Date: November 2013

TRANSPORTATION IMPACT STUDY

for

BANZHOFF DEVELOPMENT SITE

Grantham Road (SR 2026), Mill Road and Lisburn Road (SR 2004)

Upper Allen Township
Cumberland County, Pennsylvania

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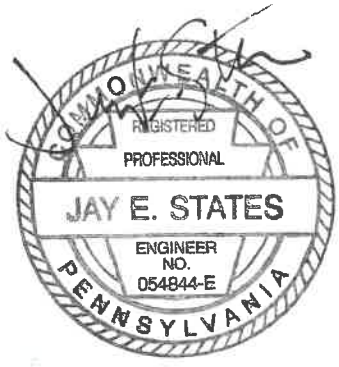

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SECTION 1 - EXECUTIVE SUMMARY

A mixed residential development is proposed for a tract of land within Upper Allen Township, Cumberland County. The Banzhoff Development site is located east of US Route 15 and south of and adjacent to Grantham Road (SR 2026). The development will be referred to as the "Banzhoff Development site" in this study. The proposed development will include ten (10) single family, detached housing units, and 54 residential condominium / townhouse units.

The Transportation Impact Study (TIS) was prepared for a 2015 Opening Year and a 2025 Horizon Year. The following conclusions and recommendations, to be constructed by the developer, are provided for the study area and the study area intersections:

Grantham Road (SR 2026) and Mill Road

- The intersection is expected to operate at an overall LOS "A" through the 2025 Horizon Year with or without the proposed development.

- No intersection improvements are required or recommended as a result of the proposed residential development.

Lisburn Road (SR 2004) and Mill Road

- The intersection is expected to operate at an overall LOS "B" or better during the AM Peak hour and at an overall LOS "C" or better during the PM Peak hour, through the 2025 horizon year, with or without the proposed development.

- No intersection improvements are required or recommended as a result of the proposed residential development.

Grantham Roadway

- Pedestrians and bicyclists share the road with vehicles along the study area roadways. Although increased pedestrian activity was not observed during the peak traffic periods, higher recreational usage may occur during evening and weekend periods.

- Traffic resulting from the Banzhoff Development Site is not expected to have an impact on the pedestrian usage of the study area roadways.

- The roadway context and surrounding land uses should cause drivers to expect pedestrian and bicyclist use of the roadway. The roadway alignment in the vicinity of the study area allows pedestrians and motorists good visibility of each other while using the roadways.

Capacity analyses performed for each of the study area intersections are summarized in Table 1. Queue analyses performed for the study area intersections are summarized in Table 2. Capacity analysis and Queue analyses summary tables are also provided in Appendix A.

Table 1 . Levels of Service Summary
2015 Opening Year, 2025 Horizon Year

Intersection Approach Movement	Highway Capacity Analyses Full Buildout Results									
	LOS (delay)									
	AM Peak Hour					PM Peak Hour				
	2013	2015		2025		2013	2015		2025	
	Base Year	No Build	Build	No Build	Build	Base Year	No Build	Build	No Build	Build
Grantham Road (SR 2026) and Mill Road										
Grantham Road - EB	A	A	A	A	A	A	A	A	A	A
Grantham Road - WB	A	A	A	A	A	A	A	A	A	A
Mill Road - NB	A	A	B	B	B	B	B	B	B	C
Mill Road - SB	B	B	B	B	B	B	B	B	B	B
Overall Intersection	**A (8.1)**	**A (8.2)**	**A (8.4)**	**A (8.4)**	**A (8.7)**	**A (8.8)**	**A (8.9)**	**A (9.3)**	**A (9.5)**	**A (10.0)**
Lisburn Road (SR 2004) and Mill Road										
Lisburn Road - EB	B	B	B	B	C	B	B	C	C	C
Lisburn Road - WB	B	B	B	B	B	B	B	B	C	C
Mill Road - NB	B	B	B	B	B	B	B	B	B	C
Mill Road - SB	B	B	B	B	B	A	A	A	B	B
SB Left/Thru	A	A	A	A	B	A	B	B	B	B
SB Right	B	B	B	B	B	A	A	A	A	B
Overall Intersection	**B (10.9)**	**B (11.2)**	**B (12.0)**	**B (12.9)**	**B (13.9)**	**B (13.0)**	**B (13.5)**	**B (14.7)**	**C (17.3)**	**C (19.7)**

Table 2 . Queue Analysis Summary
2025 Horizon Year

Intersection Movement	Queue Analysis Results			
	95th Percentile Queue (feet)			
	Available Storage	AM 2025 No Build / Build	PM 2025 No Build / Build	**Adequate Storage**
Grantham Road (SR 2026) and Mill Road				
Mill Road - NB	280	8 / 9	25 / 29	YES
Mill Road - SB	375	14 / 19	33 / 42	YES
Lisburn Road (SR 2004) and Mill Road				
Lisburn Road - EB Approach	425	85 / 98	142 / 178	YES
Lisburn Road - WB Approach	500+	55 / 58	105 / 110	YES
Mill Road - NB Approach	500+	32 / 42	52 / 62	YES
Mill Road - SB Left / Thru	230	2 / 2	2 / 2	YES
Mill Road - SB Right	175	10 / 10	5 / 5	YES

SECTION 2 - INTRODUCTION/PROJECT SUMMARY

A mixed residential development is proposed for a tract of land within Upper Allen Township, Cumberland County. The Banzhoff Development site is located east of US Route 15 and south of and adjacent to Grantham Road (SR 2026). The development will be referred to as the "Banzhoff Development site" in this study. The proposed development will include ten (10) single family, detached housing units, and 54 residential condominium / townhouse units.

Access to the development site will be via a local roadway connection to Grantham Road. The existing cul-de-sac, east of US Route 15, will be reconfigured as a roundabout Intersection. The roundabout intersection will be approximately 2,900 feet west of Mill Road.

Grove Miller Engineering, Inc. has been retained by Melham Associates to conduct a transportation impact study (TIS) for the proposed mixed residential development site. The scope of the TIS was approved by Upper Allen Township. The study methodology and traffic analyses documented in this transportation impact study report are in accordance with PENNDOT Strike Off Letter 470-09-4 "Transportation Impact Study Guidelines" dated February 12, 2009.

Land Use Contexts

The area around the development project is located in a Suburban Neighborhood area as defined by the PENNDOT Smart Transportation Guidebook. Site plan review and discussions with the development team indicate that the proposed land uses are consistent with the land uses surrounding community. The proposed conditions are consistent with the existing land use context, and the proposed development will not change the land use context of the study area.

Study Area Transportation Facilities

The study area consists of the Grantham Road (SR 2026) and Mill Road intersection and the Lisburn Road (SR 2004) and Mill Road Intersection. During the scoping process it was determined that analyses would not need to be conducted at the Grantham Road and Entrance Road roundabout intersection.

Photographs of the study area intersections and documentation of existing roadway conditions are included in the Appendix.

There are no sidewalks provided throughout the area surrounding the development site. Bicycles share the roadway with motorized vehicles. There is no significant bus or passenger rail service in the study area.

Study Area Map

A study area map showing the proposed site location is provided in Appendix B, Figure 1.

Site Plan

A site area plan is provided in Appendix B, Figure 2.

SECTION 3 - DATA COLLECTION

Manual turning movement counts (TMC) were conducted at the study area intersections to document the current peak hour volumes. The traffic counts were conducted during the weekday morning (6:30 AM to 9:00 AM) and afternoon (3:30 PM to 6:00 PM) peak traffic periods in September 2013, while Messiah College was in session. The TMC data sheets are provided in the Appendix.

Automatic traffic recorder (ATR) counts were conducted on Grantham Road in the vicinity of the proposed development. The ATR count data are provided in the Appendix.

SECTION 4 - EXISTING STUDY AREA CONDITIONS

The area around the proposed development location is a Suburban Neighborhood area. Grantham Road (SR 2026), Lisburn Road (SR 2004), and Mill Road are the major roadways providing access to the proposed Banzhoff development site.

Roadway Network

The study area includes the following roadways:

Grantham Road. Grantham Road (SR 2026), in the vicinity of the development site operates most nearly like a Local Road. The state roadway provids east/west access to portions of Upper Allen Township, east of US Route 15. The roadway has two (2)

travel lanes with variable width shoulders. The roadway is marked with a double yellow centerline and white edge lines, and is posted with a 25 MPH speed limit. The ATR count data indicates that the current average daily traffic (ADT) volume on Grantham Road in the area of proposed development is approximately 290 vehicles per day. The intersection of Grantham Road and Mill Road is two-way stop controlled on Mill Road.

Lisburn Road. Lisburn Road (SR 2004) is an Urban Minor Arterial state roadway providing an east/west corridor through the southern portion of Upper Allen Township. The roadway and shoulder widths vary along the subject stretch of roadway. The roadway is marked with a double yellow centerline and white edge lines, and is posted with a 35 MPH speed limit. The PENNDOT research data indicates that the current ADT volume on Lisburn Road in the area of the Mill Road is approximately 4,800 vehicles per day. The intersection of Lisburn Road and Mill Road is all-way Stop controlled.

Mill Road. Mill Road is a Urban Local Road providing north/south access between Grantham Road and Lisburn Road. The roadway and shoulder widths vary along the roadway in the vicinity of the development. The roadway is marked with a double yellow centerline, and is posted with a 25 MPH speed limit.

Volumes and Capacity

Capacity analyses for existing conditions at study area intersections are summarized in Appendix A, Table 1. Existing traffic volumes and levels of service at study area intersections are shown in Appendix B, Figure 3a. The capacity analyses worksheets are provided in the Appendix.

Queue Analysis

Queue analyses for existing conditions at study area intersections are summarized in Appendix A, Table 2. The queue analyses worksheets are provided with the capacity analyses worksheets in the Appendix.

Pedestrian/Bicycle Facilities

Within the context of this Suburban Neighborhood, there are no sidewalks along the study area roadways. Pedestrian activity was limited in the study area during periods when traffic counts and field observations were being conducted. There are no bicycle lanes on any

of the study area roadways, and none of the adjacent roadways are on designated bicycle routes.

Pedestrians and bicyclists share the road with vehicles along all of the study area roadways. Although increased pedestrian activity was not observed during the peak traffic periods, the suburban nature of the study area suggest that higher recreational usage may occur during evening and weekend periods.

Additional traffic resulting from the Banzhoff Development site is not expected to have an impact on the pedestrian usage of the study area roadways. The roadway context and surrounding land uses should cause drivers to expect pedestrian and bicyclist use of the roadway. The roadway alignment in the vicinity of the study area allows pedestrians and motorists good visibility of each other while using the roadways. The cul-de-sac at the west end of Grantham Road also reduces the through traffic volumes and speeds. The recorded vehicular speeds are within reasonable ranges, with the 85th percentile speed on Grantham Road within ten (10) MPH of the posted speed limit and under 35 MPH.

Transit Facilities

There are no significant bus or rail transit facilities within or near the study area.

SECTION 5 - OPENING YEAR CONDITIONS WITHOUT DEVELOPMENT

The 2015 Opening Year traffic analyses for conditions without the development are documented in this report section.

Background Growth Factors

Traffic projections were made in order to account for growth in background traffic volumes which may result from other future potential development in the region. The 2013 existing traffic count volumes were projected to the 2015 Opening Year using a 1.37 percent annual traffic growth rate. The traffic growth rate was referenced from growth factor data provided by the PENNDOT Bureau of Planning and Research and is documented in the Appendix. Opening Year traffic volumes are shown in Appendix C, Figure 5a. Traffic volume projections are documented in spreadsheet format in the Appendix.

Adjacent Development Traffic

Traffic projections were included for another proposed residential development. Trip generation and distribution were generated for seven (7) Condominium / Townhouse units within a development near the Lisburn Road and Mill Road intersection.

Planned Roadway Improvement Projects

There are currently no planned roadway improvement projects in the study area.

Capacity Analysis

Capacity analyses for the Opening Year without development conditions at study area intersections are summarized in Appendix A, Table 1. Levels of service for opening year conditions without development are shown in Appendix C, Figures 5c. The capacity and queue analyses worksheets are provided in the Appendix.

SECTION 6 - HORIZON YEAR CONDITIONS WITHOUT DEVELOPMENT

The 2025 Horizon Year traffic analyses for conditions without the development are documented in this report section.

Background Growth Factors

Traffic projections were made for the 2025 Horizon Year in a similar manner as the projections for the 2015 Opening Year as defined in the previous report section. Horizon Year traffic volumes are shown in Appendix D, Figure 6a.

Adjacent Development Traffic

Traffic projections were included for the other proposed residential development as indicated in the previous report section.

Planned Roadway Improvement Projects

There are currently no planned roadway improvement projects in the study area.

Capacity Analysis

Capacity analyses for Horizon Year conditions at study area intersections are summarized in Appendix A, Table 1. Levels of service for Horizon Year conditions without development

are shown in Appendix D, Figure 6c. The capacity and queue analyses worksheets are provided in the Appendix.

SECTION 7 - DEVELOPMENT DESCRIPTION

Site Narrative

A mixed residential development is proposed for an undeveloped tract of land within Upper Allen Township, Cumberland County. The Banzhoff Development site is located east of US Route 15 and south of and adjacent to Grantham Road (SR 2026). Grantham Road, Mill Road, and Lisburn Road are the primary roadways in the vicinity of the Banzhoff Site. The development will include ten (10) single family, detached housing units, and 54 residential condominium / townhouse units.

Access to the development site will be via a local roadway connection to Grantham Road. The existing cul-de-sac, on the east side of US Route 15, will be reconfigured as a roundabout intersection for the primary access to the development site. The roundabout intersection will be approximately 2,900 feet west of Mill Road.

For purposes of this TIS, is was assumed that full build out of the development will be completed in 2015. Per Upper Allen Township ordinance, the Horizon Year is 2025, ten (10) years past full build out.

Trip Generation

The Institute of Transportation Engineers (ITE), Trip Generation Manual, 9th Edition (2012) was used to estimate the number of trips which could be generated by the combined single family, detached housing units, and residential condominium / townhouse units. Regression equations were used to estimate the average daily trips and the AM and PM peak hour trips. Table 4 summarizes the trip generation projections for the site, and trip generation calculation worksheets are provided in the Appendix.

Table 4. ITE Trip Generation Summary:
Proposed Banzhoff Development Site

Land Use (Size)	Average Weekday Vehicle Trips (vpd)	AM Peak (vph)		PM Peak (vph)	
		Enter	Exit	Enter	Exit
Single Family Detached Housing (10 Units)	126	4	13	8	5
Residential Condominium / Townhouse (54 Units)	376	5	27	24	12
Total	**502**	**9**	**40**	**32**	**17**

Pass-By Trips

The pass-by capture trips were not used in this study.

Internal Capture Trips

The internal capture trips were not used in this study.

Trip Distribution/Assignment

The trips expected to be generated by the proposed development were distributed onto the surrounding roadway network based on the directional distribution of existing traffic, roads available for travel, and local area traffic generators. The trip distributions for the AM and PM peak hours are shown in Appendix B, Figure 4.

SECTION 8 - OPENING YEAR CONDITIONS WITH DEVELOPMENT

The 2015 Opening Year traffic analyses for conditions with the development are documented in this report section.

Volumes and Capacity Analysis

Capacity analyses for 2015 Opening Year traffic conditions with development at study area intersections are summarized in Appendix A, Table 1. Projected traffic volumes at study area intersections are shown in Appendix C, Figure 5b for the 2015 Opening Year. Levels of service with 2015 Opening Year traffic volumes with development are shown in Appendix C, Figure 5c. The capacity and queue analyses worksheets are provided in the Appendix.

SECTION 9 - HORIZON YEAR CONDITIONS WITH DEVELOPMENT

The 2025 Horizon Year traffic analyses for conditions with the development are documented in this report section.

Volumes and Capacity Analysis

Capacity analyses for 2025 Horizon Year traffic conditions with development at study area intersections are summarized in Appendix A, Table 1. Projected traffic volumes at study area intersections are shown in Appendix D, Figure 6b for the 2025 Horizon Year. Levels of service with 2025 Horizon Year traffic volumes with development are shown in Appendix D, Figure 6c. The capacity and queue analyses worksheets are provided in the Appendix.

Queue Analysis

Queue analyses were performed for the relevant turn lanes using the Synchro software to determine the 95th percentile queues. The Synchro printouts are provided in the Appendix. The results of the analyses are provided in Appendix A, Table 2.

SECTION 10- MITIGATION IDENTIFICATION AND RECOMMENDATIONS

The Horizon Year traffic analyses for conditions with the development and with mitigation improvements are documented in this report section.

Capacity Analysis

No improvements are required or recommended.

Queue Analysis

No improvements are required or recommended.

Pedestrian Considerations

No improvements are required or recommended

SECTION 11 - CONCLUSIONS

Grantham Road (SR 2026) and Mill Road

- The intersection is expected to operate at an overall LOS "A" through the 2025 Horizon Year with or without the proposed development.

- No intersection improvements are required or recommended as a result of the proposed residential development.

Lisburn Road (SR 2004) and Mill Road

- The intersection is expected to operate at an overall LOS "B" or better during the AM Peak hour and at an overall LOS "C" or better during the PM Peak hour, through the 2025 horizon year, with or without the proposed development.

- No intersection improvements are required or recommended as a result of the proposed residential development.

Grantham Roadway

- Pedestrians and bicyclists share the road with vehicles along the study area roadways. Although increased pedestrian activity was not observed during the peak traffic periods, higher recreational usage may occur during evening and weekend periods.

- Traffic resulting from the Banzhoff Development site is not expected to have an impact on the pedestrian usage of the study area roadways.

- The roadway context and surrounding land uses should cause drivers to expect pedestrian and bicyclist use of the roadway. The roadway alignment in the vicinity of the study area allows pedestrians and motorists good visibility of each other while using the roadways.

