

GARRISON HEIGHTS

TRAFFIC IMPACT STUDY

GARRISON HEIGHTS
RESIDENTIAL DEVELOPMENT

KNOX COUNTY, TN

CCI PROJECT NO. 00773-0012

REV. I

PREPARED FOR:
Primos Land Company, LLC
4909 Ball Road
Knoxville, TN 37931

SUBMITTED BY
Cannon & Cannon, Inc.
8550 Kingston Pike
Knoxville, TN 37919
865.670.8555



REVISED
December 14
2018

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REVISION I (12/14/18)

This report replaces the previous version of the traffic impact study dated 11/26/18 in its entirety. The associated changes are a result of comments received from Knoxville / Knox County MPC staff which includes a change to the development access. Knox County comments are located in APPENDIX D.

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EXECUTIVE SUMMARY

This report provides a summary of a traffic impact study that was performed for a proposed residential development to be located off Karns Valley Drive in west Knox County, southwest of the Karns Northwest Sports Complex. The current plans for this proposed residential development provide for a total of 193 single family lots at full build-out. The proposed site will have two access points, one onto Karns Valley Drive at its existing intersection with Byington Solway Road, and the other becoming the fourth leg at the existing intersection of Byington Solway Road, Coward Mill Road and Chuck Jones Drive.

The purpose of this study was to provide a thorough evaluation of the traffic operational and safety impacts of the proposed development upon the adjacent portion of Karns Valley Drive, as well as the two study intersections, which are the two site access intersections. Study intersection no. 1 is Karns Valley Drive at Byington Solway Road and study intersection no. 2 is Byington Solway Road, Coward Mill Road and Chuck Jones Drive. This evaluation was performed assuming full build-out of all units of the proposed development, with existing and background growth conditions also evaluated for purposes of comparison.

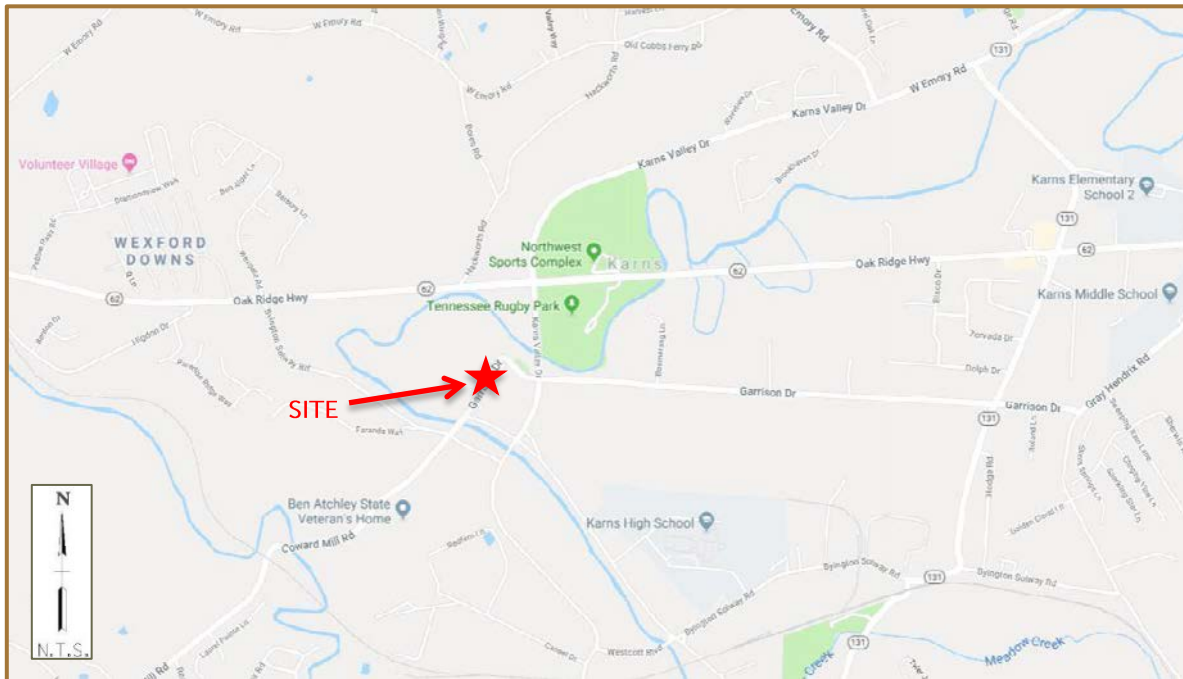
The primary conclusion of this study is that the traffic generated by the proposed development will result in minimal traffic operational impacts in the project area. It is also concluded that additional turning lanes are not justified at either of the study intersections.

The improvement recommendations that resulted from this study are summarized below:

1. Install a 30 inch STOP sign for the new development approach at study intersection 1.
2. Establish and maintain corner sight distance at both proposed site entrance intersections. The primary concern is study intersection 1, where embankment north of the intersection and on the west side of Karns Valley Drive will need to be significantly cut back in order to establish a minimum 400 foot sight line looking to the left. Also, ensure that new site signage and landscaping is properly positioned to not impede the lines of sight.
3. At study intersection 2, consider changing the traffic control to 4-way stop or reversing the stop control. Knox County will need to make the final decision as to the appropriate traffic control.

INTRODUCTION & PURPOSE OF STUDY

This report provides a summary of a traffic impact study that was performed for a proposed residential development to be located off Karns Valley Drive in west Knox County, southwest of the Karns Northwest Sports Complex. FIGURE 1 is a location map that identifies the project site in relation to the roadways in the vicinity of the proposed development.



**FIGURE 1
LOCATION MAP**

The current plans for this proposed residential development provide for a total of 193 single family lots at full build-out. FIGURE 2 is a conceptual site plan showing the proposed site layout, which will have two access points, one onto Karns Valley Drive at its existing intersection with Byington Solway Road, and the other becoming the fourth leg at the existing intersection of Byington Solway Road, Coward Mill Road and Chuck Jones Drive.

The purpose of this study was to provide a thorough evaluation of the traffic operational and safety impacts of the proposed development upon the adjacent portion of Karns Valley Drive, as well as the two study intersections, which are the two site access intersections. Study intersection No. 1 is Karns Valley Drive at Byington Solway Road and study intersection no. 2 is Byington Solway Road, Coward Mill Road and Chuck Jones Drive. This evaluation was performed assuming full build-out of all units of the proposed development, with existing and background growth conditions also evaluated for purposes of comparison.

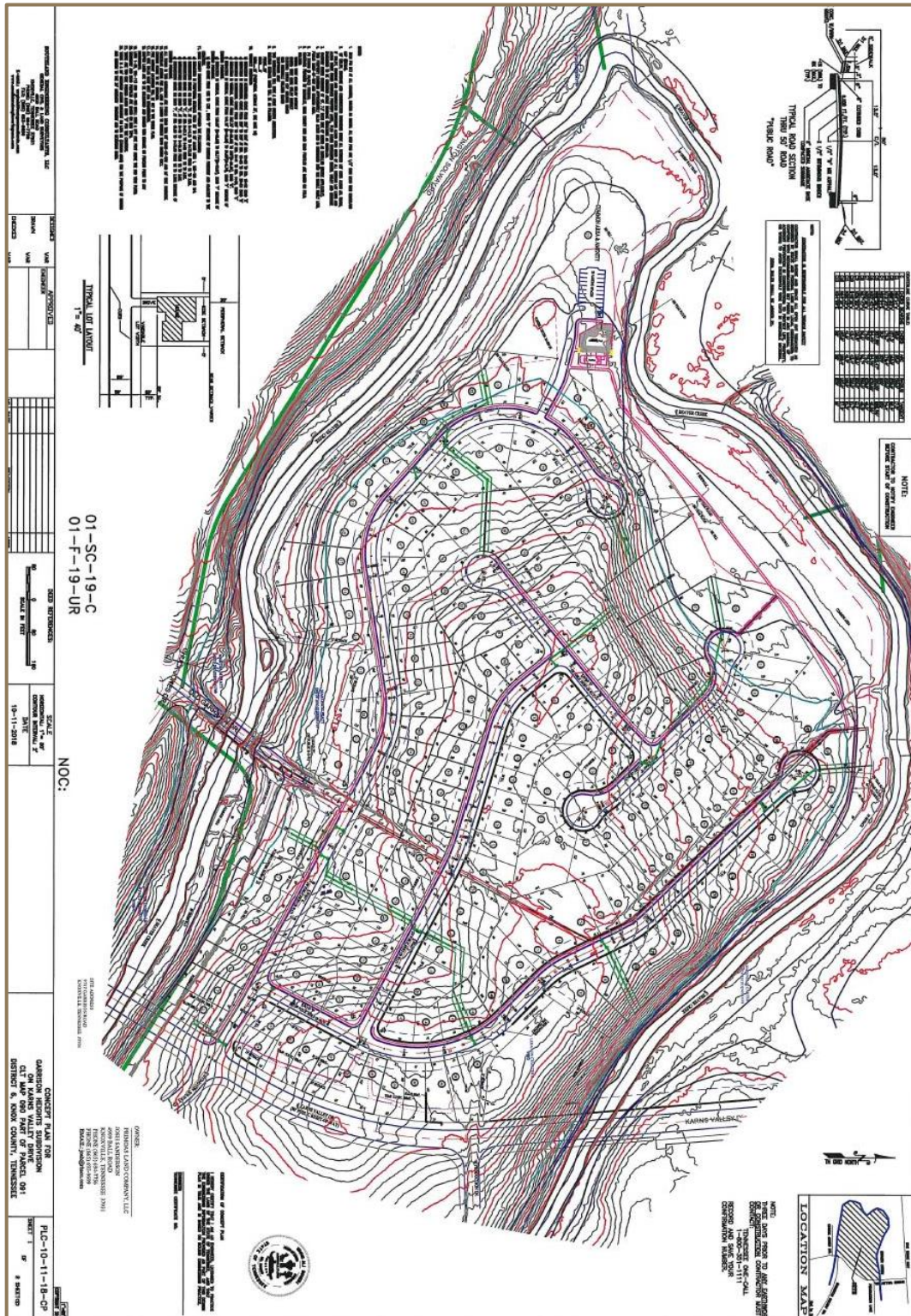


FIGURE 2
CONCEPTUAL SITE PLAN

EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

Karns Valley Drive is classified as a Major Collector roadway and is maintained by Knox County. The study section of this facility was recently constructed and opened to traffic. It fills in a missing link of a larger connector roadway that connects the Karns Community to Hardin Valley Drive, which lies to the south. The roadway was constructed as a three lane roadway with one through traffic lane in each direction and a center two-way left-turn lane. The posted speed limit on this section of Karns Valley Drive is 40 mph. Study intersection No. 1 is located on Karns Valley Drive and is controlled by a stop sign on the Byington Solway Road side street.

Study intersection No. 2 is an existing four way intersection, with the north leg currently closed to traffic. This leg is proposed to become the second access road into the project site. The roadways entering into this intersection are all two lane roadways. This is currently a two way stop intersection, with Byington Solway Road and Chuck Jones Drive stopping. The speed limit on these roadways is 30 mph.

EXISTING TRAFFIC DATA

Two relevant traffic count stations for collecting annual average daily traffic data (AADT) are located in the study area. The most recent data from these stations were provided by the Tennessee Department of Transportation with resulting AADTs shown in TABLE 1.

TABLE 1: ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY

COUNT YEAR	TDOT COUNT STATION 0468 KARNS VALLEY DRIVE NORTH OF OAK RIDGE HWY. (SR 62)	TDOT COUNT STATION 0364 OAK RIDGE HWY (SR 62) NEAR ANDERSON CO. LINE
2017	4,336	12,268
2016	4,258	11,917
2015	4,216	10,495
2014	4,183	11,682
2013	4,061	10,969
2012	3,943	11,997
2011	3,738	11,488
2010	3,533	11,033

In order to collect more refined data for analyses and to establish a basis for trip distribution patterns, turning movement traffic counts were collected at the two study intersections. These counts were conducted during the AM and PM peak traffic periods of a typical weekday. Raw data count summaries of this data are contained in APPENDIX A along with additional TDOT AADT data for the TABLE 1 count stations. In addition to helping establish trip distribution patterns, these turning movement counts were used to establish the existing traffic volumes for this study, which are shown in FIGURE 3.

EXISTING CAPACITY ANALYSES / LEVELS-OF-SERVICE

Intersection capacity analyses employing the methods of the latest edition of the Highway Capacity Manual and companion software (HCS7) were used to evaluate the two study intersections for the existing roadway, existing traffic control, and existing (2018) traffic conditions, as shown on FIGURE 3. The results were very good level-of-service “B” or better conditions for the side streets at both study intersections and during both peak traffic hours. These results are summarized in detail on the “HCS7 Two-Way Stop-Control Report” printouts contained in APPENDIX C. Also see APPENDIX C for a discussion of Intersection Capacity and Level of Service Concepts.

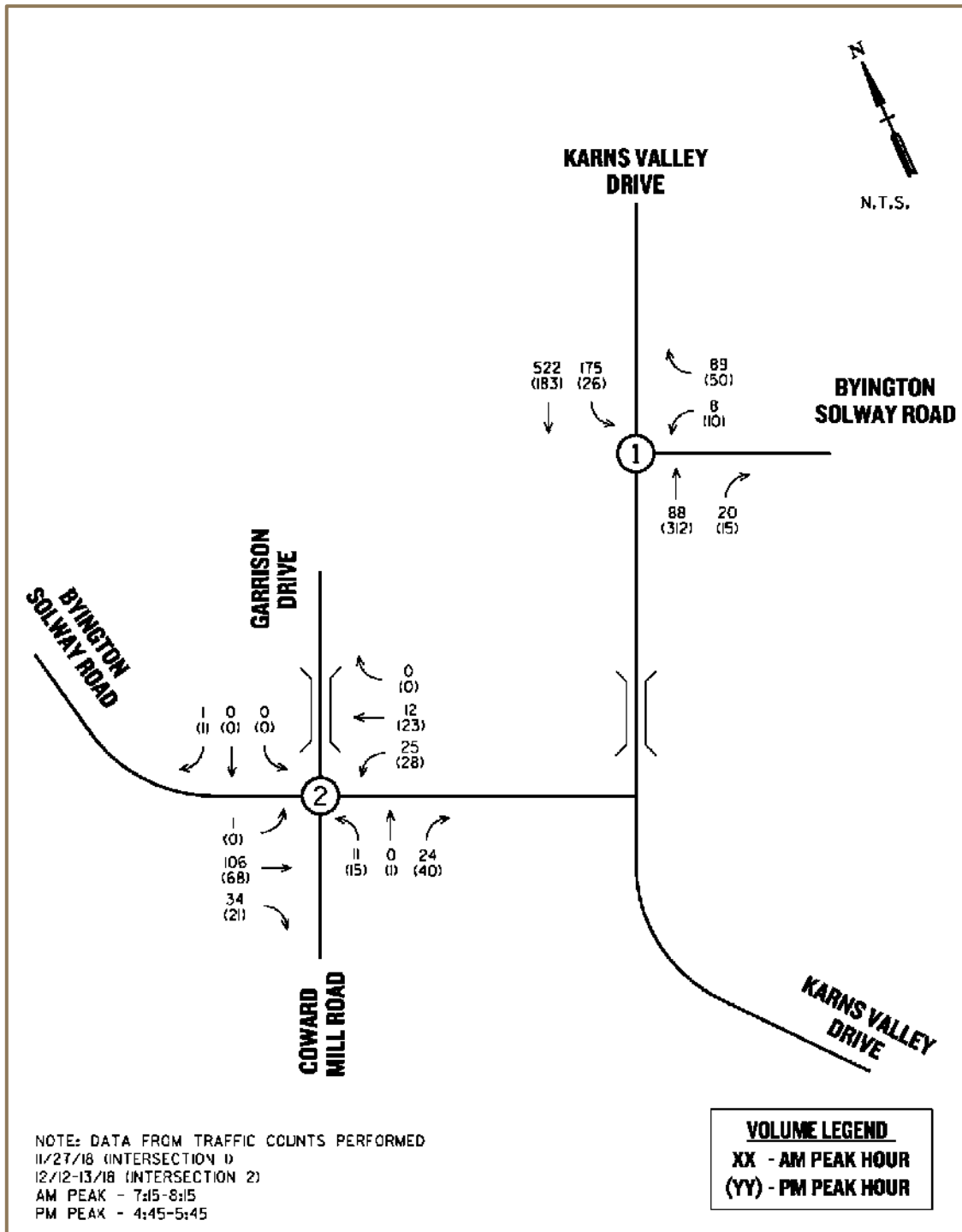


FIGURE 3
EXISTING TRAFFIC VOLUMES

BACKGROUND CONDITIONS

BACKGROUND TRAFFIC GROWTH

The anticipated time for full build-out of the proposed Garrison Heights residential project is estimated as five years. Therefore, year 2023 was established as the appropriate design/analysis year for this study. In order to determine traffic volumes resulting solely from background traffic growth to year 2023, it was necessary to establish an annual growth rate for existing traffic. The ADT values given previously in TABLE 1, along with engineering judgment, were used to arrive at a rate of 2.5 percent per year for this development. FIGURE 4 contains the background traffic volumes that would result from this 2.5 percent annual growth rate to year 2023.

