TRAFFIC PLANNING AND DESIGN, INC.

WWW.TRAFFICPD.COM

November 13, 2023

Board of Commissioners
Upper Allen Township
100 Gettysburg Pike
Mechanicsburg, PA 17055

RE: Traffic Signal Warrant Analysis – Market Street (SR 0114) and Legacy Park Drive/Hemlock Drive

Upper Allen Township, Cumberland County, PA

TPD No. LMBU.0003

Dear BOC:

Traffic Planning and Design, Inc. (TPD) has completed a traffic signal warrant analysis for the intersection of Market Street (SR 0114) and Legacy Park Drive/Hemlock Drive in conjunction with the Legacy Park development in Mechanicsburg Borough, Cumberland County, PA. See **Figure 1** for a location map. As indicated in the *Legacy Park Transportation Impact Study*, prepared by TPD, Inc, and dated February 11, 2014, it was recommended that traffic signal warrants be monitored as development progresses on-site and at the time appliable signal warrants are met a traffic signal shall be installed. However, for PennDOT to allow signalization at an intersection, a full signal warrant analysis must be conducted, and necessary warrants must be met.

It should be noted that the approved L*egacy Park Transportation Impact Study* and associated land development plans assumed a full-movement local road connection to Despina Drive. This local road connection was completed and operational until recently, when Upper Allen Township modified the connection to restrict northbound (exiting) traffic from accessing this connection (see Figure F-1). As a result, a larger portion of Legacy Park traffic is forced to exit the development via Legacy Park Drive or other access connections further to the east.

Presently, the intersection of Market Street (SR 0114) and Legacy Park Drive/Hemlock Drive is a two-way stop-controlled intersection with stop control on the eastbound and westbound Legacy Park Drive/Hemlock Drive approaches. The posted speed limit on Market Street (SR 0114) (the major street) is 35 miles per hour (mph) and the posted speed limit on Legacy Park Drive is 25 mph. Hemlock Drive and Legacy Park Drive each currently provide a single-lane approach. The Legacy Park Drive egress approach is approximately 26' wide from curb to double-yellow including a single-lane approach and a wide gore area along the curbing to facilitate a potential future right-turn lane. Market Street (SR 0114) provides two-though lanes northbound and a single through lane southbound approaching the intersection.

The purpose of this analysis is to determine if signal warrants are currently or will be satisfied at the intersection of Market Street (SR 0114) and Legacy Park Drive/Hemlock Drive with the remaining build-out of the proposed Legacy Park Development. For purposes of this analysis, the remaining build-out

of Legacy Park was anticipated to occur by 2025 and includes construction of 131 single-family detached homes and 87 senior-adult detached homes (Phases 4-5).

EXISTING TRAFFIC CONDITIONS

A twelve-hour manual traffic count was conducted at the intersection of Market Street (SR 0114) and Legacy Park Drive/Hemlock Drive on Tuesday, October 3, 2023 from 6:00 A.M. – 6:00 P.M. The manual count was conducted while the weather was clear, and all local schools/universities were under normal operating schedules. Manual traffic count data is provided in **Appendix A**.

BASE (NO-BUILD) TRAFFIC CONDITIONS

A background growth factor for the roadways in the study area was developed based on growth factors for September 2023 to July 2024 obtained from the PennDOT Bureau of Planning and Research (BPR). The PennDOT BPR suggests using a background growth trend factor of 0.54% per year in Cumberland County for urban non-interstate roadways. As such, the background growth factor was applied annually to yield overall growth percentages of 1.08% (0.54% per year, compounded over 2 years) for the 2025 build-out year.

TRIP GENERATION

The trip generation rates for the proposed development were obtained from the manual *Trip Generation*, Eleventh Edition, 2017, an Institute of Transportation Engineers (ITE) Informational Report. The data are categorized by Land Use Codes, with total vehicular trips for a given land use estimated using an independent variable and statistically generated rates or equations.

For the remaining build-out of Legacy Park, Land Use Codes 210 Single-Family (Detached) and 251 Senior Adult (Detached) Housing from the *Trip Generation Manual* was used to calculate the number of vehicular trips the development will generate during the Average Weekday.

Trip generation calculations are provided in **Appendix B**.

TRIP DISTRIBUTION

The distribution of new trips generated by the proposed development were based on the trip distributions assumed in the *Legacy Park Transportation Impact Study*. The new trips associated with the remaining build-out of the development were distributed assuming 55% of the trips would use the Market Street (SR 0114) and Legacy Park Drive/Hemlock Drive intersection to enter/exit the site. Excerpts from the approved Legacy Park Transportation Impact Study are provided in **Appendix E.**

PROJECTED (BUILD) CONDITION TRAFFIC VOLUMES

TPD estimated the traffic volumes at the subject intersection and developed 12-hours of future traffic volumes by using the Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use from the *ITE Trip Generation Manual, 11th Edition* and the trip generation and distribution assumptions contained in this study.

