SCHAAD ROAD - WEST OF PLEASANT RIDGE ROAD MIXED USE DEVELOPMENT

TRAFFIC IMPACT STUDY KNOX COUNTY, TENNESSEE

CCI PROJECT NO. 00773-0011



PREPARED FOR: Southland Engineering Consultants 4909 Ball Road Knoxville, TN 37931 SUBMITTED BY Cannon & Cannon, Inc. 8550 Kingston Pike Knoxville, TN 37919 865.670.8555

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 multifamily 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.



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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





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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 -

Schaad Road at La Christa Way/Hilda Lane -

Schaad Road at Oak Ridge Highway (SR 62) -

7:15 to 8:15 A.M. (PHF = 0.91) 4:45 to 5:45 P.M. (PHF = 0.95) 7:15 to 8:15 A.M. (PHF = 0.92) 5:00 to 6:00 P.M. (PHF = 0.94) 7:15 to 8:15 A.M. (PHF = 0.88) 4:45 to 5:45 P.M. (PHF = 0.92)



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	TAE	BLE 1	
ļ	ANNUAL AVERAGE DAILY	TRAFFIC COUNT SUM	IMARY
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



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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



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FIGURE 4B 2024 BACKGROUND TRAFFIC VOLUMES



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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.

	PHASE 1	TABLE - TRIP GENE	E 2A RATION SUM	ARY	
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%)

	PHASE	TABL 2 - TRIP GENI	E 2B ERATION SUM	MARY	
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



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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



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FIGURE 6A TRIP ASSIGNMENT - PHASE 1 (2022)



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FIGURE 6B TRIP ASSIGNMENT – PHASE 2 (2024)



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FIGURE 7A 2022 COMBINED TRAFFIC VOLUMES



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FIGURE 7B 2024 COMBINED TRAFFIC VOLUMES



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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 Existing (Los/Delay)	COMBINED Improved (Los/Delay)
Schaad Road at ¹ Pleasant Ridge Road	AM PM	C / 34.8 C / 33.3	D / 42.8 D / 40.9	D / 43.5 D / 42.1	D / 39.1 ³ D / 37.3 ³
Schaad Road at ² East Site Access Road	AM PM	N/A	N/A	F / 55.6 F / 341 4	B / 13.9 ⁴
Schaad Road at ² West Site Access Road	AM	N/A	N/A	N/A	N/A
Schaad Road at ² La Christa Way/Hilda Lane	AM PM	E / 36.8 F / 69.7	F / 72.2 F / 187.0	F / 89.8 F / 232.7	N/A
Schaad Road at ¹ Oak Ridge Hwy. (S.R. 62)	AM PM	D / 43.4 F / 83.9	E / 69.9 F / 152.3	E / 76.1 F / 163.7	E / 58.2 ³ 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.

Pł	TABLE 3B PHASE 1 – FUTURE PLANNED GEOMETRY CAPACITY ANALYSIS SUMMARY				
INTERSECTION	TIME Period	YEAR 2022 Background (Los/Delay)	Y Planned (Los/delay)	EAR 2022 COMBINE Improved I (Los/delay)	D IMPROVED 2 (LOS/DELAY)
Schaad Road at ¹ Pleasant Ridge Road	AM PM	D / 36.1 D / 38.6	D / 36.6 D / 39.3	C / 29.5 ³ C / 33.9 ³	N/A
Schaad Road at ² East Site Access Road	AM PM	N/A	C / 18.7 C / 23.9	A / 6.5 ⁴ A / 7.8 ⁴	N/A
Schaad Road at ² West Site Access Road	AM PM	N/A	N/A	N/A	N/A
Schaad Road at ² La Christa Way/Hilda Lane	AM PM	C / 21.0 C / 22.3	C / 22.5 C / 23.1	N/A	N/A
Schaad Road at ¹ Oak Ridge Hwy. (S.R. 62)	AM PM	D / 50.3 E / 65.7	D / 48.8 E / 69.4	D / 42.6 ³ E / 65.6 ³	C / 32.9 ⁵ 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)	Y Planned (Los/delay)	EAR 2024 COMBINE Improved I (Los/Delay)	D IMPROVED 2 (LOS/DELAY)
Schaad Road at ¹ Pleasant Ridge Road	AM PM	D / 38.2 D / 41.0	D / 40.5 D / 48.2	C / 32.7 ³ D / 48.3 ³	N/A
Schaad Road at ² East Site Access Road	AM PM	N/A	D / 32.2 F / 205.3	A / 9.2 ⁴ B / 12.6 ⁴	N/A
Schaad Road at ² West Site Access Road	AM PM	N/A	C / 21.5 E / 38.1	N/A	N/A
Schaad Road at ² La Christa Way/Hilda Lane	AM PM	C / 22.1 C / 23.9	D / 28.3 D / 28.9	N/A	N/A
Schaad Road at ¹ Oak Ridge Hwy. (S.R. 62)	AM PM	E / 55.1 E / 72.5	F / 81.7 F / 95.4	E / 56.9 ³ F / 90.4 ³	D / 35.3 ⁵ 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 <u>marginally</u> 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.



TRAFFIC IMPACT STUDY SCHAAD ROAD – WEST OF PLEASANT RIDGE ROAD MIXED-USE DEVELOPMENT 00773-0011 MAY 2018

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.



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8.0 APPENDIX

APPENDIX A | TRAFFIC DATA Appendix B | Trip generation Appendix C | Analyses



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8.0 APPENDIX

APPENDIX A | TRAFFIC DATA Appendix B | Trip generation Appendix C | Analyses



TRAFFIC DATA | APPENDIX A

APPENDIX A | TRAFFIC DATA



TRAFFIC IMPACT STUDY KINGSTON PIKE AT WATT ROAD MIXED-USE DEVELOPMENT 01331-0001 JANUARY 2018



Page 1 of 2



Traffic History

Station # County Location Route

000075 Knox WEST OF I-75 01254

Pleasant Ridge Road - South of Schoud Road

2017-12,540

Record Year AADT 2016 11440 1 2 2015 11327 3 2014 11530 2013 10690 4 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 1993 7351 24 1992 5665 25 26 1991 5900

27 1990 6164

Page 1 of 2



Traffic History

Station # CountyLocationRoute #000076KnoxSOUTHWEST OF I-7501252

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

Recor	d Year AADT		
1	2016 15558	2017-15,669	
2	2015 15446		
3	2014 15578		
4	2013 15224		
5	2012 16296		
б	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. (SR62) - West of School Road

76

Reco	rd Year AADT		
1	2016 18845	2017-	17.0
2	2015 17151		4
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		

Alan Childers

Karen Watts <karen.watts@tn.gov></karen.watts@tn.gov>
Monday, May 21, 2018 11:44 AM
Alan Childers
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

*** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. ***

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. 8550 Kingston Pike 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

	l.	SCHA	AD RD		0	OAK RID West	GE HV	VY	enemi	SCHA	AD RD	P	0	DAK RI	DGE HV bound	VY	
Start Time	Loft	Thru	Right	App. Total	Loft	Thru	Right	App. Total	Left	Thru	Right	App: Total	Left	Thru	Right	App. Tolal	Int. Total
07:00 AM	18	45	75	138	48	62	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	28	11	52	50	89	19	158	430
Total	133	189	223	645	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	105	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	2894	437	705	398	1540	1228	1533	181	2952	8296
Apprch %	21.7	30.4	47.9	10.0	16.1	72	11.8	C	28.4	45.8	25,8	1 A.L.	41.6	51,9	6.5	1.1.1	
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	

		SCHA	AD RD			OAK RII Wes	GE HW)	¢		SCHA	AD RD		0	AK RID East	DGE HW	Y	
Start Time	Loft	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App Total	Left	Thru	Right	App, Total	Int. Total
Peak Hour Analy	vala Fron	n 07:00	AM to 1	1:45 AM -	Peak 1	of 1			an entre			0					
Peak Hour for E	ntire Inte	arsection	Begins	at 07:15	AM			1000									
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	155	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	85	668	102	147	172	421	210	497	54	761	2561
% App. Total	19.8	37.3	42.9	1.1	22.2	68.1	9.7		24.2	34.9	40.9		27.6	65.3	7.1	1.00	
PHF	.678	.860	.897	.898	.804	.807	.774	.888	.607	.782	.672	.702	.673	.863	.794	.817	.877
Peak Hour Analy Peak Hour for E	vais From	n 12:00 irsectior	PM to C Begins	5:45 PM - at 04:45	Peak 1 PM	of 1											-
04:45 PM	22	27	64	113	22	176	25	223	34	61	16	131	128	89	47	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	N	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

642 118

133 136

0

File Name : Schaad_Pleasant Ridge_5-17-18 Site Code : 00000002 : 5/17/2018 :1

5 1.0

0

0

0

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0

App.

Total

73 132 127

158

490 2041

Int.

Total

300

533

586

622

Schaad Road Eastbound Thr Rig Ped

ht

1.0

9

13

13

17

52

108

331

387 107

CCI Project CCI Project Intersection: Counted By:	Name: Numbe Schaa CCI	Schaa er: 773 ad al P	ad Roa -0011 leasar	ad TIS nt Ridg	le		8550 Kingston Pike File Knoxville, TN 37919 Site Sta Pag										
	F	leasa Sc	nt Rid	ge Ro	ad		Sci	haad l	Road	D I HINC	F	leasa	Sc				
Start Time	Left	Thr	Rig ht	Ped	App. Total	Left	Thr	Rig ht	Ped	App. Total	Left	Thr u	Rig	Ped	App. Total	Left	Thr
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	1.1.1	1.0	1.0
07:00 AM	4	37	32	0	.73	8	63	13	0	84	25	23	22	0	70	14	50
07:15 AM	1	79	67	0	147	23	111	19	0	153	31	41	29	0	101	30	89
07:30 AM	6	106	55	0	167	31	144	19	0	194	31	26	41	0	98	30	84
07:45 AM	8	77	60	0	135	37	155	19	0	211	31	43	44	D	118	33	108

70

0

Total

299

19

204

0

522

99 473

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	G	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	Û	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	Ö	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	170	230	0	2630	344	762	848	7	1961	552	204	291	o	2884	9439
Apprch %	9,1	50.	40.	0,0	1.1	26. 5	64. 8	8,7	0.0	1.1	17.	38,	43.	0.4		19. 1	70.	10.	0.0		
Total %	1.9	10. 6	8.4	0.0	20.8	7.4	18.	2.4	0.0	27.9	3.6	8.1	9.0	0.1	20.8	5.8	21.	3.1	0.0	30.6	

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

File Name : Schaad_Pleasant Ridge_5-17-18 Site Code : 0000002 Start Date : 5/17/2018 Page No : 2

	F	Pleasa Sc	nt Rid	ge Ro	ad		Schaad Road Westbound					Pleasa No	ge Roa	bb							
Start Time	Left	Thr	Rig	Ped	App. Total	Left	Thr	Rig	Ped 5	App. Total	Left	Thr	Rig h1	Ped	App. Total	Left	Thr	Rig	Ped	App. Total	Int. Total
Peak Hour I	From D	7:00	AM to	08:45	AM - P	pak 1 d	of 1					_					-				
Intersection	07:15	5 AM																			1.1
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.	0.0		17.	74.	8.9	0.0		29.	35.	35.	0.0		21.	68. 9	10.	0.0		1
07:45 Volume Peak Factor	8	77	50	0	135	37	155	19	0	211	31	43	44	0	118	33	108	17	0	158	622 0,9
High Int.	07:30	MAC				07:45	MA i				07:45	AM .				07:45	5 AM				
Volume Peak Factor	6	106	55	0	167 0.87 9	37	155	19	0	211 0.86 3	31	43	44	D	118 0.86 7	33	108	17	0	158 0,86 1	


Cannon & Cannon, Inc. 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: 3

	1	leasa So	nt Rid	ge Roa ound	ad		Sch	haad F	Road		F	Pleasa No	nt Rid	ge Roa und	bi		Sch	aad Fastbou	Road		
Start. Time	Left	Thr	Rig	Ped	App. Total	Left	Thr	Rig ht	Ped	App. Total	Left	Thr	Rig	Ped	App. Total	Left	Thr	Rig ht	Ped s	App. Total	Int. Total
Peak Hour I	From 0	4:00 I	PM to	05:45	PM - PA	eak 1 (of 1										-				
Intersection	04:45	5 PM																		1.1	
Volume	56	252	201	0	509	267	453	52	0	772	72	275	320	7	674	200	716	99	0	1015	2970
Percent	11.	49. 5	39 5	0.0		34. 6.	58. 7	6.7	0,0		10.	40. 8	47.	1.0		19.	70. 5	9.8	0.0		
05:15 Volume Peak Factor	16	80	51	0	147	79	111	21	0	211	14	80	78	Ø	172	56	171	19	٥	246	776 0.95
High Int.	05.15	5 PM				05:15	5 PM				05:15	5 PM				04:45	PM				
Volume Peak Factor	16	80	51	0	147 0.86 6	79	111	21	0	211 0.91 5	14	80	78	0	172 0.98 0	44	214	32	0	290 0.87 5	



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

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 : 1

								(Groups	s Printer	d- Uns	hifted									
		La C Sc	Christa	a Way bund			Sci	haad I estbo	Road			H	ilda La orthbo	und			Sci	naad I astbo	Road		
Start Time	Left	Thr U	Rig	Ped	App. Total	Left	Thr U	Rig ht	Ped s	App. Total	Left	Thr	Rig ht	Ped	App. Totai	Left	Thr	Rig	Ped.	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.000	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	O	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	Q	849	1	0	850	3	0	3	0	6	6	504	1	0	511	1417
08:00 AM	2	Ó	4	0	6	0	205	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	σ	183	0	0	0	0	0	100	125	O	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	D	7	0	10	0	103	1	0	104	0	.0	0	0	0	0	127	D	0	127	241
Total	11	0	20	Q	31	0	630	2	0	632	0	0	0	0	0	6	508	D	ġ	514	1177
*** BREAK																					
04:00 PM	2	0	2	0	4	0	138	4	0	142	0	o	0	0	0	3	189	0	0	192	338
04:15 PM	0	0	2	0	2	T	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	- t	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	1.10	0	- 1	0	2	8	232	3	0	243	469
05:45 PM	3	0	3	0	6	P.	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	Q	996	1765
Grand Total	49	Q	66	0	115	5	282 7	35	Ó	2867	4	٥	10	Ō	14	44	286 6	6	0	2916	5912
Apprch %	42.	0.0	57.	0.0		0.2	98. 6	1.2	0.0		28. 6	0.0	71.	0,0	1	1.5	98. 3	0,2	0.0	1.5	
Total %	0.8	0.0	1.1	0.0	19	0.1	47.	0.6	0.0	48.5	0.1	0.0	0,2	0.0	0.2	0.7	48.	0.1	0.0	49.3	

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File Name : Schaad_La Grista_5-17-18 Site Code : 00000001 Start Date : 5/17/2018 Page No : 2

The		La C Sc	Christa	a Way ound			Sch	estbo	Road			H	Ida La	und			Sch	aad F astbol	Road		
Start Time	Left	Thr	Rig ht	Ped	App. Total	Left	Thr	Rig	Ped	App. Total	Loft	Thr	Rig	Ped	App. Total	Left	Thr	Rig ht	Ped	App. Total	Int. Total
Peak Hour I	From C	7:00 A	AM to	08:45	AM - P	eak 1 d	of 1					_			_	-					
Intersection	07:15	5 AM				10															2.5
Volume	15	0	29	0	44	0	911	0	Ω	911	0	0	1	0	- 1	8	537	1	0	546	1502
Percent	34.	0.0	65. 9	0.0		0.0	100	0.0	0.0		0.0	0.0	100	0.0		1,5	98. 4	0.2	0.0		1
07:45 Volume Peak Factor	6	0	7	0	13	0	249	0	0	249	0	0	Q	0	Ō	3	143	0	0	146	408 0.92
High Int.	07:15	AM				07:45	AM				07:30	AM				07:45	MA			1.1	
Volume Peak Factor	1	0	12	Ø	13 0.84 6	0	249	0	0	249 0.91 5	0	0	1	0	0.25 0	3	143	0	0	146 0.93 5	



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 (So	Christa	a Way und			Sch	aad Festbo	Road und			Hi	Ida La	und			Sch	aad Fastbou	Road		
Start Time	Left	Thr	Rig	Ped	App. Total	Left	Thr	Rig	Ped	App. Total	Left	Thr	Rig	Ped	App. Total	Left	Thr	Rig	Ped	App. Total	Int. Total
Peak Hour I	From C	04:00 F	PM to	05:45	PM - Pe	ak I d	of 1		-									-			
Intersection	05:00	PM																		1.1	1
Volume	12	Ð	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. B	0.0		0.5	96. 9	2.5	0,0		25.	0.0	75. 0	0.0		2.2	97. 3	0.5	0.0		-
05:30 Volume Peak Factor	4	0	ţ	٥	5	2	213	4	0	219	1	0	7	0	2	B	232	3	0	243	469 0.94
High Int.	05:15	5 PM				05:30	PM				05:30	PM				05:15	PM			10.0	
Volume Peak Factor	4	0	2	D	6 0.79 2	2	213	4	0	219 0.85 2	1	0	1	0	2 0.50 0	7	245	1	0	253 0.98 4	



A-12

TRIP GENERATION | APPENDIX B

APPENDIX B | TRIP GENERATION



TRAFFIC IMPACT STUDY KINGSTON PIKE AT WATT ROAD MIXED-USE DEVELOPMENT 01331-0001 JANUARY 2018



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





Trip Generation Manual, 10th Edition . Institute of Transportation Engineers

(2	.10)
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

Trip Generation Manual, 10th Edition . Institute of Transportation Engineers

(4	
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

Trip Generation Manual, 10th Edition . Institute of Transportation Engineers

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



Trip Generation Manual, 10th Edition . Institute of Transportation Engineers

(2	20)
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





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(2	20)
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





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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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Shoppin (8	n g Center 20)
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 (Seneration	per	1000	Sq.	Ft.	GLA	ł
---------	--------	------------	-----	------	-----	-----	-----	---

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





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Shoppi (8	ng Center 20)
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

cie Trip Generation	per 1000 Sq. Ft. GLA	
Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04





Trip Generation Manual, 10th Edition . Institute of Transportation Engineers



B-11



B-12

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.