BACKGROUND CAPACITY ANALYSES / LEVELS-OF-SERVICE

Intersection Capacity Analyses employing the methods of the Highway Capacity Manual and companion software (HCS7) were used to evaluate the two study intersections. For the existing roadway, existing traffic control, and background (2023) traffic conditions, as shown on FIGURE 4. The results were similar to the existing analyses, very good level-of-service "B" or better conditions for the side streets at both study intersections and during both peak traffic hours. These results are summarized in detail on the "HCS7 Two-Way Stop-Control Report" printouts contained in APPENDIX C. Also see APPENDIX C for a discussion of Intersection Capacity and Level-of-Service Concepts.

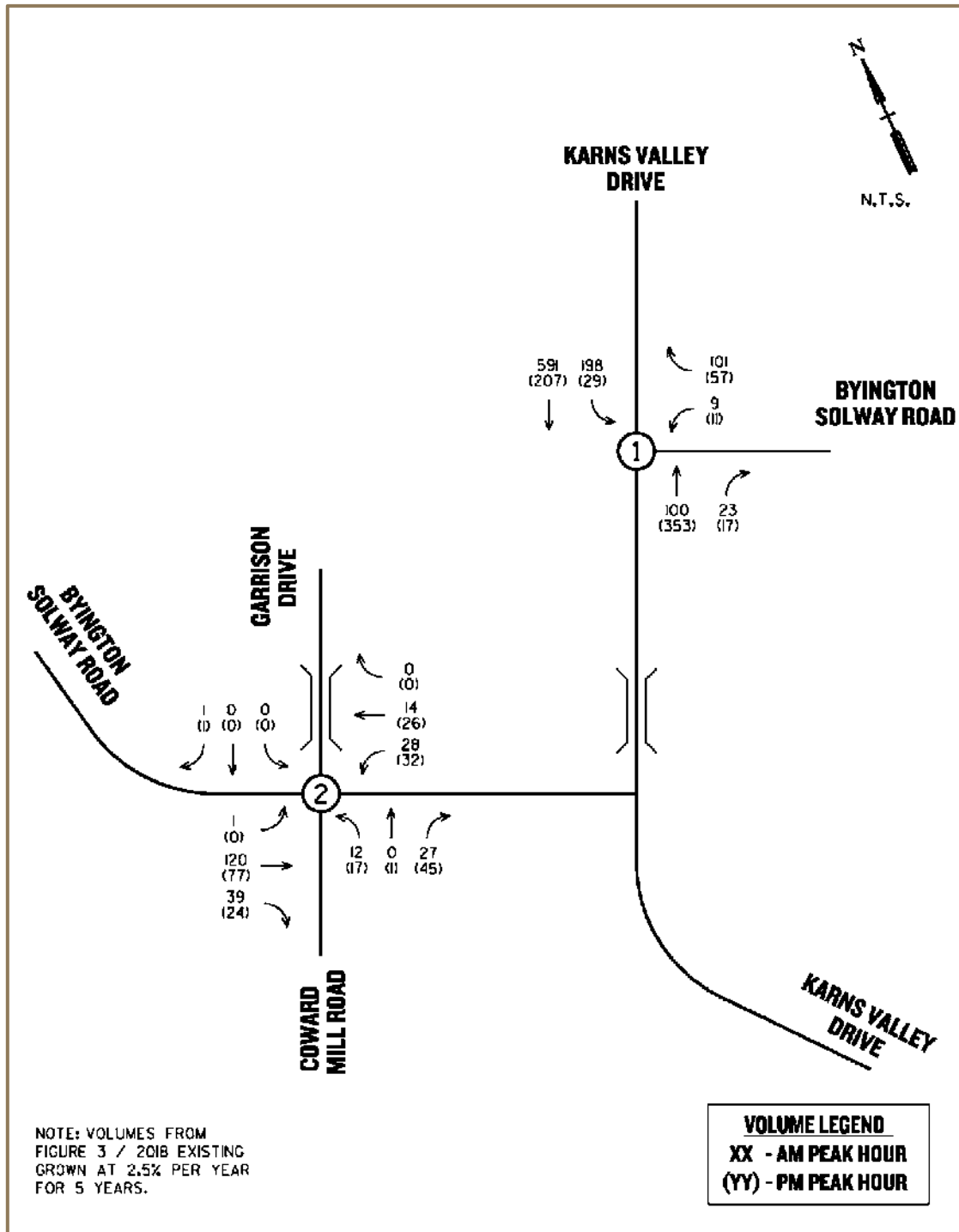


FIGURE 4
 2023 BACKGROUND TRAFFIC VOLUMES

FUTURE CONDITIONS

TRIP GENERATION

In order to estimate the expected traffic volumes to be generated by full build-out of the proposed development, the data and procedures of *Trip Generation, Tenth Edition* (Institute of Transportation Engineers, 2017) were utilized. The generated traffic volumes were determined based on the total weekday morning and evening peak hour of adjacent street traffic trip generation rates for single-family detached housing (Land Use Code 210). Utilizing a maximum number of units upon full build-out of 195, the newly generated trips were estimated. TABLE 2 summarizes the number and directional split of these anticipated entering and exiting trips from the proposed development.

TABLE 2: TRIP GENERATION SUMMARY

LAND USE	ITE CODE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HR)	PM PEAK HOUR (TRIPS/HR)
Single-Family Detached Housing	210	195 units	961	36	122
Entering Trips					
Exiting Trips			961	107	71
TOTAL			1,922	143	193
Generated Trips					
Entering Trips	-	-	961	36	122
Exiting Trips			961	107	71

TRIP DISTRIBUTION AND ASSIGNMENT

FIGURE 5 provides a summary of the trip distribution patterns developed for the study intersection, which were derived from knowledge of the existing traffic counts and local area travel trends. In addition, FIGURE 6 provides the generated traffic volumes as assigned to the local roadway network in accordance with these distribution patterns. FIGURE 7 shows the combined year 2023 volumes reflecting the existing traffic, the background traffic growth, and the newly generated traffic from the proposed residential development. These are the volumes used in the analysis of full build-out conditions.

FUTURE CAPACITY ANALYSES / LEVELS-OF-SERVICE

Intersection Capacity Analyses employing the methods of the Highway Capacity Manual and companion software (HCS7) were used to evaluate the two study intersections for the existing roadway, existing traffic control, and combined (2023) traffic conditions, as shown on FIGURE 7. The results were good level-of-service “C” or better conditions for the side streets at both study intersections and during both peak traffic hours. These results are summarized in detail on the “HCS7 Two-Way Stop-Control Report” printouts contained in APPENDIX C. Also see APPENDIX C for a discussion of Intersection Capacity and Level of Service Concepts.

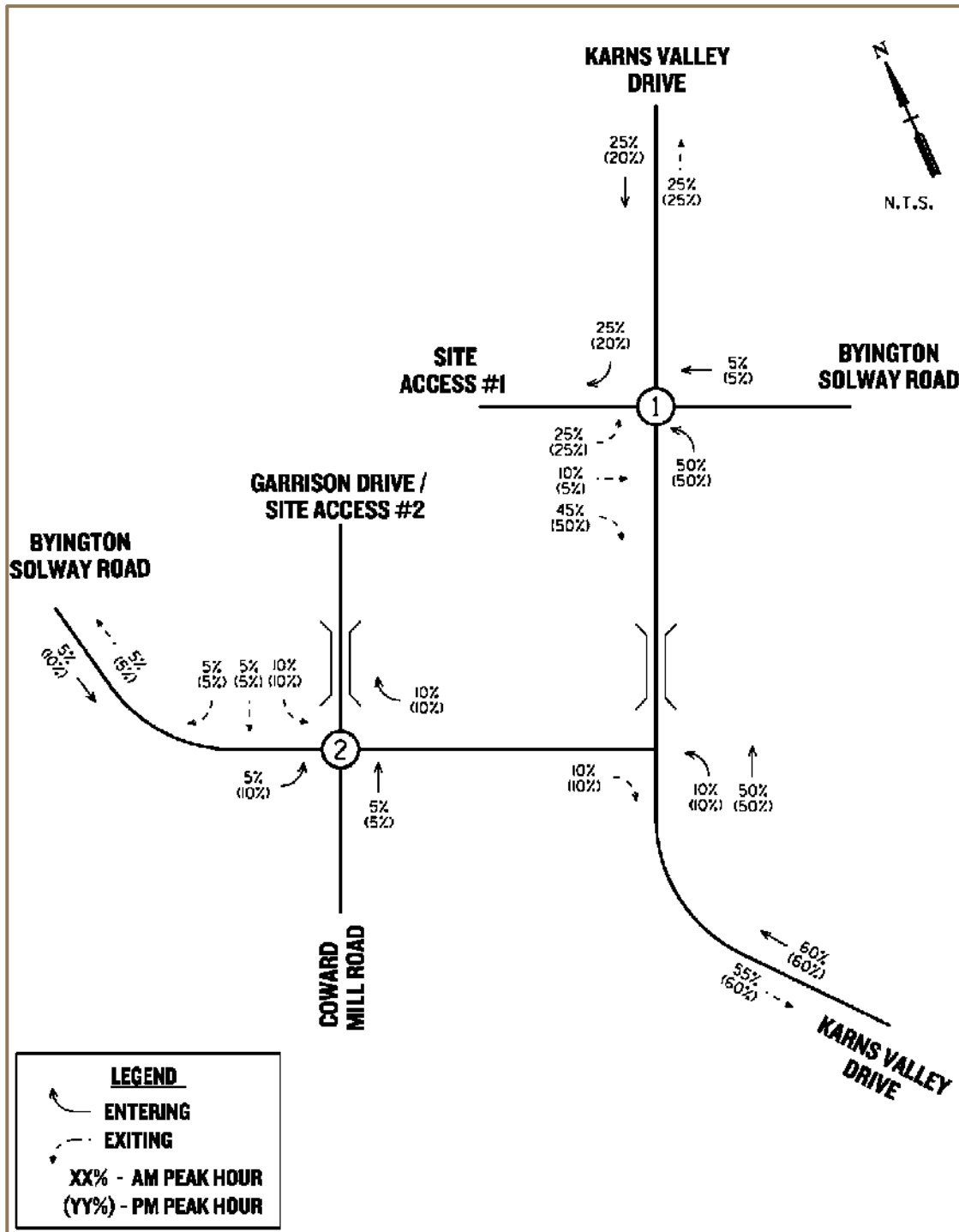


FIGURE 5
TRIP DISTRIBUTION PATTERNS (%)

