TRAFFIC IMPACT STUDY

WEIGEL'S COMMERCIAL DEVELOPMENT

CLINTON HWY AT EMORY ROAD
POWELL, TN

CCI PROJECT NO 01040-0002

REV. 4

PREPARED FOR
Weigel's
3100 Weigel Lane
Powell, TN 37849

SUBMITTED BY

CANNON & CANNON INC
CONSULTING ENGINEERS
FIELD SURVEYORS

REVISED
FEBRUARY 1
2017

TRAFFIC IMPACT STUDY

WEIGEL'S COMMERCIAL DEVELOPMENT

CLINTON HWY AT EMORY ROAD
POWELL, TN

CCI PROJECT NO 01040-0002

REVISION 4 (2/1/17)

This report replaces the previous version, Revision 3 dated 12/29/16 in its entirety. The changes are associated with the correction of typing errors, addition of square footage of pharmacy to the text, and modifications to Tables 3 & 4 to incorporate capacity runs modified for right-turn overlaps.

PREPARED FOR
Weigel's
3100 Weigel Lane
Powell, TN 37849

SUBMITTED BY
CANNON & CANNON INC
CONSULTING ENGINEERS
FIELD SURVEYORS

REVISED
FEBRUARY 1
2017

TABLE OF CONTENTS

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

EXECUTIVE SUMMARY

This report provides a summary of a traffic impact study that was performed for a proposed commercial development to be located along Clinton Highway (S.R. 9) at W. Emory Road (S.R. 131) in the Powell Community of Knox County. The project site is located on the west side of Clinton Highway at the intersection of W. Emory Road. The conceptual development plan for this project proposes a convenience market with 16 fueling positions, a 10,000 square foot pharmacy, and a 10,000 square foot office building. The project proposes to have two access driveways onto Clinton Highway and one onto W. Emory Road located approximately 550 feet west of Clinton Highway.

The purpose of this study was the evaluation of the traffic operational and safety impacts of the proposed development upon roadways in the vicinity of the site. Of particular interest were the signalized intersections of Clinton Highway with W. Emory Road (north) and Clinton Highway with W. Emory Road (south), as well as the proposed unsignalized site driveway intersections. Appropriate evaluations were conducted at these locations for existing and future conditions, both with and without traffic volumes generated from the proposed development. This was done in order to determine the anticipated impacts and to establish recommended measures to mitigate these impacts.

The primary conclusion of this study is that the traffic generated from the proposed commercial development will have several significant impacts to the study intersections. However, these impacts either result in acceptable conditions or can be addressed with the implementation of a series of improvements. The following is a listing of the improvements that are recommended in order to address these impacts, along with some associated discussion.

1. The intersection of Clinton Highway with W. Emory Road (north) will operate with acceptable levels of service after development of this proposed project, with no major geometric improvements required. It is recommended, however, that the existing eastbound right-turn lane be modified from one with a continuous flow into a southbound acceleration lane, to one that is required to stop at the signal. The acceleration lane would be removed and the traffic signal modified to provide a right-turn overlapping signal arrow.

2. The intersection of Clinton Highway with W. Emory Road (south) is proposed to have the main site roadway added as a new eastbound approach intersection leg. This leg requires three approach lanes, one for the left-turn movement, one for the through movement, and one for the right-turn movement. The storage length for the right-turn lane is recommended to be a minimum of 75 feet. In addition, it is recommended that a new northbound left-turn lane be added, with a minimum storage length of 200 feet. This lane should be offset far enough into the median so that left-turning vehicles can see around opposing left-turn vehicles to the oncoming southbound traffic. In addition, the signal should be modified to add a northbound protected-permissive signal head and phase, and east-west protected-only signal heads and phases.

3. The proposed site driveway intersection on Clinton Highway will be a right-in, right-out driveway provided with a concrete separator island. A southbound right-turn lane, with a storage length of 50 feet shall be provided at this intersection. This lane can be developed where the existing southbound acceleration lane is currently located, that is proposed for removal as discussed in item 1 above. Pavement marking cross hatching and reflective pavement markers are recommended for use in delineating this lane, including defining the radius for vehicles turning from eastbound W.

Emory Road to southbound Clinton Highway. The exiting lane of this driveway should be provided with a yield sign and a yield bar on the pavement at the appropriate yield location.

4. The proposed site driveway intersection on W. Emory Road should be provided with a separate eastbound right-turn deceleration lane, as well as a northbound stop sign and stop bar. The eastbound right-turn lane shall include a modification to the existing eastern radius on Holgate Lane at Emory Road to prevent eastbound traffic destined to the proposed site driveway from entering the existing right-turn lane for Holgate Lane and continuing through the Holgate intersection. In addition, the proposed right-turn lane for the proposed site driveway shall include a 75' taper beginning at the end of the relocated radius on Holgate Lane and a minimum 35' of storage.

5. Retime both existing traffic signals as necessary to optimize traffic flow under the new traffic volume and signal operational conditions.

6. The required corner sight distances are attainable at all proposed site driveway intersections. The locations of embankment, signage, vegetation and other features to be installed as part of the development of the site should be positioned so as to maintain these sight distances.

INTRODUCTION & PURPOSE OF STUDY

This report provides a summary of a traffic impact study that was performed for a proposed commercial development to be located along Clinton Highway (S.R. 9) at W. Emory Road (S.R. 131) in the Powell Community of Knox County. The project site is located on the west side of Clinton Highway at the intersection of W. Emory Road. FIGURE 1 is a location map identifying the major roadways in the vicinity of the site.

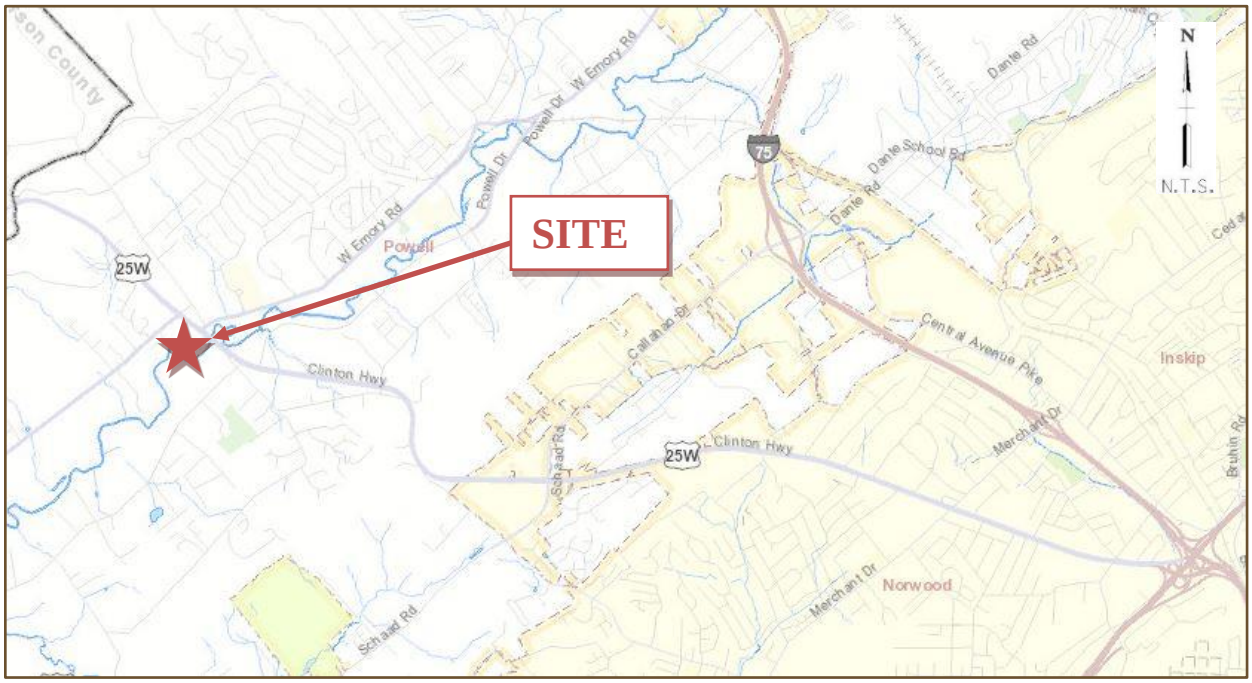


FIGURE 1
LOCATION MAP

The conceptual development plan for this project proposes a convenience market with 16 fueling positions, a 10,000 square foot pharmacy, and a 10,000 square foot office building. The project proposes to have two access driveways onto Clinton Highway and one on W. Emory Road located approximately 550 feet west of Clinton Highway. FIGURE 2 is a Conceptual Site Plan which details the proposed site configuration.

The purpose of this study was the evaluation of the traffic operational and safety impacts of the proposed development upon roadways in the vicinity of the site. Of particular interest were the signalized intersections of Clinton Highway with W. Emory Road (north) and Clinton Highway with W. Emory Road (south), as well as the proposed site driveway intersections. Appropriate intersection evaluations were conducted at these locations for existing and future conditions, both with and without traffic volumes generated from the proposed development, in order to determine the anticipated impacts and to establish recommended measures to mitigate these impacts. These evaluations included intersection capacity analyses, corner sight distance reviews and others as appropriate.

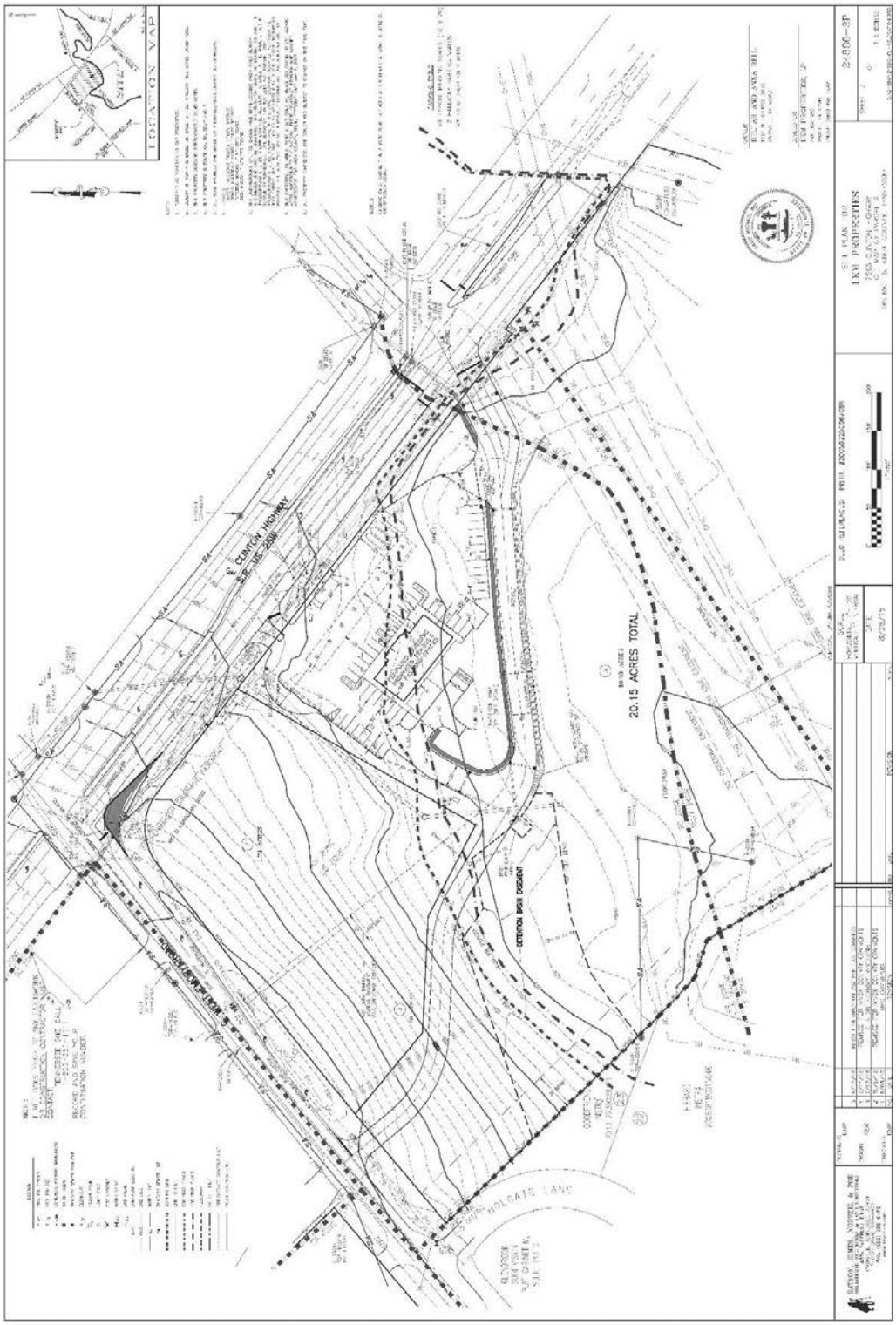


FIGURE 2
CONCEPTUAL SITE PLAN

EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

Clinton Highway (U.S. 25W / S.R. 9) is a Major Arterial roadway that provides north-south access for north Knox County stretching from Interstate 640 to the south, to the Anderson County line to the north. Clinton Highway carries significant regional traffic to and from Anderson County and Knox County. In the vicinity of the proposed project, the roadway consists of two through travel lanes in each direction with a raised median. Auxiliary turn-lanes are provided at the two signalized intersections with W. Emory Road. The speed limit on Clinton Highway is posted as 50 mph. The 2014 ADT on Clinton Highway was 27,026 south of the study area and 16,332 to the north.

W. Emory Road (S.R. 131) is a Major Arterial roadway that provides east-west access for north Knox County, stretching from Oak Ridge Highway (S.R. 62) to the west, to the Grainger County line to the east. It carries significant traffic to and from residential and commercial areas, and also to and from Interstate 75. In the vicinity of the proposed development, the roadway consists of one travel lane in each direction, with auxiliary turn-lanes provided at the signalized intersection with Clinton Highway. The speed limit on W. Emory Road is posted as 40 mph. The 2014 ADT on W. Emory Road was 8,866.

EXISTING SITE CONDITIONS

The existing site consists of approximately 20 acres located west of Clinton Highway, south of W. Emory Road, and north of Beaver Creek. An existing single-family residence is present on the west side of the site. The site is bordered to the west by Glennbrook Subdivision (single-family) and to the south by Beaver Creek. Existing commercial uses are located to the east, across Clinton Highway, and a shopping center is located to the north, across W. Emory Road. This center is currently approximately 90 percent occupied.

FIGURE 3
EXISTING SITE CONDITIONS

EXISTING TRAFFIC DATA

Existing traffic data was gathered for this study. The Tennessee Department of Transportation (TDOT) collects average daily traffic data (ADT) annually on roadways in the study area. Three count stations were found near the project site that were felt to have particular relevance for this study. The most currently available data from these count stations are contained in TABLE 1.

TABLE 1
ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY

COUNT YEAR	TDOT COUNT STATION 047 W. EMORY ROAD WEST OF CLINTON HIGHWAY	TDOT COUNT STATION 049 CLINTON HIGHWAY SOUTH OF W. EMORY RD	TDOT COUNT STATION 184 CLINTON HIGHWAY NORTH OF W. EMORY RD
2015	10,074	29,596	NA
2014	8,866	27,026	16,332
2013	9,480	30,371	15,899
2012	9,336	29,297	15,480
2011	9,006	28,142	15,842
2010	9,512	29,186	15,381
2009	9,426	28,256	15,308
2008	8,792	28,302	15,656
2007	9,077	30,279	16,677
2006	8,872	31,275	17,166
2005	9,140	31,769	17,300
2004	8,467	45,842	17,526

In addition to the available ADT data, intersection turning movement traffic counts were conducted in order to determine the current AM, Midday and PM peak hour operating volumes for the intersections of Clinton Highway with W. Emory Road (northern and southern) and W. Emory Road at the Dollar General Market / proposed site driveway. The existing peak hour traffic counts are summarized on FIGURE 4, and the raw data traffic count summary sheets are contained in the APPENDIX.

The following summarizes the time period that was identified as the peak traffic hour of each study intersection:

- Clinton Hwy. / W. Emory (north) – 7-8 am, 12-1 pm, 4:45–5:45 pm
- Clinton Hwy. / W. Emory (south) – 7:15-8:15 am, 12-1 pm, 5–6 pm
- W. Emory / Dollar General Shopping Ctr. – 7:15-8:15 am, 12-1 pm, 4:15–5:15 pm

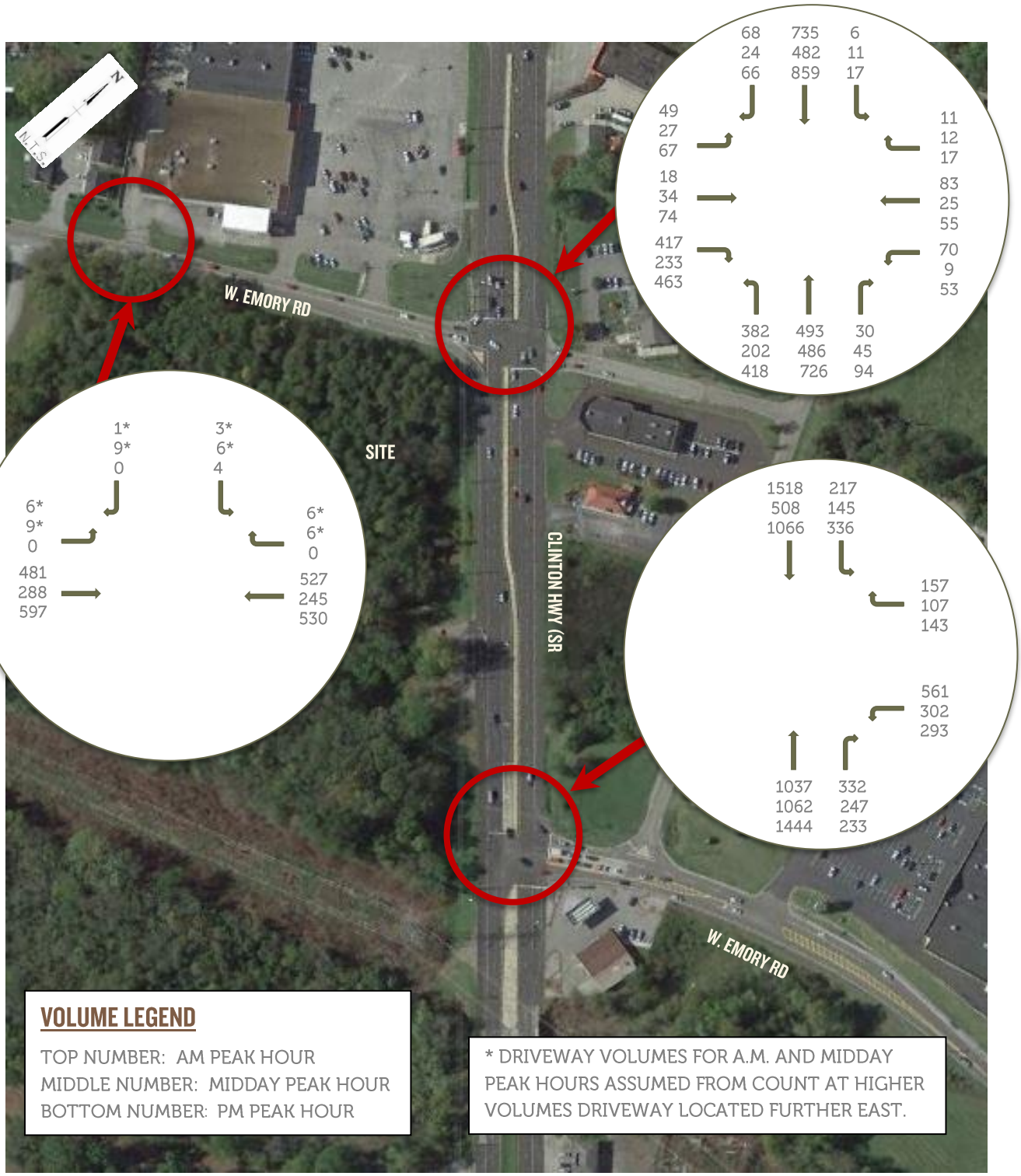


FIGURE 4
2015 EXISTING TRAFFIC VOLUMES

EXISTING CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses employing the methods of the Highway Capacity Manual (HCM2010) were conducted for the intersections of Clinton Highway at W. Emory Road (north) and Clinton Highway at W. Emory Road (south), as well as W. Emory Road at the western driveway to the Dollar General Market development. The analyses were performed with the 2015 existing traffic volumes and existing intersection traffic control, lane configurations and signal timing. These analyses indicate that all three intersections are currently operating at acceptable levels-of-service ("D" or better) during all three evaluated traffic periods.

The EVALUATIONS section of this report may be referenced for tabular summaries of these analyses, while more detailed summaries are presented on the computer printouts contained in the APPENDIX. Also contained in the APPENDIX is a section entitled "Capacity and Level of Service Concepts", which provides a description of the utilized procedures.

4.0 BACKGROUND CONDITIONS

BACKGROUND TRAFFIC GROWTH

The proposed development is anticipated to be constructed in one general phase with completion anticipated by 2017. Therefore, year 2017 was established as the appropriate design / analysis year for the study. In order to determine traffic volumes resulting solely from background traffic growth to year 2017, it was necessary to establish an annual growth rate for existing traffic. The TDOT ADT values previously discussed, as well as knowledge of the area, were used to determine an approximate annual growth rate. Based on the available data, a background annual growth rate of two percent was assumed. FIGURE 5 contains the background traffic volumes that would result from a two percent annual growth rate from year 2015, when the counts were conducted, to year 2017.

BACKGROUND CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the Existing Conditions section of this report were conducted utilizing the Year 2017 background volumes shown in FIGURE 5 and existing intersection traffic control, lane configurations and signal timing. These analyses indicate that all three intersections will continue to operate at acceptable levels-of-service ("D" or better) during all three evaluated traffic periods.

The EVALUATIONS section of this report may be referenced for tabular summaries of these analyses, while more detailed summaries are presented on the computer printouts contained in the APPENDIX.

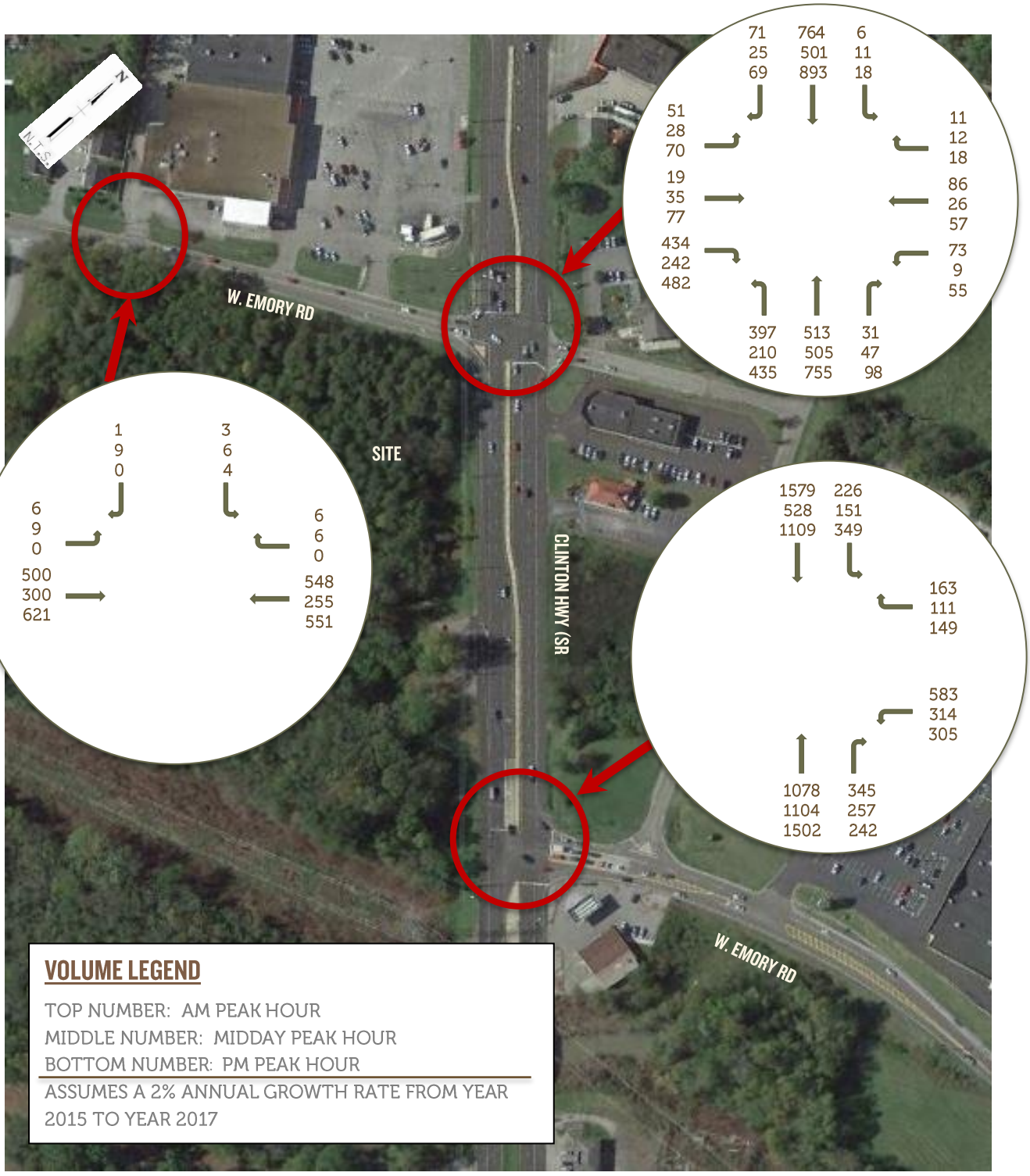


FIGURE 5
2017 BACKGROUND TRAFFIC VOLUMES

5.0 FUTURE CONDITIONS

TRIP GENERATION

In order to estimate the expected traffic volumes to be generated by the proposed development, the procedures recommended by the Institute of Transportation Engineers and Knox County were utilized. The generated traffic volumes were determined based on the data for the peak hours of adjacent street traffic. See TABLE 2 for a summary of the traffic generated for this project. More detailed information is contained in the APPENDIX.

TABLE 2
TRIP GENERATION SUMMARY

LAND USE	ITE CODE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HR)	MIDDAY PEAK HOUR (TRIPS/HR)	PM PEAK HOUR (TRIPS/HR)
General Office Building	710	10,000sf	228	31	31[1]	89
Entering Trips			114	27	15[1]	15
Exiting Trips			114	4	16[1]	74
Convenience Market w/ Gas	853	16 fueling positions	8,682	266	272[2]	306
Entering Trips			4,341	133	136[2]	153
Exiting Trips			4,341	133	136[2]	153
Pharmacy / Drugstore with Drive ThroughWindow	881	10,000sf	970	35	84[2]	99
			485	18	42[2]	49
Entering Trips			485	17	42[2]	50
Exiting Trips						
TOTALS			9,880	332	387	494
Entering Trips			4,940	178	193	217
Exiting Trips			4,940	154	194	277

[1] AM Peak generation with 50/50 entering /exiting distribution used for Midday Peak Trip Generation.
[2] AM Peak of the Generator used for Midday Peak Trip Generation.

TRIP DISTRIBUTION AND ASSIGNMENT

The existing traffic volume patterns around the study site were evaluated in order to establish the likely trip distribution orientation for newly generated trips. In accordance with this evaluation, it was estimated that approximately 25 percent of the new trips will be oriented to and from the north, 45 percent to and from the south, 15 percent to and from the east, and 15 percent to and from the west. The newly generated trips were then assigned to the study intersections, including the proposed new site intersections, utilizing this orientation. This was done separately for each proposed site use, with the exact trip routing assigned as appropriate depending on the location of each use in relation to the study roadways. Adjustments were made to account for pass-by trips for the convenience market, which are those trips already on the street system that simply pull-in to the market as they are passing by the site. This adjustment was taken from MPC published criteria and was assumed to be 60 percent. FIGURE 6 provides a summary of the resulting assignment of all newly generated trips to the study intersections. FIGURE 6A provides a summary of the

overall trip distribution percentages. Full trip distribution and assignment patterns for the individual land uses are located in the APPENDIX.

The proposed development site will include a new roadway that will bisect the site and provide access to all site uses. This roadway will intersect W. Emory Road (north) several hundred feet west of Clinton Highway and then head south and loop around to the east and intersect Clinton Highway at its intersection with W. Emory Road (south). This roadway will likely encourage some drivers to divert through the site, especially during peak traffic times. Therefore, it was assumed that some diversion will take place around this roadway, especially for eastbound vehicles on W. Emory Road. They will only have to make a right-turn onto the new roadway and then will be able to come around to Clinton Highway at a traffic signal. These volumes were assumed to be 20 percent of the existing traffic that is currently eastbound and turns right to either continue south on Clinton Highway or turn left to continue east on W. Emory Road. The reverse movement will not be as appealing, as it will require a left-turn or through movement at the Clinton Highway and W. Emory Road (south) traffic signal, and then a left turn onto W. Emory Road (north) from a stop sign at an unsignalized intersection. These diverted volumes were assumed to be five percent of the current volumes that come from either Clinton Highway to the south or the east leg of W. Emory Road, and turn left onto the west leg of W. Emory Road. FIGURE 7 provides a summary of the background traffic volumes that were assumed to divert along this new roadway.

FIGURE 8 shows the future projected traffic volumes that were developed by adding generated trips to the background traffic volumes developed in the previous section, and including the pass-by and diverted trip adjustments. These combined year 2017 volumes are the 2017 projected volumes used in the analysis of future conditions.

FUTURE CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the EXISTING CONDITIONS section of this report were conducted for 2017 full build-out conditions utilizing the Year 2017 Combined volumes shown in FIGURE 8. These analyses employed appropriate modifications to the existing lane configurations, traffic control and signal operation, as discussed in the CONCLUSIONS AND RECOMMENDATIONS section of this report. Tabular summaries of the analyses results and associated discussion are contained in the EVALUATIONS section. In addition, detailed computer printout summaries of the analyses are contained in the APPENDIX.

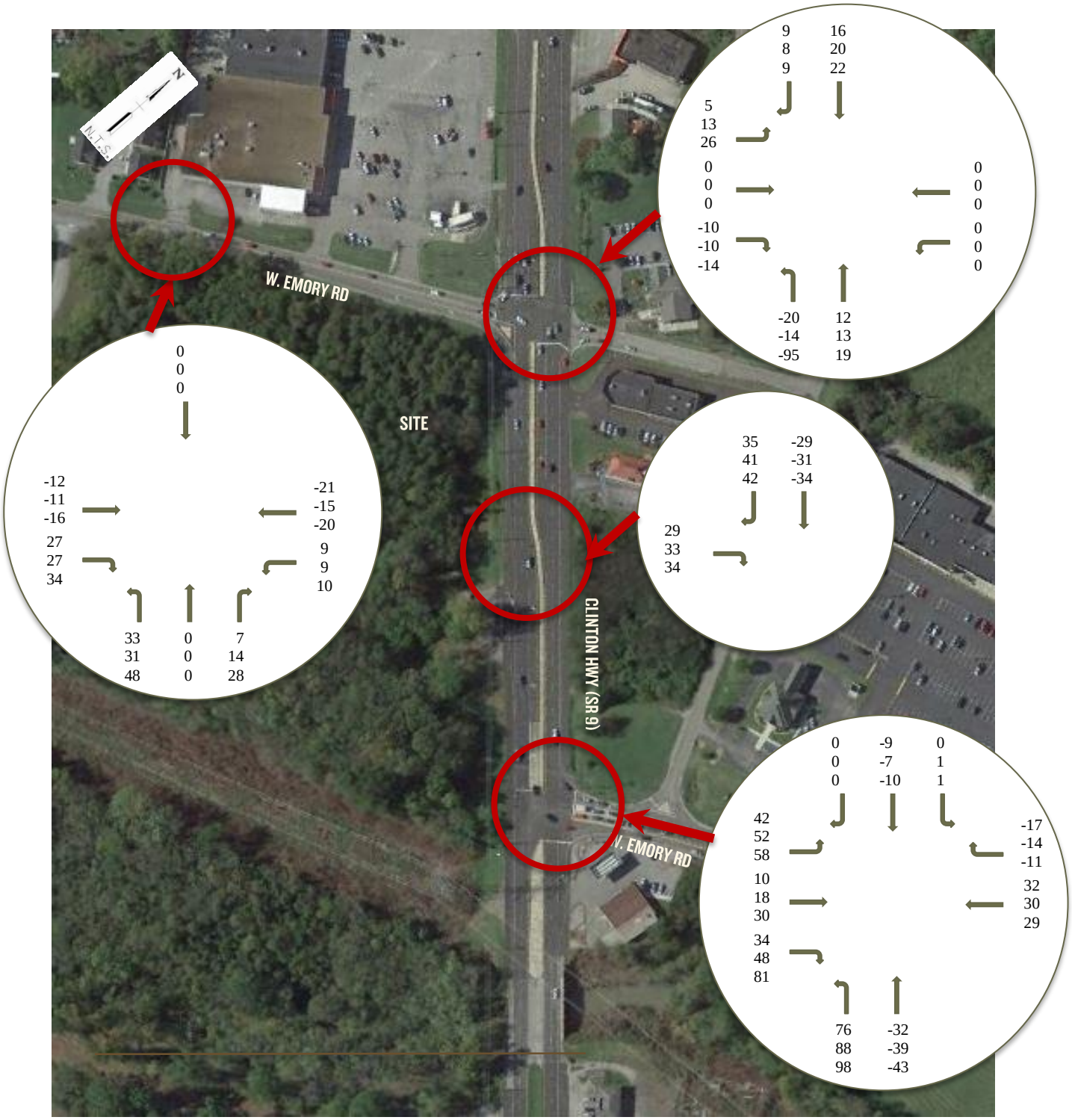


FIGURE 6
GENERATED TRIPS

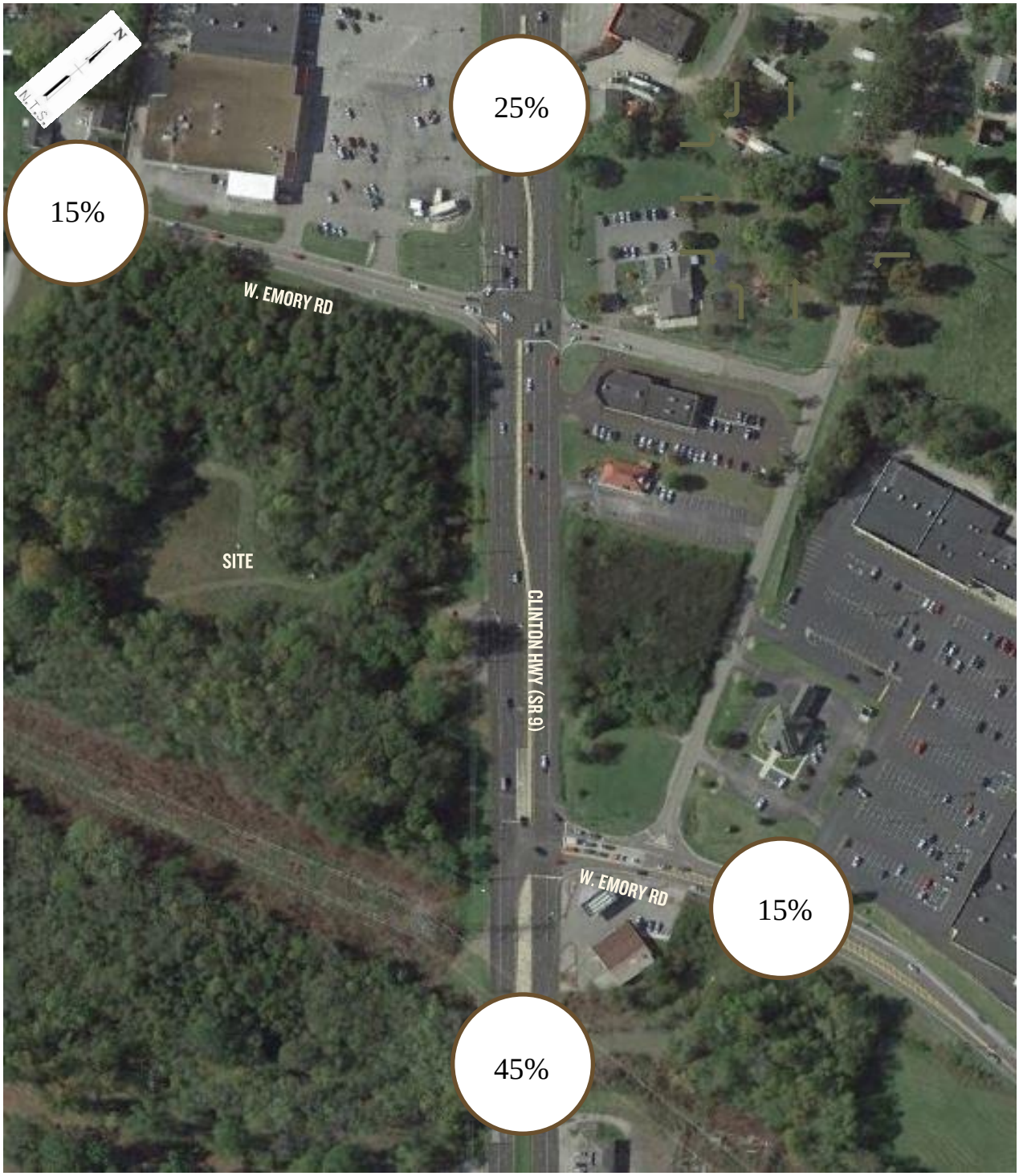


FIGURE 6A
PERCENT TRIP DISTRIBUTION

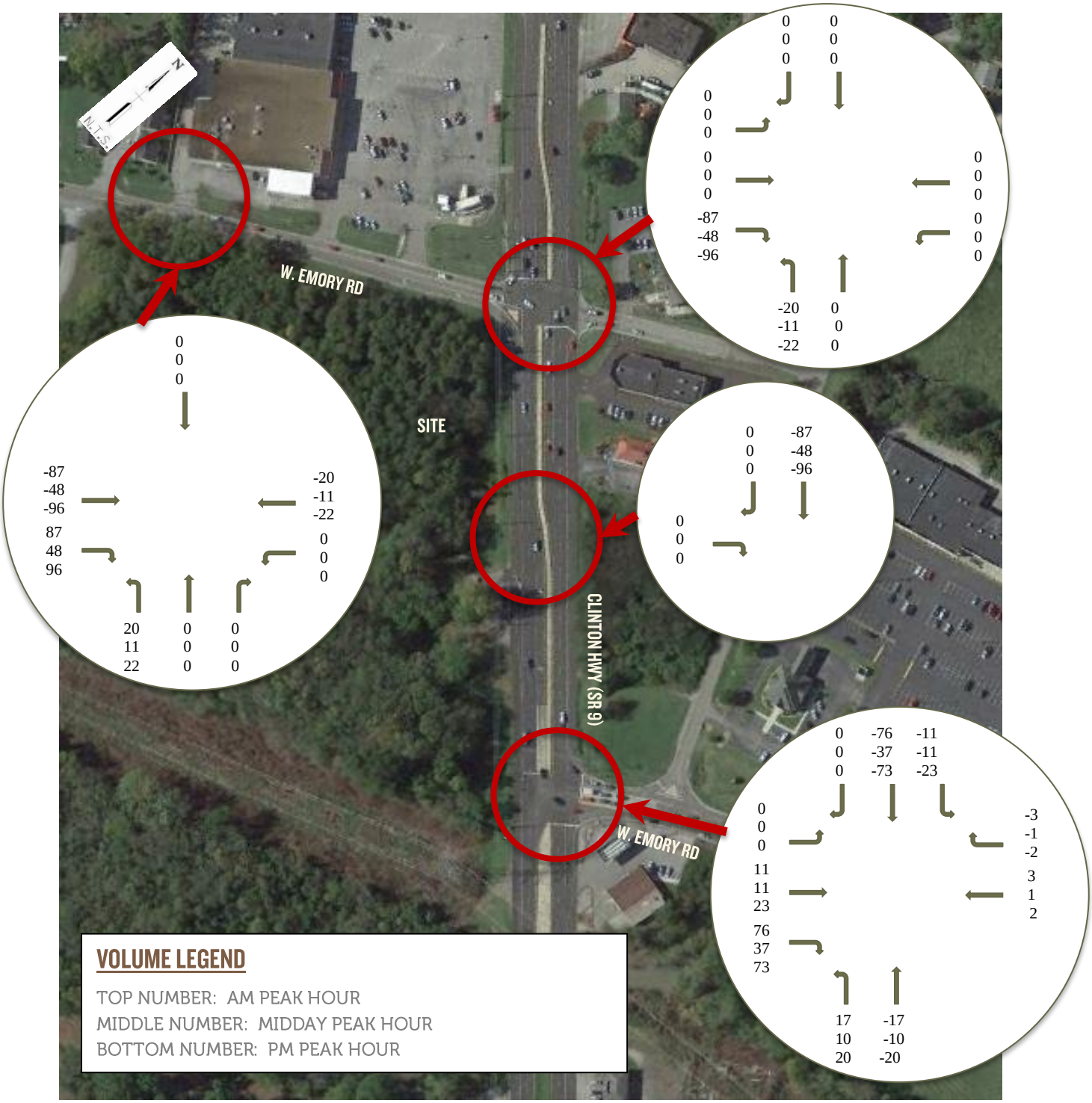


FIGURE 7
POTENTIAL EMORY ROAD TRAFFIC DIVERSION

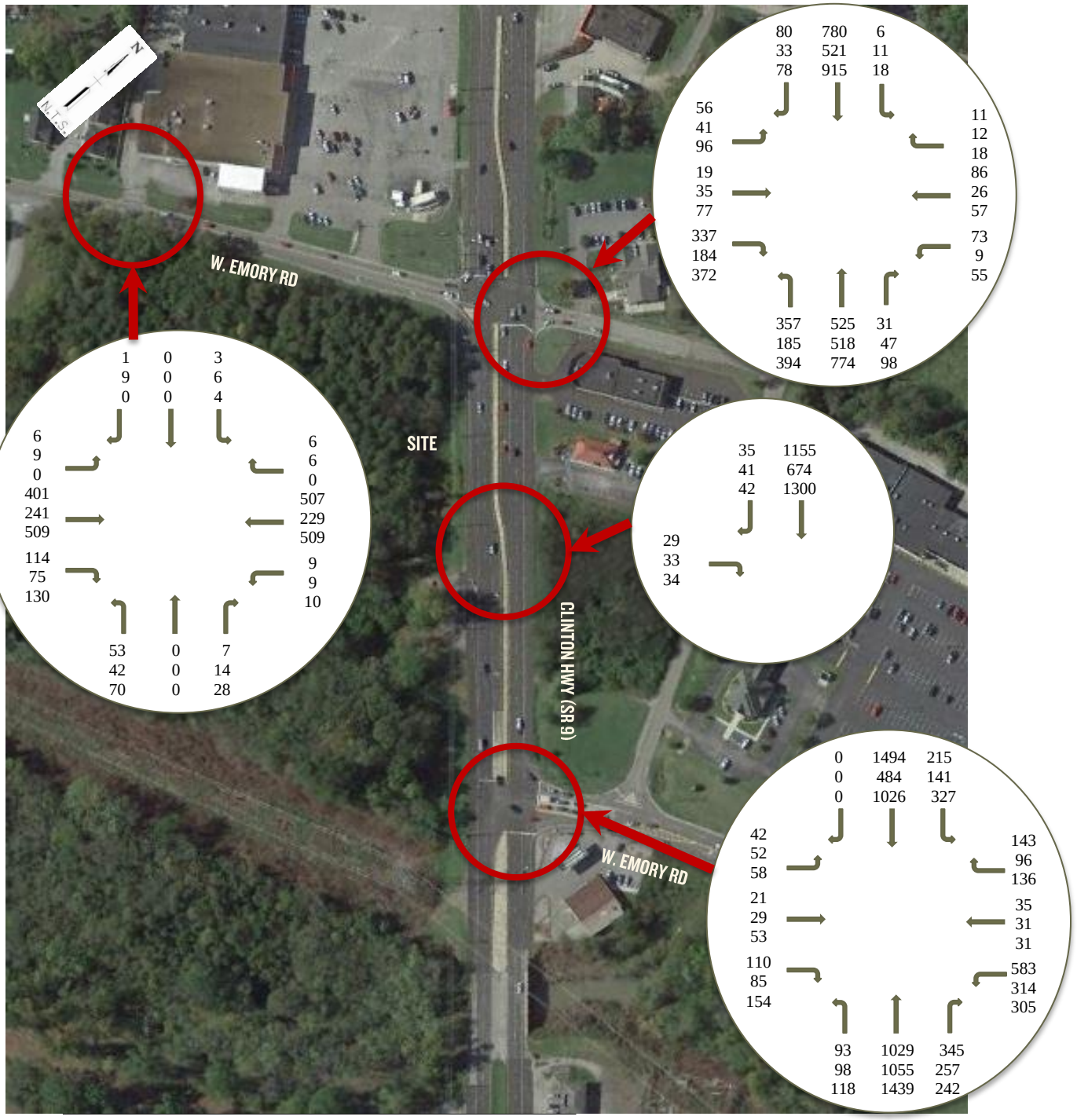


FIGURE 8
2017 COMBINED TRAFFIC DATA

6.0 EVALUATIONS

INTERSECTION CAPACITY ANALYSES:

As discussed in the preceding sections of this report, capacity analyses employing the methods of the Highway Capacity Manual (HCM2010) were conducted for the study intersections. These analyses were performed for existing, background, and anticipated 2017 combined traffic conditions. Existing geometry, traffic control and signal timing were used in the 2015 Existing and 2017 Background analyses, while appropriate modifications were proposed and included in the 2017 Combined analyses. These recommendations are covered in the CONCLUSIONS and RECOMMENDATIONS section of this report. A summary of the capacity analysis results for the Year 2015 Existing Conditions, Year 2017 Background Conditions and Year 2017 Combined Conditions is shown in TABLE 3.