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

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.

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

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.

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

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

ANALYSES | APPENDIX C

APPENDIX C | ANALYSES



TRAFFIC IMPACT STUDY KINGSTON PIKE AT WATT ROAD MIXED-USE DEVELOPMENT 01331-0001 JANUARY 2018



TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS

8 2 2	Warrant #S (Peak Hour Voiss) Warrant Percent Warrant Percent Voiune Marrant voiune Marrant voiune Marrant 0	VCR1
sourt . Minor Street .	Warrant #2 (Four Hour Vois) Warrant Percent Volume Warrant Volume Warrant Volume Warrant Volume Warrant 0 147 0 0 0 0 0 0 0 0 0 0 0 0 0	cy Sulivan, P.E.
f week and month of year of Major Streat,	Contribution Contribution Major Minor Major Minor 421 79 421 79 421 79 421 79 421 79 421 79 421 79 421 70 6 0 0 0 520 53 420 112 6 0 0 0 520 53 420 70 112 70 112 70 112 70 112 70 70 70 70 70 70 70 70 70 70	Developed Dy, T, Dar
Adlustment factor for day o Number of Lanes:	Warrant e19 (S. He Internation) Parcent of Warrant Major Minor Major Minor 0 0 0 120 0 0 0 120 0 0 0 120 0 0 0 120 0 0 0 120 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	05/31/18
2 Projected Weekday	Warrant #1A (B.Hr Min, Vol.) Percent of Narrant, Major Minor 905 93 90 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Date
ste of Court. ar of Week of Count, Average V	Minor Street Actual Adjusted Volume Total Volume Total Volume 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ŭ
Calv of Knowylite Da Termintace Da	Major Street Actual Volume Adjudfind op #1 App #2 Total Volum", 693 1075 1788 1768 693 1075 1788 1768 693 00 0 0 0 0 0 0 266 350 2198 2106 268 2198 2106 268 2198 2106 200 0 0 200 0 0 200 0 0 218 2106 218 216 218 21	ed br. IDANNON AND CANNON, INC. Alan L. Obilette B.E.
City or County : State	Time Beginning A 5:00 am 7:00 am 11:00 5:00 am 11:00 noos 11:00 noos 2:00 pm 5:00 pm 5:00 pm 8:00 pm 8:00 pm 7:00 pm 8:00 pm 9:00 pm 9	Analysis Prepare

TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS

d Warrant #1A, Hr Min. Vol.) Promit of Warrant #1A, Hr Min. Vol.) Col		Advantant action of tantas to Number of Lantas to (a Major Minor Major Minor Major Minor 281 128 281 128 281 128 281 128 0	Activation of values Advances Combination Number of Lanes: Major Major Street,	Active warantering wurder of Lareat: Maior Street. 2 Active warantering wurder of Lareat: Warrant #1B Combination (Warrant #1B) Maior Street. Maior Street. Warrant #1B Warrant #1B Warrant #1B Warrant #1B Warrant #2B Warrant #1B Warrant Maior Minor Minor Maior Minor Minor Minor Warrant 0 0 0 0 0 281 128 331 79 0 281 128 331 79 0 0 0 0 0 0 0 0 281 128 331 79 0 0 281 128 331 79 0 0 0 0 0 0 0 0 0 281 128 331 79 0 0 0 361 128 331 78 0 0 0 361 128 331 12 12 12 74 0 0 0 0 0 0 128 178 10 0 0 0 129 178 </th
	A Warrant #1 K Warrant #1 K Warrant #1 K Warrant of Warrant Warrant of Warrant Warrant of Warrant Major Moor A 21 63 4 2 6 0 0 6 0 6	Marrant #1A Acte warrant and volocity of all of a	Maint #1A Maint #1A Warmant #1A Warmant #1B Warmant #1B Warmant #1B Warmant #1 Warmant #1B Warmant #1 <td< td=""><td>Main Main Main</td></td<>	Main Main

TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS

100	Warrant #3 (Peak Hour Vola.) Warrant Perom Warrant Perom Volume Warrant volume Warrant 0 122 0 122 122	VCR1
count	Warrani 42 Feur Hour Volk.) Warrani Percent Providime Varrani Volume Varrani 0 153 0 15	tty Sullivan, P.E.
be adjusted for speeds or by week and month of year of Major Street	Combration Major Michor Major Michor 0 371 109 0 0 0 0 0 0 0 0 0 500 176 500 176 500 176 776 800 176 776 776 776 776 776 776 776 776 776	Developed by: T. Dan Distributed by: Techoo
Are warranterig volumes to Adjustment factor for day o Number of Lanes;	Warrant #18 (B.H Internuption) Percent of Warrant Major Minor 257 174 257 174 257 174 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	05/31/18
use cost	Warrant #1A (18 Hr Min. Vol.) Percent of Warrant Major Major 465 87 0	Date
ate of Count. Year 20 hay of Week of Count. Average	Minor Street Actual Aduated Volume Total - volum, - volum	.0
Calvol Knoxvite D Terriesses	Major Street: Actual Volume Adjusted Actual Volume Adjusted Total 1100 11102 1572 1372 1372 1372 1372 1372 2521 2521 254 1197 2521 2521 254 1197 2521 2521 2521 2521 2521 252 volume and made the more minor approach ted the MUTCD specified volume level	P BY: CANNON AND CANNON, IN Alan L Childers, P.E.
City or County : State	Titme Bepirming A 6:00 am 5:00 am 10:00 am 11:00 am 12:00	Analysis Prepare

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 - 00D1 Project Name: Schard Road - West of Notes: Pleasent Ridse Rd, Mixed-Use Development

RIGHT-TURN		THR	OUGH VOLUME PLU	IS LEFT-TURN VOLU	ME *	
VOLUME	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25				L		
25 - 49						
50 - 99				· · · · · · · · · · · · · · · · · · ·		
100 - 149		11 S		12 1	_	
150 - 199				Sector Carlos		
200 - 249						Yes
250 - 299		·	· · · · · · · · ·		Yes	Yes
300 - 349		S		Yes	Yes	Yes
350 - 399		S	Yes	Yes	Yes	Yes
400 - 449	-	h	Yes	Yes	Yes	Yes
450 - 499		Yes	Yes	Yes	Yes	Yes
500 - 549	-	Yes	Yes	Yes	Yés	Yes
550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN		THR	OUGH VOLUME PLU	IS LEFT-TURN VOLU	ME *	
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/>600
Fewer Than 25		1	1	St	B	
25 - 49			2		Yes	Yes
50 - 99				Yes	Yes	(Yes) 23
100 - 149			Yes	Yes	Yes	Yes
150 - 199		Yes	Yes	Yes	Yes	(Yes) O
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 7 Gazel	D Site East	PM Peak	1197: Zx1.05	157	Yes
1 mase 2 (2024)	3)Site West	PM Peak	1178÷2 x 1.05	52,	Yes
Phase 1 (2022)	3) Site (Fast)	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 <u>Year 2010 Highway Capacity Manual</u> (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
В	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
Е	Poor	Roadways – Unstable flow*, lower operating speeds, congestion severely restricts maneuverability Intersections – All vehicles stop, very long queues and very long intolerable delay
E.	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.

100	C	ONTROL DELAY (S/VEH)
LUS	SIGNALIZED	UNSIGNALIZED	ROUNDABOUT
A	≤10	≤10	≤10
В	>10-20	>10-15	>10-15
С	>20-35	>15-25	>15-25
D	>35-55	>25-35	>25-35
E	>55-80	>35-50	>35-50
F	>80	>50	>50

LOS CRITERIA: SIGNALIZED & UNSIGNALIZED INTERSECTIONS

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.

Schaad Road TIS Existing AM 2018 Existing Geometry, Traffic Control, and Timing

	1	-+	V	*	+	A.	1	1	p	1	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	^ î+	-	1919	朴	-	Ni.	^t		ħ	4	1
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	disp	0.985		10.00	0.981		1107	0.919				0.850
Fit 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+pl	NA	-	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	Carto
Permitted Phases							8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase	-	A 199						-				
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Solit (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)	25	2.0		2.5	2.0		2.5	20		25	20	20
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-Lao 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		20	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effcl Green (s)	17.6	46.7		10.7	39.8		32.4	23.3		36.9	25.6	25.6
Actuated o/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	92
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
IOS	F	C		F	D		D	F		D.	F	Δ
Approach Delay		39.8		-	49.9		5	516		D.	36.2	Ú.
Approach LOS		D			D			D			D	
Queue Length 50th (fl)	149	196		68	341		64	189		90	226	ó
Queue Length 95th (ft)	242	258		117	473		133	#366		177	#466	83
Internal Link Dist (ff)	676	798		110	904		100	450		01	302	00
Turn Bay Length (ft)	175	100		200			170	400		245	552	_
Rase Canacity (vnh)	468	1668		721	1068		330	402		240	408	618
Starvation Can Reducto	400	000		0	0		0.00	402		0	-100	010
Snillhack Can Reducta	0	0		0	0		0	0		0	0	0
Storage Can Reducto	0	Ő		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

Timing Plan: AM Peak

Cannon & Cannon, Inc.

Schaad Road TIS Existing AM 2018 Existing Geometry, Traffic Control, and Timing

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 m	ay be longer.
Queue shown is maximum after two cycles.	

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

¥ Ø1		1 03	V Ø4
32.5.2	62.9	22.55	31,5 %
Aøs	Ø6	107	1 _{Ø8}
32.55	107.11	22.5 5	31,53

Schaad Road TIS Existing PM 2018 Existing Geometry, Traffic Control, and Timing

	1	->	V	V	-	A	1	1	p	1	¥	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	15	^		55	^		¥i.	^	-	3	4	7
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	and the second	1000	0.959	01014	1000	00050	0.850
Fit 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	1.000
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	20		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	Lan		Lead	Lan	Lao
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	20	5.0		20	5.0		20	30		20	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	247		33.7	22.8	22.8
Actuated o/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		F	F		-10.0	F		D	F	10.0
Annroach Delay	- N	135.7		-	64.6			74 4		0	31 4	5
Approach LOS		F			F			F			C	
Oueue Length 50th (ff)	~537	122		44	588		130	270		84	103	n
Queue Length 95th (ft)	#738	172		75	#823		200	#440		138	168	85
Internal Link Dist (ff)	11100	798		10	904		200	450		100	302	00
Turn Bay Length (fi)	175	100		200	904		170	450		245	502	-
Rase Canacity (uph)	380	1714		505	880		350	306		240	202	509
Starvation Can Reducto	0.00	0		000	000		000	000		200	020	500
Spillback Can Poducto	0	0		0	0		0	0		0	0	0
Storage Cap Reducto	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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

Schaad Road TIS Existing PM 2018 Existing Geometry, Traffic Control, and Timing

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 in	finite.	
Queue shown is maximum after two cycles.		
# 95th percentile volume exceeds capacity, queue m	ay be longer.	
Queue shown is maximum after two cycles.		

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

√ Ø1	-•• ₀₂	1 03	V Ø4
32.5.s	623	22.5 5	31.5 2
A @5	4 − Ø6	107	1øs
32/59	62.0	122.5 5	133.5100

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

Schaad Road TIS Existing AM 2018 Existing Geometry, Traffic Control, and Timing

	1	->	V	*	+	A.	1	Ť	p	1	t	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	^ 1		5	↑ î≽		5	1	71	5	A	1
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	0.3			0.850			0.850
FIt Protected	0.950			0.950	1		0.950			0.950		
Satd, Flow (prot)	1770	3472	0	1770	2310	0	1770	1863	1583	1770	1863	1583
Fit 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+pl	NA		pm+pl	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	Lao		Lead	Lao	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	40		3.0	4.0		30	30	3.0	30	30	30
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 o/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	36	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	313		20.5	43.1		31 3	35.6	3.6	26.6	66.0	0.0
I OS	0.0	C		C	D		C	D.0	۵.0	20.0 C	60.0	4
Approach Delay	U.	30.2		Q	39.2		0	23.1		0.	41.8	A
Approach LOS		C			D.2			C			41.0 D	
Oueue Length 50th (II)	53	145		58	375		76	106	0	13	207	37
Queue Length 95th (ft)	115	248		123	650		133	178	40	35	168	108
Internal Link Dist /ft)	110	708		140	000		100	450	40	00	302	100
Turn Poy Longth (A)	120	190		075	504		115	400	220	110	392	175
Rose Conseity (uph)	130	1472		820	073		521	724	1029	620	712	001
Staniation Can Poduate	410	14/2		020	515		021	151	1020	029	112	901
Spillback Can Deductin	0	0		0	0		0	0	0	0	0	0
Starage Cap Reducts	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

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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

2 Ø1	4 − Ø2	103	1ø4	
39.5.6	GIS	10.5 n	86.5	
105		107	V Ø8	
35.5 5	615	140,55	16.4	

Timing Plan: AM Peak Cannon & Cannon, Inc.

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

	1	->	V	*	+	A	4	1	p	4	ł	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	3	^1		5	^ 1		1	1	71	5	A	1
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 Ufil, 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	- Andrew	0.982	PACE		0.985	eros-		112-54	0.850		12963	0.850
FIL Protected	0.950			0.950			0.950		1.2.2.1	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+pl	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	Ĩ
Switch Phase	-				-		-			ų		<u> </u>
Minimum Initial (s)	8.0	12.0		8.0	12.0		80	10.0	8.0	8.0	10.0	80
Minimum Solit (s)	13.5	18.0		13.5	18.0		13.5	16.0	13.5	13.5	16.0	13.5
Total Solit (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
Vollow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All Pod Time (s)	1.0	1.5		1.5	1.5		1.5	1.5	4.0	1.5	4.0	4.0
Lost Time Adjust (c)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Lost Time Adjust (5)	0.0	60		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Load/Loa	Lond	1.00		Lood	1.00		Lond	1.00	beel	bool	1.00	Lood
Lead Lag Optimize?	Leau	Vac		Voc	Vac		Voe	Lag.	Voc	Voc	Vac	Voc
Lead-Lag Optimizer	2.0	105		2.0	105		2.0	2.0	20	20	20	2.0
People Extension (s)	J.U.	4.U Min		None	4.U		None	None	Mana	0.0	5.0	0.0
Act Effet Green (a)	FC D	40.7		71.0	50.9		29.4	20.7	R1.0	24.6	24.0	ARO
Act Elici Gleen (s)	0.45	40.7		0.60	0.41		0.4	29.7	0.10	0.20	24.0	40.0
Actuated g/C Ratio	0.45	0.00		0.00	0.41		0.01	0.24	0.49	0.20	0.20	0.37
V/C Kallo	0.53	0.75		0.02	0.00		0.21	0.04	0.35	0.21	0.71	0.29
Control Delay	20.0	42.0		21.2	32.2		34.7	04.0	3.3	34.1	00.2	4.0
Queue Delay	0.0	10.0		0.0	20.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	42.5		21.2	32.2		34.7	54.3	3.3	34,1	60.Z	4.6
LOS	В	D		G	C		G	0	A	C	E	A
Approach Delay		38.1			30.5			21.1			35.4	_
Approach LOS	70	D		447	0		10	0		00	D	
Queue Length 50th (ft)	76	322		11/	250		43	219	0	33	203	0
Queue Length 95th (ft)	143	465		255	425		93	3/4	55	(5	348	52
Internal Link Dist (11)	100	(98			904		110	450			392	100
Turn Bay Length (ft)	130	1000		2/5			115		230	110		1/5
Base Capacity (vph)	611	1592		523	1090		545	173	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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

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 & Sch	aad Road	

101	4 Ø2	103	1 _{Ø4}
35.5 s	61.9	10.55	56 <
1005		107	↓ Ø8
35.5'2	619	40.5 5	56/4

Timing Plan: PM Peak Cannon & Cannon, Inc.

HCS7 Two-Way Stop-Control Report

General Information		Site Information	Site Information						
Analyst	ВЈН	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 Contro	ol							

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound Westbound Northbound Southbourd			bound	- 11											
Movement	U	L.	T	R	U	L	T	R	U	L	Т	R	U	L	T	R
Priority	10	1	2	3	40	4	5	6	1	7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0	Co.d.	0	1	0	1000	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		8	537	1		0	911	0	l ní	0	0	1		15	0	29
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)					-			1.1			0		1		0	
Right Turn Channelized	_				2					-						
Median Type Storage	1			Undi	vided									_		
Critical and Follow-up H	eadway	ys														
Base Critical Headway (sec)		4.1	1.1	1.00		4.1				7.1	6.5	6.2	10.00	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			1	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	1	3.53	4.03	3.33
Delay, Queue Length, an	d Level	of Se	ervice		-											
Flow Rate, v (veh/h)		9				0					1		1		48	
Capacity, c (veh/h)		694				985					509				160	
v/c Ratio		0.01			1.1.1	0.00					0.00				0.30	
95% Queue Length, Q ₉₅ (veh)		0.0				0.0			1.11		0.0				1,2	
Control Delay (s/veh)		10.3	1	0.2		8.7		0.0			12.1	[]			36.8	
Level of Service (LOS)		B		A		A		A			В				Ē	
Approach Delay (s/veh)		0	.3		1.000	0	.0			13	2.1			36	5.8	
Approach LOS					1	В	- 0	1	1	Ē						

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HCS 1980 TWSC Version 7.5 Schaad at La Christa Existing AM.xtw Generated: 5/24/2018 9:00:01 AM

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 Contro	bl			

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound			Westbound			Northbound				Southbound					
Movement	1.0	1	Т	D	10		Т	D	11	L	Т	p	11	L L	Т	p
Décelha	111	1	2	2	411	4	5	6	0	7	0	0	-	10	11	12
Phoney	10	-	e .	3	10	4	3	0	-	-	0	9	-	10		16
Number of Lanes	0	U.		0	0	U	1	U		0	1	0	-	0		0
Configuration	-	_	LTR		-		LTR			-	LTR	-	-		LTR,	-
Volume (veh/h)	1	22	969	5		4	723	19		1	0	3		12	0	7
Percent Heavy Vehicles (%)		3		1		3			1.	3	З	3		3	3	3
Proportion Time Blocked				-										-	i = i	
Percent Grade (%)	0.0									1.1	0				0	
Right Turn Channelized	10-										-	- 1				120
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	ys			_											
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		11.	1	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, an	d Level	of Se	ervice													
Flow Rate, v (veh/h)		23				4					4				20	
Capacity, c (veh/h)		826	1			667					131				75	
v/c Ratio		0.03				0.01					0.03				0.27	
95% Queue Length, Q ₉₅ (veh)	1	0.1	2	177		0.0					0.1			1.000	1,0	(11)
Control Delay (s/veh)		9.5		0.6	1.00	10.4		0.1	1	1.1	33.4			-	69.7	
Level of Service (LOS)		٨	1	A	0.00	В		А			D				F	
Approach Delay (s/veh)		0	.8		0.2				33.4			69.7				
Approach LOS							D			F						

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HCS 980 TWSC Version 7.5 Schaad at La Christa Existing PM.xtw Generated: 5/24/2018 9:02:43 AM

	1	-	V	1	+	R	1	1	1	4	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	At.		55	At.		Ŋ	At ₂		15	*	71
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	0.00	0.973		orea.	0.977	619961	1.04	0.904	0110		120	0.850
Fit Protected	0.950			0.950	1121.1		0.950			0.950		
Satd. Flow (prot)	2230	3444	0	3433	2293	0	1770	2088	0	1770	1863	1583
Fit 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			1	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 Solit (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	Lao
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 o/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	В
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		4.54.55	450		102000	392	120
Turn Bay Length (ft)	175			200			170			245		
Base Capacity (vph)	421	1443		648	957		253	484		254	379	567
Starvation Cap Reducto	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

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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 theoreticall	/ infinite.	
Queue shown is maximum after two cycles.		
# 95th percentile volume exceeds capacity, queu	e may be longer.	
Queue shown is maximum after two cycles.		
dr Defacto Right Lane. Recode with 1 though lan	e as a right lane.	