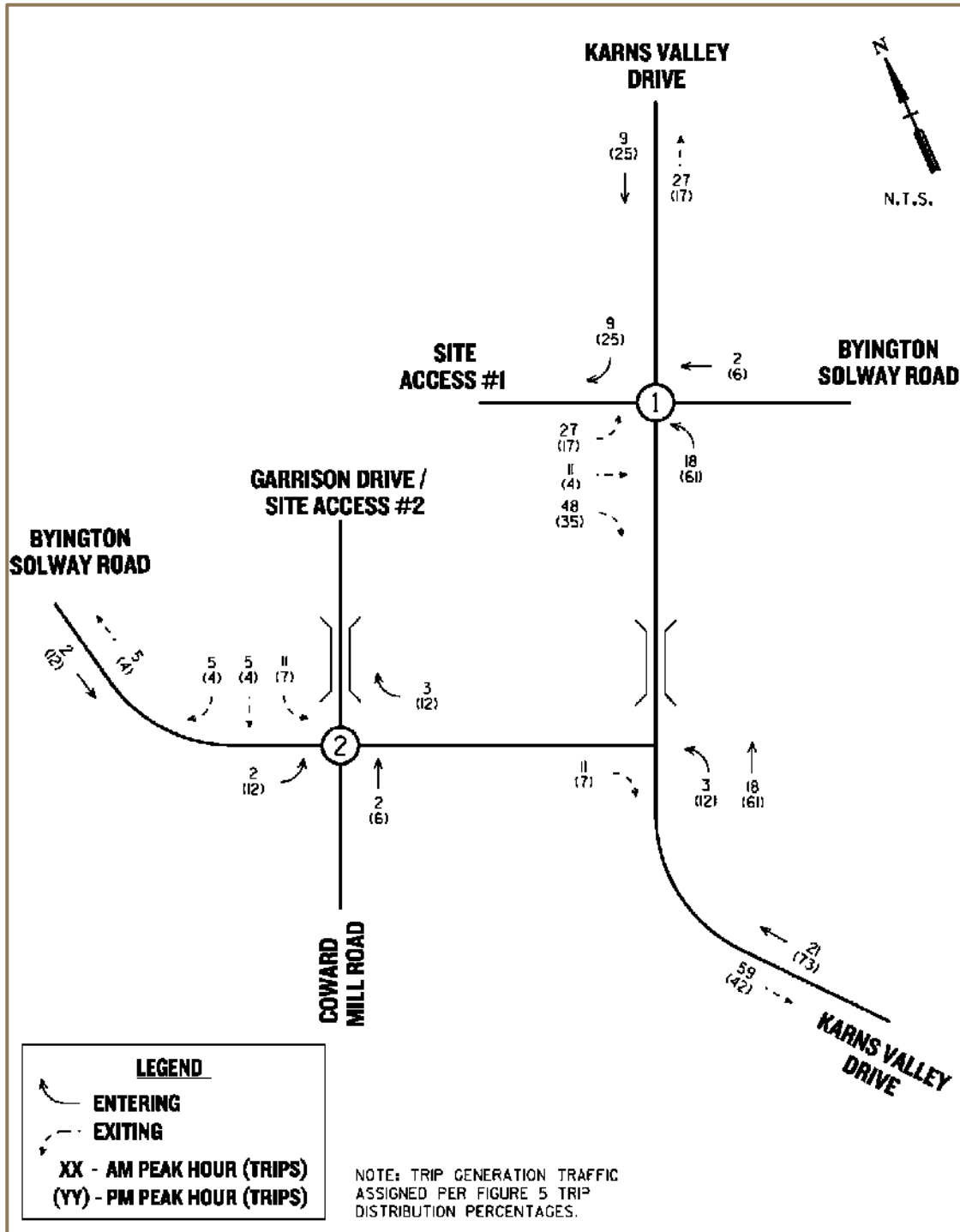


FIGURE 6
TRIP ASSIGNMENT

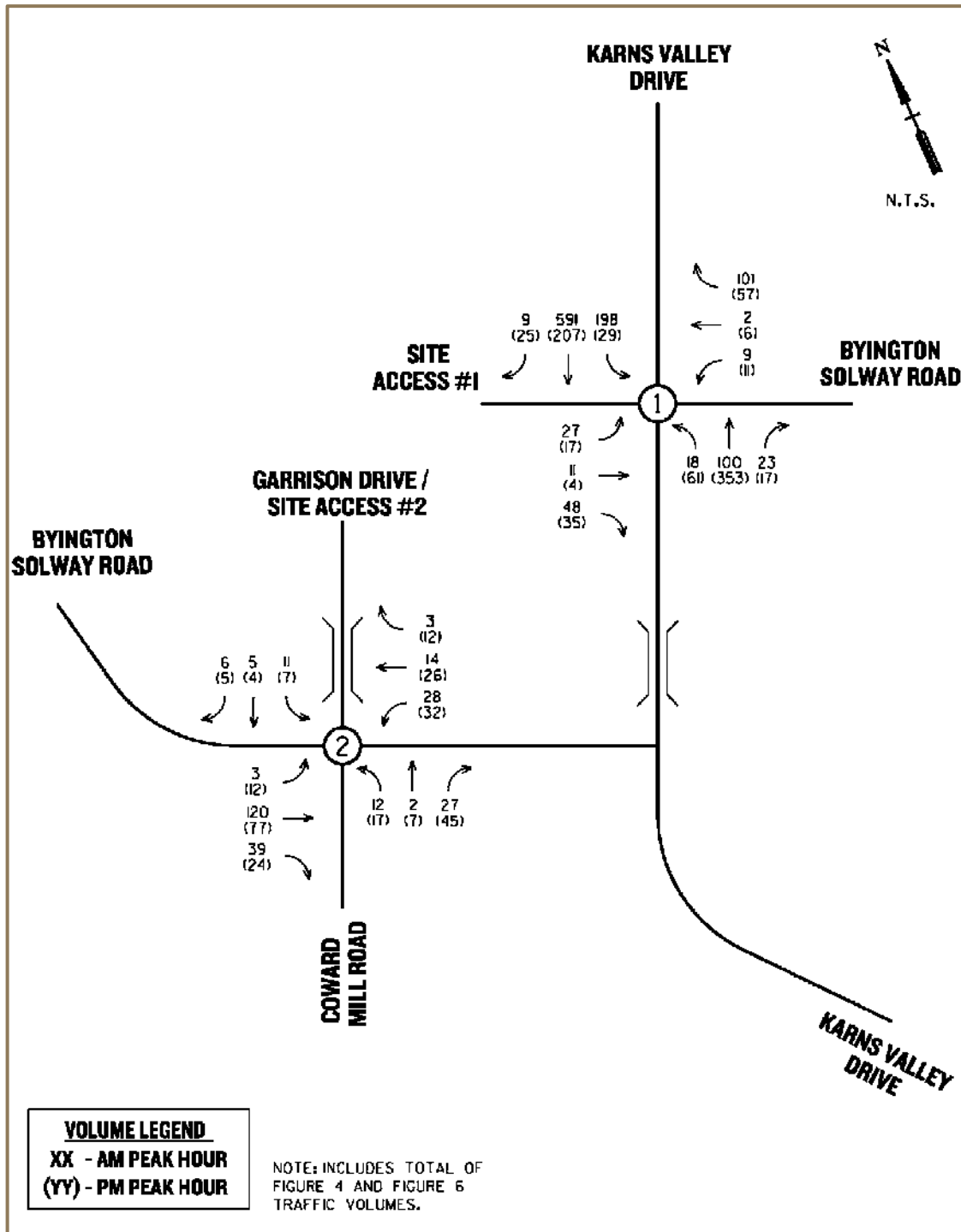


FIGURE 7
2023 COMBINED TRAFFIC VOLUMES

EVALUATIONS

INTERSECTION CAPACITY ANALYSES

As discussed in the preceding sections of this report, capacity analyses employing the methods of the Highway Capacity Manual and companion software (HCS7) were conducted for the two study intersections. These analyses were performed for existing, background, and combined traffic conditions using existing geometry and existing traffic control. Some additional analyses of possible stop control alternatives were also conducted for study intersection 2. A summary of the capacity analyses results is shown in TABLES 3 & 4.

**TABLE 3: CAPACITY ANALYSES SUMMARY – INTERSECTION 1
KARNS VALLEY DR AND BYINGTON SOLWAY**

EVALUATION CONDITION	LEVEL-OF-SERVICE (AVG. DELAY IN SECONDS)*	
	BYINGTON SOLWAY APPROACH (LEFT & RIGHT TURNS)	KARNS VALLEY DRIVE SOUTHBOUND APPROACH (LEFT ONLY / LEFT & THRU)
Existing (2018) – AM	A (9.9)	A (7.8) / A (2.0)
Existing (2018) – PM	B (10.9)	A (8.1) / A (1.0)
Background (2023) – AM	B (10.2)	A (7.9) / A (2.0)
Background (2023) – PM	B (11.3) SITE	A (8.2) / A (1.0)
Combined w/ Existing Lanes (2023) – AM	B (11.5) / C (21.4)	A (7.9) / A (2.0)
Combined w/ Existing Lanes (2023) – PM	B (12.5) / B (12.7)	A (8.2) / A (0.9)

* Side Street Stop Control – Level-of-Service and Average Vehicular Delay (seconds) for side street movements and main street left-turn and through movements utilizing HCM methodology.

As shown in the above table, the anticipated delays and levels-of-service for the combined traffic conditions will be only slightly worse than existing and background conditions, which are clearly acceptable with no justification for improvements.

**TABLE 4: CAPACITY ANALYSES SUMMARY – INTERSECTION 2
GARRISON / COWARD MILL AND BYINGTON SOLWAY / CHUCK JONES**

EVALUATION CONDITION	LEVEL-OF-SERVICE (AVG. DELAY IN SECONDS)*			
	BYINGTON SOLWAY EB APPROACH (LEFT/THRU/ RIGHT)	CHUCK JONES WB APPROACH (LEFT/THRU/ RIGHT)	COWARD MILL NB APPROACH (LEFT ONLY / LEFT & THRU)	GARRISON SB APPROACH (LEFT ONLY/ LEFT & THRU)
Existing (2018) – AM	A (10.0)	A (10.0)	A(7.2) / A(2.3)	A(7.3) / A(0.0)
Existing (2018) – PM	A (9.8)	A (9.8)	A(7.3) / A(2.0)	A(7.3) / A(0.0)
Background (2023) – AM	B (10.2)	B (10.2)	A(7.3) / A(2.3)	A(7.3) / A(0.0)
Background (2023) – PM	A (9.9)	A (10.0)	A(7.3) / A(2.0)	A(7.3) / A(0.0)
Combined w/ Existing Control (2023) – AM	B (10.5)	B (10.5)	A(7.3) / A(2.2)	A(7.3) / A(3.7)
Combined w/ Existing Control (2023) – PM	B (10.2)	B (10.1)	A(7.3) / A(1.9)	A(7.3) / A(3.2)
Combined w/ Reverse Control (2023) – AM	A(8.6) / A(0.2)	A(7.6) / A(4.8)	A (9.2)	B (10.2)
Combined w/ Reverse Control (2023) – PM	A(8.7) / A(1.0)	A(7.5) / A(3.5)	A (9.2)	B (10.2)
Combined w/ 4-Way Stop (2023) – AM	A (8.0)	A (7.6)	A (7.3)	A (7.6)
Combined w/ 4-Way Stop (2023) – PM	A (7.8)	A (7.7)	A (7.4)	A (7.4)

* Side Street Stop Control – Level-of-Service and Average Vehicular Delay (seconds) for side street movements and main street left-turn and through movements utilizing HCM methodology.

As shown in the above table, the anticipated delays and levels-of-service for the combined traffic conditions will be only slightly worse than existing and background conditions, which are clearly acceptable with no justification for improvements. See the STOP Sign Assessment section below for additional related discussion.

SIGHT DISTANCE ASSESSMENT

The proposed project development entrances were evaluated for corner sight distance. For study intersection 1, based on the posted 40 mph speed limit, the required minimum sight distance in accordance with Knox County regulations would be 400 feet. Field reviews indicate that the sight distance significantly exceeds 400 feet looking south, but is approximately 290 feet looking north. Significant cut slope embankment along the west side of Karns Valley Drive, in combination with horizontal and vertical curves, are the limiting factors for this sight distance.

For study intersection 2, the posted speed limit is 30 mph, requiring a minimum sight distance of 300 feet. However, the streets crossing the project site approach currently stop at this location. Measurements were made, however, since this looks like a location where the stop signs might justify reversal. The resulting sight distances were found to be 305 feet looking south up Chuck Jones Road and 440 feet looking north up Byington Solway Road. It should be noted that the 305 foot sight distance could easily be improved by cutting back some small trees and brush.

TURN LANE ASSESSMENT

Turn lane warrant analyses were conducted for the two study intersections under combined development conditions. These analyses were conducted for right-turn lanes only at study intersection 1, as left-turn lanes already exist, and for both left and right turn lanes at study intersection 2. These analyses employed tables from the [Knox County Access Control and Driveway Design Policy](#), which are based on turn lane warrants developed by Harmelink. The results indicate that no additional turn lanes are expected to be warranted during the AM and PM peak traffic hours under proposed combined development conditions. A copy of the relevant Knox County tables are located in APPENDIX C for review.

STOP SIGN ASSESSMENT

Study intersection 2 currently has 2-way stop control with east-west Byington Solway Road/Chuck Jones Road being the stop streets. With more traffic being on these streets, evaluations were conducted to assess potential stop reversal and 4-way stop alternatives. As shown in TABLE 4, all alternatives have very good levels-of-service of "B" or better. Thus, any of these alternatives are acceptable from a traffic operational standpoint. We believe that 4-way stop should be considered due to the high percentages of turning volumes at this intersection and the likelihood that it would provide speed control and safety advantages.

CONCLUSIONS & RECOMMENDATIONS

The primary conclusion of this study is that the traffic generated by the proposed development will result in minimal traffic operational impacts in the project area. It is also concluded that additional turning lanes are not justified at either of the study intersections.

The improvement recommendations that resulted from this study are summarized below:

1. Install a 30 inch STOP sign for the new development approach at study intersection 1.
2. Establish and maintain corner sight distance at both proposed site entrance intersections. The primary concern is study intersection 1, where embankment north of the intersection and on the west side of Karns Valley Drive will need to be significantly cut back in order to establish a minimum 400 foot sight line looking to the left. Also, ensure that new site signage and landscaping is properly positioned to not impede the lines of sight.
3. At study intersection 2, consider changing the traffic control to 4-way stop or reversing the stop control. Knox County will need to make the final decision as to the appropriate traffic control.

APPENDIX

APPENDIX A – TRAFFIC DATA

APPENDIX B – TRIP GENERATION

APPENDIX C – ANALYSES

APPENDIX D – KNOXVILLE / KNOX COUNTY MPC COMMENTS

APPENDIX A – TRAFFIC DATA

Click to restore the map extent and layers visibility where you left off.

Station 0468

Karns Valley Drive - North of Oak Ridge Hwy. (SR 62)

AADT by year:

- 2017 = 4,336
- 2016 = 4,258
- 2015 = 4,216
- 2014 = 4,183
- 2013 = 4,061
- 2012 = 3,943
- 2011 = 3,738
- 2010 = 3,533
- 2009 =
- 2008 =
- 2007 =
- 2006 =
- 2005 =
- 2004 =
- 2003 =
- 2002 =
- 2001 =
- 2000 =
- 1999 =
- 1998 =
- 1997 =
- 1996 =
- 1995 =
- 1994 =
- 1993 =
- 1992 =
- 1991 =
- 1990 =
- 1989 =
- 1988 =
- 1987 =
- 1986 =
- 1985 =
- 1984 =
- 1983 =

Station Number: 000364

Knox County, NEAR ANDERSON CO LINE
Route: SR062 (Oak Ridge Hwy.)