TABLE 3
CAPACITY ANALYSIS SUMMARY

INTERSECTION	TIME PERIOD	YEAR 2015 EXISTING (LOS/DELAY)	YEAR 2017 BACKGROUND (LOS/DELAY)	YEAR 2017 COMBINED (LOS/DELAY)
Clinton Hwy at W. Emory Rd (S) (SIGNALIZED)[1]	A.M. M.D. P.M.	C/29.8s. B/17.0s. D/37.3s.	C/34.1s. B/17.9s. D/48.8s.	C/29.5s. B/19.9s. D/35.5s.
Clinton Hwy at W. Emory Rd (N) (SIGNALIZED)[1]	A.M. M.D. P.M.	B/19.6s. B/15.9s. C/20.0s.	C/20.3s. B/16.0s. C/20.7s.	C/32.8s. B/15.2s. C/27.2s.
W. Emory Road at Dollar General Mkt / Site Access (SIDE-STREET STOP)[2]	A.M. M.D. P.M.	C/18.8s. B/11.2s. C/23.7s.	C/19.6s. B/11.3s. D/25.0s.	D/26.7s. B/13.3s. D/31.7s.
Clinton Hwy at Site Access (South) (SIDE-STREET STOP)[2]	A.M. M.D. P.M.	NA NA NA	NA NA NA	B/14.2s. B/11.1s. C/15.6s.

[1]SIGNALIZED CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for full intersection utilizing HCM methodology. Timing existing for EXISTING and BACKGROUND analyses, optimized for COMBINED.
[2]SIDE STREET STOP CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for highest delay side street approach utilizing HCM methodology.
See APPENDIX for detailed computer print-out summaries and discussion of Capacity and Level-of-Service concepts.

As shown in TABLE 3, acceptable levels-of-service ("D" or better) are anticipated under Year 2017 Combined conditions for all intersections and all time periods.

TABLE 4 provides a summary of vehicle queue length estimates for several movements of interest, which is information provided by the capacity analyses. As shown, the southbound movements at Clinton Highway and W. Emory Road (south) and the northbound left-turn movement at Clinton Highway and W. Emory Road (north) exhibit significant increase from existing and background conditions to combined conditions, especially during A.M. and P.M. peak hours. This does indicate that existing turn storage may be occasionally

exceeded during these peak hours. Further assessment of this situation by TDOT as part of a future intersection improvement project that is planned may be appropriate.

TABLE 4
VEHICLE QUEUE SUMMARY

INTERSECTION APPROACH	YEAR 2015 EXISTING (FEET)			YEAR 2017 BACKGROUND (FEET)			YEAR 2017 COMBINED (FEET)		
	AM	MD	PM	AM	MD	PM	AM	MD	PM
Clinton Hwy at W. Emory Road (S)									
NB Left	NA	NA	NA	NA	NA	NA	102	48	49
SB Left	70	99	114	72	107	108	181	100	387
SB Thru/Right	429	57	34	451	58	36	362	65	421
Clinton Hwy at W. Emory Road (N)									
NB Left	174	178	25	177	176	24	423	185	236
EB Left/Thru	71	65	169	74	66	181	110	87	240
EB Right	82	61	96	85	61	100	210	57	232
W. Emory Road at Dollar General Mkt/Site Access									
NB	NA	NA	NA	NA	NA	NA	50	25	50
WB Left	NA	NA	NA	NA	NA	NA	*	*	*
EB Right	NA	NA	NA	NA	NA	NA	*	*	*

Notes: *Values represent 95% queue length estimate from capacity analysis.
*Estimated value is very low (0.02-0.03 vehicles)
*Per capacity printouts, some of these values are footnoted, "95th percentile volumes exceeds capacity, queue may be longer"

TURN LANE ASSESSMENT

The need for several turn lanes was evaluated utilizing the turn lane warrant criteria published in the Knox County Access Control and Driveway Design Policy, as developed by Harmelink. The results are summarized in TABLE 5 below, with the associated recommendations discussed in more detail in the Conclusions and Recommendations section of this report. The actual assessment worksheets are contained in the APPENDIX.

TABLE 5
TURN LANE WARRANT SUMMARY

INTERSECTION	A.M. PEAK	M.D. PEAK	P.M. PEAK
Clinton Hwy at Site Access (S) Southbound Right-turn Lane	Met	Not Met	Met
W. Emory Road at Dollar General Mkt / Site Access Eastbound Right-turn Lane	Not Met	Not Met	Met
W. Emory Road at Dollar General Mkt / Site Access Westbound Left-turn Lane	Not Met	Not Met	Not Met

SIGHT DISTANCE ASSESSMENT

Intersection sight distance was assessed looking both directions from all proposed site driveway intersections. The speed limit along W. Emory Road is 40 mph, so the minimum required sight distance to oncoming traffic is 400 feet, while the speed limit on Clinton Highway is 50 mph, requiring a minimum sight distance of 500 feet. It was determined that sight distances are easily attainable at all locations well in excess of the minimum requirements. At the W. Emory Road and Dollar General Market/Site Access intersection, this may require removal of a small amount of embankment and several trees looking to the right (east) from the proposed driveway intersection, and possibly a few trees looking to the left (west). Care should also be taken during the site development process to ensure that site features such as landscaping and signage does not restrict intersection sight distance views.

7.0 CONCLUSIONS & RECOMMENDATIONS

The primary conclusion of this study is that the traffic generated from the proposed commercial development will have several significant impacts to the study intersections. These impacts either result in acceptable conditions or can be addressed with the implementation of a series of improvements. The most significant of these improvements involve the addition of some turning lanes, the removal of an acceleration lane, and modifications to the two existing traffic signals.

Intersection corner sight distances must be provided at the new site driveway intersections as required by Knox County and the Tennessee Department of Transportation. These minimum distances are 400 feet for the Emory Road driveway approach, looking both left and right, and 500 feet for the Clinton Highway driveway looking left. Field review indicates that these distances are attainable for all of the proposed driveways.

The following is a detailed listing of the improvements that are recommended by this study, along with some associated relevant discussion.

1. The intersection of Clinton Highway with W. Emory Road (north) will operate with acceptable levels of service after development of this proposed project, with no major geometric improvements required. It is recommended, however, that the existing eastbound right-turn lane be modified from one with a continuous flow into a southbound acceleration lane, to one that is required to stop at the signal. The acceleration lane would be removed and the traffic signal modified to provide a right-turn overlapping signal arrow.

2. The intersection of Clinton Highway with W. Emory Road (south) is proposed to have the main site roadway added as a new eastbound approach intersection leg. The need to provide acceptable levels-of-service requires that this new leg be provided with three approach lanes, one for the left-turn movement, one for the through movement, and one for the right-turn movement. The storage length for the right-turn lane is recommended to be a minimum of 75 feet. In addition, it is recommended that a new northbound left-turn lane be added, with a minimum storage length of 200 feet. This lane should be offset far enough into the median so that left-turning vehicles can see around opposing left-turn vehicles to the oncoming southbound traffic. In addition, the signal should be modified to add a northbound protected-permissive signal head and phase, and east-west protected-only signal heads and phases.

3. The proposed site driveway intersection on Clinton Highway will be a right-in, right-out driveway provided with a concrete separator island. A southbound right-turn lane, with a storage length of 50 feet shall be provided at this intersection. This lane can be developed where the existing southbound acceleration lane is currently located, that is proposed for removal as discussed in item 1 above. Pavement marking cross hatching and reflective pavement markers are recommended for use in delineating this lane, including defining the radius for vehicles turning from eastbound W. Emory Road to southbound Clinton Highway. The exiting lane for this driveway should be provided with a yield sign and a yield bar on the pavement at the appropriate yield location.

4. The proposed site driveway intersection on W. Emory Road should be provided with a separate eastbound right-turn deceleration lane, as well as a northbound stop sign and stop bar. The eastbound right-turn lane shall include a modification of the existing eastern radius on Holgate Lane at Emory Road to prevent eastbound traffic destined to the proposed site driveway from entering the existing right-turn lane for Holgate Lane and continuing through the Holgate intersection. In addition, the proposed right-turn lane for the proposed site driveway shall include a 75' taper beginning at the end of the relocated radius on Holgate Lane and a minimum 35' of storage.

5. In order to provide acceptable levels-of-service, both existing traffic signals should be retimed as necessary to optimize traffic flow under the new traffic volume, geometric and signal operational conditions.

6. The locations of embankment, vegetation, signage and other features to be installed as part of the development of the site should be positioned so as to maintain the sight distances that are required for each of the site driveway intersections.

8.0 APPENDIX

APPENDIX A | TRAFFIC DATA

APPENDIX B | TRIP GENERATION AND ASSIGNMENTS

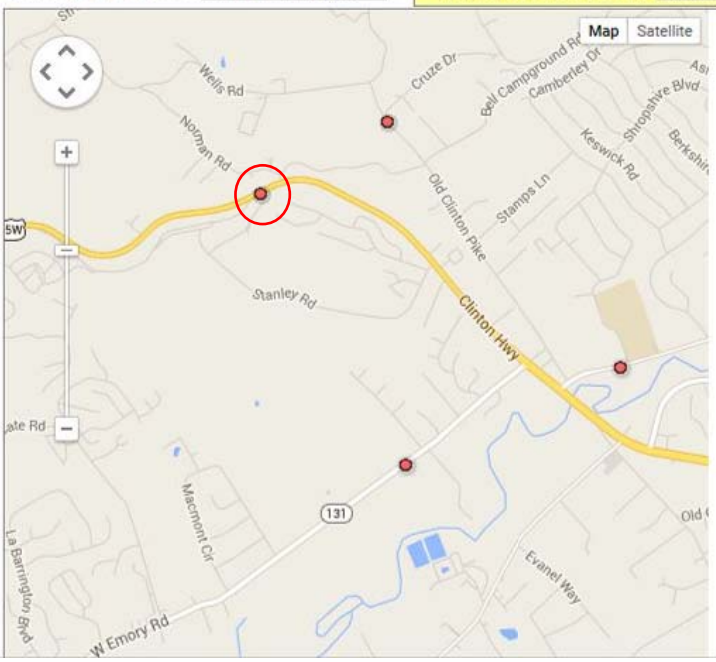
APPENDIX C | ANALYSES

APPENDIX A | TRAFFIC DATA

Traffic History

Traffic History reflects the Annual Average Daily Traffic (AADT) count along specific locations on Tennessee's road network

View stations on map: Select a county... | Non-Map Record Search: Anderson | Station Number: | Search



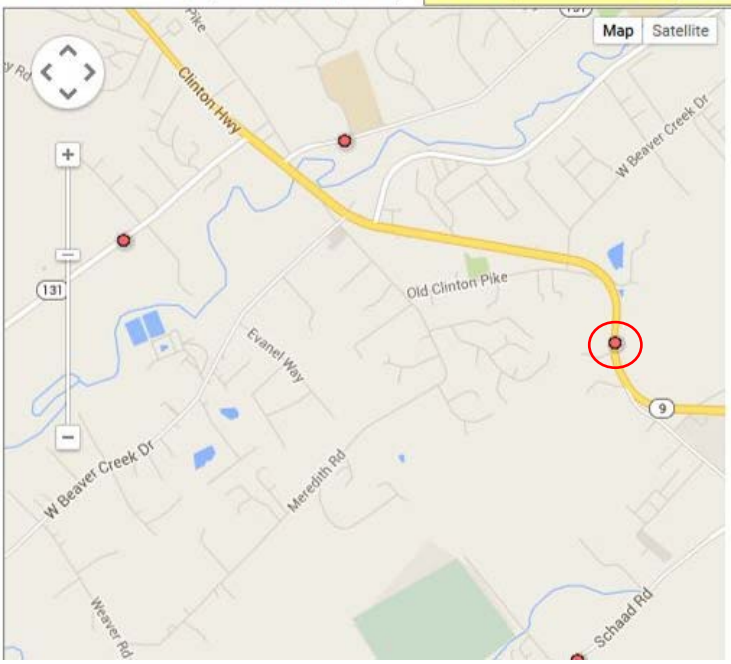
Station Information

Station	000184
Route	SR009
Location	WEST OF POWELL
County	Knox
2013	15899
2012	15480
2011	15842
2010	15381
2009	15308
2008	15656
2007	16677
2006	17166
2005	17300
2004	17526
2003	17415
2002	18541
2001	19571
2000	17601
1999	18496
1998	18009
1997	17205

Traffic History

Traffic History reflects the Annual Average Daily Traffic (AADT) count along specific locations on Tennessee's road network

View stations on map: Select a county... | Non-Map Record Search: Anderson | Station Number: | Search



Station Information

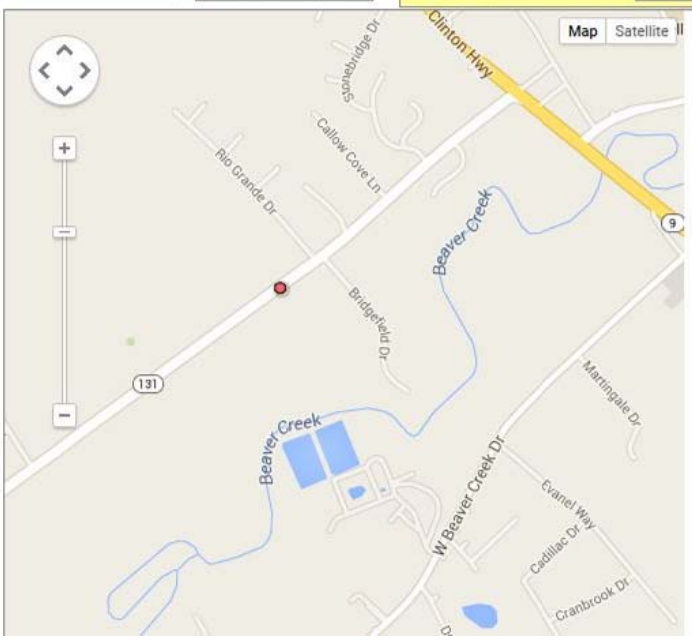
Station	000049
Route	SR009
Location	NEAR POWELL STATION
County	Knox
2013	30371
2012	29297
2011	28142
2010	29186
2009	28256
2008	28302
2007	30279
2006	31275
2005	31769
2004	45842
2003	36633
2002	33695
2001	31950
2000	28973
1999	32314
1998	29035
1997	30458

Traffic History

Traffic History reflects the Annual Average Daily Traffic (AADT) count along specific locations on Tennessee's road network

View stations on map: Select a county...

Non-Map Record Search: Anderson Station Number: Search



Station Information

Station	000047
Route	SR131
Location	NEAR ANDERSON CO LINE
County	Knox
2013	9480
2012	9336
2011	9006
2010	9512
2009	9426
2008	8792
2007	9077
2006	8872
2005	9140
2004	8467
2003	8368
2002	7948
2001	7419
2000	7819
1999	7541
1998	6908
1997	6865

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

CCI Project Name: Weigel's TIS
CCI Project Number: 1040-0002
Intersection: Clinton @ Emory North
Counted By: CCI

File Name : Clinton_Emory_am_Test_4-14-15
Site Code : 00000001
Start Date : 4/14/2015
Page No : 1

Groups Printed- Unshifted

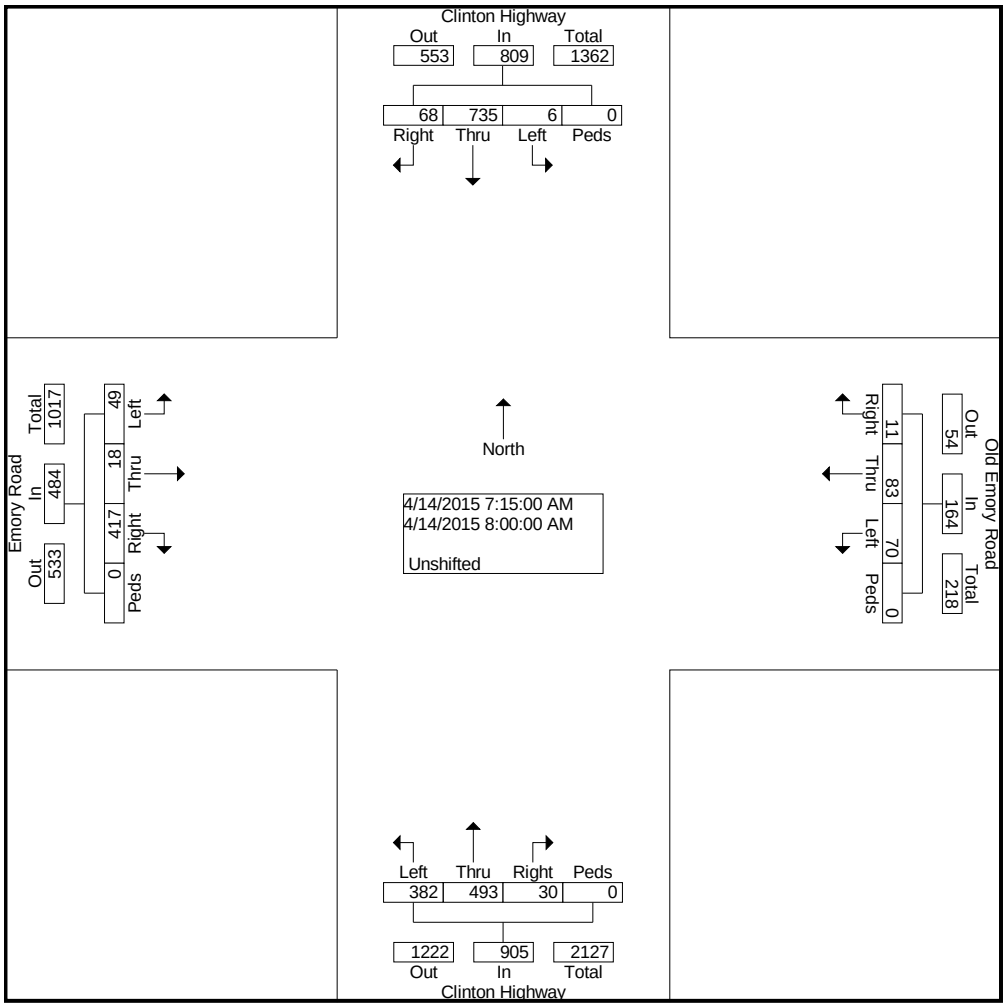
	Clinton Highway Southbound					Old Emory Road Westbound					Clinton Highway Northbound					Emory Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 AM	2	160	26	0	188	9	10	2	0	21	77	87	5	0	169	11	1	90	0	102	480
07:15 AM	1	189	22	0	212	24	26	6	0	56	115	123	3	0	241	10	2	120	0	132	641
07:30 AM	1	212	17	0	230	18	32	2	0	52	111	129	7	0	247	16	7	112	0	135	664
07:45 AM	2	177	15	0	194	14	15	3	0	32	87	120	8	0	215	14	3	106	0	123	564
Total	6	738	80	0	824	65	83	13	0	161	390	459	23	0	872	51	13	428	0	492	2349
08:00 AM	2	157	14	0	173	14	10	0	0	24	69	121	12	0	202	9	6	79	0	94	493
Grand Total	8	895	94	0	997	79	93	13	0	185	459	580	35	0	1074	60	19	507	0	586	2842
Apprch %	0.8	89.8	9.4	0.0		42.7	50.3	7.0	0.0		42.7	54.0	3.3	0.0		10.2	3.2	86.5	0.0		
Total %	0.3	31.5	3.3	0.0	35.1	2.8	3.3	0.5	0.0	6.5	16.2	20.4	1.2	0.0	37.8	2.1	0.7	17.8	0.0	20.6	

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

CCI Project Name: Weigel's TIS
CCI Project Number: 1040-0002
Intersection: Clinton @ Emory North
Counted By: CCI

File Name : Clinton_Emory_am_Test_4-14-15
Site Code : 00000001
Start Date : 4/14/2015

	Clinton Highway Southbound					Old Emory Road Westbound					Clinton Highway Northbound					Emory Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 07:00 AM to 08:00 AM - Peak 1 of 1																					
Intersection	07:15 AM																				
Volume	6	735	68	0	809	70	83	11	0	164	382	493	30	0	905	49	18	417	0	484	2362
Percent	0.7	90.9	8.4	0.0		42.7	50.6	6.7	0.0		42.2	54.5	3.3	0.0		10.1	3.7	86.2	0.0		
07:30 Volume	1	212	17	0	230	18	32	2	0	52	111	129	7	0	247	16	7	112	0	135	664
Peak Factor																					0.889
High Int.	07:30 AM					07:15 AM					07:30 AM					07:30 AM					
Volume	1	212	17	0	230	24	26	6	0	56	111	129	7	0	247	16	7	112	0	135	
Peak Factor					0.879					0.732					0.916					0.896	



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

CCI Project Name: Weigel's TIS
CCI Project Number: 1040-0002
Intersection: Clinton @ Emory North
Counted By: CCI

File Name : Clinton_Emory_md_Test_4-14-15
Site Code : 00000001
Start Date : 4/14/2015
Page No : 1

Groups Printed- Unshifted

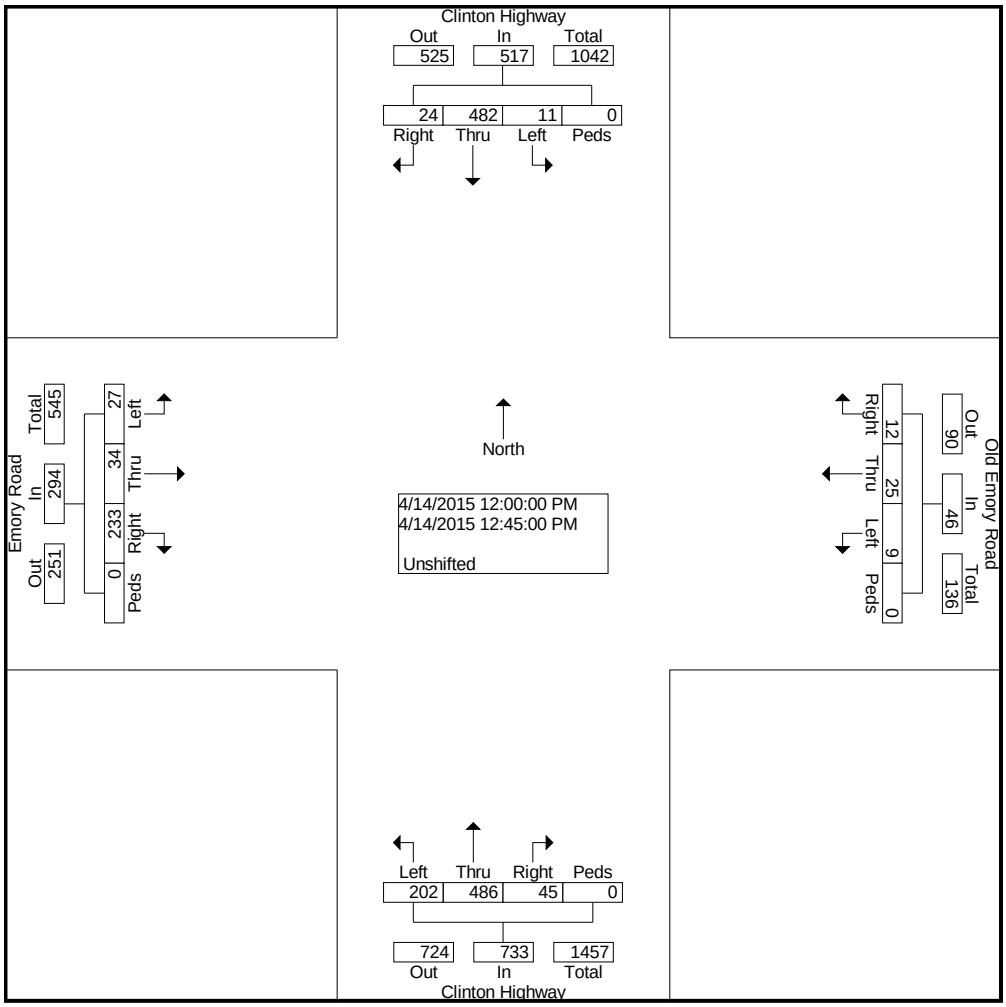
	Clinton Highway Southbound					Old Emory Road Westbound					Clinton Highway Northbound					Emory Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 PM	3	118	5	0	126	4	4	3	0	11	55	110	16	0	181	8	9	54	0	71	389
12:15 PM	3	113	9	0	125	0	3	4	0	7	49	131	7	0	187	6	5	71	0	82	401
12:30 PM	2	125	5	0	132	4	14	3	0	21	45	118	8	0	171	8	12	57	0	77	401
12:45 PM	3	126	5	0	134	1	4	2	0	7	53	127	14	0	194	5	8	51	0	64	399
Total	11	482	24	0	517	9	25	12	0	46	202	486	45	0	733	27	34	233	0	294	1590
Grand Total	11	482	24	0	517	9	25	12	0	46	202	486	45	0	733	27	34	233	0	294	1590
Apprch %	2.1	93.2	4.6	0.0		19.6	54.3	26.1	0.0		27.6	66.3	6.1	0.0		9.2	11.6	79.3	0.0		
Total %	0.7	30.3	1.5	0.0	32.5	0.6	1.6	0.8	0.0	2.9	12.7	30.6	2.8	0.0	46.1	1.7	2.1	14.7	0.0	18.5	

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

CCI Project Name: Weigel's TIS
CCI Project Number: 1040-0002
Intersection: Clinton @ Emory North
Counted By: CCI

File Name : Clinton_Emory_md_Test_4-14-15
Site Code : 00000001
Start Date : 4/14/2015
Page No : 2

	Clinton Highway Southbound					Old Emory Road Westbound					Clinton Highway Northbound					Emory Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 12:00 PM to 12:45 PM - Peak 1 of 1																					
Intersection	12:00 PM																				
Volume	11	482	24	0	517	9	25	12	0	46	202	486	45	0	733	27	34	233	0	294	1590
Percent	2.1	93.2	4.6	0.0		19.6	54.3	26.1	0.0		27.6	66.3	6.1	0.0		9.2	11.6	79.3	0.0		
12:30 Volume	2	125	5	0	132	4	14	3	0	21	45	118	8	0	171	8	12	57	0	77	401
Peak Factor																					0.991
High Int.	12:45 PM					12:30 PM					12:45 PM					12:15 PM					
Volume	3	126	5	0	134	4	14	3	0	21	53	127	14	0	194	6	5	71	0	82	
Peak Factor					0.965					0.548					0.945					0.896	



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

CCI Project Name: Weigel's TIS
CCI Project Number: 1040-0002
Intersection: Clinton @ Emory North
Counted By: CCI

File Name : Clinton_Emory_pm_Test_4-14-15
Site Code : 00000001
Start Date : 4/14/2015
Page No : 1

Groups Printed- Unshifted

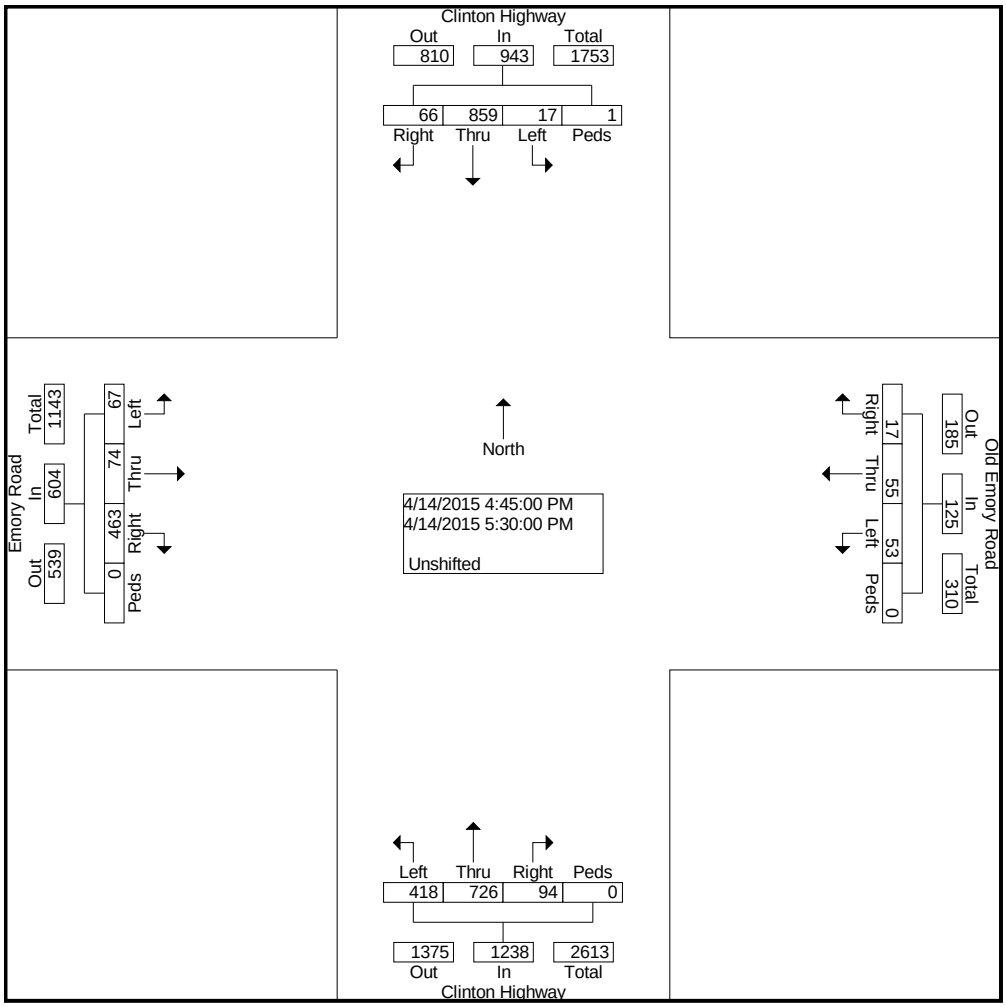
	Clinton Highway Southbound					Old Emory Road Westbound					Clinton Highway Northbound					Emory Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
04:30 PM	3	206	15	0	224	6	16	1	0	23	99	160	19	0	278	14	14	106	0	134	659
04:45 PM	6	224	14	0	244	11	10	0	0	21	100	174	17	0	291	16	17	114	0	147	703
Total	9	430	29	0	468	17	26	1	0	44	199	334	36	0	569	30	31	220	0	281	1362
05:00 PM	5	203	14	0	222	14	15	5	0	34	102	187	19	0	308	25	22	122	0	169	733
05:15 PM	3	226	16	1	246	15	16	5	0	36	109	181	28	0	318	14	14	110	0	138	738
05:30 PM	3	206	22	0	231	13	14	7	0	34	107	184	30	0	321	12	21	117	0	150	736
05:45 PM	3	184	12	0	199	10	19	9	0	38	102	177	21	0	300	5	19	108	0	132	669
Total	14	819	64	1	898	52	64	26	0	142	420	729	98	0	1247	56	76	457	0	589	2876
Grand Total	23	1249	93	1	1366	69	90	27	0	186	619	1063	134	0	1816	86	107	677	0	870	4238
Apprch %	1.7	91.4	6.8	0.1		37.1	48.4	14.5	0.0		34.1	58.5	7.4	0.0		9.9	12.3	77.8	0.0		
Total %	0.5	29.5	2.2	0.0	32.2	1.6	2.1	0.6	0.0	4.4	14.6	25.1	3.2	0.0	42.9	2.0	2.5	16.0	0.0	20.5	

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

CCI Project Name: Weigel's TIS
CCI Project Number: 1040-0002
Intersection: Clinton @ Emory North
Counted By: CCI

File Name : Clinton_Emory_pm_Test_4-14-15
Site Code : 00000001
Start Date : 4/14/2015

	Clinton Highway Southbound					Old Emory Road Westbound					Clinton Highway Northbound					Emory Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 04:30 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:45 PM																				
Volume	17	859	66	1	943	53	55	17	0	125	418	726	94	0	1238	67	74	463	0	604	2910
Percent	1.8	91.1	7.0	0.1		42.4	44.0	13.6	0.0		33.8	58.6	7.6	0.0		11.1	12.3	76.7	0.0		
05:15 Volume	3	226	16	1	246	15	16	5	0	36	109	181	28	0	318	14	14	110	0	138	738
Peak Factor																					0.986
High Int.	05:15 PM					05:15 PM					05:30 PM					05:00 PM					
Volume	3	226	16	1	246	15	16	5	0	36	107	184	30	0	321	25	22	122	0	169	
Peak Factor					0.958					0.868					0.964					0.893	

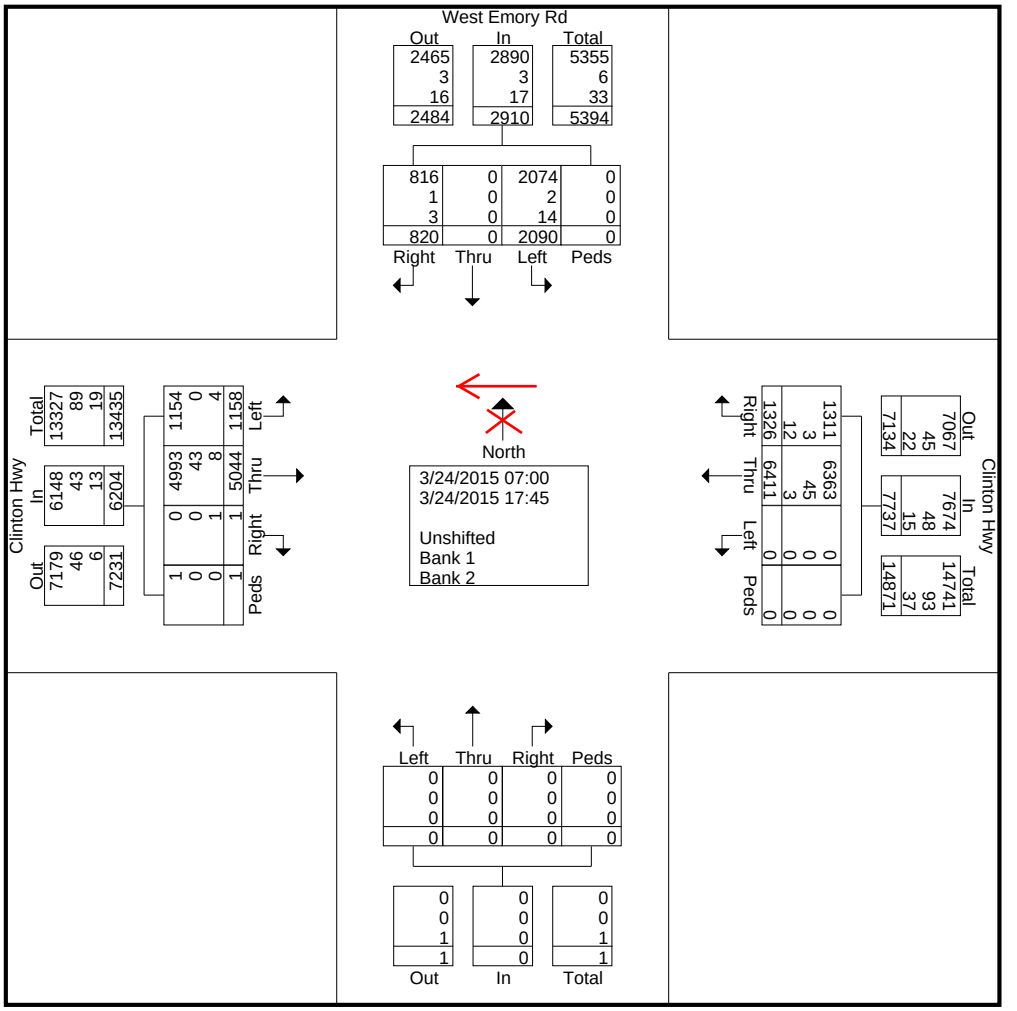


File Name : West Emory Rd at Clinton Hwy Gas Station TMC
Site Code : DB400#5
Start Date : 3/24/2015
Page No : 1

