as the existing shoulders can be restriped, and a right-turn lane on the northbound approach has been recommended by a traffic study for another development in the area. This would leave only the southbound right-turn lane to require significant additional construction.
8. New site signage and landscaping should be carefully positioned to prevent blockage of the line of sight for drivers exiting at project site driveways.
9. The project developer should have a land surveyor certify that the required corner sight distance is available upon the completion of each project access roadway onto Schaad Road.

INTRODUCTION & PURPOSE OF STUDY

This report provides a summary of a traffic impact study that was performed for a proposed mixed-use development to be located in northwest Knox County. The project site is on the north side of Schaad Road, approximately one-half way between Oak Ridge Highway (SR 62) and Pleasant Ridge Road. This is a large site, as it stretches almost 2000 feet along Schaad Road. FIGURE 1 is a project location map identifying the project in relation to the major roadways in the vicinity of the proposed development.

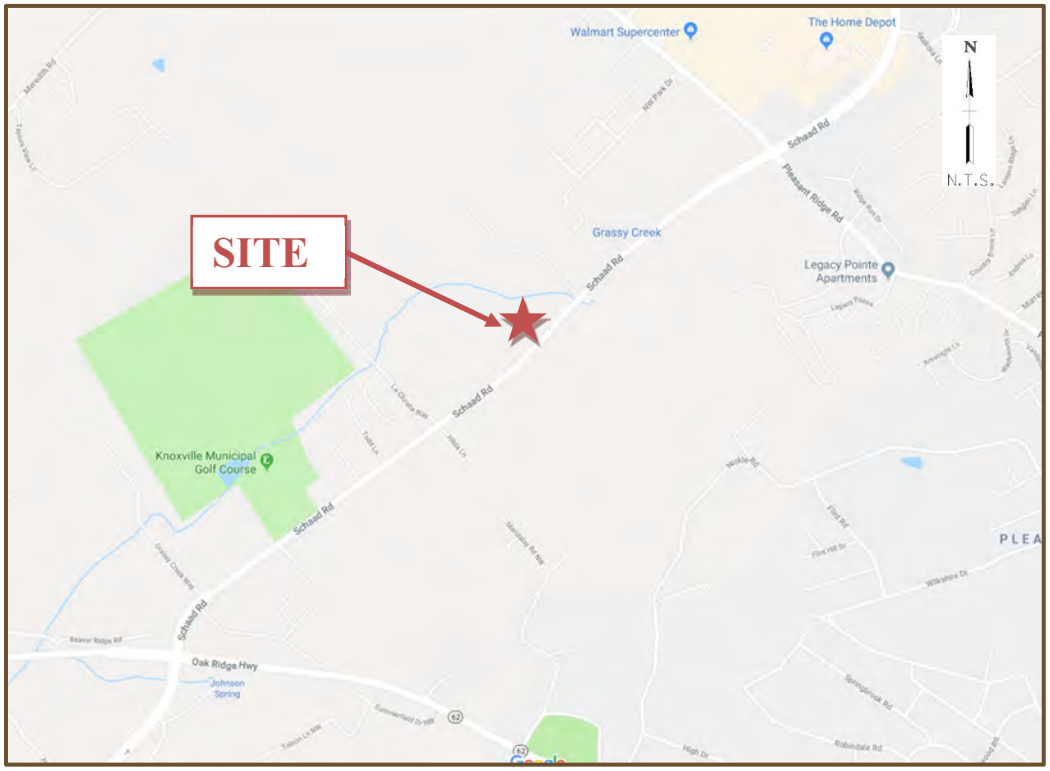


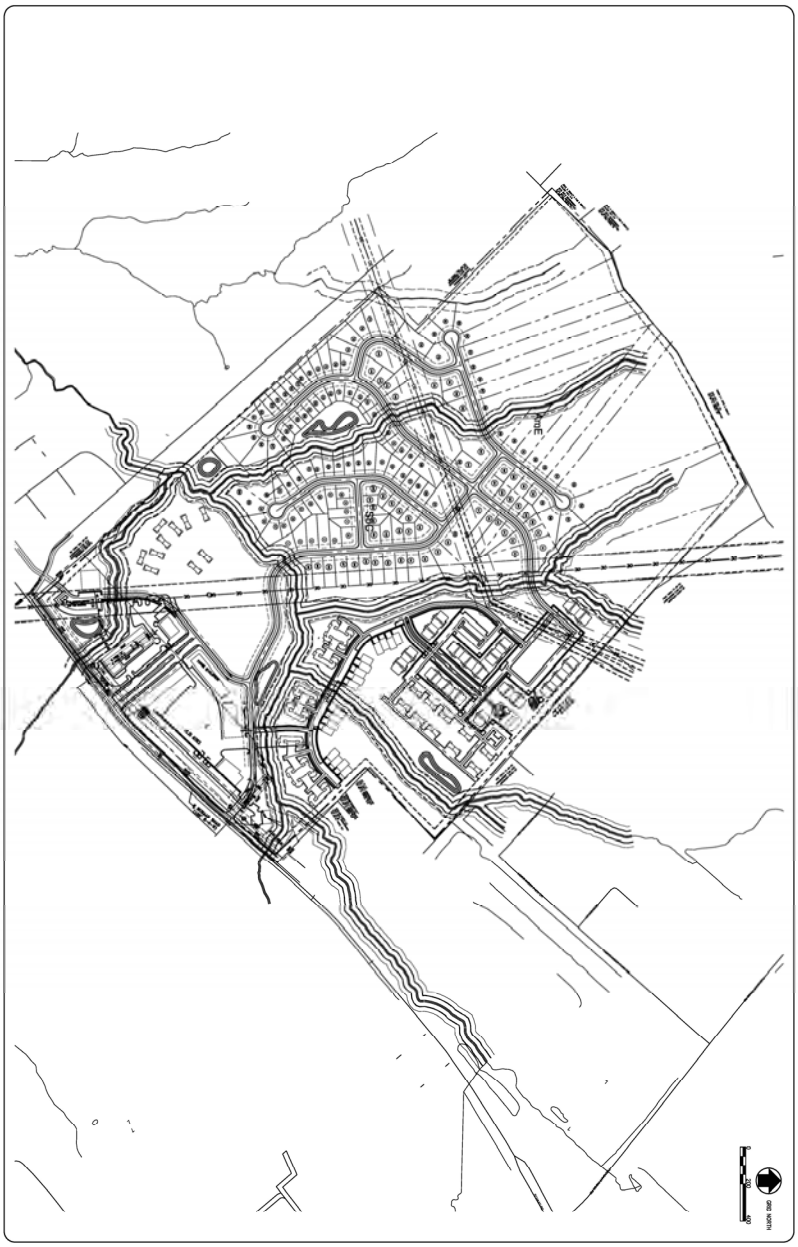
FIGURE 1
LOCATION MAP

The development plan for this project currently proposes a two phase sequence of build-out. Phase 1 will take place on the rear portions of the site, and is currently planned to include up to 160 single family units. This phase is anticipated to begin in 2019, take three years to build-out, with completion and full occupancy anticipated to be in 2022. Phase 2 is currently proposed to include commercial development and multi-family residential, taking place primarily on the front portions of the site. The build-out and full occupancy date for this phase is estimated to be sometime in year 2024. FIGURE 2 is a Conceptual Site Plan which details the currently proposed site layout and configuration.

The purpose of this study was to evaluate the anticipated impacts of newly generated traffic from the proposed development on roadways and intersections in the vicinity of the project site. Of particular interest were the intersections of Schaad Road at Oak Ridge Highway, Schaad Road at Pleasant Ridge Road, Schaad Road at La Christa Way/Hilda Lane, and the two proposed project site entrance intersections.

Appropriate evaluations were conducted at these locations for both project phases in order to determine the anticipated impacts and to establish recommended measures to mitigate the impacts.

FIGURE 2
CONCEPTUAL SITE PLAN



EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

Schaad Road is classified as a Minor Arterial roadway by the Knoxville/Knox County Metropolitan Planning Commission (MPC), and is maintained by Knox County. In the immediate vicinity of the project site it is currently a two-lane roadway with approximately 20 feet of pavement, and is posted with a 40 mph speed limit. Roadway striping includes both a double-yellow centerline and white edge-lines. This facility carries significant traffic, as it serves as one of only a few major east-west roadways in north Knox County. No sidewalk or other provisions are currently present for pedestrians or bicycles. A major roadway widening project is planned for this section of roadway, with completion currently anticipated for 2022. This project will widen Schaad Road to four traffic lanes with a median and select left and right turning lanes as justified.

Both Oak Ridge Highway and Pleasant Ridge Road have been improved at the two associated study intersections, as has Schaad Road on the immediate approaches to these intersections. As such, all approaches to these intersections currently possess multiple traffic lanes, with each approach, except the Pleasant Ridge Road approaches, designed for two through traffic lanes. All of these approaches include left turn lanes and some include and right turn lanes. Traffic signals currently control both of these intersections.

The other existing study intersection, Schaad Road at La Christa Way/Hilda Lane, is on the current two-lane section of Schaad Road and the sides streets are also two lane roadways. These roadways are classified as Local Roads by the MPC and traffic control for these side streets is Stop control.

EXISTING TRAFFIC DATA

Traffic volume data were assembled for this study, including annual average daily traffic (AADT) data that are collected each year by the Tennessee Department of Transportation (TDOT). Three AADT count stations were identified near the project-site that appear to have particular relevance for this study. The most currently available data from these count stations are contained in TABLE 1, with official TDOT count station summary sheets contained in APPENDIX A.

In addition to the available AADT data, turning movement traffic count data were obtained for the three existing study intersections, with the purpose of determining the existing AM and PM peak hour traffic volumes. The intersections of Schaad Road at Pleasant Ridge Road and Schaad Road at La Christa Way/Hilda Lane were counted specifically for this study, while the intersection of Schaad Road at Oak Ridge Highway was counted by CDM Smith, Inc. earlier in 2018, and this data was obtained for use in this study. The resulting traffic volume data for existing traffic conditions are summarized on FIGURE 3, with raw data count summary sheets contained in APPENDIX A. The peak hours and peak hour factors for these three existing intersections were determined from the turning movement traffic count data to be as follows:

Schaad Road at Pleasant Ridge Road -	7:15 to 8:15 A.M. (PHF = 0.91)
	4:45 to 5:45 P.M. (PHF = 0.95)
Schaad Road at La Christa Way/Hilda Lane -	7:15 to 8:15 A.M. (PHF = 0.92)
	5:00 to 6:00 P.M. (PHF = 0.94)
Schaad Road at Oak Ridge Highway (SR 62) -	7:15 to 8:15 A.M. (PHF = 0.88)
	4:45 to 5:45 P.M. (PHF = 0.92)

TABLE 1
ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY

COUNT YEAR	TDOT COUNT STATION 0075 PLEASANT RIDGE ROAD SOUTH OF SCHAAD ROAD	TDOT COUNT STATION 0076 SCHAAD ROAD - BETWEEN PLEASANT RIDGE ROAD AND OAK RIDGE HIGHWAY	TDOT COUNT STATION 0078 OAK RIDGE HIGHWAY WEST OF SCHAAD ROAD
2017	12,540	15,669	17,076
2016	11,440	15,558	18,845
2015	11,327	15,446	17,151
2014	11,530	15,578	19,834
2013	10,690	15,224	20,690
2012	9,302	16,296	18,626
2011	9,031	14,232	17,587
2010	8,764	14,575	18,226
2009	11,208	13,280	17,740
2008	11,174	12,676	17,080
2007	10,849	13,452	18,593
2006	10,383	13,915	19,857
2005	10,351	13,850	20,633

EXISTING CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses of Existing conditions employing the methods of the Highway Capacity Manual (HCM2010) were conducted for the three existing study intersections. These analyses were performed with the 2018 existing traffic volumes (FIGURE 3) and existing intersection traffic control, lane configurations and signal timing. The EVALUATIONS section of this report may be referenced for tabular summaries of the analyses results, while more detailed summaries are presented on the computer printouts contained in APPENDIX C. Also contained in APPENDIX C is a section entitled "Capacity and Level of Service Concepts", which provides a description of the utilized procedures.

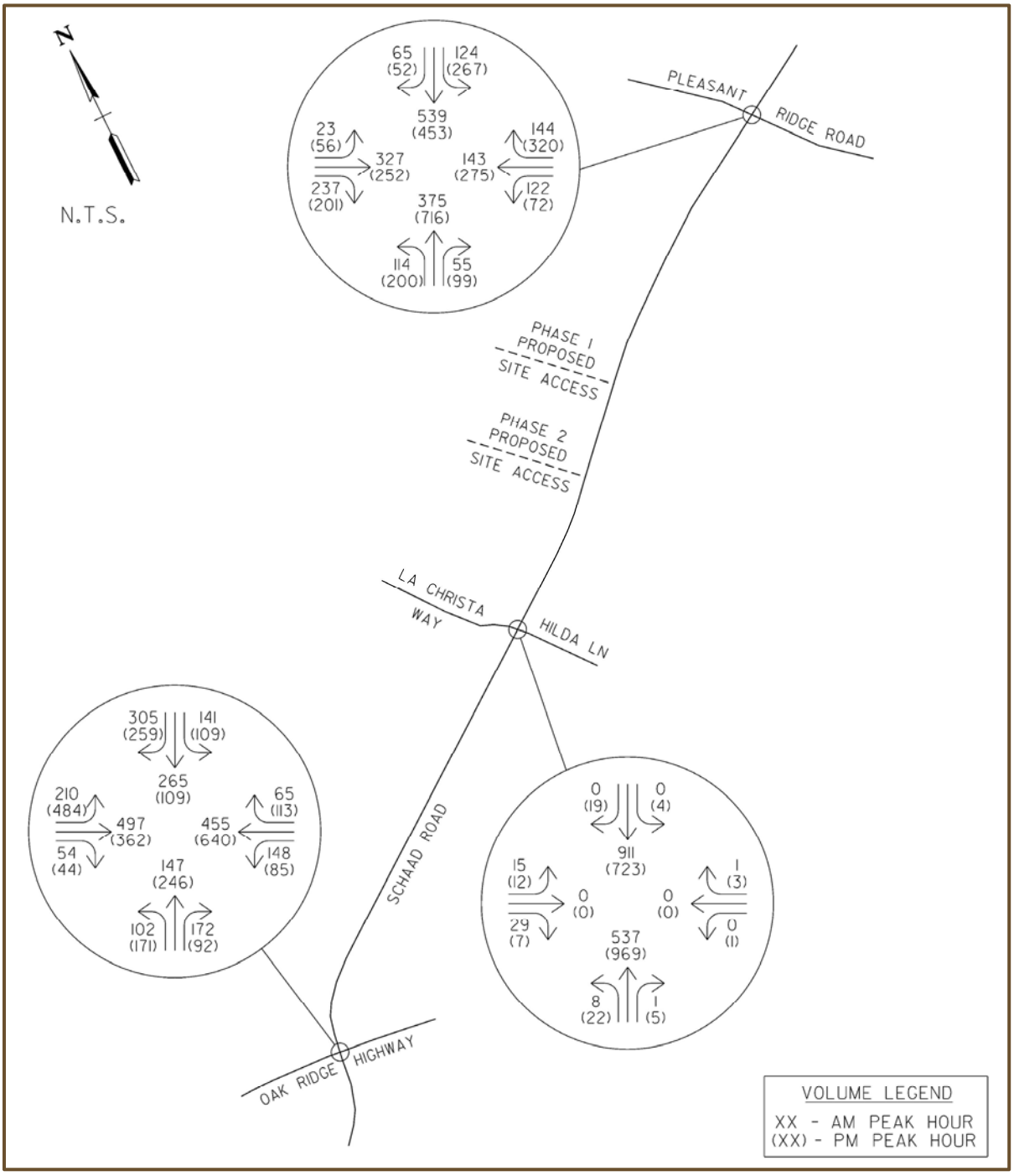


FIGURE 3
2018 EXISTING TRAFFIC VOLUMES

4.0 BACKGROUND CONDITIONS

BACKGROUND TRAFFIC GROWTH

The proposed mixed-use development is anticipated to be constructed in two primary phases, with completion and full occupancy of Phase 1 sometime in 2022 and Phase 2 sometime in 2024. Therefore, years 2022 and 2024 were established as the appropriate design/analysis years for this study. In order to determine traffic volumes resulting solely from background traffic growth to these years, it was necessary to establish a growth rate for existing 2018 traffic. The TDOT ADT values previously discussed, as well as knowledge of the area, was used in this determination, which resulted in an annual growth rate of 2.5 percent being applied to establish both 2022 and 2024 background volumes. FIGURE 4A contains the background traffic volumes that would result from a 2.5 percent growth rate from year 2018, when the existing data was collected, to the full build-out analysis year of 2022 for project Phase 1, and FIGURE 4B for project Phase 2 (year 2024).

BACKGROUND CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the EXISTING CONDITIONS section of this report were conducted utilizing the 2022 and 2024 background traffic volumes (FIGURE 4A and FIGURE 4B) and existing intersection traffic control, existing lane configurations and existing signal timing. The EVALUATIONS section of this report may be referenced for tabular summaries of the results of these analyses, while more detailed summaries are presented on the computer printouts contained in APPENDIX C.

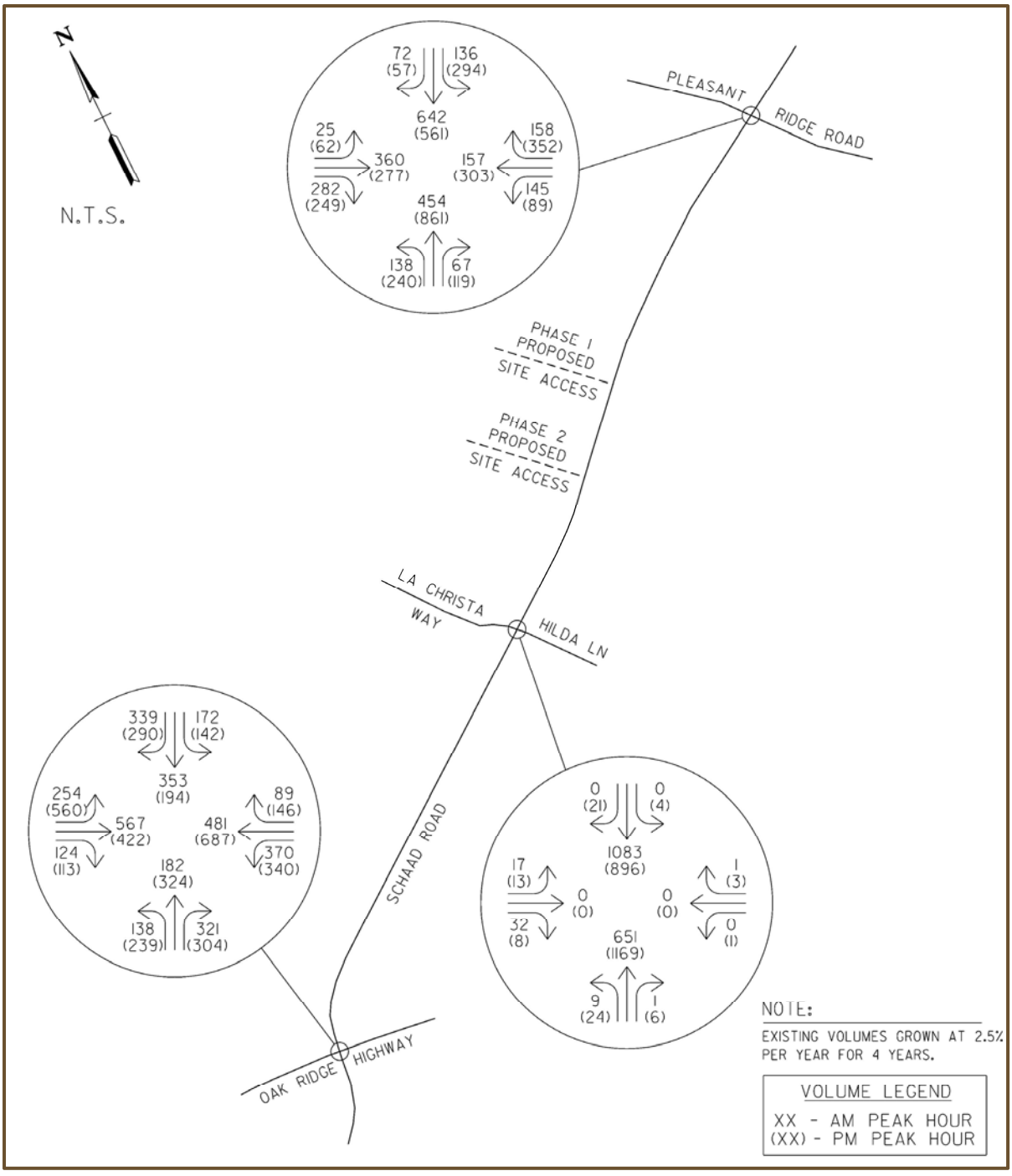


FIGURE 4A
2022 BACKGROUND TRAFFIC VOLUMES

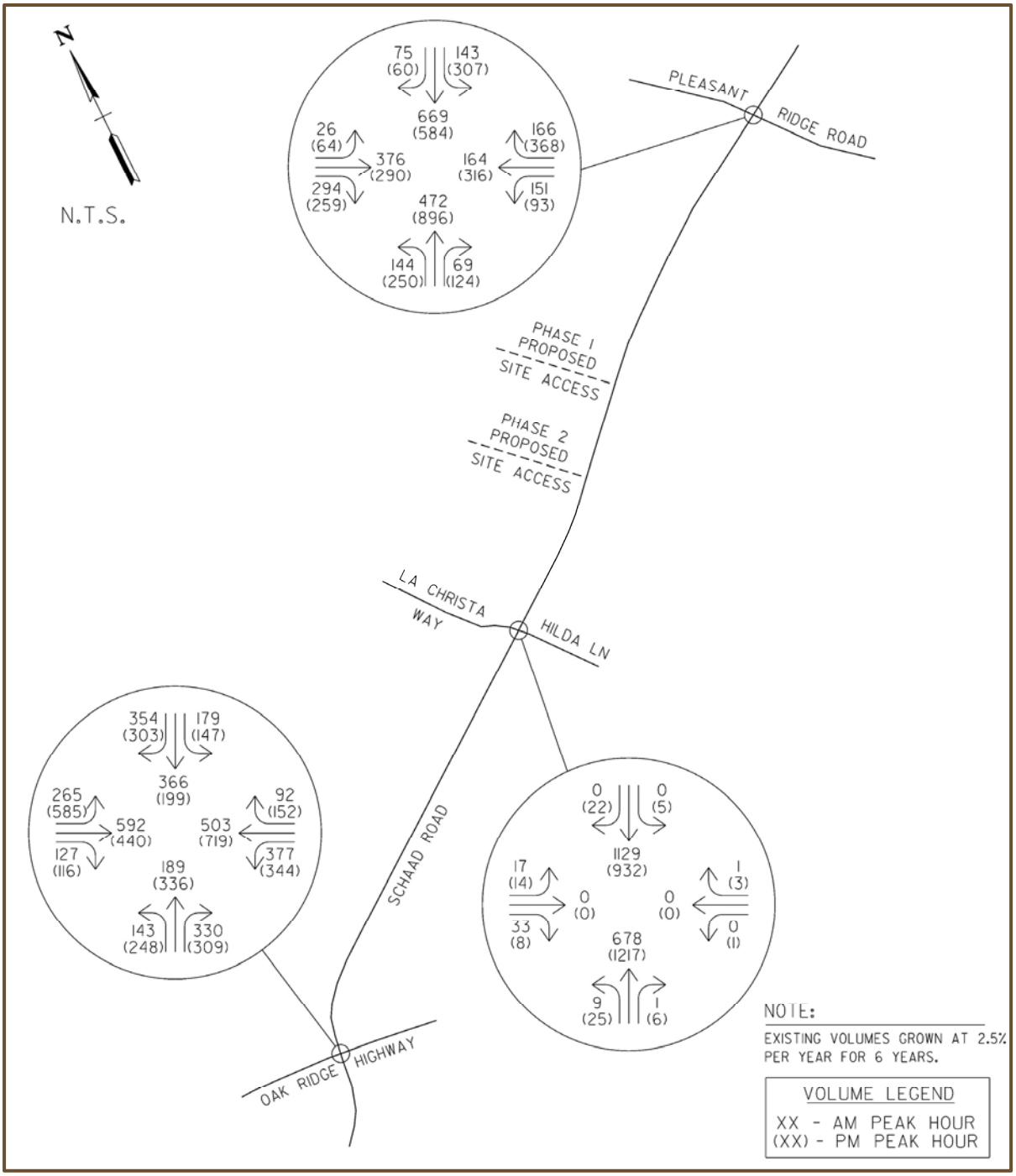


FIGURE 4B
2024 BACKGROUND TRAFFIC VOLUMES

5.0 FUTURE CONDITIONS

TRIP GENERATION

The expected traffic volumes to be generated by the proposed mixed-use development were estimated using procedures recommended in the Institute of Transportation Engineer's (ITE) *Trip Generation Manual*, 10th Edition. See TABLE 2A for a summary of these volumes for development Phase 1 and TABLE 2B for Phase 2. APPENDIX B may also be referenced for more detailed information.

TABLE 2A
PHASE 1 - TRIP GENERATION SUMMARY

LAND USE	ITE CODE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HR)	PM PEAK HOUR (TRIPS/HR)
Single Family Detached Housing	210	160 units	1,602	118	160
-Entering Trips			801 (50%)	30 (25%)	101 (63%)
-Exiting Trips			801 (50%)	88 (75%)	59 (37%)

TABLE 2B
PHASE 2 - TRIP GENERATION SUMMARY

LAND USE	ITE CODE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HR)	PM PEAK HOUR (TRIPS/HR)
.					
Multi-Family Housing (Low Rise)	220	350 units	2,606	157	180
-Entering Trips			1303 (50%)	36 (23%)	113 (63%)
-Exiting Trips			1303 (50%)	121 (77%)	67 (37%)
Shopping Center	820	100,000 sf	6,012	202	543
-Entering Trips			3,006 (50%)	125 (62%)	261 (48%)
-Exiting Trips			3,006 (50%)	77 (38%)	282 (52%)
TOTAL (Generated) Trips[1]			10,220	477	883
-Entering Trips			5,110	191	475
-Exiting Trips			5,110	286	408

INTERNAL CAPTURE [2]	1204	N/A	114
-Entering Trips	602	N/A	57
-Exiting Trips	602	N/A	57
NET TOTAL TRIPS[1]	9,016	477	769
-Entering Trips	4,508	191	418
-Exiting Trips	4,508	286	351

[1] Includes Phase 1 and Phase 2 generated trips

[2] See the two Internal Capture Spreadsheets in APPENDIX B

TRIP DISTRIBUTION AND ASSIGNMENT

FIGURES 5, 6A and 6B provide a summary of the trip distribution patterns and resulting traffic assignments for both phases at the study intersections. These patterns and assignments were based on the existing traffic patterns derived from the traffic counts, as well as knowledge of the area. Specific distribution assumptions are noted on FIGURE 5. FIGURES 7A and 7B show the combined traffic volumes reflecting the existing traffic, the background traffic growth, and the newly generated traffic from the proposed development, for both Phase 1 (2022) and Phase 2 (2024) of the project. These are the combined volumes used in the analysis of future development conditions.

FUTURE CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the EXISTING CONDITIONS section of this report were conducted for the full project build-out conditions, utilizing the Phase 1 (2022) and Phase 2 (2024) combined traffic volumes (FIGURES 7A and 7B). PHASE 1 was evaluated for both the existing two lane Schaad Road and the future widened one, while Phase 2 was evaluated for only the widened roadway. The EVALUATIONS section of this report may be referenced for tabular summaries of the analyses results, while more detailed summaries are presented on the computer printouts contained in APPENDIX C.

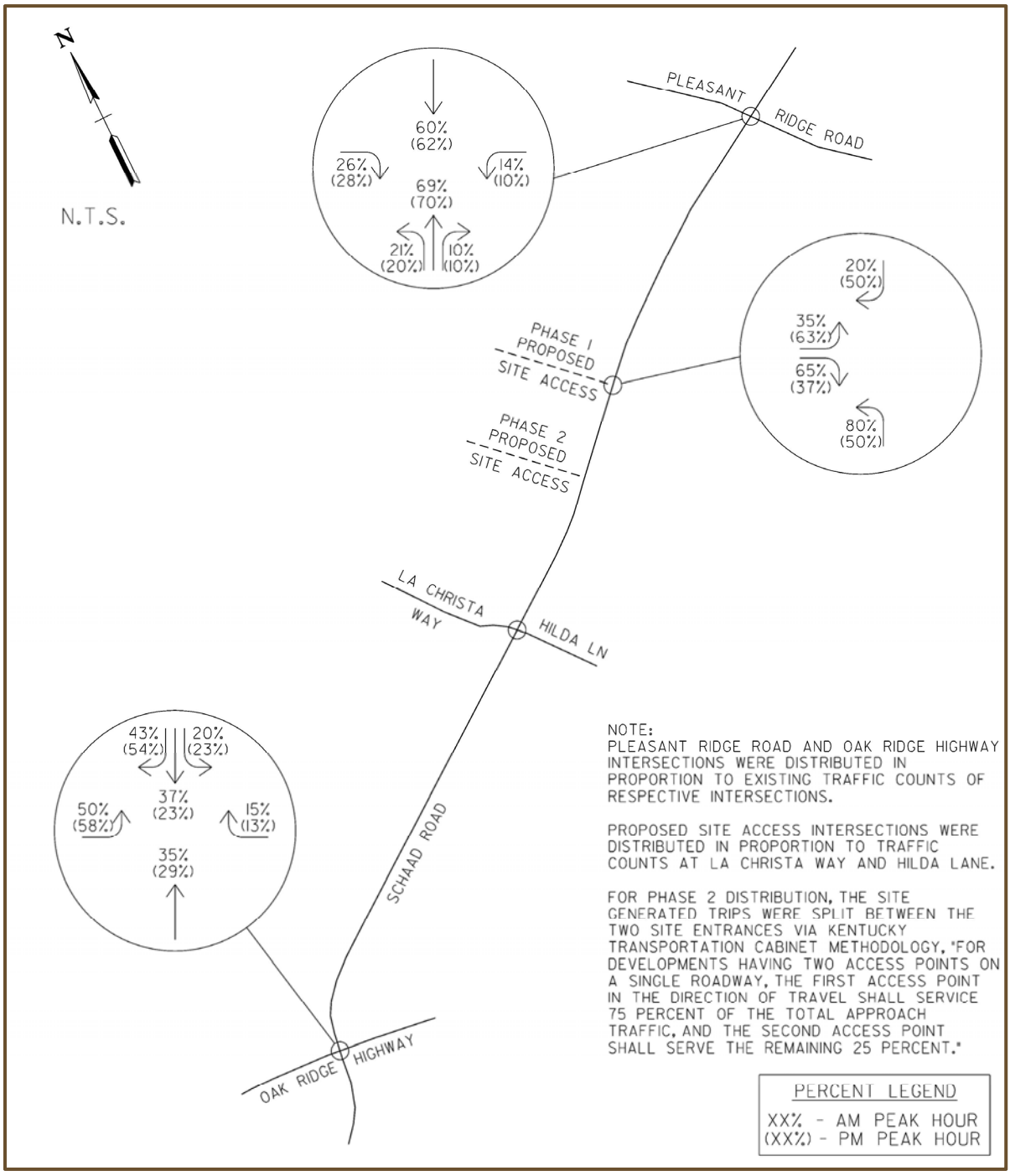


FIGURE 5
TRIP DISTRIBUTION

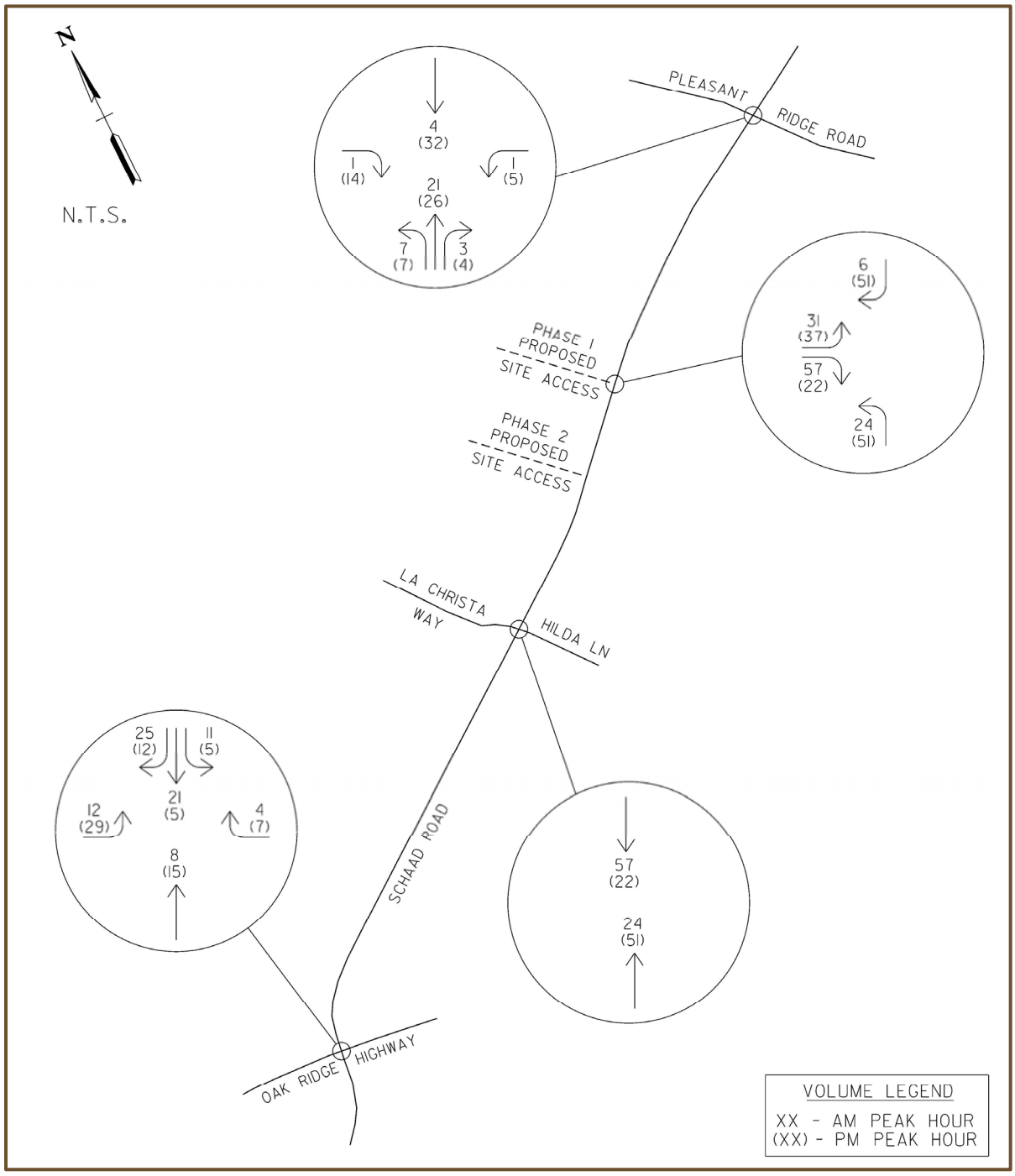


FIGURE 6A
TRIP ASSIGNMENT – PHASE 1 (2022)