APPENDIX

A: SUMMARY OF RESULTS TABLES

B: EXISTING (2013) CONDITION FIGURES

C: OPENING YEAR (2015) CONDITION FIGURES

D: HORIZON YEAR (2025) CONDITION FIGURES

E: STUDY AREA PHOTOGRAPHS

F: DOCUMENTATION OF EXISTING CONDITIONS

G: COMMITTED DEVELOPMENTS

H: TURNING MOVEMENT COUNTS/24-HOUR COUNTS

I: GROWTH RATE INFORMATION

J: TRIP GENERATION CALCULATIONS

K: TRAFFIC VOLUME SPREADSHEETS

L: CAPACITY AND QUEUE ANALYSIS

M: CORRESPONDENCE

APPENDIX A

SUMMARY OF RESULTS TABLES

Table 1 . Levels of Service Summary
2015 Opening Year, 2020 Horizon Year

Intersection Approach Movement	Highway Capacity Analyses Full Buildout Results									
	LOS (delay)									
	AM Peak Hour					PM Peak Hour				
	2013	2015		2020		2013	2015		2020	
	Base Year	No Build	Build	No Build	Build	Base Year	No Build	Build	No Build	Build
Grantham Road (SR 2026) and Mill Road										
Grantham Road - EB	A	A	A	A	A	A	A	A	A	A
Grantham Road - WB	A	A	A	A	A	A	A	A	A	A
Mill Road - NB	A	A	B	B	B	B	B	B	B	C
Mill Road - SB	B	B	B	B	B	B	B	B	B	B
Overall Intersection	**A (8.1)**	**A (8.2)**	**A (8.4)**	**A (8.4)**	**A (8.7)**	**A (8.8)**	**A (8.9)**	**A (9.3)**	**A (9.5)**	**A (10.0)**
Lisburn Road (SR 2004) and Mill Road										
Lisburn Road - EB	B	B	B	B	C	B	B	C	C	C
Lisburn Road - WB	B	B	B	B	B	B	B	B	C	C
Mill Road - NB	B	B	B	B	B	B	B	B	B	C
Mill Road - SB	B	B	B	B	B	A	A	A	B	B
SB Left/Thru	A	A	A	A	B	A	B	B	B	B
SB Right	B	B	B	B	B	A	A	A	A	B
Overall Intersection	**B (10.9)**	**B (11.2)**	**B (12.0)**	**B (12.9)**	**B (13.9)**	**B (13.0)**	**B (13.5)**	**B (14.7)**	**C (17.3)**	**C (19.7)**

Table 2 . Queue Analysis Summary
2020 Horizon Year

Intersection Movement	Queue Analysis Results			
	95th Percentile Queue (feet)			
	Available Storage	AM 2020 No Build / Build	PM 2020 No Build / Build	Adequate Storage
Grantham Road (SR 2026) and Mill Road				
Mill Road - NB	280	8 / 9	25 / 29	YES
Mill Road - SB	375	14 / 19	33 / 42	YES
Lisburn Road (SR 2004) and Mill Road				
Lisburn Road - EB Approach	425	85 / 98	142 / 178	YES
Lisburn Road - WB Approach	500+	55 / 58	105 / 110	YES
Mill Road - NB Approach	500+	32 / 42	52 / 62	YES
Mill Road - SB Left / Thru	230	2 / 2	2 / 2	YES
Mill Road - SB Right	175	10 / 10	5 / 5	YES

(1) Recommended Turn Lane Length

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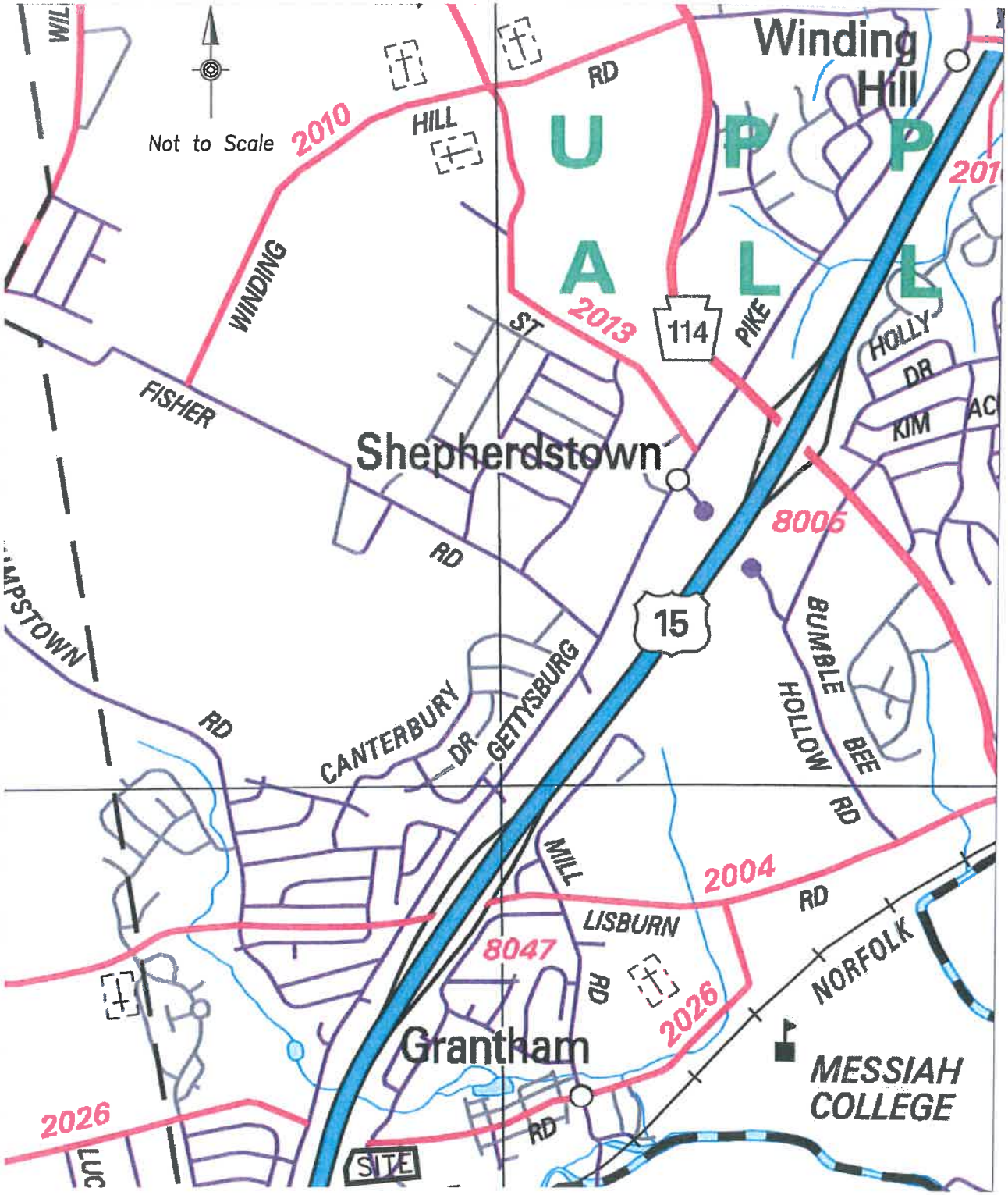
APPENDIX B

EXISTING (2013) CONDITION FIGURES

GROVE MILLER ENGINEERING, INC.



TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 1
STUDY AREA FOR
BANZHOFF PROPERTY DEVELOPMENT

GROVE MILLER ENGINEERING, INC.

SITE PLAN DRAWING
IMMEDIATELY TO FOLLOW
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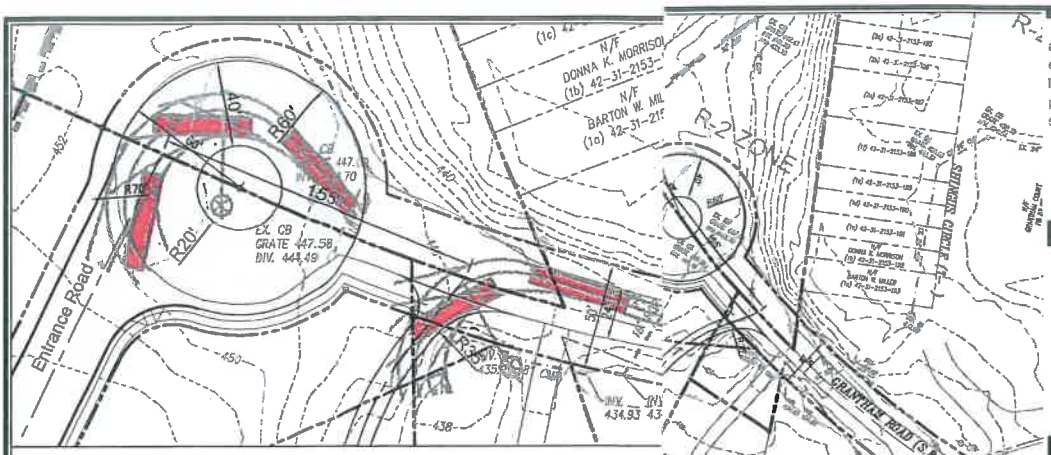
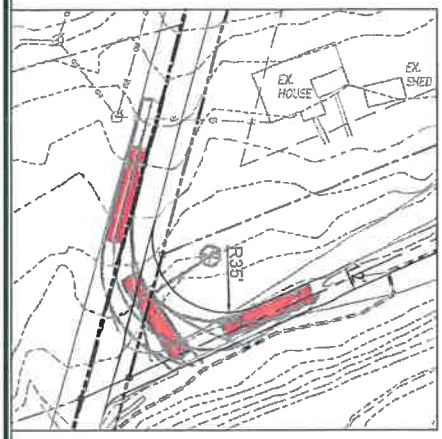
TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 2
BANZHOFF DEVELOPMENT
SITE PLAN



ENTRANCE ROAD AND NORTH EMERGENCY ACC
45' FIRE APPARATUS DETAIL
SCALE: 1" = 40'



SOUTH EMERGENCY ACCESS
45' FIRE APPARATUS DETAIL
SCALE: 1" = 40'

architecture
engineering
landscape architecture
planning
surveying

melham
ASSOCIATES, PC

2247 North Front Street
Harrisburg, PA 17110

tel 717 238 5000

fax 717 236 2600
www.melham.com

CLIENT

Joan Banzhoff

1031 GETTYSBURG PIKE, MECHANICSBURG, PA 17055

PROJECT

Banzhoff Tract

UPPER ALLEN TOWNSHIP, CUMBERLAND COUNTY, PA

PHASE

CONCEPTUAL

DRAWING

REVISED ACCESS PLAN

SCALE

1" = 80'

JOB #

7680

CADD

7680sketches.dwg

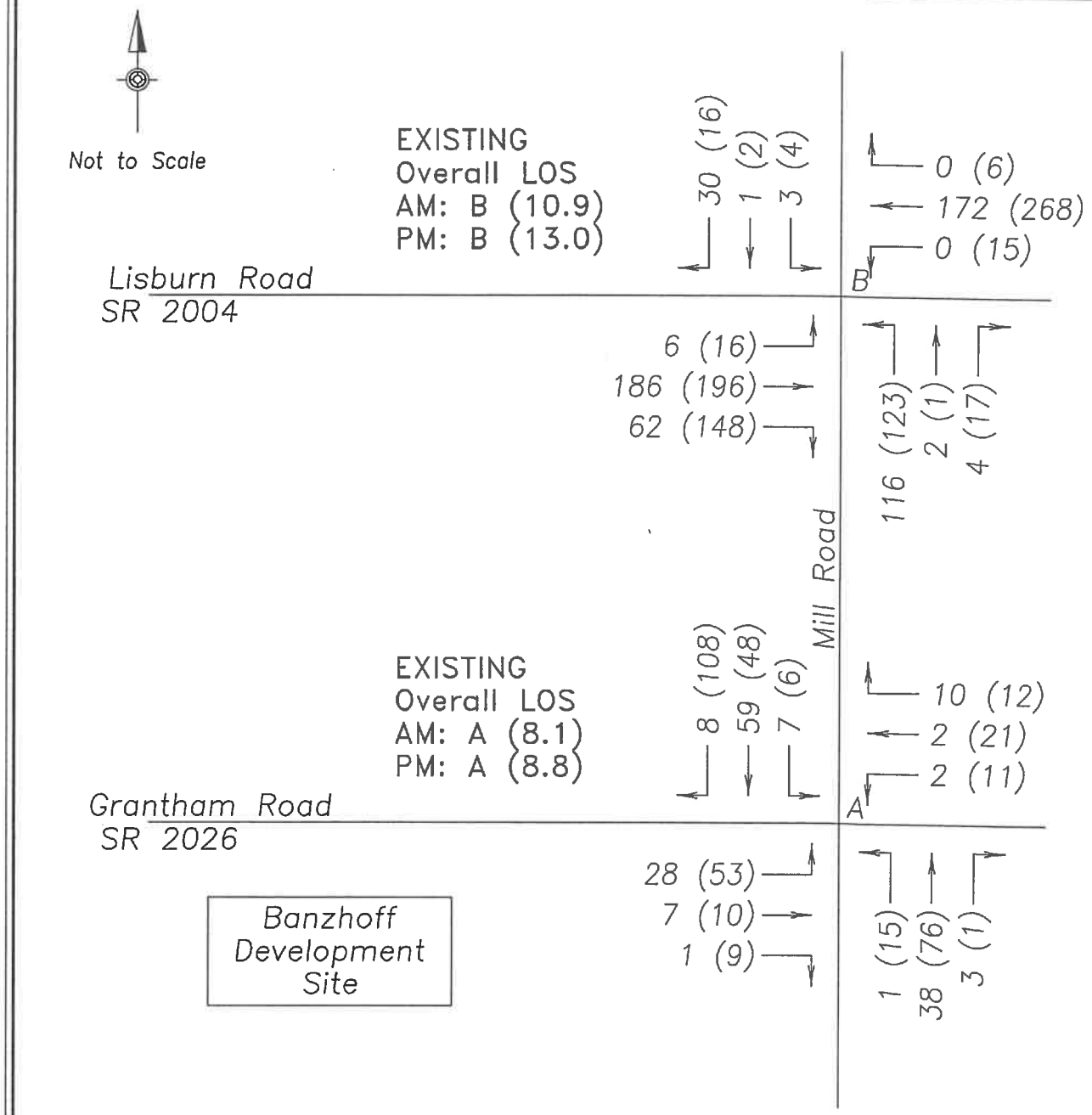
DATE

5/22/13

SHEET

1 OF 1

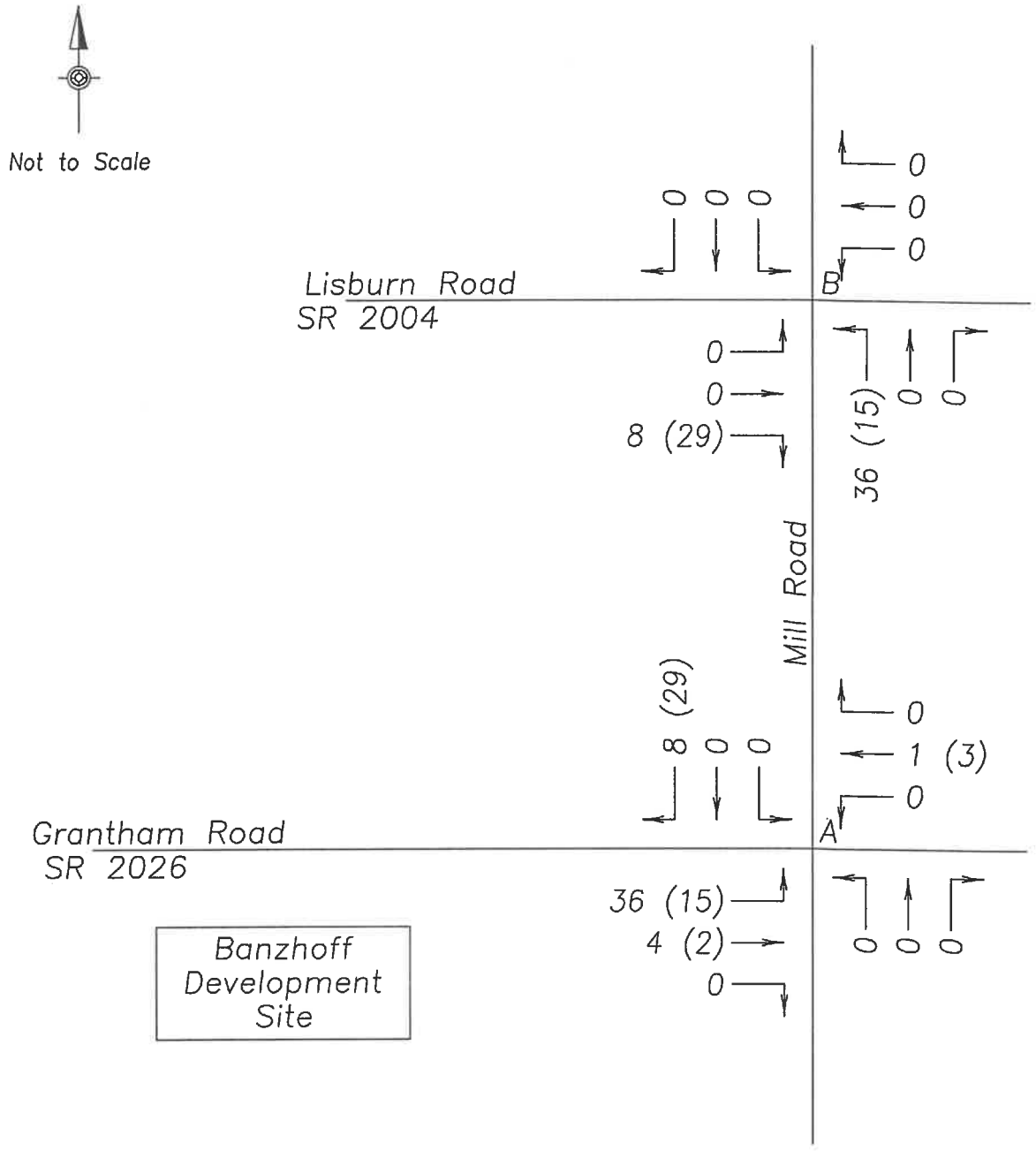
GROVE MILLER ENGINEERING, INC.



TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 3
2013 EXISTING WEEKDAY PEAK HOUR
TRAFFIC VOLUMES AND LOS

GROVE MILLER ENGINEERING, INC.



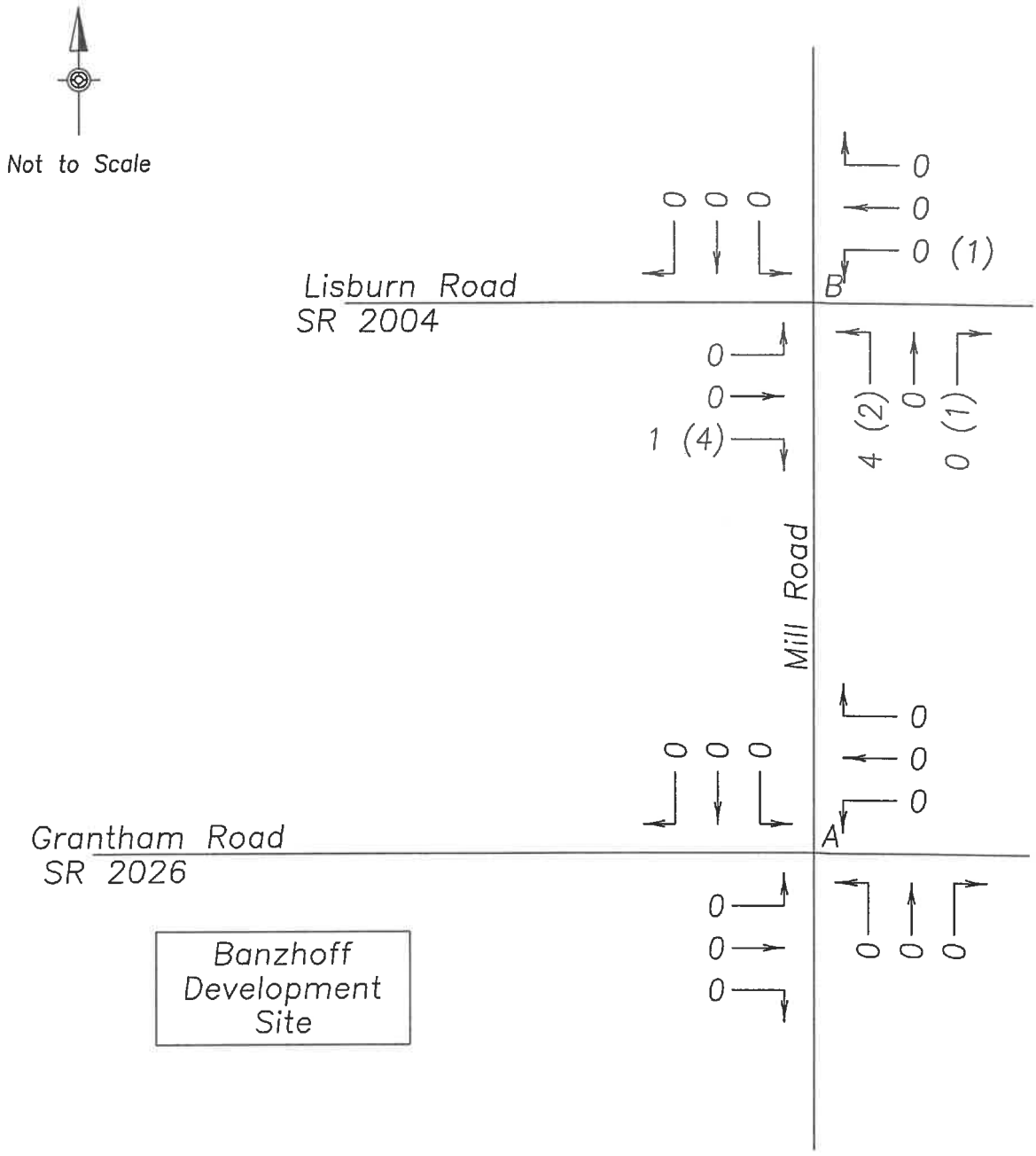
New Trip Generation

	AM	(PM)
Entering:	9	(32)
Exiting:	40	(17)

TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 4a.1
NEW WEEKDAY PEAK HOUR
TRIP DISTRIBUTION VOLUMES

GROVE MILLER ENGINEERING, INC.