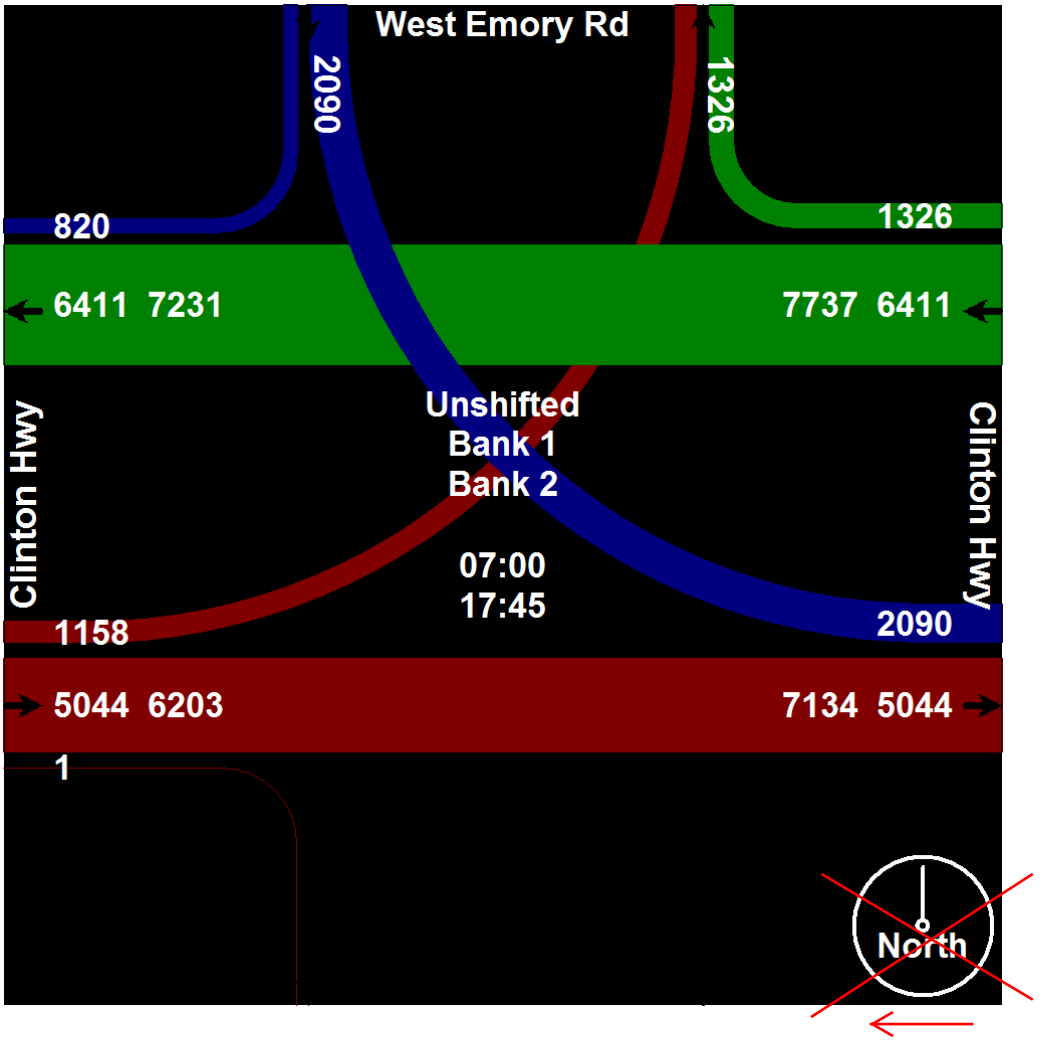
Groups Printed- Unshifted - Bank 1 - Bank 2

	West Emory Rd Westbound					Clinton Hwy Northbound										Clinton Hwy Southbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00	65	0	100	0	165	28	139	0	0	167	0	0	0	0	0	1	120	62	0	183	515
07:15	46	0	126	0	172	70	229	0	0	299	0	0	0	0	0	0	279	84	0	363	834
07:30	51	0	145	0	196	79	232	0	0	311	0	0	0	0	0	0	368	55	0	423	930
07:45	35	0	161	0	196	101	321	0	0	422	0	0	0	0	0	0	453	47	1	501	1119
Total	197	0	532	0	729	278	921	0	0	1199	0	0	0	0	0	1	1220	248	1	1470	3398
08:00	25	0	129	0	154	82	255	0	0	337	0	0	0	0	0	0	418	31	0	449	940
08:15	41	0	113	0	154	61	241	0	0	302	0	0	0	0	0	0	267	36	0	303	759
08:30	38	0	101	0	139	48	231	0	0	279	0	0	0	0	0	0	196	28	0	224	642
08:45	31	0	97	0	128	39	220	0	0	259	0	0	0	0	0	0	170	20	0	190	577
Total	135	0	440	0	575	230	947	0	0	1177	0	0	0	0	0	0	1051	115	0	1166	2918
*** BREAK ***																					
11:00	17	0	41	0	58	33	190	0	0	223	0	0	0	0	0	0	78	18	0	96	377
11:15	25	0	58	0	83	47	223	0	0	270	0	0	0	0	0	0	92	24	0	116	469
11:30	38	0	66	0	104	55	217	0	0	272	0	0	0	0	0	0	112	29	0	141	517
11:45	29	0	75	0	104	41	235	0	0	276	0	0	0	0	0	0	121	33	0	154	534
Total	109	0	240	0	349	176	865	0	0	1041	0	0	0	0	0	0	403	104	0	507	1897
12:00	22	0	83	0	105	57	252	0	0	309	0	0	0	0	0	0	113	41	0	154	568
12:15	30	0	77	0	107	53	282	0	0	335	0	0	0	0	0	0	123	37	0	160	602
12:30	29	0	74	0	103	77	247	0	0	324	0	0	0	0	0	0	110	30	0	140	567
12:45	26	0	68	0	94	60	281	0	0	341	0	0	0	0	0	0	162	37	0	199	634
Total	107	0	302	0	409	247	1062	0	0	1309	0	0	0	0	0	0	508	145	0	653	2371
*** BREAK ***																					
16:00	44	0	75	0	119	53	263	0	0	316	0	0	0	0	0	0	170	36	0	206	641
16:15	37	0	77	0	114	39	301	0	0	340	0	0	0	0	0	0	204	52	0	256	710
16:30	29	0	69	0	98	29	291	0	0	320	0	0	0	0	0	0	212	66	0	278	696
16:45	19	0	62	0	81	41	317	0	0	358	0	0	0	0	0	0	210	56	0	266	705
Total	129	0	283	0	412	162	1172	0	0	1334	0	0	0	0	0	0	796	210	0	1006	2752
17:00	32	0	53	0	85	64	423	0	0	487	0	0	0	0	0	0	242	99	0	341	913
17:15	30	0	84	0	114	49	364	0	0	413	0	0	0	0	0	0	244	74	0	318	845
17:30	43	0	84	0	127	64	354	0	0	418	0	0	0	0	0	0	317	95	0	412	957
17:45	38	0	72	0	110	56	303	0	0	359	0	0	0	0	0	0	263	68	0	331	800
Total	143	0	293	0	436	233	1444	0	0	1677	0	0	0	0	0	0	1066	336	0	1402	3515
Grand Total	820	0	2090	0	2910	1326	6411	0	0	7737	0	0	0	0	0	1	5044	1158	1	6204	16851
Apprch %	28.2	0	71.8	0		17.1	82.9	0	0		0	0	0	0		0	81.3	18.7	0		
Total %	4.9	0	12.4	0	17.3	7.9	38	0	0	45.9	0	0	0	0	0	0	29.9	6.9	0	36.8	
Unshifted	816	0	2074	0	2890	1311	6363	0	0	7674	0	0	0	0	0	0	4993	1154	1	6148	16712
% Unshifted	99.5	0	99.2	0	99.3	98.9	99.3	0	0	99.2	0	0	0	0	0	0	99	99.7	100	99.1	99.2
Bank 1	1	0	2	0	3	3	45	0	0	48	0	0	0	0	0	0	43	0	0	43	94
% Bank 1	0.1	0	0.1	0	0.1	0.2	0.7	0	0	0.6	0	0	0	0	0	0	0.9	0	0	0.7	0.6
Bank 2	3	0	14	0	17	12	3	0	0	15	0	0	0	0	0	1	8	4	0	13	45
% Bank 2	0.4	0	0.7	0	0.6	0.9	0	0	0	0.2	0	0	0	0	0	100	0.2	0.3	0	0.2	0.3

File Name : West Emory Rd at Clinton Hwy Gas Station TMC
Site Code : DB400#5
Start Date : 3/24/2015
Page No : 2



File Name : West Emory Rd at Clinton Hwy Gas Station TMC
Site Code : DB400#5
Start Date : 3/24/2015
Page No : 3



	West Emory Rd Westbound					Clinton Hwy Northbound										Clinton Hwy Southbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 09:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15																					
07:15	46	0	126	0	172	70	229	0	0	299	0	0	0	0	0	0	279	**84**	0	363	834
07:30	**51**	0	145	0	**196**	79	232	0	0	311	0	0	0	0	0	0	368	55	0	423	930
07:45	35	0	**161**	0	196	**101**	**321**	0	0	**422**	0	0	0	0	0	0	**453**	47	**1**	**501**	**1119**
08:00	25	0	129	0	154	82	255	0	0	337	0	0	0	0	0	0	418	31	0	449	940
Total Volume	157	0	561	0	718	332	1037	0	0	1369	0	0	0	0	0	0	1518	217	1	1736	3823
% App. Total	21.9	0	78.1	0		24.3	75.7	0	0		0	0	0	0		0	87.4	12.5	0.1		
PHF	.770	.000	.871	.000	.916	.822	.808	.000	.000	.811	.000	.000	.000	.000	.000	.000	.838	.646	.250	.866	.854

File Name : West Emory Rd at Clinton Hwy Gas Station TMC
Site Code : DB400#5
Start Date : 3/24/2015
Page No : 4

	West Emory Rd Westbound					Clinton Hwy Northbound										Clinton Hwy Southbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 09:45 - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	07:00					07:30					07:00					07:15					
+0 mins.	**65**	0	100	0	165	79	232	0	0	311	0	0	0	0	0	0	279	**84**	0	363	
+15 mins.	46	0	126	0	172	**101**	**321**	0	0	**422**	0	0	0	0	0	0	368	55	0	423	
+30 mins.	51	0	145	0	**196**	82	255	0	0	337	0	0	0	0	0	0	**453**	47	**1**	**501**	
+45 mins.	35	0	**161**	0	196	61	241	0	0	302	0	0	0	0	0	0	418	31	0	449	
Total Volume	197	0	532	0	729	323	1049	0	0	1372	0	0	0	0	0	0	1518	217	1	1736	
% App. Total	27	0	73	0		23.5	76.5	0	0		0	0	0	0		0	87.4	12.5	0.1		
PHF	.758	.000	.826	.000	.930	.800	.817	.000	.000	.813	.000	.000	.000	.000	.000	.000	.838	.646	.250	.866	
Peak Hour Analysis From 10:00 to 13:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00																					
12:00	22	0	83															41			
12:15	30	0	77	0	107	53	282	0	0	335	0	0	0	0	0	0	123	37	0	160	602
12:30	29	0	74	0	103	77	247	0	0	324	0	0	0	0	0	0	110	30	0	140	567
12:45	26	0	68	0	94	60	281	0	0	341	0	0	0	0	0	0	162	37	0	199	634
Total Volume	107	0	302	0	409	247	1062	0	0	1309	0	0	0	0	0	0	508	145	0	653	2371
% App. Total	26.2	0	73.8	0		18.9	81.1	0	0		0	0	0	0		0	77.8	22.2	0		
PHF	.892	.000	.910	.000	.956	.802	.941	.000	.000	.960	.000	.000	.000	.000	.000	.000	.784	.884	.000	.820	.935

	West Emory Rd Westbound					Clinton Hwy Northbound										Clinton Hwy Southbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 to 13:45 - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	11:30					12:00					10:00					12:00					
+0 mins.	**38**	0	66	0	104	57	252	0	0	309	0	0	0	0	0	0	113	**41**	0	154	
+15 mins.	29	0	75	0	104	53	**282**	0	0	335	0	0	0	0	0	0	123	37	0	160	
+30 mins.	22	0	**83**	0	105	**77**	247	0	0	324	0	0	0	0	0	0	110	30	0	140	
+45 mins.	30	0	77	0	**107**	60	281	0	0	**341**	0	0	0	0	0	0	**162**	37	0	**199**	
Total Volume	119	0	301	0	420	247	1062	0	0	1309	0	0	0	0	0	0	508	145	0	653	
% App. Total	28.3	0	71.7	0		18.9	81.1	0	0		0	0	0	0		0	77.8	22.2	0		
PHF	.783	.000	.907	.000	.981	.802	.941	.000	.000	.960	.000	.000	.000	.000	.000	.000	.784	.884	.000	.820	
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	32	0	53	0	85	64	423			487								99			
17:15	30	0	84	0	114	49	364	0	0	413	0	0	0	0	0	0	244	74	0	318	845
17:30	43	0	84	0	127	64	354	0	0	418	0	0	0	0	0	0	317	95	0	412	957
17:45	38	0	72	0	110	56	303	0	0	359	0	0	0	0	0	0	263	68	0	331	800
Total Volume	143	0	293	0	436	233	1444	0	0	1677	0	0	0	0	0	0	1066	336	0	1402	3515
% App. Total	32.8	0	67.2	0		13.9	86.1	0	0		0	0	0	0		0	76	24	0		
PHF	.831	.000	.872	.000	.858	.910	.853	.000	.000	.861	.000	.000	.000	.000	.000	.000	.841	.848	.000	.851	.918

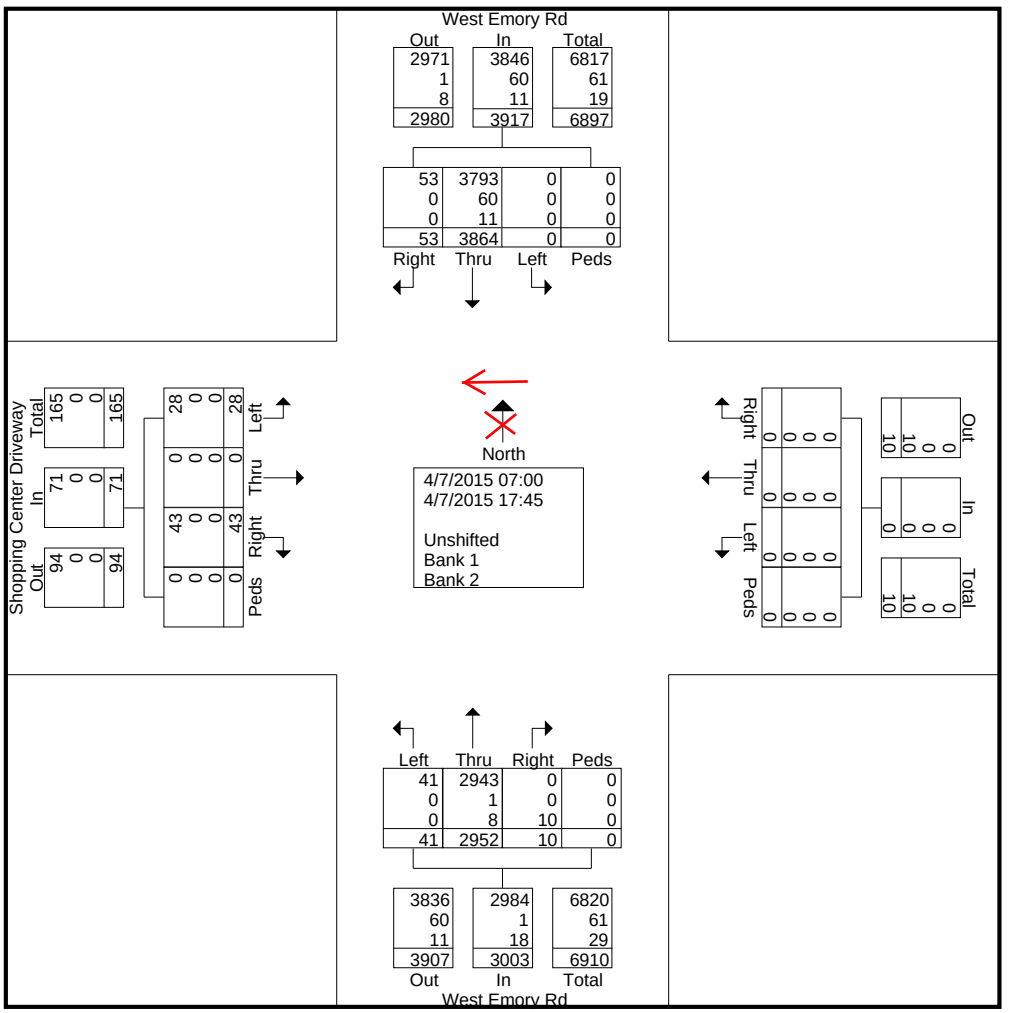
	West Emory Rd Westbound					Clinton Hwy Northbound										Clinton Hwy Southbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	17:00					17:00					14:00					17:00					
+0 mins.	32	0	53	0	85	**64**	**423**	0	0	**487**	0	0	0	0	0	0	242	**99**	0	341	
+15 mins.	30	0	**84**	0	114	49	364	0	0	413	0	0	0	0	0	0	244	74	0	318	
+30 mins.	**43**	0	84	0	**127**	64	354	0	0	418	0	0	0	0	0	0	**317**	95	0	**412**	
+45 mins.	38	0	72	0	110	56	303	0	0	359	0	0	0	0	0	0	263	68	0	331	
Total Volume	143	0	293	0	436	233	1444	0	0	1677	0	0	0	0	0	0	1066	336	0	1402	
% App. Total	32.8	0	67.2	0		13.9	86.1	0	0		0	0	0	0		0	76	24	0		
PHF	.831	.000	.872	.000	.858	.910	.853	.000	.000	.861	.000	.000	.000	.000	.000	.000	.841	.848	.000	.851	

File Name : West Emory Rd at Shopping Center Driveway Recount
Site Code : TUltra8
Start Date : 4/7/2015
Page No : 1

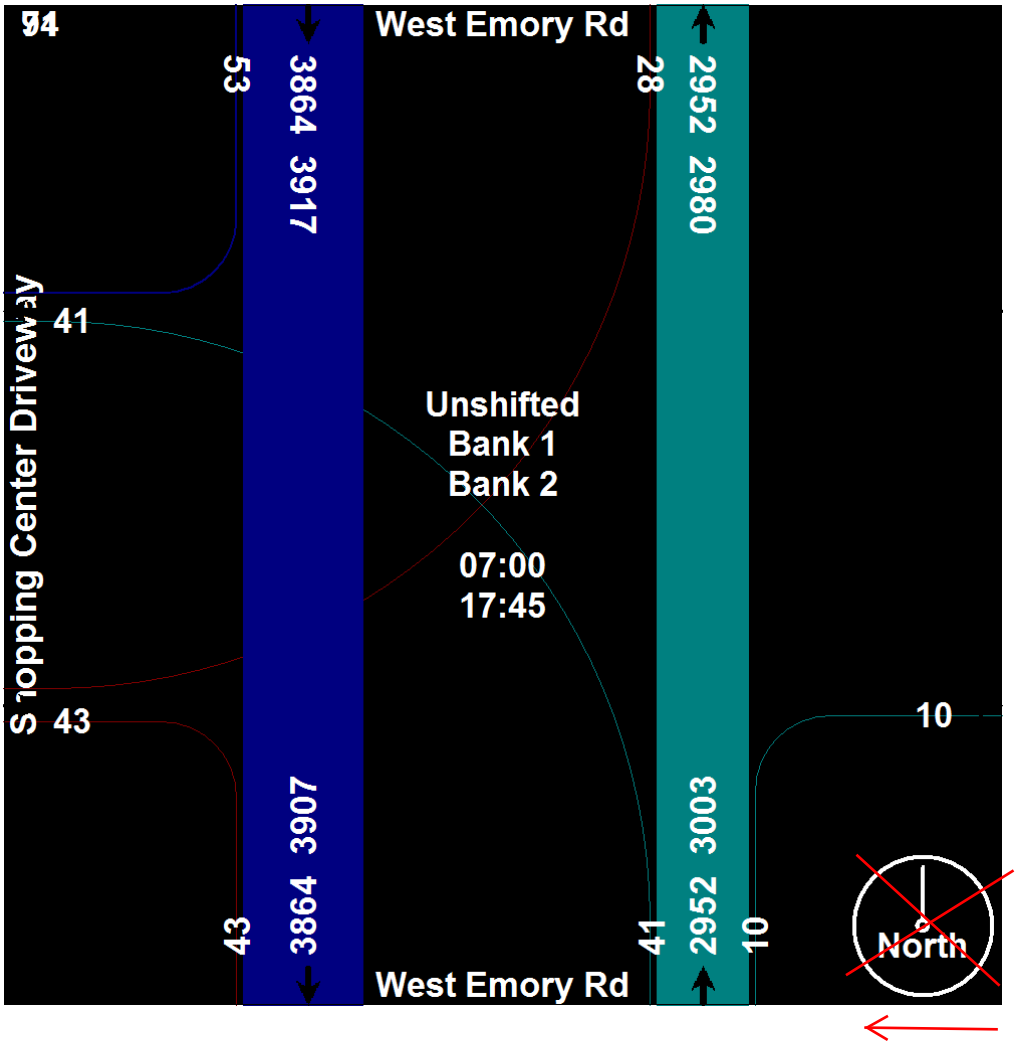
Groups Printed- Unshifted - Bank 1 - Bank 2

	West Emory Rd From North					From East					West Emory Rd From South					Shopping Center Driveway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00	0	171	0	0	171	0	0	0	0	0	0	135	0	0	135	0	0	1	0	1	307
07:15	2	245	0	0	247	0	0	0	0	0	1	245	0	0	246	0	0	0	0	0	493
07:30	3	239	0	0	242	0	0	0	0	0	1	261	2	0	264	0	0	0	0	0	506
07:45	1	227	0	0	228	0	0	0	0	0	2	211	3	0	216	1	0	3	0	4	448
Total	6	882	0	0	888	0	0	0	0	0	4	852	5	0	861	1	0	4	0	5	1754
08:00	0	165	0	0	165	0	0	0	0	0	0	163	1	0	164	0	0	0	0	0	329
08:15	1	137	0	0	138	0	0	0	0	0	0	121	1	0	122	3	0	1	0	4	264
08:30	5	142	0	0	147	0	0	0	0	0	0	101	2	0	103	2	0	0	0	2	252
08:45	3	121	0	0	124	0	0	0	0	0	0	97	0	0	97	0	0	0	0	0	221
Total	9	565	0	0	574	0	0	0	0	0	0	482	4	0	486	5	0	1	0	6	1066
*** BREAK ***																					
11:00	2	73	0	0	75	0	0	0	0	0	0	7	1	0	8	1	0	0	0	1	84
11:15	2	90	0	0	92	0	0	0	0	0	0	14	1	0	15	1	0	1	0	2	109
11:30	0	104	0	0	104	0	0	0	0	0	0	10	3	0	13	0	0	0	0	0	117
11:45	3	107	0	0	110	0	0	0	0	0	0	19	2	0	21	3	0	2	0	5	136
Total	7	374	0	0	381	0	0	0	0	0	0	50	7	0	57	5	0	3	0	8	446
12:00	0	89	0	0	89	0	0	0	0	0	0	24	5	0	29	2	0	0	0	2	120
12:15	1	74	0	0	75	0	0	0	0	0	0	40	3	0	43	2	0	1	0	3	121
12:30	2	58	0	0	60	0	0	0	0	0	0	62	1	0	63	4	0	3	0	7	130
12:45	3	89	0	0	92	0	0	0	0	0	0	56	0	0	56	1	0	2	0	3	151
Total	6	310	0	0	316	0	0	0	0	0	0	182	9	0	191	9	0	6	0	15	522
*** BREAK ***																					
16:00	3	207	0	0	210	0	0	0	0	0	0	171	1	0	172	2	0	1	0	3	385
16:15	5	221	0	0	226	0	0	0	0	0	1	195	5	0	201	1	0	4	0	5	432
16:30	7	241	0	0	248	0	0	0	0	0	2	212	3	0	217	1	0	2	0	3	468
16:45	2	256	0	0	258	0	0	0	0	0	2	203	3	0	208	3	0	3	0	6	472
Total	17	925	0	0	942	0	0	0	0	0	5	781	12	0	798	7	0	10	0	17	1757
17:00	1	253	0	0	254	0	0	0	0	0	0	196	1	0	197	1	0	1	0	2	453
17:15	3	223	0	0	226	0	0	0	0	0	0	167	0	0	167	1	0	2	0	3	396
17:30	3	185	0	0	188	0	0	0	0	0	1	132	2	0	135	5	0	1	0	6	329
17:45	1	147	0	0	148	0	0	0	0	0	0	110	1	0	111	9	0	0	0	9	268
Total	8	808	0	0	816	0	0	0	0	0	1	605	4	0	610	16	0	4	0	20	1446
Grand Total	53	3864	0	0	3917	0	0	0	0	0	10	2952	41	0	3003	43	0	28	0	71	6991
Apprch %	1.4	98.6	0	0		0	0	0	0		0.3	98.3	1.4	0		60.6	0	39.4	0		
Total %	0.8	55.3	0	0	56	0	0	0	0	0	0.1	42.2	0.6	0	43	0.6	0	0.4	0	1	
Unshifted	53	3793	0	0	3846	0	0	0	0	0	0	2943	41	0	2984	43	0	28	0	71	6901
% Unshifted	100	98.2	0	0	98.2	0	0	0	0	0	0	99.7	100	0	99.4	100	0	100	0	100	98.7
Bank 1	0	60	0	0	60	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	61
% Bank 1	0	1.6	0	0	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9
Bank 2	0	11	0	0	11	0	0	0	0	0	10	8	0	0	18	0	0	0	0	0	29
% Bank 2	0	0.3	0	0	0.3	0	0	0	0	0	100	0.3	0	0	0.6	0	0	0	0	0	0.4

File Name : West Emory Rd at Shopping Center Driveway Recount
Site Code : TUltra8
Start Date : 4/7/2015
Page No : 2



File Name : West Emory Rd at Shopping Center Driveway Recount
Site Code : TUltra8
Start Date : 4/7/2015
Page No : 3



	West Emory Rd Westbound										West Emory Rd Eastbound					Shopping Center Driveway Southbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:15																					
16:15	5	221	0	0	226	0	0	0	0	0	1	195	**5**	0	201	1	0	**4**	0	5	432
16:30	**7**	241	0	0	248	0	0	0	0	0	**2**	**212**	3	0	**217**	1	0	2	0	3	468
16:45	2	**256**	0	0	**258**	0	0	0	0	0	2	203	3	0	208	**3**	0	3	0	**6**	**472**
17:00	1	253	0	0	254	0	0	0	0	0	0	196	1	0	197	1	0	1	0	2	453
Total Volume	15	971	0	0	986	0	0	0	0	0	5	806	12	0	823	6	0	10	0	16	1825
% App. Total	1.5	98.5	0	0		0	0	0	0		0.6	97.9	1.5	0		37.5	0	62.5	0		
PHF	.536	.948	.000	.000	.955	.000	.000	.000	.000	.000	.625	.950	.600	.000	.948	.500	.000	.625	.000	.667	.967

APPENDIX B | TRIP GENERATION AND ASSIGNMENTS

TRIP GENERATION

1040-0002 WEIGEL'S CLINTON HIGHWAY

ITE TRIP GENERATION (710)
GENERAL OFFICE BUILDING

10	1,000 Sq. Feet Gross Area

WEEKDAY

T = e^(.76*Ln(X)+3.68)
T = 228.14

50%	ENTERING =	114
50%	EXITING =	114

AM PEAK

T = e^(.80*Ln(X)+1.57)
T = 30.33

88%	ENTERING =	27
12%	EXITING =	4

PM PEAK

T = 1.12(X)+78.45
T = 89.65

17%	ENTERING =	15
83%	EXITING =	74

TRIP GENERATION

1040-0002 WEIGEL'S CLINTON HIGHWAY

ITE TRIP GENERATION (853)
CONVENIENCE MARKET WITH GASOLINE PUMPS

16 FUELING POSITIONS

WEEKDAY

T = X * 542.60
T = 8681.60

50% ENTERING = 4341
50% EXITING = 4341

AM PEAK

T = X * 16.57
T = 265.120

50% ENTERING = 133
50% EXITING = 133

MID-DAY PEAK (AM Peak of the Generator)

T = X * 17.03
T = 272.48

50% ENTERING = 136
50% EXITING = 136

PM PEAK

T = X * 19.07
T = 305.12

50% ENTERING = 153
50% EXITING = 153

TRIP GENERATION

1040-0002 WEIGEL'S CLINTON HIGHWAY

ITE TRIP GENERATION (881)
PHARMACY / DRUGSTORE WITH DRIVE-THROUGH WINDOW

10 1,000 Sq. Feet Gross Leasable Area

WEEKDAY

T = X * 96.91
T = 970

50%	ENTERING =	485
50%	EXITING =	485
		970

AM PEAK

T = X * 3.45
T = 35

52%	ENTERING =	18
48%	EXITING =	17
		35

MID-DAY PEAK (AM Peak of the Generator)

T = X * 8.36
T = 84

50%	ENTERING =	42
50%	EXITING =	42
		84

PM PEAK

T = X * 9.91
T = 99

50%	ENTERING =	49
50%	EXITING =	50
		99

General Office Building
(710)

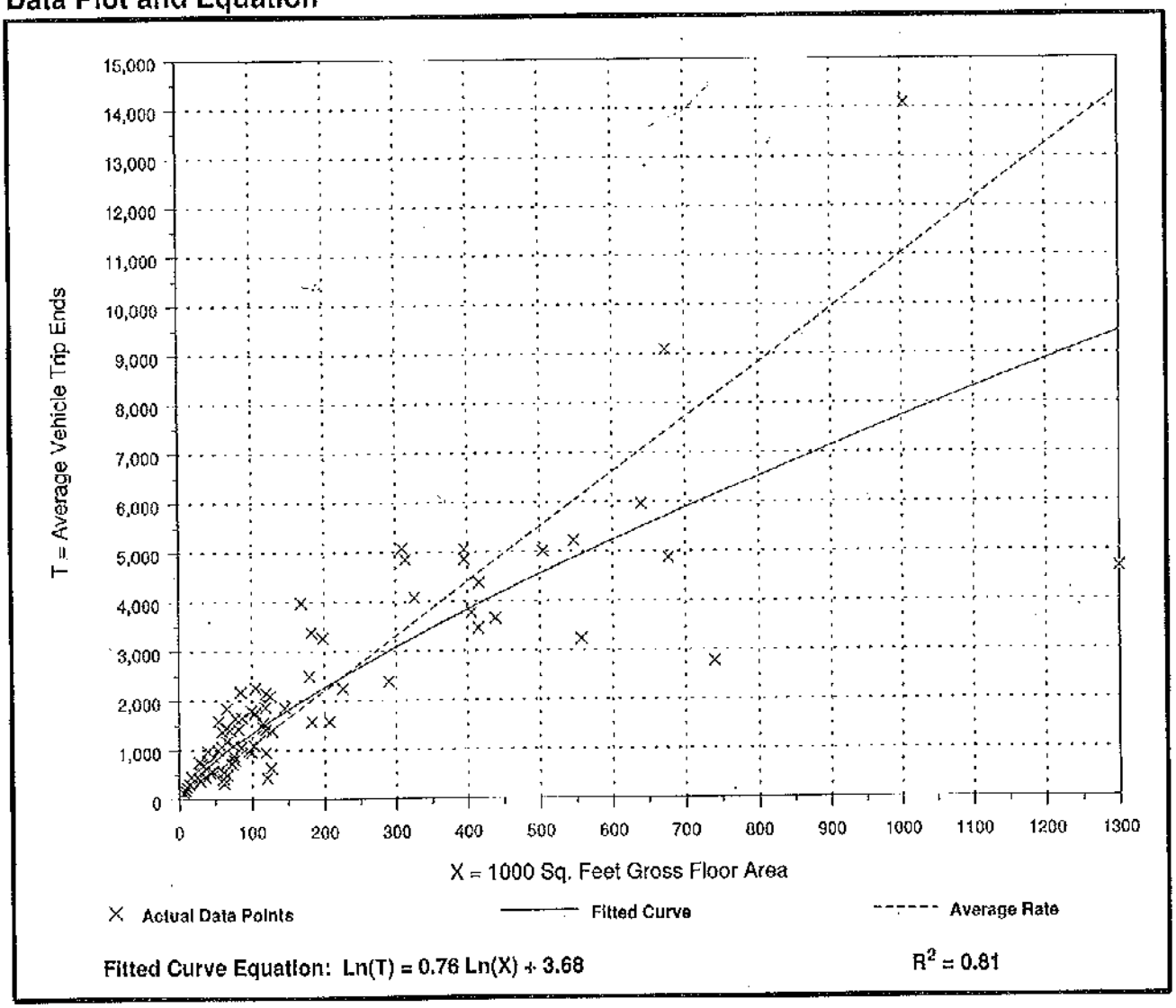
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday

Number of Studies: 79
Average 1000 Sq. Feet GFA: 197
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
11.03	3.58 - 28.80	6.15

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.76 Ln(X) + 3.68

$R^2 = 0.81$

General Office Building
(710)

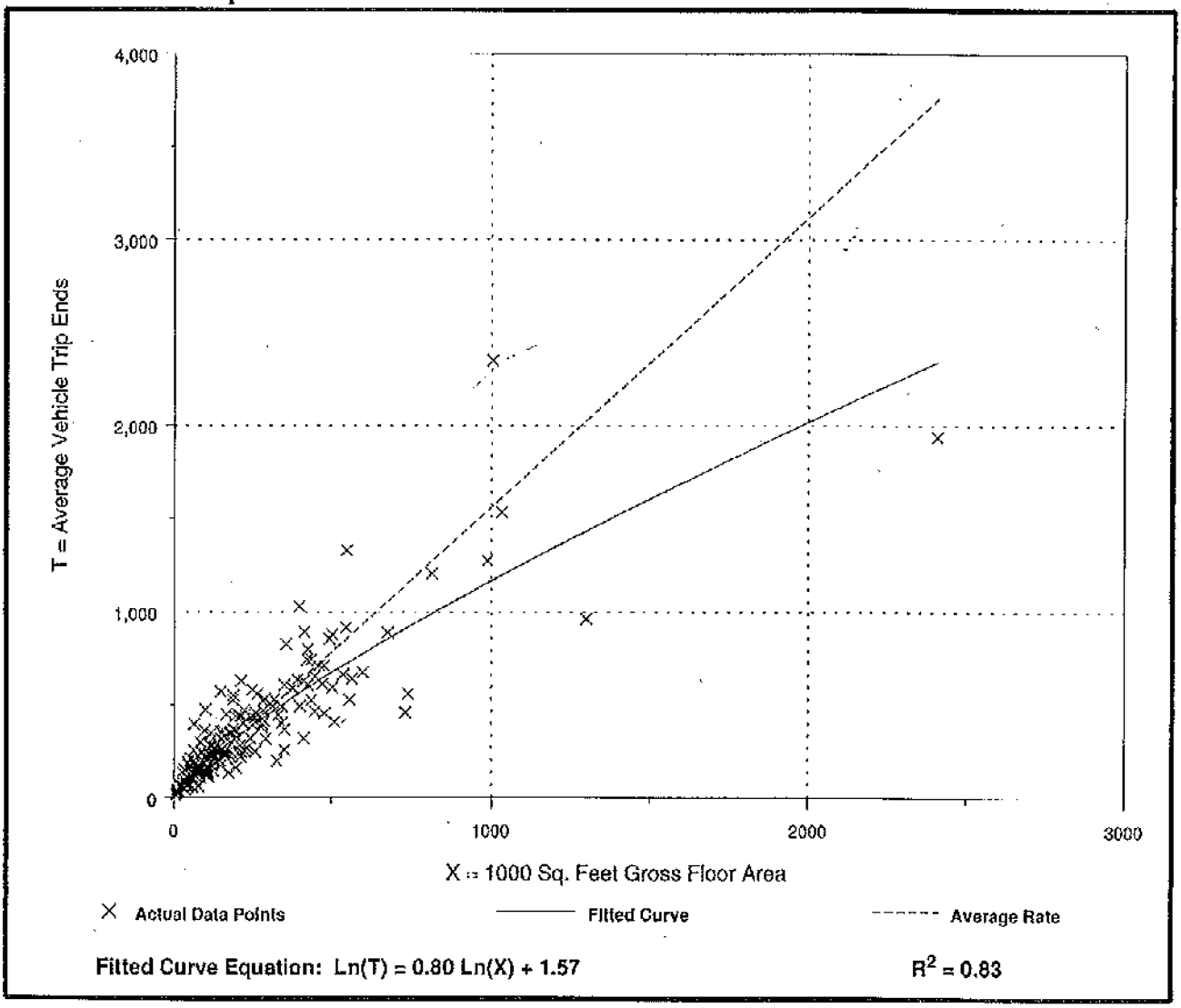
Average Vehicle Trip Ends vs: **1000 Sq. Feet Gross Floor Area**
On a: **Weekday,**
A.M. Peak Hour

Number of Studies: 218
Average 1000 Sq. Feet GFA: 222
Directional Distribution: 88% entering, 12% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.56	0.60 - 5.98	1.40

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.80 Ln(X) + 1.57

R^2 = 0.83

General Office Building
(710)

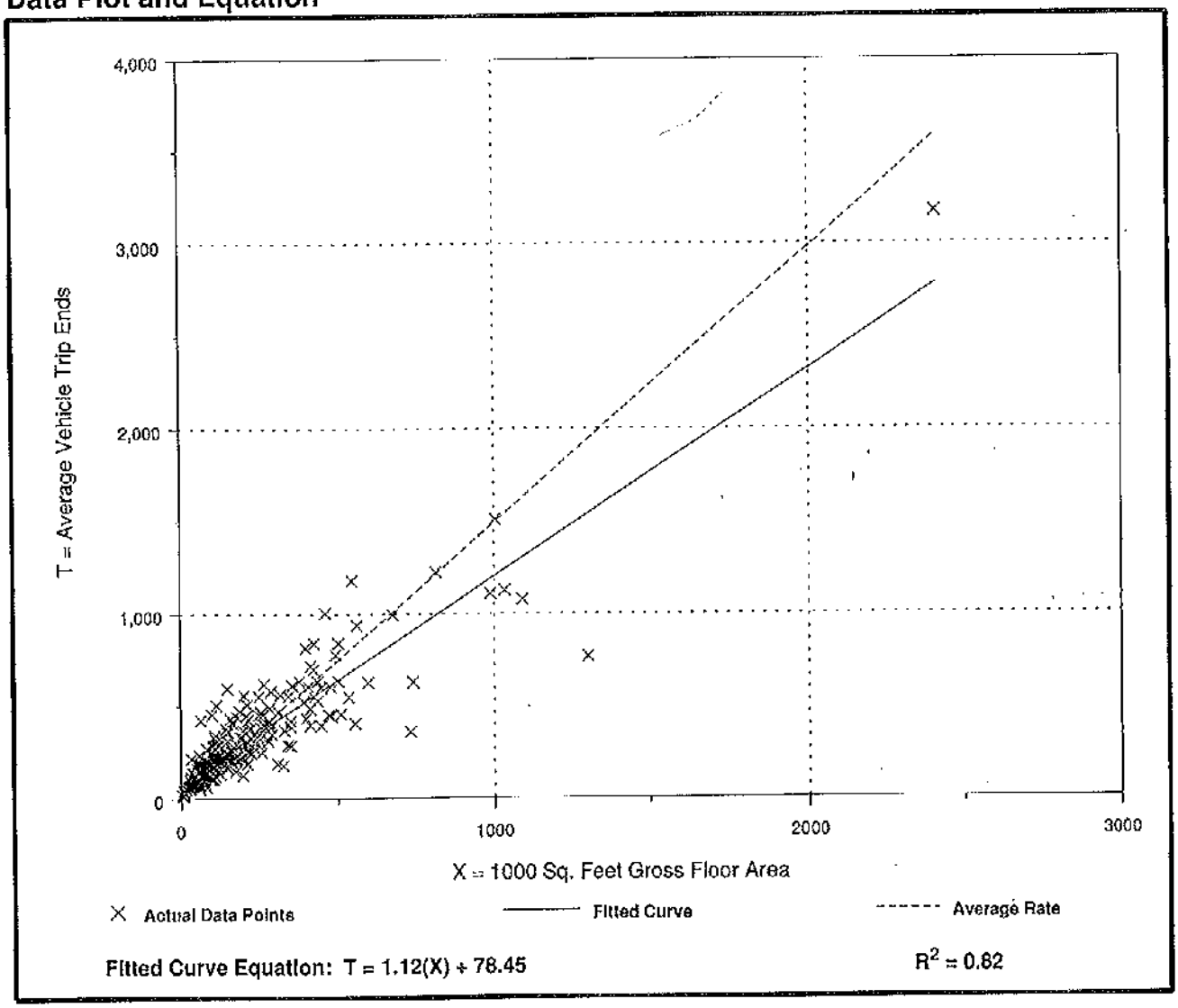
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
P.M. Peak Hour