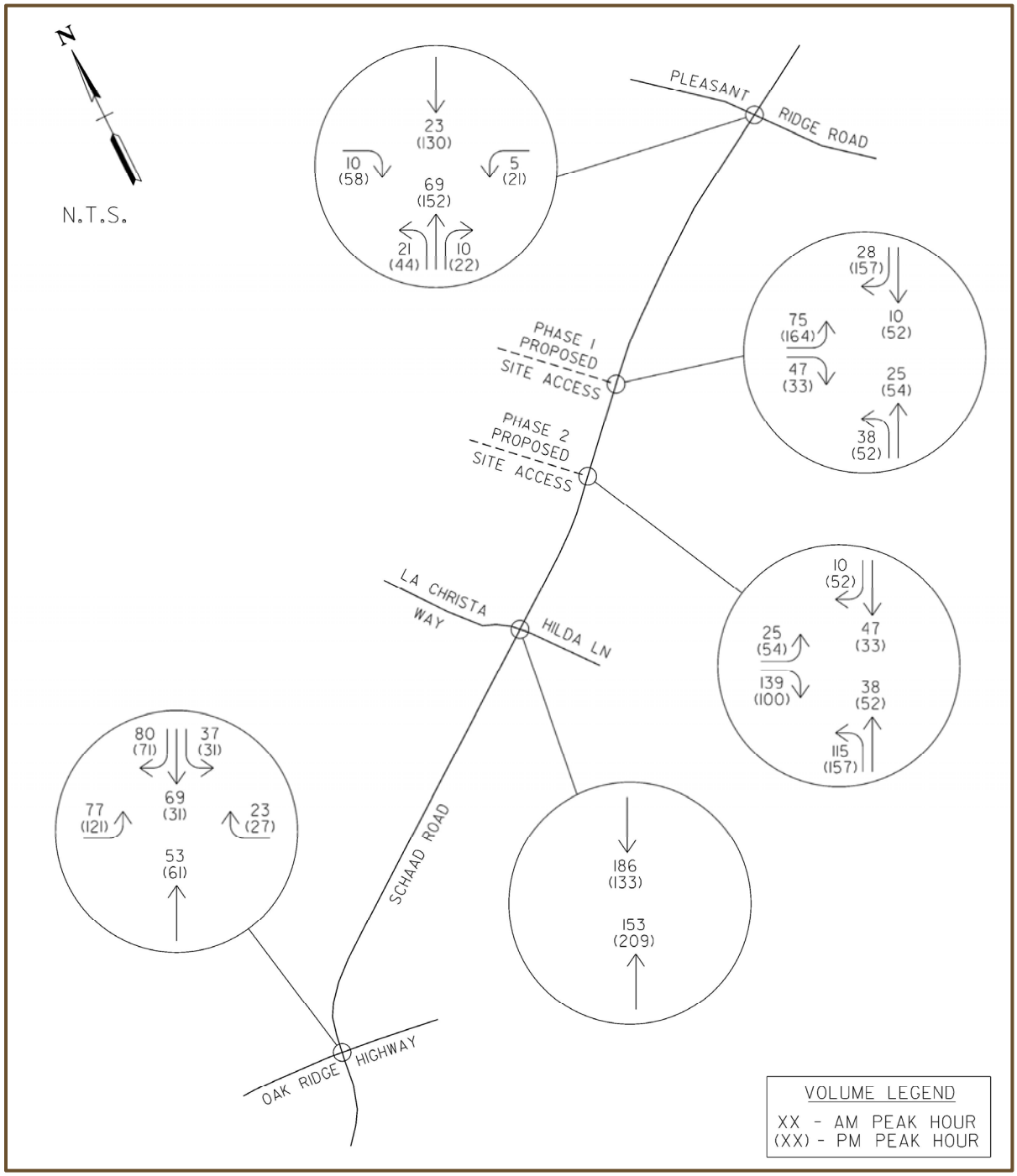


FIGURE 6B
TRIP ASSIGNMENT – PHASE 2 (2024)

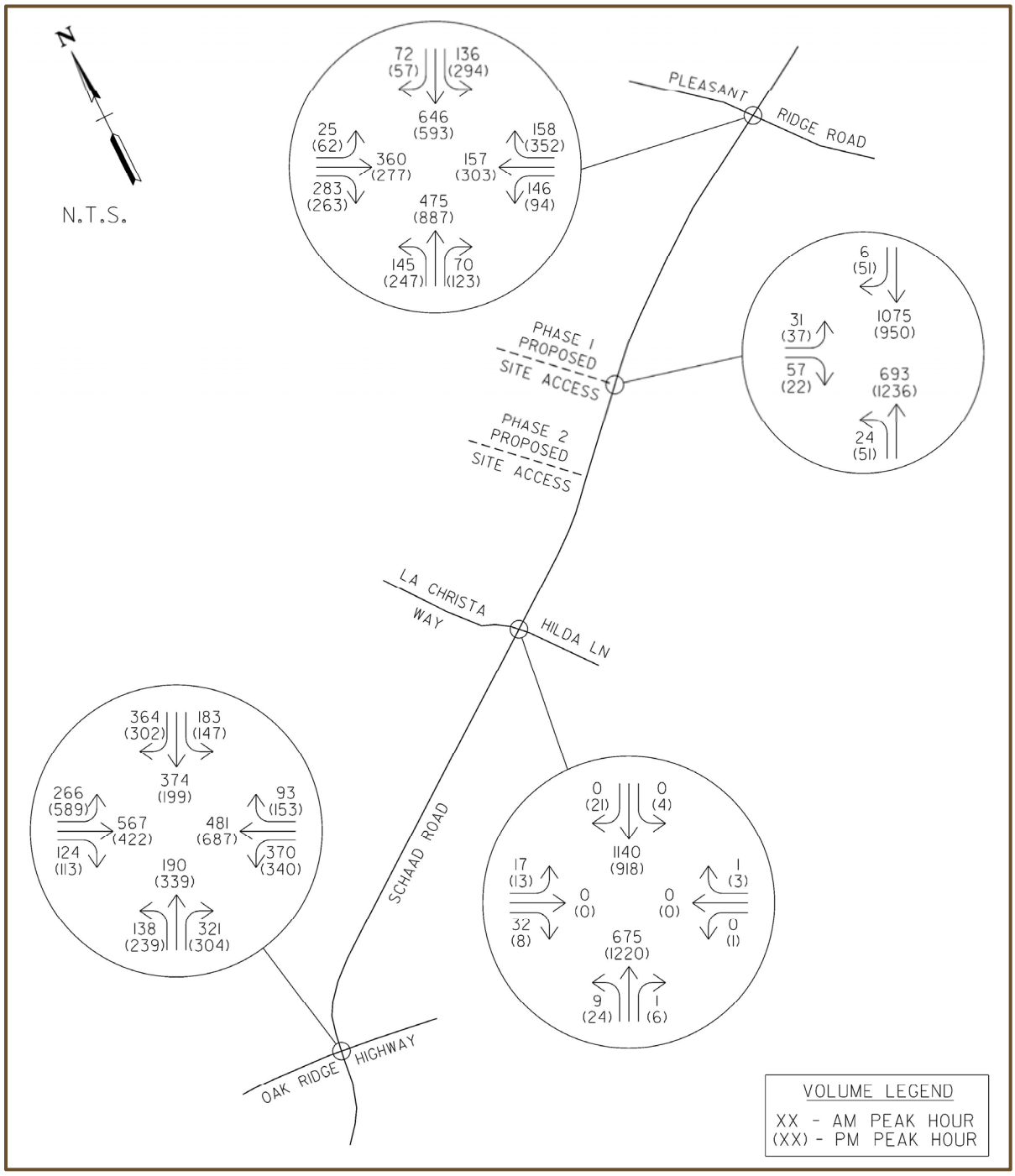


FIGURE 7A
2022 COMBINED TRAFFIC VOLUMES

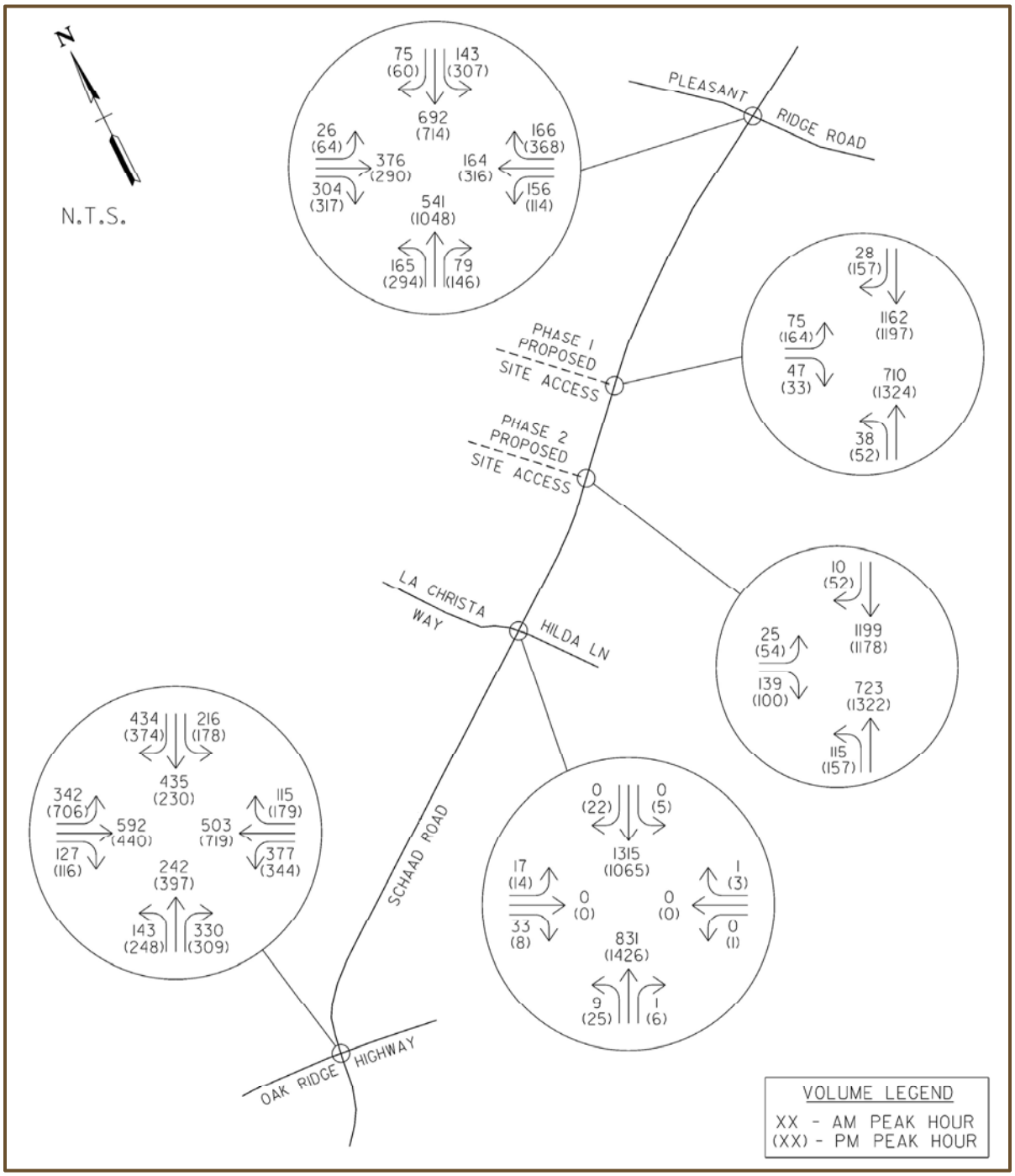


FIGURE 7B
2024 COMBINED TRAFFIC VOLUMES

6.0 EVALUATIONS

INTERSECTION CAPACITY ANALYSES

Capacity analyses employing the methods of the Highway Capacity Manual (HCM 2010) were conducted for the study intersections as described in the preceding sections. This information is summarized in three tables, which each represent roadway conditions that could be present at the conclusion of the associated development phase. TABLES 3A, 3B and 3C may be referenced for tabular summaries of these analyses, while more detailed summaries are presented on the computer printouts contained in the APPENDIX.

TABLE 3A
PHASE 1 – EXISTING ROADWAY GEOMETRY
CAPACITY ANALYSIS SUMMARY

INTERSECTION	TIME PERIOD	YEAR 2018 EXISTING (LOS/DELAY)	YEAR 2022 BACKGROUND (LOS/DELAY)	YEAR 2022 COMBINED EXISTING (LOS/DELAY)	YEAR 2022 COMBINED IMPROVED (LOS/DELAY)
Schaad Road at [1] Pleasant Ridge Road	AM	C / 34.8	D / 42.8	D / 43.5	D / 39.1 [3]
	PM	C / 33.3	D / 40.9	D / 42.1	D / 37.3 [3]
Schaad Road at [2] East Site Access Road	AM	N/A	N/A	F / 55.6	B / 13.9 [4]
	PM			F / 341.4	B / 18.5 [4]
Schaad Road at [2] West Site Access Road	AM	N/A	N/A	N/A	N/A
	PM				
Schaad Road at [2] La Christa Way/Hilda Lane	AM	E / 36.8	F / 72.2	F / 89.8	N/A
	PM	F / 69.7	F / 187.0	F / 232.7	
Schaad Road at [1] Oak Ridge Hwy. (S.R. 62)	AM	D / 43.4	E / 69.9	E / 76.1	E / 58.2 [3]
	PM	F / 83.9	F / 152.3	F / 163.7	F / 132.8 [3]

[1] SIGNALIZED CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for full intersection utilizing HCM methodology.
[2] SIDE STREET STOP CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for highest delay side street approach utilizing HCM methodology.
[3] IMPROVEMENT INCLUDED – Optimized Signal Timing
[4] IMPROVEMENTS INCLUDED – New Traffic Signal with Optimized Signal Timing
See APPENDIX C for computer print-out summaries and discussion of Capacity and Level-of-Service concepts.

The intersection capacity analyses summarized in TABLE 3A indicate that with the existing roadway geometry, two of the study intersections currently experience poor levels-of-service (LOS), LOS "E" or "F", during both peak traffic hours. These conditions will worsen under background traffic conditions and become even worse under combined traffic conditions (full development build-out). In addition, the proposed site access intersection will also experience poor LOS, under combined traffic conditions.

Optimized signal timing would alleviate the issues at Schaad Road and Oak Ridge Highway to a small degree, but conditions would still be poor, especially during the PM peak period. The LOS problem at the proposed site access intersection could be completely alleviated via installation of a traffic signal. It should be noted that part of the issue at Schaad Road and Oak Ridge Highway results from the fact that Schaad Road narrows to a two lane roadway just north of Oak Ridge Highway, causing traffic to be unbalanced in usage of the two northbound Schaad Road through lanes and the two eastbound Oak Ridge Highway left-turn lanes.

TABLE 3B
PHASE 1 – FUTURE PLANNED GEOMETRY
CAPACITY ANALYSIS SUMMARY

INTERSECTION	TIME PERIOD	YEAR 2022 BACKGROUND (LOS/DELAY)	YEAR 2022 COMBINED PLANNED (LOS/DELAY)	YEAR 2022 COMBINED IMPROVED 1 (LOS/DELAY)	YEAR 2022 COMBINED IMPROVED 2 (LOS/DELAY)
Schaad Road at [1] Pleasant Ridge Road	AM	D / 36.1	D / 36.6	C / 29.5 [3]	N/A
	PM	D / 38.6	D / 39.3	C / 33.9 [3]	
Schaad Road at [2] East Site Access Road	AM	N/A	C / 18.7	A / 6.5 [4]	N/A
	PM		C / 23.9	A / 7.8 [4]	
Schaad Road at [2] West Site Access Road	AM	N/A	N/A	N/A	N/A
	PM				
Schaad Road at [2] La Christa Way/Hilda Lane	AM	C / 21.0	C / 22.5	N/A	N/A
	PM	C / 22.3	C / 23.1		
Schaad Road at [1] Oak Ridge Hwy. (S.R. 62)	AM	D / 50.3	D / 48.8	D / 42.6 [3]	C / 32.9 [5]
	PM	E / 65.7	E / 69.4	E / 65.6 [3]	D / 50.2 [5]

[1] SIGNALIZED CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for full intersection utilizing HCM methodology.
[2] SIDE STREET STOP CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for highest delay side street approach utilizing HCM methodology.
[3] IMPROVEMENT INCLUDED – Optimized Signal Timing
[4] IMPROVEMENTS INCLUDED – New Traffic Signal with Optimized Signal Timing
[5] IMPROVEMENTS INCLUDED – Right-turn lanes on all approaches of Schaad Road at Oak Ridge Highway and Optimized Signal Timing
See APPENDIX C for computer print-out summaries and discussion of Capacity and Level-of-Service concepts.

Knox County is moving forward with a design for the widening of Schaad Road to four traffic lanes with a median, between the study intersections of Schaad Road at Oak Ridge Highway and Schaad Road at Pleasant Ridge Road. The current schedule is for this project to be completed by 2022, which would coincide with the anticipated completion of Phase 1 of the proposed development project. TABLE 3B

provides a summary of the capacity analyses that would result from build-out of development Phase 1 and completion of the roadway project, which would result in implementation of the currently planned future geometry.

The proposed widening of Schaad Road between Schaad Road at Oak Ridge Highway and Schaad Road at Pleasant Ridge Road will go a long way towards alleviating LOS problems at the study intersections. Even the traffic signal that was necessary at the site access intersection without widening, will become unneeded under Phase 1 of the development when Schaad Road is widened. A LOS "E" condition would still persist at Oak Ridge Highway and Schaad Road during the PM peak. However, the addition of right-turn lanes on all approaches would address this issue. It should be noted that these lanes will be easy to do on the Oak Ridge Highway approaches, as the existing shoulders can be restriped, and a right-turn lane on the northbound approach has been recommended by a traffic study for another development in the area. This would leave only the southbound right-turn lane to require significant additional construction.

TABLE 3C
PHASE 2 – FUTURE PLANNED GEOMETRY
CAPACITY ANALYSIS SUMMARY

INTERSECTION	TIME PERIOD	YEAR 2024 BACKGROUND (LOS/DELAY)	YEAR 2024 COMBINED PLANNED (LOS/DELAY)	YEAR 2024 COMBINED IMPROVED 1 (LOS/DELAY)	YEAR 2024 COMBINED IMPROVED 2 (LOS/DELAY)
Schaad Road at [1] Pleasant Ridge Road	AM	D / 38.2	D / 40.5	C / 32.7 [3]	N/A
	PM	D / 41.0	D / 48.2	D / 48.3 [3]	
Schaad Road at [2] East Site Access Road	AM	N/A	D / 32.2	A / 9.2 [4]	N/A
	PM		F / 205.3	B / 12.6 [4]	
Schaad Road at [2] West Site Access Road	AM	N/A	C / 21.5	N/A	N/A
	PM		E / 38.1		
Schaad Road at [2] La Christa Way/Hilda Lane	AM	C / 22.1	D / 28.3	N/A	N/A
	PM	C / 23.9	D / 28.9		
Schaad Road at [1] Oak Ridge Hwy. (S.R. 62)	AM	E / 55.1	F / 81.7	E / 56.9 [3]	D / 35.3 [5]
	PM	E / 72.5	F / 95.4	F / 90.4 [3]	E / 58.1 [5]

[1] SIGNALIZED CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for full intersection utilizing HCM methodology.
[2] SIDE STREET STOP CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for highest delay side street approach utilizing HCM methodology.
[3] IMPROVEMENT INCLUDED – Optimized Signal Timing
[4] IMPROVEMENTS INCLUDED – New Traffic Signal with Optimized Signal Timing
[5] IMPROVEMENTS INCLUDED – Right-turn lanes on all approaches of Schaad Road at Oak Ridge Highway and Optimized Signal Timing
See APPENDIX C for computer print-out summaries and discussion of Capacity and Level-of-Service concepts.

TABLE 3C provides a summary of the capacity analyses that would result from build-out of development Phase 2 and completion of the previously discussed roadway project. The results are similar to those shown in TABLE 3B (Phase 1 development), except that the traffic signal at the original site entrance will be clearly needed, based on PM peak hour traffic. In addition, LOS "E" operation will marginally occur at the Oak Ridge Highway and Schaad Road intersection during the PM peak, even with right turn lanes added to all intersection approaches.

TURN LANE ASSESSMENT

The need for right-turn lanes for the two proposed site access intersections was evaluated utilizing the turn lane warrant criteria published in the Knox County Access Control and Driveway Design Policy, as developed by Harmelink. It is assumed that left-turn lanes will be provided for each of these intersections when the Schaad Road roadway widening project is constructed.

The result of this assessment is that a right-turn lane will be warranted for Phase 1 traffic at the east site intersection, which is the only one proposed, for Phase 1 development. Right-turn lanes will also be warranted for both driveways during Phase 2.

SIGHT DISTANCE ASSESSMENT

Intersection corner sight distance was field evaluated for the two site access study intersections located on Schaad Road. The posted speed limit on this section of Schaad Road is 40 mph, so the required minimum sight distance is 400 feet. Based on our field evaluation, sight distances well in excess of this minimum value are easily achievable looking both directions from both of these intersections. This will require the cutting of a line of trees and brush along the north side of Schaad Road, but this vegetable is either on the roadway right-of-way or on the project property. Once this is accomplished, not only will these sight distances greatly exceed the required 400 foot minimum, they will in fact exceed 500 feet. Once Schaad Road is widened, these distances will likely be significantly greater.

TRAFFIC SIGNAL WARRANT ASSESSMENT

The traffic signal warrants from the *Manual on Uniform Traffic Control Devices (MUTCD)* were evaluated for the project east site access intersection on Schaad Road, using spreadsheets developed for this purpose. Unfortunately, with the only available traffic data being for the A.M. and P.M. peak traffic hours, this assessment is somewhat limited. The results did, however, allow some reasonable conclusions to be made, which are summarized below. The traffic signal warrant spreadsheets are located in APPENDIX C.

1. The peak hour signal warrant will likely be met at some point in time nearing full build-out of development Phase 1, if Schaad Road at the development site remains two lanes. It is unlikely that other signal warrants would be met under these conditions.
2. No signal warrants are likely to be met at full build-out of development Phase 1, assuming Schaad Road is widened to four traffic lanes.
3. Multiple signal warrants are likely to be met when development Phase 2 is built-out, even with the four lane roadway completed. As a minimum, the peak hour warrant will be met and it is extremely likely that the four-hour warrant will be met.

7.0 CONCLUSIONS & RECOMMENDATIONS

The primary conclusion of this study is that the traffic generated from the proposed mixed-use development will contribute towards negative level-of-service impacts at several of the study intersections. This is especially true prior to completion of the Schaad Road widening project, which will address many of these issues. The following recommendations are considered appropriate in order to maximize the operations and safety of the study intersections, and thus to minimize the impact of this development on area traffic:

1. All traffic signals in this area should have their signal timing evaluated regularly in order to ensure optimized traffic flow and operations. Given that significant development appears likely for this area over the next several years, these reviews should be conducted every one or two years.
2. The Phase 1 site access intersection should be monitored for side street delays as the project is being built-out, and if delays become intolerable, considered for installation of a temporary traffic signal. It should be noted that in addition to helping the site access intersection, such a signal would create gaps in traffic to reduce side street delays at other nearby intersections such as La Christa Way/Hilda Lane.
3. Knox County should prioritize the Schaad Road widening project, as it is desperately needed for this rapidly developing area. This project should include left-turn lanes and median openings for both project site intersections. The eastbound left-turn storage for the two site intersections should be a minimum length of 125 feet.
4. Right-turn lanes should be added to the two project site intersections, each with a minimum storage length of 75 feet.
5. Both project site intersections should be provided with left and right-turn lanes on their side street southbound approaches. The right-turn lanes for these two approaches should be a minimum of 100 feet at the west site entrance and 150 feet at the east site entrance.
6. A permanent traffic signal will likely need to be installed at the east project site intersection in conjunction with the Schaad Road widening project, assuming that project Phase 2 is on track for development. This signal should include westbound protected-permissive left-turn operation.
7. The intersection of Schaad Road and Oak Ridge Highway should have right-turn lanes constructed on all four intersection approaches. It should be noted that these lanes will be easy to do on the Oak Ridge Highway approaches, as the existing shoulders can be restriped, and a right-turn lane on the northbound approach has been recommended by a traffic study for another development in the area. This would leave only the southbound right-turn lane to require significant additional construction.
8. New site signage and landscaping should be carefully positioned to prevent blockage of the line of sight for drivers exiting at project site driveways.
9. The project developer should have a land surveyor certify that the required corner sight distance is available upon the completion of each project access roadway onto Schaad Road.

8.0 APPENDIX

APPENDIX A | TRAFFIC DATA

APPENDIX B | TRIP GENERATION

APPENDIX C | ANALYSES

8.0 APPENDIX

APPENDIX A | TRAFFIC DATA

APPENDIX B | TRIP GENERATION

APPENDIX C | ANALYSES

APPENDIX A | TRAFFIC DATA

Traffic History

Station #	County	Location	Route #
000075	Knox	WEST OF I-75	01254

Pleasant Ridge Road - South of Schaad Road

Record	Year	AADT
1	2016	11440
2	2015	11327
3	2014	11530
4	2013	10690
5	2012	9302
6	2011	9031
7	2010	8764
8	2009	11208
9	2008	11174
10	2007	10849
11	2006	10383
12	2005	10351
13	2004	10542
14	2003	9626
15	2002	9973
16	2001	8898
17	2000	9005
18	1999	9007
19	1998	9514
20	1997	7693
21	1996	7495
22	1995	8511
23	1994	7142
24	1993	7351
25	1992	5665
26	1991	5900
27	1990	6164

2017 - 12,540

Traffic History

Station #	County	Location	Route #
000076	Knox	SOUTHWEST OF I-75	01252

Schaad Road - Between Pleasant Ridge Rd. & Western Ave.

2017 - 15,669

Record	Year	AADT
1	2016	15558
2	2015	15446
3	2014	15578
4	2013	15224
5	2012	16296
6	2011	14232
7	2010	14575
8	2009	13280
9	2008	12676
10	2007	13452
11	2006	13915
12	2005	13850
13	2004	13009
14	2003	11514
15	2002	8775
16	2001	9000
17	2000	8539
18	1999	7815
19	1998	6586
20	1997	5524
21	1996	6034
22	1995	5351
23	1994	6200
24	1993	6249
25	1992	5252
26	1991	3100
27	1990	2725

Traffic History

Station #	County	Location	Route #
000078	Knox	WEST OF RIDGEDALE	SR062

Oak Ridge Hwy. (SR 62) - West of Schaad Road

Record	Year	AADT
1	2016	18845
2	2015	17151
3	2014	19834
4	2013	20690
5	2012	18626
6	2011	17587
7	2010	18226
8	2009	17740
9	2008	17080
10	2007	18593
11	2006	19857
12	2005	20633
13	2004	19594
14	2003	18053
15	2002	18925
16	2001	19309
17	2000	17193
18	1999	17772
19	1998	16512
20	1997	16076
21	1996	15671
22	1995	18065
23	1994	13830
24	1993	15228
25	1992	13381
26	1991	11717
27	1990	11810

2017 - 17,076

Alan Childers

From: Karen Watts <Karen.Watts@tn.gov>
Sent: Monday, May 21, 2018 11:44 AM
To: Alan Childers
Subject: RE: Traffic Count Request

Mr. Childers, the AADT for the three stations you have requested are:

75-12,540
76-15,669
78-17,076
Are all 2017
Have a good rest of the week.
karen

From: Alan Childers [mailto:achilders@cannon-cannon.com]
Sent: Monday, May 21, 2018 10:28 AM
To: Karen Watts
Cc: Brian Haas
Subject: Traffic Count Request

Karen,

We are doing a traffic study and it would be very helpful to have 2017 data for the following stations if available:

All in Knox County:
-Station 75 - West of I-75, Route 01254
-Station 76 - Southwest of I-75, Route 01252
-Station 78 - West of Ridgedale, SR 62

ALAN CHILDERS, P.E.

CANNON & CANNON INC

DIRECT: 865.770.4065
MAIN: 865.670.8555
FAX: 865.670.8866
EMAIL: achilders@cannon-cannon.com

Cannon & Cannon, Inc.
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Knoxville, Tennessee 37919
www.cannon-cannon.com

enhancing community life by design

CDM Smith, Inc.
1100 Marion Street, Ste 300
Knoxville, TN 37921
865-963-4300

File Name : Oak Ridge Hwy & Schaad
Site Code : 00000000
Start Date : 2/15/2018
Page No : 1

Groups Printed- Unshifted

	SCHAAD RD Southbound				OAK RIDGE HWY Westbound				SCHAAD RD Northbound				OAK RIDGE HWY Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	18	45	75	138	48	82	7	137	14	30	22	66	36	103	20	159	500
07:15 AM	15	52	73	140	37	109	16	162	22	22	47	91	31	102	15	148	541
07:30 AM	33	77	73	183	46	116	21	183	42	44	64	150	64	133	17	214	730
07:45 AM	41	64	85	190	34	141	13	188	20	34	42	96	78	144	11	233	707
Total	107	238	306	651	165	448	57	670	98	130	175	403	209	482	63	754	2478
08:00 AM	52	72	74	198	31	89	15	135	18	47	19	84	37	118	11	166	583
08:15 AM	32	47	58	137	27	99	17	143	16	46	16	78	59	105	9	173	531
08:30 AM	31	45	42	118	19	74	15	108	11	15	26	52	46	78	19	143	421
08:45 AM	18	25	49	92	26	89	13	128	13	26	11	52	50	89	19	158	430
Total	133	189	223	545	103	351	60	514	58	136	72	266	192	390	58	640	1965
*** BREAK ***																	
04:00 PM	32	29	54	115	17	161	30	208	28	49	16	93	89	111	15	215	631
04:15 PM	23	21	51	95	24	95	23	142	30	41	6	77	75	47	1	123	437
04:30 PM	29	41	57	127	19	157	18	194	27	43	19	89	110	88	7	205	615
04:45 PM	22	27	64	113	22	176	25	223	34	81	16	131	128	89	17	234	701
Total	106	118	226	450	82	589	96	767	119	214	57	390	402	335	40	777	2384
05:00 PM	27	24	91	142	14	187	39	240	48	41	29	118	118	112	5	235	735
05:15 PM	28	35	52	115	24	106	16	146	42	52	33	127	106	58	17	181	569
05:30 PM	32	23	52	107	25	171	33	229	47	72	14	133	132	103	5	240	709
05:45 PM	25	15	60	100	22	89	17	128	25	60	18	103	69	53	3	125	456
Total	112	97	255	464	85	553	105	743	162	225	94	481	425	326	30	781	2469
Grand Total	458	642	1010	2110	435	1941	318	2694	437	705	398	1540	1228	1533	191	2952	9296
Apprch %	21.7	30.4	47.9		16.1	72	11.8		28.4	45.8	25.8		41.6	51.9	6.5		
Total %	4.9	6.9	10.9	22.7	4.7	20.9	3.4	29	4.7	7.6	4.3	16.6	13.2	16.5	2.1	31.8	

	SCHAAD RD Southbound				OAK RIDGE HWY Westbound				SCHAAD RD Northbound				OAK RIDGE HWY Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	15	52	73	140	37	109	16	162	22	22	47	91	31	102	15	148	541
07:30 AM	33	77	73	183	46	116	21	183	42	44	64	150	64	133	17	214	730
07:45 AM	41	64	85	190	34	141	13	188	20	34	42	96	78	144	11	233	707
08:00 AM	52	72	74	198	31	89	15	135	18	47	19	84	37	118	11	166	583
Total Volume	141	265	305	711	148	455	65	668	102	147	172	421	210	497	54	761	2561
% App. Total	19.8	37.3	42.9		22.2	68.1	9.7		24.2	34.9	40.9		27.6	65.3	7.1		
PHF	.678	.860	.897	.898	.804	.807	.774	.888	.607	.782	.672	.702	.673	.863	.794	.817	.877
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	22	27	64	113	22	176	25	223	34	81	16	131	128	89	17	234	701
05:00 PM	27	24	91	142	14	187	39	240	48	41	29	118	118	112	5	235	735
05:15 PM	28	35	52	115	24	106	16	146	42	52	33	127	106	58	17	181	569
05:30 PM	32	23	52	107	25	171	33	229	47	72	14	133	132	103	5	240	709
Total Volume	109	109	259	477	85	640	113	838	171	246	92	509	484	362	44	890	2714
% App. Total	22.9	22.9	54.3		10.1	76.4	13.5		33.6	48.3	18.1		54.4	40.7	4.9		
PHF	.852	.779	.712	.840	.850	.856	.724	.873	.891	.759	.697	.957	.917	.808	.647	.927	.923

Cannon & Cannon, Inc.
Consulting Engineers - Field Surveyors
8550 Kingston Pike
Knoxville, TN 37919

CCI Project Name: Schaad Road TIS
CCI Project Number: 773-0011
Intersection: Schaad at Pleasant Ridge
Counted By: CCI

File Name : Schaad_Pleasant Ridge_5-17-18
Site Code : 00000002
Start Date : 5/17/2018
Page No : 1

Groups Printed- Group 1

	Pleasant Ridge Road Southbound					Schaad Road Westbound					Pleasant Ridge Road Northbound					Schaad Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	4	37	32	0	73	8	63	13	0	84	25	23	22	0	70	14	50	9	0	73	300
07:15 AM	1	79	67	0	147	23	111	19	0	153	31	41	29	0	101	30	89	13	0	132	533
07:30 AM	6	106	55	0	167	31	144	19	0	194	31	26	41	0	98	30	84	13	0	127	586
07:45 AM	8	77	50	0	135	37	155	19	0	211	31	43	44	0	118	33	108	17	0	158	622
Total	19	299	204	0	522	99	473	70	0	642	118	133	136	0	387	107	331	52	0	490	2041
08:00 AM	8	65	65	0	138	33	129	8	0	170	29	33	30	0	92	21	94	12	0	127	527
08:15 AM	8	70	64	0	142	41	99	6	0	146	25	23	31	0	79	21	111	9	0	141	508
08:30 AM	7	36	44	0	87	24	65	11	0	100	27	39	29	0	95	26	93	10	0	129	411
08:45 AM	11	36	29	0	76	22	73	7	0	102	15	32	41	0	88	20	95	17	0	132	398
Total	34	207	202	0	443	120	366	32	0	518	96	127	131	0	354	88	393	48	0	529	1844
*** BREAK ***																					
04:00 PM	14	47	36	0	97	62	106	18	0	186	15	51	55	0	121	37	121	22	0	180	584
04:15 PM	20	67	53	0	140	51	85	26	0	162	18	64	57	0	139	35	144	23	0	202	643
04:30 PM	28	49	51	0	128	47	112	17	0	176	15	48	66	0	129	36	150	27	0	213	646
04:45 PM	11	64	44	0	119	54	106	12	0	172	17	64	84	0	165	44	214	32	0	290	746
Total	73	227	184	0	484	214	409	73	0	696	65	227	262	0	554	152	629	104	0	885	2619
05:00 PM	22	56	51	0	129	62	116	11	0	189	18	69	82	0	169	44	153	26	0	223	710
05:15 PM	16	80	51	0	147	79	111	21	0	211	14	80	78	0	172	56	171	19	0	246	776
05:30 PM	7	52	55	0	114	72	120	8	0	200	23	62	76	7	168	56	178	22	0	256	738
05:45 PM	8	75	42	0	125	50	109	15	0	174	10	64	83	0	157	49	186	20	0	255	711
Total	53	263	199	0	515	263	456	55	0	774	65	275	319	7	666	205	688	87	0	980	2935
Grand Total	179	996	789	0	1964	696	1704	230	0	2630	344	762	848	7	1961	552	2041	291	0	2884	9439
Apprch %	9.1	50.7	40.2	0.0		26.5	64.8	8.7	0.0		17.5	38.9	43.2	0.4		19.1	70.8	10.1	0.0		
Total %	1.9	10.6	8.4	0.0	20.8	7.4	18.1	2.4	0.0	27.9	3.6	8.1	9.0	0.1	20.8	5.8	21.6	3.1	0.0	30.6	