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

¥01		103	Ø4									
32.5 =	52.5	22.55	31/5 5									
A @5	4 − Ø6	07	1 øs									
32.54	62.5	22.5 5	8160 s									
	1	->	V	*	-	*	1	1	1	1	ŧ	4
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	A1.		55	A1		TT.	At ₂		5	4	71
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		1,000	0.927				0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd, Flow (prot)	2194	3426	0	3433	2286	0	1770	2141	0	1770	1863	1583
Fit Permitted	0.950			0.950	1.1		0.335		-	0.172	1000	1000
Satd, Flow (perm)	2194	3426	0	3433	2286	0	624	2141	0	320	1863	1583
Satd, Flow (RTOR)		26			11			44	*		10,00	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 (%)												0.012
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		om+nt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	1 shirt
Permitted Phases					, in the second se		8			4		4
Detector Phase	5	2		1	6		3	8		7	4	4
Switch Phase								0				
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Solit (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	315		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
Vellow Time (s)	5.0	5.0		50	5.0		5.0	4.5		5.0	4.5	4.5
All-Red Time (s)	25	2.0		2.5	20		2.5	20		2.5	20	20
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/l an	Lead	Lao		Lead	Lag		heal	Lan		heal	Lan	1.20
Lead an Ontimize?	Vae	Ves		Ves	Ves		Ves	Yes		Vos	Vac	Vas
Vehicle Extension (s)	20	5.0		20	50		2.0	3.0		20	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effet Green (s)	25.0	60.0		20.0	55.0		39.0	25.0		35.5	23.3	23.3
Actuated n/C Ratio	0.17	0.41		0.14	0.37		0.27	0.17		0.24	0.16	0.16
vic 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	350 5		60.8	73.0	10.01
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	350.5		8.03	73.0	10.0
LOS	500.9 F	C		(4.0 E	F		E	555.5 F		00.0 E	F	IV.J
Annroach Dalay	1	185.7		-	84.0		t.	282 6		- E	415	ų
Approach LOS		F			64.0			F			41.0	
Oueue Length 50th (ft)	-684	201		180	~754		203	~755		113	104	0
Queue Length John (II)	#870	270		230	#067		#322	#080		176	297	01
latornal Link Diet (ff)	#013	708		200	904		TUGE	450		170	207	31
Turn Boy Longth (ff)	175	130		200	304		170	400		245	092	
Rase Canacity (uph)	272	1416		584	863		282	101		240	917	624
Staniation Can Paduate	313	1410		004	005		202	401		229	517	031
Snillback Con Reducto	0	0		0	0		0	0		0	0	0
Storage Con Peductr	0	0		0	0		0	0		0	0	0
Reduced we Patie	1.62	0.41		0.62	1.05		0.02	1 70		0.67	0.67	0.50
Legaced MC Mano	1.03	0.41		0.05	1.00		0.92	1.70		0.07	0.07	0.59

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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 lo	nger.
Queue shown is maximum after two cycles.	

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

¥Ø1	ÞØ2	103	↓ Ø4
32.5 n	62 8	22.5 5	3153
A 05	4 − Ø6	107	1 ø8
32.59	62.8	22,50	B RATE I

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

	1	->	V	*	4-	A	1	1	p	1	ŧ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	^ î		Ti .	^		1	1	1	15	4	1
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
Fit Protected	0.950			0.950			0.950			0.950		
Satd, Flow (prot)	1770	3472	0	1770	2312	0	1770	1863	1583	1770	1863	1583
Fit 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 (%)												107.1
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 Solit (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/Lao	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 o/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	e .	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)	765	798		1.12	904			450	1.2		392	354
Turn Bay Length (ft)	130			275			115	100	230	110	552	175
Base Capacity (vph)	405	1348		565	878		476	695	1022	629	641	879
Starvation Can Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reducto	0	0		0	0		0	0	0	0	0	Ő
Storage Cap Reductn	0	0		0	0		0	Ő	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

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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

1 Ø1	◆ Ø2	103	104	
35,50	615	40.5 s	58.s	
105	-106	107	V Ø8	
35.5 5	645	40,5±	lips	-

Timing Plan: AM Peak Cannon & Cannon, Inc.

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

	1	->	V	1	+	*	1	1	1	4	+	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	11		15	<u>ት</u> ኩ		7	1	1	15	1	7
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	0.54		11-04710	0.850	1000		0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd, Flow (prot)	1770	3476	0	1770	2314	0	1770	1863	1583	1770	1863	1583
Fit 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 (%)				A.L.C.		11400						-
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	С	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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

Synchro 10 Report

Page 1

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

2 Ø1	Ø2	103 103	104	
35,5 0	61.5	10.55	56.4	
105		\$ 07	V Ø8	
25,5 4	615	190,52	56'0	

Timing Plan: PM Peak Cannon & Cannon, Inc.

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	вјн	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				1.2										
Movement	U	L	T	R	U.	L	T	R	U	L	T	R	U	L	T	R
Priority	10	1	2	3	40	4	5	6		7	8	9	-	10	11	12
Number of Lanes	0	0	1	0	0	0	1	0	1	0	1	0		0	1	0
Configuration		100	LTR		1	1.0	LTR				LTR				LTR	1
Volume (veh/h)		9	651	1	1	0	1083	0		0	0	1		17	0	32
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked									0.00					120		
Percent Grade (%)							-		-		0	-			0	
Right Turn Channelized			-		1				0							
Median Type Storage				Undi	vided		_	-								
Critical and Follow-up H	eadway	ys						-								
Base Critical Headway (sec)		4.1			0	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			1	2,2		100		3.5	4.0	3,3		3,5	4.0	3.3
Follow-Up Headway (sec)		2.23		X	1	2.23	T L	T.		3,53	4.03	3.33		3.53	4.03	3.33
Delay, Queue Length, an	d Level	of Se	ervice													
Flow Rate, v (veh/h)		10				0					1				53	
Capacity, c (veh/h)		590			1	886	1				433	1			103	1
v/c Ratio		0.02				0.00		-			0.00				0.52	-
95% Queue Length, Qas (veh)		0.1				0,0					0.0				2.3	
Control Delay (s/veh)		11.2		0.3	1	9.1		0.0			13.3				72.2	
Level of Service (LOS)		B		A	11.	A		A			В			100	F	
Approach Delay (s/veh)	1	0	.5			0	.0			13	3.3			72	2.2	
Approach LOS	B					3	F									

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HCS 10 TWSC Version 7.5

Generated: 5/24/2018 9:52:52 AM

Schaad at La Christa Background Phase 1 AM.xtw

HCS7 Two-Way Stop-Control Report

General Information		Site Information					
Analyst	ВЈН	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		East	bnuoc	1.1		Westbound Northbound				11.1	Southbound					
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	10	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	0.11			LTR				LTR				LTR	
Volume (veh/h)		24	1169	6	-	4	896	21	1	1	0	3		13	0	8
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked				100			1									
Percent Grade (%)	1			- 11							0		0			
Right Turn Channelized			· · · ·					1.17						-		
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	ys					-									
Base Critical Headway (sec)	1	4.1				4.1			21	7.1	6.5	6.2		7.1	6.5	6,2
Critical Headway (sec)		4.13				4.13			U.	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, an	d Level	of Se	ervice							-			-			
Flow Rate, v (veh/h)		26				4					4				22	
Capacity, c (veh/h)		703				553					73				38	
v/c Ratio		0.04			1	0.01				-	0.06	1			0.58	
95% Queue Length, Q ₃₅ (veh)		0.1			(0.0				-	0,2				2,1	
Control Delay (s/veh)		10.3		1.2	1	11.6		0.2			57.5				187.0	-
Level of Service (LOS)		B		A		В		A			F	1			F	
Approach Delay (s/veh)		1	A		10-	0	.2]	57	7,5		187.0			
Approach LOS										Ē.		F				

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HCS 100 TWSC Version 7.5 Schaad at La Christa Background Phase 1 PM.xtw Generated: 5/24/2018 9:55:39 AM

	*	->	Y	*	+	*	1	1	1	1	+	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	41		55	A1.		5	4 1,		5	*	1
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	110.00		1100	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd, Flow (prot)	2230	3444	0	3433	2291	0	1770	2093	0	1770	1863	1583
Fit 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 (%)							-				11-1	
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	0.501
Permitted Phases		-		-	-		8	1000		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 Solit (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	Lao		Lead	Lag		Lead	Lag		Lead	Lag	Lad
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.0		20	5.0		2.0	30		2.0	3.0	30
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 o/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		F	D		F	F		F	F	C
Approach Delay	-	50.7		-	59.2		÷.	137.6		-	76.3	9
Approach LOS		D			F			F			F	
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)	11 Craste	798		100	904		10.1.2	450		11000	392	2.10
Turn Bay Length (ft)	175	100		200	991		170	100		245	UUL	-
Base Canacity (vph)	414	1420		638	942		249	472		250	379	570
Starvation Can Reducto	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	Ő		Ő	0		0	0	0
Storage Cap Reducto	0	0		0	0		0	0		0	Ő	õ
Reduced v/c Ratio	0.73	0.55		0.66	0.69		0.63	1.23		0.83	1.12	0.73

Timing Plan: AM Peak Cannon & Cannon, Inc.

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 in	finite.	
Queue shown is maximum after two cycles.		
# 95th percentile volume exceeds capacity, queue m	ay be longer.	
Queue shown is maximum after two cycles.		
dr Defacto Right Lane. Recode with 1 though lane a	s a right lane.	

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

√ Ø1		1 Ø3	₩ Ø4
32.55	52S	22.5>	31.5.8
A _ @5	4 − Ø6	107	1 _{Ø8}
32.81	aks.	22.50	ALES.

	*	->	¥	*	+	4	1	Ť	1	1	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	At _b		55	A1		5	作	_	5	*	1
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	0.00	19/20	0.973	-144.	11.02	0.929			1000	0.850
Fit Protected	0.950			0.950	1111.1		0.950			0.950		
Satd, Flow (prot)	2194	3426	0	3433	2284	0	1770	2146	0	1770	1863	1583
Fit 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			1000	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	1 onlin
Permitted Phases		-					8			4		4
Detector Phase	5	2		- 1	6		3	8		7	4	4
Switch Phase		-								'	4	-
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	60
Minimum Solit (s)	13.5	27.0		13.5	27.0		13.5	12.5		13.5	12.5	12.5
Total Solit (s)	32.5	62.0		32.5	62.0		22.5	31.5		22.5	31.5	31.5
Total Split (%)	21.0%	41.8%		21.0%	41.8%		15 2%	21.2%		15 2%	21.2%	21 2%
Maximum Groon (c)	21.570	55.0		25.0	55.0		15.0	25.0		15.0	21.270	25.0
Vellow Time (s)	5.0	5.0		5.0	50		5.0	4.5		5.0	4.5	4.5
All Rod Time (s)	25	20		2.5	20		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 (c)	7.5	7.0		75	7.0		7.5	6.5		7.5	6.5	0.0
Load/Lag	beel	1.0		Lond	1.0		Load	1.00		Lood	1.00	1.00
Lead Log Onlimize?	Voe	Vac		Voe	Vac		Voc	Vas		Voc	Vog	Vas
Vehicle Extension (c)	20	50		20	50		2.0	3.0		20	20	2.0
Pacall Mada	Nono	Min		Nono	Min		Nono	Nono		2.0	Mono	Nong
Act Effet Green (a)	25.0	60.0		20.0	55.0		20.0	25.0		26 1	02.5	22.6
Actuated a/C Palia	20.0	0.41		0.14	0.27		0.27	0.17		0.25	20.0	20.0
Actuated gro Ratio	1.70	0.41		0.14	1.00		0.02	1.75		0.20	0.10	0.10
Control Dolou	260 4	21.4		74.0	01.5		0.95	200.0		62.4	72 5	10.02
Oucue Delay	0.0	0.0		14.2	91.0		02.0	0.000		02.1	13.5	10.9
Total Dalay	260.4	21.4		74.0	0.0		0.0	0.0		0.0	72.5	10.0
Total Delay	309.4	01.4		(4.2	91.0		02.0	000.0 F		02.1	13.5	10.9
LUS Assessed Delay	r	200 4		E	00 5		F	200.0		E	E 44.7	p
Approach LOS		200.4			00.0			299.9			41.7	_
Approach LOS	. 707	202		404	770		002	700		447	100	0
Queue Length both (11)	~/3/	202		181	~//0		203	~/88		11/	199	0
Queue Length 95th (II)	#933	2/0		230	#9/9		#321	#990		#190	294	93
Internal Link Dist (ft)	476	798		000	904		170	450		045	392	-
Turn Bay Length (II)	1/5	1110		200	004		1/0	000		245		
Base Capacity (vph)	3/3	1413		583	861		280	399		229	316	541
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductin	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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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

¥ 01		1 03	Ø4	
32.5 :	6.2.5	221日日	31/54	
A 05	← Ø6	107	1ø8	
32,5 a	62.6	22.50	84.53	1.0

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

	٠	->	7	1	+	4	1	1	1	1	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	3	^		5	↑ t→		5	1	1	15	*	1
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	20202		0.985	P. M. M.			0.850	01000		0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd, Flow (prot)	1770	3472	0	1770	2312	0	1770	1863	1583	1770	1863	1583
FII Permitted	0.069			0.334			0.160		100	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 (%)								1.75		ALC: N		-
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/Lao	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
IOS	D	D		C	E		C	D	A	C	E	В
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)	2.91	798		1,19	904		100	450	3.0		392	101
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (voh)	403	1353		556	873		474	694	1020	628	637	876
Starvation Can Reducto	0	0		0	0		0	0	0	0	0	0
Spillback Can Reductn	0	0		0	0		0	0	0	Ő	0	0
Storage Cap Reducto	0	Ő		0	0		õ	0	0	Ő	0	0
Reduced v/c Ratio	0.39	0.44	1	0.27	0.90		0.34	0.25	0.17	0.04	0.62	0.36

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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

2 01	Ø2	103	104	
36.50	0.Lo	10.5 p	55.4	
105		107	↓ Ø8	
35.5 5	513	110.55	56.5	

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

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	1	-	Y	1	+	*	1	1	1	1	ŧ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	14		5	1		5	1	14	5	4	1
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	ALC:N	0.982	0120		0.987	1000	1.000	1100	0.850	1110	110-	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd, Flow (prot)	1770	3476	0	1770	2317	0	1770	1863	1583	1770	1863	1583
Fit 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		1	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+pl	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				7								
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/Lao	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 q/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	1400	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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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	e may be longer.	
	and the second	

Queue shown is maximum after two cycles.