AADT by year:

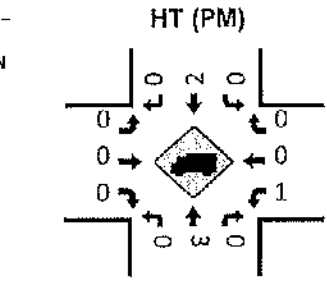
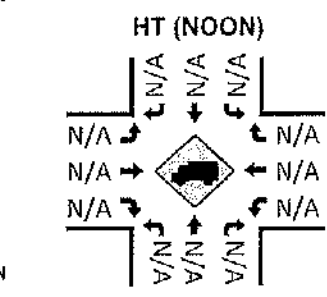
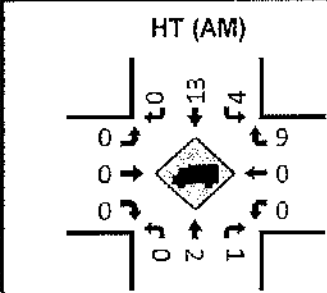
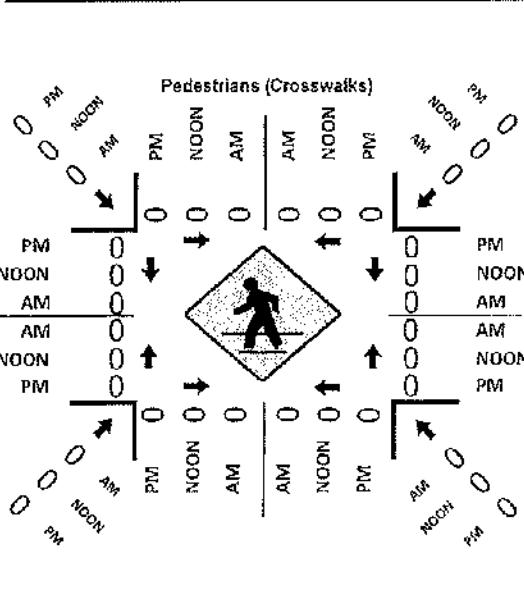
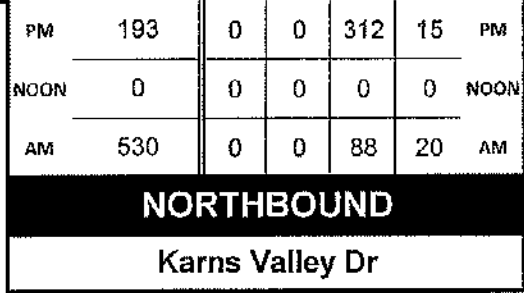
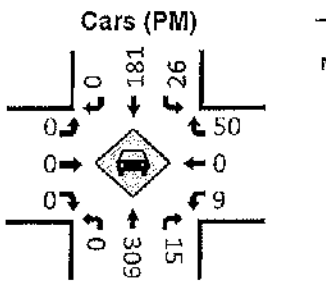
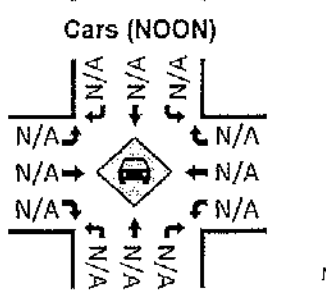
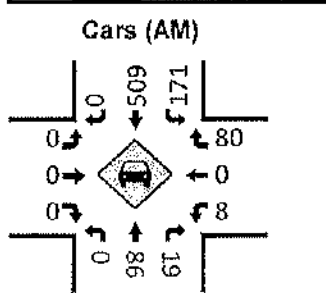
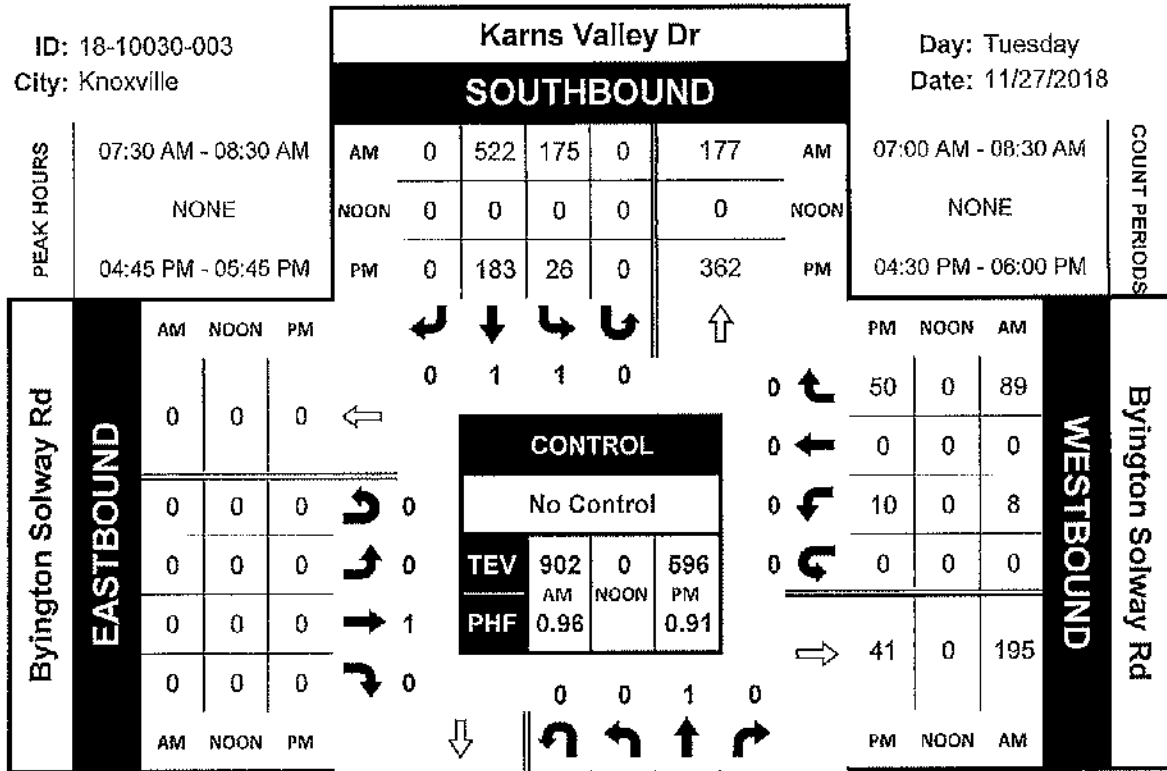
2017 = 12,268
2016 = 11,917
2015 = 10,495
2014 = 11,682
2013 = 10,969
2012 = 11,997
2011 = 11,488
2010 = 11,033
2009 = 11,597
2008 = 10,781
2007 = 10,639
2006 = 12,201
2005 = 12,497
2004 = 11,668
2003 = 10,920
2002 = 10,338
2001 = 10,312
2000 = 10,544
1999 = 10,095
1998 = 9,836
1997 = 10,560
1996 = 14,849
1995 = 11,363
1994 = 9,905
1993 = 8,667
1992 = 9,909
1991 = 9,513
1990 = 9,213
1989 = 9,165
1988 = 8,091
1987 = 7,231
1986 = 7,578
1985 =
1984 =
1983 =

Karns Valley Dr & Byington Solway Rd

Peak Hour Turning Movement Count

ID: 18-10030-003
City: Knoxville

Day: Tuesday
Date: 11/27/2018



National Data & Surveying Services

Intersection Turning Movement Count

Location: Karns Valley Dr & Byington Solway Rd
 City: Knoxville
 Control: No Control

Project ID: 18-10930-003
 Date: 11/27/2010

Total

NS/EW Streets:	Karns Valley Dr				Karns Valley Dr				Byington Solway Rd				Byington Solway Rd				TOTAL
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	11	4	0	5	91	0	0	0	0	0	0	0	0	4	0	115
7:15 AM	0	30	3	0	11	128	0	0	0	0	0	0	0	0	7	0	179
7:30 AM	0	30	4	0	34	151	0	0	0	0	0	0	4	0	12	0	235
7:45 AM	0	21	3	0	31	145	0	0	0	0	0	0	0	0	21	0	221
8:00 AM	0	70	8	0	51	179	0	0	0	0	0	0	0	0	28	0	236
8:15 AM	0	17	5	0	59	97	0	0	0	0	0	0	4	0	28	0	210
TOTAL VOLUMES	0	129	27	0	191	741	0	0	0	0	0	0	8	0	100	0	1196
APPROACH %'s	0.00%	82.69%	17.31%	0.00%	20.40%	79.51%	0.00%	0.00%	0	0	0	0	7.41%	0.00%	92.59%	0.00%	
PEAK HR	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL	0	88	20	0	175	522	0	0	0	0	0	0	8	0	89	0	902
PEAK HR FACTOR	0.000	0.733	0.625	0.000	0.742	0.864	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.795	0.000	0.956
	0.794				0.942								0.758				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
4:30 PM	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	
4:30 PM	0	60	3	0	3	49	0	0	0	0	0	0	2	0	9	0	125
4:45 PM	0	84	2	0	5	35	0	0	0	0	0	0	1	0	14	0	141
5:00 PM	0	77	5	0	9	42	0	0	0	0	0	0	2	0	12	0	147
5:15 PM	0	77	6	0	7	56	0	0	0	0	0	0	4	0	13	0	153
5:30 PM	0	74	2	0	5	50	0	0	0	0	0	0	3	0	11	0	145
5:45 PM	0	56	1	0	3	25	0	0	0	0	0	0	1	0	4	0	90
TOTAL VOLUMES	0	428	19	0	32	257	0	0	0	0	0	0	13	0	63	0	812
APPROACH %'s	0.00%	95.75%	4.25%	0.00%	11.07%	88.93%	0.00%	0.00%	0	0	0	0	17.11%	0.00%	82.89%	0.00%	
PEAK HR	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL	0	312	15	0	26	183	0	0	0	0	0	0	10	0	50	0	596
PEAK HR FACTOR	0.000	0.929	0.625	0.000	0.722	0.817	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.893	0.000	0.914
	0.951				0.829								0.882				

Cannon & Cannon, Inc.

8550 Kingston Pike
 Knoxville, Tennessee 37919
 (865) 670-8555

File Name : Coward Mill @ Byington Solway - Existing AM

Site Code : 773-12

Start Date : 12/13/2018

Page No : 1

Groups Printed- All Vehicles

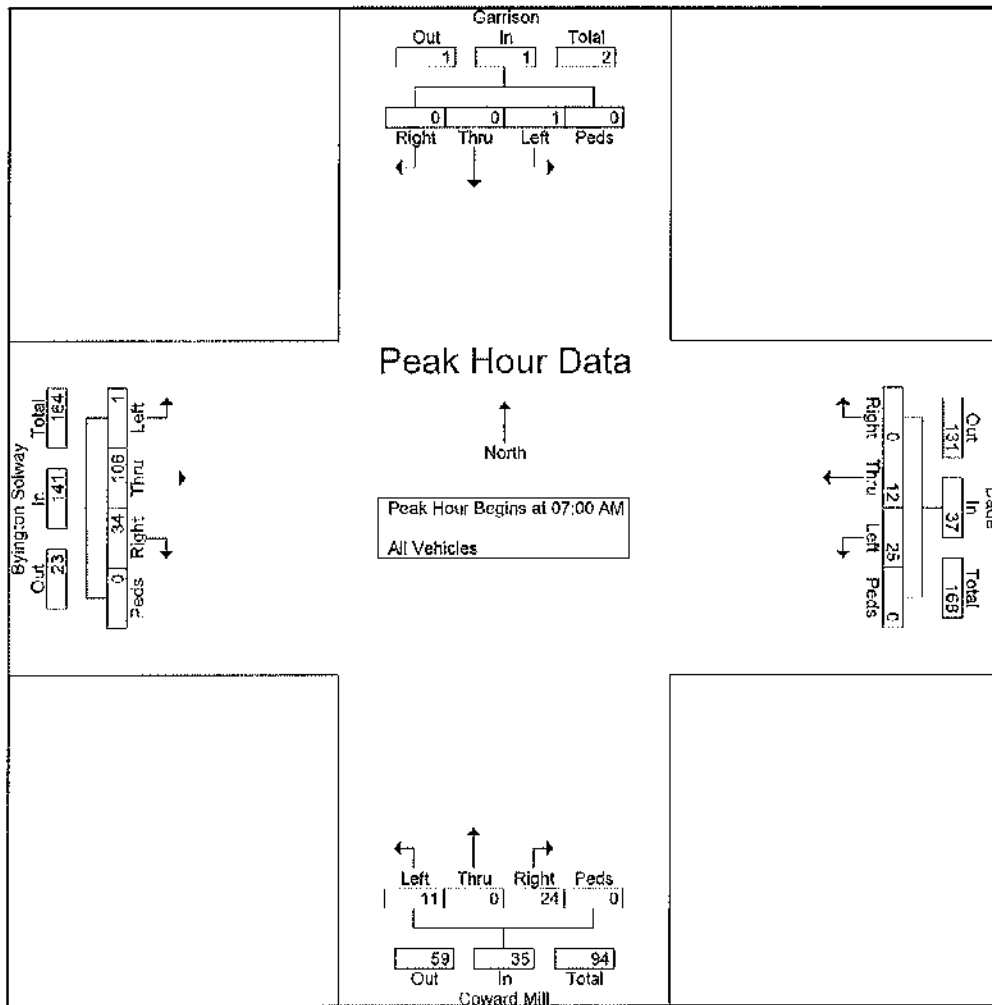
Start Time	Garrison Southbound					Dade Westbound					Coward Mill Northbound					Byington Solway Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
06:45 AM	0	0	0	0	0	2	3	0	0	5	1	0	5	0	6	0	25	4	0	29	40
Total	0	0	0	0	0	2	3	0	0	5	1	0	5	0	6	0	25	4	0	29	40
07:00 AM	0	0	0	0	0	1	2	0	0	3	5	0	7	0	12	0	27	3	0	30	45
07:15 AM	0	0	0	0	0	4	1	0	0	5	2	0	4	0	6	0	35	9	0	44	55
07:30 AM	0	0	0	0	0	5	5	0	0	10	2	0	8	0	10	0	24	10	0	34	54
07:45 AM	1	0	0	0	1	15	4	0	0	19	2	0	5	0	7	1	20	12	0	33	60
Total	1	0	0	0	1	25	12	0	0	37	11	0	24	0	35	1	106	34	0	141	214
08:00 AM	0	0	0	0	0	7	8	0	0	15	2	0	5	0	7	0	15	4	0	19	41
Grand Total	1	0	0	0	1	34	23	0	0	57	14	0	34	0	48	1	146	42	0	189	295
Approch %	100	0	0	0		59.6	40.4	0	0		29.2	0	70.8	0		0.6	77.2	22.2	0		
Total %	0.3	0	0	0	0.3	11.5	7.8	0	0	19.3	4.7	0	11.5	0	16.3	0.3	49.5	14.2	0	64.1	

Cannon & Cannon, Inc.

8550 Kingston Pike
 Knoxville, Tennessee 37919
 (865) 670-8555

File Name : Coward Mill @ Byington Solway - Existing AM
 Site Code : 773-12
 Start Date : 12/13/2018
 Page No : 2

Start Time	Garrison Southbound					Dade Westbound					Coward Mill Northbound					Byington Solway Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 06:45 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	1	2	0	0	3	5	0	7	0	12	0	27	3	0	30	45
07:15 AM	0	0	0	0	0	4	1	0	0	5	2	0	4	0	6	0	36	9	0	44	55
07:30 AM	0	0	0	0	0	5	5	0	0	10	2	0	8	0	10	0	24	10	0	34	54
07:45 AM	1	0	0	0	1	15	4	0	0	19	2	0	5	0	7	1	20	12	0	33	60
Total Volume	1	0	0	0	1	25	12	0	0	37	11	0	24	0	35	1	106	34	0	141	214
% App. Total	100	0	0	0		67.6	32.4	0	0		31.4	0	68.6	0		0.7	75.2	24.1	0		
PHF	.250	.000	.000	.000	.250	.417	.600	.000	.000	.487	.550	.000	.750	.000	.729	.250	.757	.708	.000	.801	.892



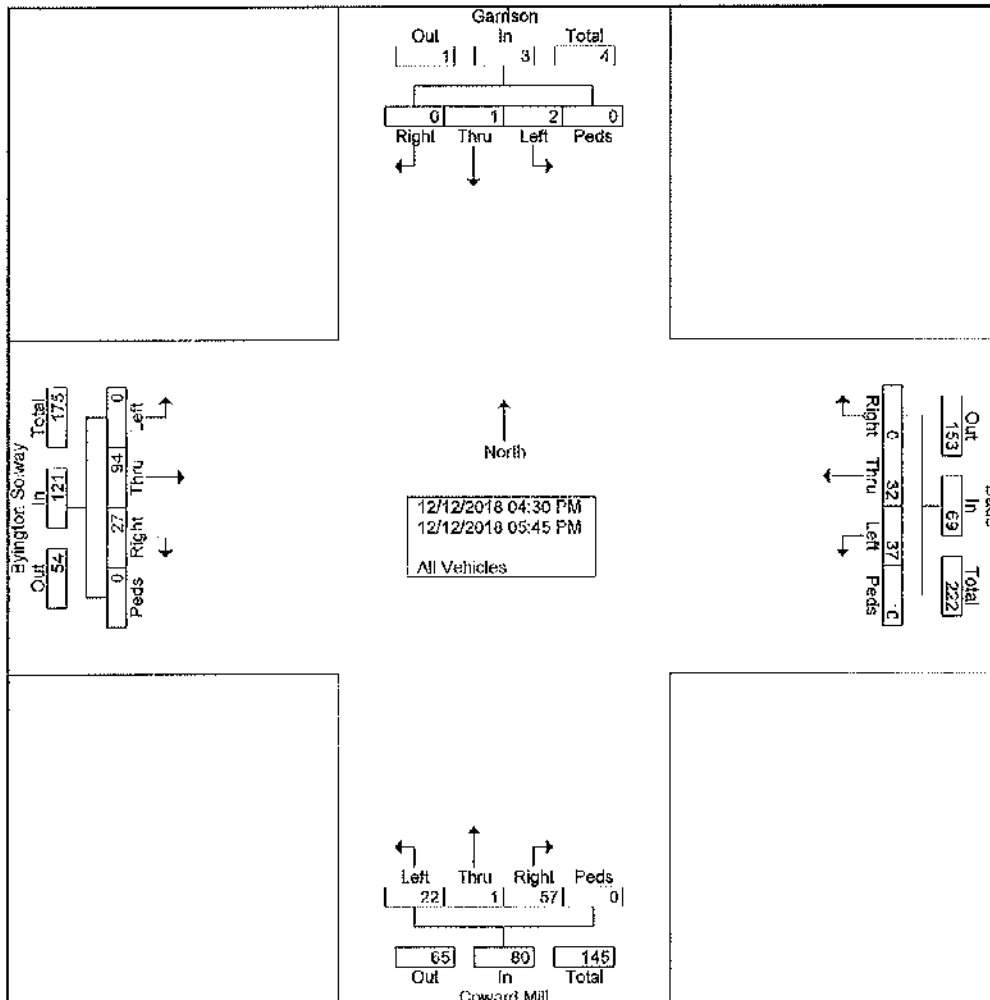
Cannon & Cannon, Inc.