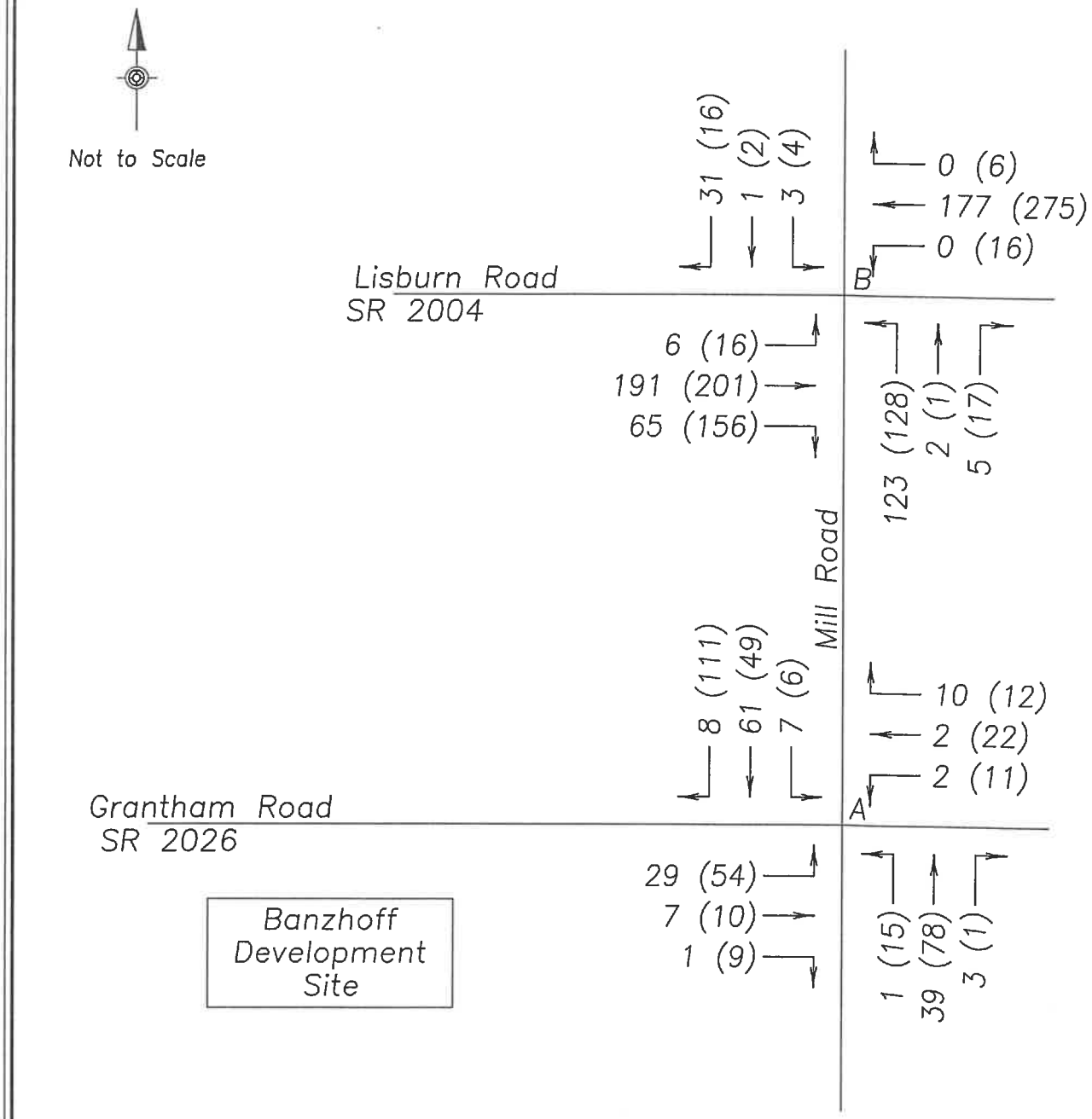
TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 4a.2
ADJACENT DEVELOPMENT TRAFFIC
LISBURN/MILL RESIDENTIAL DEVELOPMENT

APPENDIX C

OPENING YEAR (2015) CONDITION FIGURES

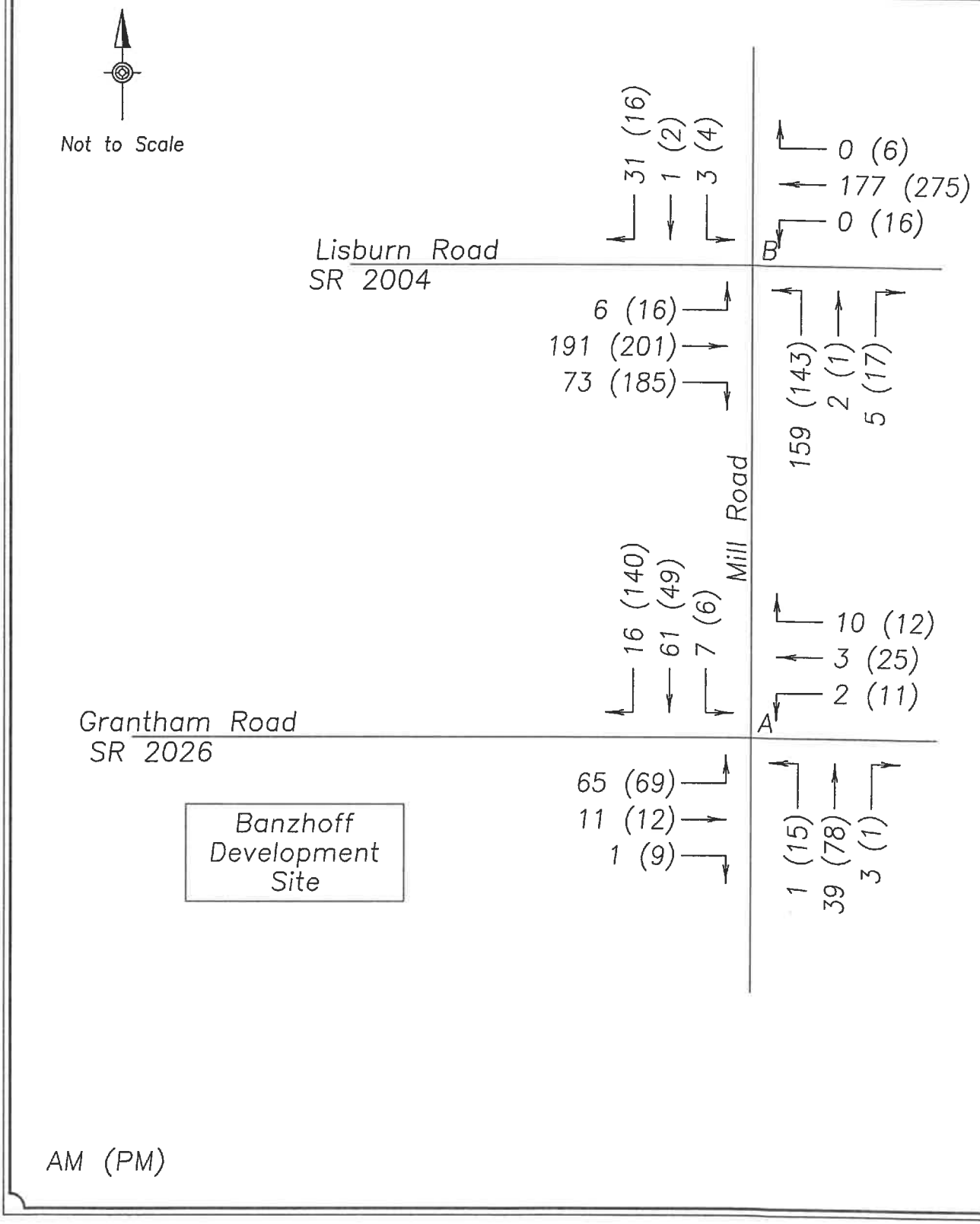
GROVE MILLER ENGINEERING, INC.



TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 5a
2015 OPENING YEAR WEEKDAY
PEAK HOUR TRAFFIC VOLUMES – NO BUILD

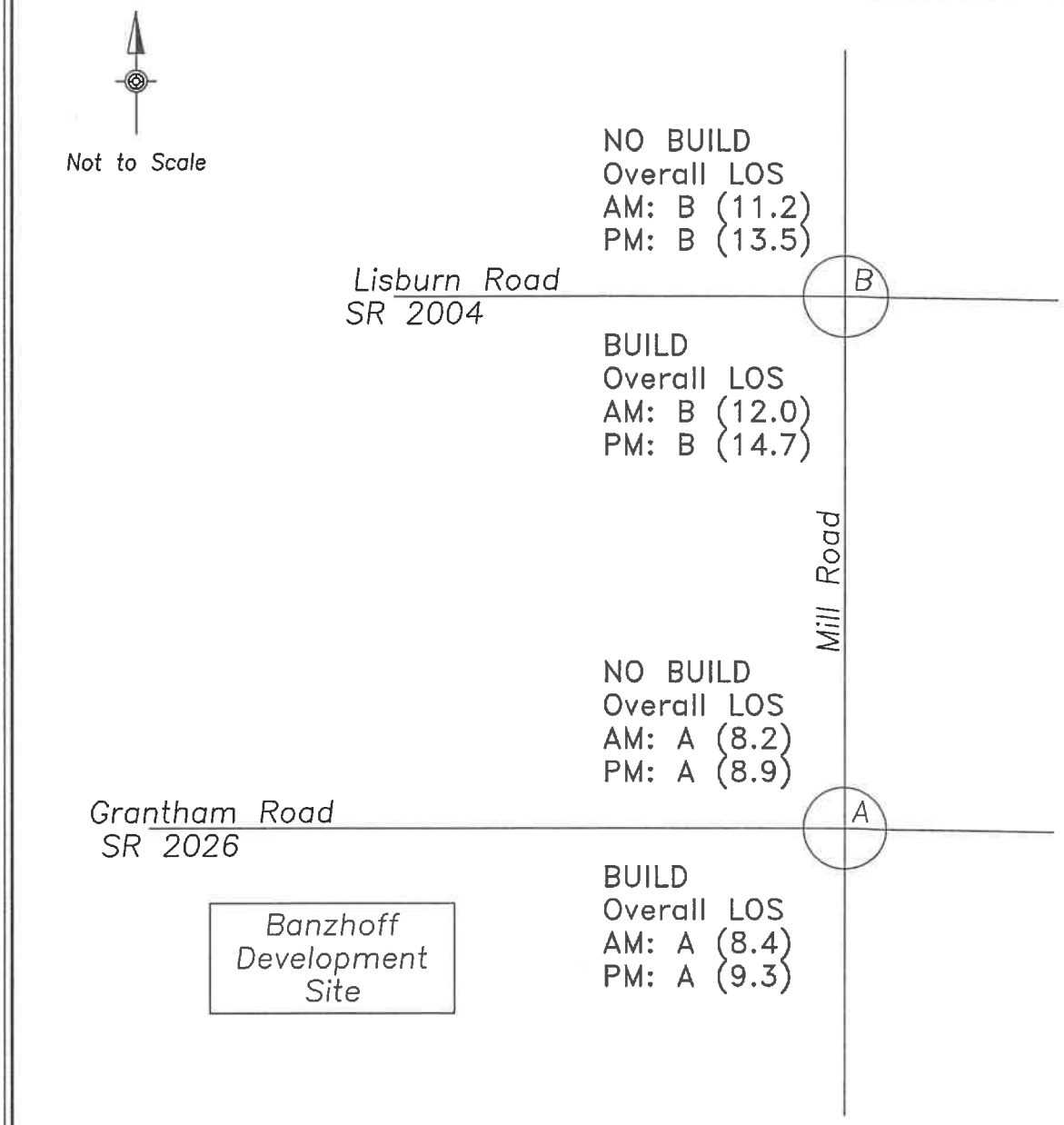
GROVE MILLER ENGINEERING, INC.



TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 5b
2015 OPENING YEAR WEEKDAY
PEAK HOUR TRAFFIC VOLUMES – BUILD

GROVE MILLER ENGINEERING, INC.



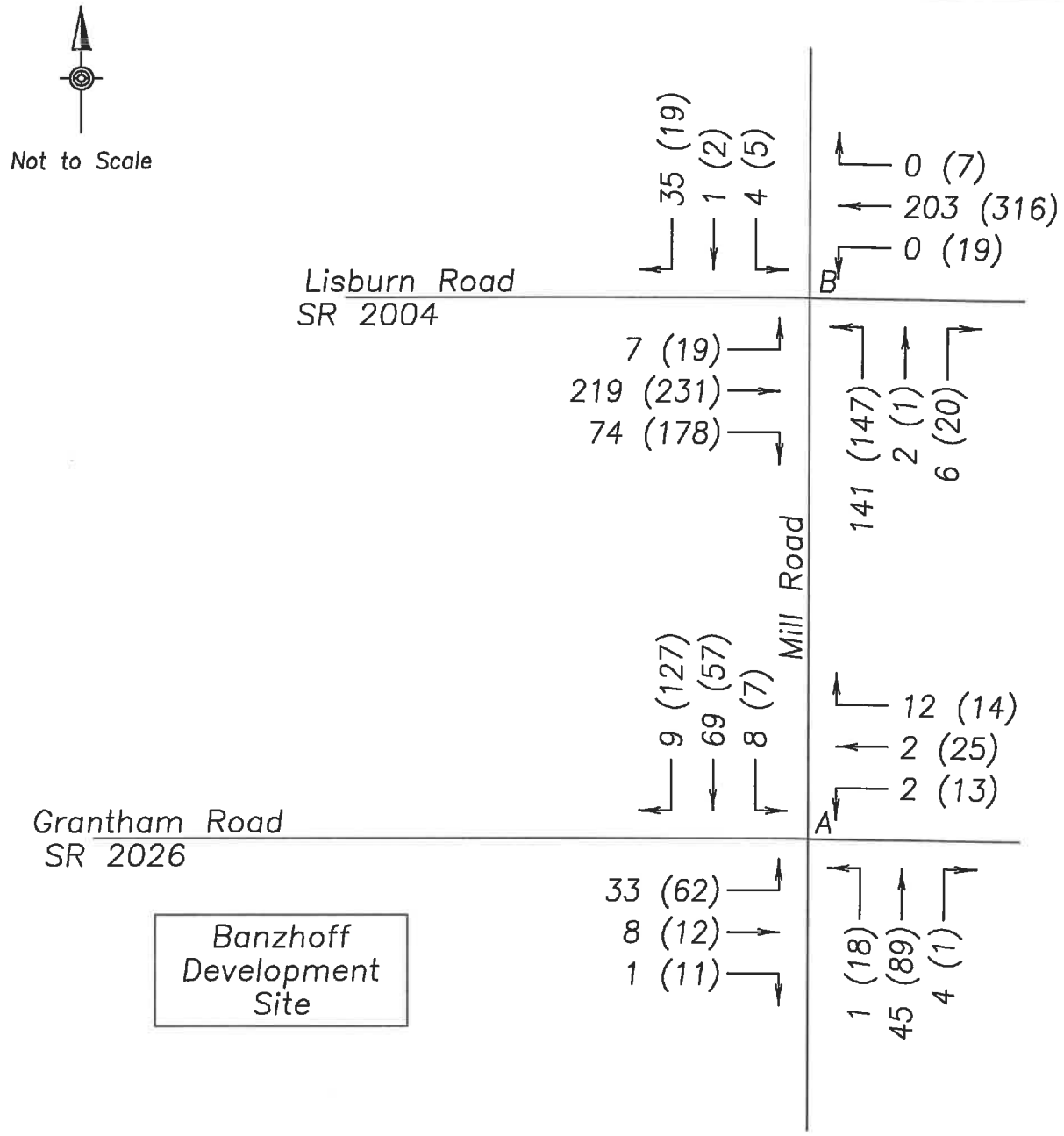
TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 5c
2015 OPENING YEAR
PEAK HOUR LOS – NO BUILD AND BUILD

APPENDIX D

HORIZON YEAR (2025) CONDITION FIGURES

GROVE MILLER ENGINEERING, INC.

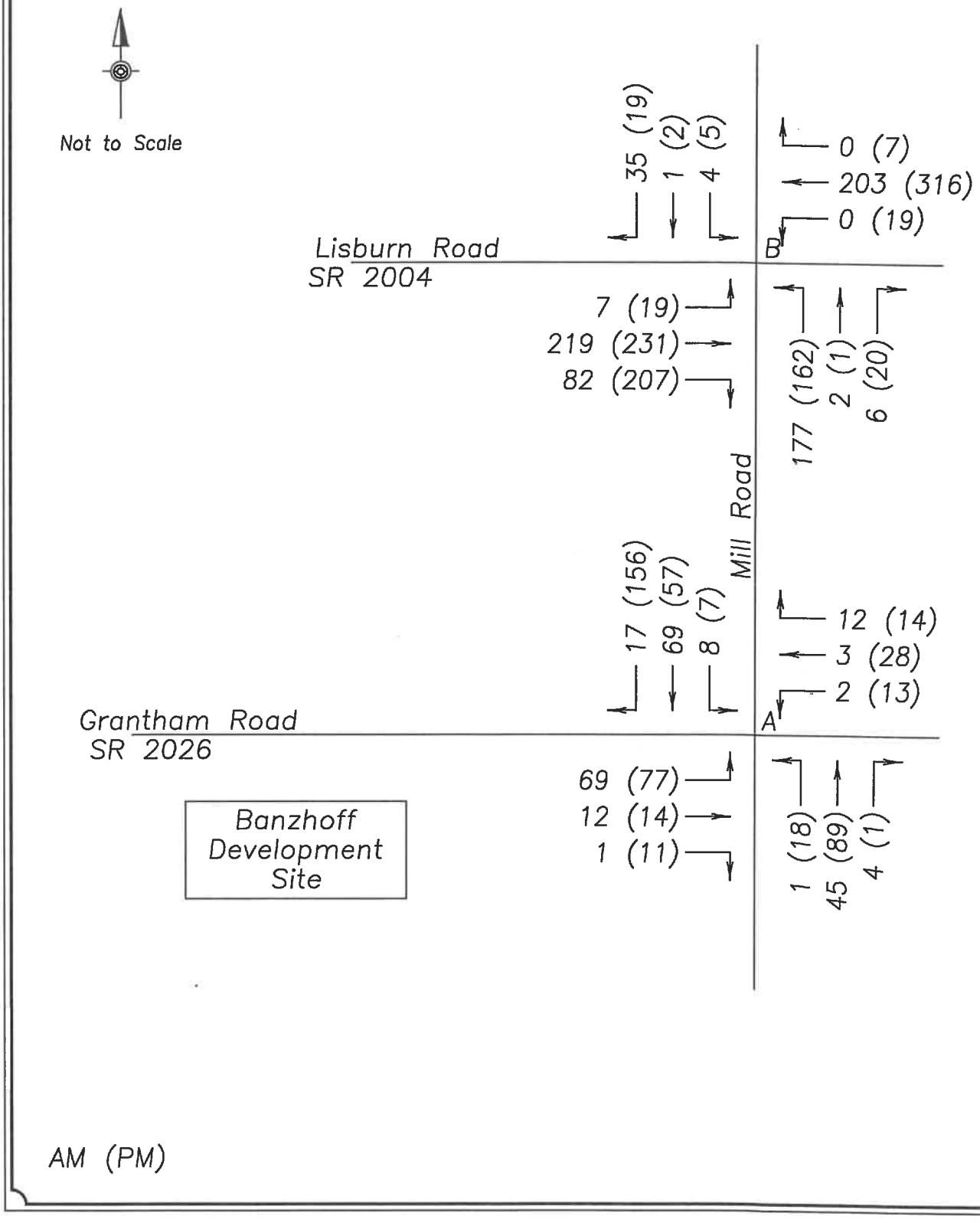


AM (PM)

TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 6a
2025 HORIZON YEAR WEEKDAY
PEAK HOUR TRAFFIC VOLUMES – NO BUILD

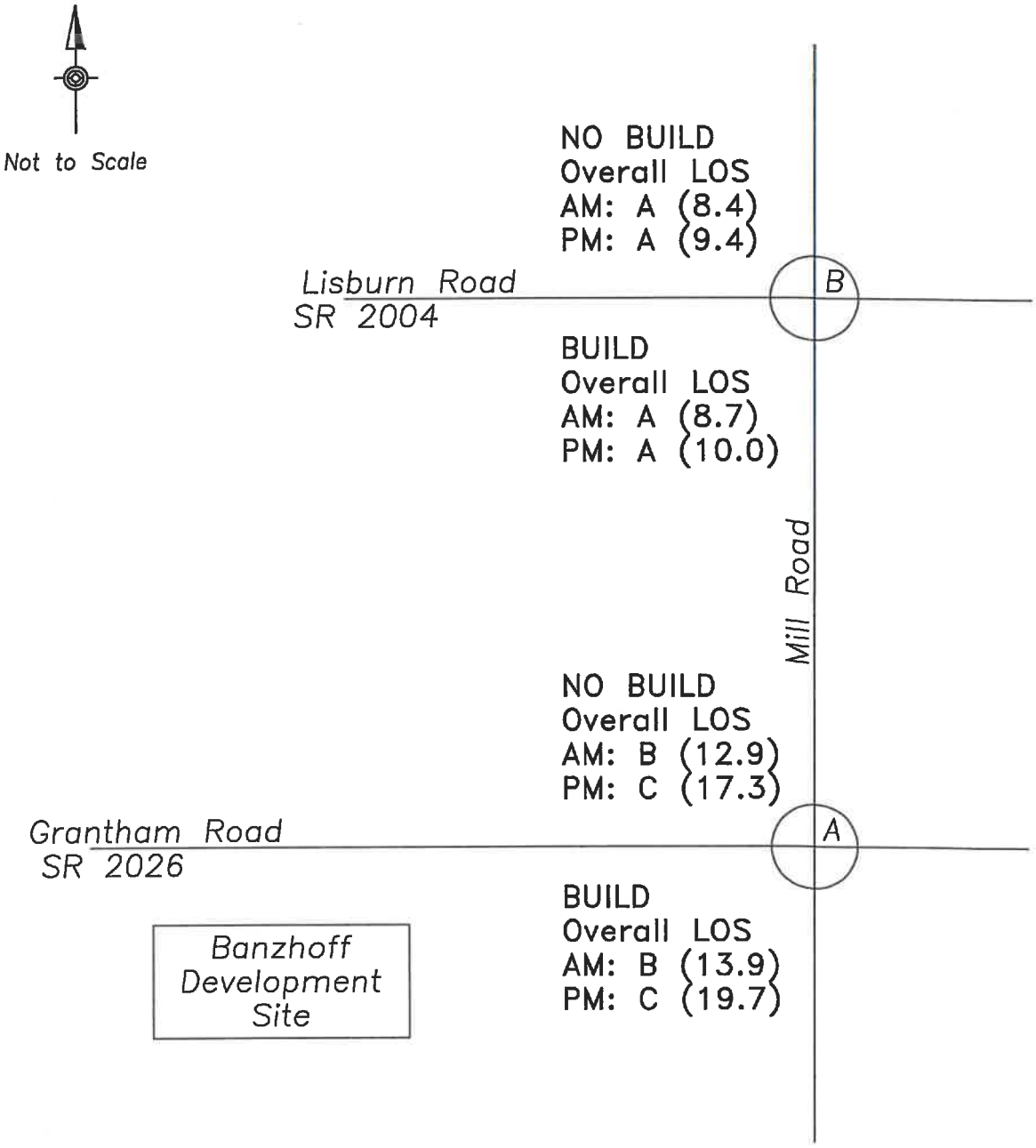
GROVE MILLER ENGINEERING, INC.



TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 6b
2025 HORIZON YEAR WEEKDAY
PEAK HOUR TRAFFIC VOLUMES – BUILD

GROVE MILLER ENGINEERING, INC.



TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FIGURE 6c
2025 HORIZON YEAR
PEAK HOUR LOS – NO BUILD AND BUILD

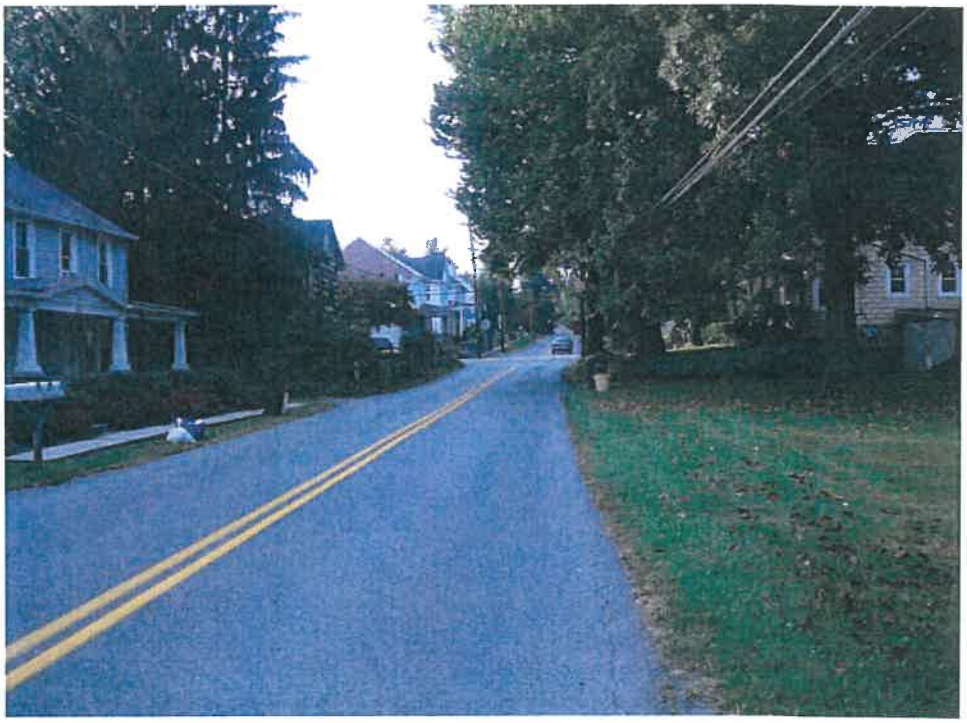
APPENDIX E

STUDY AREA PHOTOGRAPHS

Grantham Road looking east (200') at Mill Road

Grantham Road looking west (200') at Mill Road

Mill Road looking north (200') at Grantham Road



Mill Road looking south (200') at Grantham Road

Lisburn Road looking east (200') at Mill Road

Lisburn Road looking west (200') at Mill Road

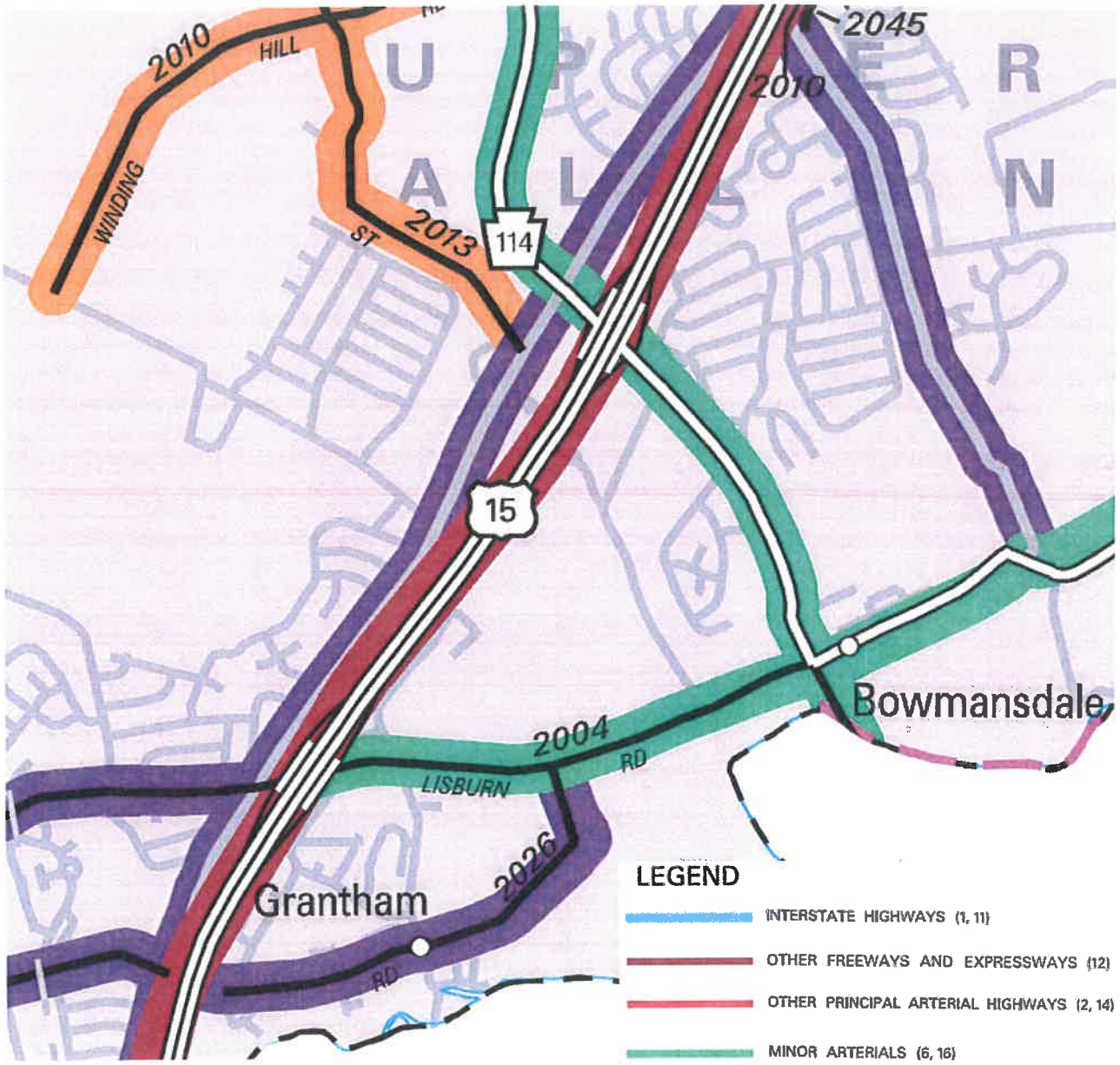
Mill Road Looking north (200') at Lisburn Road

Mill Road Looking south (200') at Lisburn Road

APPENDIX F

DOCUMENTATION OF EXISTING CONDITIONS

GROVE MILLER ENGINEERING, INC.



TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

FUNCTIONAL CLASS MAP

'roject: 257.18

ntersection:

irantham Road & Mill Road

Eastbound

treet: Grantham Road

PH: 25

rade: - 2.0

Westbound

treet: Grantham Road

PH: 25

rade: + 2.0

Northbound

treet: Mill Road

PH: 25

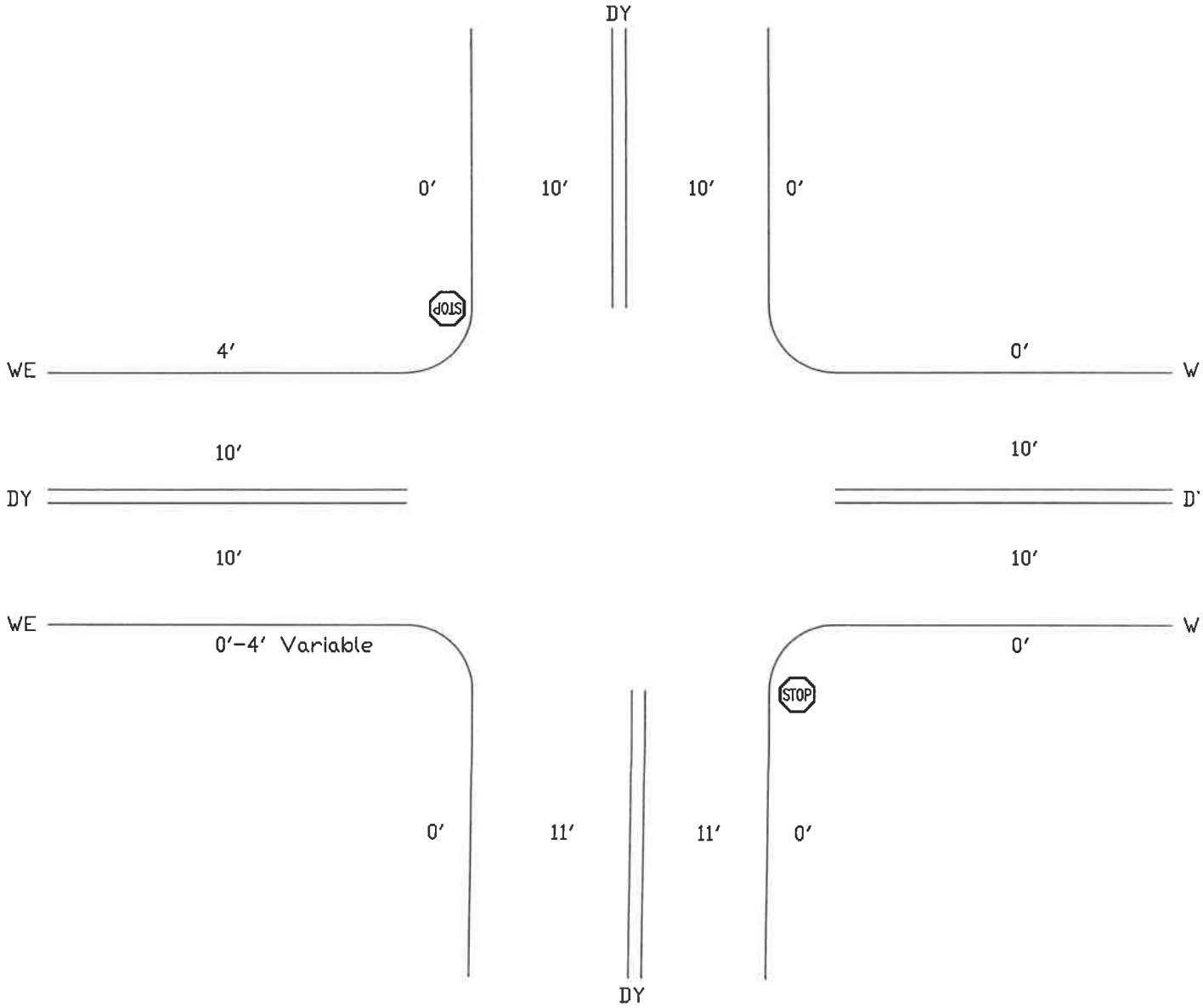
rade: - 3.0

Southbound

treet: Mill Road

PH: 25

rade: + 2.0

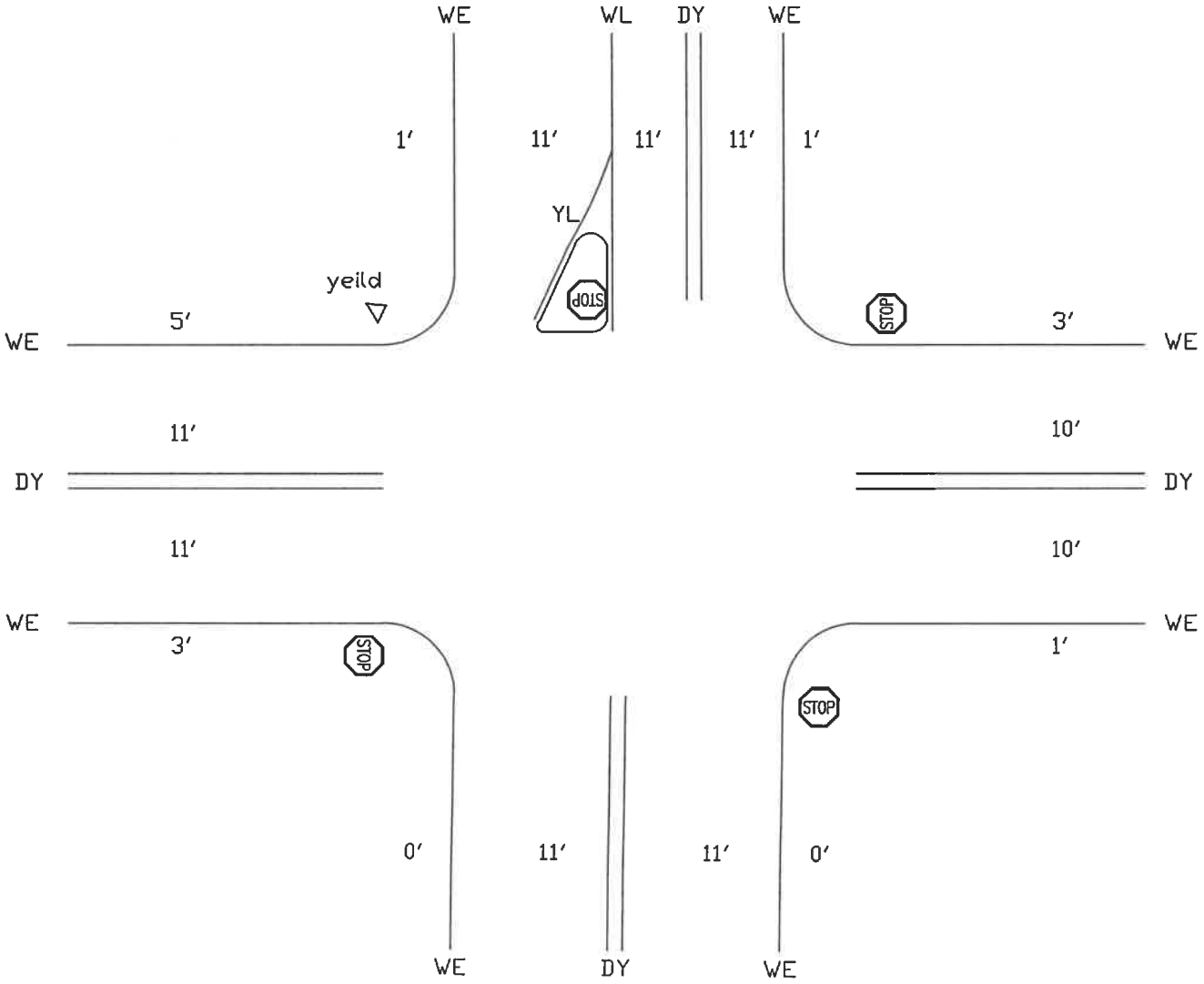


SITE NO: 5117	
County	CUMBERLAND (21)
Route	2052
Segment	0010
Dir	B
Current Avg Daily Traffic	697
Current Avg Daily Truck Volume	42
K Factor	10
D Factor	55
T Factor	3
Truck Percent	6
Base Traffic Year	2010
Traffic Pattern Group	URBAN - MINOR ARTERIALS, COLLECTORS, LOCAL ROADS

roject:257.18

ntersection: Lisburn Road &

ill Road



Eastbound

Street: Lisburn Road

MPH: 35

Grade: - 2.0

Westbound

Street: Lisburn Road

MPH: 35

Grade: + 5.0

Northbound

Street: Mill Road

MPH: 25

Grade: + 5.0

Southbound

Street: Mill Road

MPH: NP

Grade: - 1.0

SITE NO: 17139	
County	CUMBERLAND (21)
Route	2004
Segment	0160
Dir	B
Current Avg Daily Traffic	4776
Current Avg Daily Truck Volume	144
K Factor	11
D Factor	60
T Factor	1
Truck Percent	3
Base Traffic Year	2012
Traffic Pattern Group	URBAN - MINOR ARTERIALS, COLLECTORS, LOCAL ROADS

APPENDIX G

COMMITTED DEVELOPMENTS

Daily Average Rate Trip Calculations
For 7 Dwelling Units of Residential Condominium / Townhouse(230) - [E]

Project: Banzhoff Development Site
Phase:

Open Date:
Analysis Date:

Description: Adjacent Development - Residential Development @ Lisburn / Mill

	24 Hour Two-Way Volume	7-9 AM Pk Hour Enter	7-9 AM Pk Hour Exit	4-6 PM Pk Hour Enter	4-6 PM Pk Hour Exit
Average Weekday	64	1	5	5	2

	24 hour Two-Way Volume	Peak Hour Enter	Peak Hour Exit
Saturday	453	24	21
Sunday	379	25	27

The above rates were calculated from these equations:

24-Hr. 2-Way Volume: LN(T) = .87LN(X) + 2.46, R^2 = 0.8
7-9 AM Peak Hr. Total: LN(T) = .8LN(X) + .26
R^2 = 0.76 , 0.17 Enter, 0.83 Exit
4-6 PM Peak Hr. Total: LN(T) = .82LN(X) + .32
R^2 = 0.8 , 0.67 Enter, 0.33 Exit
AM Gen Pk Hr. Total: LN(T) = .82LN(X) + .15
R^2 = 0.8 , 0.19 Enter, 0.81 Exit
PM Gen Pk Hr. Total: T = .34(X) + 35.87
R^2 = 0.82 , 0.64 Enter, 0.36 Exit
Sat. 2-Way Volume: T = 3.62(X) + 427.93, R^2 = 0.84
Sat. Pk Hr. Total: T = .29(X) + 42.63
R^2 = 0.84 , 0.54 Enter, 0.46 Exit
Sun. 2-Way Volume: T = 3.13(X) + 357.26, R^2 = 0.88
Sun. Pk Hr. Total: T = .23(X) + 50.01
R^2 = 0.78 , 0.49 Enter, 0.51 Exit

Note: A zero indicates no data available.
Source: Institute of Transportation Engineers
Trip Generation Manual, 9th Edition, 2012

APPENDIX H

TURNING MOVEMENT COUNTS/ 24-HOUR COUNTS

Grove Miller Engineering, Inc.
Traffic Specialists
4800 Linglestown Road, Suite 105
Harrisburg, PA 17112
Ph (717) 545-3636 *Fax* (717) 545-3535

Day: Tuesday
Municipality: Upper Allen Township
County: Cumberland
Weather: Clear Counter: rgf - 2

File Name : LisburnRd_MillRd_AM
Site Code : 257.18
Start Date : 9/24/2013
Page No : 1