Number of Studies: 236
Average 1000 Sq. Feet GFA: 215
Directional Distribution: 17% entering, 83% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.49	0.49 - 6.39	1.37

Data Plot and Equation



Fitted Curve Equation: $T = 1.12(X) + 78.45$

$R^2 = 0.62$

Convenience Market with Gasoline Pumps
(853)

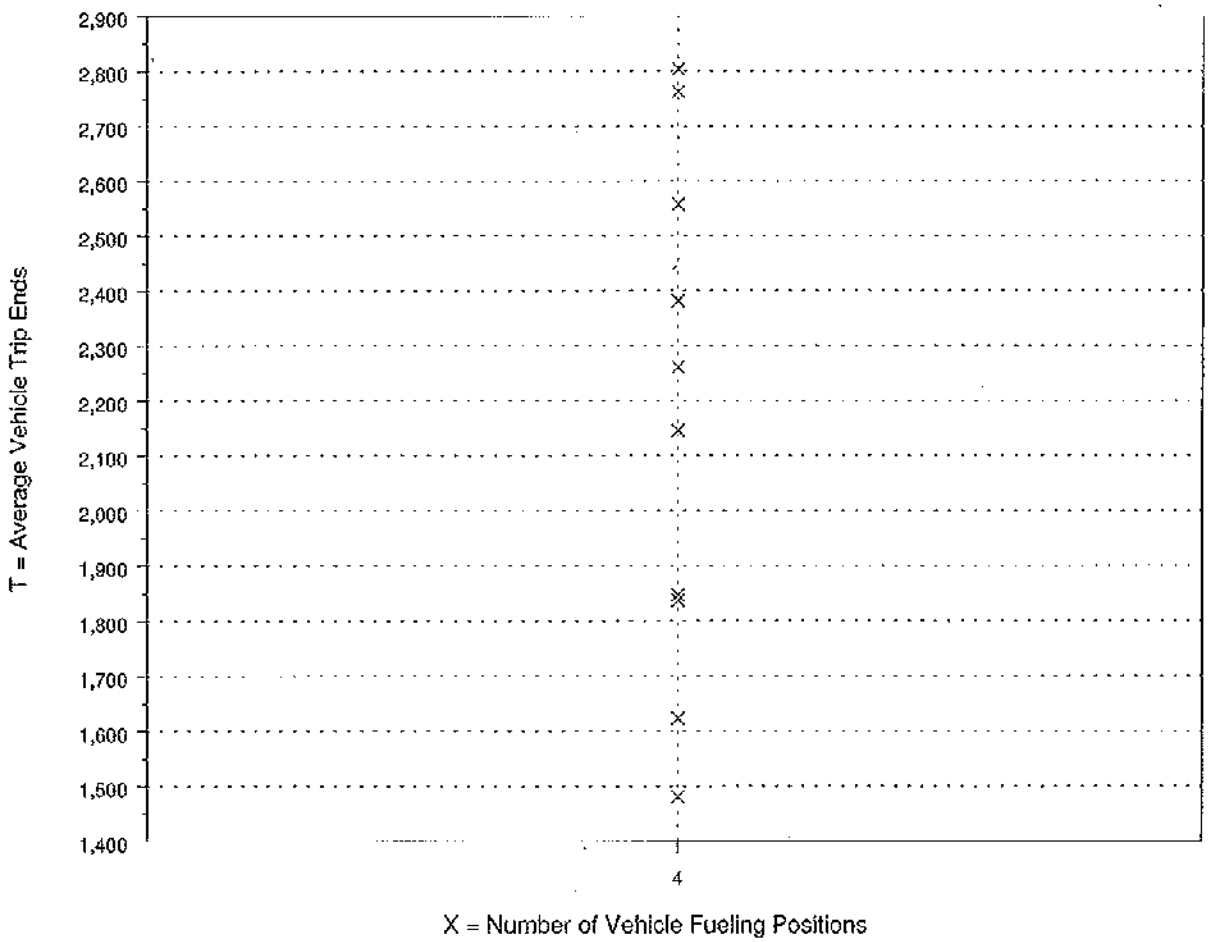
Average Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday

Number of Studies: 10
Average Vehicle Fueling Positions: 4
Directional Distribution: 50% entering, 50% exiting

Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
542.60	370.25 - 701.00	113.52

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Convenience Market with Gasoline Pumps
(853)

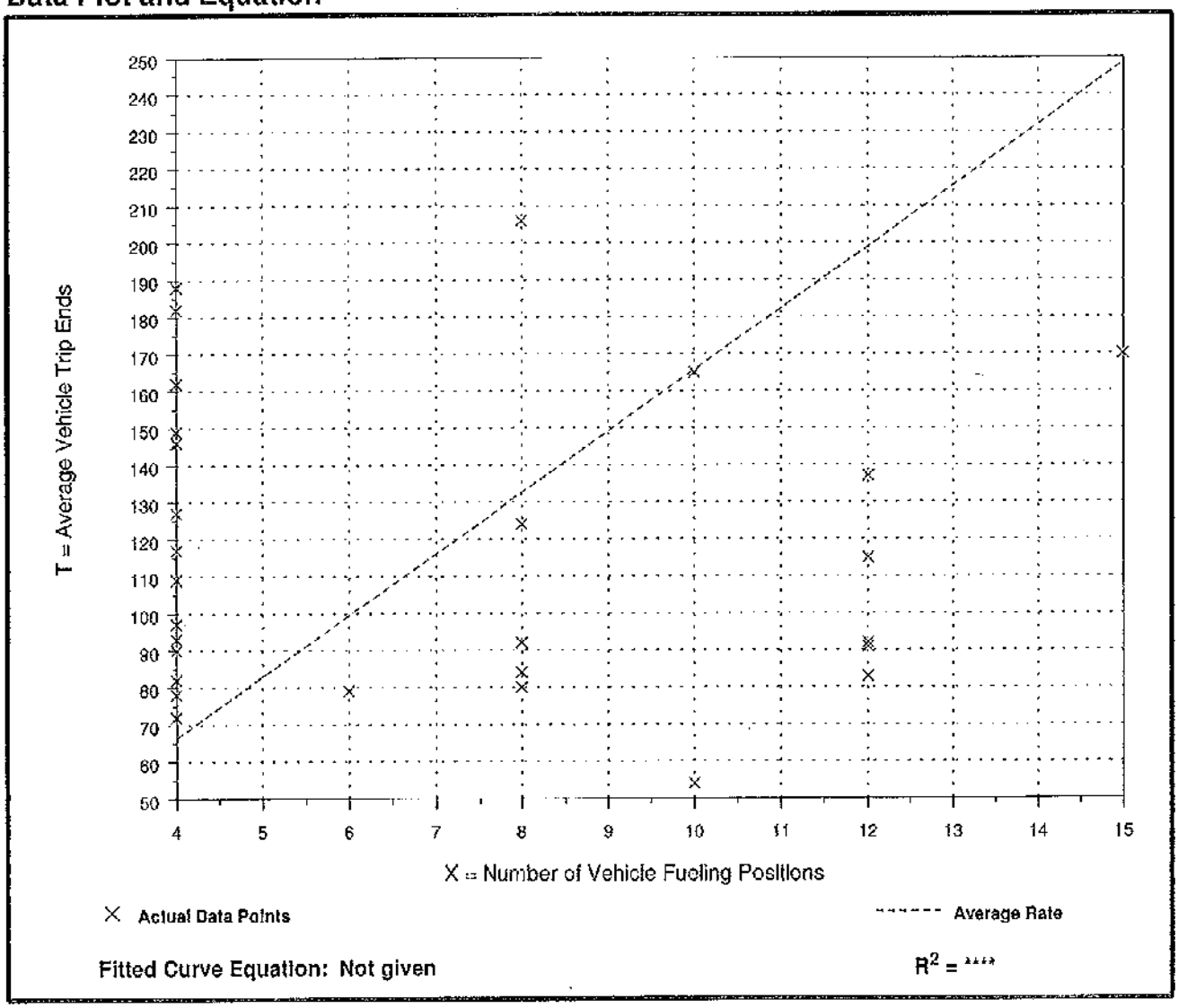
Average Vehicle Trip Ends vs: **Vehicle Fueling Positions**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 28
Average Vehicle Fueling Positions: 7
Directional Distribution: 50% entering, 50% exiting

Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
16.57	5.40 - 47.00	11.34

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Convenience Market with Gasoline Pumps
(853)

Average Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday,
A.M. Peak Hour of Generator

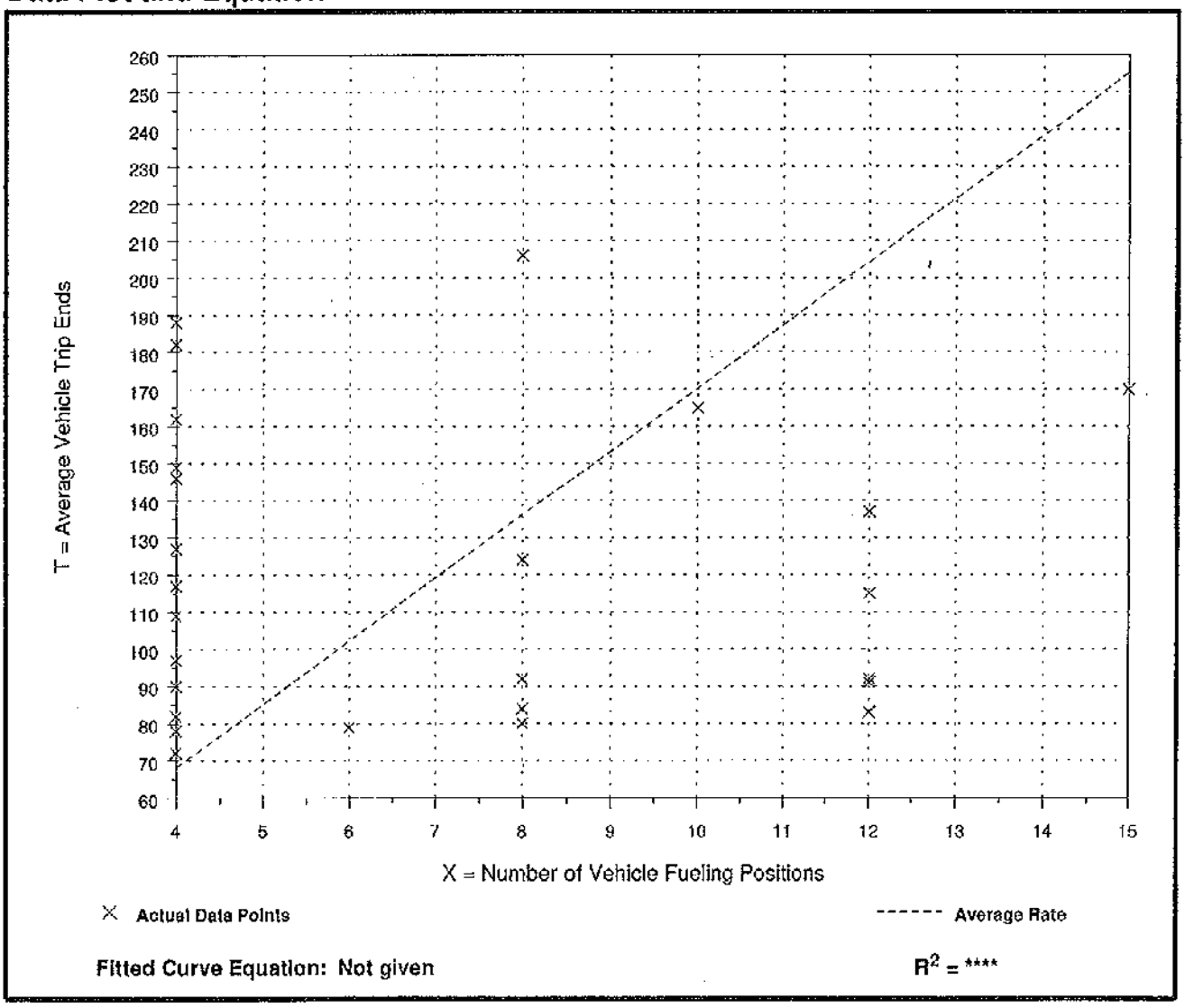
Used for Midday Peak

Number of Studies: 26
Average Vehicle Fueling Positions: 7
Directional Distribution: 50% entering, 50% exiting

Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
17.03	6.92 - 47.00	11.39

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Convenience Market with Gasoline Pumps
(853)

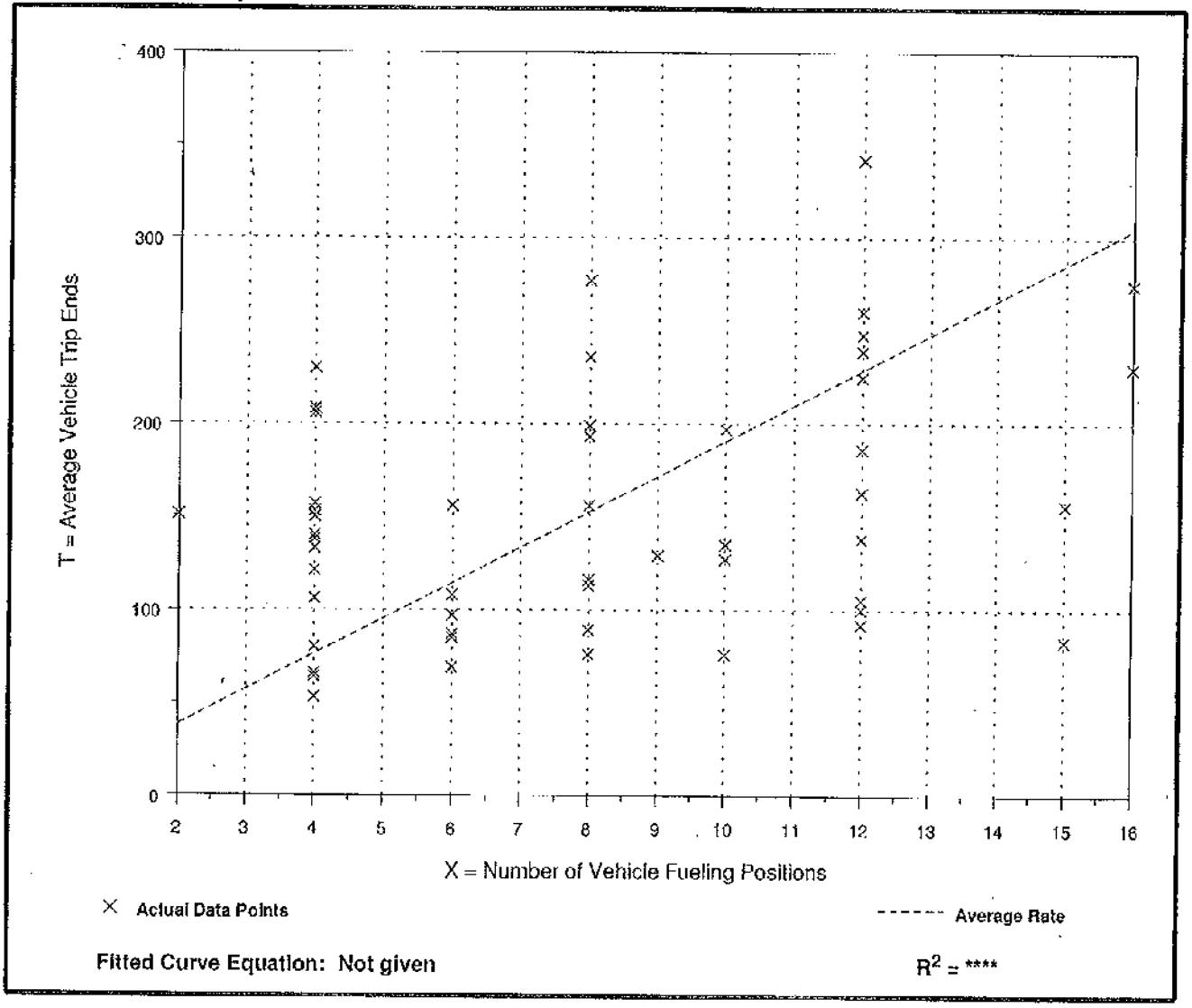
Average Vehicle Trip Ends vs: **Vehicle Fueling Positions**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 54
Average Vehicle Fueling Positions: 8
Directional Distribution: 50% entering, 50% exiting

Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
19.07	5.53 - 75.50	11.93

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Pharmacy/Drugstore with Drive-Through Window
(881)

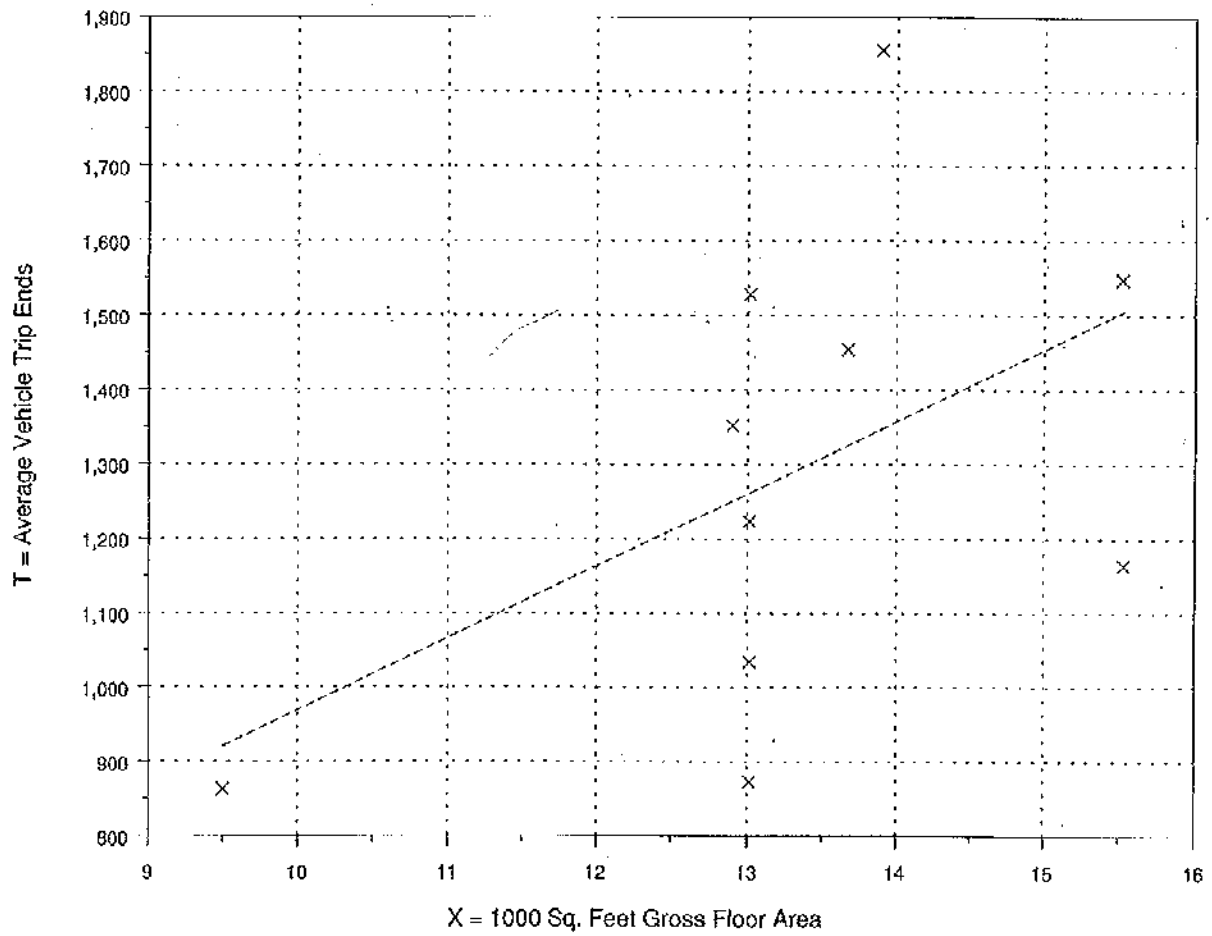
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday

Number of Studies: 10
Average 1000 Sq. Feet GFA: 13
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
96.91	67.09 - 133.45	21.59

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Pharmacy/Drugstore with Drive-Through Window
(881)

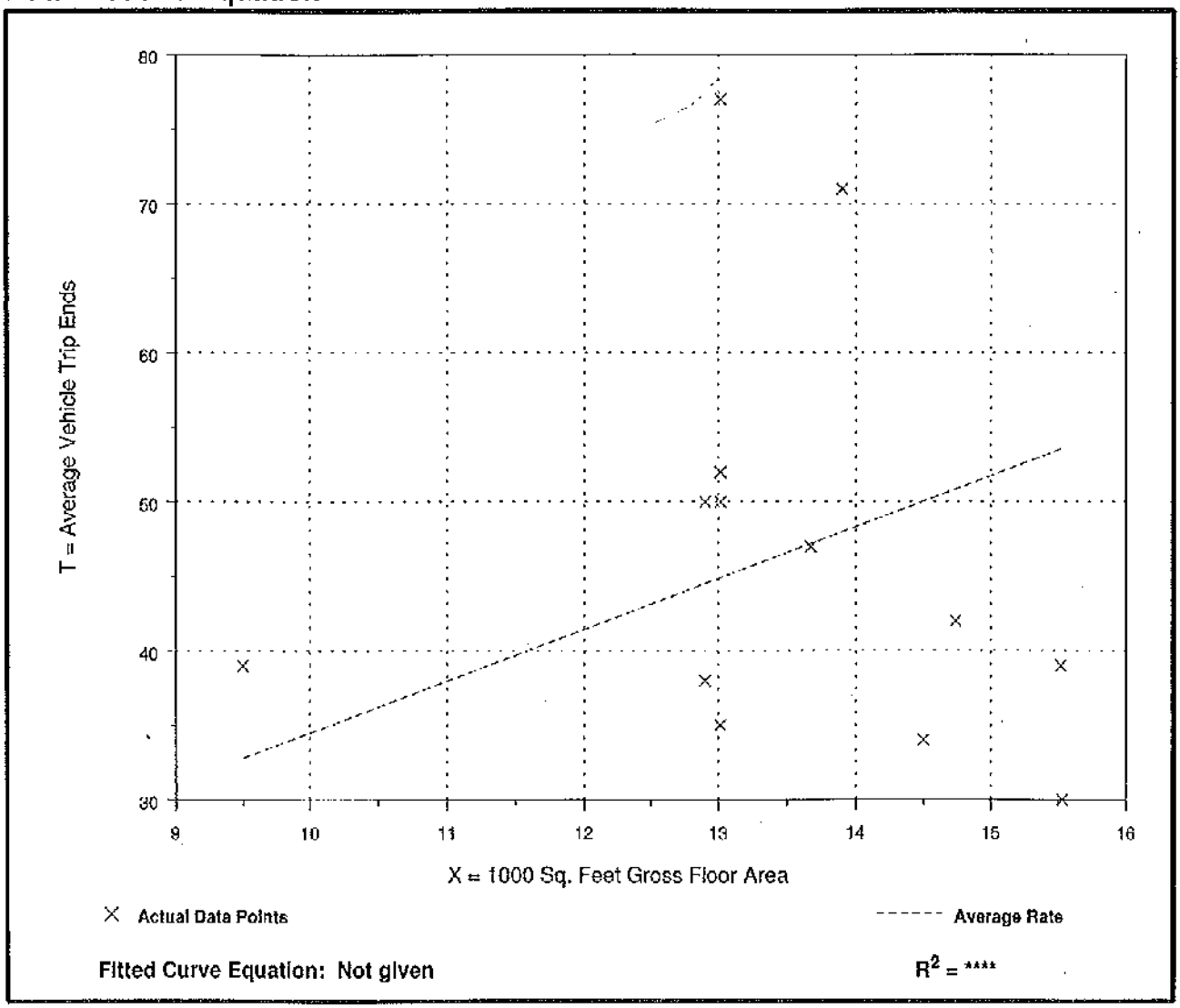
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 13
Average 1000 Sq. Feet GFA: 13
Directional Distribution: 52% entering, 48% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
3.45	1.93 - 5.92	2.10

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Pharmacy/Drugstore with Drive-Through Window
(881)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
A.M. Peak Hour of Generator

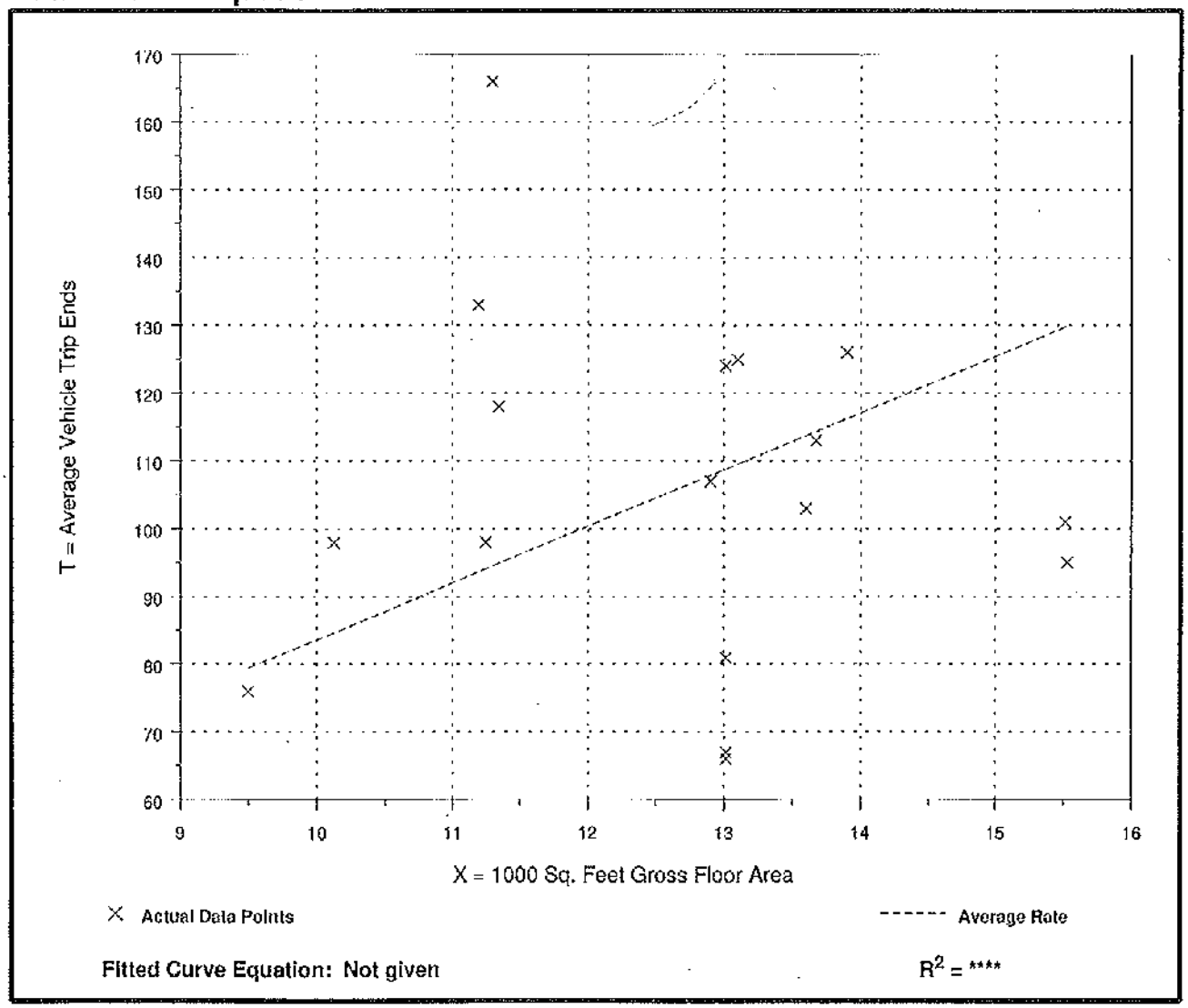
Used for Midday Peak

Number of Studies: 17
Average 1000 Sq. Feet GFA: 13
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
8.36	5.07 - 14.69	3.64

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Pharmacy/Drugstore with Drive-Through Window
(881)

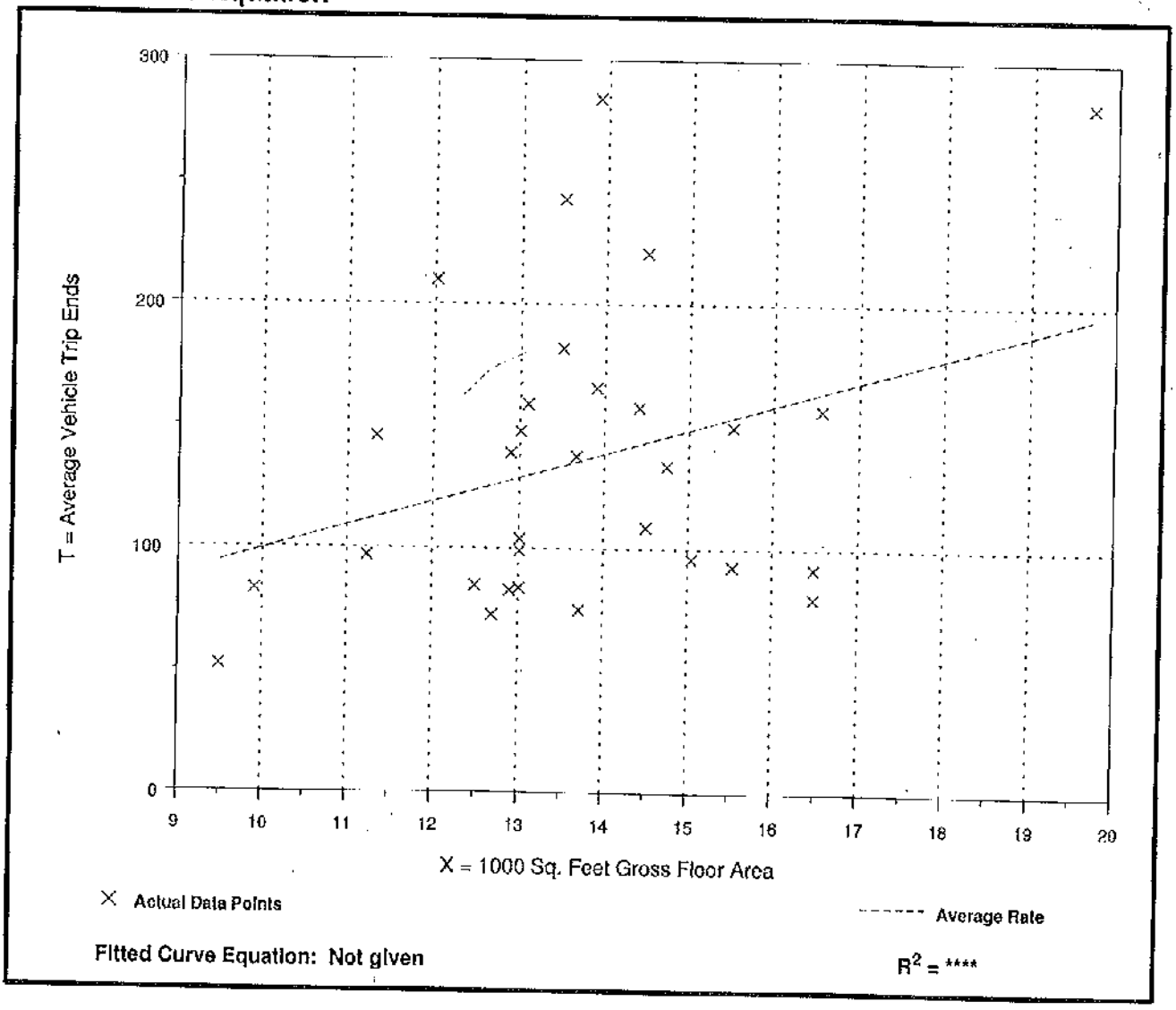
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 31
Average 1000 Sq. Feet GFA: 14
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
9.91	4.85 - 20.43	5.04

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

KNOXVILLE•KNOX COUNTY
MPC
METROPOLITAN PLANNING COMMISSION
TENNESSEE

MEMORANDUM

TO: Traffic Impact Study Reviewers and Preparers
FROM: Cindy Pionke
DATE: March 10, 1997
SUBJECT: Minutes from October 11, 1996 Meeting

Two items were presented for discussion at our last meeting. Hollis Loveday did a presentation on pass-by rates for a few specific land uses and Darcy Sullivan did a presentation on auxiliary lane issues. These specific matters seemed to cause some problems over the past year.

Percentage of pass-by trips for fast-food restaurants, supermarkets, convenience markets and shopping centers were discussed. The following percentages were agreed upon.

LAND USE	PERCENTAGE
Fast-food Restaurant	40
Supermarket	
> 50,000 SF	10
25,000 - 50,000 SF	35
< 25,000 SF	55
Convenience Market	
< 10,000 ADT	60
10,000 - 20,000 ADT	65
20,000 - 30,000 ADT	70
30,000 - 40,000 ADT	75
> 40,000 ADT	80
Shopping Center	
Use GLA formula up to 30%	

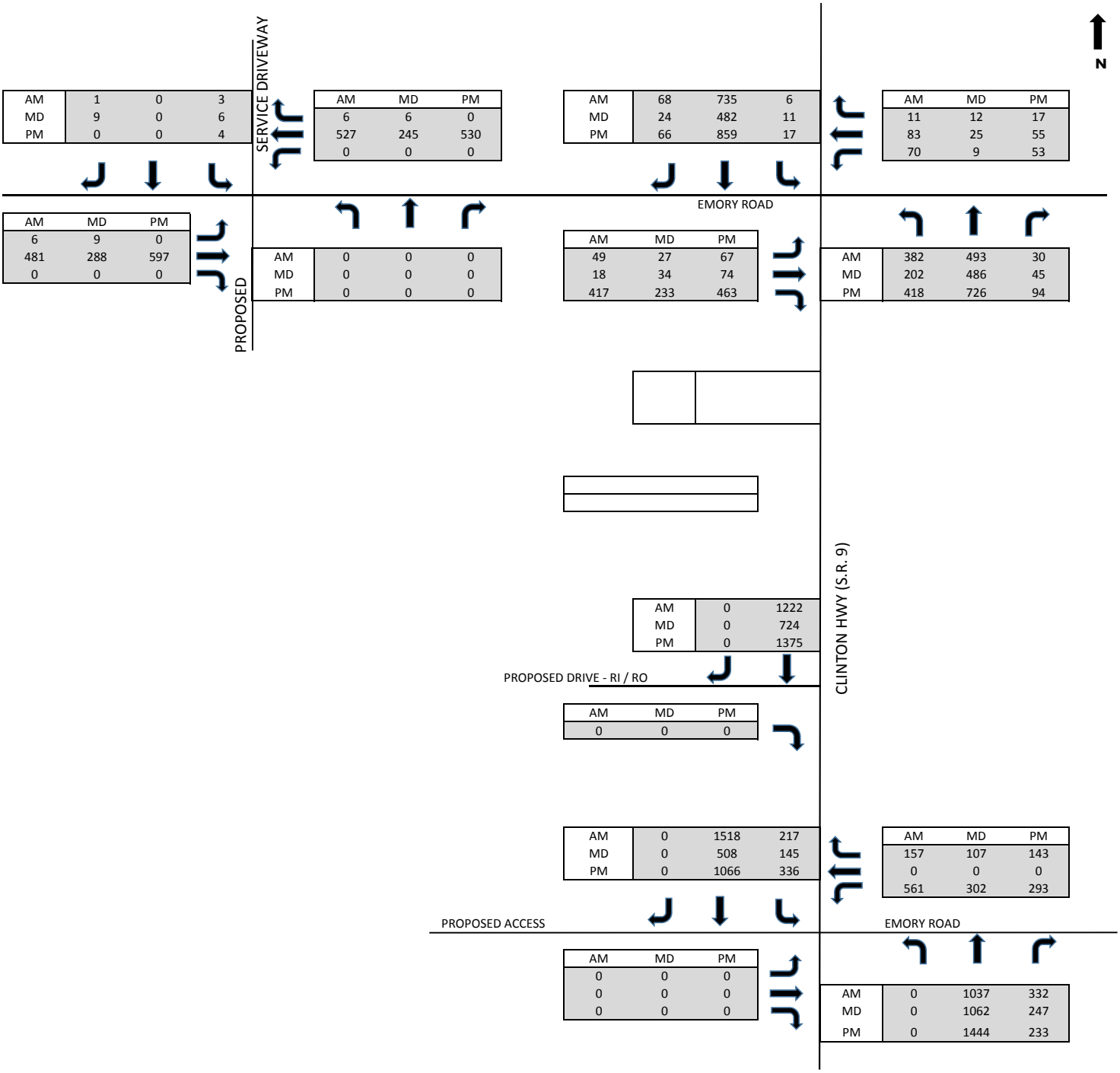
60% pass-by rate used for Convenience Market Trips

Emory

Clinton Hwy

Attached is the draft "Procedure for Determining Need for and Design of Auxiliary Lanes on Uncontrolled Approaches to Intersections and Driveways". **Please note that the bay taper rates have changed since we met.** The proposed 15:1 and 20:1 taper rates were previously 14:1 and 16:1, respectively. This procedure is for left and right turn lanes on two-lane roadways. The recommendation for four-lane roadways was to exercise judgment because no particular quantification method leads to consistent results.