The site-generated trips for the remaining build-out of the proposed development were added to the 2025 base (no-build) condition traffic volumes to calculate 2025 projected (build) condition traffic volumes. Traffic volume development worksheets are included in **Appendix C**.

TRAFFIC SIGNAL WARRANT ANALYSIS

The traffic signal warrant analysis was conducted at the intersection in accordance with PennDOT Publication 212, *Official Traffic Control Devices*, Subchapter D, "Highway Traffic Signals" and the 2009 MUTCD.

TPD examined traffic volumes at the intersection to determine if the following MUTCD signal warrants will be satisfied based on 2022 existing traffic volumes and 2025 design year traffic volume projections with full build-out of the development:

- Warrant 1, Eight-Hour Vehicular Volumes Warrant
  - Warrant 1A, Minimum Vehicular Volume;
  - Warrant 1B, Interruption of Continuous Traffic;
- Warrant 2, Four-Hour Vehicular Volume Warrant;
- Warrant 3, Peak Hour Volume Warrant;
- Warrant 7, Crash Experience.

Warrant 1 Eight-Hour Volume Warrant

Warrant 1A - Minimum Vehicular Volume

Warrant 1A, Minimum Vehicular Volume, is satisfied when, for each of any 8 hours of an average day, the traffic volumes on the major street exceed 500 vehicles per hour (both approaches) and the traffic volumes on the higher volume minor street or driveway approach to the intersection equal or exceed 150 vehicles per hour (one approach).

Warrant 1B - Interruption of Continuous Traffic

Warrant 1B, Interruption of Continuous Traffic, is satisfied when, for each of any 8 hours of an average day, the traffic volumes on the major street exceed 750 vehicles per hour (both approaches) and the traffic volumes on the higher volume minor street or driveway approach to the intersection equal or exceed 75 vehicles per hour (one approach).

Warrant 2 Four-Hour Volume Warrant

Warrant 2, Four-Hour Volume, is satisfied when for each of any four hours of an average day, the volumes are plotted on a graph which is provided as part of the warrant. If the plotted points all fall above the curve on the graph, then the warrant is met.

Warrant 3 Peak Hour Volume Warrant

Warrant 3, Peak Hour Volume, is intended for application when traffic conditions are such that for one hour of the day minor street traffic suffers undue delay in entering or crossing the major street. *It is usually only applied for unusual cases, such as office/industrial complexes or other facilities that attract/discharge a large amount of traffic during peak times*. To determine if the warrant is met, the volumes for both roadways are plotted on a graph which is provided as part of the warrant. If the plotted point falls above the curve on the graph, then the warrant is met.

Warrant 7 Crash Experience Warrant

Warrant 7, Crash Experience, is satisfied when five (5) or more crashes of types susceptible to correction by a traffic signal occur within a 12-month period during the most recent three (3) years of available crash data. The data for the analysis was obtained from PennDOT's Bureau of Highway Safety & Traffic Engineering (Crash Records System) for the most recent five years available (2018-2022).

It should be noted that in accordance with Section 4C.01 of the MUTCD (see excerpt below) the Legacy Park Drive approach to Market Street (SR 0114) was analyzed as a single-lane approach with 75% of right turning traffic excluded from the volume projections, given that the minor street approach is ~26' wide it provides a de-facto right-turn lane. As observed over the course of the manual count, motorists turning right from Legacy Park Drive routinely used the gore area to maneuver around through/left-turning vehicles and experienced minimal conflict/delay entering onto Market Street (SR 0114). As such, a significant right turn reduction is appropriate and were excluded from the traffic signal warrant analysis in accordance with Section 4C.01 of the MUTCD. ***The decision to exclude a portion of exiting right turn traffic from the signal warrant analysis was also discussed with Eric Kinard at PennDOT District 8-0, who confirmed that right turn traffic exiting Legacy Park Drive should be excluded due to the excess width and TPD's observations during the traffic counts.***

MUTCD Excerpt:

08 *The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the signal warrants listed in Paragraph 2.*

10 *Similar engineering judgment and rationale should be applied to a street approach with one through/left-turn lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.*

Signal Warrant Analysis Results

Existing (2023) Conditions

Based on existing condition traffic volumes obtained in October 2023, the results of the existing warrant analysis are as follows:

- Warrant 1A: exceeds threshold volumes for 0 hours, 8 hours needed **(Not Satisfied)**;
- Warrant 1B: exceeds threshold volumes for 2 hours, 8 hours needed **(Not Satisfied)**;
- Warrant 2: exceeds threshold volumes for 1 hour, 4 hours needed **(Not Satisfied)**;
- Warrant 3: exceeds threshold volumes for 0 hours **(Not Satisfied)**;
- Warrant 7: No reportable incidents over the last five years (2018-2022) **(Not Satisfied)**.