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

P 01	€ Ø2	103	104	
35.5%	619	90.5 5	56.4	
frøs.		\$ 07		
39.52	619	90.5 5	lifes	

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	влн	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 Contr	ol w/ 2-lane	

Lanes



Vehicle Volumes and Adjustments

Approach	1	Eastb	ound			West	bound			North	bound		1	South	bound	
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6	1.117	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	1	1.1				TR						L	1	R
Volume (veh/h)		24	693				1075	6				1		31		57
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)	1													()	
Right Turn Channelized												- 1		N	0	
Median Type Storage	1			Undi	vided		-		1							
Critical and Follow-up H	eadway	ys		-												
Base Critical Headway (sec)		4.1							1000			1.00	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				1								3,53		3,33
Delay, Queue Length, an	d Level	of Se	ervice							-		-		-		
Flow Rate, v (veh/h)		26				1.11								34		62
Capacity, c (veh/h)		591										1		65		233
v/c Ratio		0.04										1		0.52	_	0.27
95% Queue Length, Q95 (veh)		0,1												2.1		1.0
Control Delay (s/veh)		11.4	-			711		121						110.1		25.9
Level of Service (LOS)		В				1								F		D
Approach Delay (s/veh)		1	.2											55	.6	
Approach LOS				-								- 1		1		

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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	PM Peak - Combined Phs1	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Proposed Geometry and Traffic Contr	rol w/ 2-lane	

Lanes



Approach Eastbound Westbound Northbound Movement U. R U R U R U L T L Т L τ Priority 10 1 2 3 4U 4 5 6 7 8 9 Number of Lanes 0 0 1 0 0 0 1 0 0 0 Ó Configuration LT TR Volume (veh/h) 1236 950 51 51 Percent Heavy Vehicles (%) 3 **Proportion Time Blocked** Percent Grade (%) **Right Turn Channelized**

Undivided

Critical and Follow-up Headways

Median Type | Storage

Vehicle Volumes and Adjustments

structure and tonott ap the	aamays							
Base Critical Headway (sec)	4.1	1 2 1 1 2 4	111	2.1.1771	141 121 23		1.1	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 Se	rvice						
Flow Rate, v (veh/h)	55						40	24
Capacity, c (veh/h)	637						28	271
v/c Ratio	0.09	1 - 1 - 1				1	43	0.09
95% Queue Length, Q ₉₅ (veh)	0.3						1.7	0.3
Control Delay (s/veh)	11.2					53	2,8	19.6
Level of Service (LOS)	В						F	С
Approach Delay (s/veh)	4.1			111			341.4	
Approach LOS							F	

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Southbound

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No

Schaad at Site Entrance Combined Phase 1 PM.xtw

HCS7	Two-Way	Stop-Control	Report	
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General Information		Site Information	
Analyst	вјн	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	1	Easti	ound		-	West	bound			North	bound	1990 B		South	bound	
Movement	U	Ê	T	R	U	L	т	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	1	0	1	0
Configuration	1.2.41	1.01	LTR				LTR				LTR	1	신문이		LTR	
Volume (veh/h)		9	675	4		0	1140	.0		0	0	1		17	0	32
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked	160					1					1			123		
Percent Grade (%)						_			1		0				0	
Right Turn Channelized								- 1	1							
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	/s		1		-								-		
Base Critical Headway (sec)		4.1		Ca. Is	1 1 1 1	4.1				7.1	6.5	6.2	1	7.1	6.5	6,2
Critical Headway (sec)	1.000	4.13				4.13			1	7,13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2			1	2.2			-	3.5	4.0	3,3	-	3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2,23			1	3.53	4.03	3.33	17	3.53	4.03	3.33
Delay, Queue Length, an	d Level	of Se	ervice													
Flow Rate, v (veh/h)		10				0					1		1.1		53	
Capacity, c (veh/h)	1	559	-	100	1	866			1		418				91	
v/c Ratio		0.02				0.00			()		0.00				0.59	
95% Queue Length, Q ₂₅ (veh)		0,1			1	0.0					0,0				2.7	
Control Delay (s/veh)		11.6		0.3		9.2		0.0	1	-	13.6	1.000	-		89.8	1.1
Level of Service (LOS)		8		A		Á.		A			В				F	
Approach Delay (s/veh)		0.	5			0	.0			13	3.6			89	9.8	
Approach LOS					1					3	B			9	E.	

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HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ВЈН	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		East	bound			West	bound		1	North	bound			South	bound	
Movement	U	L	T	R	U	L	T	R	U	L	Ť	R	U	L	T	R
Priority	10	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	1			LTR		-	-	LTR		(* E)		LTR.	-
Volume (veh/h)		24	1220	6		4	918	21		1	0	3		13	0	8
Percent Heavy Vehicles (%)		3				Е				3	3	3		3	3	3
Proportion Time Blocked									1-51	1		1	1		5	
Percent Grade (%)			-		2						0		1		0	
Right Turn Channelized							_		1							
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	ys	-				-									
Base Critical Headway (sec)		4,1				4.1	1	1		7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13			1	7.13	6.53	6.23		7,13	6.53	6.23
Base Follow-Up Headway (sec)		2.2	1		1.	2.2	1		-	3.5	4.0	3.3		3,5	4.0	3.3
Follow-Up Headway (sec)		2.23			1	2.23				3.53	4.03	3.33		3.53	4.03	3.33
Delay, Queue Length, an	d Level	of Se	ervice			-		-		-						
Flow Rate, v (veh/h)		26				4					4				22	
Capacity, c (veh/h)		689				528		1			64				33	1
v/c Ratio		0.04				0.01	1				0.07				0.67	
95% Queue Length, Q ₉₅ (veh)	1	0.1				0.0					0.2				2,3	
Control Delay (s/veh)		10.4		1.4		11.9	-	0,2		1000	65.1				232.7	
Level of Service (LOS)		В	1	A		В		A		1	F				F	
Approach Delay (s/veh)		1	.6			0	3			65	5.1		-	23	2.7	
Approach LOS					0			. 1			E				F	

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HCS100 TWSC Version 7.5 Schaad at La Christa Combined Phase 1 PM.xtw Generated: 5/24/2018 3:49:33 PM

	1	->	V	1	4-	*	1	1	P	1	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	14		ሻሻ	↑ ₽		ħ,	1		5	1	1
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	1	0.973	57.500		0.976			0.906	60000		110.0	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2230	3444	0	3433	2291	0	1770	2093	0	1770	1863	1583
Fit 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 (%)							0100	0100	0100	0100	0100	0100
Lane Group Flow (vph)	302	785	0	420	653	0	157	581	0	208	425	414
Turn Type	Prot	NA	· ·	Prot	NA		nm+nl	NA	é.	nm+nt	NA	Perm
Protected Phases	5	2		1	6		- Min Pi	8		7	4	1.ciul
Permitted Phases	9	4			0		8	0		4	4	4
Detector Phase	5	2		4	6		3	0		7	A	4
Switch Dhaco	9	2		,	0		5	0			4	
Minimum Initial (a)	6.0	20.0		6.0	20.0		6.0	6.0		6.0	6.0	60
Minimum Initial (5)	42.5	20.0	-	42.6	20.0		43.6	10.0		42.5	10.0	10.0
Tatal Calib (a)	10.0	21.0		13.0	27.0		13.0	12.0		13.0	12.5	12,0
Total Split (S)	23.0	24.70/		23.2	30,4		13.0	31.0		17.0	35.0	35.0
Total Split (%)	20.9%	34.170		21.1%	34.9%		12.4%	28.2%		10.0%	31.8%	31.8%
Maximum Green (s)	15.5	31.2		15.7	31.4		0.1	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		Yeş	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	1		200			170			245		
Base Capacity (vph)	314	1006		489	662		180	581		227	482	696
Starvation Cap Reducto	0	0		0	0		0	0		0	0	0
Spillback Cap Reducto	0	0		0	0		0	0		0	0	Ó
Storage Cap Reducto	0	0		0	0		0	0		0	Ő	0
Reduced v/c Ratio	0.96	0.78		0.86	0.99		0.87	1.00		0.92	0.88	0.59

Timing Plan: AM Peak

Cannon & Cannon, Inc.

Intersection Summary	and the second	
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 land	a as a right lane.	
Salite and Phases 1: Schood Road & Oak Ridge	Highway	

opina anu ritaaca.	1. Ochadu Road & Oak Riuge Highway	
601		1 03

√ Ø1	>02	1 03	₩ Ø4	
23/2.9	38.23	113.6.5	35 s	1000
ØS	← Ø6	V07	1ø8	
23.1	13849 VI	17.6=	315	2 m 2

	1	->	V	1	+	*	*	1	1	1	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	^ 1		55	↑ 1→		5	A 1.		5	4	1
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	2010-	0.968			0.973		1.2	0.929	Server S			0.850
Fit 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	1000		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		50	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	Lan		Lead	Lan	Lad
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	20	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 o/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		F	F		F	F		F	F	B
Approach Delay		127.2		-	136.7		-	188.1			59 9	U
Approach LOS		F			F			F			F	
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)	1004	798		200	904		1004	450		#210	302	54
Turn Bay Length (ft)	175.	100		200	504		170	400		245	002	-
Rase Canacity (unh)	475	1306		542	737		301	408		147	208	528
Starvation Can Reducto	415	0		0	0		0	400		0	200	020
Snillback Cap Reducto	0	0		0	0		0	0		0	0	0
Storage Can Reducto	0	0		0	0		Ď	0		0	0	ñ
Reduced v/c Ratio	1.35	0.42		0.68	1.24		0.86	1.40		1.09	0.72	0.62

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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

¥ Ø1		1 03	04
11.28	63.8 =	24.65	10.4 s
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10.5	55,6	115 2	9 =

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

	1	-	V	1	+	*	1	Ť	1	1	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	14		ħ,	11		15	1	1	15	1	1
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	mesa	27020	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	2312	0	1770	1863	1583	1770	1863	1583
Fit Permitted	0.134			0.311			0.180			0.648		
Satd. Flow (perm)	250	3472	0	579	2312	0	335	1863	1583	1207	1863	1583
Sald, 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 (%)				1.4.0								1141
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	, in the second se	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		80	20.0	9.6	80	20.0	83
Yellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	4.0	40	4.5	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5		1.5	1.5	1.5	1.5	15	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	Lan	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	40		3.0	4.0		3.0	30	3.0	30	30	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 o/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	0.02	0.96	0.47
Control Delay	28.2	25.4		15.8	61.0		34.1	27.5	36	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	F		C	C	Δ.	B	F	B
Approach Delay	Ŭ	26.0		U	53.8		v	21 4	n	D.	45.0	8
Approach LOS		C.0			00.0			C			40.0 D	
Queue Length 50th (ft)	47	139		44	347		61	67	0	10	223	84
Queue Length 95th (ff)	#113	192		78	#546		#127	146	38	26	#402	159
Internal Link Diet (ff)	#110	708		10	904		1141	450	00	20	302	100
Turo Bay Length (ft)	120	100		275	504		116	400	230	110	002	175
Raco Conacity (unh)	247	1166		380	705		246	692	250	110	414	667
Stanuation Can Poduate	24/	1100		009	100		240	002	000	432	414	007
Spillback Can Deduction	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductin	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

Timing Plan: AM Peak

Cannon & Cannon, Inc.

Intersection Summary	and the second sec	
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	e may be longer.	

Queue shown is maximum after two cycles.

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

P 01	€ Ø2	V03	104	
13.8.5	36:7.5	13.55	26.5	
Pos		107	V Ø8	
15.1=	SH ME	Hattin	26 #	

Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

	1	->	V	*	4-	*	1	1	1	1	ŧ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ĥ	^†		ή	1		ή	1	1	5	1	7
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
FIt Protected	0.950			0.950			0.950			0.950		1.1.1.1.1.1
Satd. Flow (prot)	1770	3476	0	1770	2317	0	1770	1863	1583	1770	1863	1583
Fit 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 (%)								2.2.1	-			
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	- 6	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 Solit (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/Lao	Lead	Lag		Lead	Lag		Lead	Lao	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 o/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	F	B	C	F	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)	02.10	798		11201	904		10	450	1.1.6	01	392	
Turn Bay Length (ft)	130	100		275			115	400	230	110	002	175
Base Canacity (vnh)	326	1215		367	861		265	350	744	245	350	732
Starvation Can Reducto	0	0		0	0		0	0	0	0	0.00	0
Spillback Cap Reducto	0	0		0	0		0	0	0	0	0	0
Storage Can Reducto	0	ő		0	ñ		ő	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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

Intersection Summary	the second s	and the second sec
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 m	ay be longer.	
Queue shown is maximum after two cycles.		

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

1 Ø1	€ Ø2	03	104
17.5	37.5%	100/5/s	22:5
105	-206	107	₩ 'Ø8
19 5	35,51	11.5%	LIST I

Lanes, Volumes, Timings 4: Schaad Road & Site Entrance

	٠	-	-	A	1	1	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		£.	Ť.		5	1	
Traffic Volume (vph)	24	693	1075	6	31	57	
Future Volume (vph)	24	693	1075	6	31	57	
Lane Util Eactor	1.00	1.00	*0.95	1.00	1.00	1.00	-
Frt	1100	1.00	0.999		110.0	0.850	
FII Protected		0.998	01000		0.950	0.000	
Satd Flow (prot)	0	1859	1768	0	1770	1583	
Ell Permitted		0.779	1100		0.950	1000	
Satd Flow (perm)	0	1451	1768	0	1770	1583	
Sald Flow (RTOR)		1.01	1			62	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Shared Lane Traffic (%)	w.v.4	0.04	0.04	0.00	0.04		
Lane Group Flow (vph)	0	779	1175	0	34	62	
Turn Type	Perm	NA	NA		Prot	Perm	
Protected Phases	1. ortin	6	2		4	1.vint	
Permitted Phases	6	0	-		T	4	
Detector Phase	6	6	2		4	4	
Switch Phase	0	0	4		4	4	
Minimum Initial (e)	15.0	15.0	15.0		8.0	80	
Minimum Solit (s)	21.0	21.0	21.0		14.0	14.0	
Total Solit (s)	56.0	56.0	56.0		14.0	14.0	
Total Split (%)	80.0%	80.0%	80.0%		20.0%	20.0%	
Meximum Groom (n)	50.0	50.0	50.0		20.070	20.070	
Vallow Time (c)	4.0	4.0	4.0		4.0	4.0	-
All Red Time (s)	9.0	4.0	2.0		2.0	2.0	
Lost Time Adjust (s)	2.0	2.0	2.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	
Load/Loa		0.0	0.0		0.0	0.0	
Load Lag Optimize?							
Vehicle Extension (a)	4.0	10	4.0		20	20	
Penal Mede	4,0	4.0	4.0		Nona	Nona	
Act Effet Cross (a)	(VIII)	54 A	64.4		NOTIE	0.2	
Act Elict Green (S)		0.70	0.70		0.3	0.3	
Actuated g/C Ratio		0.78	0.78		0.12	0.12	
Control Delaw		0.08	16.3		24.0	0.20	
Control Delay		9.7	10.3		31.0	11.5	
Queue Delay		0.0	0.0		0.0	0.0	
Total Delay		9.7	16.3		31.0	11.5	
LUS		A	B		10.4	В	
Approach Delay		9.7	16.3		18.4		
Approach LOS		A	B		В		
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)			10.00			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	

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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 Entran	28	
4		



Lanes, Volumes, Timings 4: Schaad Road & Site Entrance

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		â	î.		3	1	
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		Wee	0.993	110.0	1100	0.850	
Fit Protected		0.998			0.950		
Satd, Flow (prot)	0	1859	1757	0	1770	1583	
Fit Permitted		0.891	1101	-	0.950	1000	
Satd. Flow (nerm)	0	1660	1757	0	1770	1583	
Satd Flow (RTOR)		1000	10	×.	1110	24	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Shared Lane Traffic (%)	0.04	0.02	0.02	0.04	0.02	0.06	
Lane Group Flow (unh)	0	1308	1088	0	40	24	
Turn Tyne	Perm	NA	NA	U	Prot	Porm	
Protected Phases	roini	6	2		A	Form	
Pormitted Phases	6	0	2		4	4	
Peterter Phases	6	G	2		4	4	
Switch Phase	0	0	2		4	4	
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 o/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	Δ.		F	C	
Approach Delay		26.1	6.6		52.0	9	
Approach LOS		C	Δ.0		D		
Oueue Length 50th (ft)		865	280		33	0	
Queue Length 95th (ft)		#1484	424		73	20	
Internal Link Diet (ft)		708	904		302	.40	
Turn Boy Length (ff)		100	004		JUL	200	
Rase Canacity (uph)		1455	1542		110	121	
Staniation Can Reducts		1400	042		0	121	
Spillback Cap Peducin		0	0		0	0	
Storage Cap Reductin		0	0		0	0	
Reduced v/a Palia		0.00	0.74		0.36	0.20	
Neurceo vic Mailo		0.90	0.71		0.00	0.20	

Timing Plan: PM Peak

Cannon & Cannon, Inc.

Lanes, Volumes, Timings 4: Schaad Road & Site Entrance

Schaad Road TIS Combined Phase 1 PM 2022 Existing Geometry and Traffic Control, Optimized Timing

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	

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116 \$	195
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Timing Plan: PM Peak Cannon & Cannon, Inc.

Schaad Road TIS Combined Phase 1 AM 2022 Future Geometry and Traffic Control w/ County Project, Existing Timing

	1	->	V	*	4-	*	1	1	p	1	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	77	AT+		35	11	-	ሻ	44	1	5	4 1+	
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	141-940		South State	0.850		0.938	
Fit Protected	0.950			0.950			0.950			0.950	10112	
Satd, Flow (prot)	3433	3444	0	3433	2291	0	1770	3539	1583	1770	3320	0
FIt 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 (%)										0.00	0.00	0.00
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	nm+nl	NA	-
Protected Phases	5	2		1	6		3	8	1 51111	7	4	_
Permitted Phases	-	-		· ·			8	, in the second s	8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	_
Switch Phase	~			,	~			0				1000
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	_
Minimum Solit (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	315	31.5	22.5	315	-
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		50	50		5.0	4.5	15	5.0	4.5	-
All-Red Time (s)	25	20		2.5	20		2.5	2.0	20	2.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	2.0	
Total Lost Time (s)	7.5	7.0		7.5	7.0		7.5	6.5	6.6	7.5	0.0	
Lead/Lan	Lead	Lon		Lood	Lon		Logd	Log	1.00	Lond	Log	
Lead-Lag Ontimize?	Vec	Vee		Vee	Ves		Voe	Voc	Vos	Vec	Voc	
Vehicla Extension (s)	20	50		20	50		20	3.0	3.0	20	2.0	
Recall Mode	None	Min		None	Min		None	None	Mone	None	None	
Act Effet Green (s)	15.7	30.2		10.5	43.1		34.8	23.0	23.0	37.8	25.4	-
Actuated a/C Ratio	0.13	0.31		0.16	0.34		0.28	0.10	0.10	0.20	20.4	-
v/c Ratio	0.70	0.72		0.70	0.04		0.20	0.13	0.19	0.50	0.20	
Control Delay	63.4	41.2		63.2	46.7		40.2	47.0	0.01	29.5	67.0	
Outro Delay	0.0	-1.2		00.2	40.7		43.2	47.9	0.0	0.0	07.2	_
Total Dalay	63.4	41.2		62.2	46.7		40.0	47.0	0.0	20.5	67.0	
10tal Delay	03.4	91.2		00.Z	40.7		49.2	47.9	9.7	30.5	01.2	_
Approach Dolay	E	17 4		C.	62.4		U	20.2	M	U	E 60.9	-
Approach Delay		47.4			00.1			29.5			60.8	
Approach Loos	400	200		474	276		01	00	0	104	070	-
Queue Length Soft (II)	125	276		240	510		160	424	0	124	2/3	_
Laternal Link Diet (ff)	100	3/0		248	004		109	134	84	220	#4/6	
Ture Dou Longth (ft)	476	(90		000	904		170	400	000	-OVE	392	_
Rana Conocily (m)	1/0	1551		200	1020		170	740	200	245	757	
Classe Capacity (vpn)	098	1001		098	1030		2/2	/19	612	424	/5/	
Starvation Gap Reducth	0	0		0	0		0	0	0	0	0	-
Spinback Cap Reductin	0	0		0	0		0	0	0	0	0	-
Storage Cap Reductin	0 40	0		0 00	0.00		0.50	0 00	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	

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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	a may be longer.	
Queue shown is maximum after two cycles		

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

¥ Ø1		103	V Ø4
32.53	62 \$	22.5 s	31.5.5
♪ _{ØS}	4	107	1 ₀₈
32.54	67.9	22.5 5	31.5 -

Timing Plan: AM Peak Cannon & Cannon, Inc.