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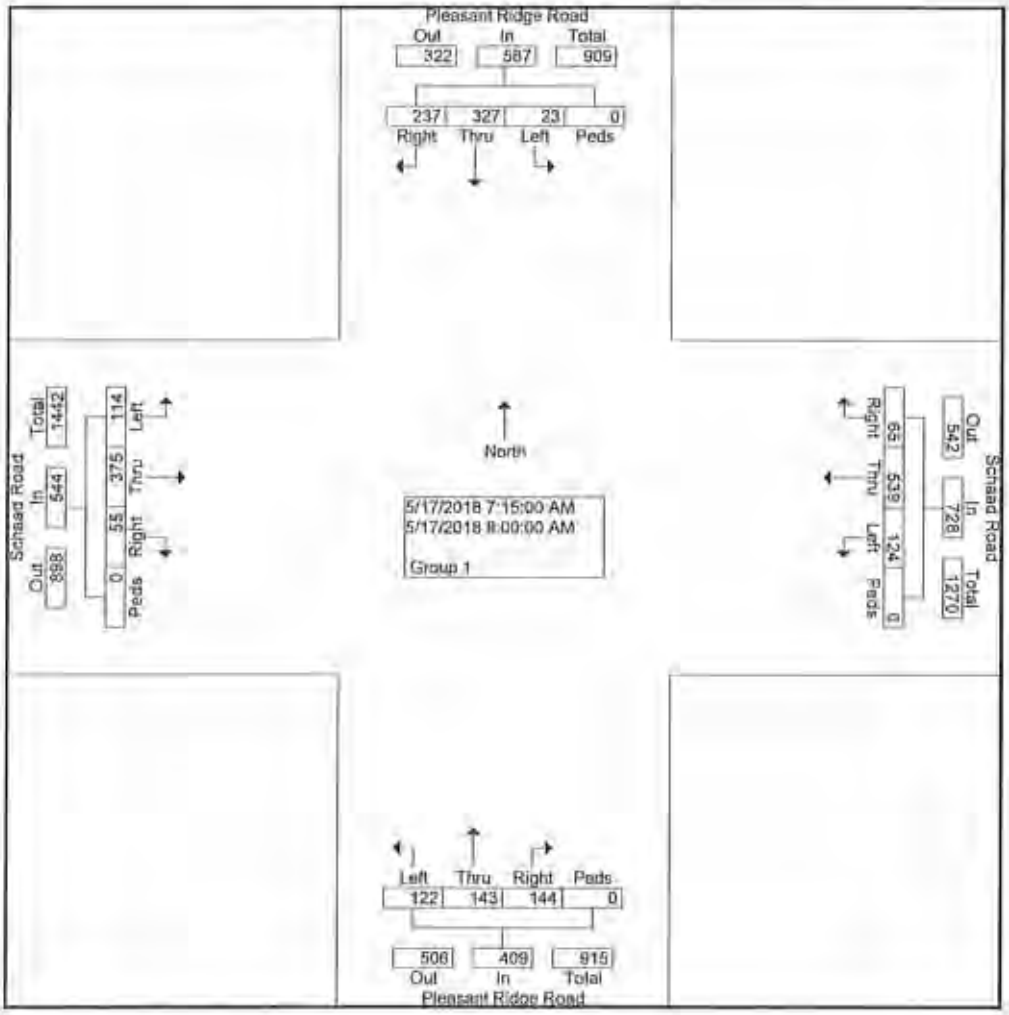
Consulting Engineers - Field Surveyors
8550 Kingston Pike
Knoxville, TN 37919

File Name : Schaad_Pleasant Ridge_5-17-18
Site Code : 00000002
Start Date : 5/17/2018
Page No : 2

	Pleasant Ridge Road Southbound					Schaad Road Westbound					Pleasant Ridge Road Northbound					Schaad Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Intersection	07:15 AM																				
Volume	23	327	237	0	587	124	539	65	0	728	122	143	144	0	409	114	375	55	0	544	2268
Percent	3.9	55.7	40.4	0.0		17.0	74.0	8.9	0.0		29.8	35.0	35.2	0.0		21.0	68.9	10.1	0.0		
07:45 Volume	8	77	50	0	135	37	155	19	0	211	31	43	44	0	118	33	108	17	0	158	622
Peak Factor																					0.912
High Int.	07:30 AM					07:45 AM					07:45 AM					07:45 AM					
Volume	6	106	55	0	167	37	155	19	0	211	31	43	44	0	118	33	108	17	0	158	
Peak Factor					0.879					0.863					0.867					0.861	



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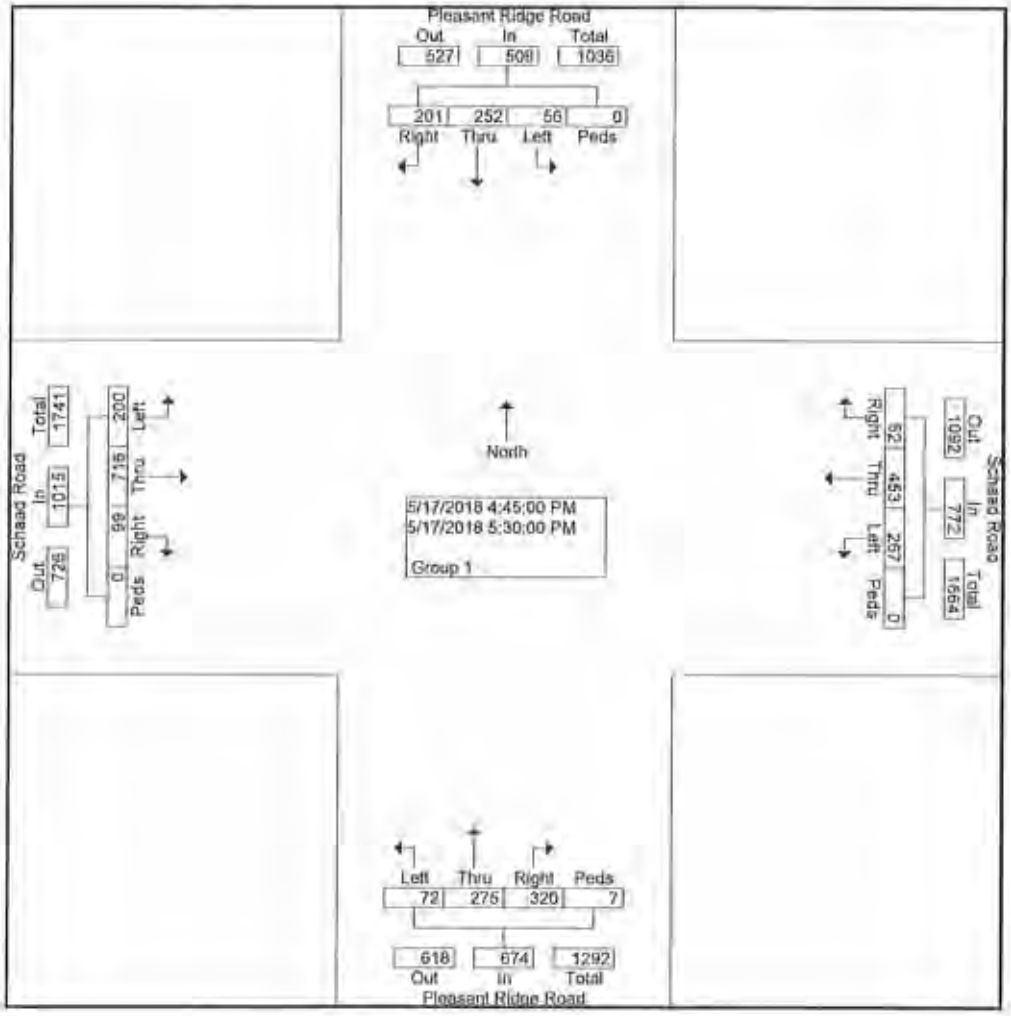
8550 Kingston Pike
Knoxville, TN 37919

File Name : Schaad_Pleasant Ridge_5-17-18
Site Code : 00000002
Start Date : 5/17/2018
Page No : 3

	Pleasant Ridge Road Southbound					Schaad Road Westbound					Pleasant Ridge Road Northbound					Schaad Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:45 PM																				
Volume	56	252	201	0	509	267	453	52	0	772	72	275	320	7	674	200	716	99	0	1015	2970
Percent	11.0	49.5	39.5	0.0		34.6	58.7	6.7	0.0		10.7	40.8	47.5	1.0		19.7	70.5	9.8	0.0		
05:15 Volume	16	80	51	0	147	79	111	21	0	211	14	80	78	0	172	56	171	19	0	246	776
Peak Factor																					0.957
High Int.	05:15 PM					05:15 PM					05:15 PM					04:45 PM					
Volume	16	80	51	0	147	79	111	21	0	211	14	80	78	0	172	44	214	32	0	290	
Peak Factor					0.866					0.910					0.980					0.875	



Cannon & Cannon, Inc.
Consulting Engineers - Field Surveyors
8550 Kingston Pike
Knoxville, TN 37919

CCI Project Name: Schaad Road TIS
CCI Project Number: 773-0011
Intersection: Schaad at La Christa
Counted By: CCI

File Name : Schaad_La Crista_5-17-18
Site Code : 00000001
Start Date : 5/17/2018
Page No : 1

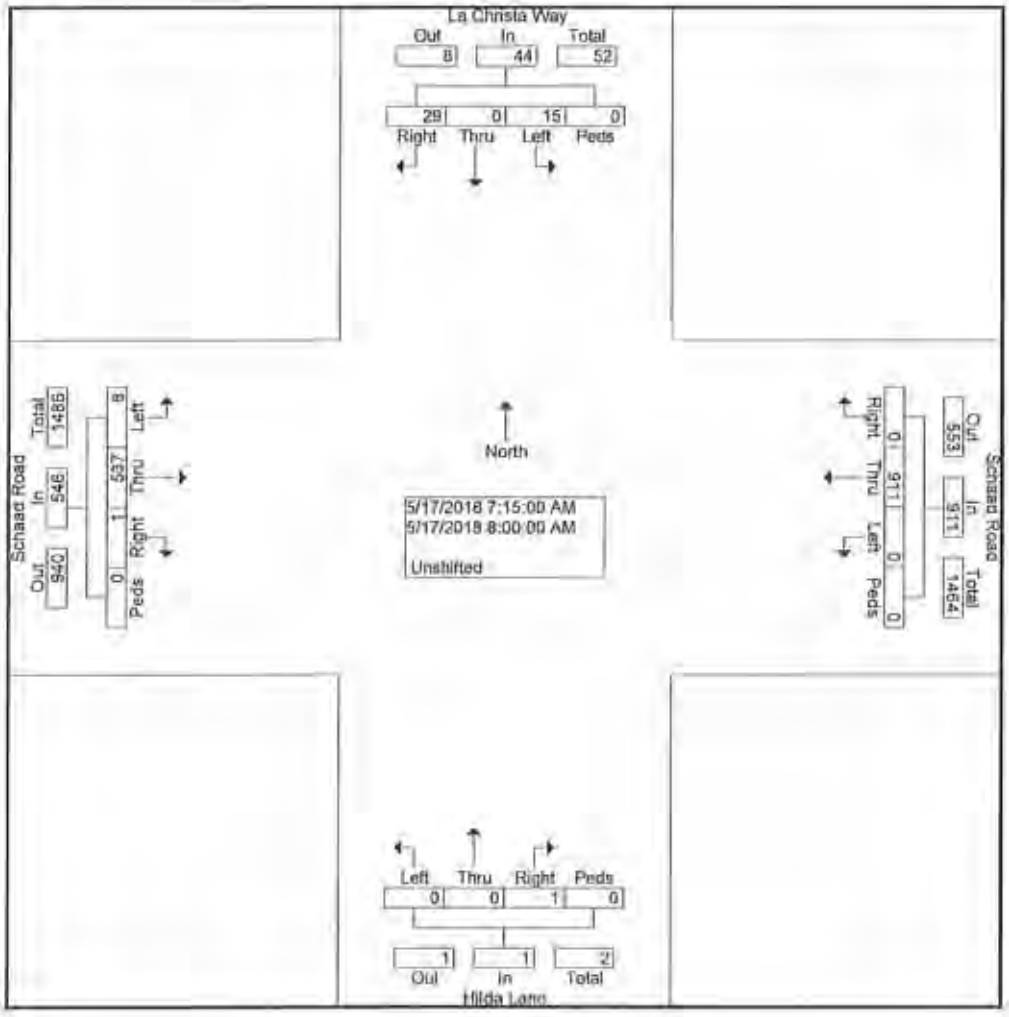
Groups Printed- Unshifted

	La Christa Way Southbound					Schaad Road Westbound					Hilda Lane Northbound					Schaad Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	4	0	8	0	12	0	144	1	0	145	3	0	2	0	5	0	90	0	0	90	252
07:15 AM	1	0	12	0	13	0	220	0	0	220	0	0	0	0	0	2	137	0	0	139	372
07:30 AM	6	0	6	0	12	0	236	0	0	236	0	0	1	0	1	1	134	1	0	136	385
07:45 AM	6	0	7	0	13	0	249	0	0	249	0	0	0	0	0	3	143	0	0	146	408
Total	17	0	33	0	50	0	849	1	0	850	3	0	3	0	6	6	504	1	0	511	1417
08:00 AM	2	0	4	0	6	0	206	0	0	206	0	0	0	0	0	2	123	0	0	125	337
08:15 AM	2	0	6	0	8	0	183	0	0	183	0	0	0	0	0	1	125	0	0	126	317
08:30 AM	4	0	3	0	7	0	138	1	0	139	0	0	0	0	0	3	133	0	0	136	282
08:45 AM	3	0	7	0	10	0	103	1	0	104	0	0	0	0	0	0	127	0	0	127	241
Total	11	0	20	0	31	0	630	2	0	632	0	0	0	0	0	6	508	0	0	514	1177
*** BREAK ***																					
04:00 PM	2	0	2	0	4	0	138	4	0	142	0	0	0	0	0	3	189	0	0	192	338
04:15 PM	0	0	2	0	2	1	168	2	0	171	0	0	2	0	2	2	209	0	0	211	386
04:30 PM	5	0	1	0	6	0	173	3	0	176	0	0	2	0	2	3	232	0	0	235	419
04:45 PM	2	0	1	0	3	0	146	4	0	150	0	0	0	0	0	2	255	0	0	257	410
Total	9	0	6	0	15	1	625	13	0	639	0	0	4	0	4	10	885	0	0	895	1553
05:00 PM	1	0	1	0	2	0	187	5	0	192	0	0	0	0	0	4	244	0	0	248	442
05:15 PM	4	0	2	0	6	1	166	6	0	173	0	0	0	0	0	7	245	1	0	253	432
05:30 PM	4	0	1	0	5	2	213	4	0	219	1	0	1	0	2	8	232	3	0	243	469
05:45 PM	3	0	3	0	6	1	157	4	0	162	0	0	2	0	2	3	248	1	0	252	422
Total	12	0	7	0	19	4	723	19	0	746	1	0	3	0	4	22	969	5	0	996	1765
Grand Total	49	0	66	0	115	5	2827	35	0	2867	4	0	10	0	14	44	2866	6	0	2916	5912
Apprch %	42.6	0.0	57.4	0.0		0.2	98.6	1.2	0.0		28.6	0.0	71.4	0.0		1.5	98.3	0.2	0.0		
Total %	0.8	0.0	1.1	0.0	1.9	0.1	47.8	0.6	0.0	48.5	0.1	0.0	0.2	0.0	0.2	0.7	48.5	0.1	0.0	49.3	

Cannon & Cannon, Inc.
Consulting Engineers - Field Surveyors
8550 Kingston Pike
Knoxville, TN 37919

File Name : Schaad_La Crista_5-17-18
Site Code : 00000001
Start Date : 5/17/2018

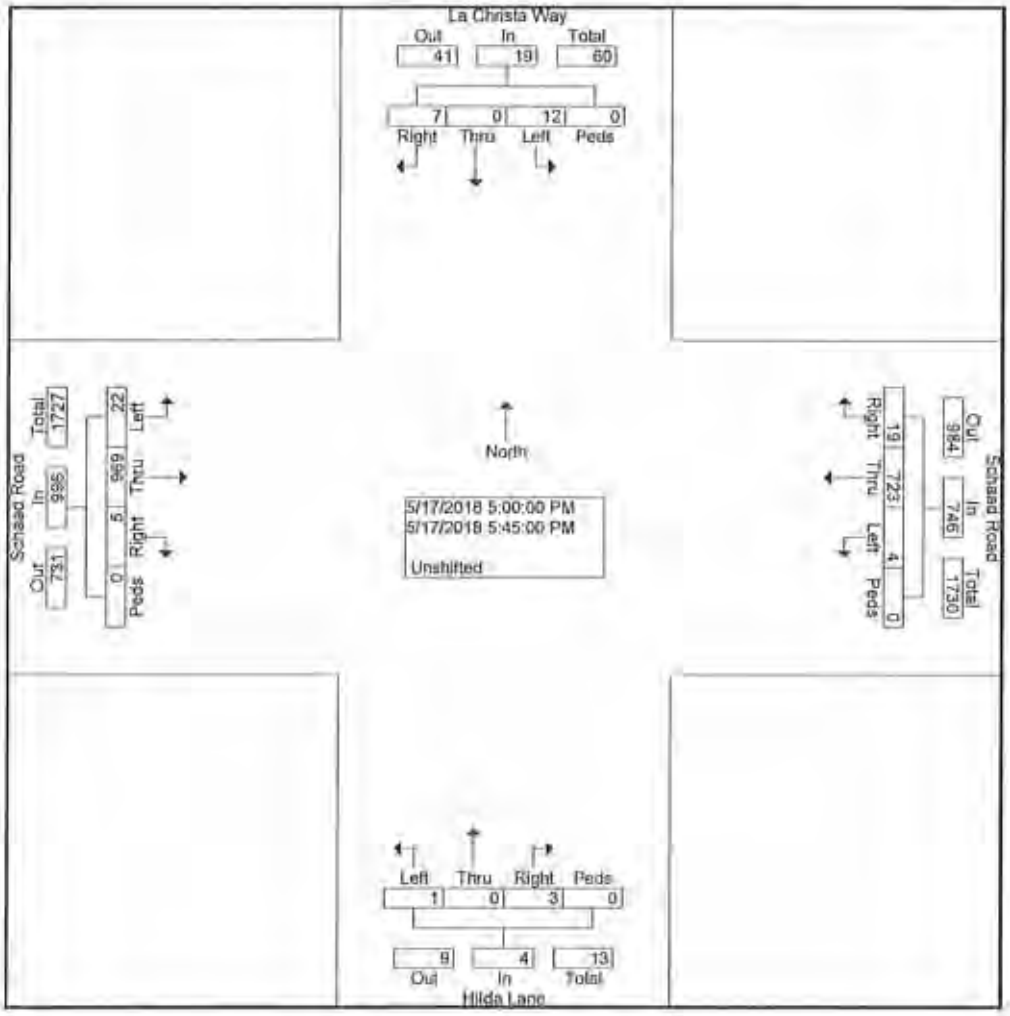
	La Christa Way Southbound					Schaad Road Westbound					Hilda Lane Northbound					Schaad Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Intersection	07:15 AM																				
Volume	15	0	29	0	44	0	911	0	0	911	0	0	1	0	1	8	537	1	0	546	1502
Percent	34.1	0.0	65.9	0.0		0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		1.5	98.4	0.2	0.0		
07:45 Volume	6	0	7	0	13	0	249	0	0	249	0	0	0	0	0	3	143	0	0	146	408
Peak Factor																					0.920
High Int.	07:15 AM					07:45 AM					07:30 AM					07:45 AM					
Volume	1	0	12	0	13	0	249	0	0	249	0	0	1	0	1	3	143	0	0	146	
Peak Factor					0.846					0.911					0.250					0.932	



Cannon & Cannon, Inc.
Consulting Engineers - Field Surveyors
8550 Kingston Pike
Knoxville, TN 37919

File Name : Schaad_La Crista_5-17-18
Site Code : 00000001
Start Date : 5/17/2018
Page No : 3

	La Christa Way Southbound					Schaad Road Westbound					Hilda Lane Northbound					Schaad Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	05:00 PM																				
Volume	12	0	7	0	19	4	723	19	0	746	1	0	3	0	4	22	969	5	0	996	1765
Percent	63.2	0.0	36.8	0.0		0.5	96.9	2.5	0.0		25.0	0.0	75.0	0.0		2.2	97.3	0.5	0.0		
05:30 Volume	4	0	1	0	5	2	213	4	0	219	1	0	1	0	2	8	232	3	0	243	469
Peak Factor																					0.941
High Int.	05:15 PM					05:30 PM					05:30 PM					05:15 PM					
Volume	4	0	2	0	6	2	213	4	0	219	1	0	1	0	2	7	245	1	0	253	
Peak Factor					0.792					0.850					0.500					0.984	



APPENDIX B | TRIP GENERATION

Single-Family Detached Housing
(210)

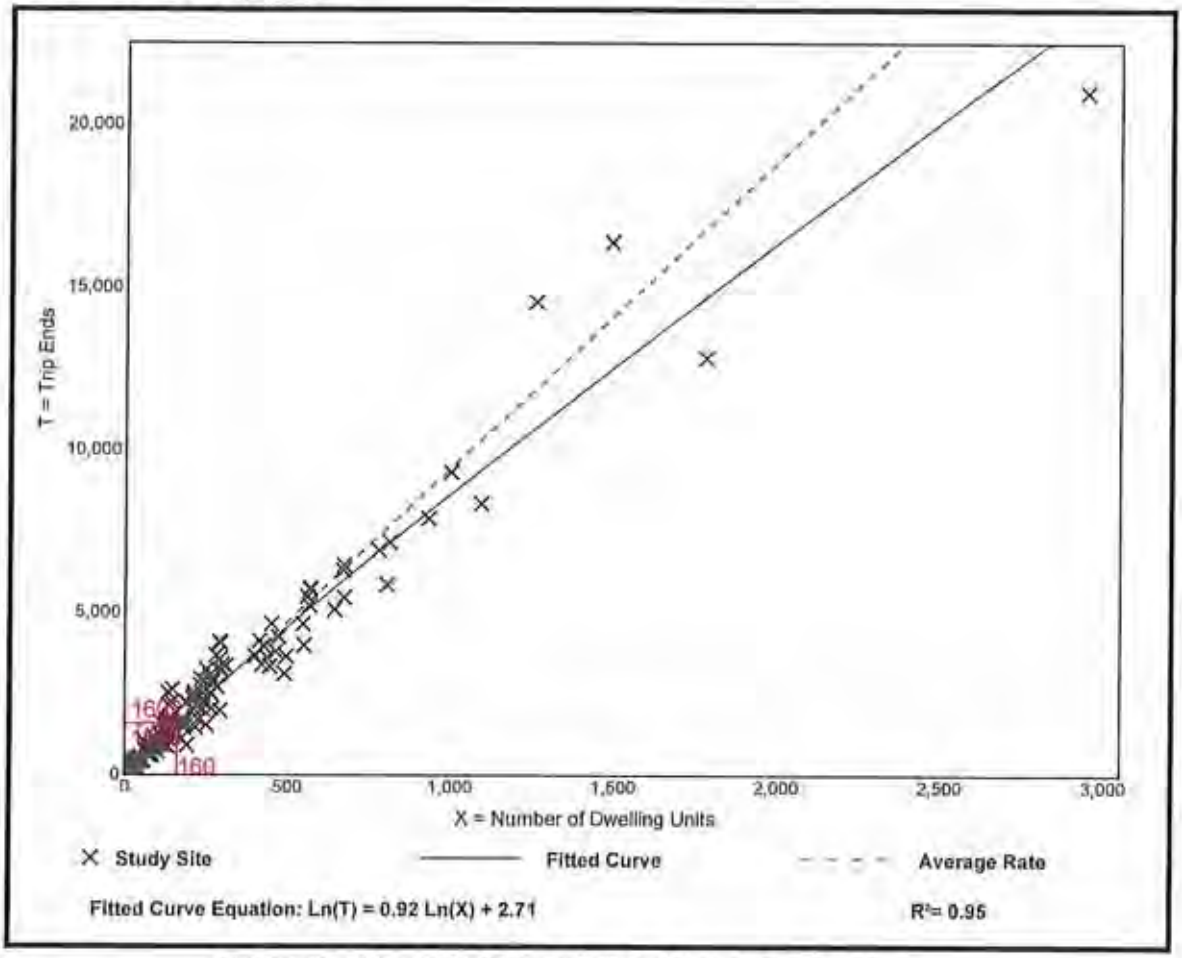
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



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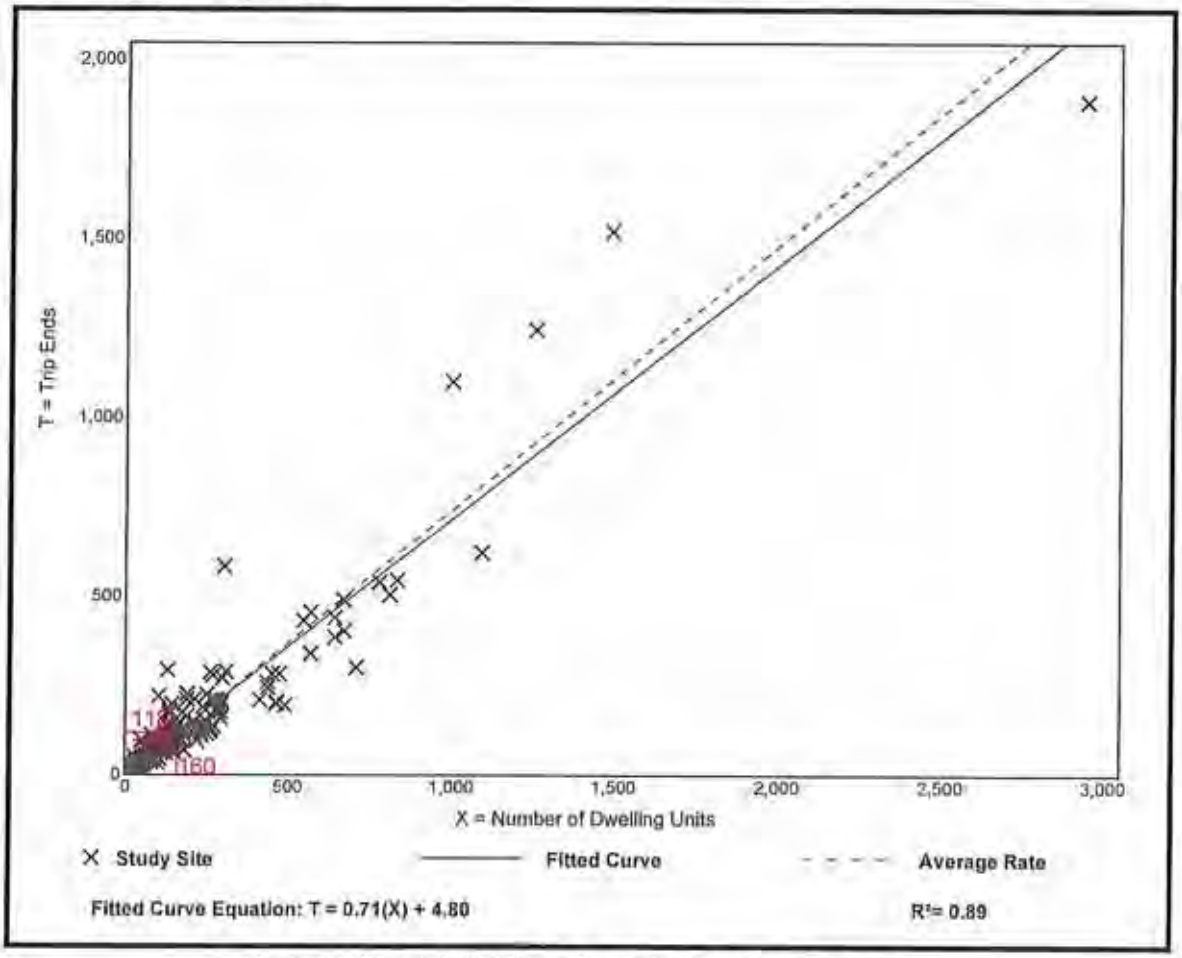
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	173
Avg. Num. of Dwelling Units:	219
Directional Distribution:	25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



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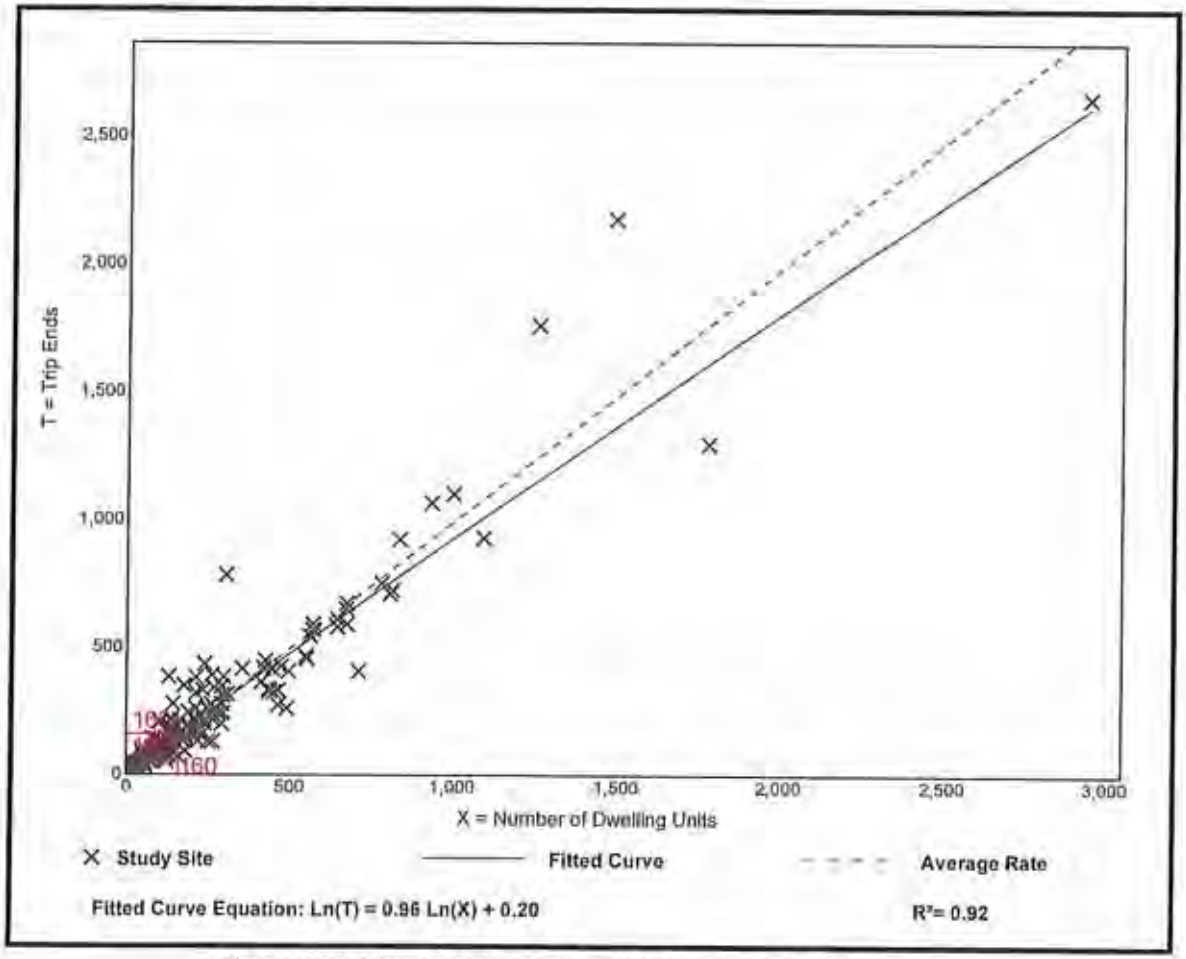
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	190
Avg. Num. of Dwelling Units:	242
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



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Multifamily Housing (Low-Rise)
(220)

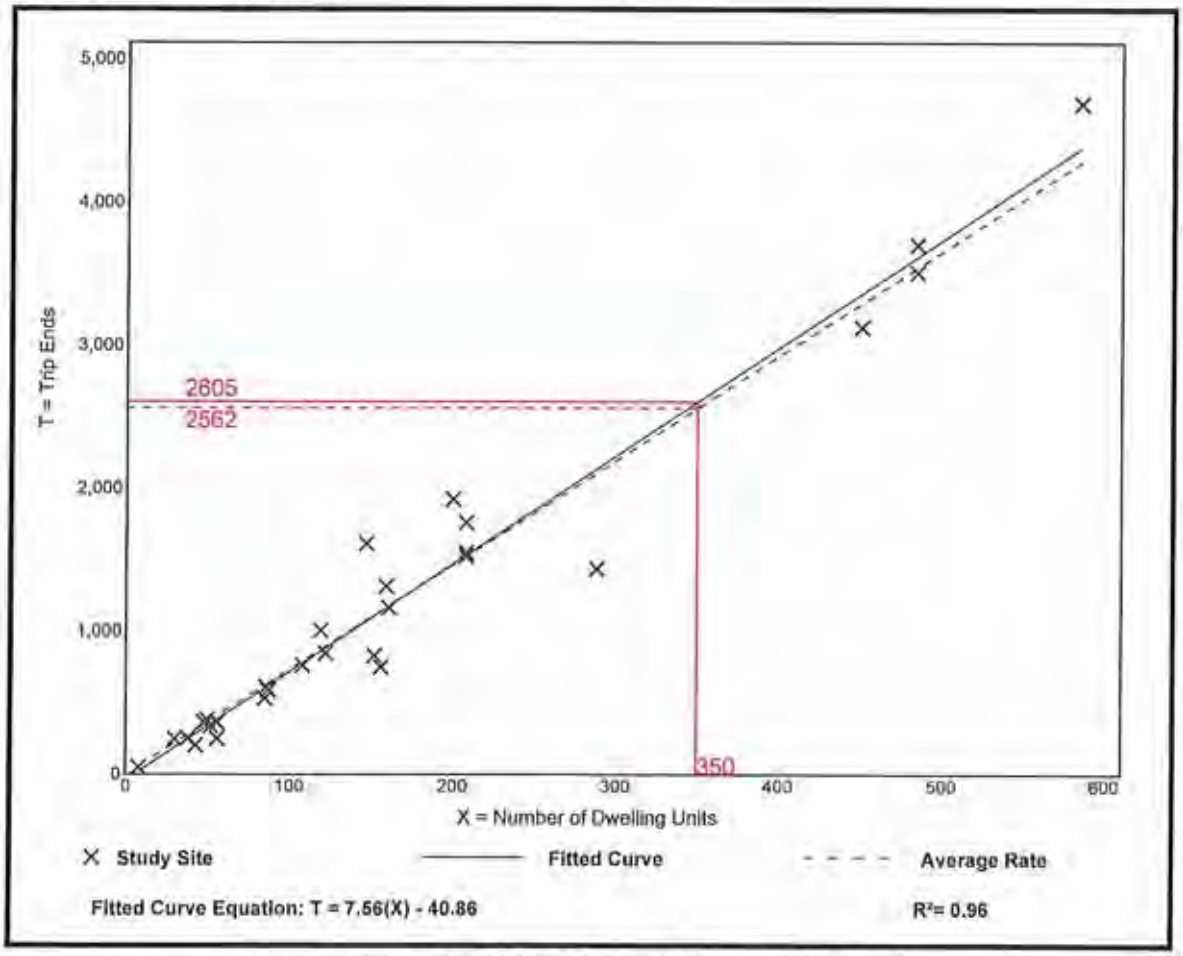
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 29
Avg. Num. of Dwelling Units: 168
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.32	4.45 - 10.97	1.31