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File Name : Coward Mill @ Byington Solway - Existing PM
 Site Code : 773-12
 Start Date : 12/12/2018
 Page No : 1

Groups Printed- All Vehicles

Start Time	Garrison Southbound					Dade Westbound					Coward Mill Northbound					Byington Solway Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
04:30 PM	1	1	0	0	2	3	8	0	0	11	3	0	11	0	14	0	16	1	0	17	44
04:45 PM	0	0	0	0	0	9	5	0	0	14	5	0	7	0	12	0	14	3	0	17	43
Total	1	1	0	0	2	12	13	0	0	25	8	0	18	0	26	0	30	4	0	34	87
05:00 PM	0	0	0	0	0	9	5	0	0	14	2	0	12	0	14	0	21	6	0	27	55
05:15 PM	1	0	0	0	1	9	5	0	0	14	3	1	10	0	14	0	16	6	0	22	51
05:30 PM	0	0	0	0	0	1	8	0	0	9	5	0	11	0	16	0	17	6	0	23	48
05:45 PM	0	0	0	0	0	6	1	0	0	7	4	0	6	0	10	0	10	5	0	15	32
Total	1	0	0	0	1	25	19	0	0	44	14	1	39	0	54	0	64	23	0	87	186
Grand Total	2	1	0	0	3	37	32	0	0	69	22	1	57	0	80	0	94	27	0	121	273
Approch %	86.7	33.3	0	0		53.6	46.4	0	0		27.5	1.2	71.2	0		0	77.7	22.3	0		
Total %	0.7	0.4	0	0	1.1	13.6	11.7	0	0	25.3	8.1	0.4	20.9	0	29.3	0	34.4	9.9	0	44.3	

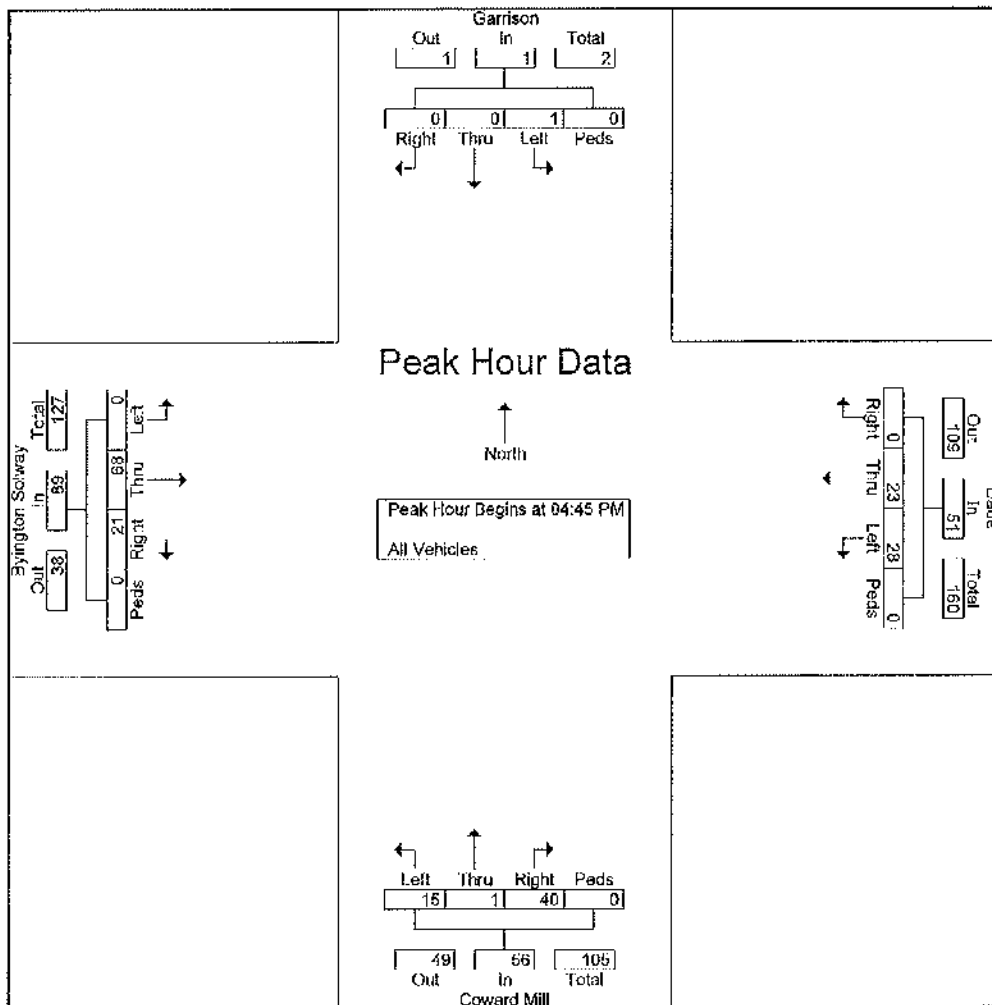


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File Name : Coward Mill @ Byington Solway - Existing PM
Site Code : 773-12
Start Date : 12/12/2018
Page No : 2

Start Time	Garrison Southbound					Dade Westbound					Coward Mill Northbound					Byington Solway Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:30 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	9	5	0	0	14	5	0	7	0	12	0	14	3	0	17	43
05:00 PM	0	0	0	0	0	9	5	0	0	14	2	0	12	0	14	0	21	6	0	27	55
05:15 PM	1	0	0	0	1	9	5	0	0	14	3	1	10	0	14	0	16	6	0	22	51
05:30 PM	0	0	0	0	0	1	8	0	0	9	5	0	11	0	16	0	17	6	0	23	48
Total Volume	1	0	0	0	1	26	23	0	0	51	15	1	40	0	56	0	68	21	0	89	197
% App. Total	100	0	0	0		54.9	45.1	0	0												
PHF	.250	.000	.000	.000	.250	.778	.719	.000	.000	.911	.750	.250	.833	.000	.875	.000	.810	.875	.000	.824	.895



APPENDIX B – TRIP GENERATION

Land Use: 210

Single-Family Detached Housing

Description

Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.

Additional Data

The number of vehicles and residents had a high correlation with average weekday vehicle trip ends. The use of these variables was limited, however, because the number of vehicles and residents was often difficult to obtain or predict. The number of dwelling units was generally used as the independent variable of choice because it was usually readily available, easy to project, and had a high correlation with average weekday vehicle trip ends.

This land use included data from a wide variety of units with different sizes, price ranges, locations, and ages. Consequently, there was a wide variation in trips generated within this category. Other factors, such as geographic location and type of adjacent and nearby development, may also have had an effect on the site trip generation.

Single-family detached units had the highest trip generation rate per dwelling unit of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than other residential land uses; they were generally located farther away from shopping centers, employment areas, and other trip attractors than other residential land uses; and they generally had fewer alternative modes of transportation available because they were typically not as concentrated as other residential land uses.

Time-of-day distribution data for this land use are presented in Appendix A. For the six general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:00 and 5:00 p.m., respectively. For the two sites with Saturday data, the overall highest vehicle volume was counted between 3:00 and 4:00 p.m. For the one site with Sunday data, the overall highest vehicle volume was counted between 10:15 and 11:15 a.m.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Illinois, Indiana, Maryland, Minnesota, Montana, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 903, 925, 936

Single-Family Detached Housing (210)

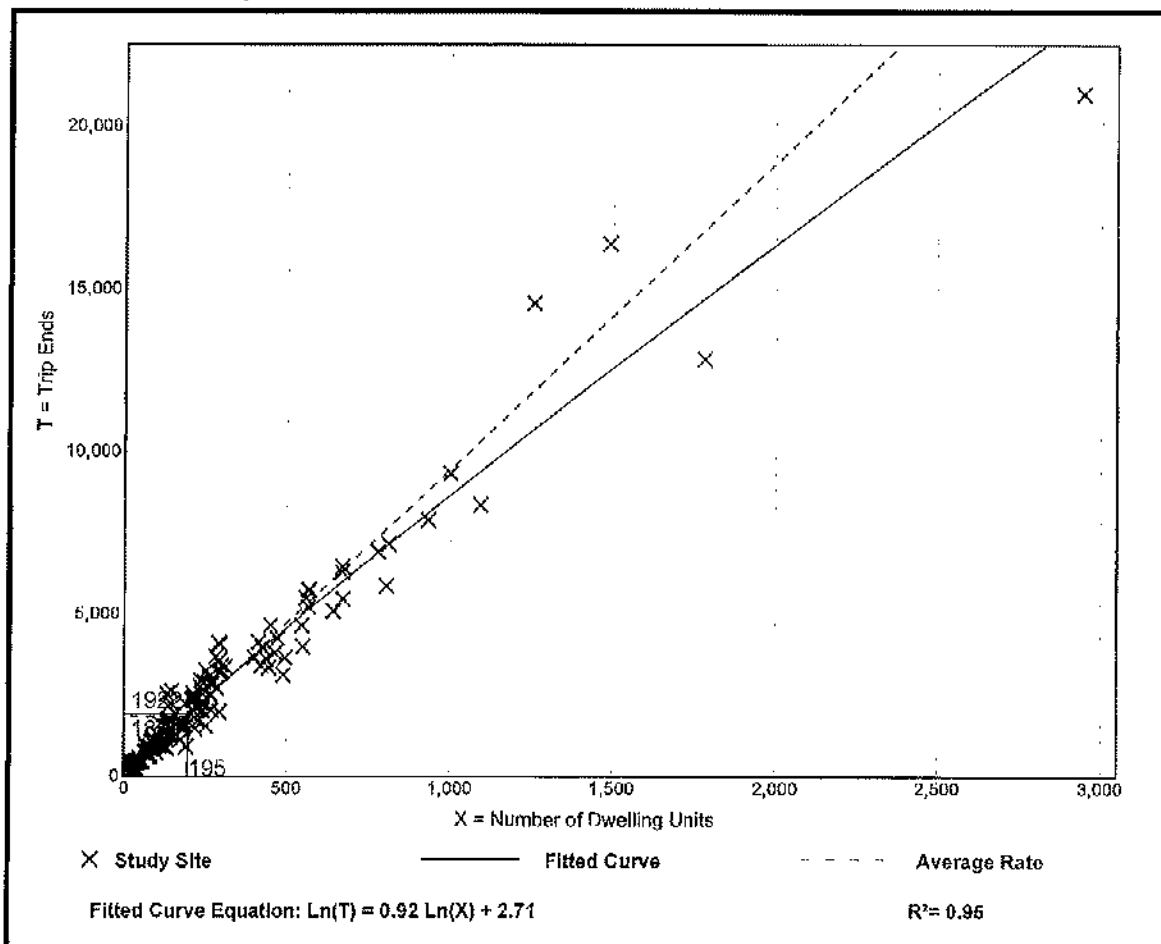
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