Schaad Road TIS Combined Phase 1 PM 2022 Future Geometry and Traffic Control w/ County Project, Existing Timing

	1	->	V	*	+	*	1	1	1	1	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	15	^†		ሻሻ	1		5	^	1	5	↑ ₽	
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
Frl	2.00	0.968			0.973				0.850		0.910	
Fit Protected	0.950	1000		0.950			0.950			0.950		
Satd, Flow (prot)	3433	3426	0	3433	2284	0	1770	3539	1583	1770	3221	0
Fit Permitted	0.950			0.950			0.181		-	0.365	-	1
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		la+ma	NA	Perm	pm+pt	NA	-
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	- 1	-		-			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 Solit (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/Lad	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 o/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		F	F		F	F	B	D	D	-
Annroach Delay		73.6			80.3			64.6			48.8	_
Approach LOS		F			F			F			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 (ff)	11100	798		200	904		1.14.9	450	04	104	392	
Turn Bay Length (ff)	175	100		200			170	100	200	245		_
Base Canacity (vnh)	596	1452		596	880		234	615	547	275	743	
Starvation Can Reducto	0	0		0	0.00		0	0	0	0	0	
Spillback Can Reducto	0	0		0	0		0	0	0	0	0	
Storage Can Reducto	õ	Ő		0	0		0	0	0	0	Ő	-
Reduced v/c Ratio	1.07	0.40		0.62	1.04		1.11	0.60	0.60	0.58	0.73	

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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 theoretica	ly infinite.
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, que	e may be longer.
Queue shown is maximum after two cycles.	

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


Schaad Road TIS Combined Phase 1 AM 2022 Future Geometry and Traffic Control w/ County Project, Existing Timing

	1	->	V	*	+	*	4	Ť	1	1	ŧ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	15	^		5	^		Ni.	^	7	5	1	1
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 Ulil. 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	0.612	0.981			0.985	Carles		0410	0.850			0.850
Fit Protected	0.950			0.950			0.950		117.20	0.950		
Satd, Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
Fit 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 (%)		illia.		1.174	ALC: N							
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+pl	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 q/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	В
Approach Delay		39.7			43.7			19.4			36.4	
Approach LOS		D			D			В			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)	100	798			904			450			392	100
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	495	1567		539	1572		575	810	1148	713	762	983
Starvation Can Reducto	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		Ő	0	0	0	0	0
Storage Cap Reducto	0	Ő		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

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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 & Scl	haad Road	

\$ O1	₹Ø2	103	104	
35.55	61.5	10.9 #	1 be 2	
105	->106	107	V Ø8	
35,50	1612	100.5 5	16.9	

Timing Plan; AM Peak Cannon & Cannon, Inc.

Schaad Road TIS Combined Phase 1 PM 2022 Future Geometry and Traffic Control w/ County Project, Existing Timing

	1	->	>	*	+	*	1	1	1	1	+	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	^		15	^		15	1	1	7	1	1
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
Frl	1.1922	0.982			0.987			WACO.	0.850			0.850
Fit 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		10.70	0.229		
Satd, Flow (perm)	726	3476	0	168	3493	0	408	1863	1583	427	1863	1583
Satd, Flow (RTOR)	1-5	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										0		
Minimum Initial (s)	80	12.0		8.0	12.0		8.0	10.0	8.0	80	10.0	80
Minimum Solit (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
Vellow Time (s)	40	4.5		40	4.5		4.0	4.5	4.0	4.0	4.5	4.0
All-Red Time (s)	1.5	15		1.5	1.5		15	1.5	1.5	1.5	1.5	1.6
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	60		5.5	6.0		5.5	6.0	5.5	5.5	6.0	5.5
Load/Loa	beol	1.00		Load	Log		Lood	1.00	bed	Lood	Lag	Load
Lead Log Optimize?	Vor	Vac		Vag	Vac		Ver	Vas	Vec	Voc	Vac	Vas
Vehicle Extension (e)	2.0	10		3.0	103		20	2.0	20	2.0	20	20
Peopli Mede	Nono	4.0		Mono	4.0		Nono	Mana	Nono	None	Mono	Nono
Act Effet Creen (a)	70.2	55.2		00.7	69.2		1000	20.4	GG 1	29.4	202.2	50.0
Actualed a/C Datio	12.0	0.27		90.7	0.46		42.0	0.21	0.45	0.06	20.3	0.34
Actualed g/o Ratio	0.49	0.07		0.01	0.40		0.29	0.21	0.40	0.20	0.19	0.20
Vic Rallo	0.00	10.01		0.72	0.42		40.7	74.5	0.42	0.00	75.6	0.59
Control Delay	20.5	40.2		44.0	29.0		42.7	/4.0	0.1	40.4	10.0	0.0
Queue Delay	0.0	0.0		0.0	0.0		0,0	74.5	0.0	0.0	0.0	0.0
Total Delay	20.3	40.2		44.0	29.0		42.7	74.0	0.1	40,4	/5.0	0.0
LUS Australia Dalari	Ç.	10.7		Ų	24.0		U	20.0	A	D	E	A
Approach Delay		42.7			34.2			38.3			41.0	
Approach LUS	105	170		004	000		00	0	04	40	070	10
Queue Length 50th (ft)	105	4/3		201	220		69	294	31	45	2/0	12
Queue Length 95th (tt)	191	647		#3/4	356		116	416	100	82	389	69
Internal Link Dist (It)	100	798		075	904		-	450	000	226	392	100
Turn Bay Length (ft)	130	1000		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 Ralio	0.41	0.81		0.71	0.42		0.22	0.50	0.42	0.14	0.46	0.33

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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	a may be longer.	
Queue shown is maximum after two cycles.		

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

1 Ø1	√ Ø2	03	104	
35,5 9	615	140.55	56.9	
105	->>06	\$ 07	ØS	
35.5 s	61	140.5 1	156 9	

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		Easth	bound	_		West	bound		/	North	bound		Southbound			
Movement	U	L	T	R	U	Ĺ	T	R	U	L	T	R	U	L.	T	R
Priority	10	1	2	3	4U	. 4	5	6	1.2.5	7	8	9	6.	10	11	12
Number of Lanes	0	1	2	0	0	1	2	0	1.00	0	1	0		0	1	0
Configuration	1	L	τ	TR		L	T	TR			LTR				LTR	1
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	1	3	3	3
Proportion Time Blocked					1.77									253		
Percent Grade (%)										-	0		(t -==		0	-
Right Turn Channelized	1						_	-	·			- 2	1		_	
Median Type Storage				Left +	Thru							1	1			
Critical and Follow-up H	eadway	ys	-							-	-					
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	1000			4.16				7.56	6.56	6.96		7.56	6,56	6.96
Base Follow-Up Headway (sec)		2,2	1			2.2		1		3,5	4.0	3.3	1	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, an	d Level	of Se	ervice	0.0		-	-	-				-				
Flow Rate, v (veh/h)		10				0					1				53	
Capacity, c (veh/h)		552	1			860				1	627				259	
v/c Ratio		0.02		1.1.6		0.00					0.00				0.21	
95% Queue Length, Q ₉₅ (veh)		0.1				0.0			1 33		0,0			1	0.8	
Control Delay (s/veh)		11.6				9,2		1211		1.5.1	10.8				22.5	-
Level of Service (LOS)		8				A					В				С	
Approach Delay (s/veh)		0	2			0	0,0		10,8				22,5			
Approach LOS								В				c				

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HCS100 TWSC Version 7.5 Schaad at La Christa Combined Phase 1 AM.xtw Generated: 5/24/2018 3:52:47 PM

Cto

General Information		Site Information	
Analyst	ВЈН	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	Future Geometry and Traffic Control	w/ County Proj	

Lanes



Vehicle Volumes and Adjustments

Approach		East	bnuoc			West	bound			North	bound	1	Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	10	1	2	3	4U	4	5	6		7	8	9	h. 10.	10	11	12
Number of Lanes	0	1	2	0	0	1	2	0	Fail S	0	1	0		0	1	0
Configuration		t	T	TR		L	т	TR			LTR				LTR	
Volume (veh/h)	0	24	1220	6	0	4	918	21	2	1	0	3	1	13	0	8
Percent Heavy Vehicles (%)	3	3		1.1	E	3				З	3	3		3	3	3
Proportion Time Blocked										100	1 1					
Percent Grade (%)											0		0			
Right Turn Channelized		-					-									
Median Type Storage				Left -	Thru							3	1			
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1			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	1	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, an	d Leve	of S	ervice				-			-						
Flow Rate, v (veh/h)		26				4					4		y == 1		22	
Capacity, c (veh/h)		683			T	521					253				221	
v/c Ratio		0.04			1	0.01		i			0.02				0.10	
95% Queue Length, Q ₉₅ (veh)		0.1				0,0				1000	0.1	2 1			0,3	
Control Delay (s/veh)		10.5				12.0					19.5		1		23.1	1
Level of Service (LOS)		В				В					C				C	
Approach Delay (s/veh)		0	2			0	1		19.5				23.1			
Approach LOS									C				c			

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HCS 1001 TWSC Version 7.5 Schaad at La Christa Background Phase 1 PM.xtw

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	влн	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 Contr	ol w/ County Pr	

Lanes



Vehicle Volumes and Adjustments

Approach		Easth	ound			West	bound	- 1		North	bound		Southbound			
Movement	U	Ļ	T	R	U	L	T	R	U	ι	T	R	U	L	T	R
Priority	10	1	2	3	4U	4	5	6	1	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	0					31		57
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked										12						
Percent Grade (%)														()	
Right Turn Channelized	1		_			1	٩٥						-	N	Ó	
Median Type Storage				Left -	Thru			1.1					1			
Critical and Follow-up H	eadway	ys			-											
Base Critical Headway (sec)	120	4.1			1.0									7.5	1.11	6.9
Critical Headway (sec)		4.16											-	6.86		6.96
Base Follow-Up Headway (sec)		2,2								111		0.71		3,5	1.	3.3
Follow-Up Headway (sec)		2.23												3,53		3.33
Delay, Queue Length, an	d Level	of Se	ervice													
Flow Rate, v (veh/h)		26							1 1					34		62
Capacity, c (veh/h)		585		1.10								1.000		197		452
v/c Ratio		0.04												0.17		0.14
95% Queue Length, Qss (veh)		0.1										0		0.6		0.5
Control Delay (s/veh)	1	11.4												27.1		14,2
Level of Service (LOS)		В								Ĩ.				D		В
Approach Delay (s/veh)		0	4											18	.7	
Approach LOS						-							1	(

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HCS 100 TWSC Version 7,5

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Schaad at Site Entrance Combined Phase 1 AM.xtw

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	PM Peak - Combined Phs1	Peak Hour Factor	0.92	
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25	
Project Description	Proposed Geometry and Traffic Contr	rol w/ County Pr		
Longs				-

Lanes



Vehicle Volumes and Adjustments

Approach	1	East	bound		0.00	West	bound			North	bound			South	bound	
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	1.1	10	11	12
Number of Lanes	0	1	2	0	0	0	2	1	1.17	0	0	0		1	0	1
Configuration	1.1	ι	T	2.5.1		(T	R	- 1	1				L		R
Volume (veh/h)	0	51	1236			0	950	51				1.5		37	1	22
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked						1				1.1						·
Percent Grade (%)					1.000			1			-)	
Right Turn Channelized	-	-		-		P	lo		1	1	-		8	N	0	
Median Type Storage				Left +	Thru								1			
Critical and Follow-up H	eadway	ys														
Base Critical Headway (sec)		4.1		1.1.1	1.000					1				7.5		6.9
Critical Headway (sec)		4.16									10.57			6.86		6,96
Base Follow-Up Headway (sec)	1.5.5	2.2		1-1		16.50					1.1	1		3.5		3.3
Follow-Up Headway (sec)		2.23					-							3,53		3.33
Delay, Queue Length, an	d Level	of Se	ervice								-			-		
Flow Rate, v (veh/h)		55				11.2								40		24
Capacity, c (veh/h)		631												180		501
v/c Ratio		0.09							1			1.00		0,22	1	0.05
95% Queue Length, Q ₉₅ (veh)		0.3		1										0.8		0,1
Control Delay (s/veh)		11.3						111						30.6		12.5
Level of Service (LOS)		В			120							F. N		D		В
Approach Delay (s/veh)		0	.4								-	-		23	.9	
Approach LOS								-	1				-	(

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HCS 100 TWSC Version 7.5

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Schaad at Site Entrance Combined Phase 1 PM.xtw

Lanes, Volumes, Timings 1: Schaad Road & Oak Ridge Highway

Schaad Road TIS Combined Phase 1 AM 2022 Future Geometry and Traffic Control w/ County Project, Optimzed Timing

	>		Y	1	*	*	1	Ť	r	1	+	*
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻሻ	11-	1 1	ካካ	14		ħ	*	1	7	14	
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		an a		0.850	an a construction of a state of the	0.938	an andre on an oraș
FIt 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		60	20.0		60	60	60	60	6.0	
Minimum Snlit (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	22.0	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)	95	25.0		12.5	28.0		65	16.2	16.2	78	17.5	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	45	45	5.0	4.5	
All-Red Time (s)	2.5	20		2.5	2.0		25	20	20	25	20	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	6.0	0.0	00	0.0	
Total Lost Time (s)	75	7.0		7.5	7.0		7.6	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	lan		heal	Del .		Lead	l an	0.0	heal	1.00	
Lead-Lag Ontimize?	Vae	Vos		Voe	Voe		Voc	Vac	Lay	Voc	Lay	
Vehicle Extension (s)	20	50		20	5.0		20	30	20	20	20	
Recall Mode	None	Min		Nono	0.0 Min		Nono	Nono	None	Alono	J.U Mana	
Act Effet Green (s)	Q.V	24.6		1016	27.5		24 4	15.0	15.0	24.0	17.0	
Actuated a/C Patio	0.11	0.29		12.4	0.21		6.24	10.9	10.9	24.0	0.40	
via Patio	0.01	0.20		0,14	0.01		0.24	0.10	0.10	0.27	0.19	
Control Dolov	0.00 60.4	36.9		60.7	170		10.10	22.0	10.00	0.00	0.93	
Outro Delay	00.1	0.0 0 0		0.0	47.5		40.2	0.9	12,5	0.10	40.7	
Total Dalay	0.0	0.0		0.0 50.7	17.0		10.0	0.0	0:0	0.0	0.0	
Total Delay	00.1	30.0 D		09.7 E	47,9		40.2	33.9	12.5	31.0	40.7	
LUG Approach Dalau	2	42.2		Ę	50 F		D	00.4	В	U	10.4	
Approach Delay		43.2			02.0 D			20.4			43.4	656900-865
Approach LOS	00	U		100	U 074			6	40	00	U	
Queue Length Solin (II)	00	210		122	2/4		04	00	19	88	165	
Queue Lengin Soin (II)	#100	212		#190	#421		#129	88	97	142	#263	
Internal Link Dist (tt)	170	798		000	904		470	450	000	015	392	
Turn Bay Length (ft)	1/5	000		200	700		1/0	0.10	200	245		
Base Capacity (vph)	366	986		481	/30		208	643	554	348	792	nensergeneese
Starvation Cap Reductin	0	U		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	an a
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	

Timing Plan: AM Peak Cannon & Cannon, Inc.

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 I	be longer.			

Queue shown is maximum after two cycles.

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

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	**	ት ሴ		* *	A 15		ካ	**	*	7	A 1.	
Traffic Volume (vph)	589	422	113	340	687	153	239	339	304	147	199	302
Future Volume (voh)	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	998 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 -			0.850		0.910	999999555555 1999
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 (%)	ens er sins											
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	incide in the second second
Permitted Phases							8		8	4		
Detector Phase	5	2	********	1	6		3	8	8	7	4 4	100000000000000
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	sentad da sana das par
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	16.34	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	و و د معرور میں میں دورور و مورو میں دورو	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	В	E	E	
Approach Delay		61.9		and the second states of the	80.9			53.7	andre was selected at the way		60.4	
Approach LOS		E			F.			D	0.7453-0044		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)	ang kanalang <u>kang</u> angkan	798			904	and angles of Specific Contracts	4.59999 <u>9799</u> 9499	450			392	
Jurn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	615	1415		566	850		257	497	506	216	559	194594CD-0702
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	

Timing Plan: PM Peak Cannon & Cannon, Inc.

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 I	F	
Analysis Period (min) 15			
* User Entered Value			1917 - Charles Anno 1920 - Charles Charles anno 1920 - Charles
 Volume exceeds capacity, queue is theoretically infinite. 			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be lo	nger.		
Queue shown is maximum after two cycles.			