Data Plot and Equation



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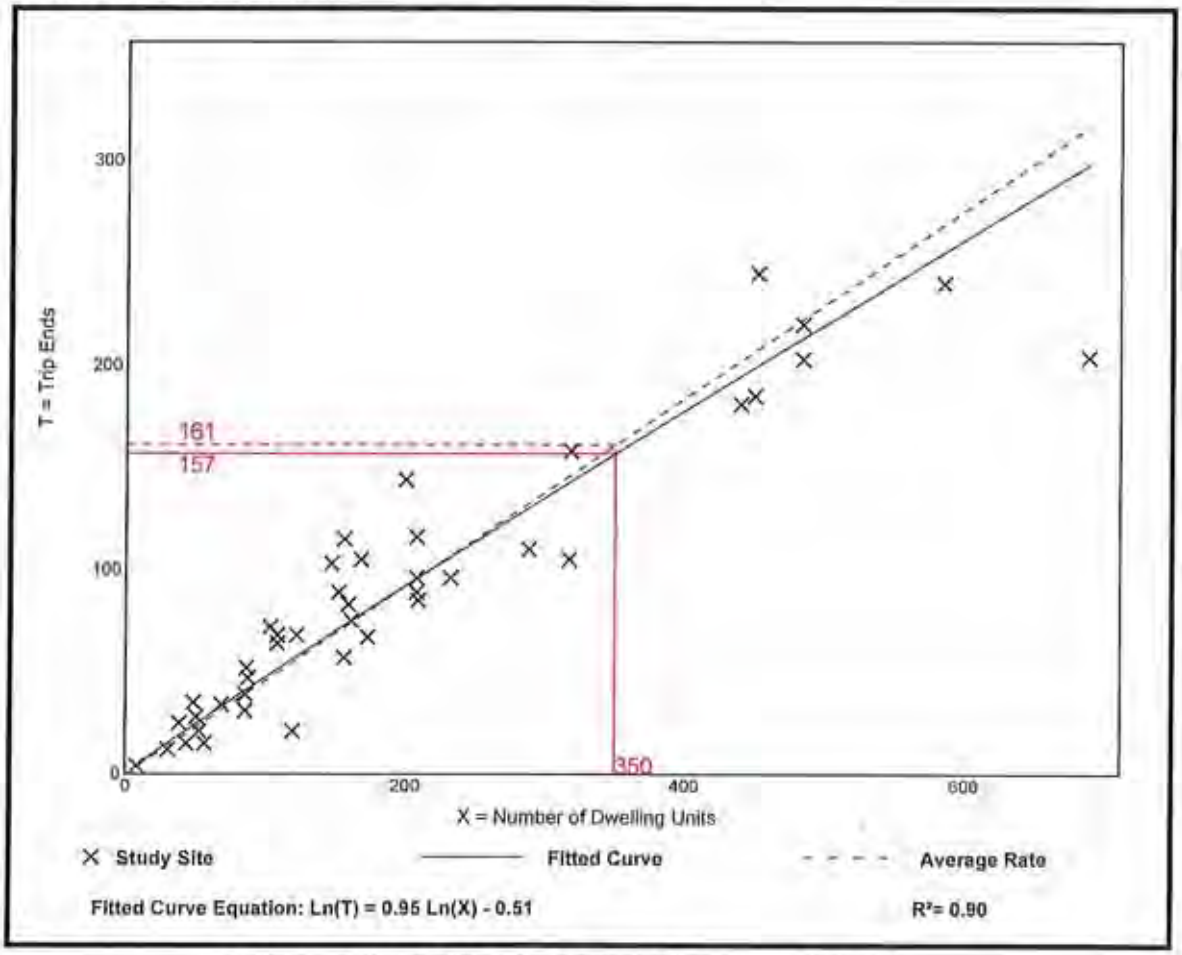
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 42
Avg. Num. of Dwelling Units: 199
Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.46	0.18 - 0.74	0.12

Data Plot and Equation



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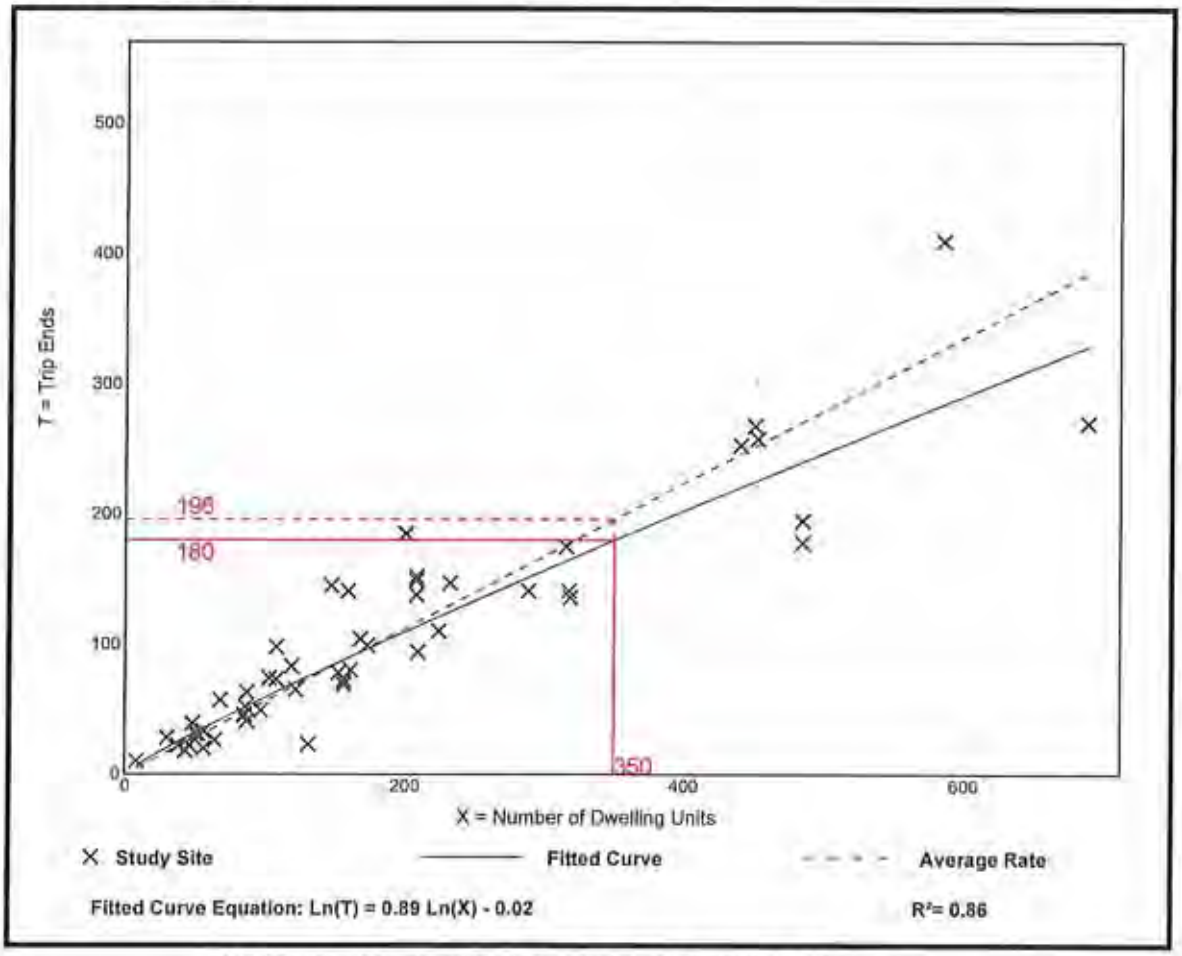
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 50
Avg. Num. of Dwelling Units: 187
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.18 - 1.25	0.16

Data Plot and Equation



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Shopping Center
(820)

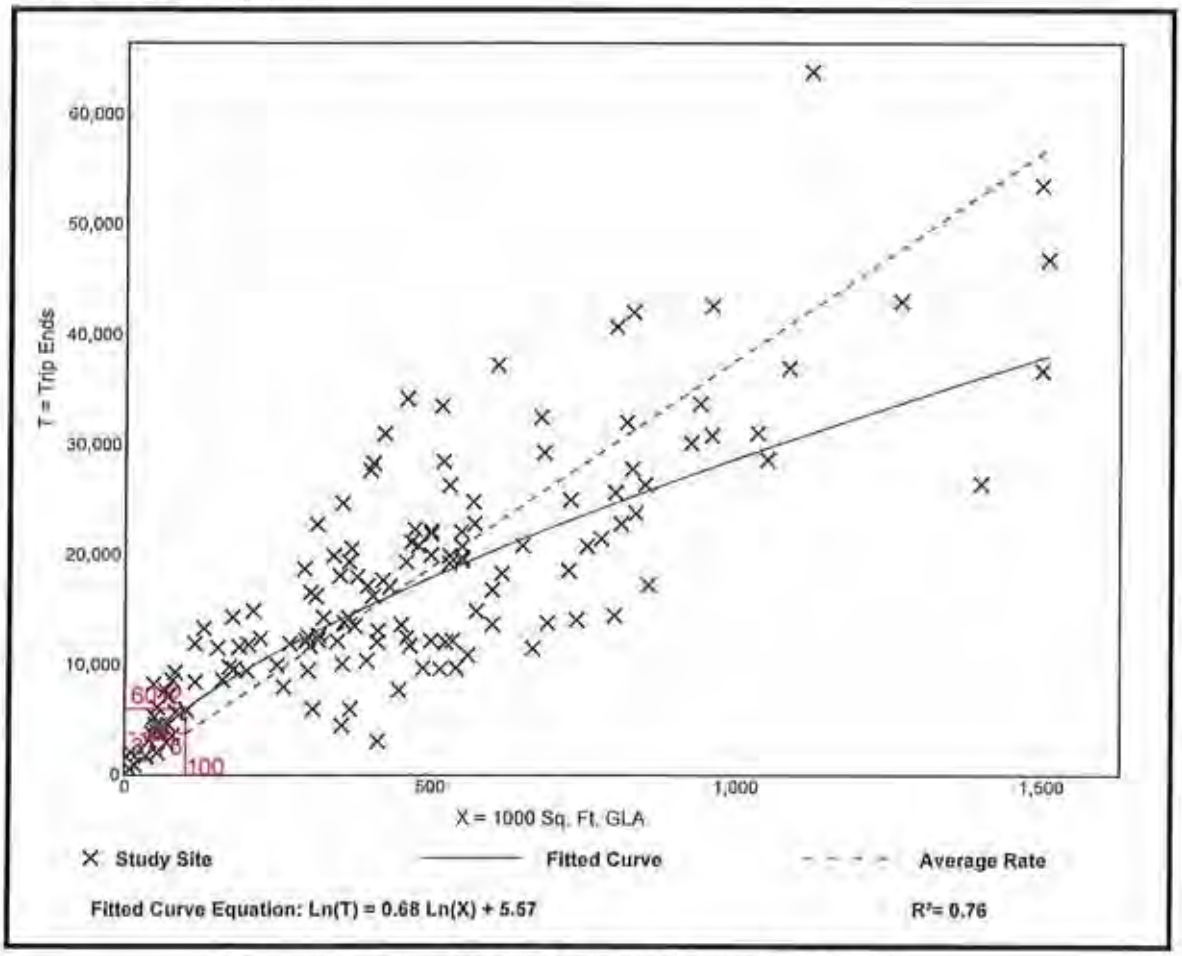
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 147
Avg. 1000 Sq. Ft. GLA: 453
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
37.75	7.42 - 207.98	16.41

Data Plot and Equation



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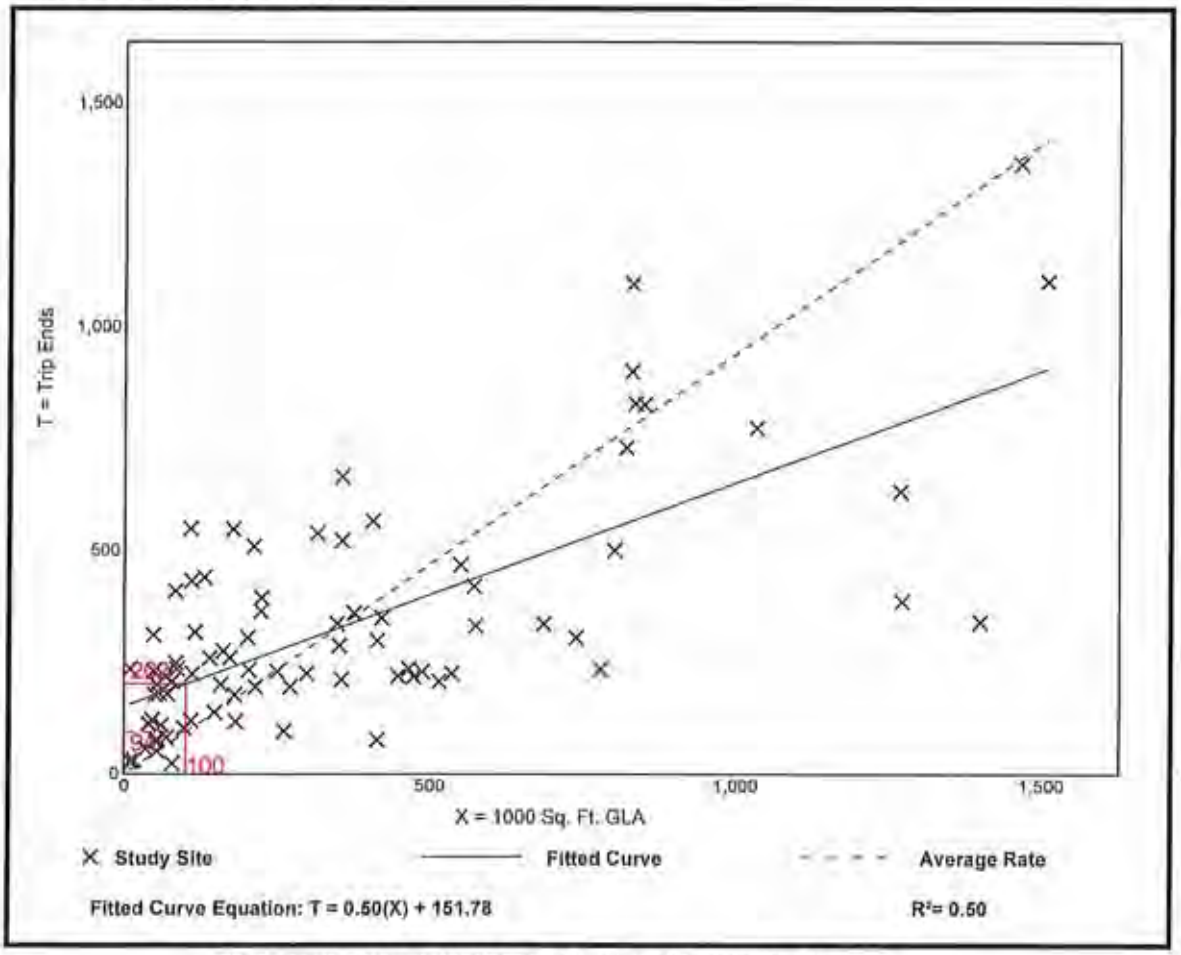
Shopping Center
(820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 84
Avg. 1000 Sq. Ft. GLA: 351
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

Data Plot and Equation



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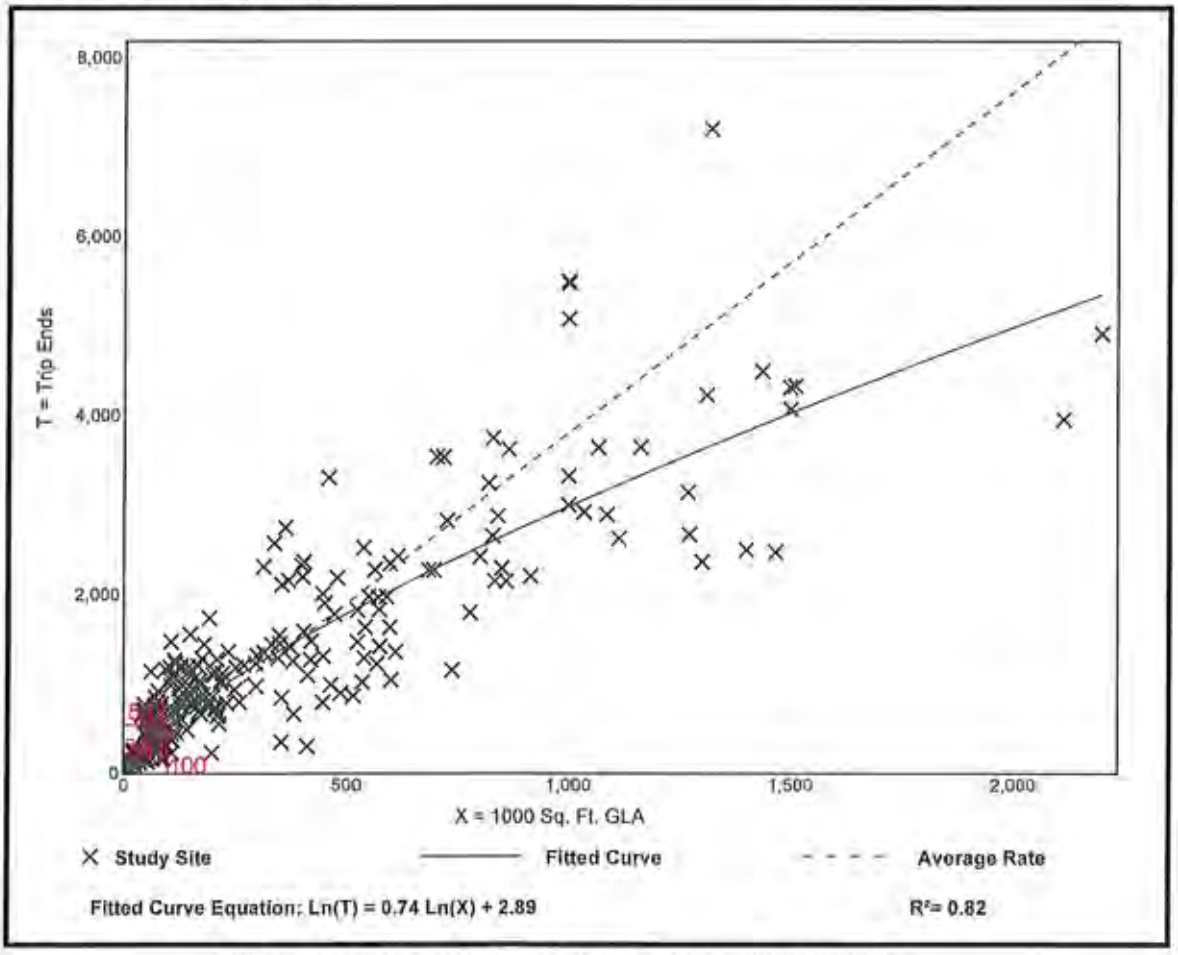
Shopping Center
(820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 261
Avg. 1000 Sq. Ft. GLA: 327
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation



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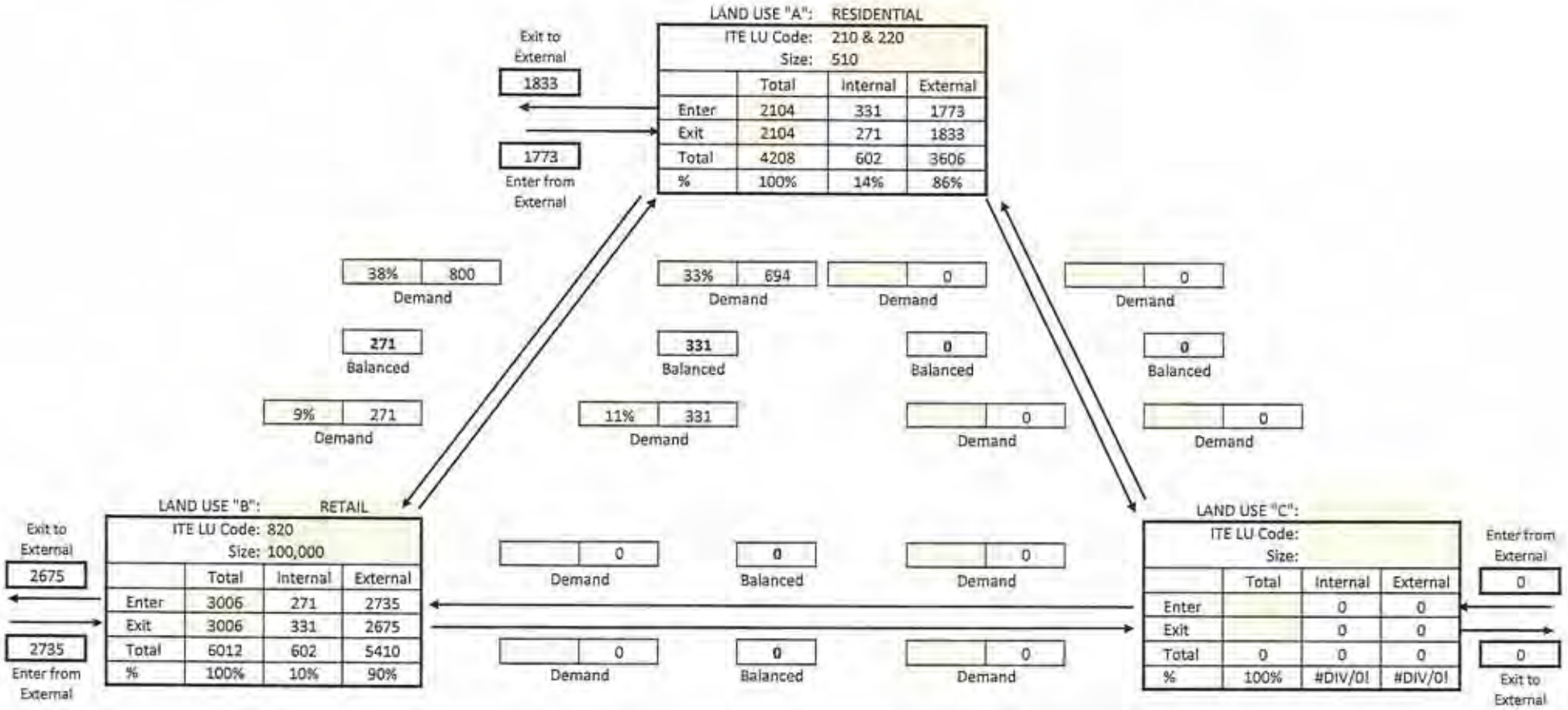
Analyst: ALC
Date: 5/24/2018

MULTI-USE DEVELOPMENT
TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Name of Dvlpt: Schaad Road Mixed Use
Project No.: 00773-11
Time Period: Daily



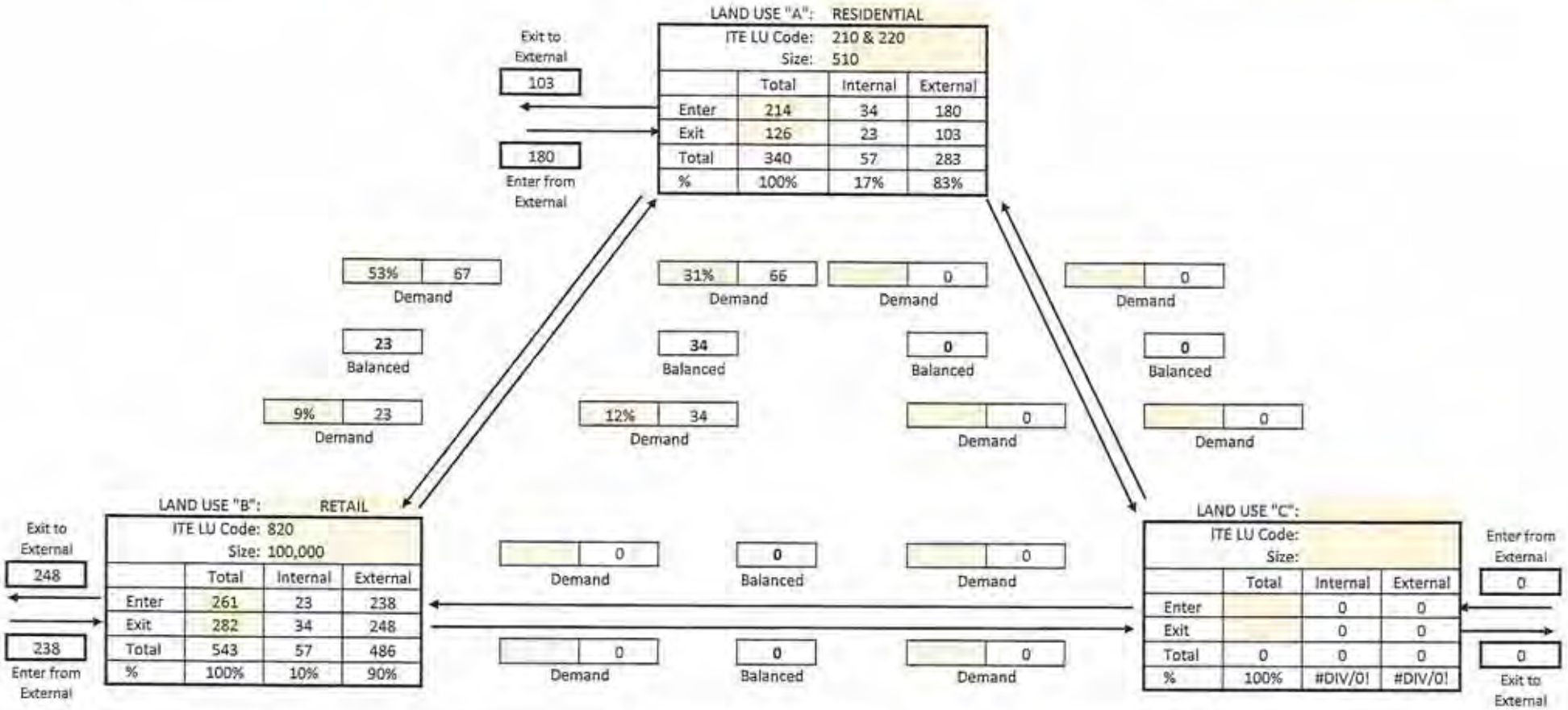
Net External Trips for Multi-Use Development				
	LAND USE A	LAND USE B	LAND USE C	TOTAL
Enter	1773	2735	0	4508
Exit	1833	2675	0	4508
Total	3606	5410	0	9016
Single-Use Trip Gen. Est.	4208	6012	0	10220

INTERNAL CAPTURE 12%

Analyst: ALC
Date: 5/24/2018

MULTI-USE DEVELOPMENT
TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Name of Dvlpt: Schaad Road Mixed-Use
Project No.: 00773-11
Time Period: PM



Net External Trips for Multi-Use Development				
	LAND USE A	LAND USE B	LAND USE C	TOTAL
Enter	180	238	0	418
Exit	103	248	0	351
Total	283	486	0	769
Single-Use Trip Gen. Est.	340	543	0	883

INTERNAL CAPTURE 13%

KY Trip Distribution Recommendations

2. For land uses and analysis periods that do not have 6 or more pass-by trip data points provided in the *ITE Trip Generation Report*, the pass-by trip rate shall be zero (0). Supplemental local data may be collected for additional uses. Local supplemental data must be collected in accordance with the recommended data collection procedures of the *ITE Trip Generation Handbook*. A minimum of 100 pass-by trip surveys should be collected for each local data point collected. Supplemental data and average pass-by rate calculations shall be provided in the appendix of the report.

4.3.4 Trip Distribution. Trips generated by the development should be distributed onto the public roadway network consistent with existing traffic patterns in the area as prescribed below.

1. Identify existing directional traffic volumes and total frontage volumes at all proposed access points.

2. Determine entering trip distribution percentage based on approaching directional volumes at each access point.

3. Trace entering trip distribution percentage through system proportionate to turning movement volumes at intersections. For developments having two access points on a single roadway, the first access point in the direction of travel shall service 75 percent of the total approach traffic, and the second access point shall serve the remaining 25 percent. For developments having three or more access points on a single roadway, distribution among the access points shall be determined by the service area of each access point and the land uses it service.

4. Determine exiting trip distribution percentage based on approaching directional volumes at each access point.

5. Trace exiting trip distribution percentage through system proportionate to turning movement volumes at intersections.

6. Distribute pass-by trips at access points in accordance with trip distribution. *Note: Pass-by trips are not added to any movement other than those entering or exiting the access point(s).*

7. Reduce pass-by trip volume from accompanying diverted movement at access point. *Note: Pass-by trip reductions are not taken at any other intersection or movement other than from the movement from which the trip was diverted at the access point.*

8. Distribute entering primary trips on system in accordance with trip distribution.

9. Distribute exiting primary trips on system in accordance with trip distribution.

10. Determine final opening day traffic volumes by summing existing traffic, pass-by trips and trips generated (entering and exiting).

APPENDIX C | ANALYSES

TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS

Intersection : Schaad Road & East Site Drive (Phase 1 Traffic-2 Lane Schaad Road)
City or County : City of Knoxville — Date of Count: Year 2022 Projected
State : Tennessee — Day of Week of Count: Average Weekday

Are warranting volumes to be adjusted for speeds or built up area? . . . . . Yes
Adjustment factor for day of week and month of year of count 1.00
Number of Lanes: Major Street . . 1 — Minor Street . . . 2

Time Beginning	Major Street Actual Volume App #1	App #2	Total	Adjusted Total Volum .	Minor Street Actual Volume –	Adjusted Total Volum .
6:00 am	0	0	0	0	0	0
7:00	693	1075	1768	1768	88	88
8:00	0	0	0	0	0	0
9:00 am	0	0	0	0	0	0
10:00	0	0	0	0	0	0
11:00	0	0	0	0	0	0
12:00 noon	0	0	0	0	0	0
1:00	0	0	0	0	0	0
2:00	0	0	0	0	0	0
3:00 pm	0	0	0	0	0	0
4:00	0	0	0	0	0	0
5:00	1236	950	2186	2186	59	59
6:00 pm	0	0	0	0	0	0
7:00	0	0	0	0	0	0
8:00	0	0	0	0	0	0

Note: . No adjustment made
– Where more than one minor approach exists use the higher approach volume
. Number of hours shown is the minimum meeting the MUTCD requirements. Additional hours outside of the count period may meet the MUTCD specified volume levels.

Warrant #1A (8 Hr. - Min. Vol.) Percent of Warrant Major	Minor
0	0
505	63
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
625	42
0	0
0	0
0	0
Warranting Volumes 350	140
Total Hours Meeting Warrant =	0 .
Warrant Met	No

Warrant #1B (8 Hr. - Interruption) Percent of Warrant Major	Minor
0	0
337	126
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
416	84
0	0
0	0
0	0
Warranting Volumes 525	70
Total Hours Meeting Warrant =	1 .
Warrant Met	No

Combination (Warrants 1A & 1B) Percent of Warrant Major	Minor
0	0
421	79
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
520	53
0	0
0	0
0	0
Warranting Volumes 420	112
Total Hours Meeting Warrant =	0 .
Warrant Met	No

Warrant #2 (Four Hour Vols.) Warrant Volume	Percent of Warrant
0	*****
60	147
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
50	98
0	*****
0	*****
0	*****
Warranting Volumes From MUTCD Fig. 4-6	
Total Hours Meeting Warrant =	1 .
Warrant Met	No

Warrant #3 (Peak Hour Vols.) Warrant Volume	Percent of Warrant
0	*****
80	110
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
60	74
0	*****
0	*****
0	*****
Warranting Volumes From MUTCD Fig. 4-6	
Total Hours Meeting Warrant =	1 .
Warrant Met	Yes

***** Major Street volume is so low that no Minor Street warrant exists

Comments: (include any information which may be useful to the reviewer)

Analysis Prepared by: CANNON AND CANNON, INC.
Alan L. Childers, P.E.
Date: 05/31/16
Time: 13:32

Developed by: T. Darcy Sullivan, P.E. VC/R1
Distributed by: Tennessee Transportation Assistance Program (TTAP)

TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS

Intersection : Schaad Road and East Site Drive (Phase 1 Traffic-4 lane Schaad Road)
City or County : City of Knoxville Date of Count: Year 2024 Projected
State : Tennessee Day of Week of Count: Average Weekday

Are warranting volumes to be adjusted for speeds or built up area? . . . . . Yes
Adjustment factor for day of week and month of year of count 1.00
Number of Lanes: Major Street . 2 Minor Street . 2

Time Beginning	Major Street Actual Volume App #1	App #2	Total	Adjusted Total Volume	Minor Street Actual Volume	Adjusted Total Volume
6:00 am	0	0	0	0	0	0
7:00	693	1075	1768	1768	88	88
8:00	0	0	0	0	0	0
9:00 am	0	0	0	0	0	0
10:00	0	0	0	0	0	0
11:00	0	0	0	0	0	0
12:00 noon	0	0	0	0	0	0
1:00	0	0	0	0	0	0
2:00	0	0	0	0	0	0
3:00 pm	0	0	0	0	0	0
4:00	0	0	0	0	0	0
5:00	1236	950	2186	2186	59	59
6:00 pm	0	0	0	0	0	0
7:00	0	0	0	0	0	0
8:00	0	0	0	0	0	0

Note: . No adjustment made
– Where more than one minor approach exists use the higher approach volume
. Number of hours shown is the minimum meeting the MUTCD requirements. Additional hours outside of the count period may meet the MUTCD specified volume levels.

Warrant #1A (8 Hr. - Min. Vol.) Percent of Warrant Major	Minor
0	0
421	63
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
520	42
0	0
0	0
0	0
Warranting Volumes 420	140
Total Hours Meeting Warrant = 0 .	
Warrant Met No	

Warrant #1B (8 Hr. - Interruption) Percent of Warrant Major	Minor
0	0
281	126
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
347	84
0	0
0	0
0	0
Warranting Volumes 630	70
Total Hours Meeting Warrant = 1 .	
Warrant Met No	

Combination (Warrants 1A & 1B) Percent of Warrant Major	Minor
0	0
351	79
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
434	53
0	0
0	0
0	0
Warranting Volumes 504	112
Total Hours Meeting Warrant = 0 .	
Warrant Met No	

Warrant #2 (Four Hour Vols.) Warrant Volume	Percent of Warrant
0	*****
80	110
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
80	74
0	*****
0	*****
0	*****
Warranting Volumes From MUTCD Fig. 4-6	
Total Hours Meeting Warrant = 1 .	
Warrant Me No	

Warrant #3 (Peak Hour Vols.) Warrant Volume	Percent of Warrant
0	*****
100	86
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
100	59
0	*****
0	*****
0	*****
Warranting Volumes From MUTCD Fig. 4-6	
Total Hours Meeting Warrant = 0 .	
Warrant Me No	

***** Major Street volume is so low that no Minor Street warrant exists

Comments: (include any information which may be useful to the reviewer)

Analysis Prepared by: CANNON AND CANNON, INC.
Alan L. Childers, P.E.
Date: 05/31/18
Time: 13:38

Developed by: T. Darcy Sullivan, P.E. VC/R1
Distributed by: Tennessee Transportation Assistance Program (TTAP)

TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS

Intersection : Schaad Road and East Site Drive (Phase 2 Traffic-4 lane Schaad Road)
City or County : City of Knoxville
State : Tennessee
Date of Count: Year 2024 Projected
Day of Week of Count: Average Weekday

Are warranting volumes to be adjusted for speeds or built up area? . . . . . Yes
Adjustment factor for day of week and month of year of count 1.00
Number of Lanes: Major Street . . 2 Minor Street . . . 2

Time Beginning	Major Street Actual Volume App #1	App #2	Total	Adjusted Total Volum .	Minor Street Actual Volume –	Adjusted Total Volum .
6:00 am	0	0	0	0	0	0
7:00	710	1162	1872	1872	122	122
8:00	0	0	0	0	0	0
9:00 am	0	0	0	0	0	0
10:00	0	0	0	0	0	0
11:00	0	0	0	0	0	0
12:00 noon	0	0	0	0	0	0
1:00	0	0	0	0	0	0
2:00	0	0	0	0	0	0
3:00 pm	0	0	0	0	0	0
4:00	0	0	0	0	0	0
5:00	1324	1197	2521	2521	197	197
6:00 pm	0	0	0	0	0	0
7:00	0	0	0	0	0	0
8:00	0	0	0	0	0	0

Note: , No adjus ment made
– Where more than one minor approach exists use the higher approach volume
: Number of hours shown is the minimum meeting the MUTCD requirements. Additional hours outside of the count period may meet the MUTCD specified volume levels.