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

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



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

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 173

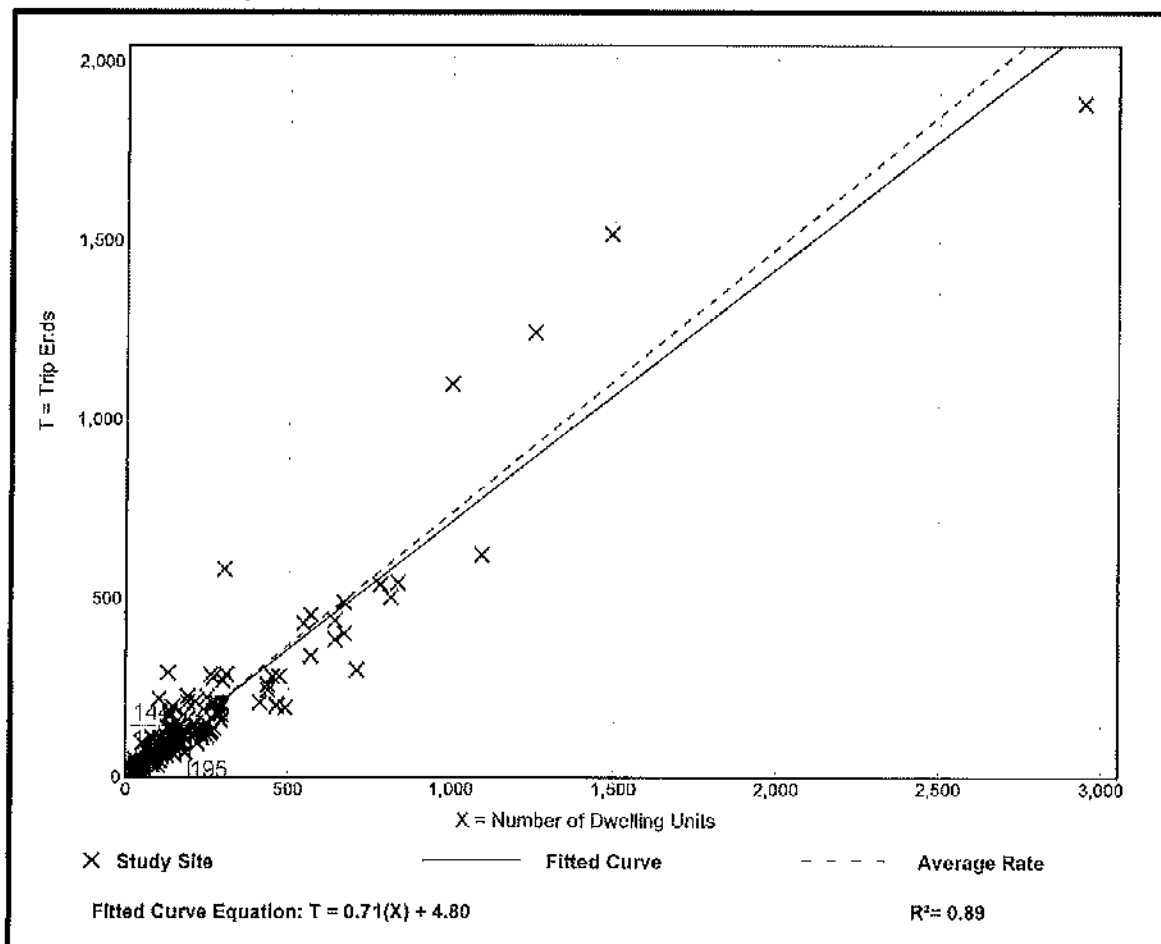
Avg. Num. of Dwelling Units: 219

Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



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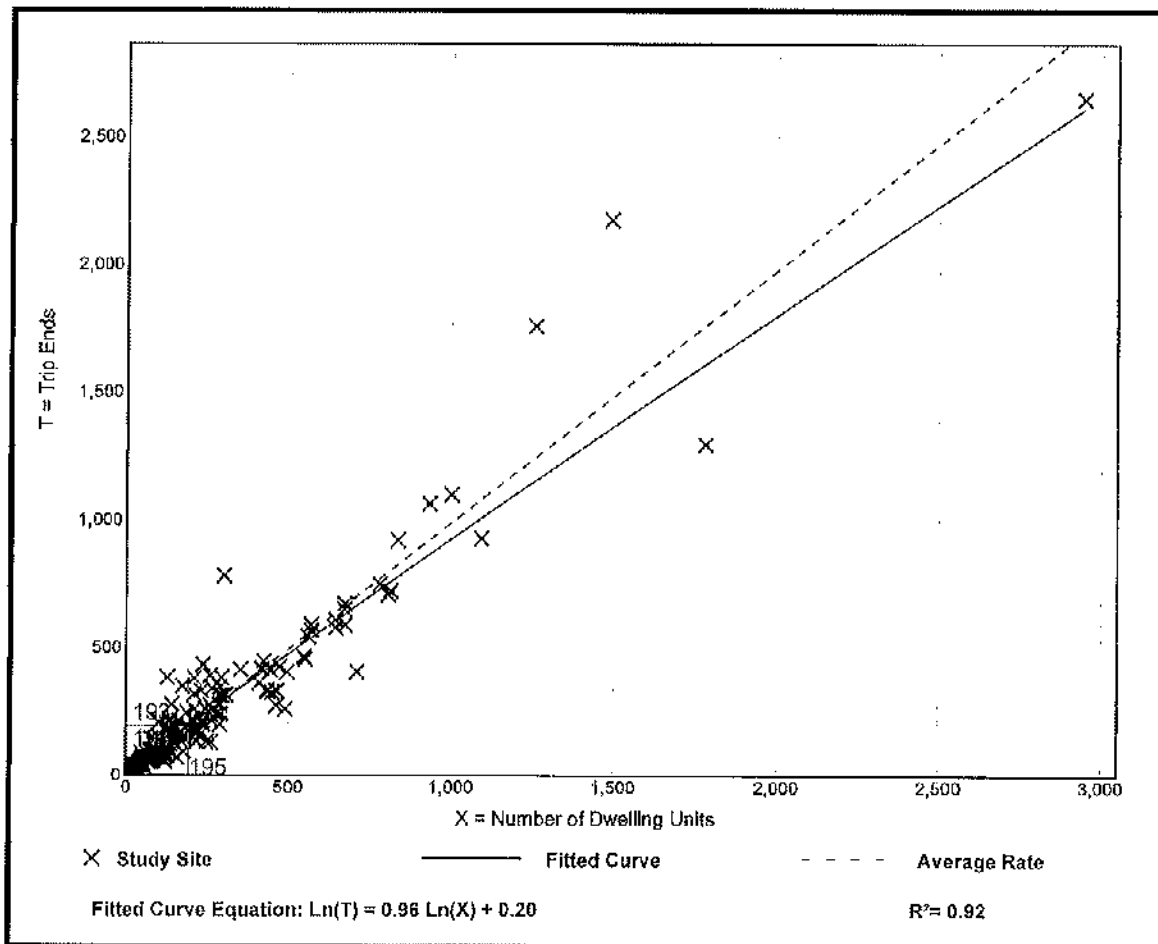
Single-Family Detached Housing (210)

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

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



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

APPENDIX C - ANALYSES

CAPACITY AND LEVEL-OF-SERVICE CONCEPTS

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

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

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

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

LOS CRITERIA: SIGNALIZED & UNSIGNALIZED INTERSECTIONS

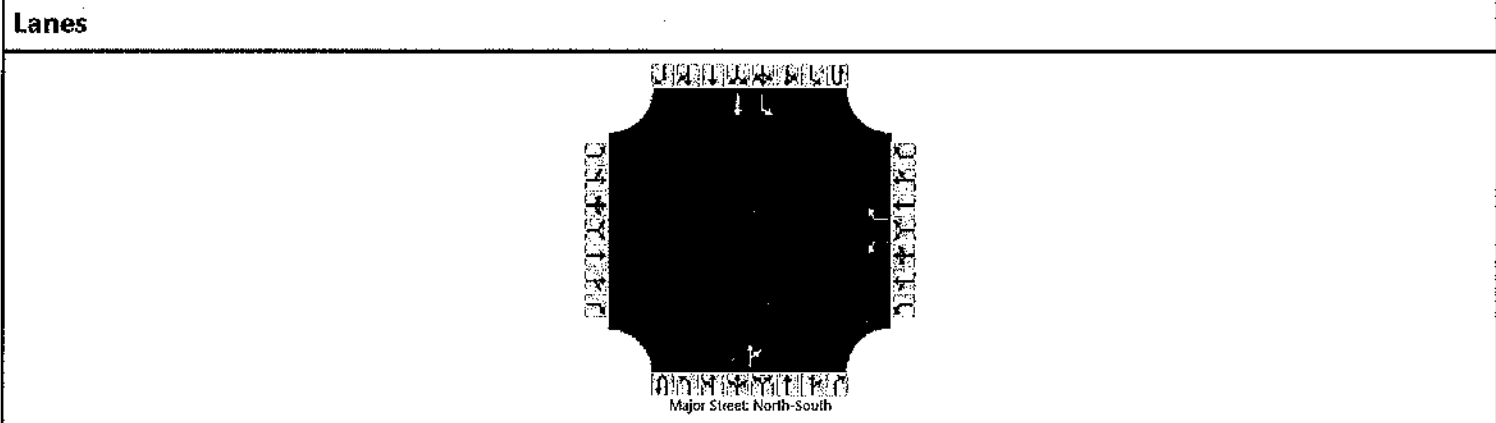
LOS	CONTROL DELAY (S/VEH)		
	SIGNALIZED	UNSIGNALIZED	ROUNDBABOUT
A	≤10	≤10	≤10
B	>10-20	>10-15	>10-15
C	>20-35	>15-25	>15-25
D	>35-55	>25-35	>25-35
E	>55-80	>35-50	>35-50
F	>80	>50	>50

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

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

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 1		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/12/2018			East/West Street	Byington-Solway Road		
Analysis Year	2018			North/South Street	Karns Valley Drive		
Time Analyzed	AM Peak Existing			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1		0	1	0		0	1	0
Configuration						L		R				TR		L		T
Volume (veh/h)						8		89			88	20		175		522
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized							No									
Median Type Storage							Left Only									1

Critical and Follow-up Headways

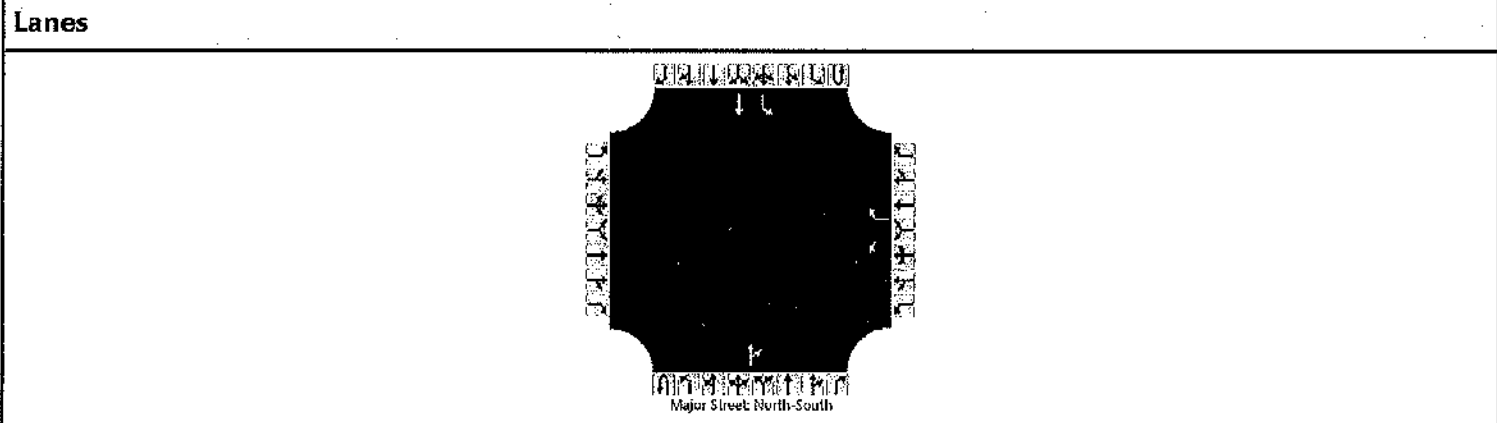
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						8		94						184		
Capacity, c (veh/h)						295		949						1469		
v/c Ratio						0.03		0.10						0.13		
95% Queue Length, Q ₉₅ (veh)						0.1		0.3						0.4		
Control Delay (s/veh)						17.5		9.2						7.8		
Level of Service (LOS)						C		A						A		
Approach Delay (s/veh)							9.9								2.0	
Approach LOS							A									

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 1		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/12/2018			East/West Street	Byington-Solway Road		
Analysis Year	2018			North/South Street	Karns Valley Drive		
Time Analyzed	PM Peak Existing			Peak Hour Factor	0.91		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	1	0	0	1	1	0
Configuration						L		R				TR		L	T	
Volume (veh/h)						10		50			312	15		26	183	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized							No									
Median Type Storage							Left Only									1

Critical and Follow-up Headways

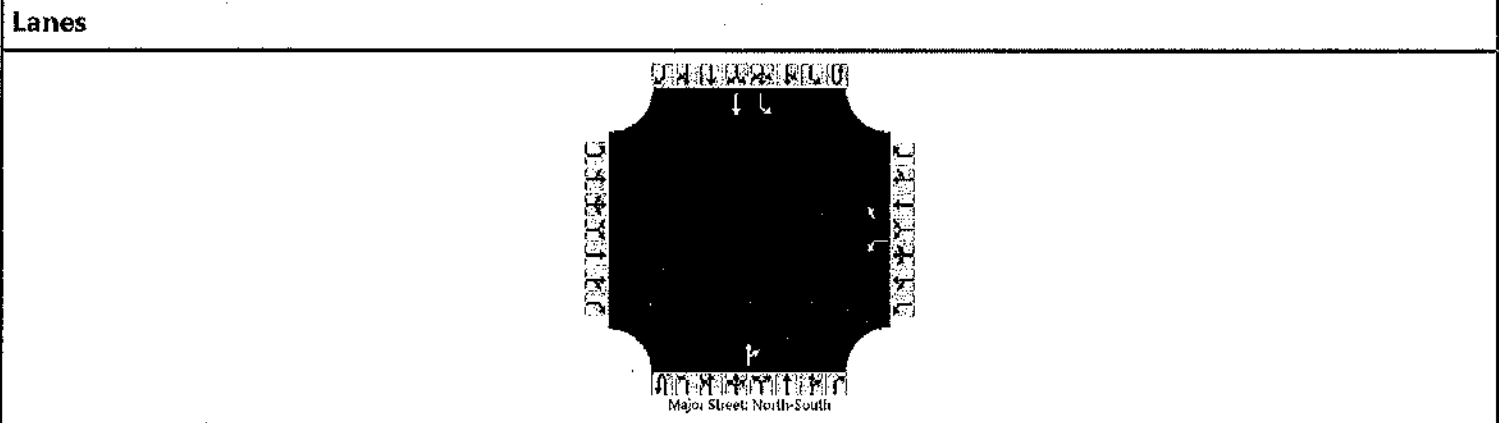
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						11		55						29		
Capacity, c (veh/h)						539		690						1194		
v/c Ratio						0.02		0.08						0.02		
95% Queue Length, Q ₉₅ (veh)						0.1		0.3						0.1		
Control Delay (s/veh)						11.8		10.7						8.1		
Level of Service (LOS)						B		B						A		
Approach Delay (s/veh)							10.9								1.0	
Approach LOS							B									

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ALC	Intersection	Study Int 1
Agency/Co.	CCI	Jurisdiction	Knox County
Date Performed	12/12/2018	East/West Street	Byington-Solway Road
Analysis Year	2023	North/South Street	Karns Valley Drive
Time Analyzed	AM Peak Background	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Garrison Heights Subdivision TIS		



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	1	0	0	1	1	0
Configuration						L		R				TR		L	T	
Volume (veh/h)						9		101			100	23		198	591	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized							No									
Median Type Storage							left Only									1

Critical and Follow-up Headways

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

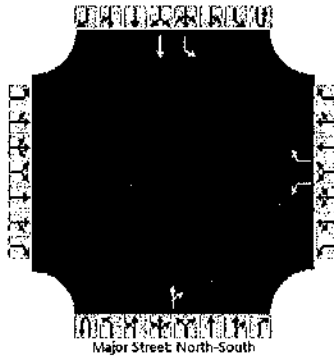
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9		106							208	
Capacity, c (veh/h)						253		932							1450	
v/c Ratio						0.04		0.11							0.14	
95% Queue Length, Q ₉₅ (veh)						0.1		0.4							0.5	
Control Delay (s/veh)						19.8		9.4							7.9	
Level of Service (LOS)						C		A							A	
Approach Delay (s/veh)							10.2								2.0	
Approach LOS							B									

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ALC	Intersection	Study Int 1
Agency/Co.	CCI	Jurisdiction	Knox County
Date Performed	12/12/2018	East/West Street	Byington-Solway Road
Analysis Year	2023	North/South Street	Karns Valley Drive
Time Analyzed	PM Peak Background	Peak Hour Factor	0.91
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Garrison Heights Subdivision TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	10	1	2	3	4	4	5	6
Number of Lanes		0	0	0		1	0	1		0	1	0		0	1	0
Configuration						L		R				TR		L	T	
Volume (veh/h)						11		57			353	17		29	207	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized							No									
Median Type Storage							Left Only									1

Critical and Follow-up Headways

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

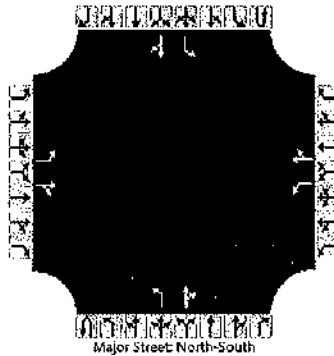
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						12		63							32	
Capacity, c (veh/h)						503		650							1147	
v/c Ratio						0.02		0.10							0.03	
95% Queue Length, Q ₉₅ (veh)						0.1		0.3							0.1	
Control Delay (s/veh)						12.3		11.1							8.2	
Level of Service (LOS)						B		B							A	
Approach Delay (s/veh)							11.3								1.0	
Approach LOS							B									