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

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Schaad Road TIS Combined Phase 1 AM 2022 Future Geometry and Traffic Control w/ County Project, Optimized Timing

	*	-	7	1	+	*	4	1	1	\$	4	*
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	* \$		1	14	1.11	4	1	1	5	A	1
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
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
FIt 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	С		В	D		C	С	A	В	E	B
Approach Delay		26.7			33.5			16,3			36.4	
Approach LOS		C			C			В			D	
Queue Length 50th (ft)	46	133		43	191	an a	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	an dan mutan sa	and water and a star	450	weeksterne er en en er	والمروانية والمعاورين والمعاد	392	and a second reading of
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

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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



Schaad Road TIS Combined Phase 1 PM 2022 Future Geometry and Traffic Control w/ County Project, Optimized Timing

	1	+	Y	*	-	*	*	1	1	5	÷.	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	15	朴族		*	朴族		×	4	1	5	4	*
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	i nije na time water zamer	0,982	a o, manufanas nijaran	a e tal de la factoria	0.987	angal (n. 17. general Jacob an	and to a first of plants parts		0.850	na oo sana dahara dahara dah	on a control de l'estador de	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	3493	0	1770	1863	1583	1770	1863	1583
Fit 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	ageneraça menaran dan mananan içim i	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	a spin million so spin a da a stana	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	В	D		D	С		Ç	E	В	С	E	A
Approach Delay		35.2			30.4			37.2	a posta de contra de contra de	september of the sector of the	32.6	
Approach LOS		D			C	i den		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	and and a start of the start of		392	Constant Solor Press
Turn Bay Length (ft)	130			275			115		230	110		175
Base Capacity (vph)	461	1212	an a	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

Timing Plan: PM Peak Cannon & Cannon, Inc.

Intersection Summary					
Cycle Length: 90					
Actuated Cycle Length	: 86.2				
Natural Cycle: 90					
Control Type: Actuated	I-Uncoordinated				
Maximum v/c Ratio: 0.9	91				
Intersection Signal Del	ay: 33.9	Intersection LO	S: C		
Intersection Capacity L	Itilization 86.5%	ICU Level of Se	rvice E		
Analysis Period (min) 1	15				
 * User Entered Value 		an a			
# 95th percentile volu	ime exceeds capacity, queue	may be longer.			
Queue shown is ma	iximum after two cycles.				
Splits and Phases: 3	i: Pleasant Ridge Road & Sch	haad Road			
\$ Ø1	Ø2		1 Ø3	104	
10.23					
frø5		-	1 Ø7	Øs	
19.5				224	

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	7	朴朴	个个	1	5	7
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	a en al la construction de la Const La construction de la Construction d	en e	arean an a	0.850	ann a an air an	0.850
Flt Protected	0.950				0.950	
Satd, Flow (prof)	1770	3539	3539	1583	1770	1583
Elt Permitted	0 159				0.950	
Satd Flow (perm)	296	3539	3539	1583	1770	1583
Sald Flow (PTOP)	200	0000	0003	7		69
Dook Hour Englar	0.02	0.02	0.02	0.02	0.02	0.02
Chorod Lano Troffic (0/)	0.92	0.92	0.92	0.92	0.92	0.92
Sindled Lane Hallid (%)	00	750	4400	7	'ni	00
Lane Group How (vpn)	20	/55	1100	/	- 54 	- 62 - D
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2	and the second second second	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	40	4.0	40
All-Red Time (s)	20	2.0	20	2.0	20	20
Lost Timo Adjust (s)	2.0 0.0	0.0	0.0	0.0	0.0	2.V 0.0
Total Loat Time (a)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	0.0	0,U	0,0	0.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes	ana ang ang katalana.	Yes	Yes	an sa	
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 Delav	4.2	4.1	7.6	5.0	20.1	8.6
IOS	A	A	A	A	C	A
Approach Delay		41	76	1.1	127	
Approach LOS		Δ	Δ		12.1 R	
Ouque Longth 50th (ff)	2	л 49	۳ ۵۵	0	Q	0
Queue Length Solit (ii)	0	40 74	00	U C	0	U OD
Gueue Length Soln (II)	0.	700	230	D	20	20
Internal Link Dist (ft)	000	199	904	000	392	000
Turn Bay Length (It)	200	8486	0510	200	005	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

Timing Plan: AM Peak Cannon & Cannon, Inc.

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



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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	7	个个	个个	7	N.	7
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		Ma planding in		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+nf	NA	NA	Perm	Prot	Perm
Protected Phases	1 1	6	2	a witu s	4	
Permitted Phases	A A	U	<i>L</i>	2	т	Δ
Detector Phase	4	3	2	2	Λ	4
Switch Dises	1	U	4	2	4	4
Owich Flidse	60	15.0	150	15.0	0.0	0.0
winimum initial (S)	0.0 40 F	10,0	15,0	10.0	0.0	0.0
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	and the second second	
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 o/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	A 2	5.1	11.1	30	21.5	10.0
Ounuo Dolov	4.4	0.1	0.0	0.0	0.0	0.0
Tatal Dalay	0.0	U.U E 1	14.1	0.0	0.0 04 E	10.0
Total Delay	4.2	D, 1	11.1	5.9	21.5	10.9
LUS	A	A	B	A	47.5	В
Approach Delay		5.1	10.7		17.5	
Approach LOS		A	В		В	
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

Timing Plan: PM Peak Cannon & Cannon, Inc.

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



Lanes, Volumes, Timings 1: Schaad Road & Oak Ridge Highway

Schaad Road TIS Background Phase 2 AM 2024 Future Geometry and Traffic Control w/ County Project, Existing Timing

	*	->	Y	*	+-	A	1	1	1	1	¥	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	45		ሻሻ	↑ ↑→		ħ	**	*	×.	44	
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	o Construction and a state of the state of the	0.974	and Control of the State of the	-Charles and an and a second	0.977	and the second	Warner all an oan dae	a na sana sa	0.850	an hai perinta dan kerangkan dari	0.926	a series and the first of
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
Fit 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	timente da est
Permitted Phases							8		8	4		
Detector Phase	5	2	dan garakan sa karas	1	6		3	8	8	7	4	energi tekni jareke
Switch Phase												
Minimum Initial (s)	6.0	20.0		6.0	20.0		6.0	6.0	6.0	6.0	6.0	ACCHECKING
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	h Mediya Berta Balan Astron	32.5	62.0		22.5	31.5	31.5	22.5	31.5	eteri merenderi d
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	ani na mana kao amin'ny fisiana. N	7.5	6.5	6.5	7.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lad		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	99660-00-00-00-00-00-00-00-00-00-00-00-00-
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	al na sua ang ang ang ang ang ang ang ang ang an
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	0	65.1	47.2		52.2	49.0	9.9	39.4	93,1	ballen else de antre gran
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	and soldared on serial	65.1	47.2	accordents de certo staro	52.2	49.0	9.9	39.4	93.1	no na mana ang ang ang ang ang ang ang ang ang
LOS	E	D		Е	D		D	D	A	D	F	
Approach Delay		47.9			54.1			30.2			82.4	
Approach LOS		D			D			С			F	
Queue Length 50th (ft)	126	311	an a	179	401	n an	98	83	0	125	~353	and designed of the
Queue Length 95th (ft)	187	394		257	545		#187	136	85	220	#557	
Internal Link Dist (ft)	en an	798	en men oan de recebieren en	 Investorations 	904		an a	450	n an an a' a' an	n tradicional de la completada	392	
Turn Bay Length (ft)	175			200			170		200	245		
Base Capacity (vph)	683	1520		683	1015		267	704	615	418	765	w ochoristich
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	Ō	weeksteeringen (1995)
Storage Cap Reductn	0	Ó		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	

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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Intersection Summary			
Cycle Length: 148.5			
Actuated Cycle Length: 127.7			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.07			2 0 10 1
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 lo	iger.		
Queue shown is maximum after two cycles.			
Colline and Disease 4. Octored Deed 9. Oct. Dideo Liteburge			
Splits and Phases; 1: Schaad Road & Oak Ridge Highway			
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Lanes, Volumes, Timings 1: Schaad Road & Oak Ridge Highway

Schaad Road TIS Background Phase 2 PM 2024 Future Geometry and Traffic Control w/ County Project, Existing Timing

	1	-+	~	+	+	*	1	1	1	6	ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	* [>		ሻሻ	作品		7	^	1	- 7	朴臣	-
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	a na sa santa ng panananana	0.969			0,974			a na mangang sa sa sa	0.850	anna active occhrodiger	0.909	and the second s
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3429	0	3433	2286	0	1770	3539	1583	1770	3217	0
FIt 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	an an ing ang ang ang ang ang ang ang ang ang a	7	4	an a
Permitted Phases							8		8	4		
Detector Phase	5	2	********	1	6	en de la desta de la desta Nota de la desta	3	8	8	7	4	ener ortooriene av
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	alan anan sinanan	22.5	31.5	31.5	22.5	31.5	odalah generalakan
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	an a	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	and the second second
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	and the second second
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	an a tha a tha an	None	None	None	None	None	a service account of the
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	menera foran ereger	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	С		E	F		F	E	В	D	D	
Approach Delay		71.9			88.3			69.0			48.7	here and a second second second
Approach LOS		E			F			Е			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	Ó	0	and the second control of	0	0		0	0	0	0	0	and a discount
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	

Timing Plan: PM Peak Cannon & Cannon, Inc.

Intersection Summary				
Cycle Length: 148.5				
Actuated Cycle Length: 144			g Sterard in th	
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 infinit	e,			
Queue shown is maximum after two cycles.				
# 95th percentile volume exceeds capacity, queue may I	be longer.			
Queue shown is maximum after two cycles.				
Splits and Phases: 1: Schaad Road & Oak Ridge Highw	/ay			
		al.		

V Ø1		N Ø3	♦ Ø4
32.5 9	F23	22.65	
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\$2.5 g	528		1458

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Schaad Road TIS Background Phase 2 AM 2024 Future Geometry and Traffic Control w/ County Project, Existing Timing

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ħ	*5		1	14		ħ	*	7	¥	*	*
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	an a	0.981	SUCCESSION (DOWN	Terrangan kerangan se	0.985	anna an taona an taon Taona an taona an taon	900999497-78499 1	9999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	0.850	24 7 ,7.2	n dan sekara karangan Karangan	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
Fit Permitted	0.146			0.273			0 197	1000	1000	0.644	1000	1000
Satd Flow (perm)	272	3472	0	509	3486	0	367	1863	1583	1200	1863	1583
Satd, Flow (RTOR)		8			6				182		1000	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 (%)	0101				0101	0.01	0101	0.01	0.01	0.01	0.01	0.01
Lane Group Flow (vph)	158	595	0	157	817	0	166	180	182	29	413	323
Turn Type	nm+nt	NA		pm+pt	NA		om+pt	NA	nmtov	nm+nt	NA	nm+ov
Protected Phases	рш р. 1	6		5	2		7	4	5	3	8	1
Permitted Phases	6	Č.		2	-		4		Å	8		8
Detector Phase	1	6		5	2		7	4	5	3	8	1
Switch Phase					-			7		· · · · ·	Ŷ	1
Minimum Initial (s)	80	12.0		80	12.0		80	10.0	80	80	10.0	80
Minimum Solit (s)	13.5	18.0		13.5	18.0		19.5	16.0	19.5	13.5	16.0	19.5
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%	20.0%	18 /0%	21.0%	20.0%	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
Vellow Time (s)	4.0	4.5		4.0	4.5		4.0	4.5	10	4.0	15	4.0
All-Red Time (s)	15	15		1.0	1.5		15	1.0	15	1.5	1.5	4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	1.0
Total Lost Time (s)	0.0 5.5	6.0		5.5	6.0 6.0		55	6.0	0.0 6.5	5.5	0.0 6.0	5.5
Lead/Lea	heel	l an		beal	Lan		beel	0.0	Leod	beol	0.0	bcol
Lead-Lag Ontimize?	Vee	Vae		Ves	Vas		Vae	Vae	Voc	Voc	Voc	Voc
Vehicle Eviension (s)	30	103		30	4.0		3.0	30	3.0	30	3.0	3.0
Recall Mode	None	Min		None	Min		None	None	Nono	Nono	None	Nono
Act Effet Green (s)	54.2	40.2		55.6	40.0		61 7	53.0	7/ /	150	36.0	56.8
Actuated a/C Ratio	0.40	0.30		0.42	A0.0		0.46	0.40	0.56	40.0	0.28	0.42
We Ratio	0.40	0.50		0.42	0.77		0.40	0.40	0.00	0.04	0.20	0.44
Control Delay	3/1 1	126		28.2	18 7		0.40	30.0	3.0	23.8	60.3	10.41
Queue Delay	0.0	0.0		0.0	0.7		0.0	00.0	0.0	20.0	00.0	0.0
Total Delay	2/11	12.6		28.2	18.7		27.2	20.0	3.0	23.8	60.3	12.8
IOS	04.1	42.0 D		20.2	40.7 D		21.2 C	00.0	J.U A	20.0	00.5 E	12.0
Approach Dolay	0	10.8		U.	15 A		v	20.1	n.	v	38.8	D
Approach LOS		40.0 D			-10.4 D			20.1			J0.0	
Oueue Length 50th /ft)	80	225		80	330		83	110	0	13	320	70
Queue Length 05th (ft)	169	26/		167	504		162	201	10	20	523	170
Internal Link Diet (ff)	100	708		IVI	004		100	450	HU		202	03
Turn Roy Longth (ft)	120	100		975	304		115	400	220	110	552	175
Reco Consoity (uph)	100	1504		576	1503		653	704	1140	708	700	067
Staruation Can Doduate	410 A	1004		020	1000		000	194	1140	100	120	907
Spillback Con Doducto	0	U D		v n	0 N		0	U	0	0	U	U
Storogo Con Poductn	0	0		U A	Ų A		0	U O	0	0	0	0 d
Deduced via Datio	0.22	0.40		0.30	0.54		0.30	0.00	0.46	0.04	0.57	0 22
Meduced we reallo	0.00	0.40		0.30	0.04		0.50	0.23	0.10	0.04	0.57	0.55

Timing Plan: AM Peak Cannon & Cannon, Inc.

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

₽ Ø1	Ø2	1 Ø3	Ø4
94.5 s	61.s	40.5.s	<u> </u>
føs:		1 Ø7	↓ Ø8
3652.5	(61-3)	146.653	56×9-

Schaad Road TIS Background Phase 2 PM 2024 Future Geometry and Traffic Control w/ County Project, Existing Timing

	×	+	Y	*	+		1	1	1	4	÷.	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	3	44	1 1	η	14		5	1	*	*	4	7
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
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3476	0	1770	3490	0	1770	1863	1583	1770	1863	1583
Fit 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	and a function of the second	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	a manakan kata kara kara ka	30.0	55.0	a neo mante a strata de	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	С		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	and the second	419	1596	and the part of the second	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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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 i	may be longer.	
Queue shown is maximum after two cycles.		

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

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€ Ø5		N Ø7	Ø8
35.30	61-ss	A9/5-8	56.e

HCS7 Two-Way Stop-Control Report								
General Information		Site Information						
Analyst	вјн	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 and the second presented	2024	North/South Street	La Christa Way					
Time Analyzed	AM Peak - Background 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



Eastbound Westbound Northbound Approach U L Т R U L Т R U L T R U Movement 3 7 1U 1 2 4U 4 5 6 8 9 Priority Number of Lanes 0 1 2 0 0 1 2 0 0 1 0 L Т ΤR L т TR LTR Configuration 9 0 1129 0 0 Volume (veh/h) 0 678 1 0 0 1 3 3 3 3 3 3 3 Percent Heavy Vehicles (%) **Proportion Time Blocked** Percent Grade (%) 0

Right Turn Channelized	19999												1999	<u>Salada</u>		(anda)
Median Type Storage				Left -	+ Thru								1			
Critical and Follow-up He	adwa	ys														
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	1999-1	81933) (1993)		4.16				7,56	6.56	6.96	강물통을	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			1941 - 1941 - 1942 - 1944 - 1945 - 1945	2.23	1999 - 1993 NGC 1997 - 1997 NGC 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1	SRAME.		3.53	4.03	3,33		3.53	4.03	3,33
Delay, Queue Length, and	Leve	l of Se	ervice													
Flow Rate, v (veh/h)		10				0					1				54	
Capacity, c (veh/h)		558		888 <u>8</u>		857			- 83887		625				264	
v/c Ratio		0.02				0.00					0.00				0.21	
95% Queue Length, Q ₉₅ (veh)		0.1		1233		0.0	1993,993		<u>Habba</u>		0.0	ANNE.			0.8	
Control Delay (s/veh)		11.6				9.2					10.8				22.1	
Level of Service (LOS)		В				A					В				С	
Approach Delay (s/veh)		0	.2			0	.0			10).8			22	2.1	
Approach LOS											3				c.330	

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Vehicle Volumes and Adjustments

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Southbound

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Schaad at La Christa Background Phase 2 AM.xtw

HCS7 Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	ВЈН	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							





Vehicle Volumes and Adju	istme	nts														
Approach		Eastk	ound			West	bound			North	bound			South	bound	
Movement	U	State State	Т	R	U	NL'S	F r a	R	ਿੱਚ ਤੋ	STAR.	T	R	U	9 1 8	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9	1	10	11	12
Number of Lanes	0	1	2	0	0	3 1 ,8	2	0		0	目的	0		0	S I R	0
Configuration		L	Т	TR		L	Т	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			2039) (VENS				
Percent Grade (%)										i	0				0	
Right Turn Channelized	지구하		00 es es												NEE S	
Median Type Storage				Left ⊣	- Thru								1			
Critical and Follow-up He	adwa	ys														
8ase Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16	1999 B.			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	Leve	l of Se	ervice													
Flow Rate, v (veh/h)		27				5					4				23	
Capacity, c (veh/h)		673				523					253		10575	10.63	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				and the second	19.5				23.9	
Level of Service (LOS)		В				В					С				С	
Approach Delay (s/veh)	0.2					0	.1		19.5				23.9			
Approach LOS										6						

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Lanes, Volumes, Timings 1: Schaad Road & Oak Ridge Highway

Schaad Road TIS Combined Phase 2 AM 2024 Future Geometry and Traffic Control w/ County Project, Optimized Timing

	×	->	Y	1	-	*	4	1	1	1	÷.	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	ŚBR
Lane Configurations	55	AT.		竹竹	*1.		ħ	44	1	ħ	Ab	
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		o a serie della debartenaritete	a ser de la fille fille de la fille de la fille	0.850		0.925	and the second second
Fit 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	Con Transit Scheder Lagrance	3	8	ana an canadaranja ak	7	4	
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	adher and a set of sectors
Switch Phase												
Minimum Initial (s)	6.0	20.0		6,0	20.0		6.0	6.0	6.0	6.0	6.0	Anonce of the second second
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	an a	21.4	36.1	a na	14.1	25.5	25.5	19.0	30.4	Burldon of a second of a
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	and a subserve who ever	13.9	29.1		6.6	19.0	19.0	11.5	23.9	and a second
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	transferration and the
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	В	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	a fundamentaria	477	675		187	688	587	400	963	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		Q	0		0	Ô	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	

Timing Plan: AM Peak

Cannon & Cannon, Inc.