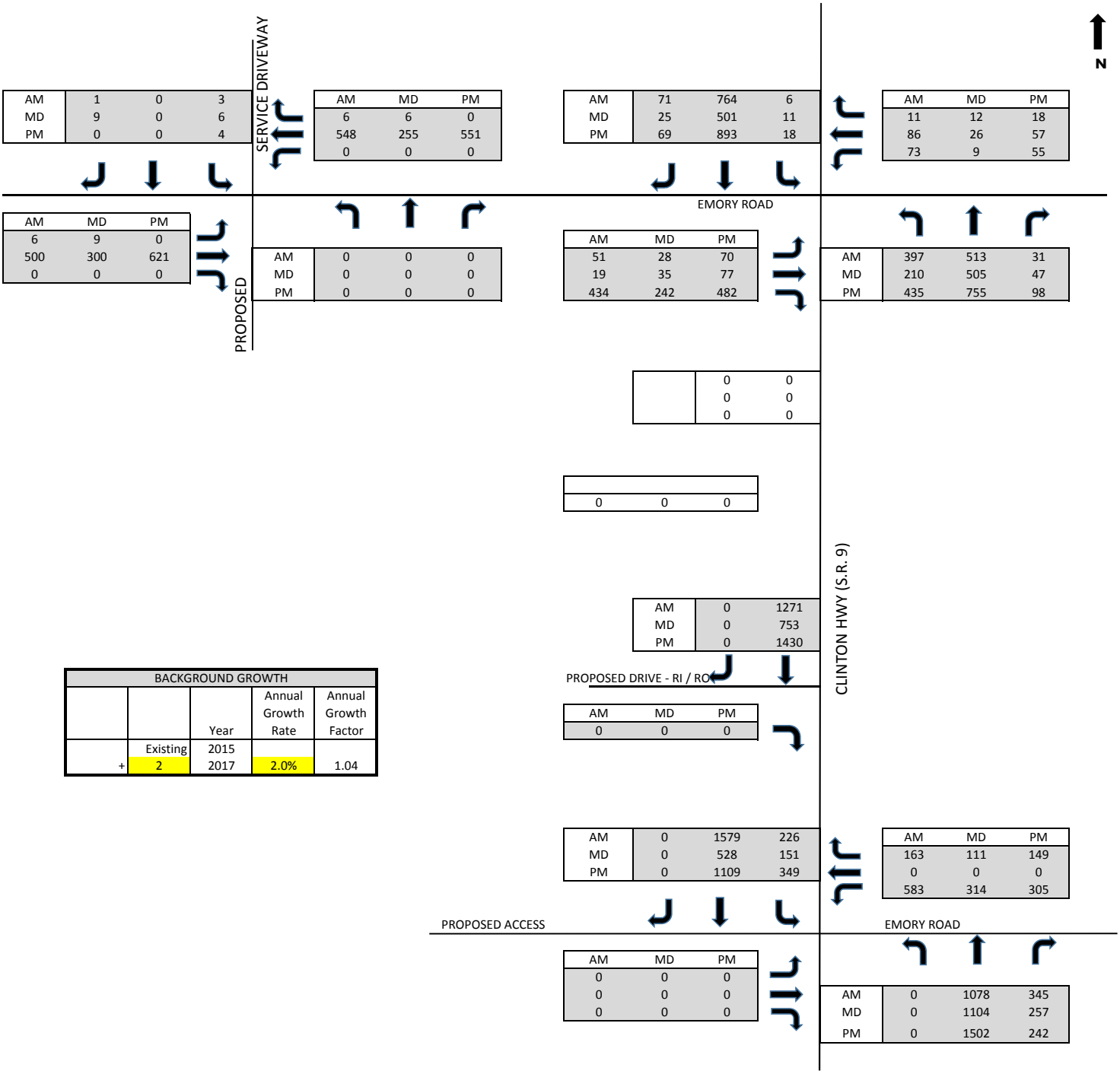
Suite 403 • City County Building
400 Main Street
Knoxville, Tennessee 37902
423 • 215 • 2500
FAX • 215 • 2068



2015 EXISTING VOLUMES

AM / MID-DAY / PM PEAK HOUR

WEIGEL'S CLINTON HIGHWAY
01040-0002

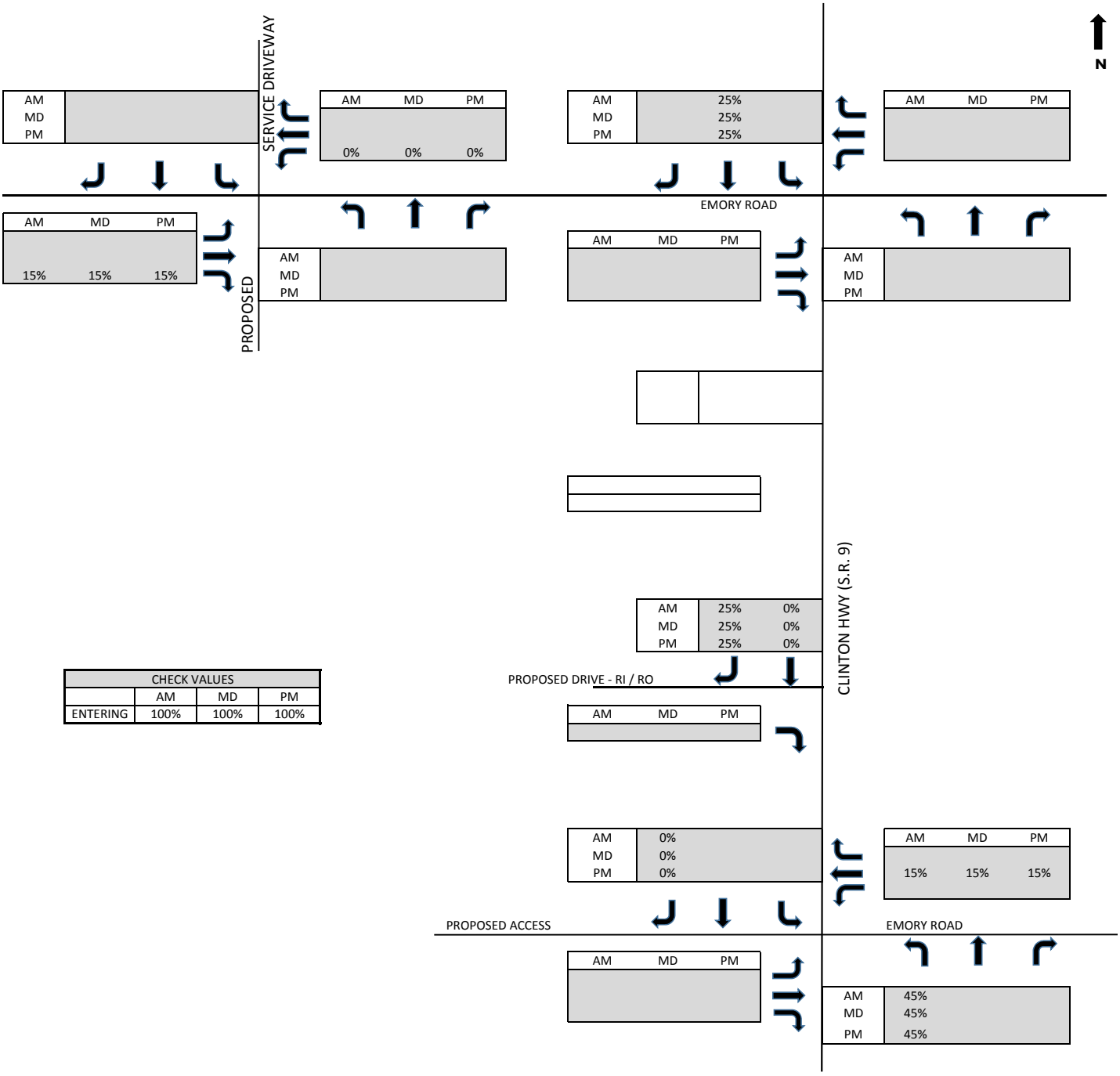


BACKGROUND GROWTH				
		Year	Annual Growth Rate	Annual Growth Factor
	Existing	2015		
+	2	2017	2.0%	1.04

2017 BACKGROUND VOLUMES

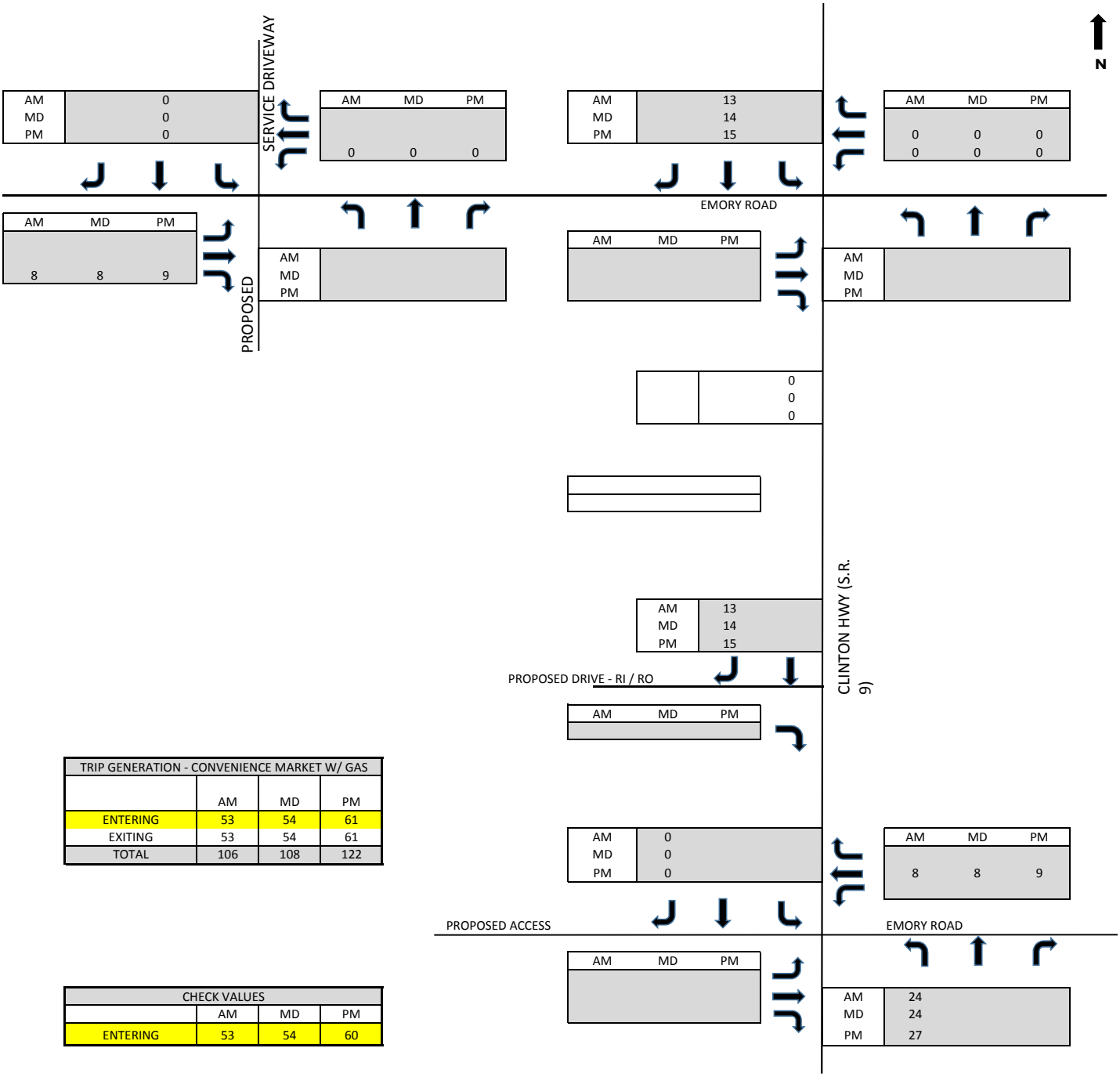
AM / MID-DAY / PM PEAK HOUR

WEIGEL'S CLINTON HIGHWAY
01040-0002



CHECK VALUES			
	AM	MD	PM
ENTERING	100%	100%	100%

TRIP DISTRIBUTION PATTERNS
CONVENIENCE MARKET WITH GAS (NON-PASS BY - ENTERING)
AM / MID-DAY / PM PEAK HOUR
WEIGEL'S CLINTON HIGHWAY 01040-0002



TRIP GENERATION - CONVENIENCE MARKET W/ GAS			
	AM	MD	PM
ENTERING	53	54	61
EXITING	53	54	61
TOTAL	106	108	122

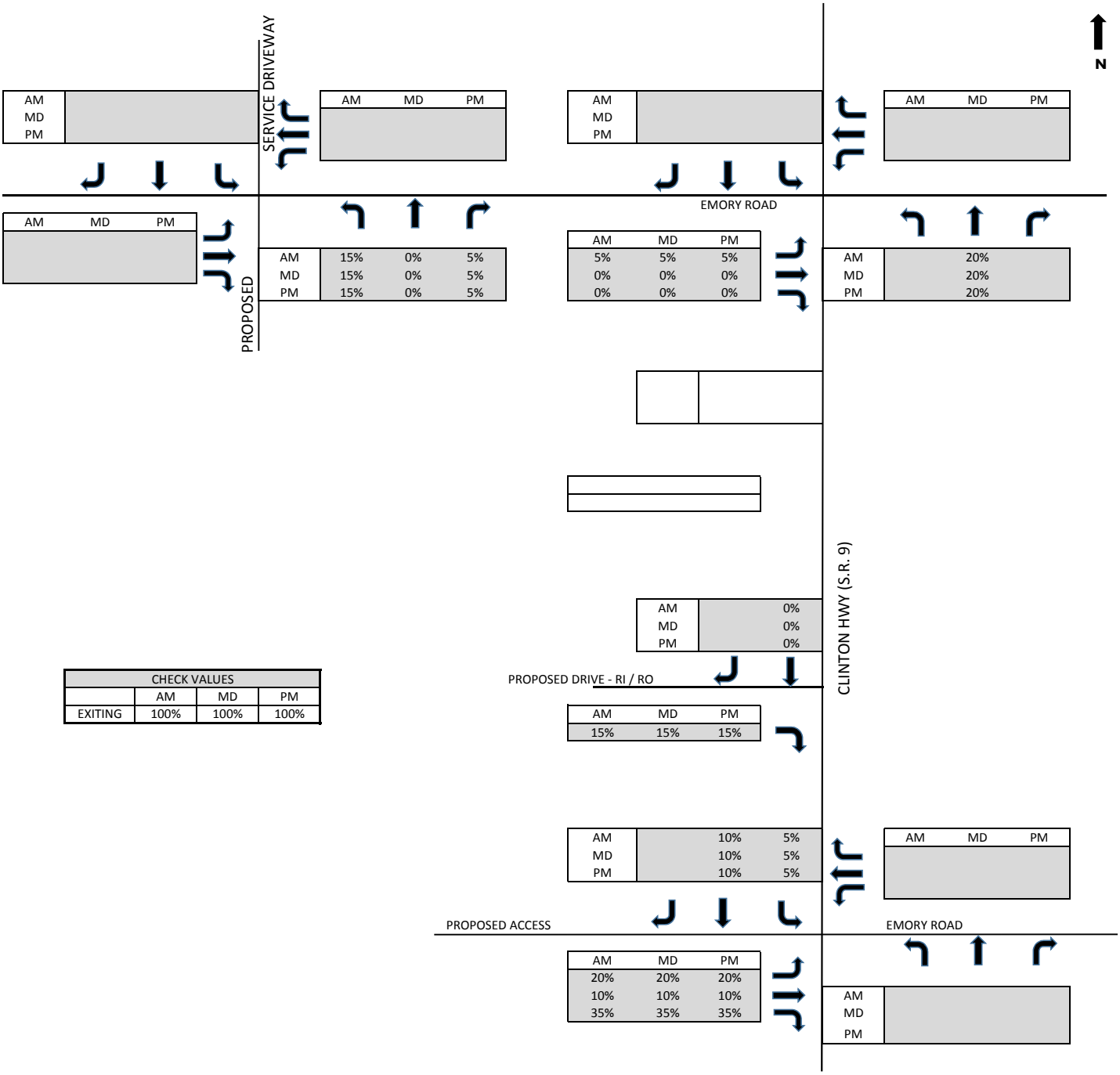
CHECK VALUES			
	AM	MD	PM
ENTERING	53	54	60

TRIP ASSIGNMENTS

CONVENIENCE MARKET WITH GAS
(NON-PASS BY - ENTERING)

AM / MID-DAY / PM PEAK HOUR

WEIGEL'S CLINTON HIGHWAY
01040-0002



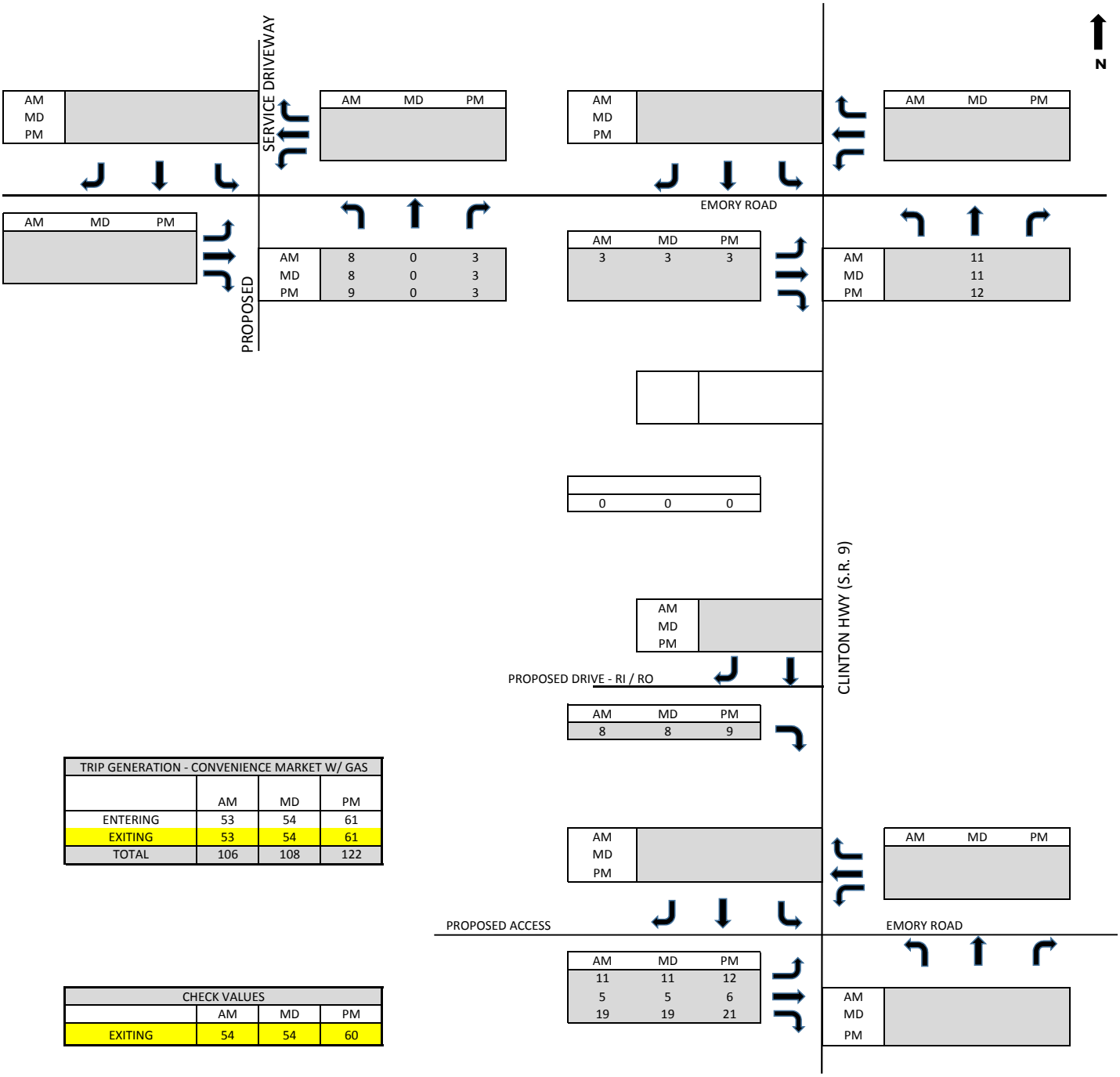
CHECK VALUES			
	AM	MD	PM
EXITING	100%	100%	100%

TRIP DISTRIBUTION PATTERNS

CONVENIENCE MARKET WITH GAS
(NON-PASS BY - EXITING)

AM / MID-DAY / PM PEAK HOUR

WEIGEL'S CLINTON HIGHWAY
01040-0002



TRIP GENERATION - CONVENIENCE MARKET W/ GAS			
	AM	MD	PM
ENTERING	53	54	61
EXITING	53	54	61
TOTAL	106	108	122

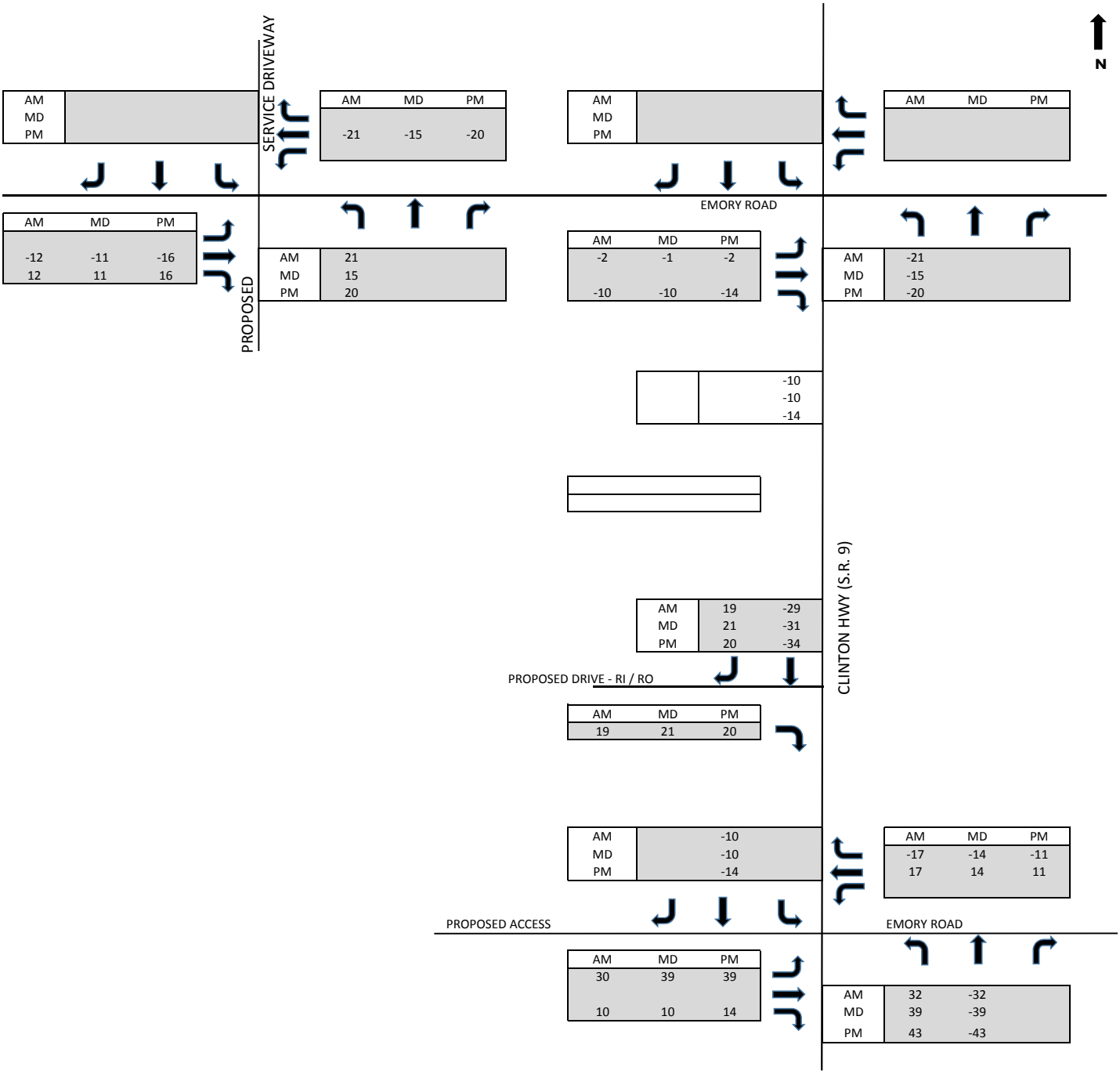
CHECK VALUES			
	AM	MD	PM
EXITING	54	54	60

TRIP ASSIGNMENTS

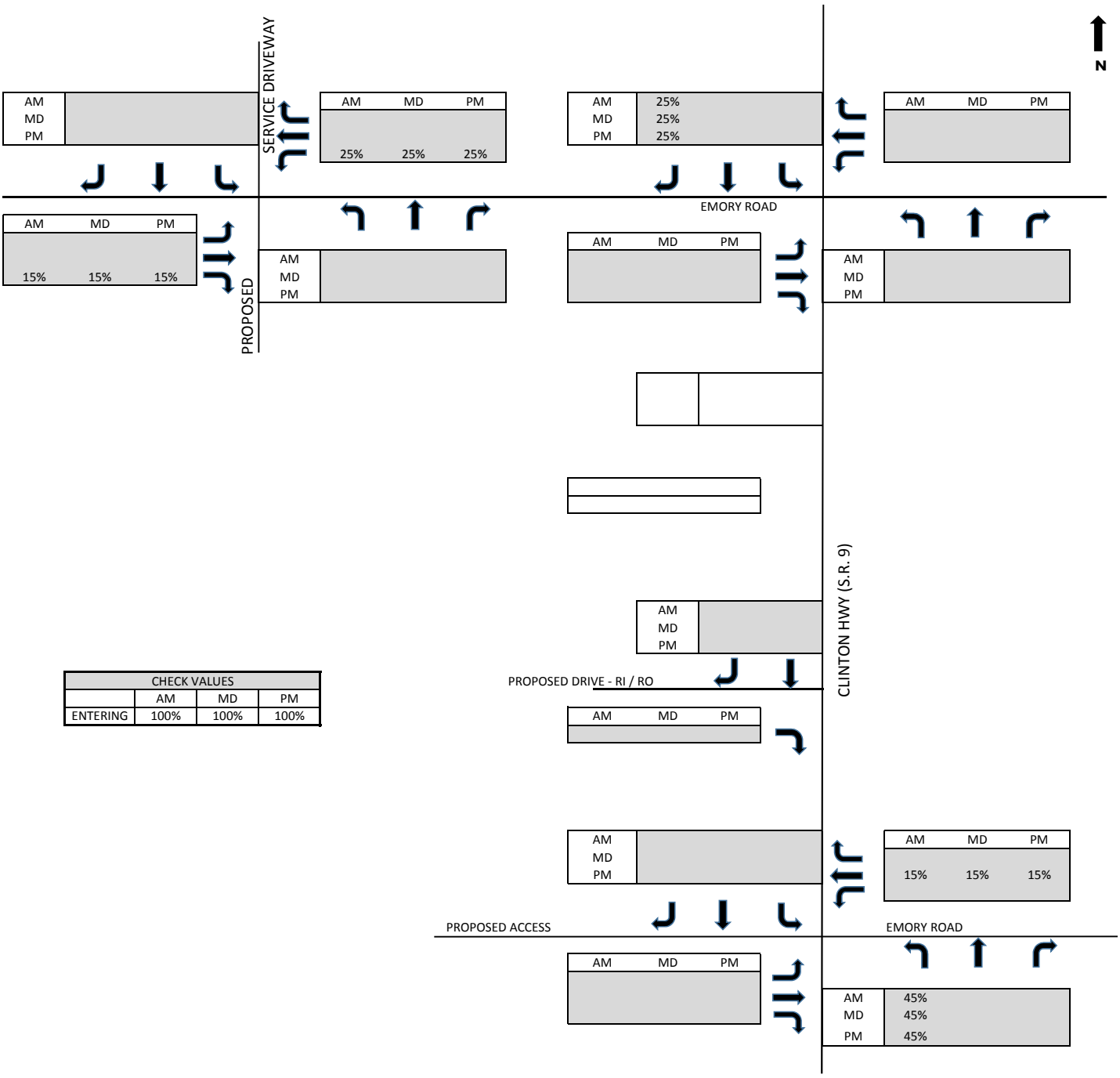
CONVENIENCE MARKET WITH GAS
(NON-PASS BY - EXITING)

AM / MID-DAY / PM PEAK HOUR

WEIGEL'S CLINTON HIGHWAY
01040-0002

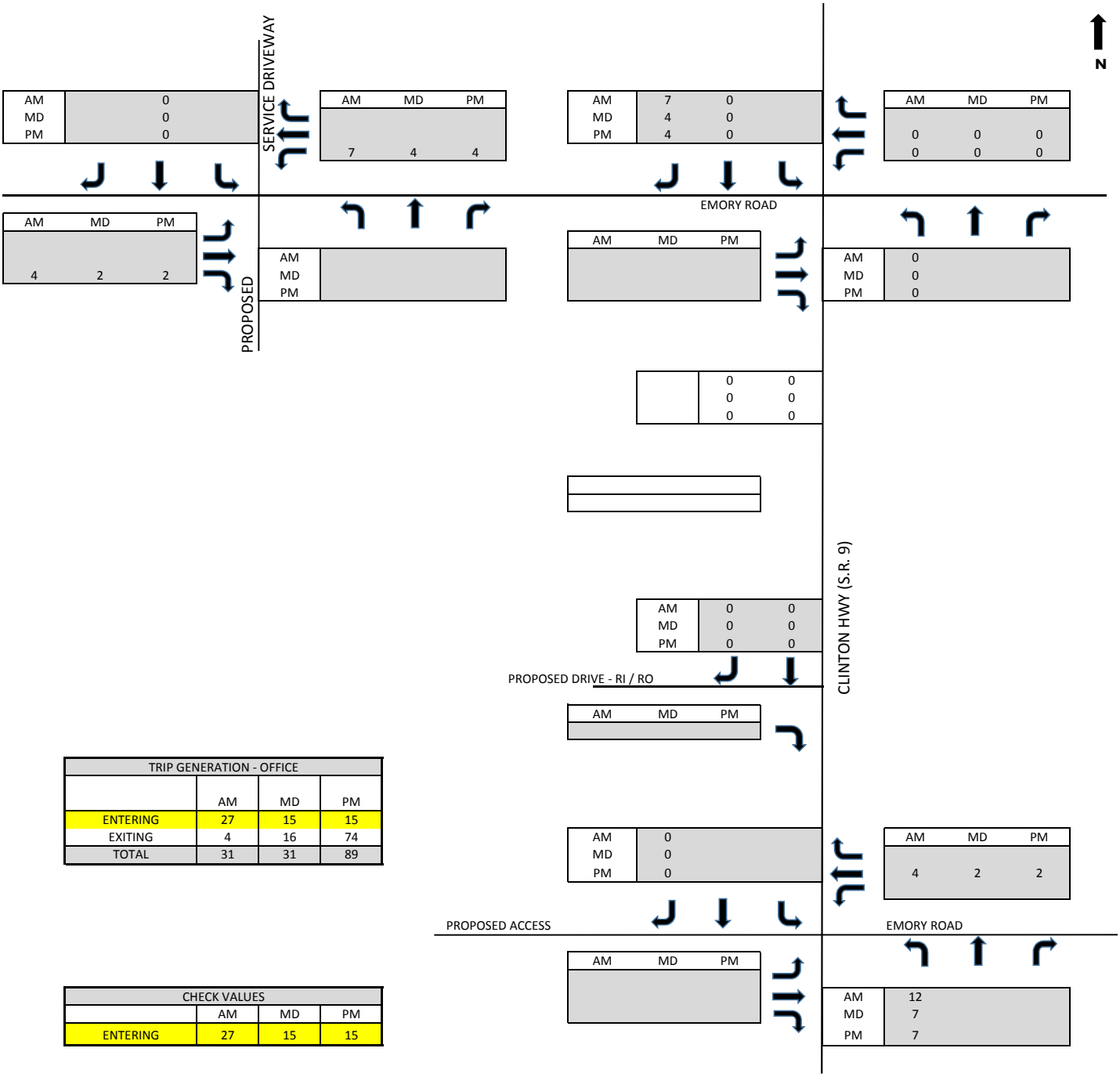


PASSBY TRIP ASSIGNMENTS
CONVENIENCE MARKET WITH GAS
AM / MID-DAY / PM PEAK HOUR
WEIGEL'S CLINTON HIGHWAY 01040-0002



CHECK VALUES			
	AM	MD	PM
ENTERING	100%	100%	100%

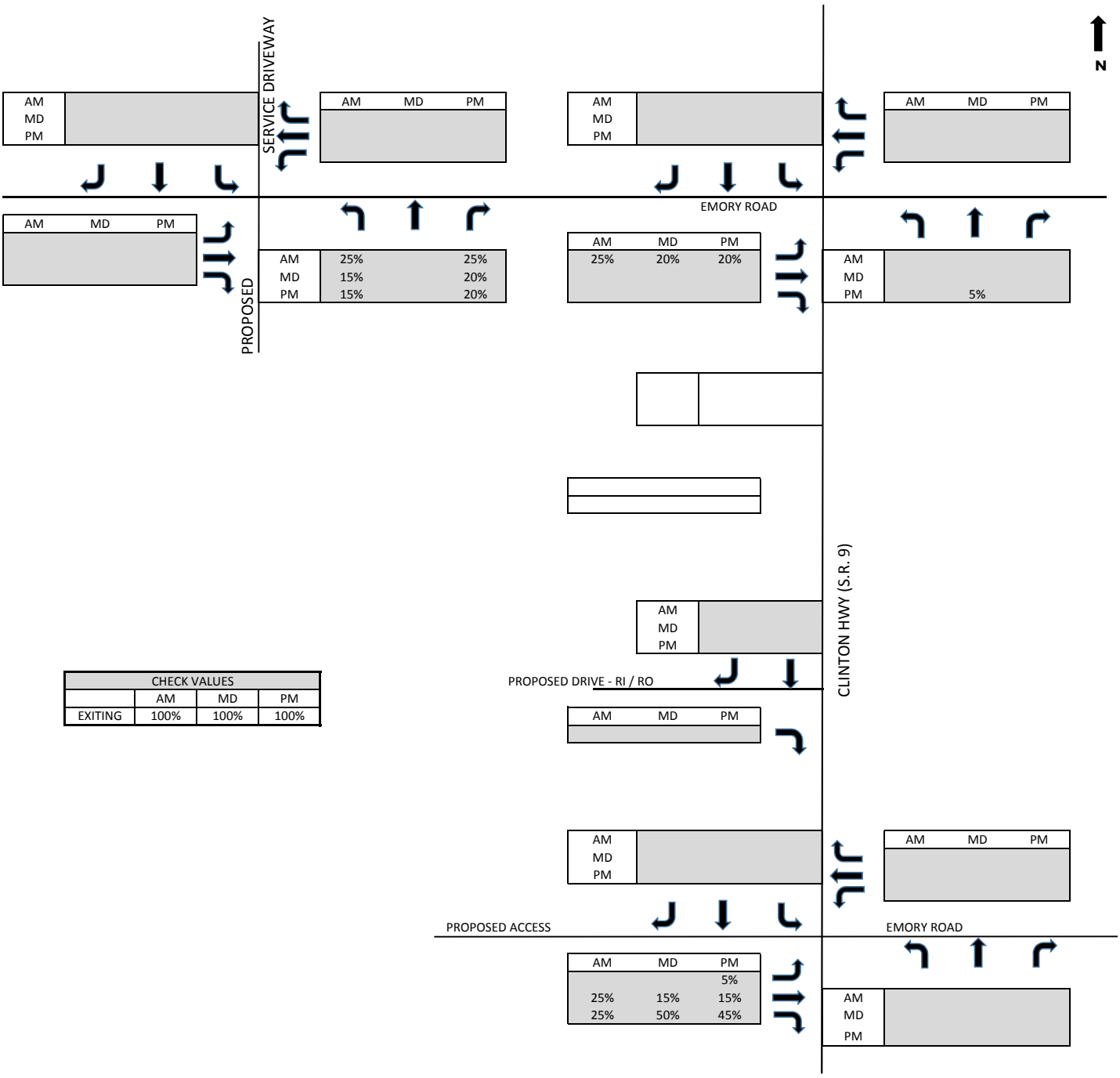
TRIP DISTRIBUTION PATTERNS
OFFICE
(ENTERING)
AM / MID-DAY / PM PEAK HOUR
WEIGEL'S CLINTON HIGHWAY
01040-0002



TRIP GENERATION - OFFICE			
	AM	MD	PM
ENTERING	27	15	15
EXITING	4	16	74
TOTAL	31	31	89

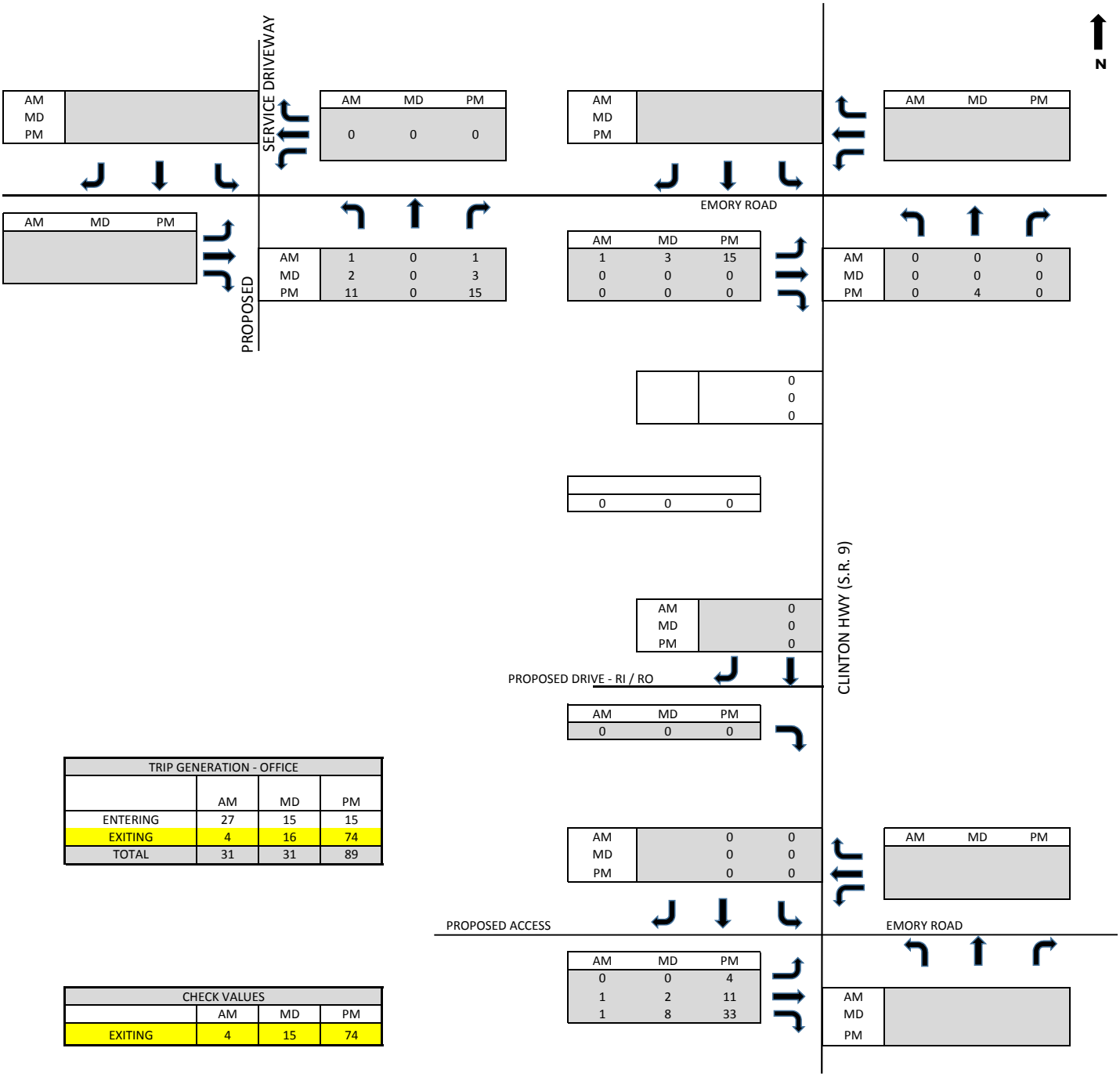
CHECK VALUES			
	AM	MD	PM
ENTERING	27	15	15

TRIP ASSIGNMENTS
OFFICE
(ENTERING)
AM / MID-DAY / PM PEAK HOUR
WEIGEL'S CLINTON HIGHWAY
01040-0002



CHECK VALUES			
	AM	MD	PM
EXITING	100%	100%	100%

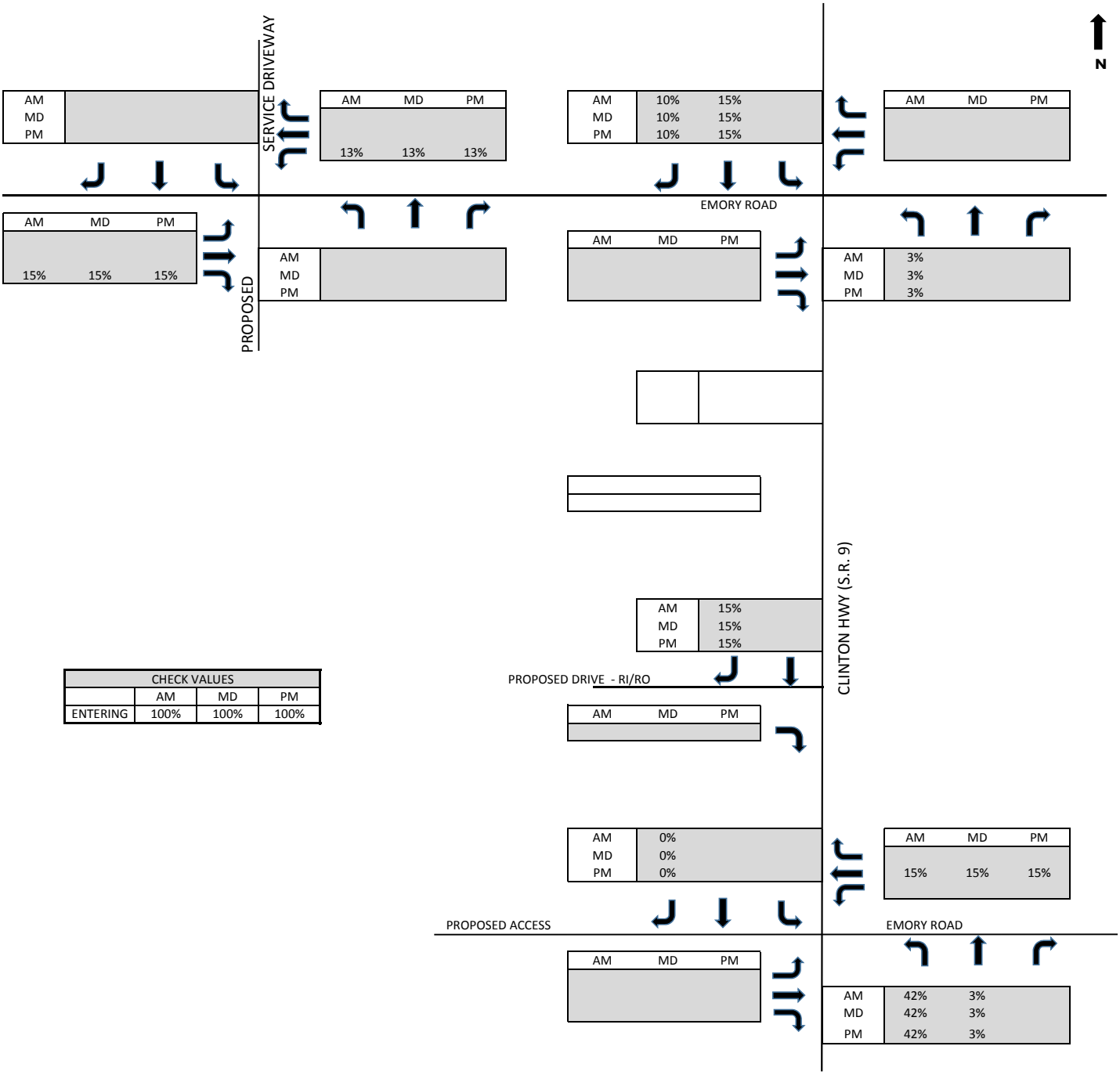
TRIP DISTRIBUTION PATTERNS
OFFICE
(EXITING)
AM / MID-DAY / PM PEAK HOUR
WEIGEL'S CLINTON HIGHWAY
01040-0002