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 1		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/13/2018			East/West Street	Byington-Solway Road		
Analysis Year	2023			North/South Street	Karns Valley Drive		
Time Analyzed	AM Peak Combined			Peak Hour Factor	0.95		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		/	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	1	0	0	1	1	0
Configuration		L		TR		L		TR		L		TR		L		TR
Volume (veh/h)		27	11	48		9	2	101		18	100	23		198	591	9
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type Storage		Left Only								1						

Critical and Follow-up Headways

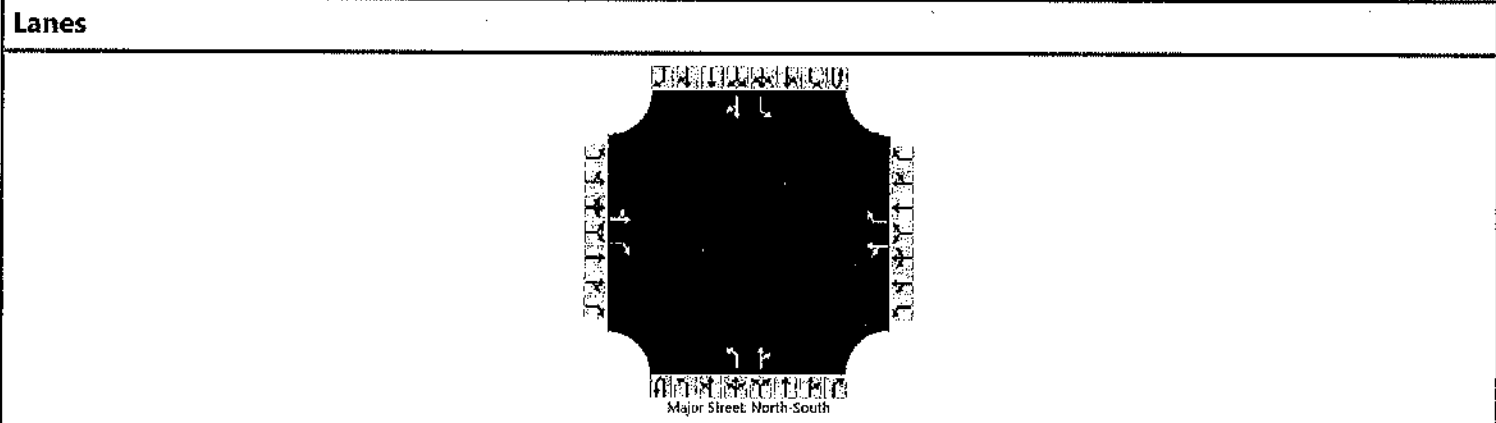
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		28		62		9		108		19				208		
Capacity, c (veh/h)		187		343		150		849		945				1450		
v/c Ratio		0.15		0.18		0.06		0.13		0.02				0.14		
95% Queue Length, Q ₉₅ (veh)		0.5		0.7		0.2		0.4		0.1				0.5		
Control Delay (s/veh)		27.7		17.8		30.6		9.9		8.9				7.9		
Level of Service (LOS)		D		C		D		A		A				A		
Approach Delay (s/veh)		20.9				11.5				1.1				2.0		
Approach LOS		C				B										

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 1		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/13/2018			East/West Street	Byington-Solway Road		
Analysis Year	2023			North/South Street	Karns Valley Drive		
Time Analyzed	PM Peak Combined			Peak Hour Factor	0.91		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6
Number of Lanes		0	1	1		0	1	1		0	1	0		0	1	0
Configuration		LT		R		LT		R		L		TR		L		TR
Volume (veh/h)		17	4	35		11	6	57		61	353	17		29	207	25
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No											
Median Type Storage	Left Only								1							

Critical and Follow-up Headways

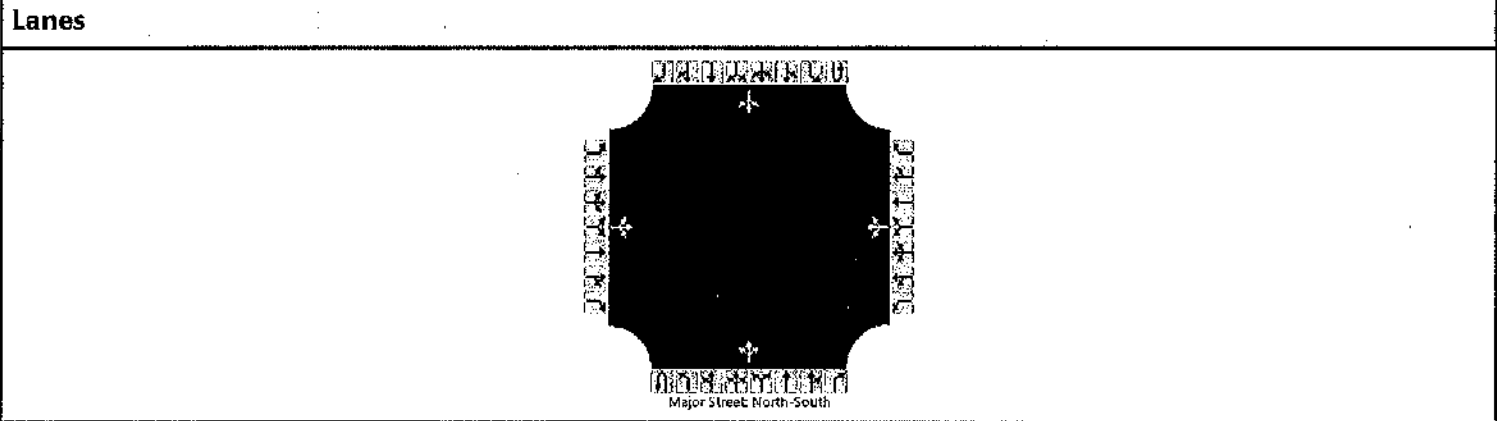
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		23		38		19		63		67				32		
Capacity, c (veh/h)		308		795		319		650		1303				1147		
v/c Ratio		0.07		0.05		0.06		0.10		0.05				0.03		
95% Queue Length, Q ₉₅ (veh)		0.2		0.2		0.2		0.3		0.2				0.1		
Control Delay (s/veh)		17.6		9.8		17.0		11.1		7.9				8.2		
Level of Service (LOS)		C		A		C		B		A				A		
Approach Delay (s/veh)	12.7				12.5				1.1				0.9			
Approach LOS	B				B											

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 2		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/12/2018			East/West Street	Byington-Solway/C. Jones		
Analysis Year	2018			North/South Street	Site/Coward Mill Road		
Time Analyzed	AM Peak Existing			Peak Hour Factor	0.89		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Priority		10	11	12		/	8	9	10	1	2	3	40	4	5	6
Number of Lanes		0	1	0		0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	106	34		25	12	0		11	0	24		0	0	1
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

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

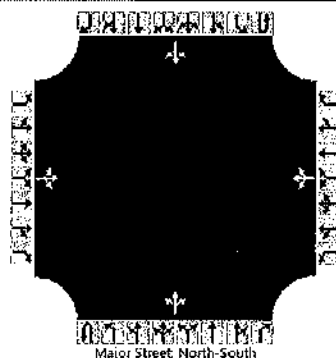
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			158				42				12				0	
Capacity, c (veh/h)			880				764				1613				1580	
v/c Ratio			0.18				0.05				0.01				0.00	
95% Queue Length, Q ₉₅ (veh)			0.7				0.2				0.0				0.0	
Control Delay (s/veh)			10.0				10.0				7.2	0.1			7.3	0.0
Level of Service (LOS)			A				A				A	A			A	A
Approach Delay (s/veh)	10.0				10.0				2.3				0.0			
Approach LOS	A				A											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ALC	Intersection	Study Int 2
Agency/Co.	CCI	Jurisdiction	Knox County
Date Performed	12/12/2018	East/West Street	Byington-Solway/C. Jones
Analysis Year	2018	North/South Street	Site/Coward Mill Road
Time Analyzed	PM Peak Existing	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Garrison Heights Subdivision TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement																	
Priority		10	11	12		/	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	1	0		0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		0	68	21		28	23	0		15	1	40		0	0	1	
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage	Undivided																

Critical and Follow-up Headways

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

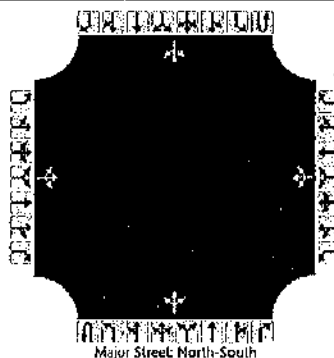
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			99				57				17				0	
Capacity, c (veh/h)			852				801				1613				1556	
v/c Ratio			0.12				0.07				0.01				0.00	
95% Queue Length, Q ₉₅ (veh)			0.4				0.2				0.0				0.0	
Control Delay (s/veh)			9.8				9.8				7.3	0.1			7.3	0.0
Level of Service (LOS)			A				A				A	A			A	A
Approach Delay (s/veh)	9.8				9.8				2.0				0.0			
Approach LOS	A				A											

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 2		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/12/2018			East/West Street	Byington-Solway/C. Jones		
Analysis Year	2023			North/South Street	Site/Coward Mill Road		
Time Analyzed	AM Peak Background			Peak Hour Factor	0.89		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	1	0		0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		1	120	39		28	14	0		12	0	27		0	0	1	
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

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

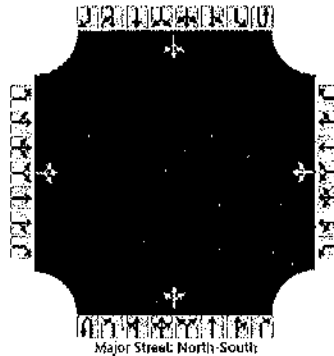
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			180			47				13				0			
Capacity, c (veh/h)			875			740				1613				1576			
v/c Ratio			0.21			0.06				0.01				0.00			
95% Queue Length, Q ₉₅ (veh)			0.8			0.2				0.0				0.0			
Control Delay (s/veh)			10.2			10.2				7.3		0.1		7.3		0.0	
Level of Service (LOS)			B			B				A		A		A		A	
Approach Delay (s/veh)		10.2				10.2				2.3				0.0			
Approach LOS		B				B				A				A			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 2		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/12/2018			East/West Street	Byington-Solway/C. Jones		
Analysis Year	2023			North/South Street	Site/Coward Mill Road		
Time Analyzed	PM Peak Background			Peak Hour Factor	0.90		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	1	0		0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		0	77	24		32	26	0		17	1	45		0	0	1	
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

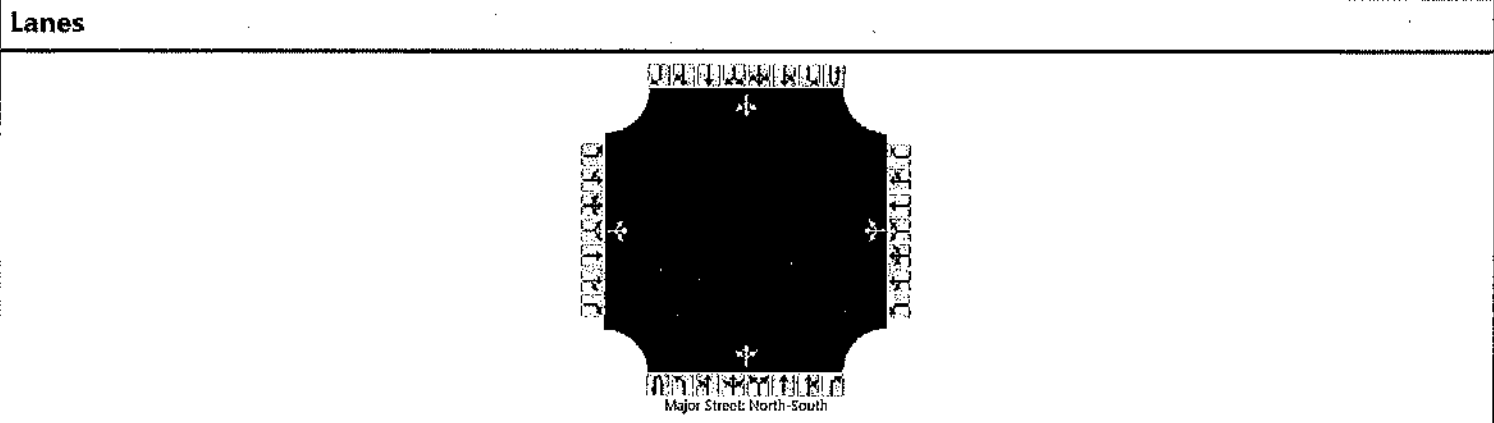
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			112			64				19				0			
Capacity, c (veh/h)			843			780				1613				1549			
v/c Ratio			0.13			0.08				0.01				0.00			
95% Queue Length, Q ₉₅ (veh)			0.5			0.3				0.0				0.0			
Control Delay (s/veh)			9.9			10.0				7.3		0.1		7.3		0.0	
Level of Service (LOS)			A			B				A		A		A		A	
Approach Delay (s/veh)		9.9				10.0				2.0				0.0			
Approach LOS		A				B											

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 2		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/12/2018			East/West Street	Byington-Solway/C. Jones		
Analysis Year	2023			North/South Street	Site/Coward Mill Road		
Time Analyzed	AM Peak Combined-Exist Op			Peak Hour Factor	0.89		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement																	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	1	0		0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		3	120	39		28	14	3		12	2	27		11	5	6	
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