Groups Printed- Passenger Cars - Heavy Vehicles - Buses

	Lisburn Road Eastbound					Lisburn Road Westbound					Mill Road Northbound					Mill Road Southbound					
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
06:30 AM	0	33	6	0	39	3	24	0	0	27	19	2	1	0	22	1	1	6	0	8	96
06:45 AM	1	43	6	0	50	0	35	0	1	36	29	0	1	0	30	1	0	3	0	4	120
Total	1	76	12	0	89	3	59	0	1	63	48	2	2	0	52	2	1	9	0	12	216
07:00 AM	1	38	9	0	48	0	33	0	0	33	32	1	2	0	35	0	1	11	0	12	128
07:15 AM	4	43	13	0	60	0	44	0	0	44	31	0	0	0	31	0	0	7	1	8	143
07:30 AM	1	50	15	1	67	0	62	0	0	62	33	0	1	0	34	1	0	8	0	9	172
07:45 AM	0	55	25	0	80	0	33	0	1	34	20	1	1	0	22	2	0	4	1	7	143
Total	6	186	62	1	255	0	172	0	1	173	116	2	4	0	122	3	1	30	2	36	586
08:00 AM	1	38	10	0	49	2	34	1	0	37	21	0	2	0	23	2	0	7	0	9	118
08:15 AM	0	40	12	0	52	2	33	1	0	36	21	0	1	0	22	1	1	5	0	7	117
08:30 AM	1	38	15	0	54	1	30	1	0	32	15	0	2	0	17	1	1	3	0	5	108
08:45 AM	0	38	15	0	53	1	48	0	0	49	20	0	3	0	23	1	0	3	0	4	129
Total	2	154	52	0	208	6	145	3	0	154	77	0	8	0	85	5	2	18	0	25	472
Grand Total	9	416	126	1	552	9	376	3	2	390	241	4	14	0	259	10	4	57	2	73	1274
Apprch %	1.6	75.4	22.8	0.2		2.3	96.4	0.8	0.5		93.1	1.5	5.4	0		13.7	5.5	78.1	2.7		
Total %	0.7	32.7	9.9	0.1	43.3	0.7	29.5	0.2	0.2	30.6	18.9	0.3	1.1	0	20.3	0.8	0.3	4.5	0.2	5.7	
Passenger Cars																					
% Passenger Cars	88.9	99	97.6	100	98.6	100	98.4	100	100	98.5	97.9	100	100	0	98.1	100	75	100	100	98.6	98.4
Heavy Vehicles	0	2	1	0	3	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	7
% Heavy Vehicles	0	0.5	0.8	0	0.5	0	1.1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.5
Buses	1	2	2	0	5	0	2	0	0	2	5	0	0	0	5	0	1	0	0	1	13
% Buses	11.1	0.5	1.6	0	0.9	0	0.5	0	0	0.5	2.1	0	0	0	1.9	0	25	0	0	1.4	1

	Lisburn Road Eastbound					Lisburn Road Westbound					Mill Road Northbound					Mill Road Southbound					
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 Analysis From 06:30 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	38	9	0	48	0	33	0	0	33	32	1	2	0	35	0	1	11	0	12	128
07:15 AM	4	43	13	0	60	0	44	0	0	44	31	0	0	0	31	0	0	7	1	8	143
07:30 AM	1	50	15	1	67	0	62	0	0	62	33	0	1	0	34	1	0	8	0	9	172
07:45 AM	0	55	25	0	80	0	33	0	1	34	20	1	1	0	22	2	0	4	1	7	143
Total Volume	6	186	62	1	255	0	172	0	1	173	116	2	4	0	122	3	1	30	2	36	586
% App. Total	2.4	72.9	24.3	0.4		0	99.4	0	0.6		95.1	1.6	3.3	0		8.3	2.8	83.3	5.6		
PHF	.375	.845	.620	.250	.797	.000	.694	.000	.250	.698	.879	.500	.500	.000	.871	.375	.250	.682	.500	.750	.852
Passenger Cars	6	184	60	1	251	0	171	0	1	172	113	2	4	0	119	3	0	30	2	35	577
% Passenger Cars	100	98.9	96.8	100	98.4	0	99.4	0	100	99.4	97.4	100	100	0	97.5	100	0	100	100	97.2	98.5
Heavy Vehicles	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
% Heavy Vehicles	0	0	1.6	0	0.4	0	0.6	0	0	0.6	0	0	0	0	0	0	0	0	0	0	0.3
Buses	0	2	1	0	3	0	0	0	0	0	3	0	0	0	3	0	1	0	0	1	7
% Buses	0	1.1	1.6	0	1.2	0	0	0	0	0	2.6	0	0	0	2.5	0	100	0	0	2.8	1.2

Grove Miller Engineering, Inc.
Traffic Specialists
4800 Linglestown Road, Suite 105
Harrisburg, PA 17112
Ph (717) 545-3636 *Fax* (717) 545-3535

Day: Tuesday
Municipality: Upper Allen Township
County: Cumberland
Weather: Clear Counter: rgf - 2

File Name : LisburnRd_MillRd_PM
Site Code : 257.18
Start Date : 9/24/2013
Page No : 1

Groups Printed- Passenger Cars - Heavy Vehicles - Buses

	Lisburn Road Eastbound					Lisburn Road Westbound					Mill Road Northbound					Mill Road Southbound					
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
03:30 PM	2	34	31	0	67	2	50	3	0	55	12	1	5	0	18	1	2	2	0	5	145
03:45 PM	4	32	19	0	55	2	54	0	0	56	13	0	2	0	15	0	0	4	0	4	130
Total	6	66	50	0	122	4	104	3	0	111	25	1	7	0	33	1	2	6	0	9	275
04:00 PM	2	24	21	1	48	2	48	4	0	54	21	1	4	0	26	1	0	2	0	3	131
04:15 PM	4	50	23	0	77	3	47	0	1	51	26	0	5	0	31	0	0	4	0	4	163
04:30 PM	5	44	22	0	71	0	52	0	0	52	15	1	2	0	18	0	0	2	0	2	143
04:45 PM	1	49	31	0	81	4	78	1	1	84	17	0	2	0	19	1	1	5	0	7	191
Total	12	167	97	1	277	9	225	5	2	241	79	2	13	0	94	2	1	13	0	16	628
05:00 PM	5	47	35	0	87	4	76	2	0	82	30	0	6	0	36	2	0	3	0	5	210
05:15 PM	5	50	46	0	101	3	55	2	0	60	33	1	3	0	37	0	1	2	0	3	201
05:30 PM	5	50	36	0	91	4	59	1	0	64	43	0	6	1	50	1	0	6	0	7	212
05:45 PM	6	36	31	0	73	2	57	1	0	60	23	1	5	0	29	0	1	5	0	6	168
Total	21	183	148	0	352	13	247	6	0	266	129	2	20	1	152	3	2	16	0	21	791
Grand Total	39	416	295	1	751	26	576	14	2	618	233	5	40	1	279	6	5	35	0	46	1694
Apprch %	5.2	55.4	39.3	0.1		4.2	93.2	2.3	0.3		83.5	1.8	14.3	0.4		13	10.9	76.1	0		
Total %	2.3	24.6	17.4	0.1	44.3	1.5	34	0.8	0.1	36.5	13.8	0.3	2.4	0.1	16.5	0.4	0.3	2.1	0	2.7	
Passenger Cars																					
% Passenger Cars	100	99.3	99.7	100	99.5	100	99.3	100	100	99.4	99.1	100	100	100	99.3	100	100	97.1	0	97.8	99.4
Heavy Vehicles	0	3	0	0	3	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	7
% Heavy Vehicles	0	0.7	0	0	0.4	0	0.7	0	0	0.6	0	0	0	0	0	0	0	0	0	0	0.4
Buses	0	0	1	0	1	0	0	0	0	0	2	0	0	0	2	0	0	1	0	1	4
% Buses	0	0	0.3	0	0.1	0	0	0	0	0	0.9	0	0	0	0.7	0	0	2.9	0	2.2	0.2

	Lisburn Road Eastbound					Lisburn Road Westbound					Mill Road Northbound					Mill Road Southbound					
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 Analysis From 03:30 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	1	49	31	0	81	**4**	**78**	**1**	**1**	**84**	17	0	2	0	19	1	**1**	5	0	**7**	191
05:00 PM	**5**	47	35	0	87	4	76	**2**	0	82	30	0	**6**	0	36	**2**	0	3	0	5	210
05:15 PM	5	**50**	**46**	0	**101**	3	55	2	0	60	33	**1**	3	0	37	0	1	2	0	3	201
05:30 PM	5	50	36	0	91	4	59	1	0	64	**43**	0	6	**1**	**50**	1	0	**6**	0	7	**212**
Total Volume	16	196	148	0	360	15	268	6	1	290	123	1	17	1	142	4	2	16	0	22	814
% App. Total	4.4	54.4	41.1	0		5.2	92.4	2.1	0.3		86.6	0.7	12	0.7		18.2	9.1	72.7	0		
PHF	.800	.980	.804	.000	.891	.938	.859	.750	.250	.863	.715	.250	.708	.250	.710	.500	.500	.667	.000	.786	.960
Passenger Cars	16	194	148	0	358	15	266	6	1	288	123	1	17	1	142	4	2	16	0	22	810
% Passenger Cars	100	99.0	100	0	99.4	100	99.3	100	100	99.3	100	100	100	100	100	100	100	100	0	100	99.5
Heavy Vehicles	0	2	0	0	2	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	4
% Heavy Vehicles	0	1.0	0	0	0.6	0	0.7	0	0	0.7	0	0	0	0	0	0	0	0	0	0	0.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Grove Miller Engineering, Inc.
Traffic Specialists
4800 Linglestown Road, Suite 105
Harrisburg, PA 17112
Ph (717) 545-3636 *Fax* (717) 545-3535

Day: Thursday
Municipality: Upper Allen Township
County: Cumberland
Weather: Clear Counter: rgf - 2

File Name : GranthamRd_MillRd_AM
Site Code : 257.18
Start Date : 9/26/2013
Page No : 1

Groups Printed- Passenger Cars - Heavy Vehicles - Buses

	Grantham Road Eastbound					Grantham Road Westbound					Mill Road Northbound					Mill Road Southbound					
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
06:30 AM	9	1	1	2	13	0	0	3	0	3	0	7	1	0	8	0	3	3	0	6	30
06:45 AM	11	1	3	0	15	1	1	1	1	4	0	6	0	0	6	1	7	0	0	8	33
Total	20	2	4	2	28	1	1	4	1	7	0	13	1	0	14	1	10	3	0	14	63
07:00 AM	7	0	0	0	7	2	1	1	3	7	1	11	0	1	13	1	4	1	0	6	33
07:15 AM	10	4	0	0	14	0	0	1	0	1	0	12	0	2	14	4	11	0	0	15	44
07:30 AM	9	1	0	0	10	1	0	3	0	4	0	11	1	1	13	0	17	0	0	17	44
07:45 AM	8	1	1	0	10	0	1	3	0	4	0	8	0	0	8	1	17	3	0	21	43
Total	34	6	1	0	41	3	2	8	3	16	1	42	1	4	48	6	49	4	0	59	164
08:00 AM	1	1	0	0	2	1	1	3	0	5	1	7	2	0	10	2	14	5	2	23	40
08:15 AM	8	4	1	0	13	0	0	4	0	4	2	4	0	0	6	4	5	0	0	9	32
08:30 AM	8	1	0	0	9	1	0	4	0	5	1	7	1	0	9	4	11	3	0	18	41
08:45 AM	5	2	0	0	7	3	1	0	0	4	0	18	2	0	20	3	14	0	0	17	48
Total	22	8	1	0	31	5	2	11	0	18	4	36	5	0	45	13	44	8	2	67	161
Grand Total	76	16	6	2	100	9	5	23	4	41	5	91	7	4	107	20	103	15	2	140	388
Apprch %	76	16	6	2		22	12.2	56.1	9.8		4.7	85	6.5	3.7		14.3	73.6	10.7	1.4		
Total %	19.6	4.1	1.5	0.5	25.8	2.3	1.3	5.9	1	10.6	1.3	23.5	1.8	1	27.6	5.2	26.5	3.9	0.5	36.1	
Passenger Cars																					
% Passenger Cars	97.4	93.8	100	100	97	100	60	95.7	100	92.7	100	100	100	100	100	100	100	86.7	100	98.6	97.9
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	2	1	0	0	3	0	2	1	0	3	0	0	0	0	0	0	0	2	0	2	8
% Buses	2.6	6.2	0	0	3	0	40	4.3	0	7.3	0	0	0	0	0	0	0	13.3	0	1.4	2.1

	Grantham Road Eastbound					Grantham Road Westbound					Mill Road Northbound					Mill Road Southbound					
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 Analysis From 06:30 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**10**	**4**	0	0	**14**	0	0	1	0	1	0	**12**	0	**2**	**14**	**4**	**11**	0	0	15	**44**
07:30 AM	9	1	0	0	10	**1**	0	**3**	0	4	0	11	1	1	13	0	**17**	0	0	17	44
07:45 AM	8	1	**1**	0	10	0	**1**	3	0	4	0	8	0	0	8	1	17	3	0	21	43
08:00 AM	1	1	0	0	2	1	1	3	0	**5**	**1**	7	**2**	0	10	2	14	**5**	**2**	**23**	40
Total Volume	28	7	1	0	36	2	2	10	0	14	1	38	3	3	45	7	59	8	2	76	171
% App. Total	77.8	19.4	2.8	0		14.3	14.3	71.4	0		2.2	84.4	6.7	6.7		9.2	77.6	10.5	2.6		
PHF	.700	.438	.250	.000	.643	.500	.500	.833	.000	.700	.250	.792	.375	.375	.804	.438	.868	.400	.250	.826	.972
Passenger Cars	27	7	1	0	35	2	2	9	0	13	1	38	3	3	45	7	59	7	2	75	168
% Passenger Cars	96.4	100	100	0	97.2	100	100	90.0	0	92.9	100	100	100	100	100	100	100	87.5	100	98.7	98.2
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	3
% Buses	3.6	0	0	0	2.8	0	0	10.0	0	7.1	0	0	0	0	0	0	0	12.5	0	1.3	1.8

Grove Miller Engineering, Inc.
Traffic Specialists
4800 Linglestown Road, Suite 105
Harrisburg, PA 17112
Ph (717) 545-3636 *Fax* (717) 545-3535

Day: Thursday
Municipality: Upper Allen Township
County: Cumberland
Weather: Clear Counter: rgf - 2

File Name : GranthamRd_MillRd_PM
Site Code : 257.18
Start Date : 9/26/2013
Page No : 1

Groups Printed- Passenger Cars - Heavy Vehicles - Buses

	Grantham Road Eastbound					Grantham Road Westbound					Mill Road Northbound					Mill Road Southbound					
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
03:30 PM	1	1	0	0	2	0	2	3	0	5	2	14	1	1	18	0	8	8	1	17	42
03:45 PM	6	1	1	1	9	2	7	2	0	11	1	10	0	0	11	1	11	7	0	19	50
Total	7	2	1	1	11	2	9	5	0	16	3	24	1	1	29	1	19	15	1	36	92
04:00 PM	2	0	3	0	5	0	2	3	0	5	1	20	2	2	25	2	15	15	0	32	67
04:15 PM	1	5	1	5	12	2	8	0	0	10	4	13	1	3	21	4	17	16	1	38	81
04:30 PM	5	3	1	0	9	2	1	1	0	4	2	12	0	4	18	2	13	19	3	37	68
04:45 PM	3	0	1	2	6	3	2	3	0	8	3	19	0	4	26	1	11	27	1	40	80
Total	11	8	6	7	32	7	13	7	0	27	10	64	3	13	90	9	56	77	5	147	296
05:00 PM	14	3	1	1	19	1	5	1	0	7	4	24	0	0	28	1	9	18	1	29	83
05:15 PM	19	3	3	0	25	7	7	3	0	17	5	15	1	0	21	2	15	29	3	49	112
05:30 PM	17	4	4	0	25	0	7	5	0	12	3	18	0	3	24	2	13	34	1	50	111
05:45 PM	8	3	0	1	12	0	6	2	0	8	2	15	2	0	19	3	11	11	0	25	64
Total	58	13	8	2	81	8	25	11	0	44	14	72	3	3	92	8	48	92	5	153	370
Grand Total	76	23	15	10	124	17	47	23	0	87	27	160	7	17	211	18	123	184	11	336	758
Apprch %	61.3	18.5	12.1	8.1		19.5	54	26.4	0		12.8	75.8	3.3	8.1		5.4	36.6	54.8	3.3		
Total %	10	3	2	1.3	16.4	2.2	6.2	3	0	11.5	3.6	21.1	0.9	2.2	27.8	2.4	16.2	24.3	1.5	44.3	
Passenger Cars																					
% Passenger Cars	98.7	100	100	100	99.2	100	100	95.7	0	98.9	100	100	100	100	100	100	100	99.5	100	99.7	99.6
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	3
% Buses	1.3	0	0	0	0.8	0	0	4.3	0	1.1	0	0	0	0	0	0	0	0.5	0	0.3	0.4

	Grantham Road Eastbound					Grantham Road Westbound					Mill Road Northbound					Mill Road Southbound					
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 Analysis From 03:30 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	3	0	1	**2**	6	3	2	3	0	8	3	19	0	**4**	26	1	11	27	1	40	80
05:00 PM	14	3	1	1	19	1	5	1	0	7	4	**24**	0	0	**28**	1	9	18	1	29	83
05:15 PM	**19**	3	3	0	**25**	**7**	**7**	3	0	**17**	**5**	15	**1**	0	21	**2**	**15**	29	**3**	49	**112**
05:30 PM	17	**4**	**4**	0	25	0	7	**5**	0	12	3	18	0	3	24	2	13	**34**	1	**50**	111
Total Volume	53	10	9	3	75	11	21	12	0	44	15	76	1	7	99	6	48	108	6	168	386
% App. Total	70.7	13.3	12	4		25	47.7	27.3	0		15.2	76.8	1	7.1		3.6	28.6	64.3	3.6		
PHF	.697	.625	.563	.375	.750	.393	.750	.600	.000	.647	.750	.792	.250	.438	.884	.750	.800	.794	.500	.840	.862
Passenger Cars	53	10	9	3	75	11	21	12	0	44	15	76	1	7	99	6	48	108	6	168	386
% Passenger Cars	100	100	100	100	100	100	100	100	0	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Grove Miller Engineering, Inc.
Traffic Specialists
4800 Linglestown Road, Suite 105
Harrisburg, PA 17112
(717) 545-3636 - Fax (717) 545-3535

Location: E. Grantham Road near Laurel Lane
Municipality: Upper Allen Township
County: Cumberland
Set By: rgf - 10

VOLs_E. Grantham Rd
Site Code: 257.18
Date Start: 24-Sep-13
Date End: 30-Sep-13

Start	24-Sep-13		25-Sep-13		26-Sep-13		27-Sep-13		28-Sep-13		29-Sep-13		30-Sep-13		Week Average	
Time	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	*	*	0	0	0	0	0	0	1	1	1	3	0	1	0	1
01:00	*	*	0	1	0	1	0	0	0	1	1	1	0	0	0	1
02:00	*	*	0	0	1	0	0	1	0	0	1	1	1	0	0	0
03:00	*	*	0	0	2	2	0	1	0	0	0	0	0	0	0	0
04:00	*	*	0	0	2	0	0	0	0	0	3	0	0	0	1	0
05:00	*	*	1	0	0	0	1	0	0	1	1	0	0	0	0	0
06:00	*	*	2	1	5	2	2	1	0	0	0	0	3	1	2	1
07:00	*	*	11	8	4	2	7	3	**9**	2	5	2	**16**	**10**	**9**	4
08:00	*	*	**15**	8	8	4	7	6	5	1	5	3	4	1	7	4
09:00	*	*	10	7	5	5	**12**	5	4	3	4	3	*	*	7	5
10:00	4	8	11	7	**11**	10	9	3	9	6	**8**	5	*	*	9	6
11:00	**11**	**10**	10	**9**	6	**15**	12	**9**	8	**13**	5	**9**	*	*	9	**11**
12:00 PM	7	13	8	14	11	8	11	12	7	7	**11**	12	*	*	9	11
01:00	9	10	7	8	15	10	**12**	9	11	8	4	5	*	*	10	8
02:00	16	15	11	17	4	6	7	10	5	8	3	6	*	*	8	10
03:00	13	**17**	11	12	10	16	9	**18**	**14**	**15**	7	9	*	*	11	14
04:00	10	14	12	18	12	**22**	10	17	8	12	10	10	*	*	10	**16**
05:00	**20**	17	9	**20**	**21**	15	11	18	9	14	11	**14**	*	*	**14**	16
06:00	12	15	**13**	17	14	13	6	13	8	8	5	9	*	*	10	12
07:00	8	9	11	12	8	13	10	13	12	14	10	5	*	*	10	11
08:00	6	6	7	8	7	9	7	6	6	4	7	7	*	*	7	7
09:00	0	7	7	7	0	2	1	3	6	6	3	2	*	*	3	4
10:00	2	5	3	5	2	2	3	1	3	7	1	3	*	*	2	4
11:00	1	2	1	0	1	7	0	2	1	3	1	1	*	*	1	2
Total	119	148	160	179	149	164	137	151	126	134	107	110	24	13	139	148
Day	267		339		313		288		260		217		37		287	
AM Peak	11:00	11:00	08:00	11:00	10:00	11:00	09:00	11:00	07:00	11:00	10:00	11:00	07:00	07:00	07:00	11:00
Vol.	11	10	15	9	11	15	12	9	9	13	8	9	16	10	9	11
PM Peak	17:00	15:00	18:00	17:00	17:00	16:00	13:00	15:00	15:00	15:00	12:00	17:00	-	-	17:00	16:00
Vol.	20	17	13	20	21	22	12	18	14	15	11	14	-	-	14	16