Intersection Summary					
Cycle Length: 100					
Actuated Cycle Length: 10	00				
Natural Cycle: 110					an i na na na ini na na ini na na ini na
Control Type: Actuated-Ur	ncoordinated				
Maximum v/c Ratio: 1.04					
Intersection Signal Delay:	56.9	Intersect	ion LOS: E		
Intersection Capacity Utiliz	zation 88.0%	ICU Leve	el of Service E		
Analysis Period (min) 15					
* User Entered Value					
 Volume exceeds capa 	city, queue is theoreticall	/ infinite.			
Queue shown is maxim	num after two cycles.				
# 95th percentile volume	e exceeds capacity, queu	e may be longer.			
Queue shown is maxim	rum after two cycles.				
0 10 10 10	1 10 10 0 101	40.4			
Splits and Phases: 1: Se	chaad Road & Oak Ridge	Highway			
601			1	- Maria	



	×.		V	¥	-		1	†	1	1	↓ I	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ካካ	≜ ‡		15	ተኩ	1.0	ካ	木木	1	ካ	ተኩ	
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	n na senten en proporte de la serie de
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
Fit 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	1
Permitted Phases							8		8	4		
Detector Phase	5	2		1	6		3	8	8	7	4	aldening standards
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	40000000000000
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	6 6 6 8	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	11 - d - 111 h 1-1	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	В	s ≤ F	F	
Approach Delay	a new partners and the transfer of the second s	93.4		11.000 C 1 110.000 C 141 111 111 111 111	99.2			69.0			97.8	
Approach LOS	66688	F			s 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	ene fan same de finse mentes	559	870		234	568	536	195	610	100.0100.000
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	

Timing Plan: PM Peak Cannon & Cannon, Inc.

Intersection Summary			
Cycle Length: 140			
Actuated Cycle Length: 140			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Intersection Signal Delay 90.4	Intersection LOS: F		
Intersection Capacity Utilization 100.4%	ICU Level of Service (3	
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

V Ø1		Ø 3	∀ [®] Ø4
30/31-9	(2) (2) 8	22.5	2015
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245	film	17.8	

Schaad Road TIS Combined Phase 2 AM 2024 Future Geometry and Traffic Control w/ County Project, Optimized Timing

	1		V	*	-	*	4	1	1	1	+	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ħ	^		3	ተኩ		×.	*	1	ሻ	*	1
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	an or her her her her her her her her her he	and a state of the	0.985	n en fals de sala de la falsifia de la	A STOLEN DE MAR DANS DES LA COMPANY	or and the second s	0.850	an karana sejakanan	and a fact of the state of the st	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3472	0	1770	3486	0	1770	1863	1583	1770	1863	1583
Fit 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	111000000000000000000000000000000000000	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	- 175 Met 1999 -	21.8	44.6		24.5	22.5	3.0	14.1	55.8	12.5
LOS	C	С		C	D	84916848	С	C	A	В	E	В
Approach Delay		30.6			41.0			16.5			35.6	
Approach LOS		С			D		Server of the	В			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)	in an	798		an a	904	and for a second second		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	Û		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	Q		0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.73		0.55	0.92	2	0.59	0.28	0.20	0.06	0.88	0.45

Timing Plan: AM Peak Cannon & Cannon, Inc.

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

P @1	1 02	1 03	1 04
13.3.5	20,7 g.	ALS .	逛雨
\$ P@5		107	ØS
18.6.2	26.36	135	10.00 m
Lanes, Volumes, Timings 3: Pleasant Ridge Road & Schaad Road

Schaad Road TIS Combined Phase 2 PM 2024 Future Geometry and Traffic Control w/ County Project, Optimized Timing

* WBL WBT EBL EBR WBR NBT NBR SBL SBT SBR Lane Group EBT NBL 朴 **ň** 114 **↑** 316 仰 7 ۴ Lane Configurations ħ ħ h 7 294 146 307 714 60 368 64 290 317 Traffic Volume (vph) 1048 Future Volume (vph) 294 1048 146 307 714 60 114 316 368 290 317 64 1.00 *0.95 Lane Util. Factor 1.00 0.95 0.95 0.95 1.00 1.00 1.00 1.00 1.00 1.00 0.988 Frt 0.982 0.850 0.850 0.950 **FIt Protected** 0.950 0.950 0.950 Satd. Flow (prot) 1770 0 3497 0 1770 1583 3476 1770 1863 1770 1863 1583 0.250 **FIt Permitted** 0.177 0.140 0.278 3476 0 3497 0 466 1863 1583 1863 1583 Satd. Flow (perm) 330 261 518 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 NA NA NA pm+ov NA pm+pt pm+pt pm+pt pm+pt pm+ov **Protected Phases** 6 5 2 7 4 5 3 8 1 1 Permitted Phases 6 4 4 8 2 8 2 **Detector Phase** 1 6 5 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 22.0 21.8 13.5 24.2% 40.0% 20.6% 36.3% 15.0% Total Split (%) 24.4% 20.6% 15.0% 24.4% 24.2% Maximum Green (s) 30.0 26.7 16.3 13.0 8.0 16.0 13.0 8.0 16.0 16.3 4.5 Yellow Time (s) 4.0 4.5 4.0 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 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Lost Time Adjust (s) 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 Lead/Lag Lead Lag Lead Lead Lead Lead Lag Lag Lag Lead-Lag Optimize? 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 Min None Min None None None None None None None 42.1 44.9 30.0 28.6 25.5 18.6 36.3 Act Effct Green (s) 37.6 24.4 15.9 Actuated g/C Ratio 0.50 0.33 0.47 0.32 0.28 0.21 0.40 0.42 0.27 0.18 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 0.0 Queue Delay 0.0 0.0 0.0 0,0 0.0 0.0 0.0 0.0 0.0 **Total Delay** 29.4 60.9 31.7 28.6 58.6 15.2 70.5 74.7 23.9 14.8 LOS C E С С Ε В С E Ε В Approach Delay 65.8 40.0 34.3 39.7 E D Ç Approach LOS D ~411 215 170 Queue Length 50th (ft) 90 132 48 189 98 26 83 Queue Length 95th (ft) #187 #544 #298 287 89 #359 185 56 #322 154 904 Internal Link Dist (ft) 798 450 392 Turn Bay Length (ft) 130 275 115 230 110 175 1120 386 Base Capacity (vph) 432 1171 340 248 747 252 331 735 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 0.72 Reduced v/c Ratio 0.71 1.06 0.94 0.48 0.85 0.51 0.27 0.91 0.45

Timing Plan: PM Peak Cannon & Cannon, Inc.

10/15/05

Intersection Summary										
Cycle Length: 90										
Actuated Cycle Length: 89.9										
Natural Cycle: 90										
Control Type: Actuated-Uncoord	inated									
Maximum v/c Ratio: 1.06										
Intersection Signal Delay: 48.3		Intersection L	DS: D							
Intersection Capacity Utilization 9	93.1%	ICU Level of S	ICU Level of Service F							
Analysis Period (min) 15										
* User Entered Value			- 11	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	and a state of the					
 Volume exceeds capacity, qui 	leue is theoretically in	finite.								
Queue shown is maximum af	er two cycles.	ан у сул анцу ну на разли и у уздани содора. (1970-1971) и основности содора								
# 95th percentile volume excee	ids capacity, queue m	iay be longer.								
Queue shown is maximum aff	er two cycles.									
Splits and Phases: 3: Pleasan	t Ridge Road & Schaa	ad Road								
9 _{Ø1}	Ø2		03	↑ 1 Ø4						
218.5	22.75		100045	224						
105 -	1 26		1 Ø7	Ø8						

Lanes, Volumes, Timings 4: Schaad Road & East Site Entrance

Schaad Road TIS Combined Phase 2 AM 2024 Future Geometry and Traffic Control w/ County Project, Optimized Timing

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations	×	**	个个	1	1	1	
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	and the second	and an	CONTRA MILLION AND	0.850	(all and the desired)	0.850	
Fit 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	ana na sing si na sing si sa sing si	
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	40	4.0	4.0	40	4.0	
All-Red Time (s)	2.0	20	20	20	20	20	
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	60	
Lead/Lag	heal	0,0	lan	lan	0.0	0.0	
Lead-Lag Ontimize?	Vee		Veg	Yee			
Vehicle Extension (s)	3.0	40	4.0	40	3.0	2.0	
Recall Mode	None	Min	Min	Min	None	None	
Act Effet Green (s)	34.2	35.0	31.6	31.6	8 2	83	
Actuated a/C Ratio	0.67	03.5	0.10	0.10	0.5	0.16	
vic Ratio	0.07	0.21	0.02	0.02	0.10	0.10	
Control Delay	0,12	10.01	11.0	10	0.20 0/ 7	0,17	
Oucue Dolm	4.4 0.0	4.0	0.0	4.2	24.7	9.0 0.0	
Total Delay	0.0	1.0	11 0	0.0	24.7	0.0	
LOC	4,4 A	4.0 A	11.Z	4,Z	24.1	9.0 A	
LUO Approach Dolou	A	A	14 D	A	10.0	A	
Approach Delay		4.0	11.0		10.9		
Approach LUS	,	A	100	0	B	0	
Queue Length 50th (ft)	4	50	100	0	19	0	
Queue Length 95th (ft)	12	13	268	12	62	26	
Internal Link Dist (ft)	000	798	904	000	392	000	
Turn Bay Length (tt)	200	0000	0400	200	000	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	

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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



Lanes, Volumes, Timings 4: Schaad Road & East Site Entrance

Lane Group	EBL	EBT	WBT.	WBR	SBL	SBR
Lane Configurations	ň	个个	个个	1	7	7
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
Fri	and a start of the		- Construction (Construction)	0.850		0.850
Fit Protected	0.950				0.950	
Satd, Flow (prot)	1770	3539	3539	1583	1770	1583
FIt 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 (vnh)	57	1439	1301	171	178	36
Turn Type	pm+nt	NA	NA	Perm	Prot	Perm
Protected Phases		6	2	en sonnes	4	a sem
Permitted Phases	6	v	E.	2	т.	Δ
Detector Phase	1	6	2	2	4	т Д
Switch Phase	1	U	4	2	7	۳
Minimum Initial (a)	6.0	15.0	15.0	15.0	8.0	80
Minimum anudi (5)	0.0 3.0 k	0.61	24.0	24.0	0.0	0.0
Tatal Calit (a)	13.0	21.0	21.0	21.0	14,0	14.0
Total Split (S)	13.3	40.0	51.0	01.0 E0 E0/	10.0	10.0
Total Split (%)	22.5%	75.0%	02.5%	02.0%	25.0%	25.0%
Maximum Green (s)	1.5	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	53	8.0	16.1	27	37.1	10.3
IOS	Δ	Δ	R	A	D	R
Approach Delay		79	14.5	11	32.6	Bod
Approach LOS		Δ	R		C.	
Oueue Length 50th (ft)	6	132	204	٥	08	Ô
Queue Length O5th (ff)	16	192	#226	28	#1/0	21
Internal Link Diet (ff)	10	709	000 0 100	20	200	21
Turn Poul oneth (ft)	200	190	504	200	292	200
Page Canacity (m)	200	2440	1001	200	970	200
Dase Capacity (Vpn)	339	2410	1001	009	2/0	200
Starvation Gap Reductin	U	U	U	U	U	U
Spillback Cap Reductn	0	Û	0	U	U	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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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		a character de la service de la constituir de la service de
* User Entered Value		
# 95th percentile volume exceeds capacity, queue ma	ay be longer.	
Queue shown is maximum after two cycles.		
Splits and Phases: 4: Schaad Road & East Site Entra	ance	



Lanes, Volumes, Timings 1: Schaad Road & Oak Ridge Highway

Schaad Road TIS Combined Phase 2 AM 2024 Future Geometry and Traffic Control w/ County Project, Existing Timing

	٨	undju.	Y	*	+	~	1	1	1	1	+	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ካካ	14		ሻሻ	Ab		ħ	44	7	×,	A14	
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	and a first of the second of the second s	0.974	an a		0.972	na ana ang kana ang k	and the second secon		0.850	an de la communitation de la company	0.925	en e
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3447	0	3433	2281	0	1770	3539	1583	1770	3274	0
Fit 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	NATIONAL COMPLEXION	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	a contra a contra contra de la
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	and the second second	56,5	53.8	10.7	50.3	195.5	Real-Structures
LOS	E	D		E	D		E	D	В	D	F	
Approach Delay		48.8			58.1			34.4			166.6	
Approach LOS	1	D			E			C			F	
Queue Length 50th (ft)	1/8	319		196	452		110	119	2	175	~574	organization advect
Queue Length 95th (ft)	236	394		260	594		#187-	1/2	88	#276	#/3/	
Internal Link Dist (ft)	170	798		000	904		170	450	050	C 1 P	392	
Turn Bay Length (ft)	1/5	4447		200	0.57		1/0	070	200	245	704	
Base Capacity (vph)	650	144/		650	957		254	670	602	360	739	
Starvation Cap Reductn	0	0		U	0		0	0	0	0	0	
Spinback Cap Reductin	0	U		U	U		0	0	U	U	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	

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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

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Ø5	Ø6	7 Ø7	<u>```</u> `@8
3/2/53	62.8	1928 S.S.	(19) (19)

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ካካ	^		ኻኻ	ትኩ		ካ	个个	ř	ሻ	ላሴ	
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			a tanàna 2005, kaominina dia kaominina dia kaominina dia kaominina dia kaominina dia kaominina dia kaominina d	0.850	tere strend or stad of best strends of se	0.907	a new provinsi provinsi pri
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	9 69 89 69		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									98 29 2 9 3			
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	6.6.6	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	1910 Tana Kamatan Jawa
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	ang
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	ananamana manan	74.3	117.4		155.9	66.7	10.6	61.3	57.4	Antionadore bien
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0,0	0.0	0.0	
I otal Delay	200.6	32.0		/4.3	117.4		155.9	66.7	10.6	61.3	57.4	
LOS	F S	C		E			F	E	B	E	E	
Approach Delay		126.3			105.5			71.7			58.3	
Approach LOS		ALC:			-			E			E	
Queue Length 50th (ft)	~494	212		183	~8/4		~262	211	0	144	220	
Queue Length 95th (ft)	#624	282		233	#1084		#453	273	94	#231	#327	
Internal Link Dist (ft)	1-70	798		000	904		270	450		A /	392	
Turn Bay Length (ft)	1/5	4400		200	050		1/0	004	200	245	710	
Base Capacity (vpn)	582	1408		582	859		228	601	547	260	/42	95365669
Starvation Cap Reductin	U	U ^		Ű	U		U	U	U	Û	Ű	
Spillback Cap Reductin	U	U		U	U		U	U	U	U	0	
Storage Cap Reductin	4 00	0.40		0.04	A A A		U	0.70	U	0	0	
Reduced V/C Ratio	1.32	0.43		0.64	1,14		1.18	0.72	0.61	0.74	0.89	

Timing Plan: PM Peak Cannon & Cannon, Inc.

Intersection Summary				
Cycle Length: 148.5				
Actuated Cycle Length: 147.2				
Natural Cycle: 150				
Control Type: Actuated-Uncoc	ordinated			
Maximum v/c Ratio: 1.32				
Intersection Signal Delay: 95.4	1	Intersection LOS: F		
Intersection Capacity Utilization	n 100.4%	ICU Level of Service	G	
Analysis Period (min) 15				
* User Entered Value				
 Volume exceeds capacity, 	queue is theoretically infi	nite,		
Queue shown is maximum	after two cycles.			
# 95th percentile volume exc	ceeds capacity, queue ma	iy be longer.		
Queue shown is maximum	after two cycles.			
		100		
Splits and Phases: 1: Schar	ad Road & Oak Ridge Hig	hway	-	
61			1 03	

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和為這		9265	39.55
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Ø5	Ø6	* Ø7	1Ø8
12.53	523	22/53	31.55

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ትኩ		h	朴际		7	*	1	7	*	*
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		lan ya shekara ka k	an a	0.850		an da anna an tha ann an th	0.850
FIt 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	Nacad III (1966) (1968) and	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	anta da anta anta anta anta anta anta an	29.7	51.6	2011/06/26/17/05/20/26/20	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	0		C	U		C	C	A	C	E	В
Approach Delay		42.9	reserverses.		48.2			21.3			41.0	
Approach LOS	07				U 000			U C			D	
Queue Length 50th (ft)	97	2/4		83	363		91 470	116	0	14	349	88
Queue Length 95th (ft)	190	41/		198	561		1/3	211	41	40	597	201
Internal Link Dist (It)	100	798		075	904		440	450	000	240	392	
Turn Bay Length (ft)	130	4450		2/0	1115		= 11b	770	230	110	700	
Dase Capacity (Vph)	404	1409		503	1445		533	//b	1120	090	700	942
Starvation Cap Reducth	U	U A		U	U		U	V	U	U	U ^	Ň
Spinback Cap Reducth	V	U		U A	U		U	U	U	U	U	U o
Sionage Gap Reductin	U 0 40	0.47		0.24	0 E0		0.00	0	0.40	0	0.50	- U
Venncen Mc Latio	0.40	U.47		0.01	0.00		U.3Z	0.23	V. 10	0.04	0.98	0.35

Timing Plan: AM Peak Cannon & Cannon, Inc.

ersection Summary	
cle Length: 193	
uated Cycle Length: 139.4	
tural Cycle: 80	
ntrol Type: Actuated-Uncoordinated	
ximum v/c Ratio: 0.82	
Intersection Signal Delay: 40.5 Intersection LOS: D	
Insection Capacity Offiziation 78.3% ICO Level of Service D	
ayoo ronou (min) 10 User Entered Value	

User Entered Value

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

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35.5.5	61.n	40.5 s	58.6.
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35,5 2	ida -	10.456	Hire

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	<u>^</u>		শ	朴臣		ħ	*	7	ሻ	Ť	7
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	an ngana ngana na katalan pangangan pangan	0.982		na sana sang sang sang sang sang sang sa	0.988				0.850	energen et en	an a	0.850
Fit 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	09 60 59 0		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	940 0000 000 000 M0 D400.	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
Lotal Lost Lime (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
Venicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0	3,0	3.0	3.0	3.0
	None	IVIIN			IVIIN CO O		None	None	None		NONE	INONE
Act Elici Green (S)	00.0	0.02		00.0	00.0		40.0	0.00	09.2	39.0	29.0	00.7
	0.00	0.37		0.09	0.40		0.51	0.22	0.40	0.20	0.20	0.40
Control Dolov	0.07	0.80 67 1		50.0U	20.00		44.2	0.01 71 7	0.43 7 1	20.9	77.0	0.42
Outron Delay	24.0	07.1		09.2	0.0		44,Z	00	0.1	39.0 0.0	11.9	9.0 0.0
Total Delay	0,0 24 6	67.1		50.0	20.7		44.2	71 7	0.0 7 1	20 S	77 0	0,0
I O S	24.0			55.2 E	00.7 D		44.Z	/ 1./	Δ	00.0	11.0 E	3.0
Approach Delay	v	58.7		L.	453		U	38.0		U.	42 N	ν
Approach LOS		50.1 F			-10.0 D			00.0			τ2.0 Π	
Oueue Length 50th (ff)	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)	611	798		and the first first second	904		100	450		an a	392	199
Turn Bay Length (ff)	130			275			115		230	110		175
Base Capacity (vnh)	517	1274		400	1396		443	618	889	451	618	824
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	an taga si	0 0	0		Õ	оналастика О	0	Ō	0	0
Storage Cap Reductn	0	0		0	0		0	0	Ō	0	0	Ō
Reduced v/c Ratio	0.59	0.98	uu aagu aan tarta 1996.	0.80	0.58		0.27	0.53	0.43	0.15	0.49	0.40

Timing Plan: PM Peak Cannon & Cannon, Inc.