Projected (2025) Conditions with full build-out of Legacy Park

Based on the preliminary traffic analyses performed utilizing the 2025 build-out year traffic volume projections with development of the proposed site, the results of the warrant analysis are as follows:

- Warrant 1A: exceeds threshold volumes for 0 hour, 8 hours needed **(Not Satisfied)**;
- Warrant 1B: exceeds threshold volumes for 3 hours, 8 hours needed **(Not Satisfied)**;
- Warrant 2: exceeds threshold volumes for 2 hours, 4 hours needed **(Not Satisfied)**;
- Warrant 3: exceeds threshold volumes for 0 hours **(Not Satisfied)**;
- Warrant 7: No reportable incidents over the last five years (2018-2022) **(Not Satisfied)**.

As outlined above, traffic signal warrants are not currently or projected to be satisfied at the intersection of Market Street (SR 0114) and Legacy Park Drive/Hemlock Drive under 2025 Projected (Build) conditions. Relevant signal warrant analyses worksheets are included in **Appendix D**.

CONCLUSIONS AND RECOMMENDATIONS

- Based on this analysis, signal warrants **<u>are not currently or projected to be satisfied</u>** at the intersection of Market Street (SR 0114) and Legacy Park Drive/Hemlock Drive, even with the partial closure of Despina Drive. Therefore, a traffic signal cannot be installed at this intersection at this time.

We appreciate your review of the enclosed information. Additionally, if there are any questions or comments, please call at any time.

Sincerely,

TRAFFIC PLANNING AND DESIGN, INC.

Jason T. Wheeler, PTP
Project Manager
Jwheeler@TrafficPD.com

Attachments:

Appendix A - Traffic Count Data
Appendix B – Legacy Park Phasing Plan (Remaining Build-Out) Trip Generation
Appendix C – Volume Development
Appendix D – Signal Warrant Analysis Worksheets
Appendix E – Excerpts from *Legacy Park Transportation Impact Study*
Appendix F – Phasing Plan

Appendix A

Traffic Count Data

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 kyoung@trafficpd.com

Counter: MIO:
Set up by: KY:

Count Name: (1) 12 Hour Market Street SR 0114 x Hemlock Drive/Legacy Park Drive
Site Code:
Start Date: 10/03/2023