Comb. Total	267	339	313	288	260	217	37	287

ADT ADT 289 AADT 289

Location: E. Grantham Road near Laurel Lane
Municipality: Upper Allen Township
County: Cumberland
Set By: rgf - 10

Grove Miller Engineering, Inc.
Traffic Specialists
4800 Linglestown Road, Suite 105
Harrisburg, PA 17112
(717) 545-3636 - Fax (717) 545-3535

trx4A2
Site Code: 257.16

COMBINED - EB, WB
Report for 9/24/2013 09:46:00 to 9/30/2013 08:22:38

SPEED STATISTICS - 15 to 70+ by 5 MPH

Speed in MPH	1 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 - 70	71 - 75	76 - 999
Count	63	130	320	506	475	147	19	3	0	1	1	0	0	0
Percent	3.8	7.8	19.2	30.4	28.5	8.8	1.1	0.2	0.0	0.1	0.1	0.0	0.0	0.0

Over Speed	15	20	25	30	35	40	45	50	55	60	65	70	75	999
Count	1602	1472	1152	646	171	24	5	2	2	1	0	0	0	0
Percent	96.2	88.4	69.2	38.8	10.3	1.4	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0

Percentile	5%	10%	15%	45%	50%	55%	85%	90%	95%
Speed	17	20	22	28	29	29	34	36	38

Average (Mean) 28

Pace Speed 25-34
Number in Pace 1018
Percent in Pace 61.1

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Location: E. Grantham Road near Laurel Lane
Municipality: Upper Allen Township
County: Cumberland
Set By: rgf - 10

Site Code: 257.18

COMBINED - EB, WB

Speed	Volume
7	1
8	2
9	7
10	5
11	4
12	5
13	13
14	8
15	18
16	16
17	22
18	21
19	28
20	43
21	45
22	53
23	67
24	57
25	98
26	102
27	96
28	105
29	124
30	79
31	106
32	100
33	114
34	94
35	61
36	41
37	38
38	27
39	21
40	20
41	3
42	9
43	5
44	2
45	0
46	0
47	1
48	0
49	2
50	0
51	0
52	0
53	0
54	0
55	0
56	0
57	0
58	0
59	0
60	1
61	1

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Location: E. Grantham Road near Laurel Lane
Municipality: Upper Allen Township
County: Cumberland
Set By: rgf - 10

AXLEs_E. Grantham Rd
Site Code: 257.18
Date Start: 24-Sep-13
Date End: 30-Sep-13

EB, WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/24/13	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	0	5	**5**	0	**2**	0	0	0	0	0	0	0	0	12
11:00	**1**	**16**	2	0	1	**1**	0	0	0	0	0	0	0	**21**
12 PM	0	17	1	0	2	0	0	0	0	0	0	0	0	20
13:00	0	16	2	0	1	0	0	0	0	0	0	0	0	19
14:00	1	25	4	1	0	0	0	0	0	0	0	0	0	31
15:00	0	18	3	**3**	**4**	**1**	0	0	0	0	0	0	0	29
16:00	**5**	14	2	0	2	0	0	**1**	0	0	0	0	0	24
17:00	3	**26**	**8**	0	0	0	0	0	0	0	0	0	0	**37**
18:00	0	26	1	0	0	0	0	0	0	0	0	0	0	27
19:00	0	14	3	0	0	0	0	0	0	0	0	0	0	17
20:00	0	12	0	0	0	0	0	0	0	0	0	0	0	12
21:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
22:00	0	5	2	0	0	0	0	0	0	0	0	0	0	7
23:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Day Total	10	204	33	4	12	2	0	1	0	0	0	0	0	266
Percent	3.8%	76.7%	12.4%	1.5%	4.5%	0.8%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	11:00	10:00		10:00	11:00								11:00
Vol.	1	16	5		2	1								21
PM Peak	16:00	17:00	17:00	15:00	15:00	15:00		16:00						17:00
Vol.	5	26	8	3	4	1		1						37

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Location: E. Grantham Road near Laurel Lane
Municipality: Upper Allen Township
County: Cumberland
Set By: rgf - 10

AXLEs_E. Grantham Rd
Site Code: 257.18
Date Start: 24-Sep-13
Date End: 30-Sep-13

EB, WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/25/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
06:00	0	2	0	1	0	0	0	0	0	0	0	0	0	3
07:00	0	12	5	**2**	0	0	0	0	0	0	0	0	0	19
08:00	0	**17**	5	0	0	**1**	0	0	0	0	0	0	0	**23**
09:00	**1**	11	3	2	0	0	0	0	0	0	0	0	0	17
10:00	0	16	2	0	0	0	0	0	0	0	0	0	0	18
11:00	0	10	**6**	0	**3**	0	0	0	0	0	0	0	0	19
12 PM	**3**	15	2	2	0	0	0	0	0	0	0	0	0	22
13:00	0	14	0	0	1	0	0	0	0	0	0	0	0	15
14:00	3	20	1	1	**3**	0	0	0	0	0	0	0	0	28
15:00	0	13	4	**3**	2	**1**	0	0	0	0	0	0	0	23
16:00	0	23	**6**	0	0	0	0	1	0	0	0	0	0	**30**
17:00	0	24	5	0	0	0	0	0	0	0	0	0	0	29
18:00	0	**28**	2	0	0	0	0	0	0	0	0	0	0	30
19:00	2	15	4	0	2	0	0	0	0	0	0	0	0	23
20:00	0	13	0	0	0	0	0	**2**	0	0	0	0	0	15
21:00	0	12	2	0	0	0	0	0	0	0	0	0	0	14
22:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
23:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Day Total	9	255	48	11	11	2	0	3	0	0	0	0	0	339
Percent	2.7%	75.2%	14.2%	3.2%	3.2%	0.6%	0.0%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	08:00	11:00	07:00	11:00	08:00								08:00
Vol.	1	17	6	2	3	1								23
PM Peak	12:00	18:00	16:00	15:00	14:00	15:00		20:00						16:00
Vol.	3	28	6	3	3	1		2						30

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Harrisburg, PA 17112
(717) 545-3636 - Fax (717) 545-3535

Location: E. Grantham Road near Laurel Lane
Municipality: Upper Allen Township
County: Cumberland
Set By: rgf - 10

AXLEs_E. Grantham Rd
Site Code: 257.18
Date Start: 24-Sep-13
Date End: 30-Sep-13

EB, WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/26/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	2	0	0	2	0	0	0	0	0	0	0	0	4
04:00	0	0	1	0	0	**1**	0	0	0	0	0	0	0	2
05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00	0	4	2	1	0	0	0	0	0	0	0	0	0	7
07:00	0	3	1	**2**	0	0	0	0	0	0	0	0	0	6
08:00	0	8	4	0	0	0	0	0	0	0	0	0	0	12
09:00	0	7	1	0	2	0	0	0	0	0	0	0	0	10
10:00	**1**	12	3	0	**5**	0	0	0	0	0	0	0	0	**21**
11:00	0	**14**	**6**	0	1	0	0	0	0	0	0	0	0	21
12 PM	0	16	0	0	**3**	0	0	0	0	0	0	0	0	19
13:00	0	18	4	0	3	0	0	0	0	0	0	0	0	25
14:00	0	7	1	1	1	0	0	0	0	0	0	0	0	10
15:00	0	16	5	**3**	2	0	0	0	0	0	0	0	0	26
16:00	0	**32**	2	0	0	0	0	0	0	0	0	0	0	34
17:00	0	24	**12**	0	0	0	0	0	0	0	0	0	0	**36**
18:00	**3**	22	2	0	0	0	0	0	0	0	0	0	0	27
19:00	0	19	2	0	0	0	0	0	0	0	0	0	0	21
20:00	0	13	3	0	0	0	0	0	0	0	0	0	0	16
21:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
22:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
23:00	0	7	1	0	0	0	0	0	0	0	0	0	0	8
Day Total	4	232	50	7	19	1	0	0	0	0	0	0	0	313
Percent	1.3%	74.1%	16.0%	2.2%	6.1%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	11:00	11:00	07:00	10:00	04:00								10:00
Vol.	1	14	6	2	5	1								21
PM Peak	18:00	16:00	17:00	15:00	12:00									17:00
Vol.	3	32	12	3	3									36

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09/27/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
06:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
07:00	0	8	1	0	1	0	0	0	0	0	0	0	0	10
08:00	0	11	**2**	0	0	0	0	0	0	0	0	0	0	13
09:00	0	15	1	0	0	**1**	0	0	0	0	0	0	0	17
10:00	0	12	0	0	0	0	0	0	0	0	0	0	0	12
11:00	0	**18**	1	0	**2**	0	0	0	0	0	0	0	0	**21**
12 PM	0	20	3	0	0	0	0	0	0	0	0	0	0	23
13:00	0	12	**9**	0	0	0	0	0	0	0	0	0	0	21
14:00	**1**	12	3	0	**1**	0	0	0	0	0	0	0	0	17
15:00	0	23	3	0	1	0	0	0	0	0	0	0	0	27
16:00	1	**26**	0	0	0	0	0	0	0	0	0	0	0	27
17:00	0	26	3	0	0	0	0	0	0	0	0	0	0	**29**
18:00	0	19	0	0	0	0	0	0	0	0	0	0	0	19
19:00	0	21	2	0	0	0	0	0	0	0	0	0	0	23
20:00	0	12	1	0	0	0	0	0	0	0	0	0	0	13
21:00	0	3	1	0	0	0	0	0	0	0	0	0	0	4
22:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
23:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Day Total	2	249	31	0	5	1	0	0	0	0	0	0	0	288
Percent	0.7%	86.5%	10.8%	0.0%	1.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		11:00	08:00		11:00	09:00								11:00
Vol.		18	2		2	1								21
PM Peak	14:00	16:00	13:00		14:00									17:00
Vol.	1	26	9		1									29

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09/28/13	0	2	0	0	0	0	0	0	0	0	0	0	0	2
01:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00	0	10	1	0	0	0	0	0	0	0	0	0	0	11
08:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
09:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
10:00	**1**	12	2	0	0	0	0	0	0	0	0	0	0	15
11:00	0	**17**	**4**	0	0	0	0	0	0	0	0	0	0	**21**
12 PM	0	11	3	0	0	0	0	0	0	0	0	0	0	14
13:00	**2**	15	2	0	0	0	0	0	0	0	0	0	0	19
14:00	1	9	0	0	1	0	0	**2**	0	0	0	0	0	13
15:00	1	**23**	**5**	0	0	0	0	0	0	0	0	0	0	**29**
16:00	0	16	3	0	1	0	0	0	0	0	0	0	0	20
17:00	0	21	2	0	0	0	0	0	0	0	0	0	0	23
18:00	0	11	3	0	**2**	0	0	0	0	0	0	0	0	16
19:00	0	21	4	0	0	0	0	1	0	0	0	0	0	26
20:00	0	5	5	0	0	0	0	0	0	0	0	0	0	10
21:00	0	10	1	0	0	0	0	1	0	0	0	0	0	12
22:00	0	10	0	0	0	0	0	0	0	0	0	0	0	10
23:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Day Total	5	211	36	0	4	0	0	4	0	0	0	0	0	260
Percent	1.9%	81.2%	13.8%	0.0%	1.5%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	11:00	11:00											11:00
Vol.	1	17	4											21
PM Peak	13:00	15:00	15:00		18:00			14:00						15:00
Vol.	2	23	5		2			2						29

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Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
09/29/13	0	4	0	0	0	0	0	0	0	0	0	0	0	4
01:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
02:00	0	0	**2**	0	0	0	0	0	0	0	0	0	0	2
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	**1**	2	0	0	0	0	0	0	0	0	0	0	0	3
05:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
08:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
09:00	0	5	1	**1**	0	0	0	0	0	0	0	0	0	7
10:00	0	**13**	0	0	0	0	0	0	0	0	0	0	0	13
11:00	0	12	2	0	0	0	0	0	0	0	0	0	0	**14**
12 PM	0	21	2	0	0	0	0	0	0	0	0	0	0	23
13:00	0	6	**3**	0	0	0	0	0	0	0	0	0	0	9
14:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
15:00	2	14	0	0	0	0	0	0	0	0	0	0	0	16
16:00	0	18	2	0	0	0	0	0	0	0	0	0	0	20
17:00	0	**22**	3	0	0	0	0	0	0	0	0	0	0	**25**
18:00	**3**	10	1	0	0	0	0	0	0	0	0	0	0	14
19:00	0	13	2	0	0	0	0	0	0	0	0	0	0	15
20:00	0	11	3	0	0	0	0	0	0	0	0	0	0	14
21:00	0	5	0	0	0	0	0	0	0	0	0	0	0	5
22:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
23:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Day Total	6	187	23	1	0	0	0	0	0	0	0	0	0	217
Percent	2.8%	86.2%	10.6%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	04:00	10:00	02:00	09:00										11:00
Vol.	1	13	2	1										14
PM Peak	18:00	17:00	13:00											17:00
Vol.	3	22	3											25

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09/30/13	0	1	0	0	0	0	0	0	0	0	0	0	0	1
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00	0	3	0	1	0	0	0	0	0	0	0	0	0	4
07:00	0	**18**	**4**	**2**	0	**2**	0	0	0	0	0	0	0	**26**
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Day Total	0	23	4	3	0	2	0	0	0	0	0	0	0	32
Percent	0.0%	71.9%	12.5%	9.4%	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		07:00	07:00	07:00		07:00								07:00
Vol.		18	4	2		2								26
PM Peak Vol.														
Grand Total	36	1361	225	26	51	8	0	8	0	0	0	0	0	1715
Percent	2.1%	79.4%	13.1%	1.5%	3.0%	0.5%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	

APPENDIX I

GROWTH RATE INFORMATION

Growth Factors for September 2012 to July 2013				
County	Urban Interstate	Rural Interstate	Urban Non-Interstate	Rural Non-Interstate
ADAMS	*	*	1.87	0.94
ALLEGHENY	1.29	*	0.18	0.53
ARMSTRONG	1.37	*	0.21	0.54
BEAVER	1.27	2.25	0.20	0.52
BEDFORD	*	2.33	*	0.59
BERKS	1.48	2.36	0.71	0.65
BLAIR	0.81	1.82	0.00	0.36
BRADFORD	1.32	*	0.33	0.50
BUCKS	2.04	2.55	1.43	0.81
BUTLER	1.95	2.79	1.08	0.83
CAMBRIA	0.44	*	0.00	0.24
CAMERON	*	*	*	0.32
CARBON	1.93	2.76	1.26	0.84
CENTRE	1.99	2.60	1.32	0.83
CHESTER	2.54	2.99	1.91	1.03
CLARION	1.35	2.22	0.45	0.55
CLEARFIELD	*	2.48	0.18	0.57
CLINTON	1.40	2.06	0.65	0.54
COLUMBIA	1.78	2.18	1.25	0.68
CRAWFORD	1.06	2.13	0.03	0.47
CUMBERLAND	1.72	2.04	1.37	0.68
DAUPHIN	1.46	2.24	0.75	0.62
DELAWARE	1.38	*	0.51	*
ELK	*	*	0.10	0.42
ERIE	0.97	1.78	0.15	0.41
FAYETTE	1.14	*	0.12	0.49
FOREST	*	*	*	0.70
FRANKLIN	2.49	2.72	2.00	0.98
FULTON	*	2.52	*	0.79
GREENE	1.05	2.06	0.04	0.45
HUNTINGDON	*	2.14	0.33	0.51
INDIANA	1.63	*	0.59	0.64
JEFFERSON	*	2.55	0.23	0.61
JUNIATA	*	*	*	0.70
LACKAWANNA	1.30	2.30	0.19	0.52
LANCASTER	2.02	2.47	1.42	0.81
LAWRENCE	1.24	2.21	0.17	0.50
LEBANON	*	2.35	1.09	0.70
LEHIGH	1.93	2.86	1.13	0.85
LUZERNE	1.30	2.32	0.18	0.53
LYCOMING	1.06	1.65	0.29	0.39
MCKEAN	1.10	*	0.11	0.45
MERCER	1.06	1.86	0.20	0.42
MIFFLIN	1.29	*	0.20	0.54
MONROE	2.33	2.80	1.90	0.99
MONTGOMERY	1.51	2.34	0.73	0.64
MONTOUR	*	2.96	1.46	0.92
NORTHAMPTON	2.19	*	1.57	0.94
NORTHUMBERLAND	1.22	1.88	0.24	0.42
PERRY	*	*	1.91	0.81
PHILADELPHIA	1.12	*	0.00	*
PIKE	*	3.08	*	1.16
POTTER	*	*	*	0.44
SCHUYLKILL	*	1.98	0.15	0.44
SNYDER	1.58	*	0.99	0.60
SOMERSET	1.05	2.00	0.12	0.45
SULLIVAN	*	*	*	0.51
SUSQUEHANNA	1.53	2.44	0.64	0.64
TIOGA	*	*	*	0.46
UNION	*	2.31	1.50	0.75
VENANGO	1.10	1.84	0.20	0.42
WARREN	*	*	0.09	0.53
WASHINGTON	1.50	2.73	0.30	0.66
WAYNE	*	2.43	1.20	0.76
WESTMORELAND	1.37	2.39	0.33	0.57
WYOMING	*	*	0.51	0.46
YORK	1.96	2.40	1.52	0.80

* = Functional Class Doesn't Exist in County

Questions? Please contact Andrew O'Neill at the Bureau of Planning and Research, 717-346-3250 or andoneill@pa.gov

NOTE: The projected growth factors are derived using historical VMT (Vehicle Miles Traveled) data (1994 to 2011), as well as Woods and Poole demographic and economic data. The factors should not be used to project traffic beyond a 20-year period. Please be aware that these factors are estimates, and unforeseen events (opening of shopping centers, fast food franchises, gas stations, etc) could cause growth to change over time.

pennsylvania
DEPARTMENT OF TRANSPORTATION

APPENDIX J

TRIP GENERATION CALCULATIONS

Summary of Multi-Use Trip Generation
Average Weekday Driveway Volumes (Unadjusted for Internal Trips)

Project: Banzhoff Development Site
Phase: 1

Open Date: 2014
Analysis Date:

Description: New Trip Generation

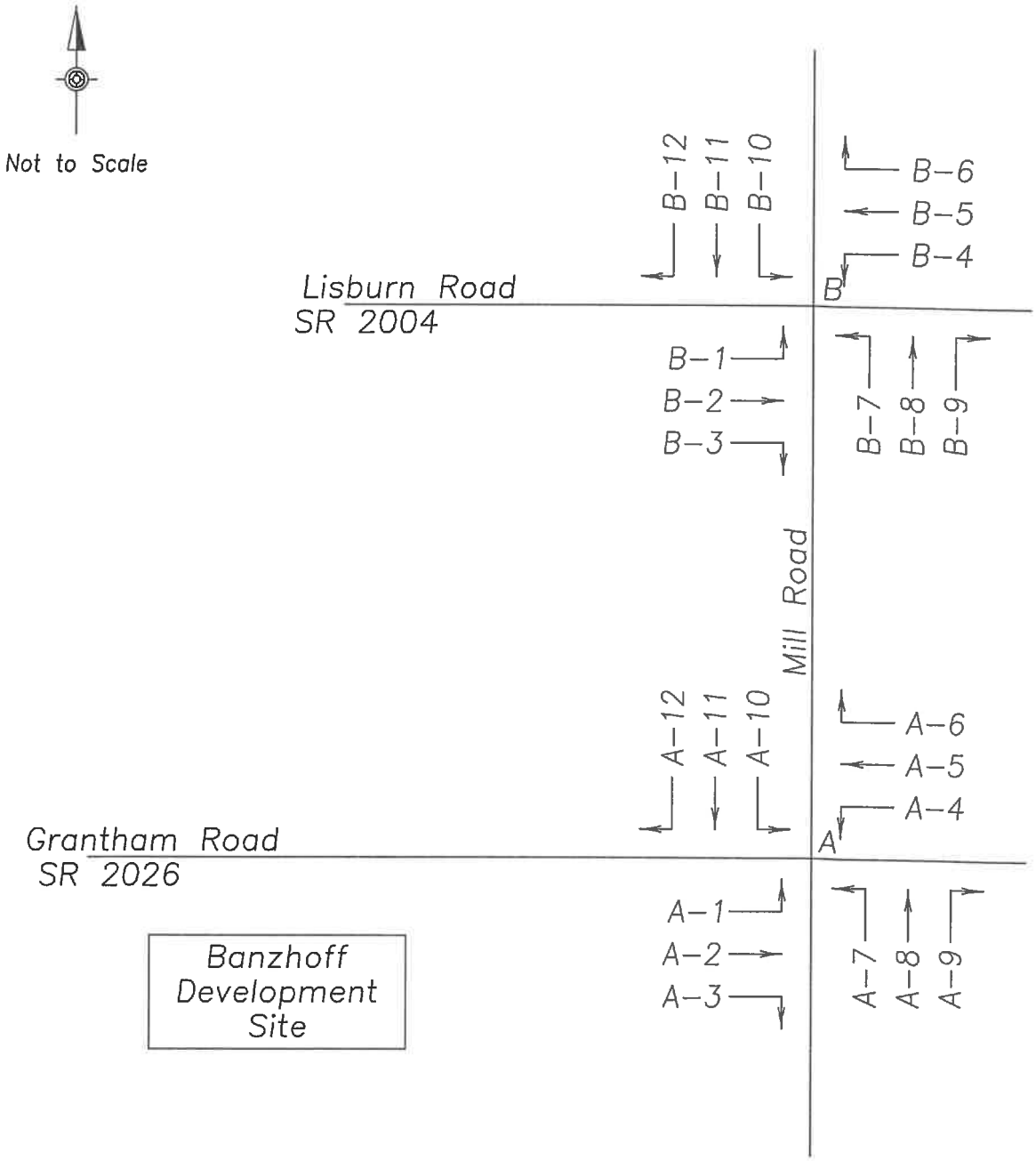
ITE: Land Use	24 Hour Two-Way Volume	AM Pk Hour Enter	AM Pk Hour Exit	PM Pk Hour Enter	PM Pk Hour Exit
210: Single Family Detached Housing 10 Dwelling Units [E]	126	4	13	8	5
230: Residential Condominium / Townhouse 54 Dwelling Units [E]	376	5	27	24	12
Total Driveway Volume	502	9	40	32	17
Total Peak Hour Pass-By Trips		0	0	0	0
Total Peak Hour Vol. Added to Adjacent Streets		9	40	32	17

Note: A zero indicates no data available.
Source: Institute of Transportation Engineers
Trip Generation Manual, 9th Edition, 2012

APPENDIX K

TRAFFIC VOLUME SPREADSHEETS

GROVE MILLER ENGINEERING, INC.