Warrant #1A (8 Hr. - Min. Vol.) Percent of Warrant Major	Minor
0	0
445	87
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
800	141
0	0
0	0
0	0
Warranting Volumes 420	140
Total Hours Meeting Warrant =	1 ,
Warrant Met	No

Warrant #1B (8 Hr. - Interruption) Percent of Warrant Major	Minor
0	0
297	174
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
400	281
0	0
0	0
0	0
Warranting Volumes 630	70
Total Hours Meeting Warrant =	2 ,
Warrant Met	No

Combination (Warrants 1A & 1B) Percent of Warrant Major	Minor
0	0
371	109
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
500	176
0	0
0	0
0	0
Warranting Volumes 504	112
Total Hours Meeting Warrant =	2 ,
Warrant Met	No

Warrant #2 (Four Hour Vols.) Warrant Volume	Percent of Warrant
0	*****
80	153
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
80	246
0	*****
0	*****
0	*****
Warranting Volumes From MUTCD Fig. 4-6	
Total Hours Meeting Warrant =	2 ,
Warrant Me	No

Warrant #3 (Peak Hour Vols.) Warrant Volume	Percent of Warrant
0	*****
100	122
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
0	*****
100	197
0	*****
0	*****
0	*****
Warranting Volumes From MUTCD Fig. 4-6	
Total Hours Meeting Warrant =	2 ,
Warrant Me	Yes

***** Major Street volume is so low that no Minor Street warrant exists

Comments: (Include any information which may be useful to the reviewer)

Analysis Prepared by: CANNON AND CANNON, INC.
Alan L. Childers, P.E.
Date: 05/31/18
Time: 13:34

Developed by: T. Darcy Sullivan, P.E. VC/R1
Distributed by: Tennessee Transportation Assistance Program (TTAP)

TABLE 5B KNOX COUNTY RIGHT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH	Project No: 00773-0001 Project Name: Schaad Road - West of Notes: Pleasant Ridge Rd. Mixed-Use Development

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25						
25 - 49						
50 - 99						
100 - 149						
150 - 199						
200 - 249						Yes
250 - 299					Yes	Yes
300 - 349				Yes	Yes	Yes
350 - 399			Yes	Yes	Yes	Yes
400 - 449			Yes	Yes	Yes	Yes
450 - 499		Yes	Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
Fewer Than 25						
25 - 49					Yes	Yes
50 - 99				Yes	Yes	(Yes) (2)(3)
100 - 149			Yes	Yes	Yes	Yes
150 - 199		Yes	Yes	Yes	Yes	(Yes) (1)
200 - 249	Yes	Yes	Yes	Yes	Yes	Yes
250 - 299	Yes	Yes	Yes	Yes	Yes	Yes
300 - 349	Yes	Yes	Yes	Yes	Yes	Yes
350 - 399	Yes	Yes	Yes	Yes	Yes	Yes
400 - 449	Yes	Yes	Yes	Yes	Yes	Yes
450 - 499	Yes	Yes	Yes	Yes	Yes	Yes
500 - 549	Yes	Yes	Yes	Yes	Yes	Yes
550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

* Or through volume only if a left-turn lane exists

	Intersection	Time Period	Through Volume	Right-Turn Volume	Right-Turn Lane Warranted (Yes / No)
Phase 2 (2024)	(1) Site East	PM Peak	1197 ÷ 2 x 1.05	157	Yes
	(2) Site West	PM Peak	1178 ÷ 2 x 1.05	52	Yes
Phase 1 (2022)	(3) Site (East)	PM Peak	950	51	Yes

Source: Knox County Department of Engineering and Public Works "Access Control and Driveway Design Policy"

CAPACITY AND LEVEL-OF-SERVICE CONCEPTS

In a general sense, a roadway is similar to a pipeline or other material carrying conduit in that it has a certain capacity for the amount of material (vehicles) that it can efficiently carry. As the number of vehicles in a given time period gradually increases, the quality of traffic flow gradually decreases. On roadway sections this results in increasing turbulence in the traffic stream, and at intersections it results in increasing stops and delay. As the volumes begin to approach the capacity of the facility, these problems rapidly magnify, with resulting serious levels of congestion, stops, delay, excess fuel consumption, pollutant emissions, etc.

The Transportation Research Board has published the Year 2010 Highway Capacity Manual (HCM2010), which establishes theoretical techniques to quantify the capacity conditions on all types of roadways, intersections, ramps, pedestrian facilities, etc. A basic concept that is applicable to most of these techniques is the idea of level of service (LOS). This concept establishes a rating system that quantifies the quality of traffic flow, as perceived by motorists and/or passengers. The general system is similar to a school grade scale, and is outlined as follows:

Level of Service (LOS)	General Quality of Traffic Flow	Description of Corresponding Conditions
A	Excellent	Roadways – Free flow, high maneuverability Intersections – Very few stops, very low delay
B	Very Good	Roadways – Free flow, slightly lower maneuverability Intersections – Minor stops, low delay
C	Good	Roadways – Stable flow, restricted maneuverability Intersections – Significant stops, significant delay
D	Fair	Roadways – Marginally stable flow, congestion seriously restricts maneuverability Intersections – High stops, long but tolerable delay
E	Poor	Roadways – Unstable flow*, lower operating speeds, congestion severely restricts maneuverability Intersections – All vehicles stop, very long queues and very long intolerable delay
F	Very Poor	Roadways – Forced flow, stoppages may be lengthy, congestion severely restricts maneuverability Intersections – All vehicles stop, extensive queues and extremely long intolerable delay

*Unstable flow is such that minor fluctuations or disruptions can result in rapid degradation to LOS F.

LOS CRITERIA: SIGNALIZED & UNSIGNALIZED INTERSECTIONS

LOS	CONTROL DELAY (S/VEH)		
	SIGNALIZED	UNSIGNALIZED	ROUNDABOUT
A	≤10	≤10	≤10
B	>10-20	>10-15	>10-15
C	>20-35	>15-25	>15-25
D	>35-55	>25-35	>25-35
E	>55-80	>35-50	>35-50
F	>80	>50	>50

Another measure of intersection capacity that is often used in the evaluation of intersection operations is the volume to capacity (V/C) ratio. This ratio is defined as "the ratio of flow rate to capacity", and is a good measure of how much of an intersection's available capacity has been used up by the analysis volumes. Conversely, it also provides an indication of the reserve capacity available for future growth in traffic volumes.

The Intersection Capacity Utilization (ICU) is another measure that expresses a value similar to the V/C ratio. Specifically, the ICU method "sums the amount of the time required to serve all movements at saturation for a given cycle length and divides by that reference cycle length." The ICU is considered a more accurate measure of volume to capacity conditions for a signalized intersection, primarily because it accounts for the effects of the signal timing on intersection capacity.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	497	54	148	455	65	102	147	172	141	265	305
Future Volume (vph)	210	497	54	148	455	65	102	147	172	141	265	305
Lane Util. Factor	*0.63	0.95	0.95	0.97	*0.63	0.95	1.00	*0.62	0.95	1.00	1.00	1.00
Frt		0.985			0.981			0.919				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2230	3486	0	3433	2302	0	1770	2123	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.317			0.187		
Satd. Flow (perm)	2230	3486	0	3433	2302	0	590	2123	0	348	1863	1583
Satd. Flow (RTOR)		9			7			59				347
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	239	626	0	168	591	0	116	362	0	160	301	347
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5		22.5	31.5	31.5
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%		15.2%	21.2%	21.2%
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0		15.0	25.0	25.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0		2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5		7.5	6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	17.6	46.7		10.7	39.8		32.4	23.3		36.9	25.6	25.6
Actuated g/C Ratio	0.14	0.38		0.09	0.32		0.26	0.19		0.30	0.21	0.21
v/c Ratio	0.75	0.47		0.56	0.78		0.46	0.80		0.65	0.78	0.57
Control Delay	67.3	29.2		64.3	45.8		37.9	55.9		44.9	62.8	9.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	67.3	29.2		64.3	45.8		37.9	55.9		44.9	62.8	9.2
LOS	E	C		E	D		D	E		D	E	A
Approach Delay		39.8			49.9			51.6			36.2	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	149	196		68	341		64	189		90	226	0
Queue Length 95th (ft)	242	258		117	473		133	#366		177	#466	83
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	468	1668		721	1068		330	492		291	408	618
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.51	0.38		0.23	0.55		0.35	0.74		0.55	0.74	0.56

Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 122.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 43.4	Intersection LOS: D
Intersection Capacity Utilization 66.0%	ICU Level of Service C
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	484	362	44	85	640	113	171	246	92	109	109	259
Future Volume (vph)	484	362	44	85	640	113	171	246	92	109	109	259
Lane Util. Factor	*0.62	0.95	0.95	0.97	*0.63	0.95	1.00	*0.62	0.95	1.00	1.00	1.00
Frt		0.984			0.977			0.959				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2194	3483	0	3433	2293	0	1770	2215	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.573			0.175		
Satd. Flow (perm)	2194	3483	0	3433	2293	0	1067	2215	0	326	1863	1583
Satd. Flow (RTOR)		10			9			15				282
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	526	441	0	92	819	0	186	367	0	118	118	282
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5		22.5	31.5	31.5
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%		15.2%	21.2%	21.2%
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0		15.0	25.0	25.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0		2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5		7.5	6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	25.0	70.8		8.3	54.1		37.5	24.7		33.7	22.8	22.8
Actuated g/C Ratio	0.17	0.49		0.06	0.37		0.26	0.17		0.23	0.16	0.16
v/c Ratio	1.38	0.26		0.46	0.95		0.54	0.94		0.61	0.40	0.58
Control Delay	231.0	21.9		74.0	63.6		46.6	88.5		52.2	59.7	10.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	231.0	21.9		74.0	63.6		46.6	88.5		52.2	59.7	10.8
LOS	F	C		E	E		D	F		D	E	B
Approach Delay		135.7			64.6			74.4			31.4	
Approach LOS		F			E			E			C	
Queue Length 50th (ft)	~537	122		44	588		139	270		84	103	0
Queue Length 95th (ft)	#738	172		75	#823		209	#440		138	168	85
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	380	1714		595	880		359	396		233	323	508
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	1.38	0.26		0.15	0.93		0.52	0.93		0.51	0.37	0.56

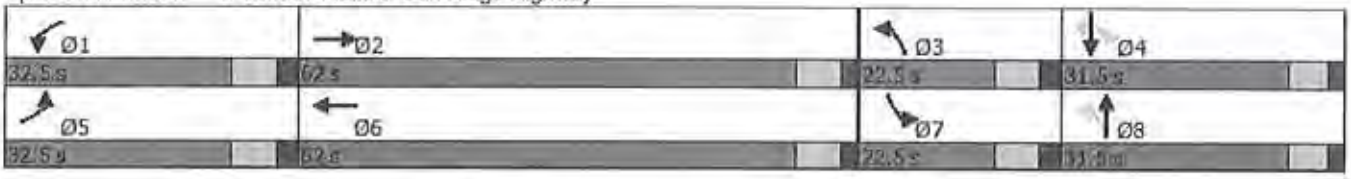
Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 144.3	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.38	
Intersection Signal Delay: 83.9	Intersection LOS: F
Intersection Capacity Utilization 73.8%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway

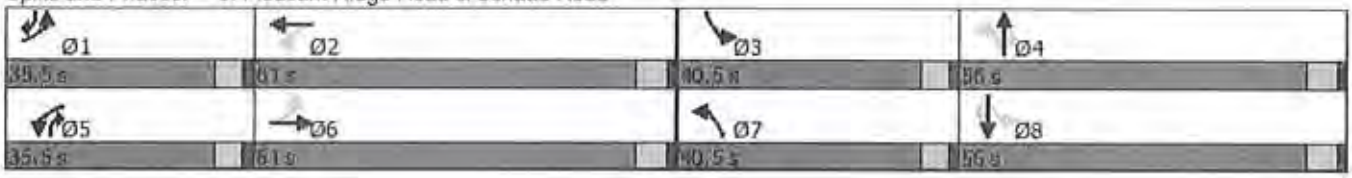


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	375	55	124	539	65	122	143	144	23	327	237
Future Volume (vph)	114	375	55	124	539	65	122	143	144	23	327	237
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.63	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.984				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	2310	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.128			0.411			0.201			0.657		
Satd. Flow (perm)	238	3472	0	766	2310	0	374	1863	1583	1224	1863	1583
Satd. Flow (RTOR)		8			4				158			195
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	125	472	0	136	663	0	134	157	158	25	359	260
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	63.9	51.6		64.1	51.7		52.8	44.8	62.7	40.0	31.3	49.1
Actuated g/C Ratio	0.48	0.39		0.48	0.39		0.40	0.34	0.47	0.30	0.23	0.37
v/c Ratio	0.50	0.35		0.30	0.74		0.44	0.25	0.19	0.06	0.82	0.37
Control Delay	26.0	31.3		20.5	43.1		31.3	35.6	3.6	26.6	66.0	9.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	31.3		20.5	43.1		31.3	35.6	3.6	26.6	66.0	9.8
LOS	C	C		C	D		C	D	A	C	E	A
Approach Delay		30.2			39.2			23.1			41.8	
Approach LOS		C			D			C			D	
Queue Length 50th (ft)	53	145		58	375		76	106	0	13	297	37
Queue Length 95th (ft)	115	248		123	650		133	178	40	35	468	108
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	475	1472		629	973		521	731	1028	629	712	901
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.32		0.22	0.68		0.26	0.21	0.15	0.04	0.50	0.29

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 133.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 34.8	Intersection LOS: C
Intersection Capacity Utilization 66.8%	ICU Level of Service C
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road

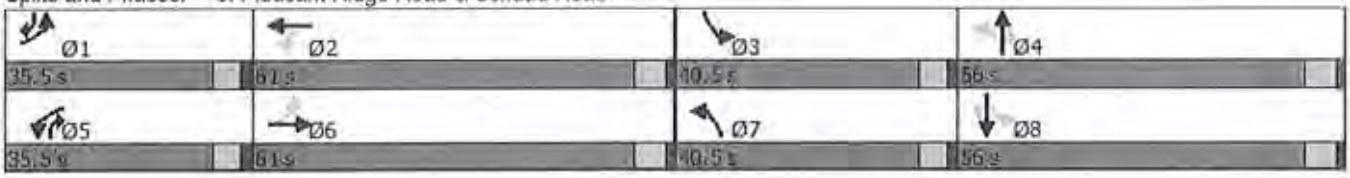


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	716	99	267	453	52	72	275	320	56	252	201
Future Volume (vph)	200	716	99	267	453	52	72	275	320	56	252	201
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.63	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	2312	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.295			0.135			0.308			0.391		
Satd. Flow (perm)	550	3476	0	251	2312	0	574	1863	1583	728	1863	1583
Satd. Flow (RTOR)		8			4				333			209
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	208	849	0	278	526	0	75	286	333	58	263	209
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	56.2	40.7		71.9	50.8		38.4	29.7	61.0	34.6	24.8	46.0
Actuated g/C Ratio	0.45	0.33		0.58	0.41		0.31	0.24	0.49	0.28	0.20	0.37
v/c Ratio	0.53	0.75		0.62	0.56		0.27	0.64	0.35	0.21	0.71	0.29
Control Delay	20.0	42.5		27.2	32.2		34.7	54.3	3.3	34.1	60.2	4.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	42.5		27.2	32.2		34.7	54.3	3.3	34.1	60.2	4.6
LOS	B	D		C	C		C	D	A	C	E	A
Approach Delay		38.1			30.5			27.7			35.4	
Approach LOS		D			C			C			D	
Queue Length 50th (ft)	76	322		117	250		43	219	0	33	203	0
Queue Length 95th (ft)	143	465		255	425		93	374	55	75	348	52
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	611	1592		523	1090		545	773	1005	554	773	893
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.53		0.53	0.48		0.14	0.37	0.33	0.10	0.34	0.23

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 124.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 33.3	Intersection LOS: C
Intersection Capacity Utilization 78.0%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2018	North/South Street	La Christa Way
Time Analyzed	AM Peak - Existing 2018	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Existing Geometry and Traffic Control		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		8	537	1		0	911	0		0	0	1		15	0	29
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		9				0					1				48	
Capacity, c (veh/h)		694				985					509				160	
v/c Ratio		0.01				0.00					0.00				0.30	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.0				1.2	
Control Delay (s/veh)		10.3		0.2		8.7		0.0			12.1				36.8	
Level of Service (LOS)		B		A		A		A			B				E	
Approach Delay (s/veh)	0.3				0.0				12.1				36.8			
Approach LOS									B				E			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2018	North/South Street	La Christa Way
Time Analyzed	PM Peak - Existing 2018	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Existing Geometry and Traffic Control		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		22	969	5		4	723	19		1	0	3		12	0	7
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		23				4					4				20	
Capacity, c (veh/h)		826				667					131				75	
v/c Ratio		0.03				0.01					0.03				0.27	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1				1.0	
Control Delay (s/veh)		9.5		0.6		10.4		0.1			33.4				69.7	
Level of Service (LOS)		A		A		B		A			D				F	
Approach Delay (s/veh)	0.8				0.2				33.4				69.7			
Approach LOS									D				F			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	254	567	124	370	481	89	138	182	321	172	353	339
Future Volume (vph)	254	567	124	370	481	89	138	182	321	172	353	339
Lane Util. Factor	*0.63	0.95	0.95	0.97	*0.63	0.95	1.00	*0.62	0.95	1.00	1.00	1.00
Frt		0.973			0.977			0.904				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2230	3444	0	3433	2293	0	1770	2088	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.158			0.147		
Satd. Flow (perm)	2230	3444	0	3433	2293	0	294	2088	0	274	1863	1583
Satd. Flow (RTOR)		20			9			111				308
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	289	785	0	420	648	0	157	572	0	195	401	385
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5		22.5	31.5	31.5
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%		15.2%	21.2%	21.2%
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0		15.0	25.0	25.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0		2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5		7.5	6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	20.8	45.4		20.3	44.9		36.6	25.3		40.6	27.3	27.3
Actuated g/C Ratio	0.16	0.34		0.15	0.33		0.27	0.19		0.30	0.20	0.20
v/c Ratio	0.84	0.67		0.81	0.84		0.73	1.33dr		0.81	1.06	0.68
Control Delay	77.4	39.9		69.1	51.5		55.5	139.2		62.2	113.3	19.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	77.4	39.9		69.1	51.5		55.5	139.2		62.2	113.3	19.1
LOS	E	D		E	D		E	F		E	F	B
Approach Delay		50.0			58.4			121.1			66.2	
Approach LOS		D			E			F			E	
Queue Length 50th (ft)	200	302		190	416		103	~439		131	~416	60
Queue Length 95th (ft)	#293	375		255	532		#175	#660		#274	#679	182
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	421	1443		648	957		253	484		254	379	567
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.69	0.54		0.65	0.68		0.62	1.18		0.77	1.06	0.68

Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 134.1	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.18	
Intersection Signal Delay: 69.9	Intersection LOS: E
Intersection Capacity Utilization 80.2%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

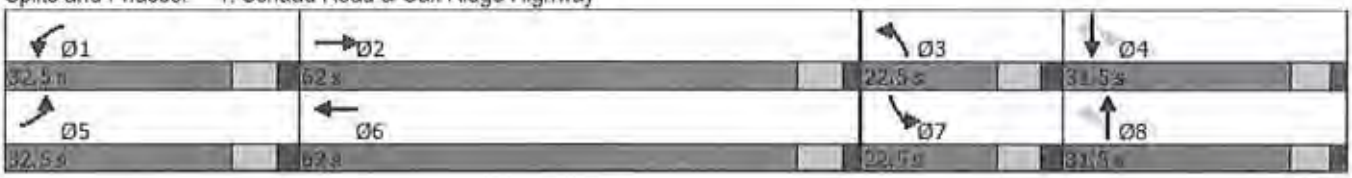
Splits and Phases: 1: Schaad Road & Oak Ridge Highway

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	560	422	113	340	687	146	239	324	304	142	194	290
Future Volume (vph)	560	422	113	340	687	146	239	324	304	142	194	290
Lane Util. Factor	*0.62	0.95	0.95	0.97	*0.63	0.95	1.00	*0.62	0.95	1.00	1.00	1.00
Frt		0.968			0.974			0.927				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2194	3426	0	3433	2286	0	1770	2141	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.335			0.172		
Satd. Flow (perm)	2194	3426	0	3433	2286	0	624	2141	0	320	1863	1583
Satd. Flow (RTOR)		26			11			44				315
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	609	582	0	370	906	0	260	682	0	154	211	315
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5		22.5	31.5	31.5
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%		15.2%	21.2%	21.2%
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0		15.0	25.0	25.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0		2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5		7.5	6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	25.0	60.0		20.0	55.0		39.0	25.0		35.5	23.3	23.3
Actuated g/C Ratio	0.17	0.41		0.14	0.37		0.27	0.17		0.24	0.16	0.16
v/c Ratio	1.63	0.41		0.79	1.05		0.92	1.70		0.74	0.72	0.61
Control Delay	333.4	31.2		74.0	88.1		81.0	359.5		60.8	73.0	10.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	333.4	31.2		74.0	88.1		81.0	359.5		60.8	73.0	10.9
LOS	F	C		E	F		F	F		E	E	B
Approach Delay		185.7			84.0			282.6			41.5	
Approach LOS		F			F			F			D	
Queue Length 50th (ft)	~684	201		180	~754		203	~755		113	194	0
Queue Length 95th (ft)	#879	270		230	#967		#322	#960		176	287	91
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	373	1416		584	863		282	401		229	317	531
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	1.63	0.41		0.63	1.05		0.92	1.70		0.67	0.67	0.59

Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 146.8	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.70	
Intersection Signal Delay: 152.3	Intersection LOS: F
Intersection Capacity Utilization 90.0%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway

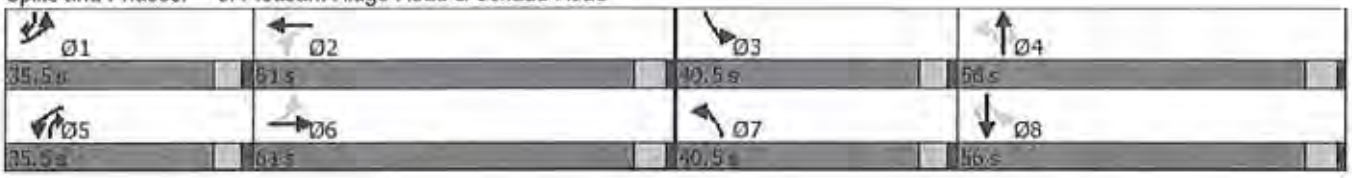


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	454	67	136	642	72	145	157	158	25	360	282
Future Volume (vph)	138	454	67	136	642	72	145	157	158	25	360	282
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.63	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	2312	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.070			0.348			0.160			0.648		
Satd. Flow (perm)	130	3472	0	648	2312	0	298	1863	1583	1207	1863	1583
Satd. Flow (RTOR)		8			4				174			194
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	152	573	0	149	784	0	159	173	174	27	396	310
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	71.5	57.1		69.1	55.8		60.4	52.3	71.1	44.9	36.2	56.3
Actuated g/C Ratio	0.49	0.39		0.47	0.38		0.41	0.35	0.48	0.30	0.25	0.38
v/c Ratio	0.70	0.43		0.37	0.89		0.53	0.26	0.20	0.07	0.87	0.43
Control Delay	51.0	36.2		24.3	58.0		34.4	36.3	3.3	27.2	73.5	13.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	36.2		24.3	58.0		34.4	36.3	3.3	27.2	73.5	13.3
LOS	D	D		C	E		C	D	A	C	E	B
Approach Delay		39.3			52.6			24.4			46.3	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	89	206		73	550		97	124	0	15	362	74
Queue Length 95th (ft)	197	335		148	#999		159	199	40	37	550	161
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	405	1348		565	878		476	695	1022	629	641	879
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.43		0.26	0.89		0.33	0.25	0.17	0.04	0.62	0.35

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 147.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 42.8	Intersection LOS: D
Intersection Capacity Utilization 73.8%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road

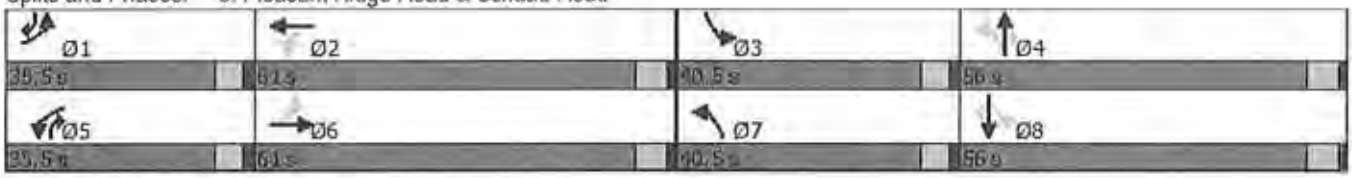


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	861	119	294	561	57	89	303	352	62	277	249
Future Volume (vph)	240	861	119	294	561	57	89	303	352	62	277	249
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.63	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.986				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	2314	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.187			0.102			0.224			0.224		
Satd. Flow (perm)	348	3476	0	190	2314	0	417	1863	1583	417	1863	1583
Satd. Flow (RTOR)		8			3				311			241
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	250	1021	0	306	643	0	93	316	367	65	289	259
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	77.7	55.2		89.1	62.5		42.0	30.1	65.4	38.4	28.3	56.3
Actuated g/C Ratio	0.53	0.37		0.60	0.42		0.29	0.20	0.44	0.26	0.19	0.38
v/c Ratio	0.63	0.78		0.71	0.65		0.42	0.83	0.42	0.33	0.81	0.34
Control Delay	24.3	46.6		41.7	40.3		42.2	75.0	6.1	40.5	74.9	5.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	46.6		41.7	40.3		42.2	75.0	6.1	40.5	74.9	5.2
LOS	C	D		D	D		D	E	A	D	E	A
Approach Delay		42.2			40.7			38.4			41.8	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	102	451		188	382		65	294	30	45	269	11
Queue Length 95th (ft)	194	617		#355	616		110	416	99	82	387	64
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	493	1308		438	983		452	634	883	452	634	828
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.78		0.70	0.65		0.21	0.50	0.42	0.14	0.46	0.31

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 147.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 40.9	Intersection LOS: D
Intersection Capacity Utilization 85.7%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2022	North/South Street	La Christa Way
Time Analyzed	AM Peak - Background Phs1	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Existing Geometry and Traffic Control		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		9	651	1		0	1083	0		0	0	1		17	0	32
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				0					1				53	
Capacity, c (veh/h)		590				886					433				103	
v/c Ratio		0.02				0.00					0.00				0.52	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.0				2.3	
Control Delay (s/veh)		11.2		0.3		9.1		0.0			13.3				72.2	
Level of Service (LOS)		B		A		A		A			B				F	
Approach Delay (s/veh)		0.5				0.0				13.3				72.2		
Approach LOS										B				F		

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2022	North/South Street	La Christa Way
Time Analyzed	PM Peak - Background Phs1	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Existing Geometry and Traffic Control		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		24	1169	6		4	896	21		1	0	3		13	0	8
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		26				4					4				22	
Capacity, c (veh/h)		703				553					73				38	
v/c Ratio		0.04				0.01					0.06				0.58	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.2				2.1	
Control Delay (s/veh)		10.3		1.2		11.6		0.2			57.5				187.0	
Level of Service (LOS)		B		A		B		A			F				F	
Approach Delay (s/veh)		1.4				0.2				57.5				187.0		
Approach LOS										F				F		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	364
Future Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	364
Lane Util. Factor	*0.63	0.95	0.95	0.97	*0.63	0.95	1.00	*0.62	0.95	1.00	1.00	1.00
Frt		0.973			0.976			0.906				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2230	3444	0	3433	2291	0	1770	2093	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.157			0.144		
Satd. Flow (perm)	2230	3444	0	3433	2291	0	292	2093	0	268	1863	1583
Satd. Flow (RTOR)		20			10			102				312
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	785	0	420	653	0	157	581	0	208	425	414
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5		22.5	31.5	31.5
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%		15.2%	21.2%	21.2%
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0		15.0	25.0	25.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0		2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5		7.5	6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	21.5	46.6		20.5	45.6		36.6	25.3		41.4	27.7	27.7
Actuated g/C Ratio	0.16	0.34		0.15	0.34		0.27	0.19		0.30	0.20	0.20
v/c Ratio	0.86	0.66		0.81	0.84		0.74	1.38dr		0.85	1.12	0.73
Control Delay	79.3	39.7		70.0	52.3		56.8	159.4		68.3	132.6	22.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	79.3	39.7		70.0	52.3		56.8	159.4		68.3	132.6	22.6
LOS	E	D		E	D		E	F		E	F	C
Approach Delay		50.7			59.2			137.6			76.3	
Approach LOS		D			E			F			E	
Queue Length 50th (ft)	212	303		193	426		105	~475		144	~476	86
Queue Length 95th (ft)	#322	375		255	538		#176	#687		#308	#731	219
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	414	1420		638	942		249	472		250	379	570
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.73	0.55		0.66	0.69		0.63	1.23		0.83	1.12	0.73

Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 135.9	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.23	
Intersection Signal Delay: 76.1	Intersection LOS: E
Intersection Capacity Utilization 81.3%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Future Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Lane Util. Factor	*0.62	0.95	0.95	0.97	*0.63	0.95	1.00	*0.62	0.95	1.00	1.00	1.00
Frt		0.968			0.973			0.929				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2194	3426	0	3433	2284	0	1770	2146	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.328			0.170		
Satd. Flow (perm)	2194	3426	0	3433	2284	0	611	2146	0	317	1863	1583
Satd. Flow (RTOR)		26			11			41				328
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	640	582	0	370	913	0	260	698	0	160	216	328
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5		22.5	31.5	31.5
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%		15.2%	21.2%	21.2%
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0		15.0	25.0	25.0
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0		2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5		7.5	6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	25.0	60.0		20.0	55.0		39.0	25.0		36.1	23.5	23.5
Actuated g/C Ratio	0.17	0.41		0.14	0.37		0.27	0.17		0.25	0.16	0.16
v/c Ratio	1.72	0.41		0.79	1.06		0.93	1.75		0.76	0.72	0.62
Control Delay	369.4	31.4		74.2	91.5		82.8	380.8		62.1	73.5	10.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	369.4	31.4		74.2	91.5		82.8	380.8		62.1	73.5	10.9
LOS	F	C		E	F		F	F		E	E	B
Approach Delay		208.4			86.5			299.9			41.7	
Approach LOS		F			F			F			D	
Queue Length 50th (ft)	~737	202		181	~770		203	~788		117	199	0
Queue Length 95th (ft)	#933	270		230	#979		#327	#990		#190	294	93
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	373	1413		583	861		280	399		229	316	541
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	1.72	0.41		0.63	1.06		0.93	1.75		0.70	0.68	0.61

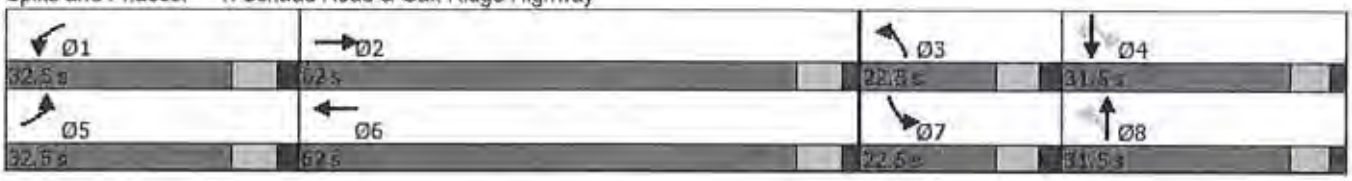
Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 147.1	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.75	
Intersection Signal Delay: 163.7	Intersection LOS: F
Intersection Capacity Utilization 91.3%	ICU Level of Service F
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway

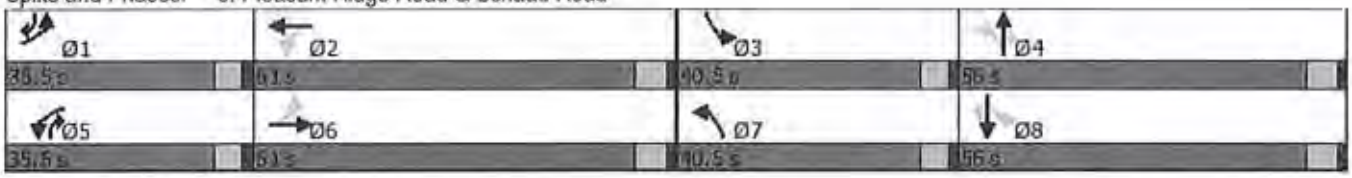


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	475	70	136	646	72	146	157	158	25	360	283
Future Volume (vph)	145	475	70	136	646	72	146	157	158	25	360	283
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.63	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	2312	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.069			0.334			0.160			0.648		
Satd. Flow (perm)	129	3472	0	622	2312	0	298	1863	1583	1207	1863	1583
Satd. Flow (RTOR)		8			4				174			193
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	159	599	0	149	789	0	160	173	174	27	396	311
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	72.6	57.6		69.1	55.8		60.7	52.6	71.4	45.1	36.4	57.0
Actuated g/C Ratio	0.49	0.39		0.47	0.38		0.41	0.35	0.48	0.30	0.25	0.38
v/c Ratio	0.71	0.44		0.38	0.90		0.53	0.26	0.20	0.07	0.87	0.43
Control Delay	52.6	36.6		24.6	59.6		34.8	36.6	3.3	27.5	74.0	13.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	36.6		24.6	59.6		34.8	36.6	3.3	27.5	74.0	13.4
LOS	D	D		C	E		C	D	A	C	E	B
Approach Delay		40.0			54.1			24.6			46.6	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	97	219		74	561		98	125	0	15	364	76
Queue Length 95th (ft)	207	352		148	#1017		162	201	41	37	555	164
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	403	1353		556	873		474	694	1020	628	637	876
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.44		0.27	0.90		0.34	0.25	0.17	0.04	0.62	0.36

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 148.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 43.5	Intersection LOS: D
Intersection Capacity Utilization 74.4%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



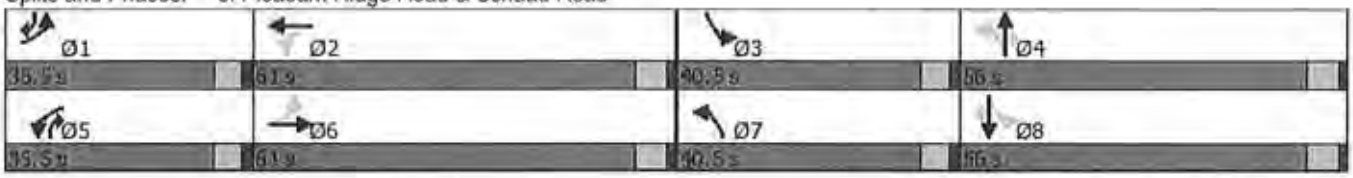
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	247	887	123	294	593	57	94	303	352	62	277	263
Future Volume (vph)	247	887	123	294	593	57	94	303	352	62	277	263
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.63	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.987				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	2317	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.158			0.092			0.222			0.232		
Satd. Flow (perm)	294	3476	0	171	2317	0	414	1863	1583	432	1863	1583
Satd. Flow (RTOR)		8			3				311			255
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	257	1052	0	306	677	0	98	316	367	65	289	274
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	78.3	55.3		88.5	61.5		42.6	30.4	65.2	38.4	28.3	56.9
Actuated g/C Ratio	0.53	0.38		0.60	0.42		0.29	0.21	0.44	0.26	0.19	0.39
v/c Ratio	0.67	0.80		0.74	0.70		0.43	0.82	0.42	0.33	0.81	0.36
Control Delay	30.4	47.6		45.9	42.3		42.4	73.7	6.1	40.2	74.9	5.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.4	47.6		45.9	42.3		42.4	73.7	6.1	40.2	74.9	5.2
LOS	C	D		D	D		D	E	A	D	E	A
Approach Delay		44.2			43.4			38.0			40.9	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	114	473		199	415		69	294	30	45	270	11
Queue Length 95th (ft)	231	647		#382	#665		116	416	99	82	389	65
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	474	1310		430	970		453	636	886	455	636	836
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.80		0.71	0.70		0.22	0.50	0.41	0.14	0.45	0.33

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 147.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 42.1	Intersection LOS: D
Intersection Capacity Utilization 86.5%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at Site Entrance
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2022	North/South Street	Site Entrance
Time Analyzed	AM Peak - Combined Phs1	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Proposed Geometry and Traffic Control w/ 2-lane		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		LT						TR						L		R
Volume (veh/h)		24	693				1075	6						31		57
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized														No		
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		26												34		62
Capacity, c (veh/h)		591												65		233
v/c Ratio		0.04												0.52		0.27
95% Queue Length, Q_{95} (veh)		0.1												2.1		1.0
Control Delay (s/veh)		11.4												110.1		25.9
Level of Service (LOS)		B												F		D
Approach Delay (s/veh)	1.2												55.6			
Approach LOS													F			