TRIP GENERATION - OFFICE			
	AM	MD	PM
ENTERING	27	15	15
EXITING	4	16	74
TOTAL	31	31	89

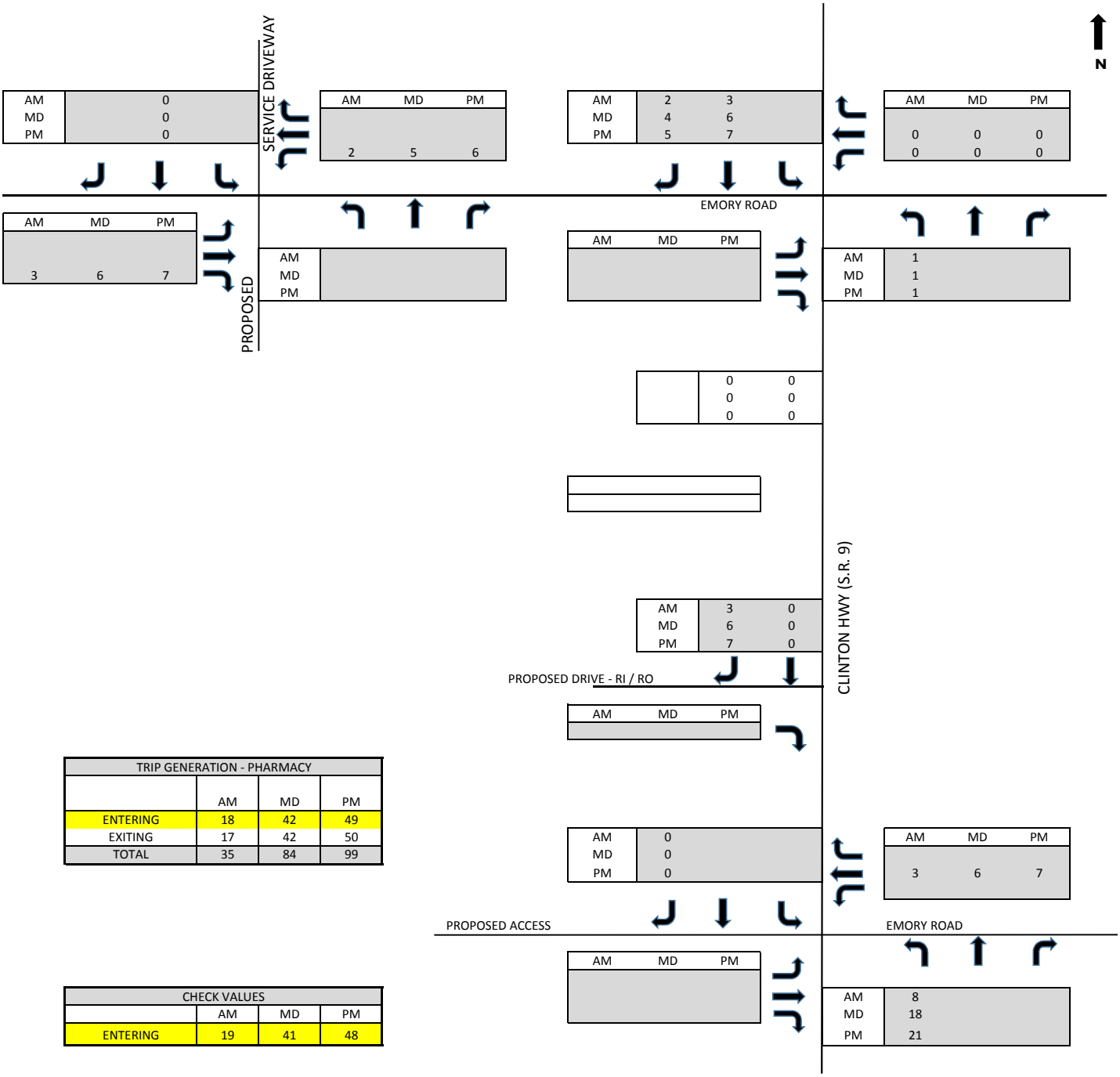
CHECK VALUES			
	AM	MD	PM
EXITING	4	15	74

TRIP ASSIGNMENTS
OFFICE (EXITING)
AM / MID-DAY / PM PEAK HOUR
WEIGEL'S CLINTON HIGHWAY 01040-0002



CHECK VALUES			
	AM	MD	PM
ENTERING	100%	100%	100%

TRIP DISTRIBUTION PATTERNS
PHARMACY WITH DRIVE-THRU (ENTERING)
AM / MID-DAY / PM PEAK HOUR
WEIGEL'S CLINTON HIGHWAY 01040-0002



TRIP GENERATION - PHARMACY			
	AM	MD	PM
ENTERING	18	42	49
EXITING	17	42	50
TOTAL	35	84	99

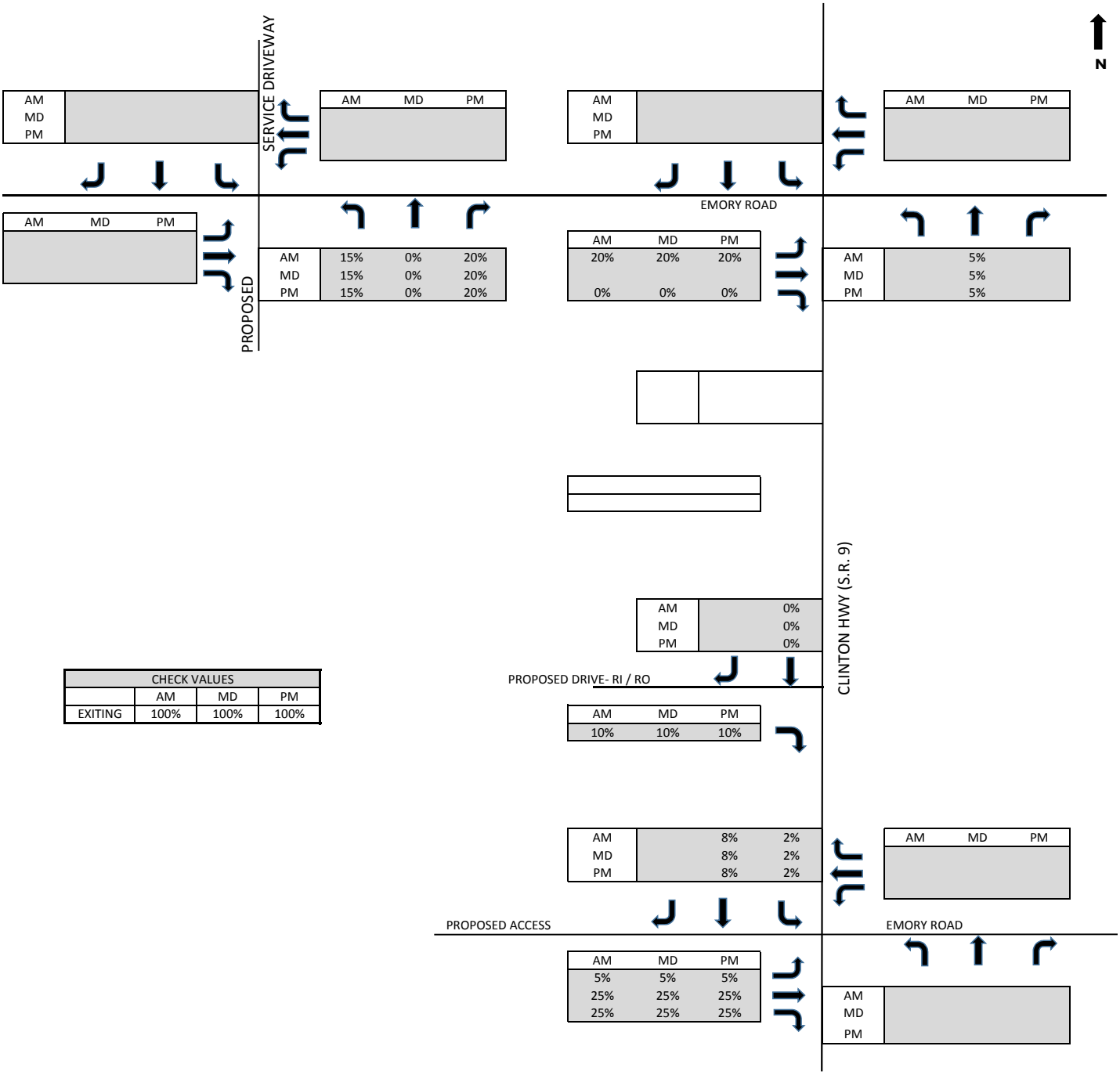
CHECK VALUES			
	AM	MD	PM
ENTERING	19	41	48

TRIP ASSIGNMENTS

PHARMACY WITH DRIVE-THRU
(ENTERING)

AM / MID-DAY / PM PEAK HOUR

WEIGEL'S CLINTON HIGHWAY
01040-0002



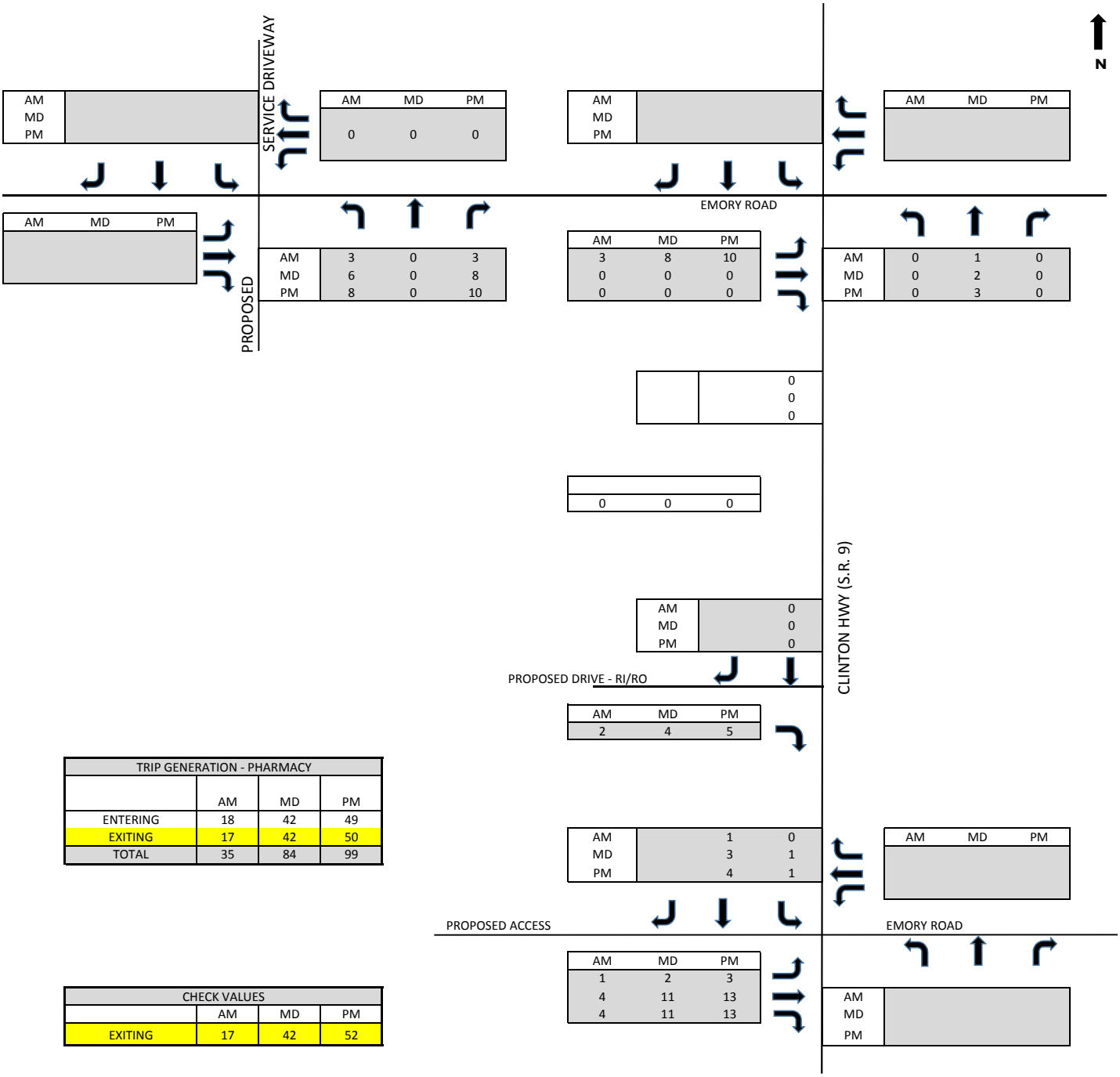
CHECK VALUES			
	AM	MD	PM
EXITING	100%	100%	100%

TRIP DISTRIBUTION PATTERNS

PHARMACY WITH DRIVE-THRU
(EXITING)

AM / MID-DAY / PM PEAK HOUR

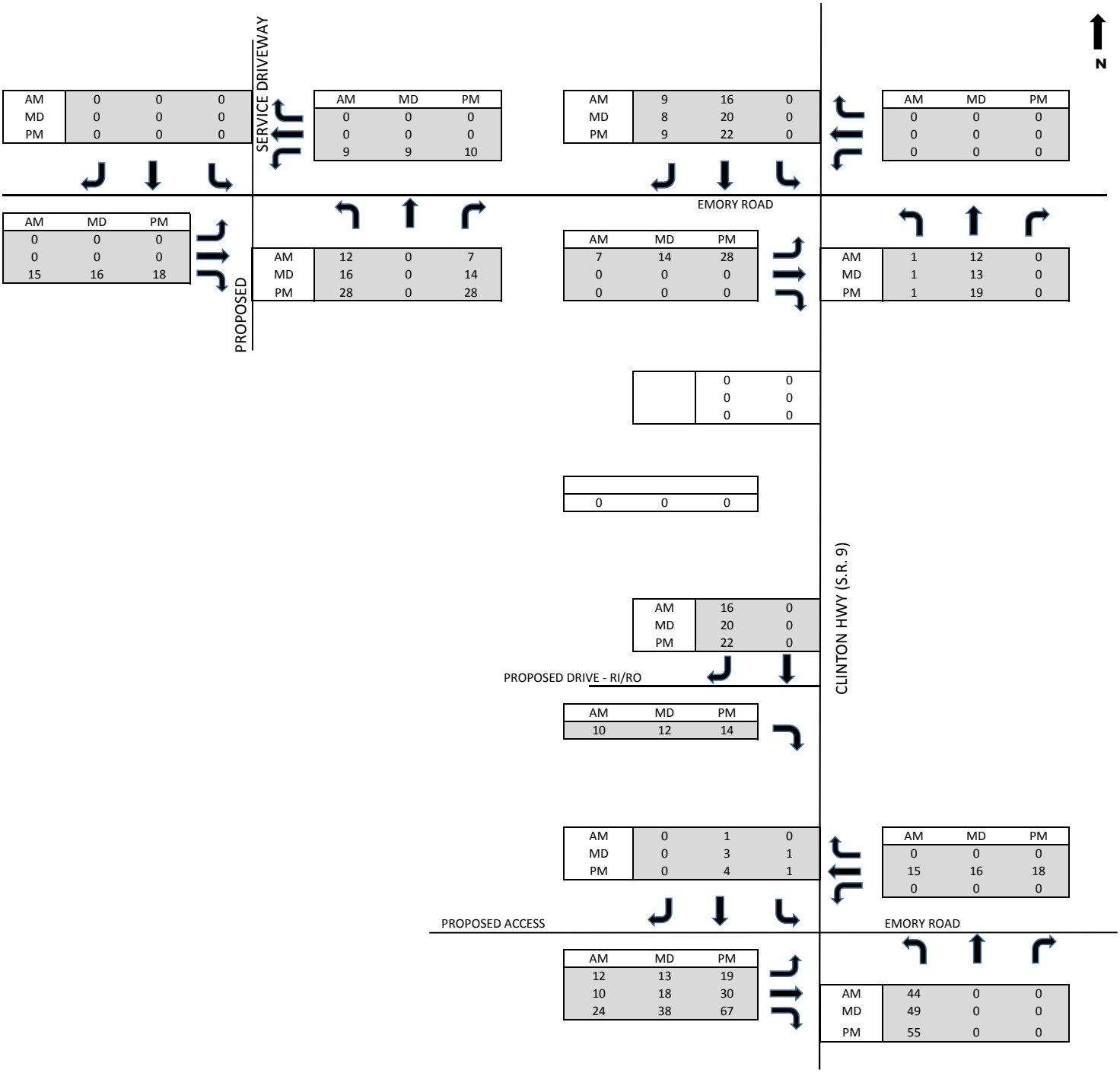
WEIGEL'S CLINTON HIGHWAY
01040-0002



TRIP GENERATION - PHARMACY			
	AM	MD	PM
ENTERING	18	42	49
EXITING	17	42	50
TOTAL	35	84	99

CHECK VALUES			
	AM	MD	PM
EXITING	17	42	52

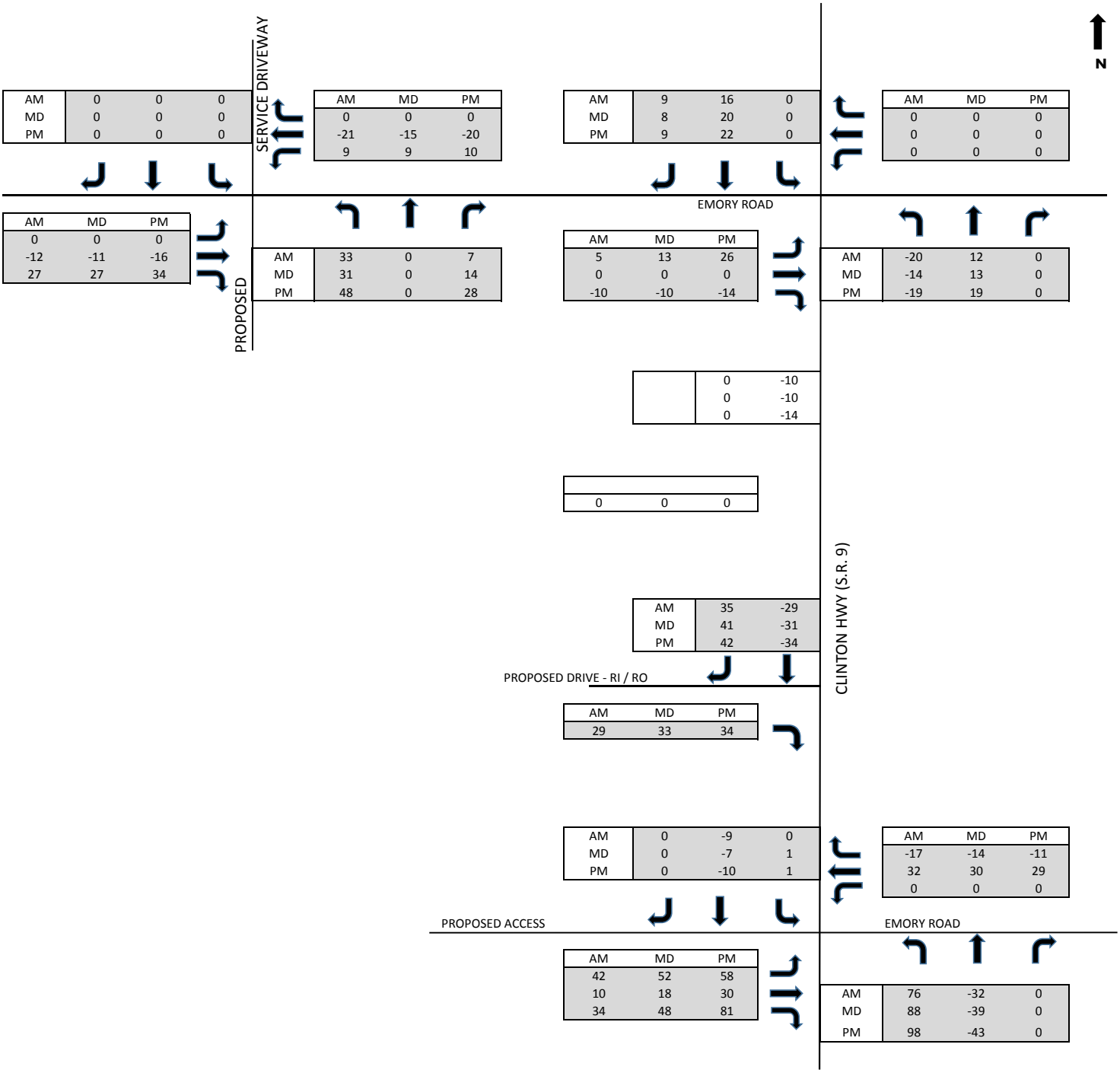
TRIP ASSIGNMENTS
PHARMACY WITH DRIVE-THRU (EXITING)
AM / MID-DAY / PM PEAK HOUR
WEIGEL'S CLINTON HIGHWAY 01040-0002



GENERATED TRIPS
(EXCLUDES PASS BY TRIPS)

AM / MID-DAY / PM PEAK HOUR

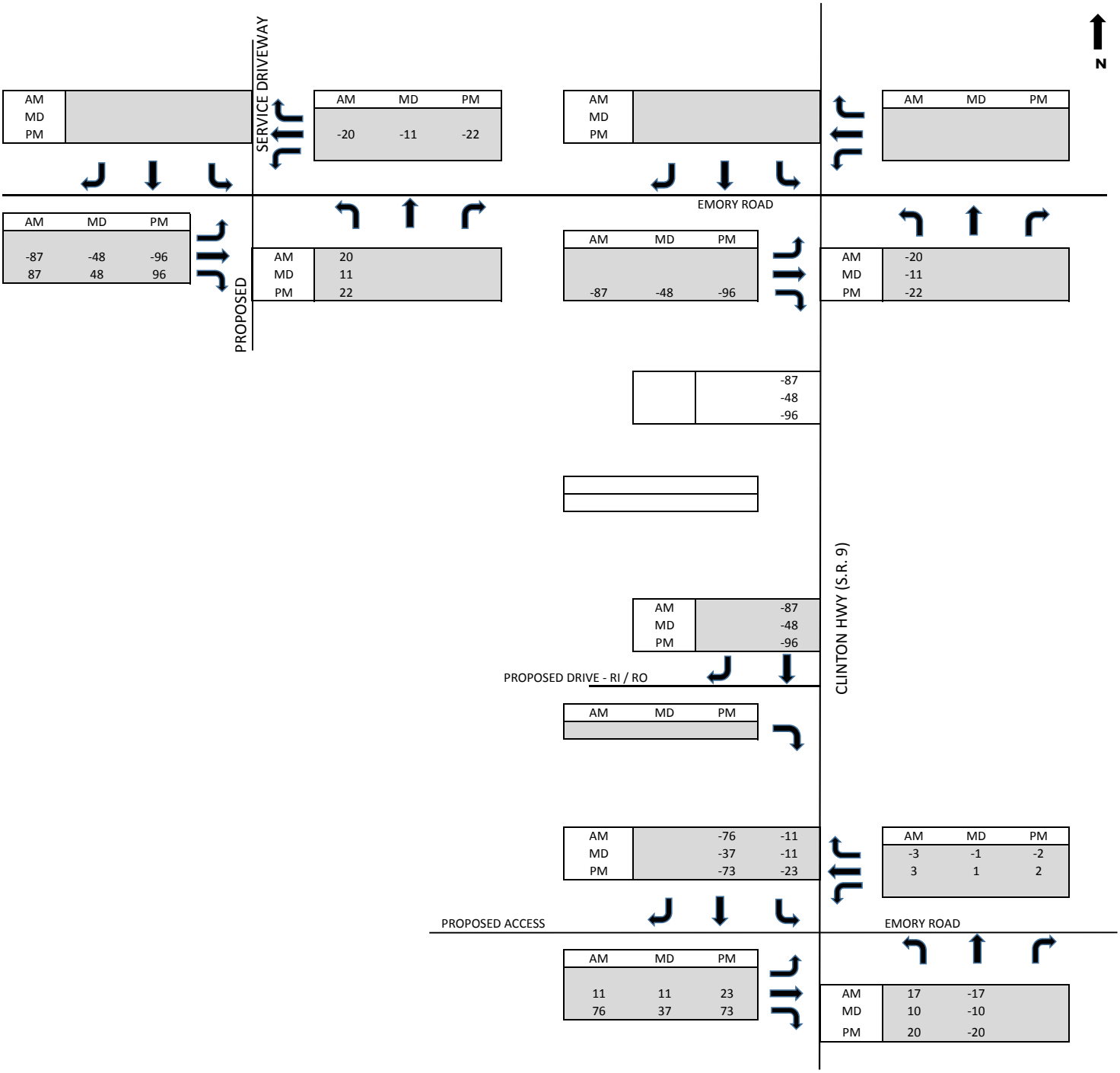
WEIGEL'S CLINTON HIGHWAY
01040-0002



GENERATED TRIPS
(INCLUDES PASS BY TRIPS)

AM / MID-DAY / PM PEAK HOUR

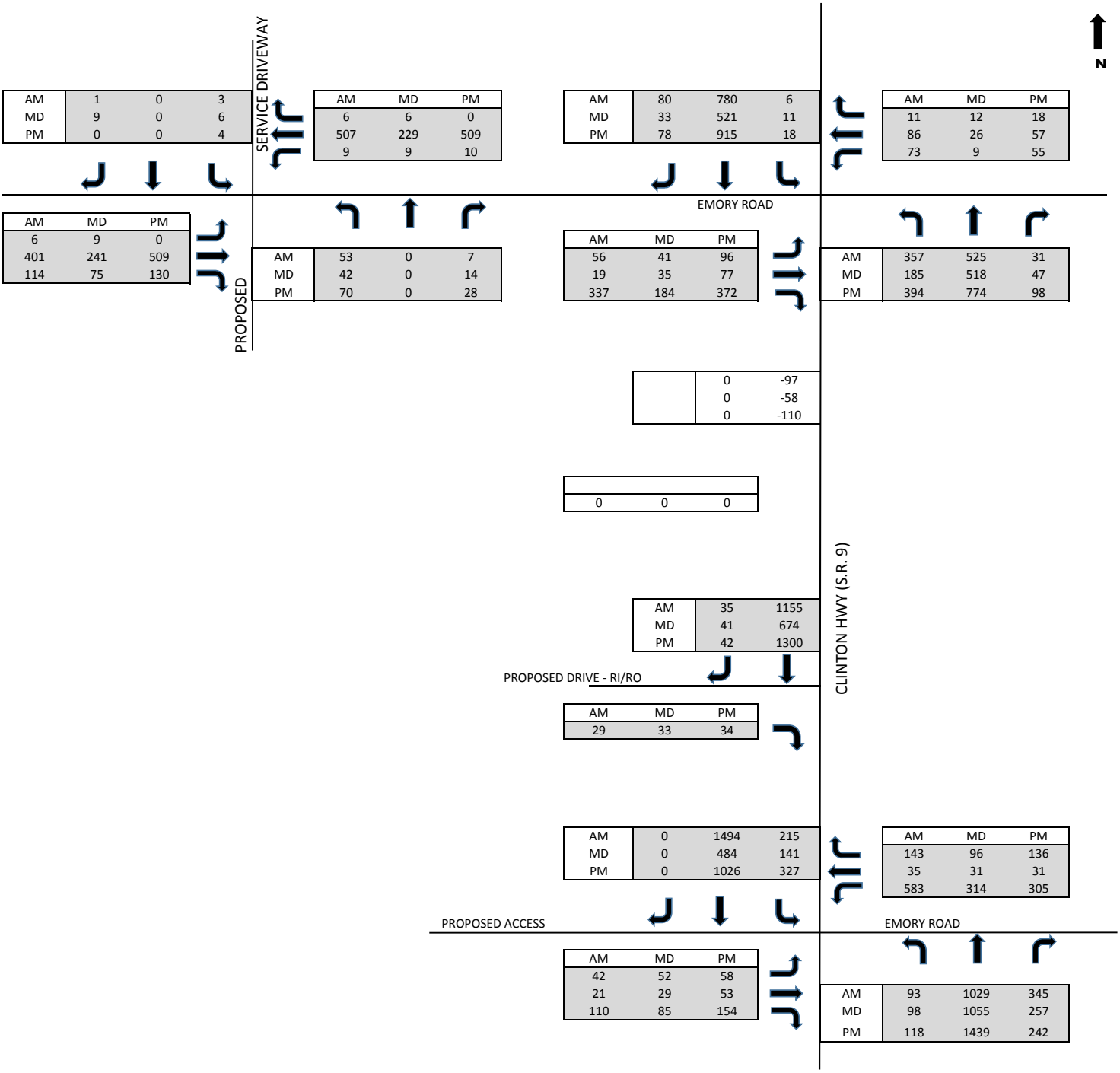
WEIGEL'S CLINTON HIGHWAY
01040-0002



EMORY ROAD
POTENTIAL DIVERTED TRAFFIC
2017

AM / MID-DAY / PM PEAK HOUR

WEIGEL'S CLINTON HIGHWAY
01040-0002



2017 COMBINED VOLUMES

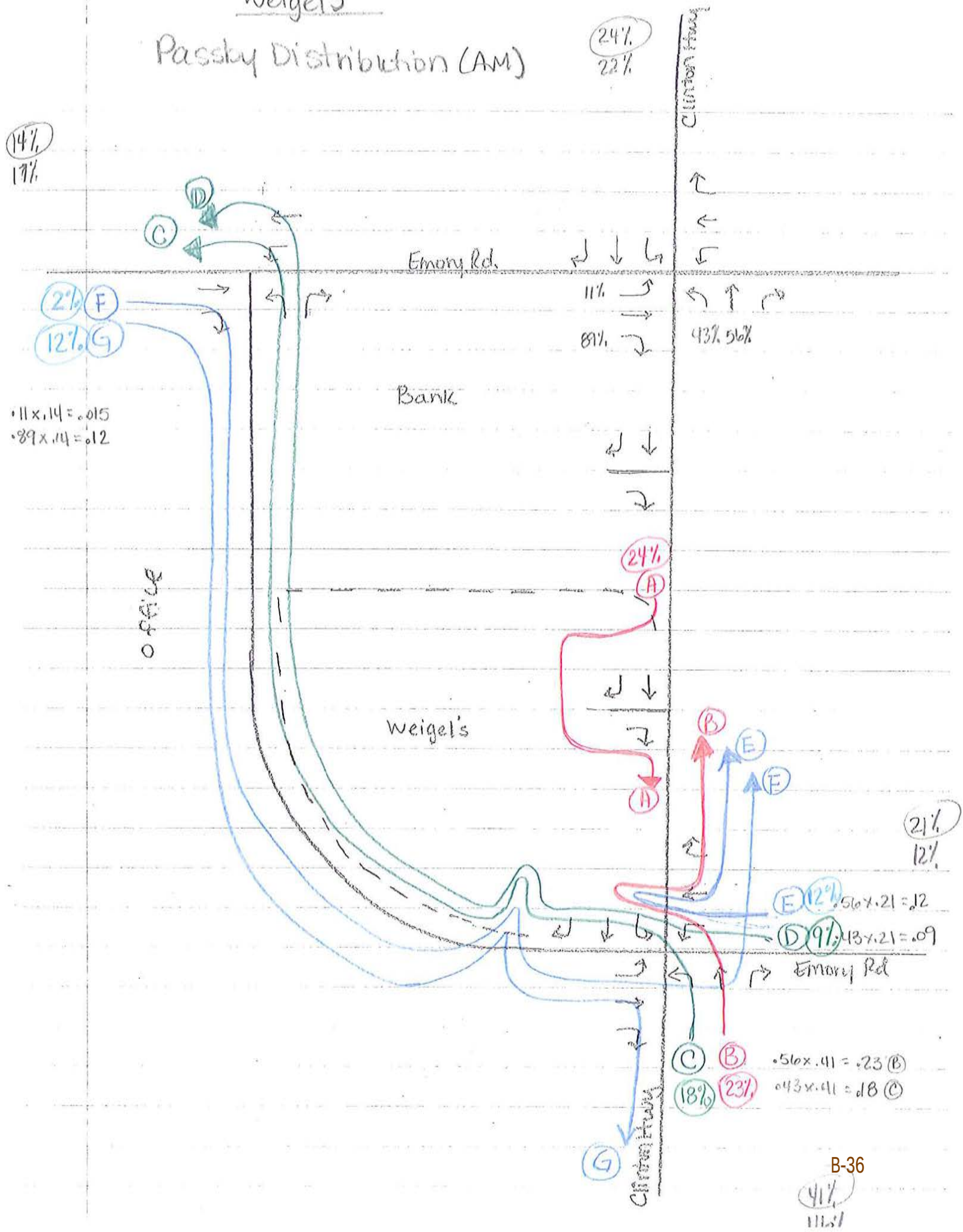
(Background, Generated, Passby, & Diverted)

AM / MID-DAY / PM PEAK HOUR

WEIGEL'S CLINTON HIGHWAY
01040-0002

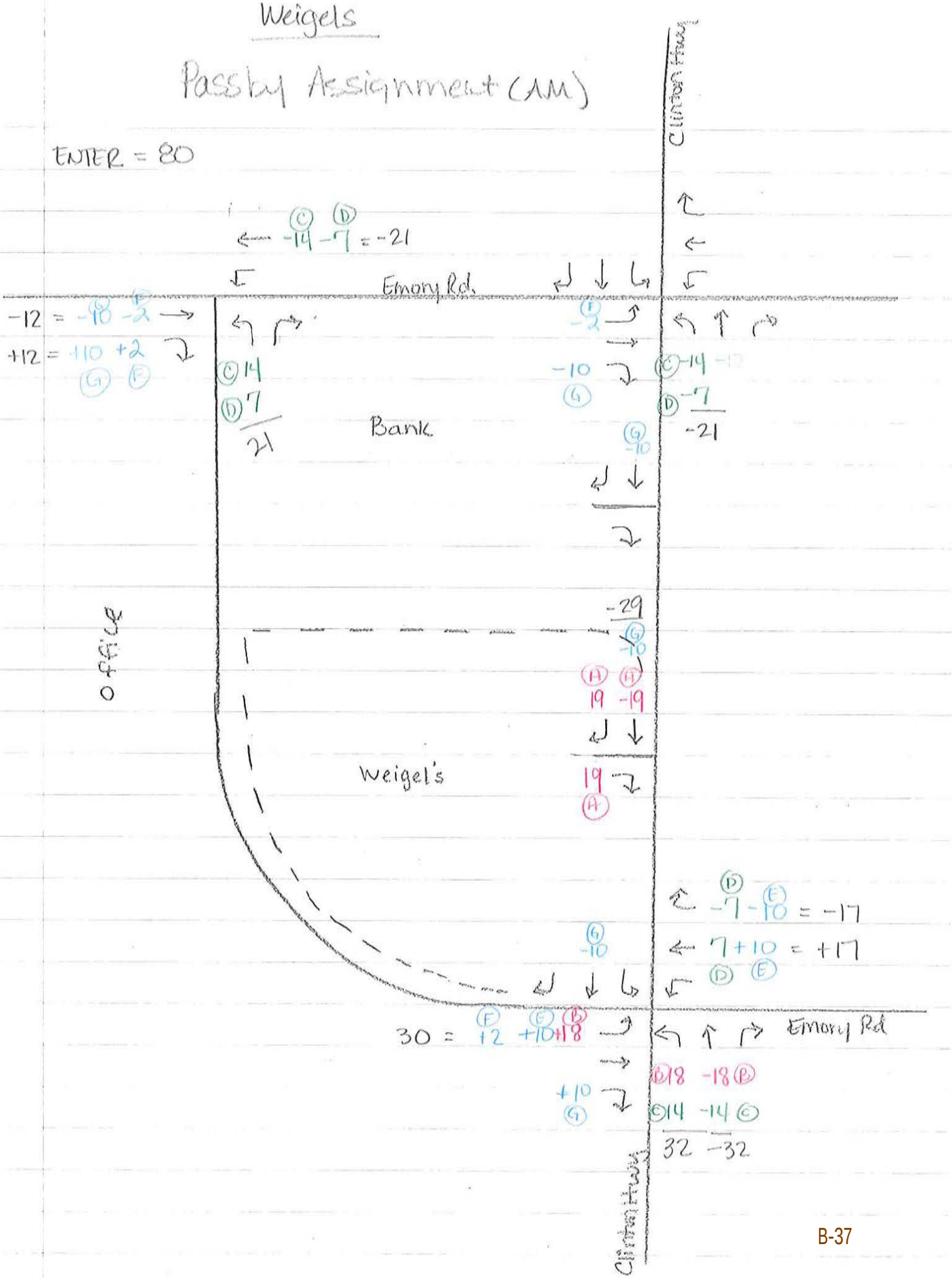
Weigels

Passby Distribution (AM)



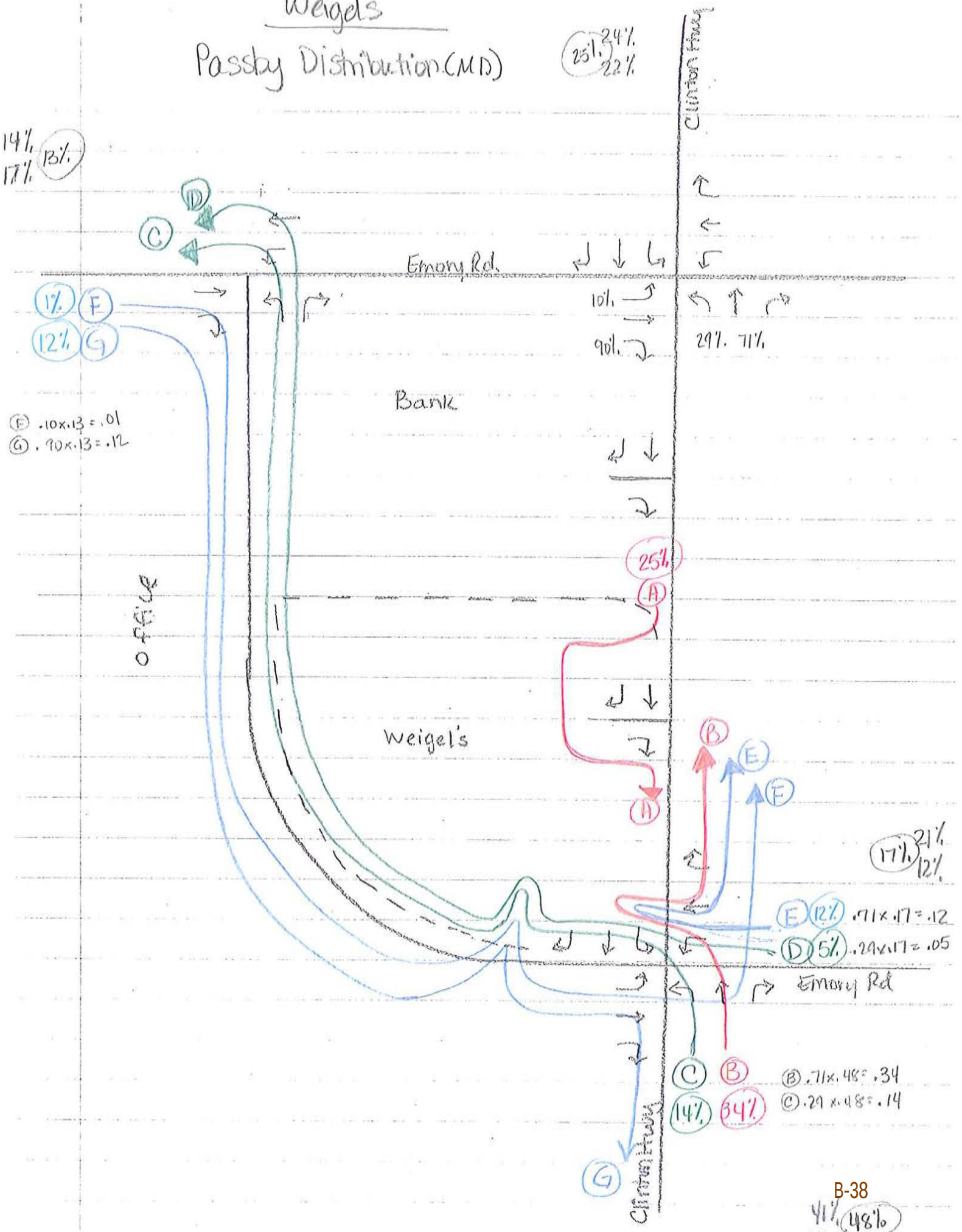
Weigels

Passby Assignment (AM)