TRANSPORTATION IMPACT STUDY
Banzhoff Property
Upper Allen Township
Cumberland County

INTERSECTION MOVEMENT KEY

PROJ: 257.18
DATE: 10.09.13
BY: MWK

TRAFFIC IMPACT STUDY
GROVE MILLER ENGINEERING INC.
Banzhoff Property
Upper Allen Township, Cumberland County

AM

EVENT	YEAR	% / YR	GROWTH FACTOR
COUNT	2013	1.37%	1.0000
BUILD	2015	1.37%	1.0276
DESIGN	2025	1.37%	1.1774

MVMT. NO.	2013 COUNT VOLUME	2015 PROJ. VOLUME	2025 PROJ. VOLUME	MVMT. NO.	TRIP GENERATIOI Enter = 9 Exit = 40	OTHER DEVELOPMENT TRIPS	MVMT. NO.	2013 BASE VOLUME	2015 NO BUILD VOLUME	2025 NO BUILD VOLUME	MVMT. NO.	2015 BUILD VOLUME	2025 BUILD VOLUME	MVMT. NO.	PHF	% HV
A-1	28	29	33	A-1	36	0	A-1	28	29	33	A-1	65	69	A-1	0.70	4
A-2	7	7	8	A-2	4	0	A-2	7	7	8	A-2	11	12	A-2	0.44	0
A-3	1	1	1	A-3	0	0	A-3	1	1	1	A-3	1	1	A-3	0.25	0
A-4	2	2	2	A-4	0	0	A-4	2	2	2	A-4	2	2	A-4	0.50	0
A-5	2	2	2	A-5	1	0	A-5	2	2	2	A-5	3	3	A-5	0.50	0
A-6	10	10	12	A-6	0	0	A-6	10	10	12	A-6	10	12	A-6	0.83	10
A-7	1	1	1	A-7	0	0	A-7	1	1	1	A-7	1	1	A-7	0.25	0
A-8	38	39	45	A-8	0	0	A-8	38	39	45	A-8	39	45	A-8	0.79	0
A-9	3	3	4	A-9	0	0	A-9	3	3	4	A-9	3	4	A-9	0.38	0
A-10	7	7	8	A-10	0	0	A-10	7	7	8	A-10	7	8	A-10	0.44	0
A-11	59	61	69	A-11	0	0	A-11	59	61	69	A-11	61	69	A-11	0.87	0
A-12	8	8	9	A-12	8	0	A-12	8	8	9	A-12	16	17	A-12	0.40	12
B-1	6	6	7	B-1	0	0	B-1	6	6	7	B-1	6	7	B-1	0.38	0
B-2	186	191	219	B-2	0	0	B-2	186	191	219	B-2	191	219	B-2	0.84	1
B-3	62	64	73	B-3	8	1	B-3	62	65	74	B-3	73	82	B-3	0.62	3
B-4	0	0	0	B-4	0	0	B-4	0	0	0	B-4	0	0	B-4	0.25	0
B-5	172	177	203	B-5	0	0	B-5	172	177	203	B-5	177	203	B-5	0.69	1
B-6	0	0	0	B-6	0	0	B-6	0	0	0	B-6	0	0	B-6	0.25	0
B-7	116	119	137	B-7	36	4	B-7	116	123	141	B-7	159	177	B-7	0.88	3
B-8	2	2	2	B-8	0	0	B-8	2	2	2	B-8	2	2	B-8	0.50	0
B-9	4	4	5	B-9	0	1	B-9	4	5	6	B-9	5	6	B-9	0.50	0
B-10	3	3	4	B-10	0	0	B-10	3	3	4	B-10	3	4	B-10	0.38	0
B-11	1	1	1	B-11	0	0	B-11	1	1	1	B-11	1	1	B-11	0.25	100
B-12	30	31	35	B-12	0	0	B-12	30	31	35	B-12	31	35	B-12	0.68	0

PROJ: 257.18
DATE: 10.09.13
BY: MWK

TRAFFIC IMPACT STUDY
GROVE MILLER ENGINEERING INC.
Banzhoff Property
Upper Allen Township, Cumberland County

PM

EVENT	YEAR	% / YR	GROWTH FACTOR
COUNT	2013	1.37%	1.0000
BUILD	2015	1.37%	1.0276
DESIGN	2025	1.37%	1.1774

MVMT. NO.	2013 COUNT VOLUME	2015 PROJ. VOLUME	2025 PROJ. VOLUME	MVMT. NO.	TRIP GENERATIOI Enter = 32 Exit = 17	OTHER DEVELOPMENT TRIPS	MVMT. NO.	2013 BASE VOLUME	2015 NO BUILD VOLUME	2025 NO BUILD VOLUME	MVMT. NO.	2015 BUILD VOLUME	2025 BUILD VOLUME	MVMT. NO.	PHF	% HV
A-1	53	54	62	A-1	15	0	A-1	53	54	62	A-1	69	77	A-1	0.70	0
A-2	10	10	12	A-2	2	0	A-2	10	10	12	A-2	12	14	A-2	0.62	0
A-3	9	9	11	A-3	0	0	A-3	9	9	11	A-3	9	11	A-3	0.56	0
A-4	11	11	13	A-4	0	0	A-4	11	11	13	A-4	11	13	A-4	0.39	0
A-5	21	22	25	A-5	3	0	A-5	21	22	25	A-5	25	28	A-5	0.75	0
A-6	12	12	14	A-6	0	0	A-6	12	12	14	A-6	12	14	A-6	0.60	0
A-7	15	15	18	A-7	0	0	A-7	15	15	18	A-7	15	18	A-7	0.75	0
A-8	76	78	89	A-8	0	0	A-8	76	78	89	A-8	78	89	A-8	0.79	0
A-9	1	1	1	A-9	0	0	A-9	1	1	1	A-9	1	1	A-9	0.25	0
A-10	6	6	7	A-10	0	0	A-10	6	6	7	A-10	6	7	A-10	0.75	0
A-11	48	49	57	A-11	0	0	A-11	48	49	57	A-11	49	57	A-11	0.80	0
A-12	108	111	127	A-12	29	0	A-12	108	111	127	A-12	140	156	A-12	0.79	0
B-1	16	16	19	B-1	0	0	B-1	16	16	19	B-1	16	19	B-1	0.80	0
B-2	196	201	231	B-2	0	0	B-2	196	201	231	B-2	201	231	B-2	0.98	1
B-3	148	152	174	B-3	29	4	B-3	148	156	178	B-3	185	207	B-3	0.80	0
B-4	15	15	18	B-4	0	1	B-4	15	16	19	B-4	16	19	B-4	0.94	0
B-5	268	275	316	B-5	0	0	B-5	268	275	316	B-5	275	316	B-5	0.86	1
B-6	6	6	7	B-6	0	0	B-6	6	6	7	B-6	6	7	B-6	0.75	0
B-7	123	126	145	B-7	15	2	B-7	123	128	147	B-7	143	162	B-7	0.72	0
B-8	1	1	1	B-8	0	0	B-8	1	1	1	B-8	1	1	B-8	0.25	0
B-9	17	17	20	B-9	0	0	B-9	17	17	20	B-9	17	20	B-9	0.71	0
B-10	4	4	5	B-10	0	0	B-10	4	4	5	B-10	4	5	B-10	0.50	0
B-11	2	2	2	B-11	0	0	B-11	2	2	2	B-11	2	2	B-11	0.50	0
B-12	16	16	19	B-12	0	0	B-12	16	16	19	B-12	16	19	B-12	0.67	0

APPENDIX L

CAPACITY AND QUEUE ANALYSES WORKSHEETS

CAPACITY AND QUEUE ANALYSES

Grantham Road (SR 2026)
and
Mill Road

Intersection	
Intersection Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	28	7	1	2	2	10	1	38	3	7	59	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	44	25	50	50	83	25	79	38	44	87	40
Heavy Vehicles, %	4	0	0	0	0	10	0	0	0	0	0	12
Mvmt Flow	40	16	4	4	4	12	4	48	8	16	68	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	16	0	0	20	0	0	160	122	18	144	118	10
Stage 1	-	-	-	-	-	-	98	98	-	18	18	-
Stage 2	-	-	-	-	-	-	62	24	-	126	100	-
Follow-up Headway	2.236	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.408
Pot Capacity-1 Maneuver	1589	-	-	1609	-	-	832	788	1068	817	766	1042
Stage 1	-	-	-	-	-	-	928	831	-	1004	883	-
Stage 2	-	-	-	-	-	-	964	883	-	870	807	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1589	-	-	1609	-	-	743	766	1068	756	745	1042
Mov Capacity-2 Maneuver	-	-	-	-	-	-	743	766	-	756	745	-
Stage 1	-	-	-	-	-	-	905	810	-	979	880	-
Stage 2	-	-	-	-	-	-	870	880	-	792	787	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.9	1.4	9.9	10.2
HCM LOS			A	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	794	1589	-	-	1609	-	-	790
HCM Lane V/C Ratio	0.076	0.025	-	-	0.002	-	-	0.131
HCM Control Delay (s)	9.9	7.324	0	-	7.243	0	-	10.2
HCM Lane LOS	A	A	A		A	A		B
HCM 95th %tile Q(veh)	0.245	0.077	-	-	0.007	-	-	0.451

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	29	7	1	2	2	10	1	39	3	7	61	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	44	25	50	50	83	25	79	38	44	87	40
Heavy Vehicles, %	4	0	0	0	0	10	0	0	0	0	0	12
Mvmt Flow	41	16	4	4	4	12	4	49	8	16	70	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	16	0	0	20	0	0	164	125	18	147	121	10
Stage 1	-	-	-	-	-	-	101	101	-	18	18	-
Stage 2	-	-	-	-	-	-	63	24	-	129	103	-
Follow-up Headway	2.236	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.408
Pot Capacity-1 Maneuver	1589	-	-	1609	-	-	828	785	1068	813	763	1042
Stage 1	-	-	-	-	-	-	925	829	-	1004	883	-
Stage 2	-	-	-	-	-	-	963	883	-	867	805	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1589	-	-	1609	-	-	737	762	1068	750	741	1042
Mov Capacity-2 Maneuver	-	-	-	-	-	-	737	762	-	750	741	-
Stage 1	-	-	-	-	-	-	901	807	-	978	880	-
Stage 2	-	-	-	-	-	-	867	880	-	787	784	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.9	1.4	9.9	10.3
HCM LOS			A	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	789	1589	-	-	1609	-	-	785
HCM Lane V/C Ratio	0.078	0.026	-	-	0.002	-	-	0.135
HCM Control Delay (s)	9.9	7.326	0	-	7.243	0	-	10.3
HCM Lane LOS	A	A	A		A	A		B
HCM 95th %tile Q(veh)	0.252	0.08	-	-	0.007	-	-	0.466

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	8.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	65	11	1	2	3	10	1	39	3	7	61	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	44	25	50	50	83	25	79	38	44	87	40
Heavy Vehicles, %	4	0	0	0	0	10	0	0	0	0	0	12
Mvmt Flow	93	25	4	4	6	12	4	49	8	16	70	40

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	18	0	0	29	0	0	288	239	27	261	235	12
Stage 1	-	-	-	-	-	-	213	213	-	20	20	-
Stage 2	-	-	-	-	-	-	75	26	-	241	215	-
Follow-up Headway	2.236	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.408
Pot Capacity-1 Maneuver	1586	-	-	1597	-	-	701	693	1057	676	652	1040
Stage 1	-	-	-	-	-	-	822	756	-	1002	881	-
Stage 2	-	-	-	-	-	-	951	881	-	747	711	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1586	-	-	1597	-	-	586	649	1057	602	611	1040
Mov Capacity-2 Maneuver	-	-	-	-	-	-	586	649	-	602	611	-
Stage 1	-	-	-	-	-	-	773	711	-	942	878	-
Stage 2	-	-	-	-	-	-	839	878	-	649	668	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.6	1.3	10.8	11.2
HCM LOS			B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	678	1586	-	-	1597	-	-	702
HCM Lane V/C Ratio	0.09	0.059	-	-	0.003	-	-	0.18
HCM Control Delay (s)	10.8	7.411	0	-	7.26	0	-	11.2
HCM Lane LOS	B	A	A		A	A		B
HCM 95th %tile Q(veh)	0.297	0.186	-	-	0.008	-	-	0.651

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	8.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	33	8	1	2	2	12	1	45	4	8	69	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	44	25	50	50	83	25	79	38	44	87	40
Heavy Vehicles, %	4	0	0	0	0	10	0	0	0	0	0	12
Mvmt Flow	47	18	4	4	4	14	4	57	11	18	79	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	18	0	0	22	0	0	184	140	20	167	135	11
Stage 1	-	-	-	-	-	-	114	114	-	19	19	-
Stage 2	-	-	-	-	-	-	70	26	-	148	116	-
Follow-up Headway	2.236	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.408
Pot Capacity-1 Maneuver	1586	-	-	1607	-	-	806	773	1065	787	748	1041
Stage 1	-	-	-	-	-	-	913	820	-	1003	882	-
Stage 2	-	-	-	-	-	-	956	881	-	845	793	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1586	-	-	1607	-	-	705	748	1065	716	723	1041
Mov Capacity-2 Maneuver	-	-	-	-	-	-	705	748	-	716	723	-
Stage 1	-	-	-	-	-	-	886	795	-	973	879	-
Stage 2	-	-	-	-	-	-	848	878	-	753	769	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5	1.3	10.1	10.6
HCM LOS			B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	780	1586	-	-	1607	-	-	766
HCM Lane V/C Ratio	0.092	0.03	-	-	0.002	-	-	0.157
HCM Control Delay (s)	10.1	7.339	0	-	7.246	0	-	10.6
HCM Lane LOS	B	A	A		A	A		B
HCM 95th %tile Q(veh)	0.302	0.092	-	-	0.007	-	-	0.553

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	69	12	1	2	3	12	1	45	4	8	69	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	44	25	50	50	83	25	79	38	44	87	40
Heavy Vehicles, %	4	0	0	0	0	10	0	0	0	0	0	12
Mvmt Flow	99	27	4	4	6	14	4	57	11	18	79	42

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	20	0	0	31	0	0	308	254	29	281	249	13
Stage 1	-	-	-	-	-	-	226	226	-	21	21	-
Stage 2	-	-	-	-	-	-	82	28	-	260	228	-
Follow-up Headway	2.236	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.408
Pot Capacity-1 Maneuver	1583	-	-	1595	-	-	683	681	1054	655	639	1038
Stage 1	-	-	-	-	-	-	811	748	-	1000	880	-
Stage 2	-	-	-	-	-	-	944	880	-	728	701	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1583	-	-	1595	-	-	559	636	1054	574	596	1038
Mov Capacity-2 Maneuver	-	-	-	-	-	-	559	636	-	574	596	-
Stage 1	-	-	-	-	-	-	759	700	-	936	877	-
Stage 2	-	-	-	-	-	-	821	877	-	620	656	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.6	1.2	11	11.6
HCM LOS			B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	670	1583	-	-	1595	-	-	681
HCM Lane V/C Ratio	0.107	0.062	-	-	0.003	-	-	0.206
HCM Control Delay (s)	11	7.425	0	-	7.263	0	-	11.6
HCM Lane LOS	B	A	A		A	A		B
HCM 95th %tile Q(veh)	0.357	0.199	-	-	0.008	-	-	0.768

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	8.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	53	10	9	11	21	12	15	76	1	6	48	108
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	62	56	39	75	60	75	79	25	75	80	79
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	76	16	16	28	28	20	20	96	4	8	60	137

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	48	0	0	32	0	0	369	280	24	320	278	38
Stage 1	-	-	-	-	-	-	176	176	-	94	94	-
Stage 2	-	-	-	-	-	-	193	104	-	226	184	-
Follow-up Headway	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1572	-	-	1593	-	-	629	662	1060	614	614	1038
Stage 1	-	-	-	-	-	-	855	780	-	908	812	-
Stage 2	-	-	-	-	-	-	840	827	-	762	736	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1572	-	-	1593	-	-	477	618	1060	512	573	1038
Mov Capacity-2 Maneuver	-	-	-	-	-	-	477	618	-	512	573	-
Stage 1	-	-	-	-	-	-	813	742	-	864	797	-
Stage 2	-	-	-	-	-	-	662	812	-	628	700	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.2	2.7	12.5	10.9
HCM LOS			B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	597	1572	-	-	1593	-	-	812
HCM Lane V/C Ratio	0.201	0.048	-	-	0.018	-	-	0.252
HCM Control Delay (s)	12.5	7.406	0	-	7.301	0	-	10.9
HCM Lane LOS	B	A	A		A	A		B
HCM 95th %tile Q(veh)	0.747	0.152	-	-	0.054	-	-	0.998

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	8.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	54	10	9	11	22	12	15	78	1	6	49	111
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	62	56	39	75	60	75	79	25	75	80	79
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	77	16	16	28	29	20	20	99	4	8	61	141

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	49	0	0	32	0	0	375	284	24	326	282	39
Stage 1	-	-	-	-	-	-	178	178	-	96	96	-
Stage 2	-	-	-	-	-	-	197	106	-	230	186	-
Follow-up Headway	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1571	-	-	1593	-	-	624	659	1060	609	611	1036
Stage 1	-	-	-	-	-	-	853	779	-	906	811	-
Stage 2	-	-	-	-	-	-	836	826	-	758	734	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1571	-	-	1593	-	-	470	615	1060	505	570	1036
Mov Capacity-2 Maneuver	-	-	-	-	-	-	470	615	-	505	570	-
Stage 1	-	-	-	-	-	-	810	740	-	861	796	-
Stage 2	-	-	-	-	-	-	655	811	-	622	697	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.2	2.7	12.6	11
HCM LOS			B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	593	1571	-	-	1593	-	-	810
HCM Lane V/C Ratio	0.207	0.049	-	-	0.018	-	-	0.259
HCM Control Delay (s)	12.6	7.41	0	-	7.301	0	-	11
HCM Lane LOS	B	A	A		A	A		B
HCM 95th %tile Q(veh)	0.773	0.155	-	-	0.054	-	-	1.034

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	9.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	69	12	9	11	25	12	15	78	1	6	49	140
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	62	56	39	75	60	75	79	25	75	80	79
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	99	19	16	28	33	20	20	99	4	8	61	177