HCS7 Two-Way Stop-Control Report

General Information

Analyst	BJH
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	5/24/2018
Analysis Year	2022
Time Analyzed	PM Peak - Combined Phs1
Intersection Orientation	East-West
Project Description	Proposed Geometry and Traffic Control w/ 2-lane

Site Information

Intersection	Schaad at Site Entrance
Jurisdiction	Knox County
East/West Street	Schaad Road
North/South Street	Site Entrance
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		LT						TR						L		R
Volume (veh/h)		51	1236				950	51						37		22
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		55												40		24
Capacity, c (veh/h)		637												28		271
v/c Ratio		0.09												1.43		0.09
95% Queue Length, Q_{95} (veh)		0.3												4.7		0.3
Control Delay (s/veh)		11.2												532.8		19.6
Level of Service (LOS)		B												F		C
Approach Delay (s/veh)		4.1												341.4		
Approach LOS														F		

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2022	North/South Street	La Christa Way
Time Analyzed	AM Peak - Combined Phs1	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Existing Geometry and Traffic Control		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		9	675	1		0	1140	0		0	0	1		17	0	32
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				0					1				53	
Capacity, c (veh/h)		559				866					418				91	
v/c Ratio		0.02				0.00					0.00				0.59	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.0				2.7	
Control Delay (s/veh)		11.6		0.3		9.2		0.0			13.6				89.8	
Level of Service (LOS)		B		A		A		A			B				F	
Approach Delay (s/veh)		0.5				0.0				13.6				89.8		
Approach LOS										B				F		

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2022	North/South Street	La Christa Way
Time Analyzed	PM Peak - Combined Phs1	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Existing Geometry and Traffic Control		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		24	1220	6		4	918	21		1	0	3		13	0	8
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

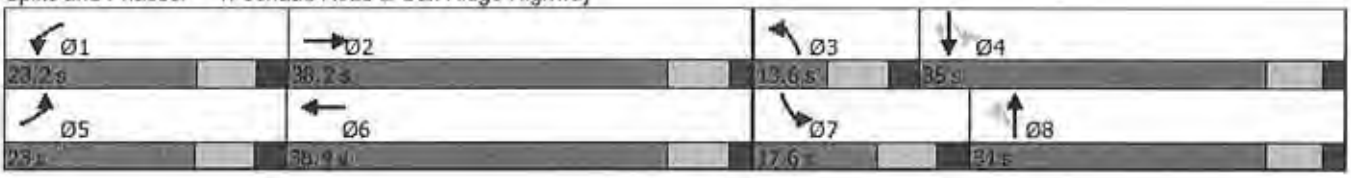
Flow Rate, v (veh/h)		26				4					4				22	
Capacity, c (veh/h)		689				528					64				33	
v/c Ratio		0.04				0.01					0.07				0.67	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.2				2.3	
Control Delay (s/veh)		10.4		1.4		11.9		0.2			65.1				232.7	
Level of Service (LOS)		B		A		B		A			F				F	
Approach Delay (s/veh)		1.6				0.3				65.1				232.7		
Approach LOS										F				F		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	364
Future Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	364
Lane Util. Factor	*0.63	0.95	0.95	0.97	*0.63	0.95	1.00	*0.62	0.95	1.00	1.00	1.00
Frt		0.973			0.976			0.906				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2230	3444	0	3433	2291	0	1770	2093	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.206			0.140		
Satd. Flow (perm)	2230	3444	0	3433	2291	0	384	2093	0	261	1863	1583
Satd. Flow (RTOR)		24			12			148				387
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	785	0	420	653	0	157	581	0	208	425	414
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Split (s)	23.0	38.2		23.2	38.4		13.6	31.0		17.6	35.0	35.0
Total Split (%)	20.9%	34.7%		21.1%	34.9%		12.4%	28.2%		16.0%	31.8%	31.8%
Maximum Green (s)	15.5	31.2		15.7	31.4		6.1	24.5		10.1	28.5	28.5
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0		2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5		7.5	6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	15.5	31.6		15.3	31.4		29.6	24.5		37.6	28.5	28.5
Actuated g/C Ratio	0.14	0.29		0.14	0.29		0.27	0.22		0.34	0.26	0.26
v/c Ratio	0.96	0.78		0.88	0.99		0.87	1.10dr		0.92	0.88	0.59
Control Delay	89.8	41.4		67.0	71.0		70.6	70.0		69.8	60.2	8.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	89.8	41.4		67.0	71.0		70.6	70.0		69.8	60.2	8.5
LOS	F	D		E	E		E	E		E	E	A
Approach Delay		54.8			69.4			70.1			41.7	
Approach LOS		D			E			E			D	
Queue Length 50th (ft)	170	261		151	357		75	259		103	289	14
Queue Length 95th (ft)	#296	326		#223	#529		#161	#431		#231	#447	90
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	314	1006		489	662		180	581		227	482	696
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.96	0.78		0.86	0.99		0.87	1.00		0.92	0.88	0.59

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 110	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 58.2	Intersection LOS: E
Intersection Capacity Utilization 81.3%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Future Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Lane Util. Factor	*0.62	0.95	0.95	0.97	*0.63	0.95	1.00	*0.62	0.95	1.00	1.00	1.00
Frt		0.968			0.973			0.929				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2194	3426	0	3433	2284	0	1770	2146	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.263			0.167		
Satd. Flow (perm)	2194	3426	0	3433	2284	0	490	2146	0	311	1863	1583
Satd. Flow (RTOR)		26			10			43				328
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	640	582	0	370	913	0	260	698	0	160	216	328
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Split (s)	40.0	63.8		31.2	55.0		24.6	39.0		16.0	30.4	30.4
Total Split (%)	26.7%	42.5%		20.8%	36.7%		16.4%	26.0%		10.7%	20.3%	20.3%
Maximum Green (s)	32.5	56.8		23.7	48.0		17.1	32.5		8.5	23.9	23.9
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0		2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5		7.5	6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	32.5	60.4		20.1	48.0		47.5	32.5		31.5	24.0	24.0
Actuated g/C Ratio	0.22	0.40		0.13	0.32		0.32	0.22		0.21	0.16	0.16
v/c Ratio	1.35	0.42		0.81	1.24		0.87	1.40		1.09	0.72	0.62
Control Delay	213.7	32.2		76.9	161.0		69.7	232.1		139.7	74.8	11.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	213.7	32.2		76.9	161.0		69.7	232.1		139.7	74.8	11.0
LOS	F	C		E	F		E	F		F	E	B
Approach Delay		127.2			136.7			188.1			59.9	
Approach LOS		F			F			F			E	
Queue Length 50th (ft)	~658	204		183	~874		204	~710		~125	204	0
Queue Length 95th (ft)	#854	268		236	#1083		#304	#912		#278	#304	94
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	475	1396		542	737		301	498		147	298	528
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	1.35	0.42		0.68	1.24		0.86	1.40		1.09	0.72	0.62

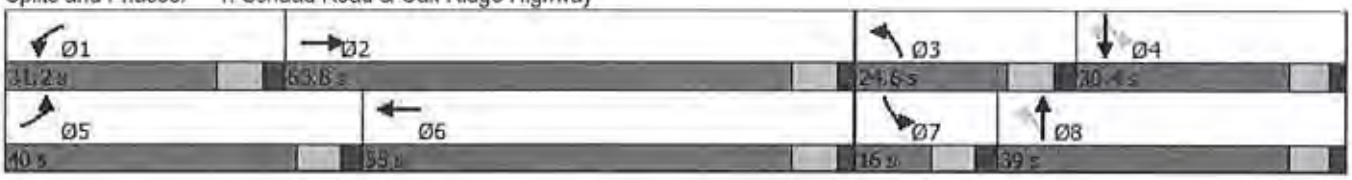
Intersection Summary	
Cycle Length: 150	
Actuated Cycle Length: 150	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.40	
Intersection Signal Delay: 132.8	Intersection LOS: F
Intersection Capacity Utilization 91.3%	ICU Level of Service F
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



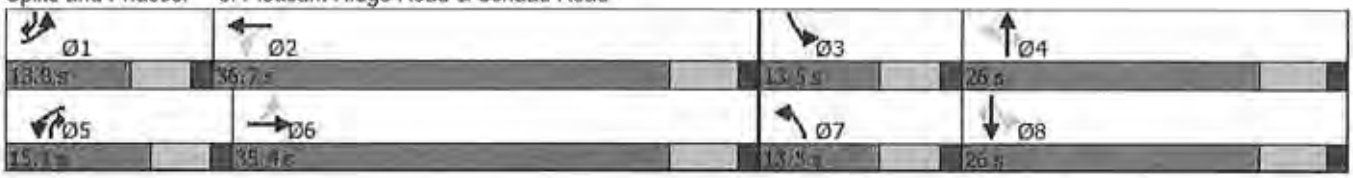
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	475	70	136	646	72	146	157	158	25	360	283
Future Volume (vph)	145	475	70	136	646	72	146	157	158	25	360	283
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.63	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	2312	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.134			0.311			0.180			0.648		
Satd. Flow (perm)	250	3472	0	579	2312	0	335	1863	1583	1207	1863	1583
Satd. Flow (RTOR)		19			9				174			103
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	159	599	0	149	789	0	160	173	174	27	396	311
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	13.8	35.4		15.1	36.7		13.5	26.0	15.1	13.5	26.0	13.8
Total Split (%)	15.3%	39.3%		16.8%	40.8%		15.0%	28.9%	16.8%	15.0%	28.9%	15.3%
Maximum Green (s)	8.3	29.4		9.6	30.7		8.0	20.0	9.6	8.0	20.0	8.3
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	38.6	29.9		40.2	30.7		31.8	28.1	43.1	28.5	20.0	34.2
Actuated g/C Ratio	0.43	0.33		0.45	0.34		0.35	0.31	0.48	0.32	0.22	0.38
v/c Ratio	0.65	0.51		0.39	0.99		0.65	0.30	0.20	0.06	0.96	0.47
Control Delay	28.2	25.4		15.8	61.0		34.1	27.5	3.6	18.4	71.0	16.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	25.4		15.8	61.0		34.1	27.5	3.6	18.4	71.0	16.3
LOS	C	C		B	E		C	C	A	B	E	B
Approach Delay		26.0			53.8			21.4			45.9	
Approach LOS		C			D			C			D	
Queue Length 50th (ft)	47	139		44	347		61	67	0	10	223	84
Queue Length 95th (ft)	#113	192		78	#546		#127	146	38	26	#402	158
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	247	1166		389	795		246	582	858	432	414	667
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.51		0.38	0.99		0.65	0.30	0.20	0.06	0.96	0.47

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 89.9	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 39.1	Intersection LOS: D
Intersection Capacity Utilization 74.4%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



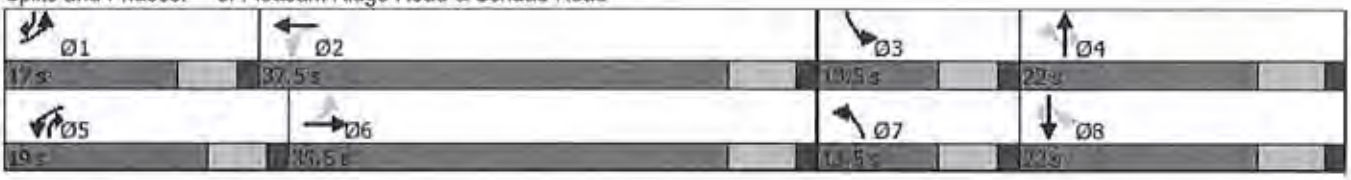
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	247	887	123	294	593	57	94	303	352	62	277	263
Future Volume (vph)	247	887	123	294	593	57	94	303	352	62	277	263
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.63	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.987				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	2317	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.139			0.129			0.310			0.249		
Satd. Flow (perm)	259	3476	0	240	2317	0	577	1863	1583	464	1863	1583
Satd. Flow (RTOR)		18			8				145			182
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	257	1052	0	306	677	0	98	316	367	65	289	274
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	17.0	35.5		19.0	37.5		13.5	22.0	19.0	13.5	22.0	17.0
Total Split (%)	18.9%	39.4%		21.1%	41.7%		15.0%	24.4%	21.1%	15.0%	24.4%	18.9%
Maximum Green (s)	11.5	29.5		13.5	31.5		8.0	16.0	13.5	8.0	16.0	11.5
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	40.2	28.7		44.6	30.9		22.8	16.2	35.4	22.8	16.2	33.2
Actuated g/C Ratio	0.47	0.33		0.52	0.36		0.26	0.19	0.41	0.26	0.19	0.39
v/c Ratio	0.82	0.90		0.85	0.81		0.37	0.90	0.50	0.27	0.83	0.38
Control Delay	41.2	39.3		44.0	34.7		25.8	66.8	14.5	24.0	56.4	9.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	39.3		44.0	34.7		25.8	66.8	14.5	24.0	56.4	9.0
LOS	D	D		D	C		C	E	B	C	E	A
Approach Delay		39.7			37.6			37.1			32.4	
Approach LOS		D			D			D			C	
Queue Length 50th (ft)	86	294		117	273		39	180	90	25	162	34
Queue Length 95th (ft)	#218	#421		#264	#420		76	#341	172	54	#303	93
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	326	1215		367	861		265	350	744	245	350	732
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.87		0.83	0.79		0.37	0.90	0.49	0.27	0.83	0.37

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 86.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 37.3	Intersection LOS: D
Intersection Capacity Utilization 86.5%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



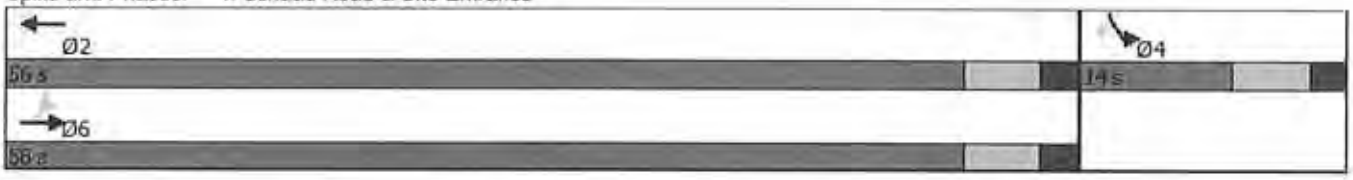
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	24	693	1075	6	31	57
Future Volume (vph)	24	693	1075	6	31	57
Lane Util. Factor	1.00	1.00	*0.95	1.00	1.00	1.00
Frt			0.999			0.850
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	1859	1768	0	1770	1583
Flt Permitted		0.779			0.950	
Satd. Flow (perm)	0	1451	1768	0	1770	1583
Satd. Flow (RTOR)			1			62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	779	1175	0	34	62
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		6	2		4	
Permitted Phases	6					4
Detector Phase	6	6	2		4	4
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		8.0	8.0
Minimum Split (s)	21.0	21.0	21.0		14.0	14.0
Total Split (s)	56.0	56.0	56.0		14.0	14.0
Total Split (%)	80.0%	80.0%	80.0%		20.0%	20.0%
Maximum Green (s)	50.0	50.0	50.0		8.0	8.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	4.0	4.0	4.0		3.0	3.0
Recall Mode	Min	Min	Min		None	None
Act Effct Green (s)		54.4	54.4		8.3	8.3
Actuated g/C Ratio		0.78	0.78		0.12	0.12
v/c Ratio		0.68	0.85		0.16	0.25
Control Delay		9.7	16.3		31.0	11.5
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		9.7	16.3		31.0	11.5
LOS		A	B		C	B
Approach Delay		9.7	16.3		18.4	
Approach LOS		A	B		B	
Queue Length 50th (ft)		164	358		15	0
Queue Length 95th (ft)		311	#766		38	32
Internal Link Dist (ft)		798	904		392	
Turn Bay Length (ft)						200
Base Capacity (vph)		1138	1388		212	244
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.68	0.85		0.16	0.25

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 69.3	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 73.6%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Schaad Road & Site Entrance

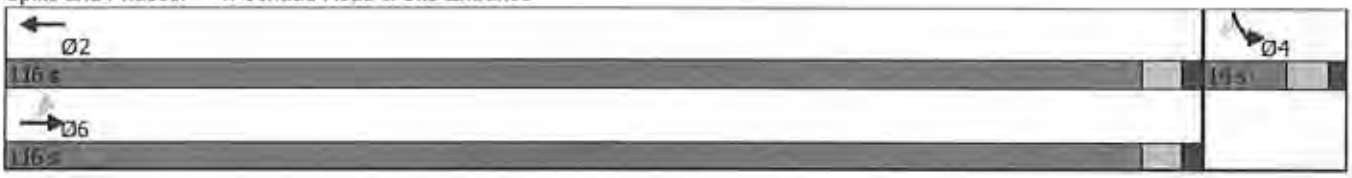


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	51	1236	950	51	37	22
Future Volume (vph)	51	1236	950	51	37	22
Lane Util. Factor	1.00	1.00	*0.95	1.00	1.00	1.00
Frt			0.993			0.850
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	1859	1757	0	1770	1583
Flt Permitted		0.891			0.950	
Satd. Flow (perm)	0	1660	1757	0	1770	1583
Satd. Flow (RTOR)			10			24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1398	1088	0	40	24
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		6	2		4	
Permitted Phases	6					4
Detector Phase	6	6	2		4	4
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		8.0	8.0
Minimum Split (s)	21.0	21.0	21.0		14.0	14.0
Total Split (s)	116.0	116.0	116.0		14.0	14.0
Total Split (%)	89.2%	89.2%	89.2%		10.8%	10.8%
Maximum Green (s)	110.0	110.0	110.0		8.0	8.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	4.0	4.0	4.0		3.0	3.0
Recall Mode	Min	Min	Min		None	None
Act Effct Green (s)		112.2	112.2		8.0	8.0
Actuated g/C Ratio		0.88	0.88		0.06	0.06
v/c Ratio		0.96	0.71		0.36	0.20
Control Delay		26.1	6.6		68.3	24.9
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		26.1	6.6		68.3	24.9
LOS		C	A		E	C
Approach Delay		26.1	6.6		52.0	
Approach LOS		C	A		D	
Queue Length 50th (ft)		865	289		33	0
Queue Length 95th (ft)		#1484	424		73	29
Internal Link Dist (ft)		798	904		392	
Turn Bay Length (ft)						200
Base Capacity (vph)		1455	1542		110	121
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.96	0.71		0.36	0.20

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 128	
Natural Cycle: 130	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 18.5	Intersection LOS: B
Intersection Capacity Utilization 123.1%	ICU Level of Service H
Analysis Period (min) 15	

* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Schaad Road & Site Entrance

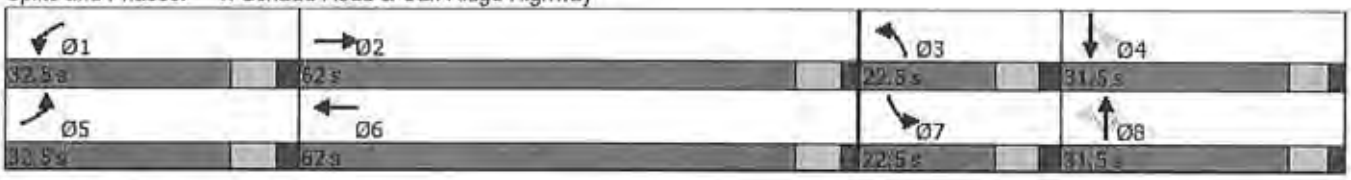


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	264
Future Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	264
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.973			0.976				0.850		0.938	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3444	0	3433	2291	0	1770	3539	1583	1770	3320	0
Flt Permitted	0.950			0.950			0.167			0.573		
Satd. Flow (perm)	3433	3444	0	3433	2291	0	311	3539	1583	1067	3320	0
Satd. Flow (RTOR)		20			10				365		103	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	785	0	420	653	0	157	216	365	208	725	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5	31.5	22.5	31.5	
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%	21.2%	15.2%	21.2%	
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0	25.0	15.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	15.7	39.2		19.5	43.1		34.8	23.9	23.9	37.8	25.4	
Actuated g/C Ratio	0.13	0.31		0.16	0.34		0.28	0.19	0.19	0.30	0.20	
v/c Ratio	0.70	0.72		0.79	0.82		0.70	0.32	0.61	0.52	0.96	
Control Delay	63.4	41.2		63.2	46.7		49.2	47.9	9.7	38.5	67.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	63.4	41.2		63.2	46.7		49.2	47.9	9.7	38.5	67.2	
LOS	E	D		E	D		D	D	A	D	E	
Approach Delay		47.4			53.1			29.3			60.8	
Approach LOS		D			D			C			E	
Queue Length 50th (ft)	123	290		171	376		91	82	0	124	273	
Queue Length 95th (ft)	185	376		248	519		169	134	84	220	#476	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	698	1551		698	1030		272	719	612	424	757	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.43	0.51		0.60	0.63		0.58	0.30	0.60	0.49	0.96	

Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 125.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 48.8	Intersection LOS: D
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Future Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.968			0.973				0.850		0.910	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3426	0	3433	2284	0	1770	3539	1583	1770	3221	0
Flt Permitted	0.950			0.950			0.181			0.365		
Satd. Flow (perm)	3433	3426	0	3433	2284	0	337	3539	1583	680	3221	0
Satd. Flow (RTOR)		26			11				330		222	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	640	582	0	370	913	0	260	368	330	160	544	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5	31.5	22.5	31.5	
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%	21.2%	15.2%	21.2%	
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0	25.0	15.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	25.0	60.4		19.7	55.0		36.2	22.1	22.1	32.5	20.3	
Actuated g/C Ratio	0.17	0.42		0.14	0.38		0.25	0.15	0.15	0.23	0.14	
v/c Ratio	1.07	0.40		0.79	1.04		1.11	0.68	0.63	0.63	0.84	
Control Delay	113.2	30.0		72.8	83.3		132.7	64.5	11.2	51.8	47.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	113.2	30.0		72.8	83.3		132.7	64.5	11.2	51.8	47.9	
LOS	F	C		E	F		F	E	B	D	D	
Approach Delay		73.6			80.3			64.6			48.8	
Approach LOS		E			F			E			D	
Queue Length 50th (ft)	~347	192		176	~737		~233	175	0	117	160	
Queue Length 95th (ft)	#488	270		230	#979		#420	233	92	182	230	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	596	1452		596	880		234	615	547	275	743	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	1.07	0.40		0.62	1.04		1.11	0.60	0.60	0.58	0.73	

Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 143.9	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.11	
Intersection Signal Delay: 69.4	Intersection LOS: E
Intersection Capacity Utilization 91.6%	ICU Level of Service F
Analysis Period (min) 15	

* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

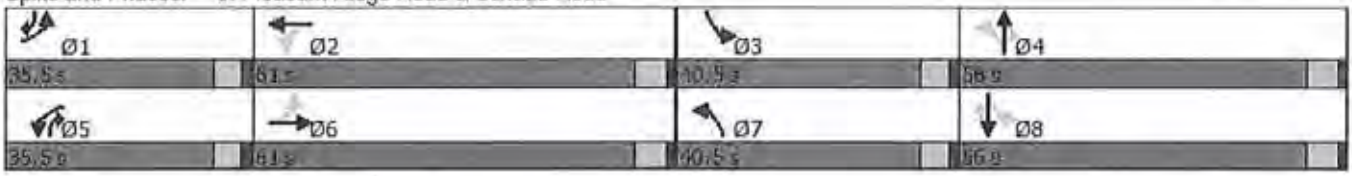
Splits and Phases: 1: Schaad Road & Oak Ridge Highway

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	475	70	136	646	72	146	157	158	25	360	283
Future Volume (vph)	145	475	70	136	646	72	146	157	158	25	360	283
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.159			0.271			0.214			0.648		
Satd. Flow (perm)	296	3472	0	505	3486	0	399	1863	1583	1207	1863	1583
Satd. Flow (RTOR)		8			6				174			203
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	159	599	0	149	789	0	160	173	174	27	396	311
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	51.8	38.1		52.7	38.6		58.7	50.9	70.9	43.7	34.7	54.2
Actuated g/C Ratio	0.40	0.30		0.41	0.30		0.46	0.40	0.55	0.34	0.27	0.42
v/c Ratio	0.59	0.58		0.44	0.75		0.43	0.23	0.18	0.06	0.79	0.40
Control Delay	32.4	41.6		27.2	46.8		25.8	30.0	2.9	23.0	57.4	11.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.4	41.6		27.2	46.8		25.8	30.0	2.9	23.0	57.4	11.0
LOS	C	D		C	D		C	C	A	C	E	B
Approach Delay		39.7			43.7			19.4			36.4	
Approach LOS		D			D			B			D	
Queue Length 50th (ft)	76	215		71	302		76	101	0	12	299	54
Queue Length 95th (ft)	158	353		148	490		153	192	39	35	531	153
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	495	1567		539	1572		575	810	1148	713	762	983
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.38		0.28	0.50		0.28	0.21	0.15	0.04	0.52	0.32

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 128.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 36.6	Intersection LOS: D
Intersection Capacity Utilization 74.4%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



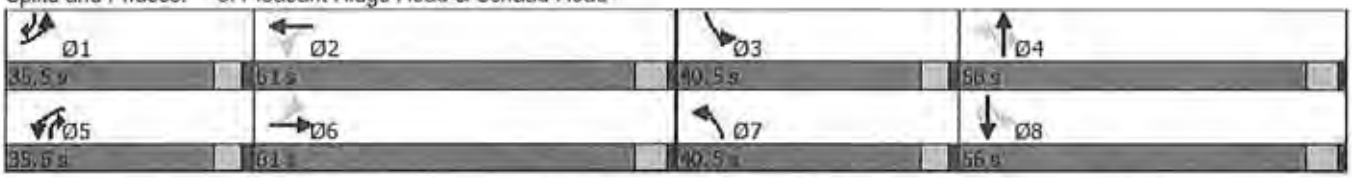
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	247	887	123	294	593	57	94	303	352	62	277	263
Future Volume (vph)	247	887	123	294	593	57	94	303	352	62	277	263
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.987				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	3493	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.390			0.090			0.219			0.229		
Satd. Flow (perm)	726	3476	0	168	3493	0	408	1863	1583	427	1863	1583
Satd. Flow (RTOR)		8			5				310			255
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	257	1052	0	306	677	0	98	316	367	65	289	274
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	72.3	55.2		90.7	68.2		42.6	30.4	66.1	38.4	28.3	50.9
Actuated g/C Ratio	0.49	0.37		0.61	0.46		0.29	0.21	0.45	0.26	0.19	0.34
v/c Ratio	0.55	0.81		0.72	0.42		0.44	0.83	0.42	0.33	0.81	0.39
Control Delay	20.3	48.2		44.6	29.6		42.7	74.5	6.1	40.4	75.6	6.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	48.2		44.6	29.6		42.7	74.5	6.1	40.4	75.6	6.0
LOS	C	D		D	C		D	E	A	D	E	A
Approach Delay		42.7			34.2			38.3			41.6	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)	105	473		201	220		69	294	31	45	270	12
Queue Length 95th (ft)	191	647		#374	356		116	416	100	82	389	69
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	633	1302		429	1614		450	632	882	451	632	833
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.81		0.71	0.42		0.22	0.50	0.42	0.14	0.46	0.33

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 147.9	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 39.3	Intersection LOS: D
Intersection Capacity Utilization 86.5%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2022	North/South Street	La Christa Way
Time Analyzed	AM Peak - Combined Phs1	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Future Geometry and Traffic Control w/ County Proj		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	9	675	1	0	0	1140	0		0	0	1		17	0	32
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				0					1				53	
Capacity, c (veh/h)		552				860					627				259	
v/c Ratio		0.02				0.00					0.00				0.21	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.0				0.8	
Control Delay (s/veh)		11.6				9.2					10.8				22.5	
Level of Service (LOS)		B				A					B				C	
Approach Delay (s/veh)	0.2				0.0				10.8				22.5			
Approach LOS									B				C			

HCS7 Two-Way Stop-Control Report

General Information

Analyst	BJH
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	5/24/2018
Analysis Year	2022
Time Analyzed	PM Peak - Combined Phs1
Intersection Orientation	East-West
Project Description	Future Geometry and Traffic Control w/ County Proj

Site Information

Intersection	Schaad at La Christa
Jurisdiction	Knox County
East/West Street	Schaad Road
North/South Street	La Christa Way
Peak Hour Factor	0.94
Analysis Time Period (hrs)	0.25

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	24	1220	6	0	4	918	21		1	0	3		13	0	8
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage	Left + Thru									1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		26				4					4				22	
Capacity, c (veh/h)		683				521					253				221	
v/c Ratio		0.04				0.01					0.02				0.10	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1				0.3	
Control Delay (s/veh)		10.5				12.0					19.5				23.1	
Level of Service (LOS)		B				B					C				C	
Approach Delay (s/veh)	0.2				0.1				19.5				23.1			
Approach LOS									C				C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at Site Entrance
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2022	North/South Street	Site Entrance
Time Analyzed	AM Peak - Combined Phs1	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Proposed Geometry and Traffic Control w/ County Pr		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	1		0	0	0		1	0	1
Configuration		L	T				T	R						L		R
Volume (veh/h)	0	24	693				1075	6						31		57
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized							No							No		
Median Type | Storage			Left + Thru								1					

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.16												6.86		6.96
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		26												34		62
Capacity, c (veh/h)		585												197		452
v/c Ratio		0.04												0.17		0.14
95% Queue Length, Q_{95} (veh)		0.1												0.6		0.5
Control Delay (s/veh)		11.4												27.1		14.2
Level of Service (LOS)		B												D		B
Approach Delay (s/veh)		0.4												18.7		
Approach LOS														C		

HCS7 Two-Way Stop-Control Report

General Information

Analyst	BJH
Agency/Co.	Cannon & Cannon, Inc
Date Performed	5/24/2018
Analysis Year	2022
Time Analyzed	PM Peak - Combined Phs1
Intersection Orientation	East-West
Project Description	Proposed Geometry and Traffic Control w/ County Pr

Site Information

Intersection	Schaad at Site Entrance
Jurisdiction	Knox County
East/West Street	Schaad Road
North/South Street	Site Entrance
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	1		0	0	0		1	0	1
Configuration		L	T				T	R						L		R
Volume (veh/h)	0	51	1236				950	51						37		22
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized							No							No		
Median Type | Storage			Left + Thru								1					

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.16												6.86		6.96
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		55												40		24
Capacity, c (veh/h)		631												180		501
v/c Ratio		0.09												0.22		0.05
95% Queue Length, Q_{95} (veh)		0.3												0.8		0.1
Control Delay (s/veh)		11.3												30.6		12.5
Level of Service (LOS)		B												D		B
Approach Delay (s/veh)		0.4												23.9		
Approach LOS														C		

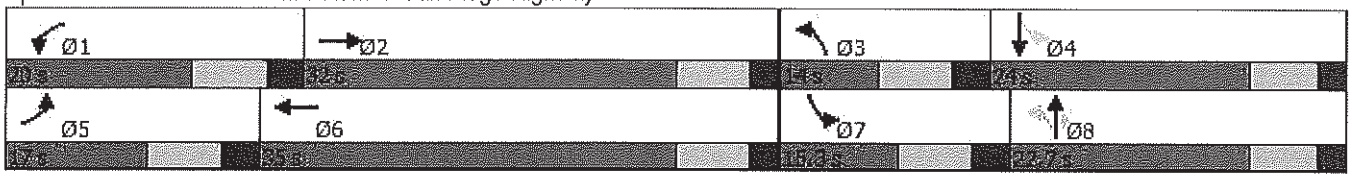
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	264
Future Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	264
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.973			0.976				0.850		0.938	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3444	0	3433	2291	0	1770	3539	1583	1770	3320	0
Flt Permitted	0.950			0.950			0.252			0.570		
Satd. Flow (perm)	3433	3444	0	3433	2291	0	469	3539	1583	1062	3320	0
Satd. Flow (RTOR)		29			15				326		175	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	785	0	420	653	0	157	216	365	208	725	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	17.0	32.0		20.0	35.0		14.0	22.7	22.7	15.3	24.0	
Total Split (%)	18.9%	35.6%		22.2%	38.9%		15.6%	25.2%	25.2%	17.0%	26.7%	
Maximum Green (s)	9.5	25.0		12.5	28.0		6.5	16.2	16.2	7.8	17.5	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	9.4	24.6		12.4	27.5		21.4	15.9	15.9	24.0	17.2	
Actuated g/C Ratio	0.11	0.28		0.14	0.31		0.24	0.18	0.18	0.27	0.19	
v/c Ratio	0.83	0.81		0.88	0.91		0.75	0.34	0.66	0.60	0.93	
Control Delay	60.1	36.8		59.7	47.9		48.2	33.9	12.5	31.8	46.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	60.1	36.8		59.7	47.9		48.2	33.9	12.5	31.8	46.7	
LOS	E	D		E	D		D	C	B	C	D	
Approach Delay		43.2			52.5			26.4			43.4	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	88	210		122	274		64	56	19	88	165	
Queue Length 95th (ft)	#150	272		#196	#421		#129	88	97	142	#263	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	366	986		481	730		208	643	554	348	792	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.83	0.80		0.87	0.89		0.75	0.34	0.66	0.60	0.92	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 89.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 42.6	Intersection LOS: D
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Future Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.968			0.973				0.850		0.910	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3426	0	3433	2284	0	1770	3539	1583	1770	3221	0
Flt Permitted	0.950			0.950			0.237			0.475		
Satd. Flow (perm)	3433	3426	0	3433	2284	0	441	3539	1583	885	3221	0
Satd. Flow (RTOR)		33			14				330		255	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	640	582	0	370	913	0	260	368	330	160	544	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	29.0	52.9		27.3	51.2		21.0	23.3	23.3	16.5	18.8	
Total Split (%)	24.2%	44.1%		22.8%	42.7%		17.5%	19.4%	19.4%	13.8%	15.7%	
Maximum Green (s)	21.5	45.9		19.8	44.2		13.5	16.8	16.8	9.0	12.3	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	21.5	48.9		16.8	44.2		29.4	16.9	16.9	20.2	12.3	
Actuated g/C Ratio	0.18	0.41		0.14	0.37		0.24	0.14	0.14	0.17	0.10	
v/c Ratio	1.04	0.41		0.77	1.07		1.01	0.74	0.65	0.74	0.97	
Control Delay	95.1	25.3		60.8	89.1		99.0	59.4	11.7	59.3	60.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	95.1	25.3		60.8	89.1		99.0	59.4	11.7	59.3	60.7	
LOS	F	C		E	F		F	E	B	E	E	
Approach Delay		61.9			80.9			53.7			60.4	
Approach LOS		E			F			D			E	
Queue Length 50th (ft)	~276	157		143	~619		~176	145	0	100	122	
Queue Length 95th (ft)	#393	215		192	#819		#332	200	89	#191	#240	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	615	1415		566	850		257	497	506	216	559	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	1.04	0.41		0.65	1.07		1.01	0.74	0.65	0.74	0.97	

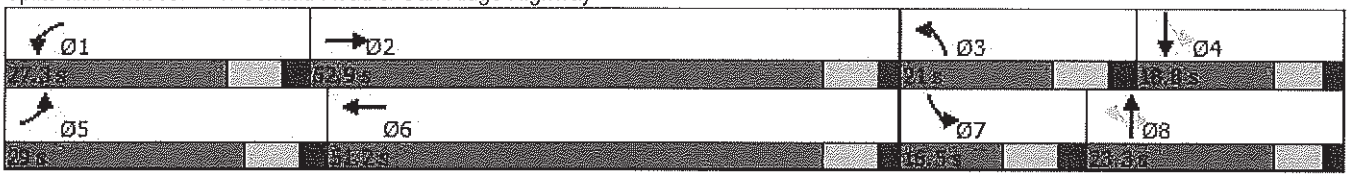
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.07	
Intersection Signal Delay: 65.6	Intersection LOS: E
Intersection Capacity Utilization 91.6%	ICU Level of Service F
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