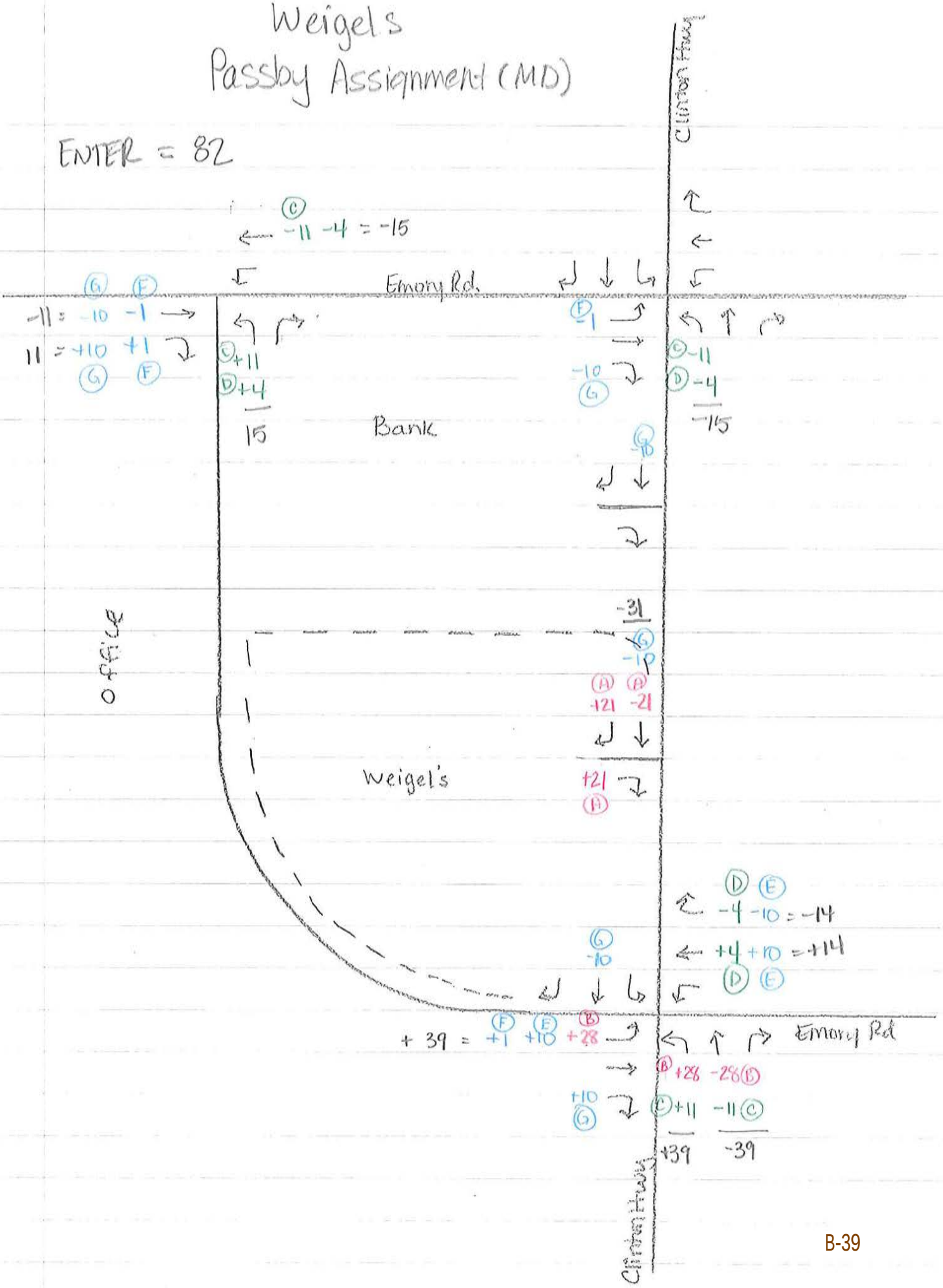
Weigels

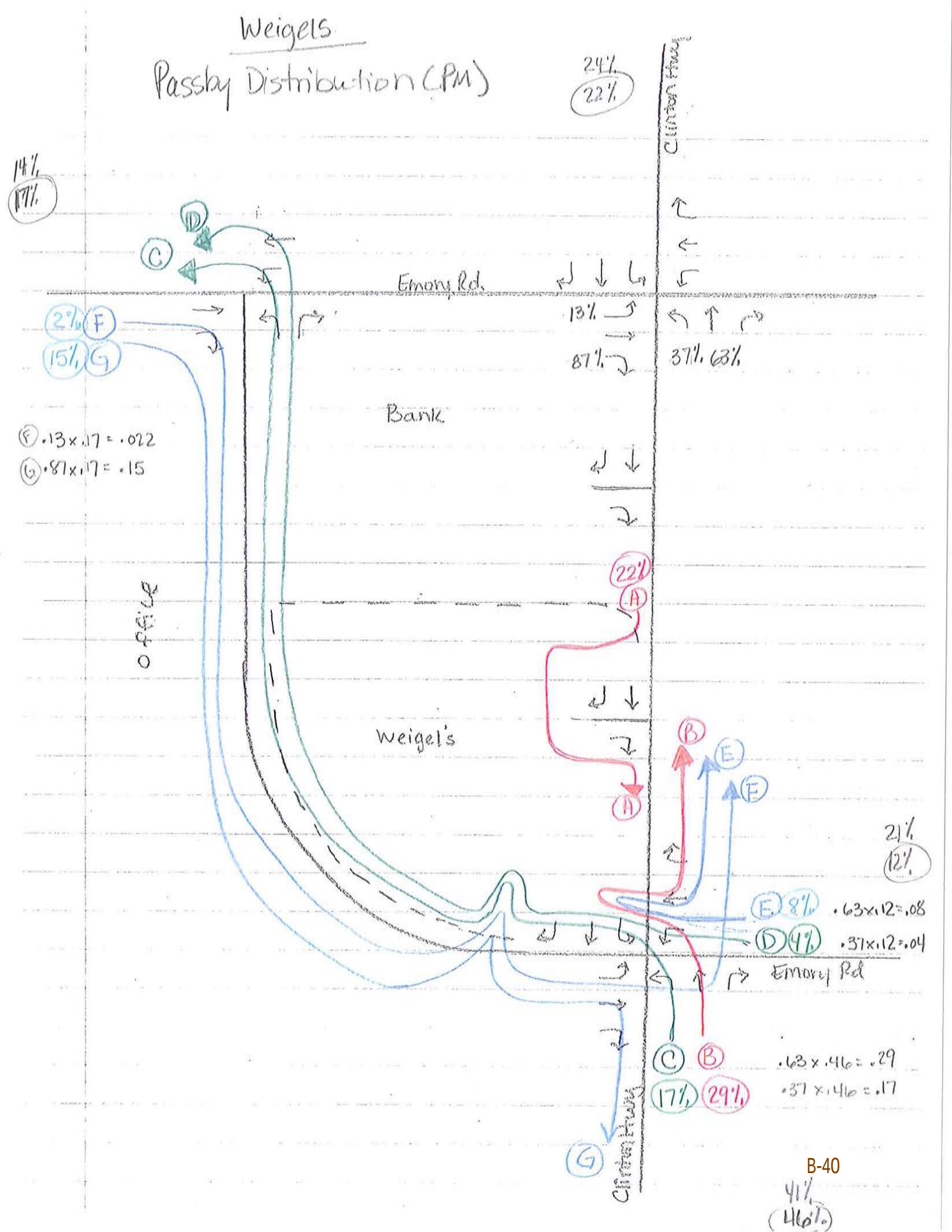
Passby Distribution (MD)



Weigels
Passby Assignment (MD)

ENTER = 82

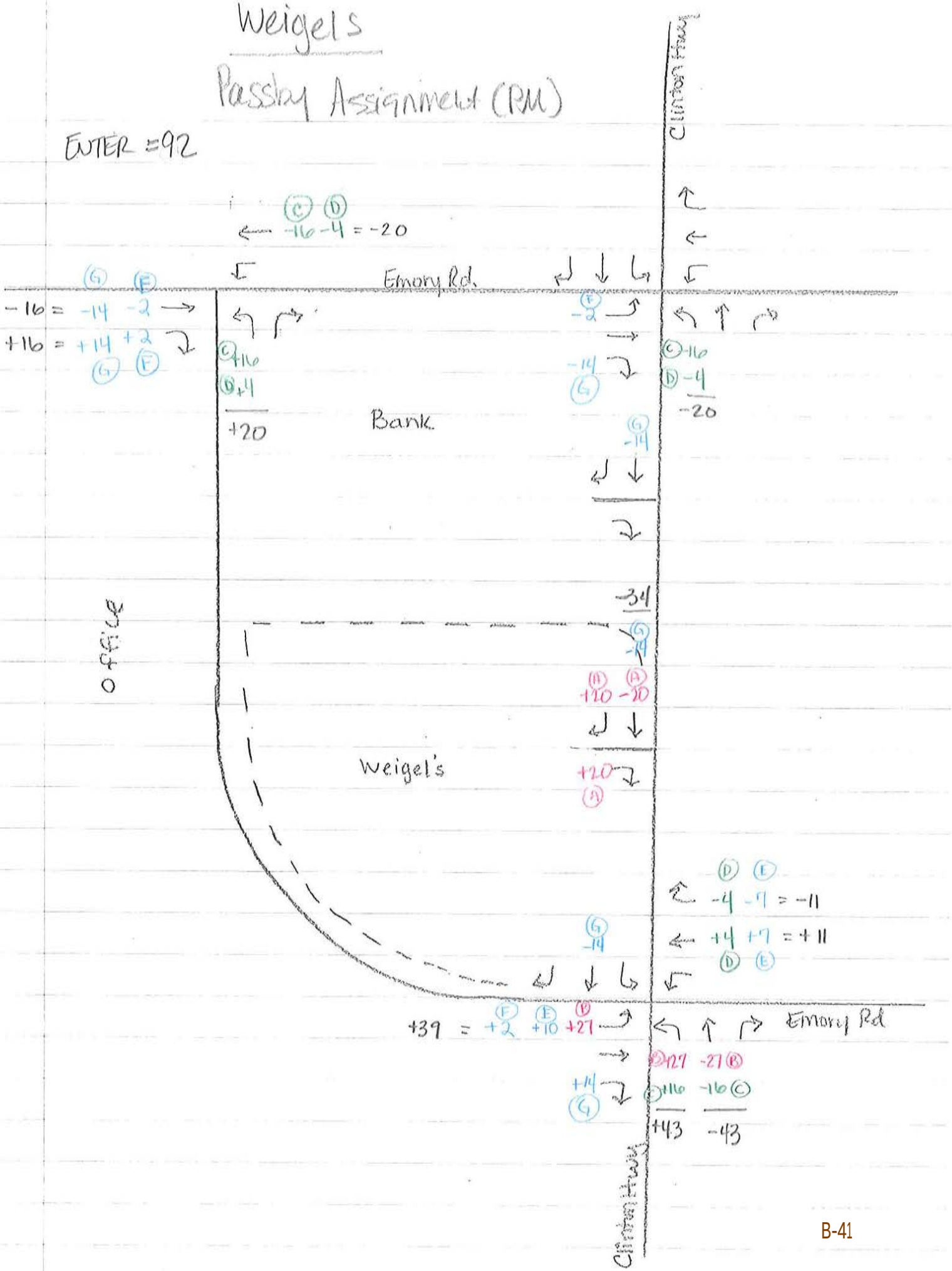



Weigels
Passby Distribution (PM)
24%
22%
Clinton Hwy
14%
17%
D
C
Emory Rd.
13%
87%
37%
63%
2%
F
15%
G
Bank
F .13 x .17 = .022
G .87 x .17 = .15
Office
22%
A
Weigel's
B
E
F
H
21%
12%
E 8%
.63 x .12 = .08
D 4%
.37 x .12 = .04
Emory Rd
C
B
.63 x .46 = .29
.37 x .46 = .17
17%
29%
G
Clinton Hwy
41%
46%

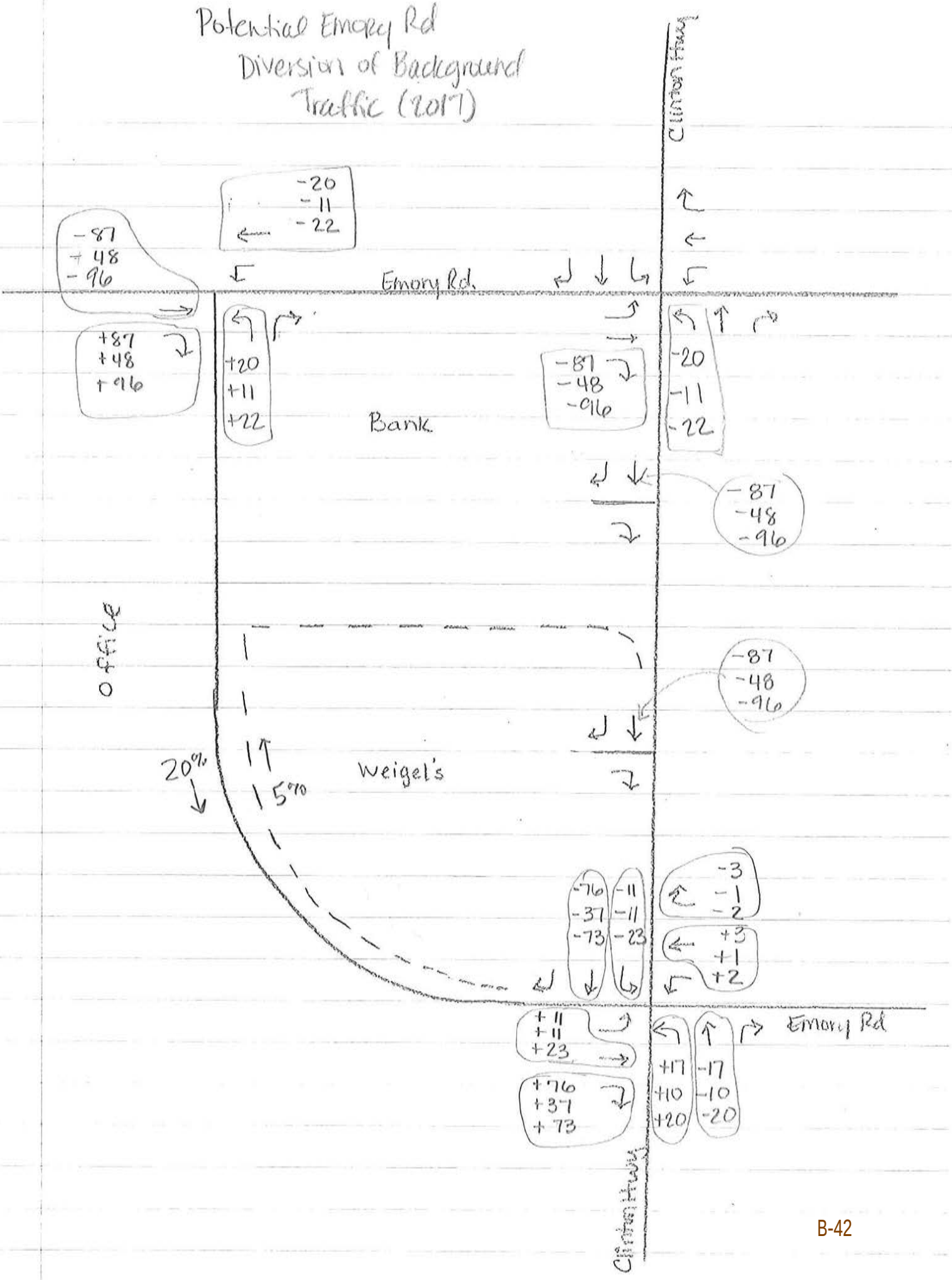
Weigels

Passby Assignment (PM)

ENTER = 92



Potential Emory Rd Diversion of Background Traffic (2017)



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 Federal Highway Administration has published the Year 2000 Highway Capacity Manual (HCM2000), 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.

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

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	561	157	1037	332	217	1518
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3467	1599	3539	1583	1770	3539
Flt Permitted	0.950				0.163	
Satd. Flow (perm)	3467	1599	3539	1583	304	3539
Satd. Flow (RTOR)		7		190		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	610	171	1127	361	236	1650
Turn Type	Prot	pm+ov	NA	Perm	pm+pt	NA
Protected Phases	4	1	2		1	1 2
Permitted Phases		4		2	1 2	
Detector Phase	4	1	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	8.0	6.0	20.0	20.0	6.0	
Minimum Split (s)	15.0	12.5	27.5	27.5	12.5	
Total Split (s)	28.0	21.0	31.0	31.0	21.0	
Total Split (%)	35.0%	26.3%	38.8%	38.8%	26.3%	
Maximum Green (s)	22.0	15.5	24.5	24.5	15.5	
Yellow Time (s)	4.0	4.0	5.0	5.0	4.0	
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	5.5	6.5	6.5	5.5	
Lead/Lag		Lead	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.5	2.0	2.0	2.5	
Recall Mode	None	None	C-Max	C-Max	None	
Act Effct Green (s)	18.7	43.5	24.5	24.5	44.3	49.8
Actuated g/C Ratio	0.23	0.54	0.31	0.31	0.55	0.62
v/c Ratio	0.75	0.20	1.04	0.59	0.46	0.75
Control Delay	34.6	9.6	67.6	15.2	12.1	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	9.6	67.6	15.2	12.1	10.0
LOS	C	A	E	B	B	B
Approach Delay	29.1		54.9			10.3
Approach LOS	C		D			B
Queue Length 50th (ft)	145	39	~325	66	24	108
Queue Length 95th (ft)	191	71	#447	154	m70	429
Internal Link Dist (ft)	1454		898			689
Turn Bay Length (ft)	125	500		95	300	
Base Capacity (vph)	953	872	1083	616	511	2201
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	0.64	0.20	1.04	0.59	0.46	0.75

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 31 (39%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 29.8 Intersection LOS: C
Intersection Capacity Utilization 71.7% ICU Level of Service C
Analysis Period (min) 15

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

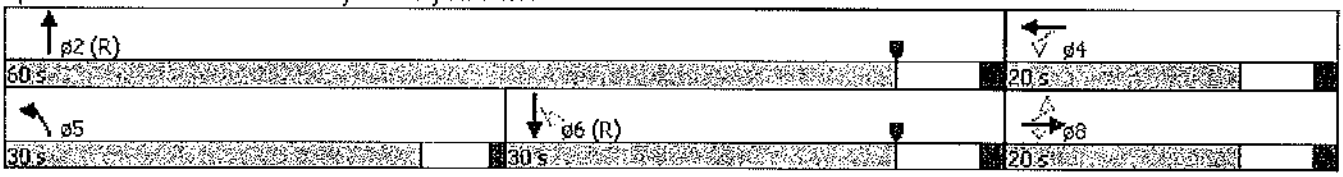
Splits and Phases: 1: Clinton Hwy & Emory Rd South

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	18	417	70	83	11	382	493	30	6	735	68
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.991			0.991			0.987	
Flt Protected		0.965			0.979		0.950			0.950		
Satd. Flow (prot)	0	1816	1599	0	1843	0	1717	3402	0	1823	3598	0
Flt Permitted		0.647			0.828		0.950			0.438		
Satd. Flow (perm)	0	1217	1599	0	1559	0	1717	3402	0	840	3598	0
Satd. Flow (RTOR)			453		4			17			12	
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)	0	73	453	0	178	0	415	569	0	7	873	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8			4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	8	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	20.0	20.0	20.0	20.0	20.0		30.0	60.0		30.0	30.0	
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%		37.5%	75.0%		37.5%	37.5%	
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0		25.0	53.5		23.5	23.5	
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		12.5	12.5		12.5		22.7	55.0		27.3	27.3	
Actuated g/C Ratio		0.16	0.16		0.16		0.28	0.69		0.34	0.34	
v/c Ratio		0.38	0.72		0.72		0.85	0.24		0.02	0.71	
Control Delay		35.9	10.4		48.3		19.3	3.5		20.7	27.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		35.9	10.4		48.3		19.3	3.5		20.7	27.8	
LOS		D	B		D		B	A		C	C	
Approach Delay		14.0			48.3			10.2			27.7	
Approach LOS		B			D			B			C	
Queue Length 50th (ft)		32	0		82		151	41		2	208	
Queue Length 95th (ft)		71	82		#162		m174	m42		12	#286	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		212	653		276		536	2343		286	1234	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.34	0.69		0.64		0.77	0.24		0.02	0.71	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 19.6 Intersection LOS: B
Intersection Capacity Utilization 73.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two-Way Stop-Control Report

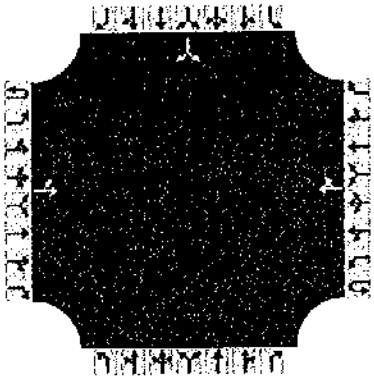
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	11/11/2016
Analysis Year	2015
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - EXISTING

Site Information

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

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		6	481				527	6						3		1
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		7													4	
Capacity, c (veh/h)		988													265	
v/c Ratio		0.01													0.02	
95% Queue Length, Q_{95} (veh)		0.0													0.0	
Control Delay (s/veh)		8.7													18.8	
Level of Service, LOS		A													C	
Approach Delay (s/veh)		0.2												18.8		
Approach LOS														C		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	302	107	1062	247	145	508
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3467	1599	3539	1583	1770	3539
Flt Permitted	0.950				0.151	
Satd. Flow (perm)	3467	1599	3539	1583	281	3539
Satd. Flow (RTOR)		15		151		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	328	116	1154	268	158	552
Turn Type	Prot	pm+ov	NA	Perm	pm+pt	NA
Protected Phases	4	1	2		1	1 2
Permitted Phases		4		2	1 2	
Detector Phase	4	1	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	8.0	6.0	20.0	20.0	6.0	
Minimum Split (s)	15.0	12.5	27.5	27.5	12.5	
Total Split (s)	24.0	20.0	36.0	36.0	20.0	
Total Split (%)	30.0%	25.0%	45.0%	45.0%	25.0%	
Maximum Green (s)	18.0	14.5	29.5	29.5	14.5	
Yellow Time (s)	4.0	4.0	5.0	5.0	4.0	
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	5.5	6.5	6.5	5.5	
Lead/Lag		Lead	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.5	2.0	2.0	2.5	
Recall Mode	None	None	C-Max	C-Max	None	
Act Effct Green (s)	12.8	29.8	38.2	38.2	50.2	55.7
Actuated g/C Ratio	0.16	0.37	0.48	0.48	0.63	0.70
v/c Ratio	0.59	0.19	0.68	0.32	0.41	0.22
Control Delay	35.4	13.9	20.5	8.0	17.3	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	13.9	20.5	8.0	17.3	3.7
LOS	D	B	C	A	B	A
Approach Delay	29.8		18.1			6.7
Approach LOS	C		B			A
Queue Length 50th (ft)	79	34	220	31	20	27
Queue Length 95th (ft)	113	56	#393	95	99	57
Internal Link Dist (ft)	1454		898			689
Turn Bay Length (ft)	125	500		95	300	
Base Capacity (vph)	780	678	1688	834	461	2416
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	0.42	0.17	0.68	0.32	0.34	0.23

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 17.0 Intersection LOS: B
Intersection Capacity Utilization 61.0% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

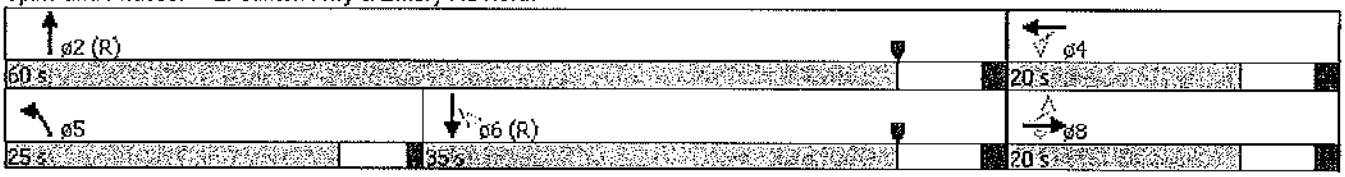
Splits and Phases: 1: Clinton Hwy & Emory Rd South

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	34	233	9	25	12	202	486	45	11	482	24
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.965			0.987			0.993	
Flt Protected		0.979			0.990		0.950			0.950		
Satd. Flow (prot)	0	1842	1599	0	1815	0	1717	3388	0	1823	3620	0
Flt Permitted		0.835			0.921		0.950			0.435		
Satd. Flow (perm)	0	1571	1599	0	1689	0	1717	3388	0	835	3620	0
Satd. Flow (RTOR)			253		13			26			7	
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)	0	66	253	0	50	0	220	577	0	12	550	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8			4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	8	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	20.0	20.0	20.0	20.0	20.0		25.0	60.0		35.0	35.0	
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%		31.3%	75.0%		43.8%	43.8%	
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0		20.0	53.5		28.5	28.5	
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		9.6	9.6		9.6		15.3	57.9		37.6	37.6	
Actuated g/C Ratio		0.12	0.12		0.12		0.19	0.72		0.47	0.47	
v/c Ratio		0.35	0.61		0.23		0.67	0.23		0.03	0.32	
Control Delay		37.0	11.4		27.3		45.6	3.9		15.3	15.0	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		37.0	11.4		27.3		45.6	3.9		15.3	15.0	
LOS		D	B		C		D	A		B	B	
Approach Delay		16.7			27.3			15.4			15.0	
Approach LOS		B			C			B			B	
Queue Length 50th (ft)		31	0		17		121	10		3	82	
Queue Length 95th (ft)		65	61		46		m178	80		15	150	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		274	488		306		432	2460		392	1705	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.24	0.52		0.16		0.51	0.23		0.03	0.32	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 15.9 Intersection LOS: B
Intersection Capacity Utilization 58.4% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two Way Stop Control Report

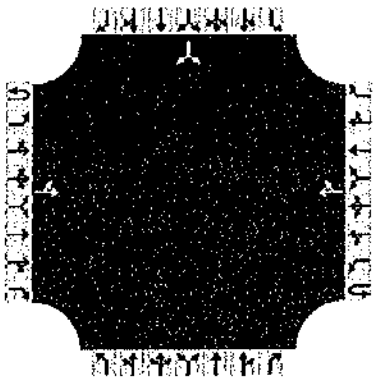
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	11/11/2016
Analysis Year	2015
Time Analyzed	MD Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - EXISTING

Site Information

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

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		9	288				245	6						6		9
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10													17	
Capacity, c (veh/h)		1283													599	
v/c Ratio		0.01													0.03	
95% Queue Length, Q_{95} (veh)		0.0													0.1	
Control Delay (s/veh)		7.8													11.2	
Level of Service, LOS		A													B	
Approach Delay (s/veh)		0.3												11.2		
Approach LOS														B		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	293	143	1444	233	336	1066
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3467	1599	3539	1583	1770	3539
Flt Permitted	0.950				0.107	
Satd. Flow (perm)	3467	1599	3539	1583	199	3539
Satd. Flow (RTOR)		2		92		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	318	155	1570	253	365	1159
Turn Type	Prot	pm+ov	NA	Perm	pm+pt	NA
Protected Phases	4	1	2		1	1 2
Permitted Phases		4		2	1 2	
Detector Phase	4	1	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	8.0	6.0	20.0	20.0	6.0	
Minimum Split (s)	15.0	12.5	27.5	27.5	12.5	
Total Split (s)	23.0	28.0	39.0	39.0	28.0	
Total Split (%)	25.6%	31.1%	43.3%	43.3%	31.1%	
Maximum Green (s)	17.0	22.5	32.5	32.5	22.5	
Yellow Time (s)	4.0	4.0	5.0	5.0	4.0	
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	5.5	6.5	6.5	5.5	
Lead/Lag		Lead	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.5	2.0	2.0	2.5	
Recall Mode	None	None	C-Max	C-Max	None	
Act Effct Green (s)	13.4	40.6	37.4	37.4	59.6	65.1
Actuated g/C Ratio	0.15	0.45	0.42	0.42	0.66	0.72
v/c Ratio	0.62	0.21	1.07	0.36	0.73	0.45
Control Delay	40.9	14.4	72.9	14.2	14.3	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	14.4	72.9	14.2	14.3	3.6
LOS	D	B	E	B	B	A
Approach Delay	32.2		64.8			6.1
Approach LOS	C		E			A
Queue Length 50th (ft)	88	48	~562	62	23	32
Queue Length 95th (ft)	125	81	#720	128	m114	34
Internal Link Dist (ft)	1454		898			689
Turn Bay Length (ft)	125	500		95	300	
Base Capacity (vph)	654	759	1468	710	540	2536
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	0.49	0.20	1.07	0.36	0.68	0.46

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 45 (50%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 37.3 Intersection LOS: D
Intersection Capacity Utilization 81.9% ICU Level of Service D
Analysis Period (min) 15

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

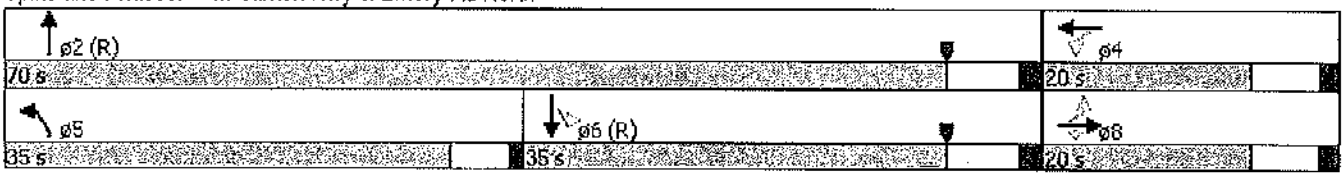
Splits and Phases: 1: Clinton Hwy & Emory Rd South

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	74	463	53	55	17	418	726	94	17	859	66
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.982			0.983			0.989	
Flt Protected		0.977			0.979		0.950			0.950		
Satd. Flow (prot)	0	1838	1599	0	1827	0	1717	3375	0	1823	3605	0
Flt Permitted		0.769			0.720		0.950			0.319		
Satd. Flow (perm)	0	1447	1599	0	1343	0	1717	3375	0	612	3605	0
Satd. Flow (RTOR)			503		7			38			9	
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)	0	153	503	0	136	0	454	891	0	18	1006	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8			4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	8	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	20.0	20.0	20.0	20.0	20.0		35.0	70.0		35.0	35.0	
Total Split (%)	22.2%	22.2%	22.2%	22.2%	22.2%		38.9%	77.8%		38.9%	38.9%	
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0		30.0	63.5		28.5	28.5	
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		12.9	12.9		12.9		27.2	64.6		32.4	32.4	
Actuated g/C Ratio		0.14	0.14		0.14		0.30	0.72		0.36	0.36	
v/c Ratio		0.74	0.76		0.69		0.87	0.37		0.08	0.77	
Control Delay		58.5	12.0		53.1		15.4	2.1		22.9	31.7	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		58.5	12.0		53.1		15.4	2.1		22.9	31.7	
LOS		E	B		D		B	A		C	C	
Approach Delay		22.9			53.1			6.6			31.5	
Approach LOS		C			D			A			C	
Queue Length 50th (ft)		83	0		89		58	1		7	276	
Queue Length 95th (ft)		#169	96		#144		m25	m1		24	#393	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		225	673		214		572	2433		220	1302	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.68	0.75		0.64		0.79	0.37		0.08	0.77	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 20.0 Intersection LOS: C
Intersection Capacity Utilization 77.1% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two-Way Stop-Control Report

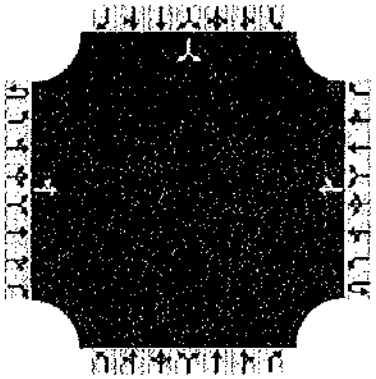
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	11/11/2016
Analysis Year	2015
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - EXISTING

Site Information

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

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		0	597				530	0						4		0
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		0													4	
Capacity, c (veh/h)		991													197	
v/c Ratio		0.00													0.02	
95% Queue Length, Q_{95} (veh)		0.0													0.1	
Control Delay (s/veh)		8.6													23.7	
Level of Service, LOS		A													C	
Approach Delay (s/veh)		0.0												23.7		
Approach LOS														C		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	583	163	1078	345	226	1579
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3467	1599	3539	1583	1770	3539
Flt Permitted	0.950				0.163	
Satd. Flow (perm)	3467	1599	3539	1583	304	3539
Satd. Flow (RTOR)		5		189		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	634	177	1172	375	246	1716
Turn Type	Prot	pm+ov	NA	Perm	pm+pt	NA
Protected Phases	4	1	2		1	1 2
Permitted Phases		4		2	1 2	
Detector Phase	4	1	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	8.0	6.0	20.0	20.0	6.0	
Minimum Split (s)	15.0	12.5	27.5	27.5	12.5	
Total Split (s)	28.0	21.0	31.0	31.0	21.0	
Total Split (%)	35.0%	26.3%	38.8%	38.8%	26.3%	
Maximum Green (s)	22.0	15.5	24.5	24.5	15.5	
Yellow Time (s)	4.0	4.0	5.0	5.0	4.0	
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	5.5	6.5	6.5	5.5	
Lead/Lag		Lead	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.5	2.0	2.0	2.5	
Recall Mode	None	None	C-Max	C-Max	None	
Act Effct Green (s)	19.3	43.5	24.5	24.5	43.7	49.2
Actuated g/C Ratio	0.24	0.54	0.31	0.31	0.55	0.62
v/c Ratio	0.76	0.20	1.08	0.61	0.49	0.79
Control Delay	34.4	9.8	81.2	16.2	13.2	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.4	9.8	81.2	16.2	13.2	11.3
LOS	C	A	F	B	B	B
Approach Delay	29.1		65.4			11.5
Approach LOS	C		E			B
Queue Length 50th (ft)	151	41	~350	74	25	390
Queue Length 95th (ft)	200	74	#474	164	m72	451
Internal Link Dist (ft)	1454		898			689
Turn Bay Length (ft)	125	500		95	300	
Base Capacity (vph)	953	871	1083	615	500	2178
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	0.67	0.20	1.08	0.61	0.49	0.79

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 31 (39%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 34.1 Intersection LOS: C
Intersection Capacity Utilization 74.0% ICU Level of Service D
Analysis Period (min) 15

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

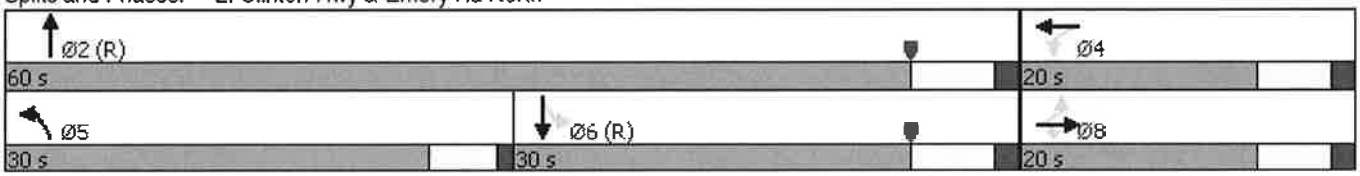
Splits and Phases: 1: Clinton Hwy & Emory Rd South

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	19	434	73	86	11	397	513	31	6	764	71
Future Volume (vph)	51	19	434	73	86	11	397	513	31	6	764	71
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.991			0.991			0.987	
Flt Protected		0.965			0.979		0.950			0.950		
Satd. Flow (prot)	0	1816	1599	0	1843	0	1717	3402	0	1823	3598	0
Flt Permitted		0.641			0.826		0.950			0.428		
Satd. Flow (perm)	0	1206	1599	0	1555	0	1717	3402	0	821	3598	0
Satd. Flow (RTOR)			472		4			17			12	
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)	0	76	472	0	184	0	432	592	0	7	907	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8			4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	8	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	20.0	20.0	20.0	20.0	20.0		30.0	60.0		30.0	30.0	
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%		37.5%	75.0%		37.5%	37.5%	
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0		25.0	53.5		23.5	23.5	
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		12.7	12.7		12.7		23.1	54.8		26.7	26.7	
Actuated g/C Ratio		0.16	0.16		0.16		0.29	0.68		0.33	0.33	
v/c Ratio		0.40	0.73		0.74		0.87	0.25		0.03	0.75	
Control Delay		36.3	10.5		49.8		19.4	3.7		20.7	29.4	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		36.3	10.5		49.8		19.4	3.7		20.7	29.4	
LOS		D	B		D		B	A		C	C	
Approach Delay		14.1			49.8			10.3			29.4	
Approach LOS		B			D			B			C	
Queue Length 50th (ft)		34	0		85		172	45		2	220	
Queue Length 95th (ft)		74	85		#171		m177	m43		12	#322	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		211	669		275		536	2337		274	1210	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.36	0.71		0.67		0.81	0.25		0.03	0.75	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 20.3 Intersection LOS: C
Intersection Capacity Utilization 75.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two-Way Stop-Control Report

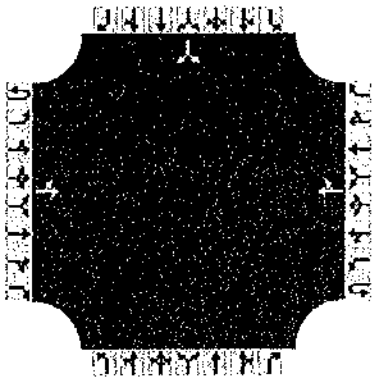
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	11/11/2016
Analysis Year	2017
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - BACKGROUND

Site Information

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

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		6	500				548	6						3		1
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		7													4	
Capacity, c (veh/h)		969													250	
v/c Ratio		0.01													0.02	
95% Queue Length, Q_{95} (veh)		0.0													0.0	
Control Delay (s/veh)		8.7													19.6	
Level of Service, LOS		A													C	
Approach Delay (s/veh)		0.2												19.6		
Approach LOS														C		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	314	111	1104	257	151	528
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3467	1599	3539	1583	1770	3539
Flt Permitted	0.950				0.132	
Satd. Flow (perm)	3467	1599	3539	1583	246	3539
Satd. Flow (RTOR)		13		151		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	341	121	1200	279	164	574
Turn Type	Prot	pm+ov	NA	Perm	pm+pt	NA
Protected Phases	4	1	2		1	1 2
Permitted Phases		4		2	1 2	
Detector Phase	4	1	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	8.0	6.0	20.0	20.0	6.0	
Minimum Split (s)	15.0	12.5	27.5	27.5	12.5	
Total Split (s)	24.0	20.0	36.0	36.0	20.0	
Total Split (%)	30.0%	25.0%	45.0%	45.0%	25.0%	
Maximum Green (s)	18.0	14.5	29.5	29.5	14.5	
Yellow Time (s)	4.0	4.0	5.0	5.0	4.0	
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	5.5	6.5	6.5	5.5	
Lead/Lag		Lead	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.5	2.0	2.0	2.5	
Recall Mode	None	None	C-Max	C-Max	None	
Act Effct Green (s)	13.1	30.4	37.6	37.6	49.9	55.4
Actuated g/C Ratio	0.16	0.38	0.47	0.47	0.62	0.69
v/c Ratio	0.60	0.20	0.72	0.34	0.44	0.23
Control Delay	35.4	14.0	22.0	8.5	20.2	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	14.0	22.0	8.5	20.2	3.7
LOS	D	B	C	A	C	A
Approach Delay	29.8		19.5			7.4
Approach LOS	C		B			A
Queue Length 50th (ft)	82	36	237	35	31	29
Queue Length 95th (ft)	117	58	#428	103	107	58
Internal Link Dist (ft)	1454		898			689
Turn Bay Length (ft)	125	500		95	300	
Base Capacity (vph)	780	683	1664	824	444	2396
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	0.44	0.18	0.72	0.34	0.37	0.24

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 17.9 Intersection LOS: B
Intersection Capacity Utilization 62.8% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

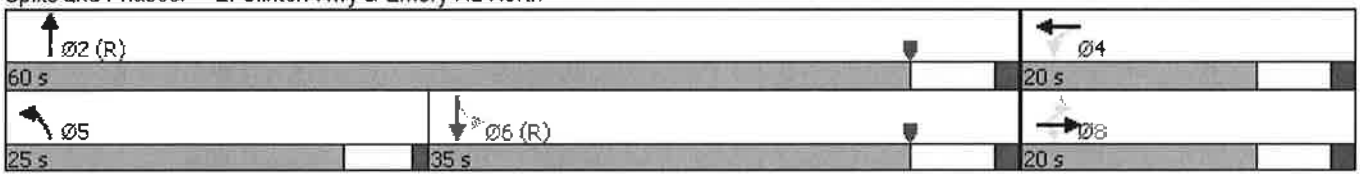
Splits and Phases: 1: Clinton Hwy & Emory Rd South