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	53	0	0	35	0	0	444	335	27	376	333	43
Stage 1	-	-	-	-	-	-	225	225	-	100	100	-
Stage 2	-	-	-	-	-	-	219	110	-	276	233	-
Follow-up Headway	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1566	-	-	1589	-	-	568	622	1057	561	569	1031
Stage 1	-	-	-	-	-	-	812	749	-	901	807	-
Stage 2	-	-	-	-	-	-	817	823	-	712	697	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1566	-	-	1589	-	-	402	571	1057	455	522	1031
Mov Capacity-2 Maneuver	-	-	-	-	-	-	402	571	-	455	522	-
Stage 1	-	-	-	-	-	-	759	700	-	842	792	-
Stage 2	-	-	-	-	-	-	613	808	-	570	652	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.5	2.5	13.6	11.5
HCM LOS			B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	542	1566	-	-	1589	-	-	803
HCM Lane V/C Ratio	0.226	0.063	-	-	0.018	-	-	0.307
HCM Control Delay (s)	13.6	7.453	0	-	7.307	0	-	11.5
HCM Lane LOS	B	A	A		A	A		B
HCM 95th %tile Q(veh)	0.864	0.201	-	-	0.054	-	-	1.304

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	62	12	11	13	25	14	18	89	1	7	57	127
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	62	56	39	75	60	75	79	25	75	80	79
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	89	19	20	33	33	23	24	113	4	9	71	161

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	57	0	0	39	0	0	434	329	29	377	328	45
Stage 1	-	-	-	-	-	-	206	206	-	112	112	-
Stage 2	-	-	-	-	-	-	228	123	-	265	216	-
Follow-up Headway	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1560	-	-	1584	-	-	576	627	1054	560	573	1028
Stage 1	-	-	-	-	-	-	829	761	-	887	797	-
Stage 2	-	-	-	-	-	-	809	814	-	723	711	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1560	-	-	1584	-	-	410	578	1054	447	528	1028
Mov Capacity-2 Maneuver	-	-	-	-	-	-	410	578	-	447	528	-
Stage 1	-	-	-	-	-	-	781	717	-	836	779	-
Stage 2	-	-	-	-	-	-	606	796	-	572	670	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.2	2.7	13.8	11.8
HCM LOS			B	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	547	1560	-	-	1584	-	-	773
HCM Lane V/C Ratio	0.257	0.057	-	-	0.021	-	-	0.312
HCM Control Delay (s)	13.8	7.447	0	-	7.322	0	-	11.8
HCM Lane LOS	B	A	A		A	A		B
HCM 95th %tile Q(veh)	1.018	0.18	-	-	0.064	-	-	1.335

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	10

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	77	14	11	13	28	14	18	89	1	7	57	156
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	2	-	-	-3	-	-	2	-
Peak Hour Factor	70	62	56	39	75	60	75	79	25	75	80	79
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	110	23	20	33	37	23	24	113	4	9	71	197

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	61	0	0	42	0	0	502	379	32	427	378	49
Stage 1	-	-	-	-	-	-	252	252	-	116	116	-
Stage 2	-	-	-	-	-	-	250	127	-	311	262	-
Follow-up Headway	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1555	-	-	1580	-	-	525	593	1050	516	534	1023
Stage 1	-	-	-	-	-	-	789	732	-	882	793	-
Stage 2	-	-	-	-	-	-	791	812	-	680	675	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1555	-	-	1580	-	-	350	538	1050	401	484	1023
Mov Capacity-2 Maneuver	-	-	-	-	-	-	350	538	-	401	484	-
Stage 1	-	-	-	-	-	-	731	679	-	818	776	-
Stage 2	-	-	-	-	-	-	567	794	-	524	626	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.4	2.6	15	12.4
HCM LOS			C	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	499	1555	-	-	1580	-	-	765
HCM Lane V/C Ratio	0.282	0.071	-	-	0.021	-	-	0.363
HCM Control Delay (s)	15	7.491	0	-	7.328	0	-	12.4
HCM Lane LOS	C	A	A		A	A		B
HCM 95th %tile Q(veh)	1.148	0.228	-	-	0.065	-	-	1.667

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

CAPACITY AND QUEUE ANALYSES

Lisburn Road (SR 2004)
and
Mill Road

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	186	62	0	172	0	116	2	4	3	1	30
Peak Hour Factor	0.38	0.84	0.62	0.25	0.69	0.25	0.88	0.50	0.50	0.38	0.25	0.68
Heavy Vehicles, %	0	1	3	0	1	0	3	0	0	0	100	0
Mvmt Flow	16	221	100	0	249	0	132	4	8	8	4	44
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	11.4	10.5	10.5	10.3
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	95%	2%	0%	75%	0%
Vol Thru, %	2%	73%	100%	25%	0%
Vol Right, %	3%	24%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	122	254	172	4	30
LT Vol	2	186	172	1	0
Through Vol	4	62	0	0	30
RT Vol	116	6	0	3	0
Lane Flow Rate	144	337	249	12	44
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.231	0.436	0.339	0.022	0.088
Departure Headway (Hd)	5.792	4.654	4.903	6.563	7.198
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	624	765	723	548	500
Service Time	3.794	2.74	2.998	4.268	4.903
HCM Lane V/C Ratio	0.231	0.441	0.344	0.022	0.088
HCM Control Delay	10.5	11.4	10.5	9.4	10.6
HCM Lane LOS	B	B	B	A	B
HCM 95th-tile Q	0.9	2.2	1.5	0.1	0.3

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	191	65	0	177	0	123	2	5	3	1	31
Peak Hour Factor	0.38	0.84	0.62	0.25	0.69	0.25	0.88	0.50	0.50	0.38	0.25	0.68
Heavy Vehicles, %	0	1	3	0	1	0	3	0	0	0	100	0
Mvmt Flow	16	227	105	0	257	0	140	4	10	8	4	46
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	11.7	10.8	10.8	10.5
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	95%	2%	0%	75%	0%
Vol Thru, %	2%	73%	100%	25%	0%
Vol Right, %	4%	25%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	130	262	177	4	31
LT Vol	2	191	177	1	0
Through Vol	5	65	0	0	31
RT Vol	123	6	0	3	0
Lane Flow Rate	154	348	257	12	46
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.25	0.454	0.353	0.022	0.092
Departure Headway (Hd)	5.849	4.701	5.065	6.644	7.28
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	617	755	716	542	495
Service Time	3.853	2.799	3.065	4.35	4.986
HCM Lane V/C Ratio	0.25	0.461	0.359	0.022	0.093
HCM Control Delay	10.8	11.7	10.8	9.5	10.7
HCM Lane LOS	B	B	B	A	B
HCM 95th-tile Q	1	2.4	1.6	0.1	0.3

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	12
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	191	73	0	177	0	159	2	5	3	1	31
Peak Hour Factor	0.38	0.84	0.62	0.25	0.69	0.25	0.88	0.50	0.50	0.38	0.25	0.68
Heavy Vehicles, %	0	1	3	0	1	0	3	0	0	0	100	0
Mvmt Flow	16	227	118	0	257	0	181	4	10	8	4	46
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	12.7	11.4	11.8	10.7
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	96%	2%	0%	75%	0%
Vol Thru, %	1%	71%	100%	25%	0%
Vol Right, %	3%	27%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	166	270	177	4	31
LT Vol	2	191	177	1	0
Through Vol	5	73	0	0	31
RT Vol	159	6	0	3	0
Lane Flow Rate	195	361	257	12	46
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.321	0.494	0.373	0.022	0.094
Departure Headway (Hd)	5.934	4.926	5.23	6.804	7.441
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	605	733	687	526	481
Service Time	3.97	2.956	3.262	4.55	5.187
HCM Lane V/C Ratio	0.322	0.492	0.374	0.023	0.096
HCM Control Delay	11.8	12.7	11.4	9.7	11
HCM Lane LOS	B	B	B	A	B
HCM 95th-tile Q	1.4	2.8	1.7	0.1	0.3

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	12.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	7	219	74	0	203	0	141	2	6	4	1	35
Peak Hour Factor	0.38	0.84	0.62	0.25	0.69	0.25	0.88	0.50	0.50	0.38	0.25	0.68
Heavy Vehicles, %	0	1	3	0	1	0	3	0	0	0	100	0
Mvmt Flow	18	261	119	0	294	0	160	4	12	11	4	51
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	14.1	12.3	11.8	11
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	95%	2%	0%	80%	0%
Vol Thru, %	1%	73%	100%	20%	0%
Vol Right, %	4%	25%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	149	300	203	5	35
LT Vol	2	219	203	1	0
Through Vol	6	74	0	0	35
RT Vol	141	7	0	4	0
Lane Flow Rate	176	398	294	15	51
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.301	0.553	0.432	0.028	0.109
Departure Headway (Hd)	6.151	4.994	5.283	7.019	7.631
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	583	721	680	509	469
Service Time	4.199	3.033	3.324	4.776	5.388
HCM Lane V/C Ratio	0.302	0.552	0.432	0.029	0.109
HCM Control Delay	11.8	14.1	12.3	10	11.3
HCM Lane LOS	B	B	B	A	B
HCM 95th-tile Q	1.3	3.4	2.2	0.1	0.4

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	13.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	7	219	82	0	203	0	177	2	6	4	1	35
Peak Hour Factor	0.38	0.84	0.62	0.25	0.69	0.25	0.88	0.50	0.50	0.38	0.25	0.68
Heavy Vehicles, %	0	1	3	0	1	0	3	0	0	0	100	0
Mvmt Flow	18	261	132	0	294	0	201	4	12	11	4	51
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	15.4	13	13.1	11.3
HCM LOS	C	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	96%	2%	0%	80%	0%
Vol Thru, %	1%	71%	100%	20%	0%
Vol Right, %	3%	27%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	185	308	203	5	35
LT Vol	2	219	203	1	0
Through Vol	6	82	0	0	35
RT Vol	177	7	0	4	0
Lane Flow Rate	217	411	294	15	51
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.376	0.589	0.448	0.029	0.112
Departure Headway (Hd)	6.242	5.153	5.48	7.2	7.813
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	573	699	656	495	457
Service Time	4.304	3.204	3.536	4.976	5.589
HCM Lane V/C Ratio	0.379	0.588	0.448	0.03	0.112
HCM Control Delay	13.1	15.4	13	10.2	11.6
HCM Lane LOS	B	C	B	B	B
HCM 95th-tile Q	1.7	3.9	2.3	0.1	0.4

Notes

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Intersection	
Intersection Delay, s/veh	13
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	196	148	15	268	6	123	1	17	4	2	16
Peak Hour Factor	0.80	0.98	0.80	0.94	0.86	0.75	0.72	0.25	0.71	0.50	0.50	0.67
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	20	200	185	16	312	8	171	4	24	8	4	24
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	13.7	13	12	9.3
HCM LOS	B	B	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	87%	4%	5%	67%	0%
Vol Thru, %	1%	54%	93%	33%	0%
Vol Right, %	12%	41%	2%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	141	360	289	6	16
LT Vol	1	196	268	2	0
Through Vol	17	148	6	0	16
RT Vol	123	16	15	4	0
Lane Flow Rate	199	405	336	12	24
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.332	0.548	0.483	0.024	0.04
Departure Headway (Hd)	6.009	4.874	5.179	7.077	6.021
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	598	741	695	505	593
Service Time	4.052	2.91	3.215	4.834	3.778
HCM Lane V/C Ratio	0.333	0.547	0.483	0.024	0.04
HCM Control Delay	12	13.7	13	10	9
HCM Lane LOS	B	B	B	A	A
HCM 95th-tile Q	1.4	3.4	2.6	0.1	0.1

Notes

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Intersection	
Intersection Delay, s/veh	13.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	201	156	16	275	6	128	1	17	4	2	16
Peak Hour Factor	0.80	0.98	0.80	0.94	0.86	0.75	0.72	0.25	0.71	0.50	0.50	0.67
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	20	205	195	17	320	8	178	4	24	8	4	24
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	14.4	13.5	12.4	9.4
HCM LOS	B	B	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	88%	4%	5%	67%	0%
Vol Thru, %	1%	54%	93%	33%	0%
Vol Right, %	12%	42%	2%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	146	373	297	6	16
LT Vol	1	201	275	2	0
Through Vol	17	156	6	0	16
RT Vol	128	16	16	4	0
Lane Flow Rate	206	420	345	12	24
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.348	0.574	0.502	0.024	0.041
Departure Headway (Hd)	6.083	4.92	5.237	7.176	6.12
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	590	731	686	497	582
Service Time	4.132	2.961	3.28	4.941	3.884
HCM Lane V/C Ratio	0.349	0.575	0.503	0.024	0.041
HCM Control Delay	12.4	14.4	13.5	10.1	9.1
HCM Lane LOS	B	B	B	B	A
HCM 95th-tile Q	1.6	3.7	2.8	0.1	0.1

Notes

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Intersection	
Intersection Delay, s/veh	14.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	201	185	16	275	6	143	1	17	4	2	16
Peak Hour Factor	0.80	0.98	0.80	0.94	0.86	0.75	0.72	0.25	0.71	0.50	0.50	0.67
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	20	205	231	17	320	8	199	4	24	8	4	24
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	16.3	14.1	13.2	9.7
HCM LOS	C	B	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	89%	4%	5%	67%	0%
Vol Thru, %	1%	50%	93%	33%	0%
Vol Right, %	11%	46%	2%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	161	402	297	6	16
LT Vol	1	201	275	2	0
Through Vol	17	185	6	0	16
RT Vol	143	16	16	4	0
Lane Flow Rate	227	456	345	12	24
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.391	0.633	0.516	0.025	0.042
Departure Headway (Hd)	6.209	4.996	5.388	7.362	6.304
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	578	721	665	484	564
Service Time	4.267	3.046	3.441	5.142	4.083
HCM Lane V/C Ratio	0.393	0.632	0.519	0.025	0.043
HCM Control Delay	13.2	16.3	14.1	10.3	9.4
HCM Lane LOS	B	C	B	B	A
HCM 95th-tile Q	1.8	4.5	3	0.1	0.1

Notes

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Intersection	
Intersection Delay, s/veh	17.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	19	231	178	19	316	7	147	1	20	5	2	19
Peak Hour Factor	0.80	0.98	0.80	0.94	0.86	0.75	0.72	0.25	0.71	0.50	0.50	0.67
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	24	236	222	20	367	9	204	4	28	10	4	28
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	19.6	17.1	14.3	10.1
HCM LOS	C	C	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	88%	4%	6%	71%	0%
Vol Thru, %	1%	54%	92%	29%	0%
Vol Right, %	12%	42%	2%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	168	428	342	7	19
LT Vol	1	231	316	2	0
Through Vol	20	178	7	0	19
RT Vol	147	19	19	5	0
Lane Flow Rate	236	482	397	14	28
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.424	0.698	0.612	0.03	0.053
Departure Headway (Hd)	6.462	5.215	5.549	7.819	6.733
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	553	689	647	461	535
Service Time	4.543	3.283	3.62	5.519	4.433
HCM Lane V/C Ratio	0.427	0.7	0.614	0.03	0.052
HCM Control Delay	14.3	19.6	17.1	10.8	9.8
HCM Lane LOS	B	C	C	B	A
HCM 95th-tile Q	*2.1*	*5.7*	*4.2*	*0.1*	*0.2*

Notes

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Intersection	
Intersection Delay, s/veh	19.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	19	231	207	19	316	7	162	1	20	5	2	19
Peak Hour Factor	0.80	0.98	0.80	0.94	0.86	0.75	0.72	0.25	0.71	0.50	0.50	0.67
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	24	236	259	20	367	9	225	4	28	10	4	28
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	23.6	18.2	15.5	10.4
HCM LOS	C	C	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	89%	4%	6%	71%	0%
Vol Thru, %	1%	51%	92%	29%	0%
Vol Right, %	11%	45%	2%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	183	457	342	7	19
LT Vol	1	231	316	2	0
Through Vol	20	207	7	0	19
RT Vol	162	19	19	5	0
Lane Flow Rate	257	518	397	14	28
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.471	0.764	0.63	0.031	0.055
Departure Headway (Hd)	6.595	5.305	5.715	8.055	6.966
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	543	674	627	447	517
Service Time	4.692	3.389	3.807	5.755	4.666
HCM Lane V/C Ratio	0.473	0.769	0.633	0.031	0.054
HCM Control Delay	15.5	23.6	18.2	11	10.1
HCM Lane LOS	C	C	C	B	B
HCM 95th-tile Q	*2.5*	*7.1*	*4.4*	*0.1*	*0.2*

Notes

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APPENDIX M

CORRESPONDENCE

From: Eileen Pauletta [mailto:PaulettaE@transassochbg.com]
Sent: Friday, January 11, 2013 12:06 PM
To: Jennifer Boyer
Cc: Sandy Green
Subject: RE: Banzhoff Property

Jennifer:

I did a field review of all the subject intersections as well as looked at the preliminary information provided Grove Miller dated May 1, 2012. Following are my findings:

1. Based on the ordinance, a TIS is required for the Township even though PennDOT isn't requiring a TIS
2. While I suspect that the trips will not dramatically impact the surrounding intersections, the Township may want to consider having the applicant review the following locations
    a. Mill/Grantham intersection. The northbound approach (stop sign controlled) of this intersection has poor sight distance. I would expect the majority of trips from the proposed development tract to travel EB towards this intersection and then head north (i.e. make a left turn), however it is reasonable to assume a portion will be through movements at this intersection. If this intersection hasn't been studied recently it should be part of this developers study.
    b. Mill/Lisburn is a 4-way stop controlled intersection. It appears to operate at acceptable level of service. I don't anticipate that changing with the addition of the trips that would be distributed to this location, however if it has not been studied recently it would be reasonable to request the developer to conduct counts/analysis here for Township records/files to determine if/when a signal may be warranted in the future for planning/budget purposes.

The following locations I don't feel warrant the need for analysis:

Park Ridge/Lisburn, Grantham/Lisburn, Woodbine/Grantham , Sand Dollar/Grantham, and Laurel & Grantham

The Grantham intersections are at the western end of the cul-de-sac street. Certainly since this roadway was cul-de-saced the residents have experience a reduction in through traffic on Grantham, but the addition of this development is not going to drastically increase traffic beyond what the roadway is capable of.

The Lisburn road intersections will most likely show no change in Level of Service from any additional traffic added to the mainline traffic from this development.

What I am more concerned with is the planned resurfacing/maintenance of the Grantham roadway. I noticed quite a few runners/walkers along the roadway, and there is no sidewalk/shoulders there. If we do have the developer evaluate this roadway it should be from a roadway use perspective versus intersection analysis. That would be a reasonable request, as there is a park nearby that may be used by the future development residents and more walkers could be anticipated.

Please call me with any questions.

Eileen

Eileen Pauletta, PE PTOE

Harrisburg Office Manager, Trans Associates

GROVE MILLER ENGINEERING, INC.

TERRANCE W. GROVE, P.E., Principal Traffic Engineer
JAY E. STATES, P.E., Principal Traffic Engineer
GREGORY E. CREASY, P.E., Principal Traffic Engineer
DENNIS E. MILLER, P.E., Traffic Engineer, Retired

5600 Derry Street
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May 1, 2012

Mr. John Melham
Melham Associates, PC
2247 North Front Street
Harrisburg, PA 17110-1027

Re: Banzhoff Tract
Upper Allen Township, Cumberland County, Pennsylvania

Dear John:

Based on our recent telephone conversation, we are providing trip generation calculations for the proposed Banzhoff Tract development site located along Grantham Road in Upper Allen Township, Cumberland County. This information was also provided to PENNDOT prior to the June 23, 2011 meeting at their offices.

Table 1 provides a summary of the trip generation estimates for the project.

Table 1. ITE Trip Generation Summary:
Banzhoff Tract

Land Use (ITE Code) [Size]	Average Weekday Vehicle Trips (vpd)	AM Peak (vph)		PM Peak (vph)	
		Enter	Exit	Enter	Exit
Single Family Dwellings (210) [10 units]	125	4	13	8	5
Residential Townhouses (230) [60 units]	412	6	28	26	13
Total New Trips	**537**	**10**	**41**	**34**	**18**

Based on these trip generation estimates and discussions during the June 23rd meeting at their offices, PENNDOT did not require the preparation of a transportation impact study (TIS) for the project. For you information, PENNDOT requires a TIS when peak hour directional (entering or exiting) volumes exceed 100 or more trips.

It is our professional opinion that these trip generation estimates are relatively low and will not significantly impact operating characteristics of adjacent streets and/or intersections near the proposed Banzhoff Tract development site.

Please give me a call if you have any questions, or need additional information.

Sincerely,

Jay E. States, P.E.
Traffic Engineer

JES/me
Z:\257_17\Twp letter.wpd

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