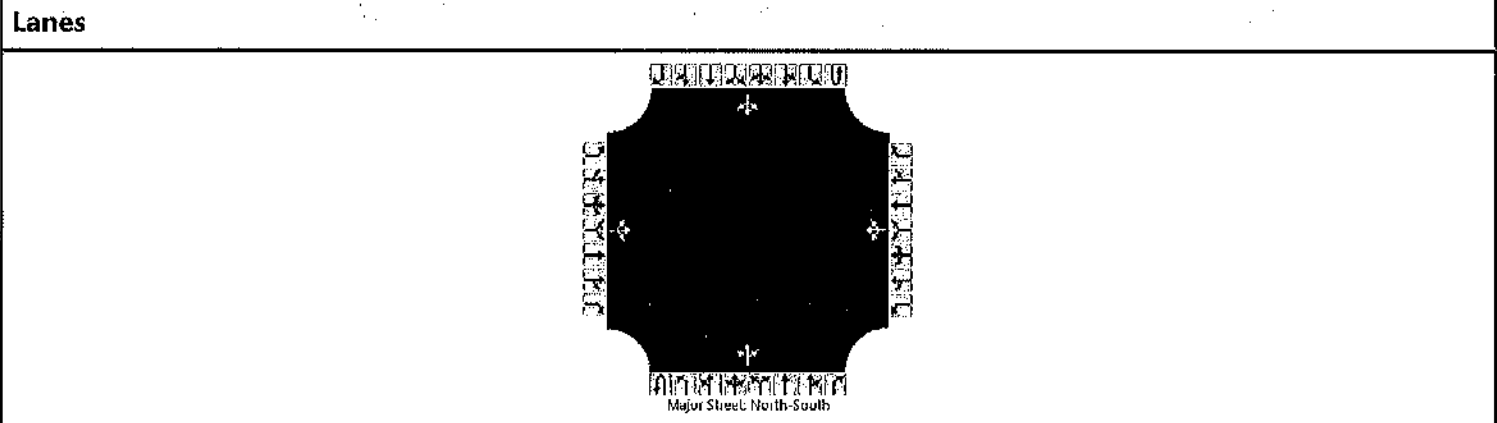
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			182				51				13				12		
Capacity, c (veh/h)			837				710				1598				1573		
v/c Ratio			0.22				0.07				0.01				0.01		
95% Queue Length, Q ₉₅ (veh)			0.8				0.2				0.0				0.0		
Control Delay (s/veh)			10.5				10.5				7.3	0.1			7.3	0.1	
Level of Service (LOS)			B				B				A	A			A	A	
Approach Delay (s/veh)		10.5				10.5				2.2				3.7			
Approach LOS		B				B				A				A			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 2		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/12/2018			East/West Street	Byington-Solway/C. Jones		
Analysis Year	2023			North/South Street	Site/Coward Mill Road		
Time Analyzed	PM Peak Combined-Exist Op			Peak Hour Factor	0.90		
Intersection Orientation	North-South			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound				
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Movement																	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		12	77	24		32	26	12		17	7	45		7	4	5	
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															

Critical and Follow-up Headways

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

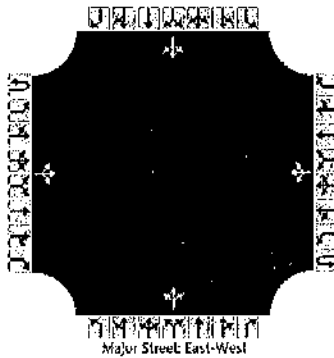
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			126				78				19				8		
Capacity, c (veh/h)			814				782				1601				1540		
v/c Ratio			0.15				0.10				0.01				0.01		
95% Queue Length, Q ₉₅ (veh)			0.5				0.3				0.0				0.0		
Control Delay (s/veh)			10.2				10.1				7.3	0.1			7.3	0.0	
Level of Service (LOS)			B				B				A	A			A	A	
Approach Delay (s/veh)		10.2				10.1				1.9				3.2			
Approach LOS		B				B				A				A			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 2		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/13/2018			East/West Street	Byington-Solway/C. Jones		
Analysis Year	2023			North/South Street	Site/Coward Mill Road		
Time Analyzed	AM Peak Combined-Reverse			Peak Hour Factor	0.89		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		3	120	39		28	14	3		12	2	27		11	5	6
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

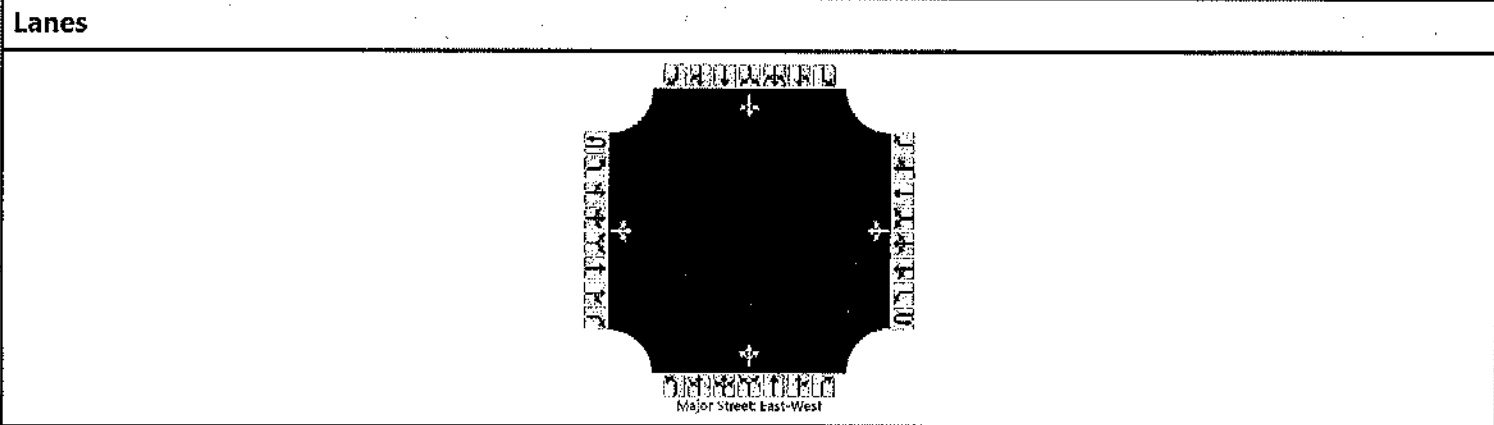
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		3.53				2.23				2.23	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		3				31					46				25		
Capacity, c (veh/h)		1007				1391					905				719		
v/c Ratio		0.00				0.02					0.05				0.03		
95% Queue Length, Q ₉₅ (veh)		0.0				0.1					0.2				0.1		
Control Delay (s/veh)		8.6		0.0		7.6		0.2			9.2				10.2		
Level of Service (LOS)		A		A		A		A			A				B		
Approach Delay (s/veh)		0.2				4.8				9.2				10.2			
Approach LOS		A				A				A				B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	ALC			Intersection	Study Int 2		
Agency/Co.	CCI			Jurisdiction	Knox County		
Date Performed	12/12/2018			East/West Street	Byington-Solway/C. Jones		
Analysis Year	2023			North/South Street	Site/Coward Mill Road		
Time Analyzed	PM Peak Combined-Reverse			Peak Hour Factor	0.90		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Garrison Heights Subdivision TIS						



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		12	77	24		32	26	12		17	7	45		7	4	5
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

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

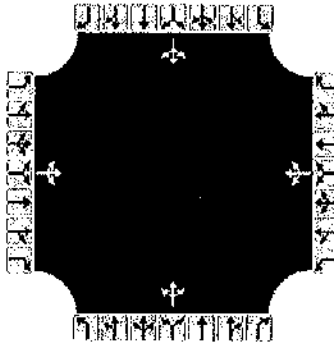
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		13				36					77					18	
Capacity, c (veh/h)		992				1471					926					717	
v/c Ratio		0.01				0.02					0.08					0.02	
95% Queue Length, Q ₉₅ (veh)		0.0				0.1					0.3					0.1	
Control Delay (s/veh)		8.7		0.1		7.5		0.2			9.2					10.2	
Level of Service (LOS)		A		A		A		A			A					B	
Approach Delay (s/veh)		1.0				3.5				9.2				10.2			
Approach LOS		A				A				A				B			

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	ALC	Intersection	Study Int 2
Agency/Co.	CCI	Jurisdiction	Knox County
Date Performed	12/14/2018	East/West Street	Byington-Solway/C. Jones
Analysis Year	2023	North/South Street	Site/Coward Mill Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.89
Time Analyzed	AM Peak Combined-4 Way		
Project Description	Garrison Heights Subdivision TIS		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	3	120	39	28	14	3	12	2	27	11	5	6
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	182			51			46			25		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.162			0.045			0.041			0.022		
Final Departure Headway, hd (s)	4.00			4.35			4.12			4.41		
Final Degree of Utilization, x	0.202			0.061			0.053			0.030		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.00			2.35			2.12			2.41		

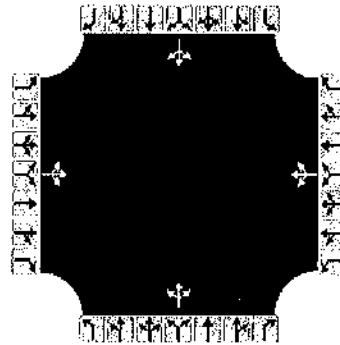
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	182			51			46			25		
Capacity	900			828			874			815		
95% Queue Length, Q ₉₅ (veh)	0.8			0.2			0.2			0.1		
Control Delay (s/veh)	8.0			7.6			7.3			7.6		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	8.0			7.6			7.3			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	7.8						A					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	ALC	Intersection	Study Int 2
Agency/Co.	CCI	Jurisdiction	Knox County
Date Performed	12/14/2018	East/West Street	Byington-Solway/C. Jones
Analysis Year	2023	North/South Street	Site/Coward Mill Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.90
Time Analyzed	PM Peak Combined-4 Way		
Project Description	Garrison Heights Subdivision TIS		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	12	77	24	32	26	12	17	7	45	7	4	5
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	126			78			77			18		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.112			0.069			0.068			0.016		
Final Departure Headway, hd (s)	4.11			4.25			4.05			4.35		
Final Degree of Utilization, x	0.143			0.092			0.086			0.021		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.11			2.25			2.05			2.35		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	126			78			77			18		
Capacity	876			847			889			827		
95% Queue Length, Q ₉₅ (veh)	0.5			0.3			0.3			0.1		
Control Delay (s/veh)	7.8			7.7			7.4			7.4		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.8			7.7			7.4			7.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	7.7						A					

TABLE 58 KNOX COUNTY RIGHT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH	Project No: <i>Garrison Heights Subd.</i> Project Name: <i>Traffic Impact Study</i> Notes: <i>Combined Traffic</i>
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RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25	③ ④					
25 - 49			②			
50 - 99						
100 - 149						
150 - 199						
200 - 249						Yes
250 - 299					Yes	Yes
300 - 349				Yes	Yes	Yes
350 - 399			Yes	Yes	Yes	Yes
400 - 449			Yes	Yes	Yes	Yes
450 - 499		Yes	Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
Fewer Than 25					①	
25 - 49					Yes	Yes
50 - 99				Yes	Yes	Yes
100 - 149			Yes	Yes	Yes	Yes
150 - 199		Yes	Yes	Yes	Yes	Yes
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)
①	Study Int. 1	AM Peak	591	9	No
②	Study Int. 1	PM Peak	207	25	No
③	Study Int. 2	AM Peak	42	3	No
④	Study Int. 2	PM Peak	58	12	No

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

TABLE 4A KNOX COUNTY LEFT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 0 TO 35 MPH	Project No: <i>Garrison Heights Subd.</i> Project Name: <i>Traffic Impact Study</i> Notes: <i>Combined Traffic</i>
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(If the left-turn volume exceeds the table value a left-turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	300	235	185	145	120	100
150 - 199	245	200	160	130	110	90
200 - 249	205	170	140	115	100	80
250 - 299	175	150	125	105	90	70
300 - 349	155	135	110	95	80	65
350 - 399	135	120	100	85	70	60
400 - 449	120	105	90	75	65	55
450 - 499	105	90	80	70	60	50
500 - 549	95	80	70	65	55	50
550 - 599	85	70	65	60	50	45
600 - 649	75	65	60	55	45	40
650 - 699	70	60	55	50	40	35
700 - 749	65	55	50	45	35	30
750 or More	60	50	45	40	35	30

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	100	80	70	60	55	50
150 - 199	90	75	65	55	50	45
200 - 249	80	72	60	55	50	45
250 - 299	70	65	55	50	45	40
300 - 349	65	60	50	50	45	40
350 - 399	60	55	50	45	40	40
400 - 449	55	50	45	45	40	35
450 - 499	50	45	45	40	35	35
500 - 549	50	45	40	40	35	35
550 - 599	45	40	40	35	35	35
600 - 649	40	35	35	35	35	30
650 - 699	35	35	35	30	30	30
700 - 749	30	30	30	30	30	30
750 or More	30	30	30	30	30	30

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

Intersection	Time Period	Opposing Volume	Through Volume	Left-Turn Volume	Warrant Threshold	Left-Turn Lane Warranted (Yes / No)
① Study Int. 2	AM Peak	17	159	3	NA*	No
② Study Int. 2	PM Peak	38	101	12	NA*	No

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

* Opposing Volume too low for table.

APPENDIX D – KNOXVILLE / KNOX COUNTY MPC COMMENTS

Alan Childers

From: Tarren Barrett <tarren.barrett@knoxplanning.org>
Sent: Wednesday, December 12, 2018 8:18 AM
To: Alan Childers
Subject: Re: Revised Concept for Garrison Road

When do you think is the earliest we can expect a revision of the study? In order to move forward for the January 10th Planning Commission meeting, we will need it by Friday, December 14th. We need to have time before the Christmas holidays to review the study and provide comments (if needed). Thanks!

On Tue, Dec 11, 2018 at 4:02 PM Tarren Barrett <tarren.barrett@knoxplanning.org> wrote:
Alan,

After my initial review of the TIS, I have a couple of items that need to be added to the revision.

Along with the update of the access points of two from Karns Valley Road to one from Karns Valley Road & one from Garrison Drive, can you also please add the total 1,922 weekday trips (in Table 2) to the table? Also, please discuss what is hindering sight distance on page 14.

Thanks!

--

Tarren Barrett, EIT
Transportation Engineer
865-215-3826



Knoxville-Knox County Planning | KnoxPlanning.org
400 Main Street, Suite 403 | Knoxville, TN 37902

On Fri, Dec 7, 2018 at 5:09 PM Alan Childers <achilders@cannon-cannon.com> wrote:
Thanks Tarren. We are on it. You have a nice weekend as well!

Sent from my iPhone

> On Dec 7, 2018, at 4:10 PM, Tarren Barrett <tarren.barrett@knoxmpc.org> wrote:

>

> Alan,

>

> If you didn't know already, Garrison Heights (off Karns Valley Drive) site plan has been changed due to recommendations by Knox County on access. The applicant (Southland Engineering Consultants/ Primos

Alan Childers

From: Tarren Barrett <tarren.barrett@knoxmpc.org>
Sent: Friday, December 07, 2018 4:11 PM
To: Alan Childers
Cc: Mike Conger
Subject: Fwd: Revised Concept for Garrison Road
Attachments: MYSCAN_20181206_0001.PDF; MYSCAN_20181206_0002.PDF

Alan,

If you didn't know already, Garrison Heights (off Karns Valley Drive) site plan has been changed due to recommendations by Knox County on access. The applicant (Southland Engineering Consultants/ Primos Land Company) has already be informed that they will have to update their traffic study with counts from Garrison Rd, since one of the access points has shifted. The attachment is the new site plan with those changes. I just wanted to make sure that this information was relayed to you.

Have a great weekend!

V/R,
Tarren

Tarren Barrett, EIT
Transportation Engineer
Knoxville Regional TPO &
Metropolitan Planning Commission
400 Main St, Suite 403
Knoxville, TN 37902
Phone: 865-215-3826
Fax: 865-215-2068
tarren.barrett@knoxtrans.org

----- Forwarded message -----

From: Tom Brechko <tom.brechko@knoxmpc.org>
Date: Fri, Dec 7, 2018 at 4:03 PM
Subject: Fwd: Revised Concept for Garrison Road
To: Tarren Barrett <tarren.barrett@knoxmpc.org>

FYI

----- Forwarded message -----

From: Wanis Rhegbi <wrghebi@sengconsultants.com>
Date: Thu, Dec 6, 2018 at 4:15 PM
Subject: Revised Concept for Garrison Road
To: Tom Brechko <tom.brechko@knoxmpc.org>