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	35	242	9	26	12	210	505	47	11	501	25
Future Volume (vph)	28	35	242	9	26	12	210	505	47	11	501	25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.966			0.987			0.993	
Flt Protected		0.978			0.990		0.950			0.950		
Satd. Flow (prot)	0	1840	1599	0	1817	0	1717	3388	0	1823	3620	0
Flt Permitted		0.834			0.923		0.950			0.425		
Satd. Flow (perm)	0	1569	1599	0	1694	0	1717	3388	0	815	3620	0
Satd. Flow (RTOR)			263		13			26			7	
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)	0	68	263	0	51	0	228	600	0	12	572	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8			4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	8	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	20.0	20.0	20.0	20.0	20.0		25.0	60.0		35.0	35.0	
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%		31.3%	75.0%		43.8%	43.8%	
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0		20.0	53.5		28.5	28.5	
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		9.8	9.8		9.8		15.4	57.7		37.3	37.3	
Actuated g/C Ratio		0.12	0.12		0.12		0.19	0.72		0.47	0.47	
v/c Ratio		0.36	0.62		0.23		0.69	0.24		0.03	0.34	
Control Delay		36.7	11.2		27.1		45.7	4.3		15.5	15.3	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		36.7	11.2		27.1		45.7	4.3		15.5	15.3	
LOS		D	B		C		D	A		B	B	
Approach Delay		16.4			27.1			15.7			15.3	
Approach LOS		B			C			B			B	
Queue Length 50th (ft)		32	0		18		125	10		3	87	
Queue Length 95th (ft)		66	61		46		m176	84		15	156	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		274	496		307		429	2451		379	1690	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.25	0.53		0.17		0.53	0.24		0.03	0.34	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 58.4% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two-Way Stop-Control Report

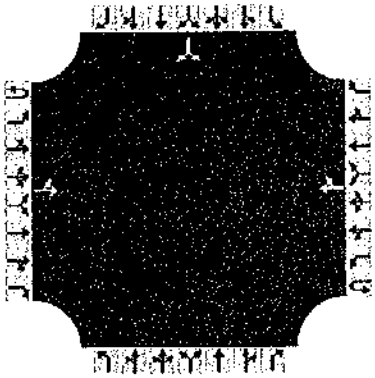
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	11/11/2016
Analysis Year	2017
Time Analyzed	MD Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - BACKGROUND

Site Information

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

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		9	300				255	6						6		9
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10													17	
Capacity, c (veh/h)		1271													585	
v/c Ratio		0.01													0.03	
95% Queue Length, Q_{95} (veh)		0.0													0.1	
Control Delay (s/veh)		7.9													11.3	
Level of Service, LOS		A													B	
Approach Delay (s/veh)		0.3												11.3		
Approach LOS														B		

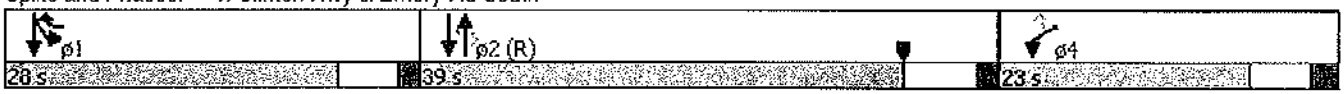
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	305	149	1502	242	349	1109
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3467	1599	3539	1583	1770	3539
Flt Permitted	0.950				0.110	
Satd. Flow (perm)	3467	1599	3539	1583	205	3539
Satd. Flow (RTOR)		2		92		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	332	162	1633	263	379	1205
Turn Type	Prot	pm+ov	NA	Perm	pm+pt	NA
Protected Phases	4	1	2		1	1 2
Permitted Phases		4		2	1 2	
Detector Phase	4	1	2	2	1	1 2
Switch Phase						
Minimum Initial (s)	8.0	6.0	20.0	20.0	6.0	
Minimum Split (s)	15.0	12.5	27.5	27.5	12.5	
Total Split (s)	23.0	28.0	39.0	39.0	28.0	
Total Split (%)	25.6%	31.1%	43.3%	43.3%	31.1%	
Maximum Green (s)	17.0	22.5	32.5	32.5	22.5	
Yellow Time (s)	4.0	4.0	5.0	5.0	4.0	
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	5.5	6.5	6.5	5.5	
Lead/Lag		Lead	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.5	2.0	2.0	2.5	
Recall Mode	None	None	C-Max	C-Max	None	
Act Effct Green (s)	13.7	41.6	36.4	36.4	59.3	64.8
Actuated g/C Ratio	0.15	0.46	0.40	0.40	0.66	0.72
v/c Ratio	0.63	0.22	1.14	0.38	0.74	0.47
Control Delay	41.0	14.1	100.7	15.0	14.2	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.0	14.1	100.7	15.0	14.2	3.6
LOS	D	B	F	B	B	A
Approach Delay	32.2		88.8			6.1
Approach LOS	C		F			A
Queue Length 50th (ft)	92	48	~625	69	22	34
Queue Length 95th (ft)	130	84	#760	136	m108	36
Internal Link Dist (ft)	1454		898			689
Turn Bay Length (ft)	125	500		95	300	
Base Capacity (vph)	654	768	1431	695	546	2512
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	0.51	0.21	1.14	0.38	0.69	0.48

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 45 (50%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.14
Intersection Signal Delay: 48.8 Intersection LOS: D
Intersection Capacity Utilization 84.6% ICU Level of Service E
Analysis Period (min) 15

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Clinton Hwy & Emory Rd South

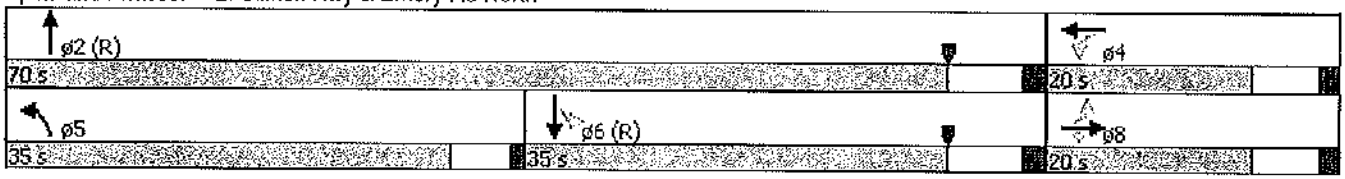


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	77	482	55	57	18	435	755	98	18	893	69
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.981			0.983			0.989	
Flt Protected		0.977			0.979		0.950			0.950		
Satd. Flow (prot)	0	1838	1599	0	1825	0	1717	3375	0	1823	3605	0
Flt Permitted		0.761			0.699		0.950			0.308		
Satd. Flow (perm)	0	1432	1599	0	1303	0	1717	3375	0	591	3605	0
Satd. Flow (RTOR)			524		8			38			9	
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)	0	160	524	0	142	0	473	928	0	20	1046	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8			4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	8	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	15.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	20.0	20.0	20.0	20.0	20.0		35.0	70.0		35.0	35.0	
Total Split (%)	22.2%	22.2%	22.2%	22.2%	22.2%		38.9%	77.8%		38.9%	38.9%	
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0		30.0	63.5		28.5	28.5	
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		13.1	13.1		13.1		27.8	64.4		31.6	31.6	
Actuated g/C Ratio		0.15	0.15		0.15		0.31	0.72		0.35	0.35	
v/c Ratio		0.77	0.77		0.72		0.89	0.38		0.10	0.82	
Control Delay		61.7	12.1		56.3		12.6	1.9		23.4	34.3	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		61.7	12.1		56.3		12.6	1.9		23.4	34.3	
LOS		E	B		E		B	A		C	C	
Approach Delay		23.7			56.3			5.5			34.1	
Approach LOS		C			E			A			C	
Queue Length 50th (ft)		88	0		73		27	2		8	296	
Queue Length 95th (ft)		#181	100		#157		m24	m1		26	#421	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		222	691		209		572	2425		207	1271	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.72	0.76		0.68		0.83	0.38		0.10	0.82	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 20.7 Intersection LOS: C
Intersection Capacity Utilization 79.4% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two-Way Stop Control Report

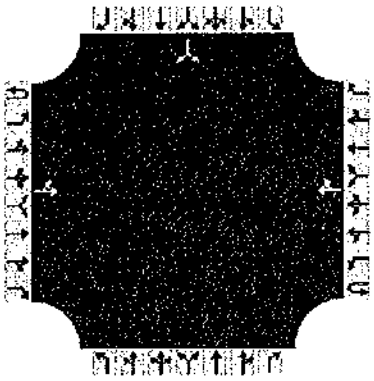
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	11/11/2016
Analysis Year	2017
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - BACKGROUND

Site Information

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

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		0	621				551	0						4		0
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

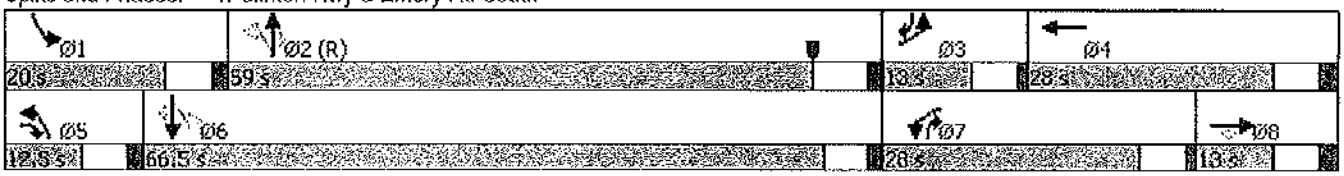
Flow Rate, v (veh/h)		0													4	
Capacity, c (veh/h)		972													184	
v/c Ratio		0.00													0.02	
95% Queue Length, Q_{95} (veh)		0.0													0.1	
Control Delay (s/veh)		8.7													25.0	
Level of Service, LOS		A													D	
Approach Delay (s/veh)		0.0												25.0		
Approach LOS														D		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	21	110	583	35	143	93	1029	345	215	1494	0
Future Volume (vph)	42	21	110	583	35	143	93	1029	345	215	1494	0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.880				0.850			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	3467	1656	0	1770	3539	1583	1770	3539	1863
Flt Permitted	0.950			0.950			0.069			0.139		
Satd. Flow (perm)	1770	1863	1583	3467	1656	0	129	3539	1583	259	3539	1863
Satd. Flow (RTOR)			173		150				290			
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)	46	23	120	634	193	0	101	1118	375	234	1624	0
Turn Type	Prot	NA	pm+ov	Prot	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	3	8	5	7	4		5	2	7	1	6	3
Permitted Phases			8				2		2	6		6
Detector Phase	3	8	5	7	4		5	2	7	1	6	3
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	8.0		6.0	20.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	13.0	12.5	11.0	15.0		12.5	27.5	11.0	12.5	12.5	13.0
Total Split (s)	13.0	13.0	12.5	28.0	28.0		12.5	59.0	28.0	20.0	66.5	13.0
Total Split (%)	10.8%	10.8%	10.4%	23.3%	23.3%		10.4%	49.2%	23.3%	16.7%	55.4%	10.8%
Maximum Green (s)	8.0	7.0	7.0	23.0	22.0		7.0	52.5	23.0	14.5	61.0	8.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.5	1.0	2.0		1.5	1.5	1.0	1.5	1.5	1.0
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
Total Lost Time (s)	5.0	6.0	5.5	5.0	6.0		5.5	6.5	5.0	5.5	5.5	5.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	2.5	3.0	3.0		2.5	2.0	3.0	2.5	2.5	3.0
Recall Mode	None	None	None	None	None		None	C-Max	None	None	None	None
Act Effct Green (s)	7.4	6.6	14.5	23.0	19.5		67.8	60.1	89.6	77.7	66.5	
Actuated g/C Ratio	0.06	0.06	0.12	0.19	0.16		0.56	0.50	0.75	0.65	0.55	
v/c Ratio	0.42	0.23	0.35	0.95	0.49		0.62	0.63	0.30	0.73	0.83	
Control Delay	65.8	59.6	4.5	73.7	16.4		35.8	25.5	2.3	35.8	22.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	65.8	59.6	4.5	73.7	16.4		35.8	25.5	2.3	35.8	22.0	
LOS	E	E	A	E	B		D	C	A	D	C	
Approach Delay		26.1			60.3			20.7			23.8	
Approach LOS		C			E			C			C	
Queue Length 50th (ft)	35	17	0	253	28		30	360	19	94	626	
Queue Length 95th (ft)	75	45	16	#368	98		#102	449	52	181	362	
Internal Link Dist (ft)		635			1454			898			689	
Turn Bay Length (ft)			120	125			200		95	300		
Base Capacity (vph)	118	108	347	664	426		169	1772	1255	352	1960	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	8	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.39	0.21	0.35	0.95	0.45		0.60	0.63	0.30	0.66	0.83	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 2:NBTL, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 29.5 Intersection LOS: C
Intersection Capacity Utilization 86.4% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Clinton Hwy & Emory Rd South

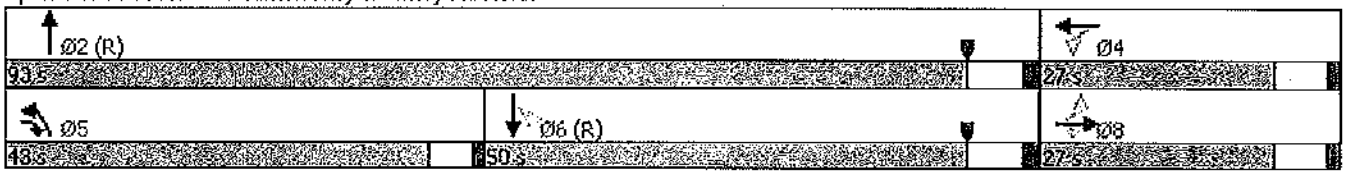


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	19	337	73	86	11	357	525	31	6	780	80
Future Volume (vph)	56	19	337	73	86	11	357	525	31	6	780	80
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.991			0.992			0.986	
Flt Protected		0.964			0.979		0.950			0.950		
Satd. Flow (prot)	0	1814	1599	0	1843	0	1717	3406	0	1823	3594	0
Flt Permitted		0.585			0.823		0.950			0.423		
Satd. Flow (perm)	0	1101	1599	0	1550	0	1717	3406	0	812	3594	0
Satd. Flow (RTOR)			47		3			13			10	
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)	0	82	366	0	184	0	388	605	0	7	935	0
Turn Type	Perm	NA	pm+ov	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8	5		4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	5	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	6.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	12.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	27.0	27.0	43.0	27.0	27.0		43.0	93.0		50.0	50.0	
Total Split (%)	22.5%	22.5%	35.8%	22.5%	22.5%		35.8%	77.5%		41.7%	41.7%	
Maximum Green (s)	21.0	21.0	38.0	21.0	21.0		38.0	86.5		43.5	43.5	
Yellow Time (s)	4.5	4.5	4.0	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.0	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	5.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		18.0	55.8		18.0		31.9	89.5		52.7	52.7	
Actuated g/C Ratio		0.15	0.46		0.15		0.27	0.75		0.44	0.44	
v/c Ratio		0.50	0.48		0.79		0.85	0.24		0.02	0.59	
Control Delay		56.8	20.0		71.0		76.3	3.8		24.2	28.9	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.1	
Total Delay		56.8	20.0		71.0		76.3	3.8		24.2	28.9	
LOS		E	B		E		E	A		C	C	
Approach Delay		26.7			71.0			32.2			28.9	
Approach LOS		C			E			C			C	
Queue Length 50th (ft)		58	157		135		321	41		3	292	
Queue Length 95th (ft)		110	210		#215		423	62		14	398	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		192	848		273		543	2544		356	1583	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	55	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.43	0.43		0.67		0.71	0.24		0.02	0.61	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 32.8 Intersection LOS: C
Intersection Capacity Utilization 74.4% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two-Way Stop-Control Report

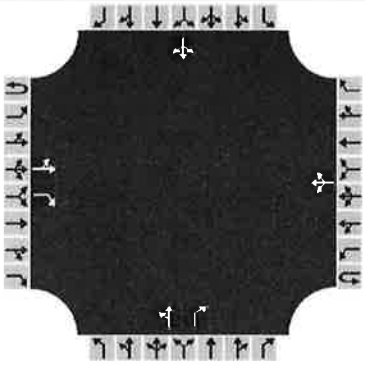
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	12/28/2016
Analysis Year	2017
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - COMBINED

Site Information

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

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	1	0	0	1	0		0	1	1		0	1	0
Configuration		LT		R			LTR			LT		R			LTR	
Volume, V (veh/h)		6	401	114		9	507	6		53	0	7		3	0	1
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		7				10				58		8			4	
Capacity, c (veh/h)		1007				1005				208		618			242	
v/c Ratio		0.01				0.01				0.28		0.01			0.02	
95% Queue Length, Q_{95} (veh)		0.0				0.0				1.1		0.0			0.1	
Control Delay (s/veh)		8.6				8.6				28.9		10.9			20.1	
Level of Service, LOS		A				A				D		B			C	
Approach Delay (s/veh)		0.2				0.3				26.7				20.1		
Approach LOS										D				C		

HCS 2010 Two-Way Stop-Control Report

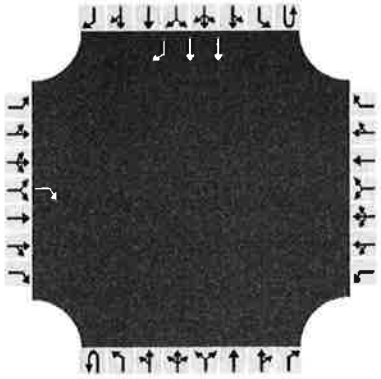
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	12/28/2016
Analysis Year	2017
Time Analyzed	AM Peak
Intersection Orientation	North-South
Project Description	Weigel's TIS - COMBINED

Site Information

Intersection	Clinton / Site Access
Jurisdiction	Knox County
East/West Street	Site Access
North/South Street	Clinton Hwy.
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	0	0	0	0	0	0	0	2	1
Configuration				R											T	R
Volume, V (veh/h)				29											1155	35
Percent Heavy Vehicles (%)				3												
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)				6.9												
Critical Headway (sec)				6.96												
Base Follow-Up Headway (sec)				3.3												
Follow-Up Headway (sec)				3.33												

Delay, Queue Length, and Level of Service

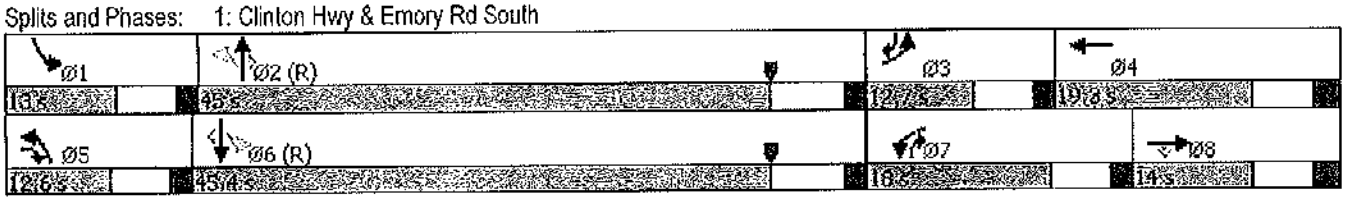
Flow Rate, v (veh/h)				32												
Capacity, c (veh/h)				423												
v/c Ratio				0.08												
95% Queue Length, Q_{95} (veh)				0.2												
Control Delay (s/veh)				14.2												
Level of Service, LOS				B												
Approach Delay (s/veh)		14.2														
Approach LOS		B														

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	29	85	314	31	96	98	1055	257	141	484	0
Future Volume (vph)	52	29	85	314	31	96	98	1055	257	141	484	0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.887				0.850			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	3467	1669	0	1770	3539	1583	1770	3539	1863
Flt Permitted	0.950			0.950			0.435			0.135		
Satd. Flow (perm)	1770	1863	1583	3467	1669	0	810	3539	1583	251	3539	1863
Satd. Flow (RTOR)			109		104				246			
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)	57	32	92	341	138	0	107	1147	279	153	526	0
Turn Type	Prot	NA	pm+ov	Prot	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	3	8	5	7	4		5	2	7	1	6	3
Permitted Phases			8				2		2	6		6
Detector Phase	3	8	5	7	4		5	2	7	1	6	3
Switch Phase												
Minimum Initial (s)	6.0	8.0	6.0	6.0	8.0		6.0	20.0	6.0	6.0	20.0	6.0
Minimum Split (s)	11.5	14.0	12.5	11.5	15.0		12.5	27.5	11.5	12.5	26.5	11.5
Total Split (s)	12.7	14.0	12.6	18.0	19.3		12.6	45.0	18.0	13.0	45.4	12.7
Total Split (%)	14.1%	15.6%	14.0%	20.0%	21.4%		14.0%	50.0%	20.0%	14.4%	50.4%	14.1%
Maximum Green (s)	7.2	8.0	7.1	12.5	13.3		7.1	38.5	12.5	7.5	38.9	7.2
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0	4.0	4.0	5.0	4.0
All-Red Time (s)	1.5	2.0	1.5	1.5	2.0		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	0.0
Total Lost Time (s)	5.5	6.0	5.5	5.5	6.0		5.5	6.5	5.5	5.5	6.5	5.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	2.5	3.0	3.0		2.5	2.0	3.0	2.5	2.5	3.0
Recall Mode	None	None	None	None	None		None	C-Max	None	None	C-Max	None
Act Effct Green (s)	6.9	8.0	15.1	13.8	11.5		50.9	43.2	63.5	51.8	43.6	
Actuated g/C Ratio	0.08	0.09	0.17	0.15	0.13		0.57	0.48	0.71	0.58	0.48	
v/c Ratio	0.42	0.19	0.26	0.64	0.45		0.20	0.68	0.23	0.58	0.31	
Control Delay	49.4	41.1	6.3	42.4	16.7		9.0	21.9	1.8	28.6	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	49.4	41.1	6.3	42.4	16.7		9.0	21.9	1.8	28.6	9.2	
LOS	D	D	A	D	B		A	C	A	C	A	
Approach Delay		26.0			35.0			17.3			13.5	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)	31	17	0	96	17		25	282	6	25	46	
Queue Length 95th (ft)	70	45	29	142	69		48	362	33	100	65	
Internal Link Dist (ft)		635			1454			898			689	
Turn Bay Length (ft)			120	125			200		95	300		
Base Capacity (vph)	141	165	362	546	335		537	1698	1195	271	1715	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.40	0.19	0.25	0.62	0.41		0.20	0.68	0.23	0.56	0.31	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 1 (1%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 19.9 — Intersection LOS: B
Intersection Capacity Utilization 72.2% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Clinton Hwy & Emory Rd South

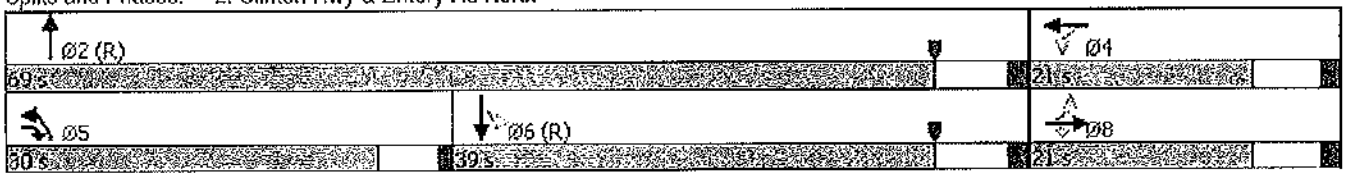


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	35	184	9	26	12	185	518	47	11	521	33
Future Volume (vph)	41	35	184	9	26	12	185	518	47	11	521	33
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.966			0.988			0.991	
Flt Protected		0.974			0.990		0.950			0.950		
Satd. Flow (prot)	0	1832	1599	0	1817	0	1717	3392	0	1823	3613	0
Flt Permitted		0.803			0.913		0.950			0.419		
Satd. Flow (perm)	0	1511	1599	0	1676	0	1717	3392	0	804	3613	0
Satd. Flow (RTOR)			138		13			25			8	
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)	0	83	200	0	51	0	201	614	0	12	602	0
Turn Type	Perm	NA	pm+ov	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8	5		4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	5	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	6.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	12.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	21.0	21.0	30.0	21.0	21.0		30.0	69.0		39.0	39.0	
Total Split (%)	23.3%	23.3%	33.3%	23.3%	23.3%		33.3%	76.7%		43.3%	43.3%	
Maximum Green (s)	15.0	15.0	25.0	15.0	15.0		25.0	62.5		32.5	32.5	
Yellow Time (s)	4.5	4.5	4.0	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.0	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	5.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		10.6	29.6		10.6		15.8	71.0		48.9	48.9	
Actuated g/C Ratio		0.12	0.33		0.12		0.18	0.79		0.54	0.54	
v/c Ratio		0.47	0.32		0.25		0.67	0.23		0.03	0.31	
Control Delay		45.2	7.4		30.7		47.5	3.3		14.7	13.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		45.2	7.4		30.7		47.5	3.3		14.7	13.8	
LOS		D	A		C		D	A		B	B	
Approach Delay		18.5			30.7			14.2			13.8	
Approach LOS		B			C			B			B	
Queue Length 50th (ft)		45	23		20		122	26		3	97	
Queue Length 95th (ft)		87	57		51		m185	68		15	168	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		251	767		290		476	2681		437	1967	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.33	0.26		0.18		0.42	0.23		0.03	0.31	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 15.2 — Intersection LOS: B
Intersection Capacity Utilization 58.8% — ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two-Way Stop-Control Report

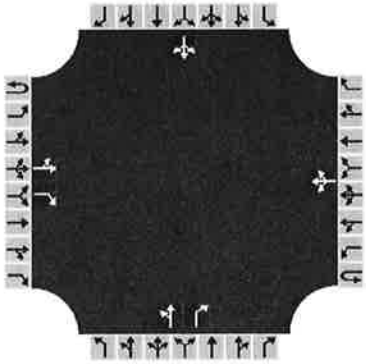
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	12/28/2016
Analysis Year	2017
Time Analyzed	MD Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - COMBINED

Site Information

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

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	1	0	0	1	0		0	1	1		0	1	0
Configuration		LT		R			LTR			LT		R			LTR	
Volume, V (veh/h)		9	241	75		9	229	6		42	0	14		6	0	9
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				10				46		15			17	
Capacity, c (veh/h)		1302				1208				425		774			579	
v/c Ratio		0.01				0.01				0.11		0.02			0.03	
95% Queue Length, Q_{95} (veh)		0.0				0.0				0.4		0.1			0.1	
Control Delay (s/veh)		7.8				8.0				14.5		9.7			11.4	
Level of Service, LOS		A				A				B		A			B	
Approach Delay (s/veh)		0.3				0.4				13.3				11.4		
Approach LOS										B				B		

HCS 2010 Two-Way Stop-Control Report

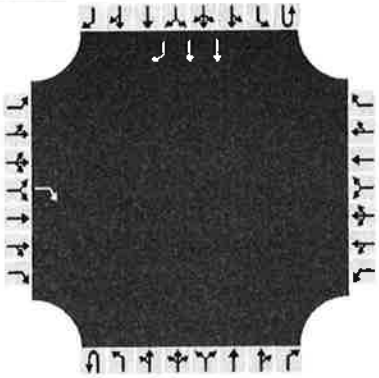
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	11/11/2016
Analysis Year	2017
Time Analyzed	MD Peak
Intersection Orientation	North-South
Project Description	Weigel's TIS - COMBINED

Site Information

Intersection	Clinton / Site Access
Jurisdiction	Knox County
East/West Street	Site Access
North/South Street	Clinton Hwy.
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	0	0	0	0	0	0	0	2	1
Configuration				R											T	R
Volume, V (veh/h)				33											674	41
Percent Heavy Vehicles (%)				3												
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)				6.9												
Critical Headway (sec)				6.96												
Base Follow-Up Headway (sec)				3.3												
Follow-Up Headway (sec)				3.33												

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)				36												
Capacity, c (veh/h)				628												
v/c Ratio				0.06												
95% Queue Length, Q_{95} (veh)				0.2												
Control Delay (s/veh)				11.1												
Level of Service, LOS				B												
Approach Delay (s/veh)	11.1															
Approach LOS	B															

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	53	154	305	31	136	118	1439	242	327	1026	0
Future Volume (vph)	58	53	154	305	31	136	118	1439	242	327	1026	0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.878				0.850			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	3467	1652	0	1770	3539	1583	1770	3539	1863
Flt Permitted	0.950			0.950			0.225			0.071		
Satd. Flow (perm)	1770	1863	1583	3467	1652	0	419	3539	1583	132	3539	1863
Satd. Flow (RTOR)			149		148				139			
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)	63	58	167	332	182	0	128	1564	263	355	1115	0
Turn Type	Prot	NA	pm+ov	Prot	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	3	8	5	7	4		5	2	7	1	6	3
Permitted Phases			8				2		2	6		6
Detector Phase	3	8	5	7	4		5	2	7	1	6	3
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	8.0	8.0		6.0	20.0	8.0	6.0	6.0	6.0
Minimum Split (s)	13.0	13.0	12.5	15.0	15.0		12.5	27.5	15.0	12.5	12.5	13.0
Total Split (s)	13.0	13.0	15.8	17.0	17.0		15.8	56.8	17.0	23.2	64.2	13.0
Total Split (%)	11.8%	11.8%	14.4%	15.5%	15.5%		14.4%	51.6%	15.5%	21.1%	58.4%	11.8%
Maximum Green (s)	7.0	7.0	10.3	11.0	11.0		10.3	50.3	11.0	17.7	57.7	7.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.0	4.0	4.0	5.0	4.0
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0		1.5	1.5	2.0	1.5	1.5	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.5	6.0	6.0		5.5	6.5	6.0	5.5	6.5	6.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	2.5	3.0	3.0		2.5	2.0	3.0	2.5	2.5	3.0
Recall Mode	None	None	None	None	None		None	C-Max	None	None	C-Max	None
Act Effct Green (s)	6.8	6.8	18.2	11.0	11.0		60.7	52.0	69.5	77.1	62.8	
Actuated g/C Ratio	0.06	0.06	0.17	0.10	0.10		0.55	0.47	0.63	0.70	0.57	
v/c Ratio	0.58	0.50	0.43	0.96	0.61		0.39	0.94	0.25	0.96	0.55	
Control Delay	71.4	65.5	11.9	89.1	21.7		11.2	39.8	4.9	55.7	19.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	71.4	65.5	11.9	89.1	21.7		11.2	39.8	4.9	55.7	19.3	
LOS	E	E	B	F	C		B	D	A	E	B	
Approach Delay		35.7			65.3			33.3			28.1	
Approach LOS		D			E			C			C	
Queue Length 50th (ft)	44	40	11	122	22		28	550	34	~165	331	
Queue Length 95th (ft)	#100	84	68	#212	94		49	#723	70	m#387	421	
Internal Link Dist (ft)		635			1454			898			689	
Turn Bay Length (ft)			120	125			200		95	300		
Base Capacity (vph)	112	118	418	346	298		367	1671	1051	369	2021	
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	0.49	0.40	0.96	0.61		0.35	0.94	0.25	0.96	0.55	

Intersection Summary

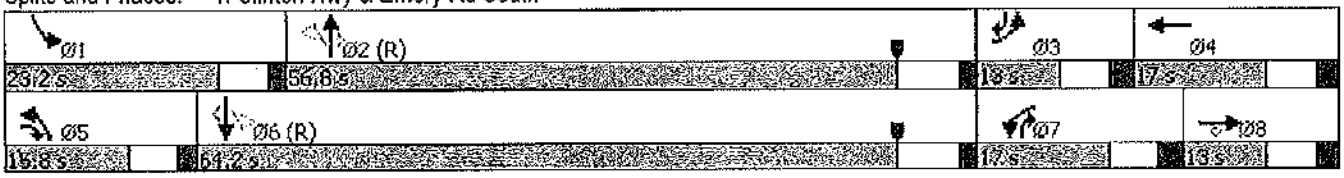
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 57 (52%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 35.5 Intersection LOS: D
Intersection Capacity Utilization 92.9% ICU Level of Service F
Analysis Period (min) 15

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Clinton Hwy & Emory Rd South

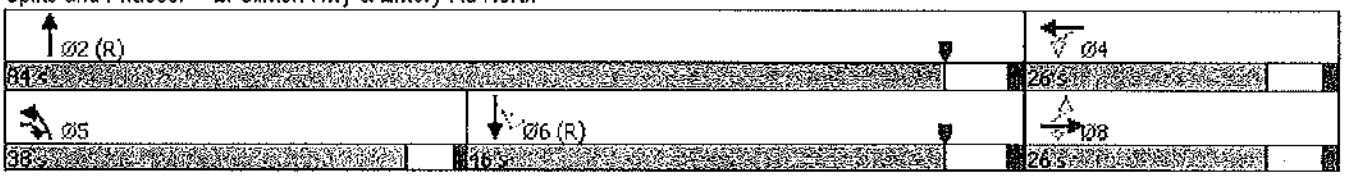


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	77	372	55	57	18	394	774	98	18	915	78
Future Volume (vph)	96	77	372	55	57	18	394	774	98	18	915	78
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.981			0.983			0.988	
Flt Protected		0.973			0.979		0.950			0.950		
Satd. Flow (prot)	0	1831	1599	0	1825	0	1717	3375	0	1823	3602	0
Flt Permitted		0.713			0.565		0.950			0.302		
Satd. Flow (perm)	0	1341	1599	0	1053	0	1717	3375	0	579	3602	0
Satd. Flow (RTOR)			35		7			30			9	
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)	0	188	404	0	142	0	428	948	0	20	1080	0
Turn Type	Perm	NA	pm+ov	Perm	NA		Prot	NA		Perm	NA	
Protected Phases		8	5		4		5	2			6	
Permitted Phases	8		8	4						6		
Detector Phase	8	8	5	4	4		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	6.0	8.0	8.0		6.0	20.0		20.0	20.0	
Minimum Split (s)	15.0	15.0	12.0	15.0	15.0		12.0	27.5		27.5	27.5	
Total Split (s)	26.0	26.0	38.0	26.0	26.0		38.0	84.0		46.0	46.0	
Total Split (%)	23.6%	23.6%	34.5%	23.6%	23.6%		34.5%	76.4%		41.8%	41.8%	
Maximum Green (s)	20.0	20.0	33.0	20.0	20.0		33.0	77.5		39.5	39.5	
Yellow Time (s)	4.5	4.5	4.0	4.5	4.5		4.0	5.0		5.0	5.0	
All-Red Time (s)	1.5	1.5	1.0	1.5	1.5		1.0	1.5		1.5	1.5	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	5.0		6.0		5.0	6.5		6.5	6.5	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Act Effct Green (s)		17.5	54.2		17.5		30.7	80.0		44.3	44.3	
Actuated g/C Ratio		0.16	0.49		0.16		0.28	0.73		0.40	0.40	
v/c Ratio		0.88	0.50		0.82		0.90	0.39		0.09	0.74	
Control Delay		82.5	18.6		76.0		28.8	5.6		24.7	32.9	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		82.5	18.6		76.0		28.8	5.6		24.7	32.9	
LOS		F	B		E		C	A		C	C	
Approach Delay		38.9			76.0			12.8			32.7	
Approach LOS		D			E			B			C	
Queue Length 50th (ft)		129	152		92		180	148		9	360	
Queue Length 95th (ft)		#240	232		#189		m236	m171		28	447	
Internal Link Dist (ft)		922			913			689			1221	
Turn Bay Length (ft)			160				245			95		
Base Capacity (vph)		243	840		197		517	2461		232	1456	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.48		0.72		0.83	0.39		0.09	0.74	

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 27.2 Intersection LOS: C
Intersection Capacity Utilization 78.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Clinton Hwy & Emory Rd North



HCS 2010 Two-Way Stop-Control Report

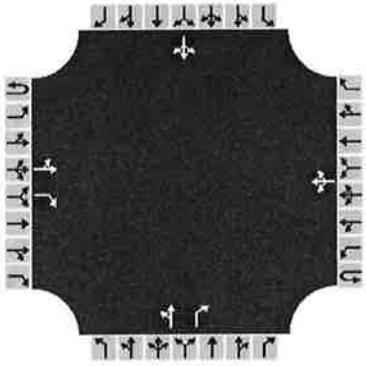
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	12/28/2016
Analysis Year	2017
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	Weigel's TIS - COMBINED

Site Information

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

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	1	0	0	1	0		0	1	1		0	1	0
Configuration		LT		R			LTR			LT		R			LTR	
Volume, V (veh/h)		0	509	130		10	509	0		70	0	28		4	0	0
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		0				11				76		30			4	
Capacity, c (veh/h)		1011				896				178		530			164	
v/c Ratio		0.00				0.01				0.43		0.06			0.02	
95% Queue Length, Q_{95} (veh)		0.0				0.0				1.9		0.2			0.1	
Control Delay (s/veh)		8.6				9.1				39.5		12.2			27.5	
Level of Service, LOS		A				A				E		B			D	
Approach Delay (s/veh)		0.0				0.3				31.7				27.5		
Approach LOS										D				D		

HCS 2010 Two-Way Stop-Control Report

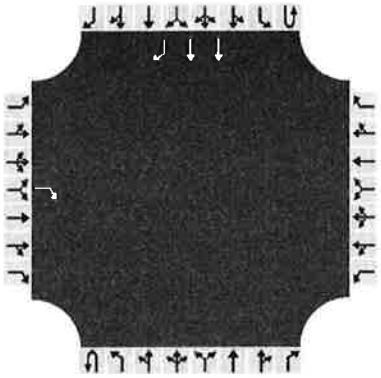
General Information

Analyst	ALC
Agency/Co.	CCI
Date Performed	12/28/2016
Analysis Year	2017
Time Analyzed	PM Peak
Intersection Orientation	North-South
Project Description	Weigel's TIS - COMBINED

Site Information

Intersection	Clinton / Site Access
Jurisdiction	Knox County
East/West Street	Site Access
North/South Street	Clinton Hwy.
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	0	0	0	0	0	0	0	2	1
Configuration				R											T	R
Volume, V (veh/h)				34											1300	42
Percent Heavy Vehicles (%)				3												
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)				6.9												
Critical Headway (sec)				6.96												
Base Follow-Up Headway (sec)				3.3												
Follow-Up Headway (sec)				3.33												

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)				37												
Capacity, c (veh/h)				376												
v/c Ratio				0.10												
95% Queue Length, Q_{95} (veh)				0.3												
Control Delay (s/veh)				15.6												
Level of Service, LOS				C												
Approach Delay (s/veh)		15.6														
Approach LOS		C														

TABLE 5A KNOX COUNTY LEFT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH	Project No: 01040-0002 Project Name: Weigel's - Clinton Highway Notes: Emory Rd @ Site Access

(If the left-turn volume exceeds the table value a left-turn lane is needed)

OPPOSING	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
VOLUME	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	250	180	140	110	80	70
150 - 199	200	140	105	90	70	60
200 - 249	160	115	85	75	65	55
250 - 299	130	100	75	65	60	50
300 - 349	110	90	70	60	55	45
350 - 399	100	80	65	55	50	40
400 - 449	90	70	60	50	45	35
450 - 499	80	65	55	45	40	30
500 - 549	70	60	45	35	35	25
550 - 599	65	55	40	35	30	25
600 - 649	60	45	35	30	25	25
650 - 699	55	35	35	30	25	20
700 - 749	50	35	30	25	20	20
750 or More	45	35	25	25	20	20

OPPOSING	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	70	60	50	45	40	35
150 - 199	60	55	45	40	35	30
200 - 249	55	50	40	35	30	30
250 - 299	50	45	35	30	30	30
300 - 349	45	40	35	30	25	25
350 - 399	40	35	30	25	25	20
400 - 449	35	30	30	25	20	20
450 - 499	30	25	25	20	20	20
500 - 549	25	25	20	20	20	15
550 - 599	25	20	20	20	20	15
600 - 649	25	20	20	20	20	15
650 - 699	20	20	20	20	20	15
700 - 749	20	20	20	15	15	15
750 or More	20	20	20	15	15	15

* 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)
Emory/Site	AM - 2017 Comb	521	513	9	**20**	No
Emory/Site	MD - 2017 Comb	325	235	9	**70**	No
Emory/Site	PM - 2017 Comb	639	509	10	**20**	No

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

TABLE 5B KNOX COUNTY RIGHT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH	Project No: 01040-0002 Project Name: Weigel's - Clinton Highway Notes: Emory Rd @ Site Access

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

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
Fewer Than 25						
25 - 49					Yes	Yes
50 - 99				Yes	Yes	Yes
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)
Emory/Site	AM - 2017 Comb	407	114	No
Emory/Site	MD - 2017 Comb	250	75	No
Emory/Site	PM - 2017 Comb	509	130	**YES**

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

TABLE 6B KNOX COUNTY RIGHT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 46 TO 55 MPH	Project No: 01040-0002 Project Name: Weigel's - Clinton Highway Notes: Clinton Hwy @ RI/RO

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

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
Fewer Than 25						
25 - 49				Yes	Yes	Yes
50 - 99			Yes	Yes	Yes	Yes
100 - 149		Yes	Yes	Yes	Yes	Yes
150 - 199	Yes	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	**Single Lane Through Volume Equiv.	Right-Turn Volume	Right-Turn Lane Warranted (Yes / No)
Clinton/RI-RO	AM - 2017 Combined	1155	578	35	YES
Clinton/RI-RO	MD - 2017 Combined	674	337	41	NO
Clinton/RI-RO	PM - 2017 Combined	1300	650	42	YES

**** Single lane equivalent for multi-lane approach = (Through Volume x 1.05) / 2**

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