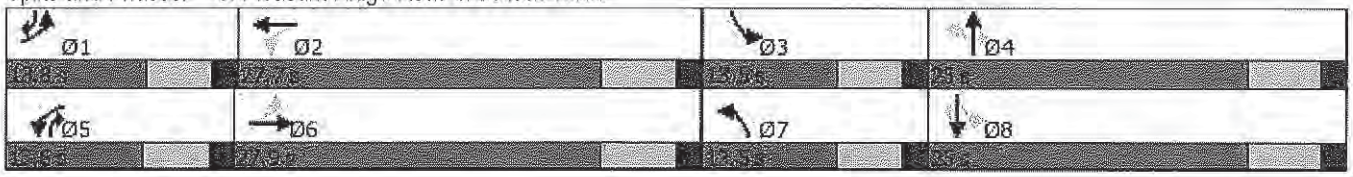
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	475	70	136	646	72	146	157	158	25	360	283
Future Volume (vph)	145	475	70	136	646	72	146	157	158	25	360	283
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.189			0.288			0.214			0.648		
Satd. Flow (perm)	352	3472	0	536	3486	0	399	1863	1583	1207	1863	1583
Satd. Flow (RTOR)		20			15				174			116
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	159	599	0	149	789	0	160	173	174	27	396	311
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	13.8	27.9		13.6	27.7		13.5	25.0	13.6	13.5	25.0	13.8
Total Split (%)	17.3%	34.9%		17.0%	34.6%		16.9%	31.3%	17.0%	16.9%	31.3%	17.3%
Maximum Green (s)	8.3	21.9		8.1	21.7		8.0	19.0	8.1	8.0	19.0	8.3
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	30.0	21.2		29.6	21.1		30.3	26.7	40.8	27.0	18.5	32.7
Actuated g/C Ratio	0.38	0.27		0.38	0.27		0.38	0.34	0.52	0.34	0.23	0.41
v/c Ratio	0.56	0.63		0.46	0.84		0.55	0.27	0.19	0.06	0.91	0.43
Control Delay	22.0	28.0		18.3	36.3		23.1	23.1	3.2	14.6	57.0	12.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	28.0		18.3	36.3		23.1	23.1	3.2	14.6	57.0	12.2
LOS	C	C		B	D		C	C	A	B	E	B
Approach Delay		26.7			33.5			16.3			36.4	
Approach LOS		C			C			B			D	
Queue Length 50th (ft)	46	133		43	191		50	55	0	8	192	63
Queue Length 95th (ft)	83	186		79	#281		91	129	35	23	#352	128
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	283	980		328	972		292	630	902	470	449	726
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.61		0.45	0.81		0.55	0.27	0.19	0.06	0.88	0.43

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 78.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 29.5	Intersection LOS: C
Intersection Capacity Utilization 74.4%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	247	887	123	294	593	57	94	303	352	62	277	263
Future Volume (vph)	247	887	123	294	593	57	94	303	352	62	277	263
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.987				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	3493	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.313			0.130			0.307			0.248		
Satd. Flow (perm)	583	3476	0	242	3493	0	572	1863	1583	462	1863	1583
Satd. Flow (RTOR)		18			12				145			174
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	257	1052	0	306	677	0	98	316	367	65	289	274
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	18.2	35.5		19.0	36.3		13.5	22.0	19.0	13.5	22.0	18.2
Total Split (%)	20.2%	39.4%		21.1%	40.3%		15.0%	24.4%	21.1%	15.0%	24.4%	20.2%
Maximum Green (s)	12.7	29.5		13.5	30.3		8.0	16.0	13.5	8.0	16.0	12.7
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	40.5	28.7		44.6	30.8		22.8	16.2	35.5	22.8	16.2	33.5
Actuated g/C Ratio	0.47	0.33		0.52	0.36		0.26	0.19	0.41	0.26	0.19	0.39
v/c Ratio	0.60	0.90		0.85	0.54		0.37	0.91	0.50	0.27	0.83	0.38
Control Delay	17.5	39.5		43.3	24.6		25.8	67.2	14.5	24.0	56.7	9.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	39.5		43.3	24.6		25.8	67.2	14.5	24.0	56.7	9.2
LOS	B	D		D	C		C	E	B	C	E	A
Approach Delay		35.2			30.4			37.2			32.6	
Approach LOS		D			C			D			C	
Queue Length 50th (ft)	73	294		118	161		39	180	90	25	162	37
Queue Length 95th (ft)	118	#421		#267	218		76	#341	172	54	#303	95
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	461	1212		367	1263		263	349	743	245	349	746
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.87		0.83	0.54		0.37	0.91	0.49	0.27	0.83	0.37

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 86.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 33.9	Intersection LOS: C
Intersection Capacity Utilization 86.5%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

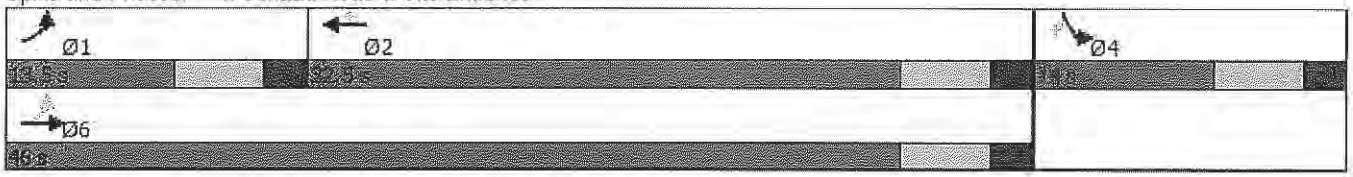
Splits and Phases: 3: Pleasant Ridge Road & Schaad Road

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	24	693	1075	6	31	57
Future Volume (vph)	24	693	1075	6	31	57
Lane Util. Factor	1.00	0.95	*0.95	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3539	1583	1770	1583
Flt Permitted	0.159				0.950	
Satd. Flow (perm)	296	3539	3539	1583	1770	1583
Satd. Flow (RTOR)				7		62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	753	1168	7	34	62
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Detector Phase	1	6	2	2	4	4
Switch Phase						
Minimum Initial (s)	6.0	15.0	15.0	15.0	8.0	8.0
Minimum Split (s)	13.5	21.0	21.0	21.0	14.0	14.0
Total Split (s)	13.5	46.0	32.5	32.5	14.0	14.0
Total Split (%)	22.5%	76.7%	54.2%	54.2%	23.3%	23.3%
Maximum Green (s)	7.5	40.0	26.5	26.5	8.0	8.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	4.0	4.0	4.0	3.0	3.0
Recall Mode	None	Min	Min	Min	None	None
Act Effct Green (s)	31.1	34.0	32.2	32.2	8.3	8.3
Actuated g/C Ratio	0.69	0.76	0.72	0.72	0.18	0.18
v/c Ratio	0.06	0.28	0.46	0.01	0.10	0.18
Control Delay	4.2	4.1	7.6	5.0	20.1	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.2	4.1	7.6	5.0	20.1	8.6
LOS	A	A	A	A	C	A
Approach Delay		4.1	7.6		12.7	
Approach LOS		A	A		B	
Queue Length 50th (ft)	3	48	89	0	8	0
Queue Length 95th (ft)	8	71	236	6	32	28
Internal Link Dist (ft)		798	904		392	
Turn Bay Length (ft)	200			200		200
Base Capacity (vph)	459	3126	2548	1142	325	341
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.24	0.46	0.01	0.10	0.18

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 44.9	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 6.5	Intersection LOS: A
Intersection Capacity Utilization 46.4%	ICU Level of Service A
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 4: Schaad Road & Site Entrance

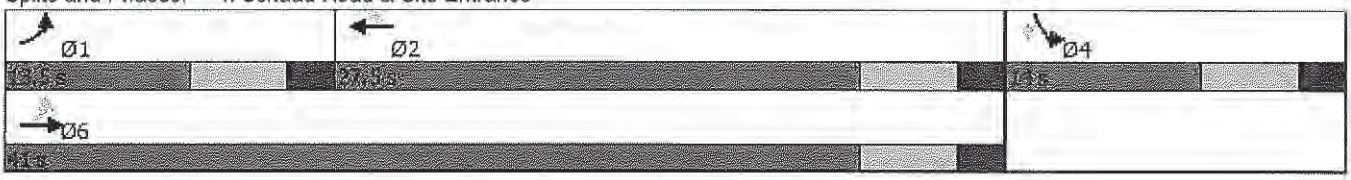


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	51	1236	950	51	37	22
Future Volume (vph)	51	1236	950	51	37	22
Lane Util. Factor	1.00	0.95	*0.95	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3539	1583	1770	1583
Flt Permitted	0.186				0.950	
Satd. Flow (perm)	346	3539	3539	1583	1770	1583
Satd. Flow (RTOR)				55		24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	55	1343	1033	55	40	24
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Detector Phase	1	6	2	2	4	4
Switch Phase						
Minimum Initial (s)	6.0	15.0	15.0	15.0	8.0	8.0
Minimum Split (s)	13.5	21.0	21.0	21.0	14.0	14.0
Total Split (s)	13.5	41.0	27.5	27.5	14.0	14.0
Total Split (%)	24.5%	74.5%	50.0%	50.0%	25.5%	25.5%
Maximum Green (s)	7.5	35.0	21.5	21.5	8.0	8.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	4.0	4.0	4.0	3.0	3.0
Recall Mode	None	Min	Min	Min	None	None
Act Effct Green (s)	34.4	37.4	30.8	30.8	8.3	8.3
Actuated g/C Ratio	0.72	0.78	0.64	0.64	0.17	0.17
v/c Ratio	0.12	0.49	0.45	0.05	0.13	0.08
Control Delay	4.2	5.1	11.1	3.9	21.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.2	5.1	11.1	3.9	21.5	10.9
LOS	A	A	B	A	C	B
Approach Delay		5.1	10.7		17.5	
Approach LOS		A	B		B	
Queue Length 50th (ft)	6	111	139	0	11	0
Queue Length 95th (ft)	15	157	207	17	34	17
Internal Link Dist (ft)		798	904		392	
Turn Bay Length (ft)	200			200		200
Base Capacity (vph)	478	2667	2271	1035	305	292
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.50	0.45	0.05	0.13	0.08

Intersection Summary	
Cycle Length: 55	
Actuated Cycle Length: 48	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.49	
Intersection Signal Delay: 7.8	Intersection LOS: A
Intersection Capacity Utilization 52.9%	ICU Level of Service A
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 4: Schaad Road & Site Entrance



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	592	127	377	503	92	143	189	330	179	366	354
Future Volume (vph)	265	592	127	377	503	92	143	189	330	179	366	354
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.974			0.977				0.850		0.926	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3447	0	3433	2293	0	1770	3539	1583	1770	3277	0
Flt Permitted	0.950			0.950			0.165			0.581		
Satd. Flow (perm)	3433	3447	0	3433	2293	0	307	3539	1583	1082	3277	0
Satd. Flow (RTOR)		19			9				375		141	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	301	817	0	428	677	0	163	215	375	203	818	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5	31.5	22.5	31.5	
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%	21.2%	15.2%	21.2%	
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0	25.0	15.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	15.8	41.1		19.9	45.2		35.6	24.3	24.3	37.8	25.4	
Actuated g/C Ratio	0.12	0.32		0.16	0.35		0.28	0.19	0.19	0.30	0.20	
v/c Ratio	0.71	0.73		0.80	0.83		0.72	0.32	0.62	0.52	1.07	
Control Delay	64.8	41.7		65.1	47.2		52.2	49.0	9.9	39.4	93.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	64.8	41.7		65.1	47.2		52.2	49.0	9.9	39.4	93.1	
LOS	E	D		E	D		D	D	A	D	F	
Approach Delay		47.9			54.1			30.2			82.4	
Approach LOS		D			D			C			F	
Queue Length 50th (ft)	126	311		179	401		98	83	0	125	~353	
Queue Length 95th (ft)	187	394		257	545		#187	136	85	220	#557	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	683	1520		683	1015		267	704	615	418	765	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.44	0.54		0.63	0.67		0.61	0.31	0.61	0.49	1.07	

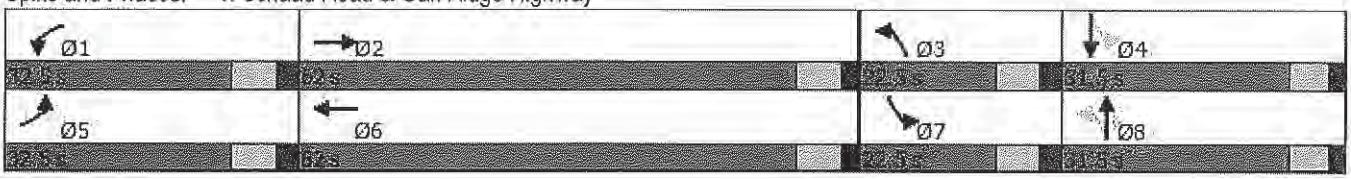
Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 127.7	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.07	
Intersection Signal Delay: 55.1	Intersection LOS: E
Intersection Capacity Utilization 83.5%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	585	440	116	344	719	152	248	336	309	147	199	303
Future Volume (vph)	585	440	116	344	719	152	248	336	309	147	199	303
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.969			0.974				0.850		0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3429	0	3433	2286	0	1770	3539	1583	1770	3217	0
Flt Permitted	0.950			0.950			0.180			0.370		
Satd. Flow (perm)	3433	3429	0	3433	2286	0	335	3539	1583	689	3217	0
Satd. Flow (RTOR)		25			11				336		223	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	636	604	0	374	947	0	270	365	336	160	545	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5	31.5	22.5	31.5	
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%	21.2%	15.2%	21.2%	
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0	25.0	15.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	25.0	60.3		19.8	55.1		36.2	22.2	22.2	32.5	20.3	
Actuated g/C Ratio	0.17	0.42		0.14	0.38		0.25	0.15	0.15	0.23	0.14	
v/c Ratio	1.07	0.42		0.79	1.07		1.16	0.67	0.64	0.63	0.84	
Control Delay	111.3	30.5		72.9	94.4		147.4	64.2	11.2	51.6	47.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	111.3	30.5		72.9	94.4		147.4	64.2	11.2	51.6	47.9	
LOS	F	C		E	F		F	E	B	D	D	
Approach Delay		71.9			88.3			69.0			48.7	
Approach LOS		E			F			E			D	
Queue Length 50th (ft)	~343	202		178	~790		~253	174	0	117	160	
Queue Length 95th (ft)	#483	282		233	#1033		#443	231	94	182	230	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	596	1449		596	881		233	615	552	277	743	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	1.07	0.42		0.63	1.07		1.16	0.59	0.61	0.58	0.73	

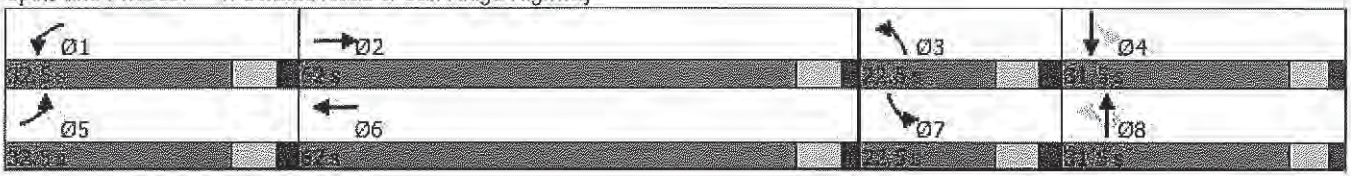
Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 144	
Natural Cycle: 130	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.16	
Intersection Signal Delay: 72.5	Intersection LOS: E
Intersection Capacity Utilization 92.9%	ICU Level of Service F
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway

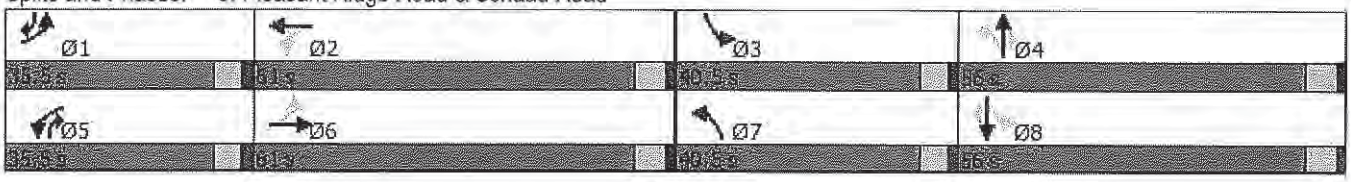


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	472	69	143	669	75	151	164	166	26	376	294
Future Volume (vph)	144	472	69	143	669	75	151	164	166	26	376	294
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.146			0.273			0.197			0.644		
Satd. Flow (perm)	272	3472	0	509	3486	0	367	1863	1583	1200	1863	1583
Satd. Flow (RTOR)		8			6				182			192
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	158	595	0	157	817	0	166	180	182	29	413	323
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	54.2	40.2		55.6	40.9		61.7	53.9	74.4	45.9	36.9	56.8
Actuated g/C Ratio	0.40	0.30		0.42	0.31		0.46	0.40	0.56	0.34	0.28	0.42
v/c Ratio	0.61	0.57		0.46	0.77		0.46	0.24	0.19	0.06	0.81	0.41
Control Delay	34.1	42.6		28.2	48.7		27.2	30.9	3.0	23.8	60.3	12.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.1	42.6		28.2	48.7		27.2	30.9	3.0	23.8	60.3	12.8
LOS	C	D		C	D		C	C	A	C	E	B
Approach Delay		40.8			45.4			20.1			38.8	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	80	225		80	332		83	110	0	13	329	70
Queue Length 95th (ft)	158	354		157	521		163	204	40	39	577	179
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	475	1504		526	1503		553	794	1140	708	728	967
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.40		0.30	0.54		0.30	0.23	0.16	0.04	0.57	0.33

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 133.9	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 38.2	Intersection LOS: D
Intersection Capacity Utilization 76.2%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



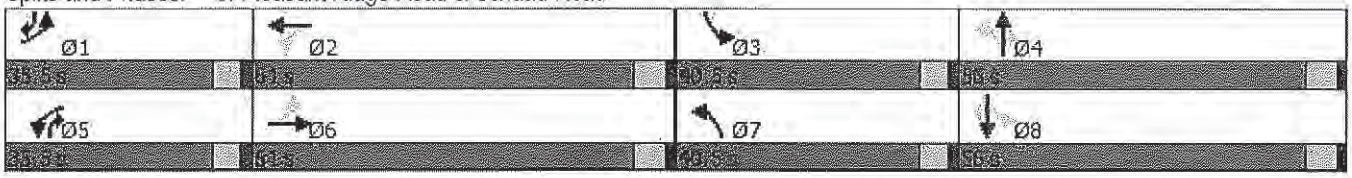
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	896	124	307	584	60	93	316	368	64	290	259
Future Volume (vph)	250	896	124	307	584	60	93	316	368	64	290	259
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.986				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	3490	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.391			0.083			0.209			0.211		
Satd. Flow (perm)	728	3476	0	155	3490	0	389	1863	1583	393	1863	1583
Satd. Flow (RTOR)		8			6				304			241
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	260	1062	0	320	671	0	97	329	383	67	302	270
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	72.7	55.2		91.1	68.3		43.7	31.5	67.6	39.8	29.6	52.6
Actuated g/C Ratio	0.49	0.37		0.61	0.46		0.29	0.21	0.45	0.27	0.20	0.35
v/c Ratio	0.55	0.83		0.76	0.42		0.44	0.84	0.43	0.35	0.82	0.38
Control Delay	20.9	49.8		50.2	30.3		42.6	75.7	7.2	40.6	76.1	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	49.8		50.2	30.3		42.6	75.7	7.2	40.6	76.1	6.6
LOS	C	D		D	C		D	E	A	D	E	A
Approach Delay		44.1			36.7			39.3			43.0	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	110	486		226	222		69	309	44	46	285	19
Queue Length 95th (ft)	199	#671		#426	360		114	433	120	84	406	76
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	627	1287		419	1596		447	624	882	447	624	830
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.83		0.76	0.42		0.22	0.53	0.43	0.15	0.48	0.33

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 149.6	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 41.0	Intersection LOS: D
Intersection Capacity Utilization 88.2%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



HCS7 Two-Way Stop-Control Report

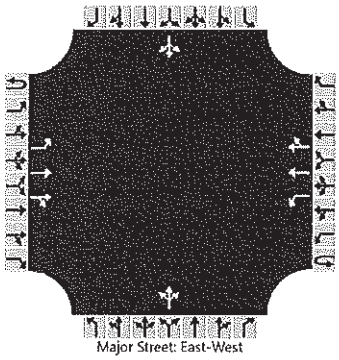
General Information

Analyst	BJH
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	5/24/2018
Analysis Year	2024
Time Analyzed	AM Peak - Background Phs2
Intersection Orientation	East-West
Project Description	Future Geometry and Traffic Control w/ County Proj

Site Information

Intersection	Schaad at La Christa
Jurisdiction	Knox County
East/West Street	Schaad Road
North/South Street	La Christa Way
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	9	678	1	0	0	1129	0		0	0	1		17	0	33
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

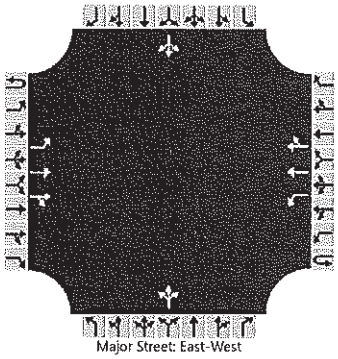
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				0					1				54	
Capacity, c (veh/h)		558				857					625				264	
v/c Ratio		0.02				0.00					0.00				0.21	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.0				0.8	
Control Delay (s/veh)		11.6				9.2					10.8				22.1	
Level of Service (LOS)		B				A					B				C	
Approach Delay (s/veh)		0.2				0.0				10.8				22.1		
Approach LOS										B				C		

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/24/2018	East/West Street	Schaad Road
Analysis Year	2024	North/South Street	La Christa Way
Time Analyzed	PM Peak - Background Phs2	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Future Geometry and Traffic Control w/ County Proj		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	25	1217	6	0	5	932	22		1	0	3		14	0	8
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		27				5					4				23	
Capacity, c (veh/h)		673				523					253				214	
v/c Ratio		0.04				0.01					0.02				0.11	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1				0.4	
Control Delay (s/veh)		10.6				12.0					19.5				23.9	
Level of Service (LOS)		B				B					C				C	
Approach Delay (s/veh)	0.2				0.1				19.5				23.9			
Approach LOS									C				C			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	342	592	127	377	503	115	143	242	330	216	435	434
Future Volume (vph)	342	592	127	377	503	115	143	242	330	216	435	434
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.974			0.972				0.850		0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3447	0	3433	2281	0	1770	3539	1583	1770	3274	0
Flt Permitted	0.950			0.950			0.205			0.462		
Satd. Flow (perm)	3433	3447	0	3433	2281	0	382	3539	1583	861	3274	0
Satd. Flow (RTOR)		25			16				346		238	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	389	817	0	428	703	0	163	275	375	245	987	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	19.4	34.1		21.4	36.1		14.1	25.5	25.5	19.0	30.4	
Total Split (%)	19.4%	34.1%		21.4%	36.1%		14.1%	25.5%	25.5%	19.0%	30.4%	
Maximum Green (s)	11.9	27.1		13.9	29.1		6.6	19.0	19.0	11.5	23.9	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	11.9	27.2		13.8	29.1		25.1	19.5	19.5	33.9	23.9	
Actuated g/C Ratio	0.12	0.27		0.14	0.29		0.25	0.20	0.20	0.34	0.24	
v/c Ratio	0.95	0.86		0.90	1.04		0.87	0.40	0.64	0.62	1.02	
Control Delay	79.2	43.8		66.5	81.0		67.3	37.4	11.1	31.5	65.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	79.2	43.8		66.5	81.0		67.3	37.4	11.1	31.5	65.0	
LOS	E	D		E	F		E	D	B	C	E	
Approach Delay		55.2			75.5			31.3			58.3	
Approach LOS		E			E			C			E	
Queue Length 50th (ft)	128	253		140	~380		71	81	15	113	~288	
Queue Length 95th (ft)	#212	#327		#218	#538		#166	118	95	173	#399	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	408	955		477	675		187	688	587	400	963	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.95	0.86		0.90	1.04		0.87	0.40	0.64	0.61	1.02	

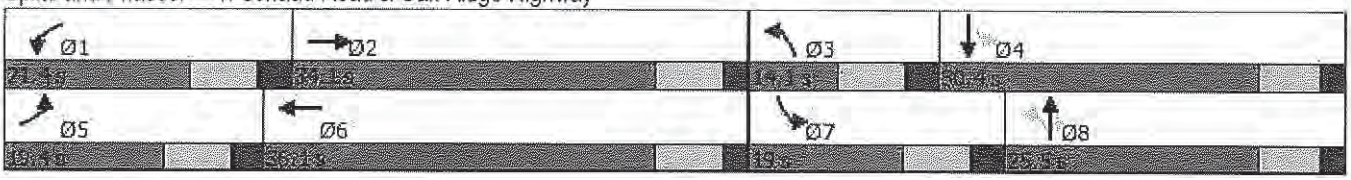
Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 56.9	Intersection LOS: E
Intersection Capacity Utilization 88.0%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	706	440	116	344	719	179	248	397	309	178	230	374
Future Volume (vph)	706	440	116	344	719	179	248	397	309	178	230	374
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.969			0.970				0.850		0.907	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3429	0	3433	2277	0	1770	3539	1583	1770	3210	0
Flt Permitted	0.950			0.950			0.178			0.344		
Satd. Flow (perm)	3433	3429	0	3433	2277	0	332	3539	1583	641	3210	0
Satd. Flow (RTOR)		28			14				336		239	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	767	604	0	374	977	0	270	432	336	193	657	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	34.0	63.7		30.3	60.0		22.0	29.0	29.0	17.0	24.0	
Total Split (%)	24.3%	45.5%		21.6%	42.9%		15.7%	20.7%	20.7%	12.1%	17.1%	
Maximum Green (s)	26.5	56.7		22.8	53.0		14.5	22.5	22.5	9.5	17.5	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	26.5	60.3		19.2	53.0		36.0	22.5	22.5	26.0	17.5	
Actuated g/C Ratio	0.19	0.43		0.14	0.38		0.26	0.16	0.16	0.19	0.12	
v/c Ratio	1.18	0.40		0.80	1.12		1.15	0.76	0.63	0.99	1.08	
Control Delay	145.3	27.5		71.3	109.9		146.5	65.8	10.8	108.2	94.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	145.3	27.5		71.3	109.9		146.5	65.8	10.8	108.2	94.7	
LOS	F	C		E	F		F	E	B	F	F	
Approach Delay		93.4			99.2			69.0			97.8	
Approach LOS		F			F			E			F	
Queue Length 50th (ft)	~430	188		172	~807		~239	200	0	144	~243	
Queue Length 95th (ft)	#558	250		223	#1016		#424	262	92	#267	#371	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	649	1493		559	870		234	568	536	195	610	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	1.18	0.40		0.67	1.12		1.15	0.76	0.63	0.99	1.08	

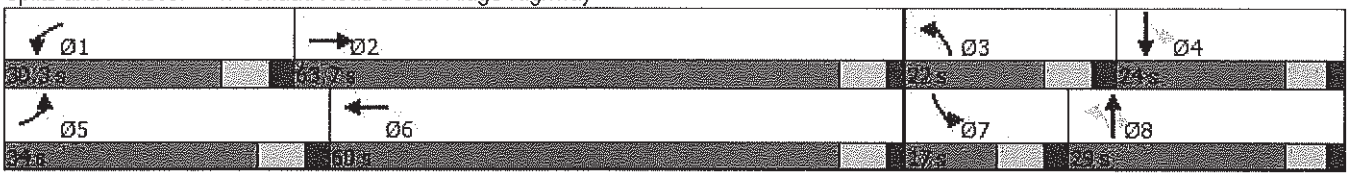
Intersection Summary	
Cycle Length: 140	
Actuated Cycle Length: 140	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.18	
Intersection Signal Delay: 90.4	Intersection LOS: F
Intersection Capacity Utilization 100.4%	ICU Level of Service G
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



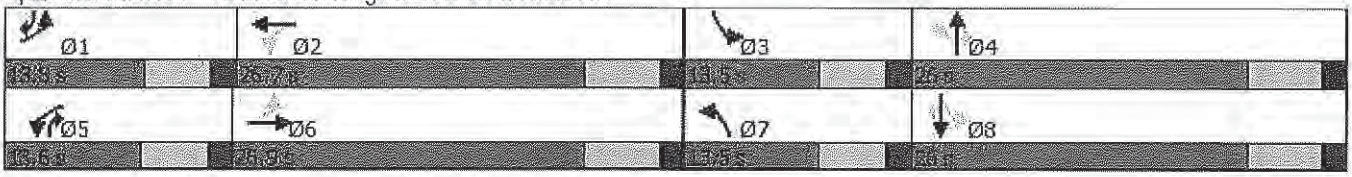
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	541	79	143	692	75	156	164	166	26	376	304
Future Volume (vph)	165	541	79	143	692	75	156	164	166	26	376	304
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.191			0.217			0.205			0.644		
Satd. Flow (perm)	356	3472	0	404	3486	0	382	1863	1583	1200	1863	1583
Satd. Flow (RTOR)		19			14				182			116
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	181	682	0	157	842	0	171	180	182	29	413	334
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	13.8	26.9		13.6	26.7		13.5	26.0	13.6	13.5	26.0	13.8
Total Split (%)	17.3%	33.6%		17.0%	33.4%		16.9%	32.5%	17.0%	16.9%	32.5%	17.3%
Maximum Green (s)	8.3	20.9		8.1	20.7		8.0	20.0	8.1	8.0	20.0	8.3
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	29.6	20.9		29.3	20.7		31.2	27.5	41.6	27.9	19.4	33.6
Actuated g/C Ratio	0.37	0.26		0.37	0.26		0.39	0.35	0.52	0.35	0.24	0.42
v/c Ratio	0.65	0.74		0.55	0.92		0.59	0.28	0.20	0.06	0.91	0.45
Control Delay	26.9	31.6		21.8	44.6		24.5	22.5	3.0	14.1	55.8	12.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	31.6		21.8	44.6		24.5	22.5	3.0	14.1	55.8	12.5
LOS	C	C		C	D		C	C	A	B	E	B
Approach Delay		30.6			41.0			16.5			35.6	
Approach LOS		C			D			B			D	
Queue Length 50th (ft)	55	159		47	212		53	56	0	8	199	70
Queue Length 95th (ft)	#112	221		85	#326		#101	131	35	23	#359	138
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	280	929		288	920		290	646	917	479	469	738
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.73		0.55	0.92		0.59	0.28	0.20	0.06	0.88	0.45

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 79.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 32.7	Intersection LOS: C
Intersection Capacity Utilization 78.3%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	294	1048	146	307	714	60	114	316	368	64	290	317
Future Volume (vph)	294	1048	146	307	714	60	114	316	368	64	290	317
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.988				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	3497	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.177			0.140			0.250			0.278		
Satd. Flow (perm)	330	3476	0	261	3497	0	466	1863	1583	518	1863	1583
Satd. Flow (RTOR)		18			10				147			110
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	306	1244	0	320	807	0	119	329	383	67	302	330
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	21.8	36.0		18.5	32.7		13.5	22.0	18.5	13.5	22.0	21.8
Total Split (%)	24.2%	40.0%		20.6%	36.3%		15.0%	24.4%	20.6%	15.0%	24.4%	24.2%
Maximum Green (s)	16.3	30.0		13.0	26.7		8.0	16.0	13.0	8.0	16.0	16.3
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	44.9	30.0		42.1	28.6		25.5	18.6	37.6	24.4	15.9	36.3
Actuated g/C Ratio	0.50	0.33		0.47	0.32		0.28	0.21	0.42	0.27	0.18	0.40
v/c Ratio	0.78	1.06		0.94	0.72		0.48	0.85	0.51	0.27	0.92	0.47
Control Delay	29.4	74.7		60.9	31.7		28.6	58.6	15.2	23.9	70.5	14.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	74.7		60.9	31.7		28.6	58.6	15.2	23.9	70.5	14.8
LOS	C	E		E	C		C	E	B	C	E	B
Approach Delay		65.8			40.0			34.3			39.7	
Approach LOS		E			D			C			D	
Queue Length 50th (ft)	90	~411		132	215		48	189	98	26	170	83
Queue Length 95th (ft)	#187	#544		#298	287		89	#359	185	56	#322	154
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	432	1171		340	1120		248	386	747	252	331	735
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.71	1.06		0.94	0.72		0.48	0.85	0.51	0.27	0.91	0.45

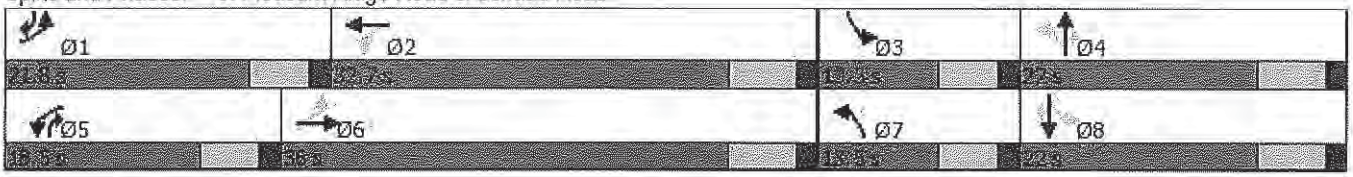
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 89.9	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.06	
Intersection Signal Delay: 48.3	Intersection LOS: D
Intersection Capacity Utilization 93.1%	ICU Level of Service F
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road

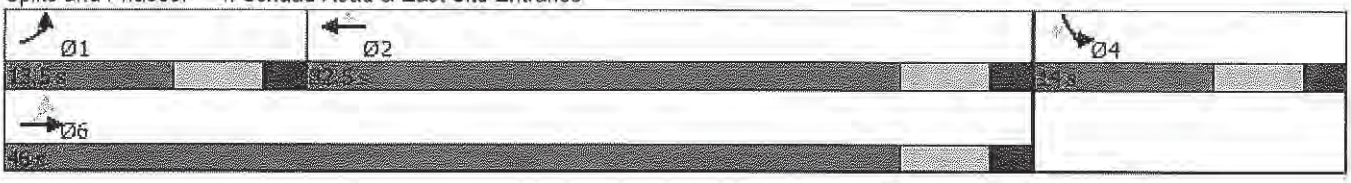


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	38	710	1162	28	75	47
Future Volume (vph)	38	710	1162	28	75	47
Lane Util. Factor	1.00	0.95	*0.95	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3539	1583	1770	1583
Flt Permitted	0.126				0.950	
Satd. Flow (perm)	235	3539	3539	1583	1770	1583
Satd. Flow (RTOR)				30		51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	41	772	1263	30	82	51
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Detector Phase	1	6	2	2	4	4
Switch Phase						
Minimum Initial (s)	6.0	15.0	15.0	15.0	8.0	8.0
Minimum Split (s)	13.5	21.0	21.0	21.0	14.0	14.0
Total Split (s)	13.5	46.0	32.5	32.5	14.0	14.0
Total Split (%)	22.5%	76.7%	54.2%	54.2%	23.3%	23.3%
Maximum Green (s)	7.5	40.0	26.5	26.5	8.0	8.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	4.0	4.0	4.0	3.0	3.0
Recall Mode	None	Min	Min	Min	None	None
Act Effct Green (s)	34.2	35.9	31.6	31.6	8.3	8.3
Actuated g/C Ratio	0.67	0.71	0.62	0.62	0.16	0.16
v/c Ratio	0.12	0.31	0.58	0.03	0.28	0.17
Control Delay	4.4	4.6	11.2	4.2	24.7	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.4	4.6	11.2	4.2	24.7	9.6
LOS	A	A	B	A	C	A
Approach Delay		4.6	11.0		18.9	
Approach LOS		A	B		B	
Queue Length 50th (ft)	4	50	100	0	19	0
Queue Length 95th (ft)	12	73	268	12	62	26
Internal Link Dist (ft)		798	904		392	
Turn Bay Length (ft)	200			200		200
Base Capacity (vph)	391	2800	2193	992	288	300
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.28	0.58	0.03	0.28	0.17