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 Serv	rice 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

2 Ø1	🐐 Ø2	1 03	Ø4
38.5 s	01.8	90/5 g	60 g
1 05		1 Ø7	Ø8
29.5	Film	40.5 s	HE IS

General Information		Site Information	
Analyst		Interaction	Cobood at Lo Christo
Analyst	BJR	mitersection	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	
Lanos			



Approach LOS



Vehicle Volumes and Adjustments Approach Eastbound Westbound Northbound Southbound U R U U U L Т R 1 T L T R L T R Movement 3 5 7 Priority 10 1 2 4U 4 6 8 9 10 11 12 0 Number of Lanes 1 2 0 0 1 2 0 0 1 0 0 1 0 L T TR L T TR LTR LTR Configuration 0 9 831 1 0 0 1315 0 0 0 17 0 33 Volume (veh/h) 1 3 3 3 3 3 Percent Heavy Vehicles (%) 3 3 3 3 3 **Proportion Time Blocked** 0 Percent Grade (%) 0 **Right Turn Channelized** Left + Thru Median Type | Storage 1 Critical and Follow-up Headways Base Critical Headway (sec) 4.1 7.5 6.5 6.9 7.5 6.5 6.9 4.1 6.96 4.16 4.16 7,56 6,56 7.56 6.56 6.96 Critical Headway (sec) 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 0 Flow Rate, v (veh/h) 10 1 54 Capacity, c (veh/h) 466 742 552 208 0.00 0.02 0.00 0.26 v/c Ratio 95% Queue Length, Q95 (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 0.0 11.5 28,3 Approach Delay (s/veh) 0.1

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Schaad at La Christa Combined Phase 2 AM.xtw

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В

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	вјн	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/ Con	unty Proj	

Lanes



Vehicle Volumes and Adjustments

Approach		Eastk	ound			West	bound		1	North	bound		Southbound				
Movement	U	1	Т	R	U	L	T	R	U	$\{T_{i_1,i_2}\}$	т	R	U	L	Т	R	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	11	2	0	0	1	2	0		0	1	0	a strange	0	1	0	
Configuration		L	Т	TR		L	Т	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					$\mathcal{J}_{\mathcal{I}}^{(n)}(z)$							1997 - 1					
Percent Grade (%)										()			()		
Right Turn Channelized	N. S. C.	24. ja 1	294 C.										10010		a shino		
Median Type Storage				Left +	Thru								1				
Critical and Follow-up He	adwa	ys															
Base Critical Headway (sec)		4,1	10.00			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	Leve	l of Se	ervice														
Flow Rate, v (veh/h)		27				5					4				23		
Capacity, c (veh/h)		594				429			163,633		197	623			174		
v/c Ratio		0.04				0.01					0.02	1			0.13		
95% Queue Length, Q ₉₅ (veh)		0.1			2003	0.0		11.500			0.1		S. Carl		0.5		
Control Delay (s/veh)		11.3				13.5		In the second			23.7	1			28.9	1.1.1	
Level of Service (LOS)		В				В					C				D	100	
Approach Delay (s/veħ)		0	2			.0.	t i			23	.7		28.9				
Approach LOS													D. State				

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Schaad at La Christa Combined Phase 2 PM.xtw

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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 Contro	ol w/ County Pr	

Lanes



Vehicle Volumes and Adjustments

Approach		Eastb	ound			Westl	bound		1	North	bound		Southbound				
Movement	U	L	Т	R	Ŭ	L	T	R	៍ប ំ	[0,1]	T	R	U	. L	τ	R	
Priority	10	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	Т				T	R						L		R	
Volume (veh/h)	0	115	723				1199	10						25		139	
Percent Heavy Vehicles (%)	3	3												3		3	
Proportion Time Blocked											A state of the				N. Predsjo		
Percent Grade (%)								1							0		
Right Turn Channelized				an 197		N	0	Gatthy	15935	A geografi	C. Miles			N	lo		
Median Type Storage				Left +	+ Thru								1				
Critical and Follow-up He	adwa	ys															
Base Critical Headway (sec)		4,1					T a C							7,5		6.9	
Critical Headway (sec)		4,16							1.45					6.86		6.96	
Base Follow-Up Headway (sec)	1	2.2	13.60											3.5	1	3.3	
Follow-Up Headway (sec)		2.23										1.00	10215	3.53		3.33	
Delay, Queue Length, and	Leve	l of Se	ervice														
Flow Rate, v (veh/h)		125												27		151	
Capacity, c (veh/h)	1	517												142		408	
v/c Ratio		0.24												0.19		0.37	
95% Queue Length, Q ₉₅ (veh)		0.9				- State							202	0.7		1.7	
Control Delay (s/veh)		14.2			Ì		iter (1					36,2		18.9	
Level of Service (LOS)		В					NEW .				n de la fi			E	1633	С	
Approach Delay (s/veh)		1.	9		1.					<u></u>		Announce of the second	21.5				
Approach LOS								V MARINA)	14814	MC Yest				(<u>Antoni</u>	

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ved. HCS TWSC Version 7.5 Schaad at West Site Entrance Combined Phase 1 AM.xtw Generated: 5/29/2018 7:59:38 AM

	HCS7 Two-Way Stop	o-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/ Cou	inty Pr								

Lanes



Vehicle Volumes and Adju	ıstme	nts															
Approach		Eastb	ound		I	West	bound		I	North	bound			South	bound		
Movement in the second second second second	ີບໍ່	in Laint	T	R	U	L	T T	R	U S	The second	ा र	R	U	<u>)</u> (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	^{14,12} 2 ¹⁴	1		0	1°0 °	0		1	0	1	
Configuration		Ĺ	Ť				Т	R	1					L		R	
Volume (veh/h)	0	157	1322	지엄하	1999		1178	52	1944. 1	N DA				54		100	
Percent Heavy Vehicles (%)	3	3				1								3		3	
Proportion Time Blocked						3833		10,000	1.0000				NACE.				
Percent Grade (%)						-	d				las anno d	£			0		
Right Turn Channelized			in and			No					- 12 (B)) N	lo della		
Median Type Storage				Left +	- Thru								1				
Critical and Follow-up He	adwa	ys															
Base Critical Headway (sec)		4.1							Ι				[7.5		6.9	
Critical Headway (sec)		4.16		NSN						484		- <u>68</u> 747	- COES	6.86		6,96	
Base Follow-Up Headway (sec)		2.2												3.5		3.3	
Follow-Up Headway (sec)	1010	2.23												3,53		3.33	
Delay, Queue Length, and	Leve	l of Se	rvice														
Flow Rate, v (veh/h)		171												59		109	
Capacity, c (veh/h)	NAR:	506							10000				- 162 F.S.	104		416	
v/c Ratio		0.34						ĺ						0.57		0.26	
95% Queue Length, Q ₉₅ (veh)	A SEAN	1.5							North State			10363		2.7		1.0	
Control Delay (s/veh)		15.7												77.7		16.7	
Level of Service (LOS)		С												F.∖		C C	
Approach Delay (s/veh)		1.	7										38,1				
Approach LOS																	

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General Information		Site Information							
General monitation		Site anomation	1						
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 Contr	ol w/ County Pr							

_anes



Vehicle Volumes and Adjustments Westbound Eastbound Approach Northbound Southbound U Movement U L Т R L T R U L R U L Т T R 1U 2 4U 7 Priority 1 3 5 6 4 8 9 10 11 12 Number of Lanes 0 1 2 0 0 0 2 1 0 0 0 1 0 1 Configuration L Т Т R L R 0 38 710 Volume (veh/h) 1162 28 75 47 3 3 Percent Heavy Vehicles (%) 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 4.16 Critical Headway (sec) 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 51 82 Capacity, c (veh/h) 526 173 421 v/c Ratio 0.08 0.47 0.12 95% Queue Length, Q95 (veh) 0.3 2.2 0.4 Control Delay (s/veh) 12.4 43,2 14.7 Level of Service (LOS) В E. B

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0.6

Approach Delay (s/veh)

Approach LOS

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D

Schaad at East Site Entrance Combined Phase 2 AM.xtw

General Information		Site 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 Contr	ol w/ County Pr							



Vehicle Volumes and Ad	justme	nts														
Approach		East	bound			West	bound		1.20	North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	u	L. A.	T	R	U	L	Т	R
Priority	10	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		1.1	0	1
Configuration	121	L	Т		11		Т	R						L		R
Volume (veh/h)	0	52	1324				1197	157					1.12	164		33
Percent Heavy Vehicles (%)	3	3												3		3
Proportion Time Blocked		No.5									1.00	1.10	10223	1.0		
Percent Grade (%)								Barner - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 199			2000	Sector Contractor		(0	
Right Turn Channelized	9 - 1130-	No							1.26225		1790 (N	lo	신학적승
Median Type Storage		dining give stage the annual	972952052952555555555555555	Left +	+ Thru								1			
Critical and Follow-up H	leadwa	ys														
Base Critical Headway (sec)		4.1	(Trank			in a s	hin ail						Γ	7.5		6.9
Critical Headway (sec)		4.16							1033		1.123.01	NISC.		6.86		6.96
Base Follow-Up Headway (sec)		2,2						100.4	1.1					3,5		3.3
Follow-Up Headway (sec)	3 - ² - 2	2.23						1. E	- 20.32		1253	Sales (3.53		3.33
Delay, Queue Length, an	id Leve	l of S	ervice													
Flow Rate, v (veh/h)		57				1								178		36
Capacity, c (veh/h)		449				12.20					- 392% S			136		409
v/c Ratio	11:1	0,13							1.221		-	CONTRACTO DE LA CONTRACIÓN		1.31		0.09
95% Queue Length, Q ₉₅ (veh)		0.4	12.13		$[0] \geq 1$									11.2		0.3
Control Delay (s/veh)		14.2	Comment of the second se						******	WYNCIAL AND AND AND A	And the second second	0-1230/0-000200000-0-00	(200-00/Diamona/Dia	243.7		14.6
Level of Service (LOS)		В				12263			1.11	1993				F	2263	В
Approach Delay (s/veh)	anang menting and an	0	.5	ann			and the second	t and the second second		Банемескольковнорти	an olivitie tais			20	5.3	
Approach LOS				6,020	1922		6.25							NEW (t and the second se	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	<u></u>	7	ሻሻ	<u> </u>	7	ሻ	**	7	ካ	木木	7
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		and a second provide a second se	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
FIt Permitted	0.950			0.950			0.390			0.590	00230	
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
Kecall Mode	None	Min	Min	None	Min	Min	None	None	None	None	None	None
Act Effet 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 Katio	U.8Z	0.07	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.U	32.7	U.5	40.3	34.1	16.6	38.8	46.2	10.1
Queue Delay	U.U	0.0	0,0	U.U	0,0	0.0	0.0	0.0	0.0	0.0	0,0	0.0
	04.7 D	29.1	0.9	02.U	32.1	C.U A	40.3 D	34.1	10.0	38.8	40.Z	10,1
LUS Approach Dolou	U	22.0	A	U	27.1	A	U		D	U	20.0	В
Approach LOC		32,9			37.1 D			20.0			১८.৬	
Approach Longth 50th (ft)	77	150	<u>م</u>	107	102	0	50	50 50	00	01	100	<u>م</u>
Queue Length 05th (ft)	#127	200	0	107	192	0 0	09 	۲C ۵۸	22 #100	0 I #452	109	U 60
Internal Link Diet (ft)	#101	709	V	#1/4	213	U	#123	450	#109	#100	200	θZ
Turn Boy Longth (ff)	175	190	200	200	904	200	170	400	200	046	392	200
Rase Canacity (uph)	262	084	600	400	7/1	670	17V 228	61 <i>1</i>	200 600	240 205	526	200
Starvation Can Roducto	000	304 N	ν22 Λ	499 N	141 0	012	220 N	514 N	000 N	290 N	000 N	494 N
Snillback Can Reductin	ر ۱	υ Λ	ب ۱	<u>ب</u> ۱	v ۵	υ Λ	ν Λ	υ 0	υ Λ	ט ה	v ∩	v n
Storage Can Reductn	ů N	ň	Ň	Ň	0 	v n	N N	v n	0 N	U N	U A	0 N
Reduced v/c Ratio	<u>በ 82</u>	0 65	0.23	0.84	0 74	0 16	0 0 A ()	0 4 2	0 በ 7 ዓ	ሰ 71	0 0 70	۷ ۱ հ ۱
FLORIDOU WO FLORID	0.02	0.00	0,20	0.07	0.7 **	0.10	0.03	0.92	0.10	0.74	0.13	0.01

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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 ()	
Analysis Period (min) 15			
* User Entered Value		h.	
# 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

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ካካ	个个	T.	ሻሻ	<u>*</u> *	Ť	ሻ	个个	7	ሻ	**	*
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		1999-9999-9999-99999 1999-9999-9999-999	0.850			0.850			0.850	an an an Argan Aranga	9999 (20 7 0) (2070) 9999 (2070)	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
Fit 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	NĀ	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6	ana na manana na ang si a ana ang	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	Е	В	E	E	В
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

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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	Э.	
Queue shown is maximum after two cycles.		
# 95th percentile volume exceeds capacity, queue may b	e longer.	
Queue shown is maximum after two cycles.		

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

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Lanes, Volumes, Timings 1: Schaad Road & Oak Ridge Highway

Schaad Road TIS Combined Phase 2 AM 2024

Future Geometry and Traffic Control w/ County Project, Optimized Timing

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	33	14	7	19	* *	*	×	养养	1	ኻ	**	7
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	ala dha a filinin airin an 1970 an 1970.	a na ann an third ann a'	0.850	a na mangang pangapang pangapang	and the second second	0.850		e en la la la la cara a calacara	0.850	allow areas determined	an an a shekara ta ta ƙasar	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	А	D	D	B	D	D	Ç
Approach Delay		36,7		ann a tha bailte that an agus	41.4		an a sub-sub-sub-sub-sub-sub-sub-sub-sub-sub-	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	and a state of the second
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

Timing Plan: AM Peak

Cannon & Cannon, Inc.

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 n	nay be longer.
Queue shown is maximum after two cycles.	

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



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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	55	*	Ħ	ሻሻ	**	×	ሻ		7	7	**	7
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	-21,092,092,092,092,092,092,092,092,092,092	anteri i apostatori d	0.850			0.850	1 m m m m m m m m m m m m m m m m m m m		0.850	-1		0.850
FIt 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										PAN SHEPH		
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	/0.4	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	/U.4	7.6	97,0	86.9	12.9	100.4	61.5 E	26.0
LOS	-	54.0	A	E	E	A	F		В	F	E 50.0	G
Approach Delay		54.8			58.7			00.0			53.3	
Approach LUS	04.4	400	0	445	470	1 4	400	477		40E	100	20
	~3 4 4475	130	U 7 4 7	140	4/0	4 07	100	/// ممصلا	U M	GZ1	100	90 400
Queue Length 95th (II)	#440	100	- 1/ -	195	000	07	#012	#202	91	#204	200	#204
Turn Dev Longih (ft)	176	190	200	200	904	200	470	400	200	945	392	200
Turn Day Lengin (II)	1/0 7E0	1170	200	200	700	200 642	170	110	200	240 107	271	200
Dase Capacity (Vpn)	001	14/U n	001	009 0	100	040 N	210	440 N	430 U	191 0	31 I A	40Z
Starvation Gap Reductin	V A	U 0	U ^	U ^	V A	U A	U ^	V A	U A	U A	ب	U A
Spinback Cap Reducin	U N	U A	U 0	v n	U A	U N	U ∩	U N	Ň	ں م	0 N	n N
Deduced via Datio	U 1 01	U 33 0	0 17	0 AA ()	0 N	U 20	1 00	0 A0 ()	0 89 ()	0 0 0 0	0 67	180
Neutreu WC Nallo	1.01	0.00	0.17	0.00	0.33	0.00	1.00	0.50	0.00	0.00	0.07	0.04

Timing Plan: PM Peak

Cannon & Cannon, Inc.

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

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	14-8	57.55	17.0	21-75