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 50.9	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 48.8%	ICU Level of Service A
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 4: Schaad Road & East Site Entrance



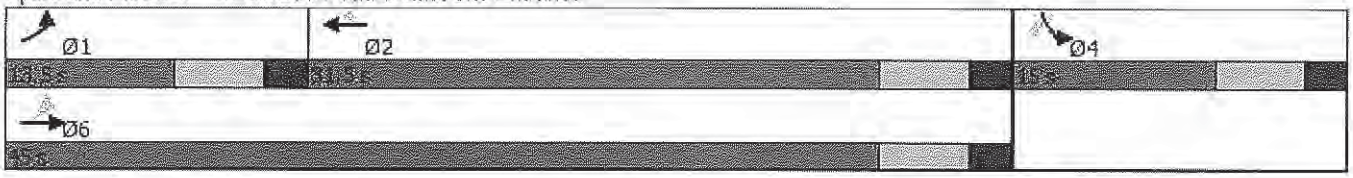
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	52	1324	1197	157	164	33
Future Volume (vph)	52	1324	1197	157	164	33
Lane Util. Factor	1.00	0.95	*0.95	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3539	1583	1770	1583
Flt Permitted	0.114				0.950	
Satd. Flow (perm)	212	3539	3539	1583	1770	1583
Satd. Flow (RTOR)				171		36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	57	1439	1301	171	178	36
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6			2		4
Detector Phase	1	6	2	2	4	4
Switch Phase						
Minimum Initial (s)	6.0	15.0	15.0	15.0	8.0	8.0
Minimum Split (s)	13.5	21.0	21.0	21.0	14.0	14.0
Total Split (s)	13.5	45.0	31.5	31.5	15.0	15.0
Total Split (%)	22.5%	75.0%	52.5%	52.5%	25.0%	25.0%
Maximum Green (s)	7.5	39.0	25.5	25.5	9.0	9.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	4.0	4.0	4.0	3.0	3.0
Recall Mode	None	Min	Min	Min	None	None
Act Effct Green (s)	36.4	36.4	29.2	29.2	8.8	8.8
Actuated g/C Ratio	0.64	0.64	0.51	0.51	0.15	0.15
v/c Ratio	0.19	0.64	0.72	0.19	0.65	0.13
Control Delay	5.3	8.0	16.1	2.7	37.1	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	8.0	16.1	2.7	37.1	10.3
LOS	A	A	B	A	D	B
Approach Delay		7.9	14.5		32.6	
Approach LOS		A	B		C	
Queue Length 50th (ft)	6	132	204	0	60	0
Queue Length 95th (ft)	16	186	#336	28	#140	21
Internal Link Dist (ft)		798	904		392	
Turn Bay Length (ft)	200			200		200
Base Capacity (vph)	339	2418	1801	889	278	280
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.60	0.72	0.19	0.64	0.13

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 57.3	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 62.2%	ICU Level of Service B
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Schaad Road & East Site Entrance

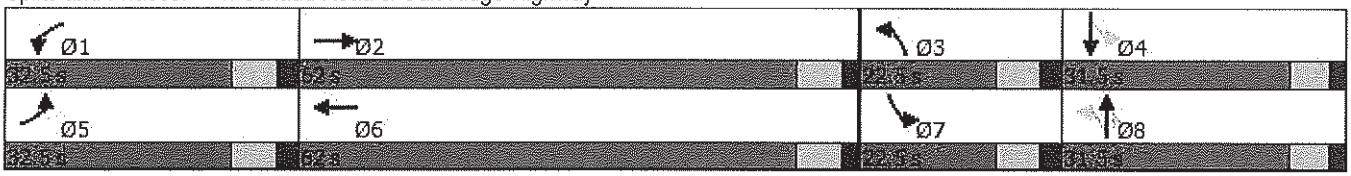


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	342	592	127	377	503	115	143	242	330	216	435	434
Future Volume (vph)	342	592	127	377	503	115	143	242	330	216	435	434
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.974			0.972				0.850		0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3447	0	3433	2281	0	1770	3539	1583	1770	3274	0
Flt Permitted	0.950			0.950			0.169			0.470		
Satd. Flow (perm)	3433	3447	0	3433	2281	0	315	3539	1583	875	3274	0
Satd. Flow (RTOR)		19			12				373		147	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	389	817	0	428	703	0	163	275	375	245	987	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5	31.5	22.5	31.5	
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%	21.2%	15.2%	21.2%	
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0	25.0	15.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	19.5	46.3		20.6	47.4		35.2	23.6	23.6	38.8	25.4	
Actuated g/C Ratio	0.15	0.35		0.15	0.35		0.26	0.18	0.18	0.29	0.19	
v/c Ratio	0.78	0.68		0.81	0.86		0.74	0.44	0.64	0.70	1.34	
Control Delay	67.7	39.8		68.7	51.7		56.5	53.8	10.7	50.3	195.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	67.7	39.8		68.7	51.7		56.5	53.8	10.7	50.3	195.5	
LOS	E	D		E	D		E	D	B	D	F	
Approach Delay		48.8			58.1			34.4			166.6	
Approach LOS		D			E			C			F	
Queue Length 50th (ft)	178	319		196	452		110	119	2	175	~574	
Queue Length 95th (ft)	236	394		260	594		#187	172	88	#276	#737	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	650	1447		650	957		254	670	602	360	739	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.60	0.56		0.66	0.73		0.64	0.41	0.62	0.68	1.34	

Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 133.8	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.34	
Intersection Signal Delay: 81.7	Intersection LOS: F
Intersection Capacity Utilization 88.0%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	706	440	116	344	719	179	248	397	309	178	230	374
Future Volume (vph)	706	440	116	344	719	179	248	397	309	178	230	374
Lane Util. Factor	*0.97	0.95	0.95	0.97	*0.63	0.95	1.00	*0.95	1.00	1.00	0.95	0.95
Frt		0.969			0.970				0.850		0.907	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3429	0	3433	2277	0	1770	3539	1583	1770	3210	0
Flt Permitted	0.950			0.950			0.163			0.280		
Satd. Flow (perm)	3433	3429	0	3433	2277	0	304	3539	1583	522	3210	0
Satd. Flow (RTOR)		25			13				336		237	
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	767	604	0	374	977	0	270	432	336	193	657	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	27.0		13.5	27.0		13.5	12.5	12.5	13.5	12.5	
Total Split (s)	32.5	62.0		32.5	62.0		22.5	31.5	31.5	22.5	31.5	
Total Split (%)	21.9%	41.8%		21.9%	41.8%		15.2%	21.2%	21.2%	15.2%	21.2%	
Maximum Green (s)	25.0	55.0		25.0	55.0		15.0	25.0	25.0	15.0	25.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	4.5	4.5	5.0	4.5	
All-Red Time (s)	2.5	2.0		2.5	2.0		2.5	2.0	2.0	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	5.0		2.0	5.0		2.0	3.0	3.0	2.0	3.0	
Recall Mode	None	Min		None	Min		None	None	None	None	None	
Act Effct Green (s)	25.0	59.8		20.2	55.0		38.5	24.5	24.5	36.9	23.7	
Actuated g/C Ratio	0.17	0.41		0.14	0.37		0.26	0.17	0.17	0.25	0.16	
v/c Ratio	1.32	0.43		0.80	1.14		1.18	0.73	0.62	0.77	0.92	
Control Delay	200.6	32.0		74.3	117.4		155.9	66.7	10.6	61.3	57.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	200.6	32.0		74.3	117.4		155.9	66.7	10.6	61.3	57.4	
LOS	F	C		E	F		F	E	B	E	E	
Approach Delay		126.3			105.5			71.7			58.3	
Approach LOS		F			F			E			E	
Queue Length 50th (ft)	~494	212		183	~874		~262	211	0	144	220	
Queue Length 95th (ft)	#624	282		233	#1084		#453	273	94	#231	#327	
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	582	1408		582	859		228	601	547	260	742	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	1.32	0.43		0.64	1.14		1.18	0.72	0.61	0.74	0.89	

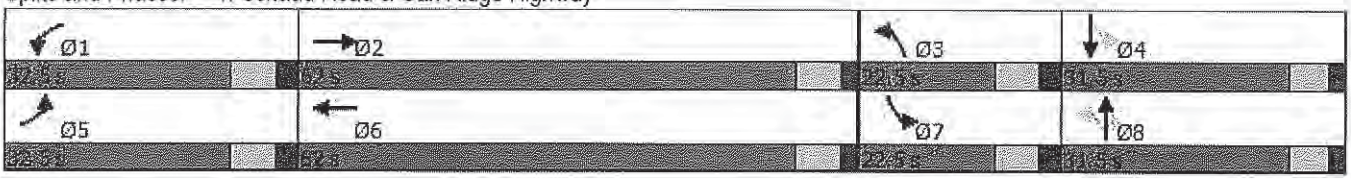
Intersection Summary	
Cycle Length: 148.5	
Actuated Cycle Length: 147.2	
Natural Cycle: 150	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.32	
Intersection Signal Delay: 95.4	Intersection LOS: F
Intersection Capacity Utilization 100.4%	ICU Level of Service G
Analysis Period (min) 15	

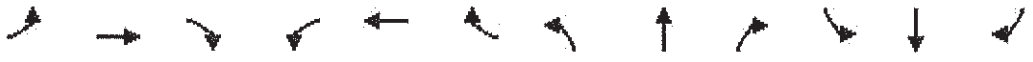
* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



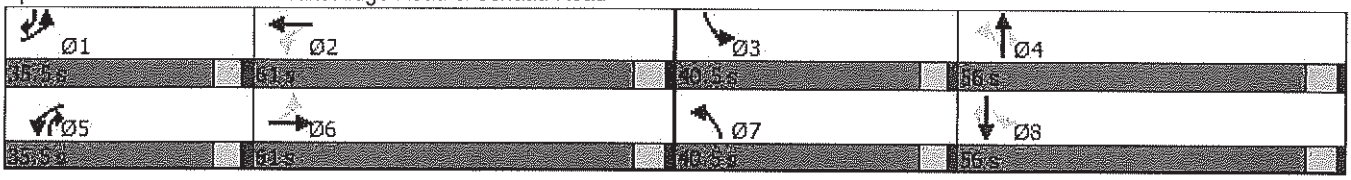


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	541	79	143	692	75	156	164	166	26	376	304
Future Volume (vph)	165	541	79	143	692	75	156	164	166	26	376	304
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.126			0.236			0.190			0.644		
Satd. Flow (perm)	235	3472	0	440	3486	0	354	1863	1583	1200	1863	1583
Satd. Flow (RTOR)		8			6				182			183
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	181	682	0	157	842	0	171	180	182	29	413	334
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	59.9	43.9		57.4	42.7		63.4	55.7	76.2	46.9	37.9	59.6
Actuated g/C Ratio	0.43	0.31		0.41	0.31		0.45	0.40	0.55	0.34	0.27	0.43
v/c Ratio	0.67	0.62		0.50	0.79		0.48	0.24	0.19	0.07	0.82	0.43
Control Delay	38.2	44.1		29.7	51.6		29.1	32.4	3.1	25.4	63.7	14.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	44.1		29.7	51.6		29.1	32.4	3.1	25.4	63.7	14.4
LOS	D	D		C	D		C	C	A	C	E	B
Approach Delay		42.9			48.2			21.3			41.0	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	97	274		83	363		91	116	0	14	349	88
Queue Length 95th (ft)	190	417		158	561		173	211	41	40	597	201
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	454	1459		503	1445		533	776	1120	696	700	942
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.47		0.31	0.58		0.32	0.23	0.16	0.04	0.59	0.35

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 139.4	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 40.5	Intersection LOS: D
Intersection Capacity Utilization 78.3%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



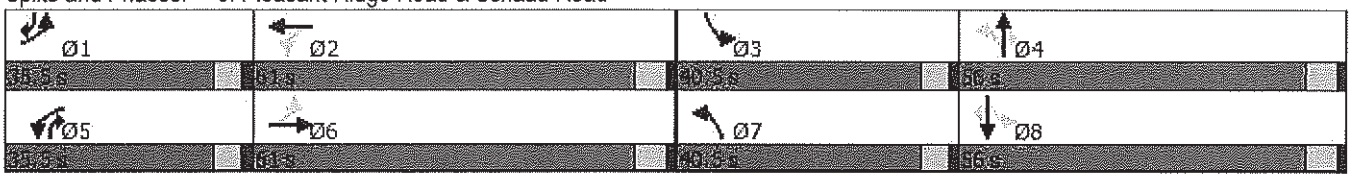
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	294	1048	146	307	714	60	114	316	368	64	290	317
Future Volume (vph)	294	1048	146	307	714	60	114	316	368	64	290	317
Lane Util. Factor	1.00	0.95	0.95	1.00	*0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.988				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	3497	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.240			0.066			0.193			0.241		
Satd. Flow (perm)	447	3476	0	123	3497	0	360	1863	1583	449	1863	1583
Satd. Flow (RTOR)		8			5				304			241
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	306	1244	0	320	807	0	119	329	383	67	302	330
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	1	6		5	2		7	4	5	3	8	1
Permitted Phases	6			2			4		4	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase												
Minimum Initial (s)	8.0	12.0		8.0	12.0		8.0	10.0	8.0	8.0	10.0	8.0
Minimum Split (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Split (s)	35.5	61.0		35.5	61.0		40.5	56.0	35.5	40.5	56.0	35.5
Total Split (%)	18.4%	31.6%		18.4%	31.6%		21.0%	29.0%	18.4%	21.0%	29.0%	18.4%
Maximum Green (s)	30.0	55.0		30.0	55.0		35.0	50.0	30.0	35.0	50.0	30.0
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	6.0		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Act Effct Green (s)	80.8	55.2		88.8	60.3		46.8	33.1	69.2	39.8	29.6	60.7
Actuated g/C Ratio	0.53	0.37		0.59	0.40		0.31	0.22	0.46	0.26	0.20	0.40
v/c Ratio	0.67	0.98		0.80	0.58		0.51	0.81	0.43	0.33	0.83	0.42
Control Delay	24.6	67.1		59.2	39.7		44.2	71.7	7.1	39.8	77.9	9.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	67.1		59.2	39.7		44.2	71.7	7.1	39.8	77.9	9.6
LOS	C	E		E	D		D	E	A	D	E	A
Approach Delay		58.7			45.3			38.0			42.0	
Approach LOS		E			D			D			D	
Queue Length 50th (ft)	138	629		250	330		85	309	44	46	288	54
Queue Length 95th (ft)	244	#927		#472	478		136	432	119	84	413	130
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	517	1274		400	1396		443	618	889	451	618	824
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.98		0.80	0.58		0.27	0.53	0.43	0.15	0.49	0.40

Intersection Summary	
Cycle Length: 193	
Actuated Cycle Length: 151.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 48.2	Intersection LOS: D
Intersection Capacity Utilization 93.1%	ICU Level of Service F
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

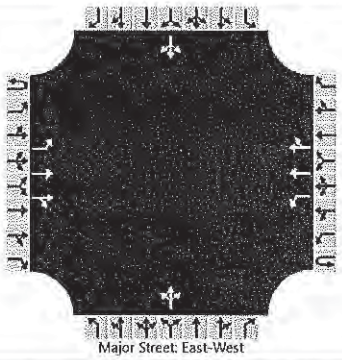
Splits and Phases: 3: Pleasant Ridge Road & Schaad Road



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/29/2018	East/West Street	Schaad Road
Analysis Year	2024	North/South Street	La Christa Way
Time Analyzed	AM Peak - Combined Phs2	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Future Geometry and Traffic Control w/ County Proj		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	9	831	1	0	0	1315	0		0	0	1		17	0	33
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage			Left + Thru							1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

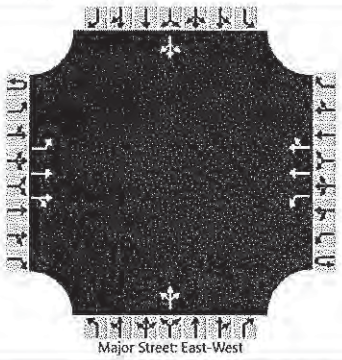
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				0					1				54	
Capacity, c (veh/h)		466				742					552				208	
v/c Ratio		0.02				0.00					0.00				0.26	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.0				1.0	
Control Delay (s/veh)		12.9				9.9					11.5				28.3	
Level of Service (LOS)		B				A					B				D	
Approach Delay (s/veh)	0.1				0.0				11.5				28.3			
Approach LOS									B				D			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at La Christa
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/29/2018	East/West Street	Schaad Road
Analysis Year	2024	North/South Street	La Christa Way
Time Analyzed	PM Peak - Combined Phs2	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Future Geometry and Traffic Control w/ County Proj		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		0	1	0		0	1	0
Configuration		L	T	TR		L	T	TR			LTR				LTR	
Volume (veh/h)	0	25	1426	6	0	5	1065	22		1	0	3		14	0	8
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

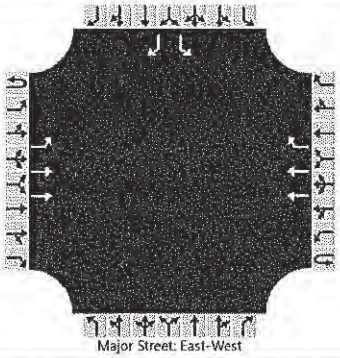
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		27				5					4				23	
Capacity, c (veh/h)		594				429					197				174	
v/c Ratio		0.04				0.01					0.02				0.13	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.1				0.5	
Control Delay (s/veh)		11.3				13.5					23.7				28.9	
Level of Service (LOS)		B				B					C				D	
Approach Delay (s/veh)	0.2				0.1				23.7				28.9			
Approach LOS									C				D			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at West Site Entr
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/29/2018	East/West Street	Schaad Road
Analysis Year	2024	North/South Street	West Site Entrance
Time Analyzed	AM Peak - Combined Phs2	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Proposed Geometry and Traffic Control w/ County Pr		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	1		0	0	0		1	0	1
Configuration		L	T				T	R						L		R
Volume (veh/h)	0	115	723				1199	10						25		139
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized						No								No		
Median Type | Storage			Left + Thru								1					

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.16												6.86		6.96
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

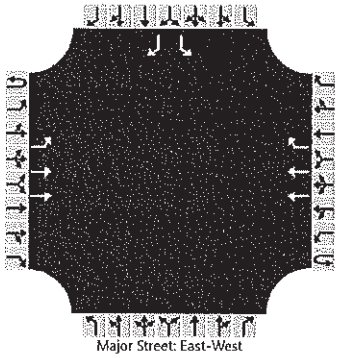
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		125												27		151
Capacity, c (veh/h)		517												142		408
v/c Ratio		0.24												0.19		0.37
95% Queue Length, Q_{95} (veh)		0.9												0.7		1.7
Control Delay (s/veh)		14.2												36.2		18.9
Level of Service (LOS)		B												E		C
Approach Delay (s/veh)		1.9												21.5		
Approach LOS														C		

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at West Site Entr
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/29/2018	East/West Street	Schaad Road
Analysis Year	2024	North/South Street	West Site Entrance
Time Analyzed	PM Peak - Combined Phs2	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Proposed Geometry and Traffic Control w/ County Pr		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	1		0	0	0		1	0	1
Configuration		L	T				T	R						L		R
Volume (veh/h)	0	157	1322				1178	52						54		100
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized						No								No		
Median Type | Storage			Left + Thru								1					

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.16												6.86		6.96
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

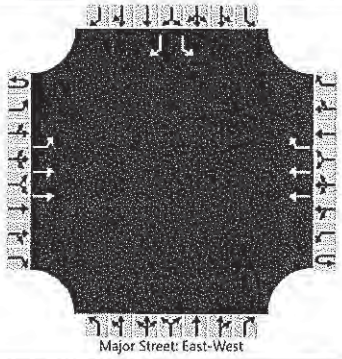
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		171												59		109
Capacity, c (veh/h)		506												104		416
v/c Ratio		0.34												0.57		0.26
95% Queue Length, Q_{95} (veh)		1.5												2.7		1.0
Control Delay (s/veh)		15.7												77.7		16.7
Level of Service (LOS)		C												F		C
Approach Delay (s/veh)		1.7												38.1		
Approach LOS														E		

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at East Site Entr
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/29/2018	East/West Street	Schaad Road
Analysis Year	2024	North/South Street	East Site Entrance
Time Analyzed	AM Peak - Combined Phs2	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Proposed Geometry and Traffic Control w/ County Pr		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	1		0	0	0		1	0	1
Configuration		L	T				T	R						L		R
Volume (veh/h)	0	38	710				1162	28						75		47
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized						No								No		
Median Type | Storage			Left + Thru								1					

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.16												6.86		6.96
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

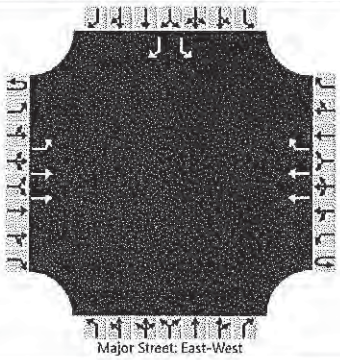
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		41												82		51
Capacity, c (veh/h)		526												173		421
v/c Ratio		0.08												0.47		0.12
95% Queue Length, Q_{95} (veh)		0.3												2.2		0.4
Control Delay (s/veh)		12.4												43.2		14.7
Level of Service (LOS)		B												E		B
Approach Delay (s/veh)		0.6												32.2		
Approach LOS														D		

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	BJH	Intersection	Schaad at East Site Entr
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	5/29/2018	East/West Street	Schaad Road
Analysis Year	2024	North/South Street	East Site Entrance
Time Analyzed	PM Peak - Combined Phs2	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Proposed Geometry and Traffic Control w/ County Pr		

Lanes



Vehicle Volumes and Adjustments

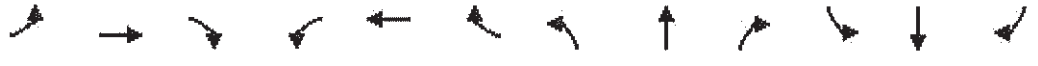
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	1		0	0	0		1	0	1
Configuration		L	T				T	R						L		R
Volume (veh/h)	0	52	1324				1197	157						164		33
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized						No								No		
Median Type | Storage			Left + Thru								1					

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.16												6.86		6.96
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		57												178		36
Capacity, c (veh/h)		449												136		409
v/c Ratio		0.13												1.31		0.09
95% Queue Length, Q_{95} (veh)		0.4												11.2		0.3
Control Delay (s/veh)		14.2												243.7		14.6
Level of Service (LOS)		B												F		B
Approach Delay (s/veh)		0.5												205.3		
Approach LOS														F		



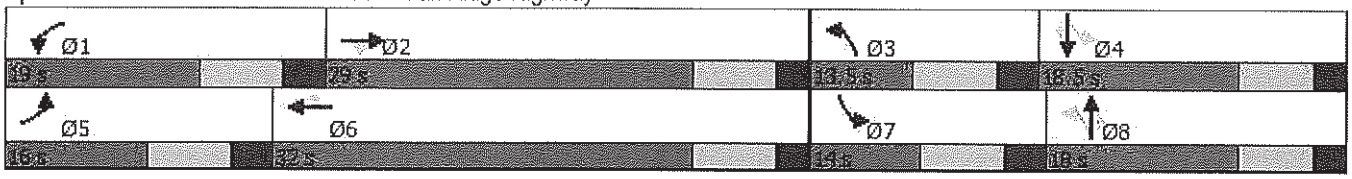
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	264
Future Volume (vph)	266	567	124	370	481	93	138	190	321	183	374	264
Lane Util. Factor	*0.97	0.95	1.00	0.97	*0.63	1.00	1.00	*0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	2347	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.390			0.590		
Satd. Flow (perm)	3433	3539	1583	3433	2347	1583	726	3539	1583	1099	3539	1583
Satd. Flow (RTOR)			252			252			317			300
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	302	644	141	420	547	106	157	216	365	208	425	300
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0	20.0	6.0	20.0	20.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.5	27.0	27.0	13.5	27.0	27.0	13.5	12.5	12.5	13.5	12.5	12.5
Total Split (s)	16.0	29.0	29.0	19.0	32.0	32.0	13.5	18.0	18.0	14.0	18.5	18.5
Total Split (%)	20.0%	36.3%	36.3%	23.8%	40.0%	40.0%	16.9%	22.5%	22.5%	17.5%	23.1%	23.1%
Maximum Green (s)	8.5	22.0	22.0	11.5	25.0	25.0	6.0	11.5	11.5	6.5	12.0	12.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	5.0	4.5	4.5
All-Red Time (s)	2.5	2.0	2.0	2.5	2.0	2.0	2.5	2.0	2.0	2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0	7.0	7.5	7.0	7.0	7.5	6.5	6.5	7.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	3.0	3.0	2.0	3.0	3.0
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	8.5	21.5	21.5	11.3	24.3	24.3	16.3	11.3	11.3	17.3	11.8	11.8
Actuated g/C Ratio	0.11	0.27	0.27	0.14	0.31	0.31	0.21	0.14	0.14	0.22	0.15	0.15
v/c Ratio	0.82	0.67	0.23	0.86	0.76	0.16	0.69	0.43	0.73	0.71	0.81	0.61
Control Delay	54.7	29.7	0.9	52.0	32.7	0.5	40.3	34.1	16.6	38.8	46.2	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.7	29.7	0.9	52.0	32.7	0.5	40.3	34.1	16.6	38.8	46.2	10.1
LOS	D	C	A	D	C	A	D	C	B	D	D	B
Approach Delay		32.9			37.1			26.8			32.9	
Approach LOS		C			D			C			C	
Queue Length 50th (ft)	77	150	0	107	192	0	59	52	22	81	109	0
Queue Length 95th (ft)	#137	200	0	#174	273	0	#123	84	#109	#153	#171	62
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175		200	200		200	170		200	245		200
Base Capacity (vph)	368	984	622	499	741	672	228	514	500	295	536	494
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.65	0.23	0.84	0.74	0.16	0.69	0.42	0.73	0.71	0.79	0.61

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 79.1	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 32.9	Intersection LOS: C
Intersection Capacity Utilization 68.1%	ICU Level of Service C
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Future Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Lane Util. Factor	*0.97	0.95	1.00	0.97	*0.63	1.00	1.00	*0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	2347	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.448			0.556		
Satd. Flow (perm)	3433	3539	1583	3433	2347	1583	835	3539	1583	1036	3539	1583
Satd. Flow (RTOR)			224			224			330			328
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	640	459	123	370	747	166	260	368	330	160	216	328
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0	20.0	6.0	20.0	20.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.5	27.0	27.0	13.5	27.0	27.0	13.5	12.5	12.5	13.5	12.5	12.5
Total Split (s)	24.4	36.9	36.9	23.2	35.7	35.7	16.2	16.4	16.4	13.5	13.7	13.7
Total Split (%)	27.1%	41.0%	41.0%	25.8%	39.7%	39.7%	18.0%	18.2%	18.2%	15.0%	15.2%	15.2%
Maximum Green (s)	16.9	29.9	29.9	15.7	28.7	28.7	8.7	9.9	9.9	6.0	7.2	7.2
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	5.0	4.5	4.5
All-Red Time (s)	2.5	2.0	2.0	2.5	2.0	2.0	2.5	2.0	2.0	2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0	7.0	7.5	7.0	7.0	7.5	6.5	6.5	7.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	3.0	3.0	2.0	3.0	3.0
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	16.9	32.1	32.1	13.5	28.7	28.7	17.6	9.9	9.9	12.2	7.2	7.2
Actuated g/C Ratio	0.19	0.36	0.36	0.15	0.32	0.32	0.20	0.11	0.11	0.14	0.08	0.08
v/c Ratio	0.99	0.36	0.17	0.72	1.00	0.25	1.03	0.95	0.71	0.85	0.76	0.77
Control Delay	72.0	22.9	0.5	44.5	64.8	2.1	98.1	75.3	13.8	68.3	59.2	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.0	22.9	0.5	44.5	64.8	2.1	98.1	75.3	13.8	68.3	59.2	18.0
LOS	E	C	A	D	E	A	F	E	B	E	E	B
Approach Delay		46.4			50.9			60.3			42.1	
Approach LOS		D			D			E			D	
Queue Length 50th (ft)	188	101	0	104	334	0	~135	111	0	75	64	0
Queue Length 95th (ft)	#302	146	0	147	#525	18	#257	#198	81	#157	#120	#111
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175		200	200		200	170		200	245		200
Base Capacity (vph)	644	1261	708	598	748	657	253	389	467	189	283	428
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.36	0.17	0.62	1.00	0.25	1.03	0.95	0.71	0.85	0.76	0.77

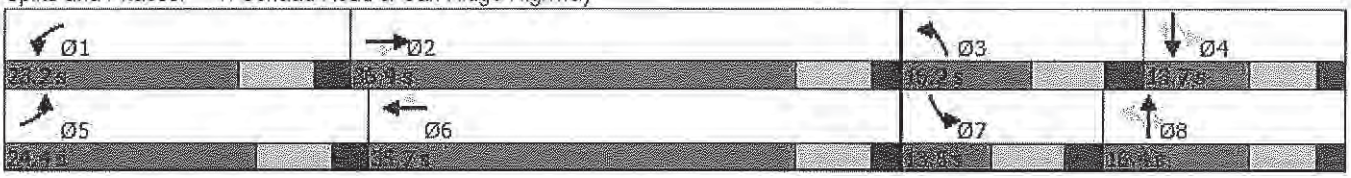
Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 50.2	Intersection LOS: D
Intersection Capacity Utilization 77.9%	ICU Level of Service D
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



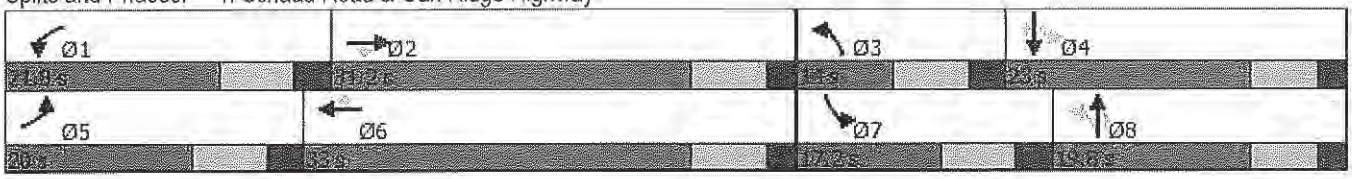
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	342	592	127	377	503	115	143	242	330	216	435	434
Future Volume (vph)	342	592	127	377	503	115	143	242	330	216	435	434
Lane Util. Factor	*0.97	0.95	1.00	0.97	*0.63	1.00	1.00	*0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	2347	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.374			0.470		
Satd. Flow (perm)	3433	3539	1583	3433	2347	1583	697	3539	1583	875	3539	1583
Satd. Flow (RTOR)			224			224			368			390
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	389	673	144	428	572	131	163	275	375	245	494	493
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0	20.0	6.0	20.0	20.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.5	27.0	27.0	13.5	27.0	27.0	13.5	12.5	12.5	13.5	12.5	12.5
Total Split (s)	20.0	31.2	31.2	21.8	33.0	33.0	14.0	19.8	19.8	17.2	23.0	23.0
Total Split (%)	22.2%	34.7%	34.7%	24.2%	36.7%	36.7%	15.6%	22.0%	22.0%	19.1%	25.6%	25.6%
Maximum Green (s)	12.5	24.2	24.2	14.3	26.0	26.0	6.5	13.3	13.3	9.7	16.5	16.5
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	5.0	4.5	4.5
All-Red Time (s)	2.5	2.0	2.0	2.5	2.0	2.0	2.5	2.0	2.0	2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0	7.0	7.5	7.0	7.0	7.5	6.5	6.5	7.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	3.0	3.0	2.0	3.0	3.0
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	12.0	23.6	23.6	13.5	25.0	25.0	18.4	12.8	12.8	24.4	15.9	15.9
Actuated g/C Ratio	0.14	0.27	0.27	0.15	0.28	0.28	0.21	0.15	0.15	0.28	0.18	0.18
v/c Ratio	0.83	0.71	0.25	0.81	0.86	0.21	0.72	0.53	0.69	0.72	0.77	0.81
Control Delay	53.9	34.2	1.6	49.8	44.3	0.8	45.1	39.4	11.7	38.3	44.0	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.9	34.2	1.6	49.8	44.3	0.8	45.1	39.4	11.7	38.3	44.0	20.7
LOS	D	C	A	D	D	A	D	D	B	D	D	C
Approach Delay		36.7			41.4			27.8			33.5	
Approach LOS		D			D			C			C	
Queue Length 50th (ft)	112	181	0	122	242	0	68	76	4	108	141	52
Queue Length 95th (ft)	#175	236	5	#180	#363	0	#119	114	78	#183	192	#199
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175		200	200		200	170		200	245		200
Base Capacity (vph)	488	977	599	558	695	626	225	535	551	343	664	613
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.69	0.24	0.77	0.82	0.21	0.72	0.51	0.68	0.71	0.74	0.80

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 88	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 35.3	Intersection LOS: D
Intersection Capacity Utilization 70.3%	ICU Level of Service C
Analysis Period (min) 15	

* User Entered Value

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	706	440	116	344	719	179	248	397	309	178	230	374
Future Volume (vph)	706	440	116	344	719	179	248	397	309	178	230	374
Lane Util. Factor	*0.97	0.95	1.00	0.97	*0.63	1.00	1.00	*0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	2347	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.417			0.317		
Satd. Flow (perm)	3433	3539	1583	3433	2347	1583	777	3539	1583	590	3539	1583
Satd. Flow (RTOR)			168			168			336			353
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	767	478	126	374	782	195	270	432	336	193	250	407
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0	20.0	6.0	20.0	20.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.5	27.0	27.0	13.5	27.0	27.0	13.5	12.5	12.5	13.5	12.5	12.5
Total Split (s)	34.0	53.9	53.9	27.4	47.3	47.3	19.6	21.7	21.7	17.0	19.1	19.1
Total Split (%)	28.3%	44.9%	44.9%	22.8%	39.4%	39.4%	16.3%	18.1%	18.1%	14.2%	15.9%	15.9%
Maximum Green (s)	26.5	46.9	46.9	19.9	40.3	40.3	12.1	15.2	15.2	9.5	12.6	12.6
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	5.0	4.5	4.5
All-Red Time (s)	2.5	2.0	2.0	2.5	2.0	2.0	2.5	2.0	2.0	2.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.5	7.0	7.0	7.5	7.0	7.0	7.5	6.5	6.5	7.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	3.0	3.0	2.0	3.0	3.0
Recall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effct Green (s)	26.5	49.9	49.9	16.9	40.3	40.3	26.3	15.2	15.2	21.1	12.6	12.6
Actuated g/C Ratio	0.22	0.42	0.42	0.14	0.34	0.34	0.22	0.13	0.13	0.18	0.10	0.10
v/c Ratio	1.01	0.33	0.17	0.77	0.99	0.30	1.00	0.96	0.68	0.98	0.67	0.84
Control Delay	82.2	24.9	1.8	60.8	70.4	7.6	97.0	86.9	12.9	100.4	61.5	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.2	24.9	1.8	60.8	70.4	7.6	97.0	86.9	12.9	100.4	61.5	26.0
LOS	F	C	A	E	E	A	F	F	B	F	E	C
Approach Delay		54.8			58.7			65.5			53.3	
Approach LOS		D			E			E			D	
Queue Length 50th (ft)	~314	130	0	145	476	14	183	177	0	125	100	39
Queue Length 95th (ft)	#445	180	17	193	#686	67	#312	#282	91	#254	145	#204
Internal Link Dist (ft)		798			904			450			392	
Turn Bay Length (ft)	175		200	200		200	170		200	245		200
Base Capacity (vph)	758	1470	756	569	788	643	270	448	493	197	371	482
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.33	0.17	0.66	0.99	0.30	1.00	0.96	0.68	0.98	0.67	0.84

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 58.1	Intersection LOS: E
Intersection Capacity Utilization 84.2%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Schaad Road & Oak Ridge Highway