Turning Movement Data

Start Time	Hemlock Drive Eastbound					Legacy Park Drive Westbound					S Market Street SR 0114 Northbound					S Market Street SR 0114 Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
6:00 AM	0	0	2	0	2	7	0	2	0	9	0	42	2	0	44	2	37	0	0	39	94
6:15 AM	0	0	0	0	0	11	0	6	1	17	0	44	4	0	48	0	30	0	0	30	95
6:30 AM	0	0	1	0	1	6	0	4	0	10	0	75	8	0	83	1	74	0	0	75	169
6:45 AM	5	0	1	0	6	16	0	6	0	22	1	98	9	0	108	1	81	1	0	83	219
Hourly Total	5	0	4	0	9	40	0	18	1	58	1	259	23	0	283	4	222	1	0	227	577
7:00 AM	0	0	2	0	2	17	0	9	0	26	0	156	1	0	157	1	68	0	0	69	254
7:15 AM	0	0	0	0	0	16	0	14	0	30	1	193	2	0	196	1	92	1	0	94	320
7:30 AM	0	0	1	0	1	14	0	16	0	30	0	207	9	0	216	3	188	1	0	192	439
7:45 AM	0	1	5	0	6	19	0	9	0	28	0	185	13	0	198	5	156	1	2	162	394
Hourly Total	0	1	8	0	9	66	0	48	0	114	1	741	25	0	767	10	504	3	2	517	1407
8:00 AM	0	0	2	0	2	24	0	7	0	31	0	134	14	0	148	3	158	3	0	164	345
8:15 AM	0	0	5	0	5	16	0	7	0	23	0	179	10	0	189	7	127	1	0	135	352
8:30 AM	0	0	2	0	2	12	0	7	1	19	2	125	10	0	137	3	89	0	0	92	250
8:45 AM	0	0	1	0	1	10	0	6	0	16	1	142	7	0	150	2	85	1	0	88	255
Hourly Total	0	0	10	0	10	62	0	27	1	89	3	580	41	0	624	15	459	5	0	479	1202
9:00 AM	0	0	0	0	0	13	0	4	5	17	0	107	10	0	117	3	90	0	0	93	227
9:15 AM	0	0	0	0	0	10	0	8	0	18	0	127	5	0	132	6	88	0	0	94	244
9:30 AM	0	0	0	0	0	13	0	7	0	20	0	110	5	0	115	4	80	2	0	86	221
9:45 AM	1	0	0	0	1	5	0	6	0	11	2	122	7	0	131	4	98	0	0	102	245
Hourly Total	1	0	0	0	1	41	0	25	5	66	2	466	27	0	495	17	356	2	0	375	937
10:00 AM	0	0	0	0	0	3	0	8	0	11	0	116	4	0	120	1	81	0	0	82	213
10:15 AM	0	0	1	0	1	5	0	3	0	8	0	104	4	0	108	2	84	1	0	87	204
10:30 AM	0	0	2	0	2	5	0	3	0	8	2	110	9	0	121	2	96	0	0	98	229
10:45 AM	0	0	0	0	0	7	0	7	0	14	0	118	3	0	121	3	91	1	0	95	230
Hourly Total	0	0	3	0	3	20	0	21	0	41	2	448	20	0	470	8	352	2	0	362	876
11:00 AM	1	0	2	0	3	10	0	4	1	14	1	109	11	0	121	5	108	1	0	114	252
11:15 AM	1	0	0	0	1	7	0	4	0	11	1	117	5	0	123	1	92	2	0	95	230
11:30 AM	1	0	0	1	1	8	0	12	0	20	1	134	10	0	145	4	106	1	0	111	277
11:45 AM	0	0	0	0	0	10	0	6	0	16	0	147	16	0	163	6	119	0	0	125	304
Hourly Total	3	0	2	1	5	35	0	26	1	61	3	507	42	0	552	16	425	4	0	445	1063
12:00 PM	0	0	1	0	1	7	0	9	0	16	0	126	14	0	140	4	112	2	0	118	275
12:15 PM	0	0	1	0	1	12	0	9	1	21	0	114	10	0	124	3	104	1	0	108	254
12:30 PM	1	0	0	0	1	2	0	4	1	6	2	120	7	0	129	7	105	1	0	113	249
12:45 PM	1	0	0	0	1	17	0	12	0	29	0	107	14	0	121	4	115	1	0	120	271
Hourly Total	2	0	2	0	4	38	0	34	2	72	2	467	45	0	514	18	436	5	0	459	1049
1:00 PM	0	0	0	0	0	7	0	7	1	14	0	135	6	0	141	7	112	1	0	120	275
1:15 PM	0	0	2	0	2	11	0	5	0	16	1	134	12	0	147	5	107	0	0	112	277
1:30 PM	0	0	0	0	0	9	0	6	0	15	0	126	10	0	136	3	110	2	0	115	266
1:45 PM	0	0	0	1	0	4	0	5	0	9	0	141	7	0	148	4	92	3	0	99	256
Hourly Total	0	0	2	1	2	31	0	23	1	54	1	536	35	0	572	19	421	6	0	446	1074
2:00 PM	2	0	2	0	4	1	0	6	0	7	2	133	9	0	144	3	115	0	0	118	273
2:15 PM	0	0	0	0	0	9	0	3	0	12	1	181	5	0	187	5	129	1	0	135	334
2:30 PM	0	0	2	0	2	12	0	7	0	19	0	166	5	0	171	10	155	0	0	165	357
2:45 PM	0	0	0	0	0	7	0	4	0	11	1	137	13	0	151	6	142	1	0	149	311
Hourly Total	2	0	4	0	6	29	0	20	0	49	4	617	32	0	653	24	541	2	0	567	1275
3:00 PM	0	1	0	0	1	14	1	6	0	21	1	133	12	0	146	2	150	0	0	152	320
3:15 PM	0	0	2	1	2	7	0	4	0	11	0	159	11	0	170	5	140	1	0	146	329
3:30 PM	2	0	0	0	2	7	0	9	1	16	0	190	9	0	199	7	157	4	0	168	385
3:45 PM	0	0	3	0	3	6	1	4	0	11	0	185	19	0	204	2	118	2	0	122	340
Hourly Total	2	1	5	1	8	34	2	23	1	59	1	667	51	0	719	16	565	7	0	588	1374
4:00 PM	1	0	0	1	1	11	0	8	0	19	2	171	8	0	181	3	138	1	0	142	343
4:15 PM	1	0	0	0	1	8	0	8	0	16	3	185	14	0	202	8	139	1	0	148	367
4:30 PM	0	0	0	0	0	11	0	9	0	20	1	184	20	0	205	9	174	3	0	186	411
4:45 PM	0	1	4	0	5	7	0	6	0	13	4	153	20	1	177	2	169	3	0	174	369
Hourly Total	2	1	4	1	7	37	0	31	0	68	10	693	62	1	765	22	620	8	0	650	1490
5:00 PM	2	0	2	0	4	12	0	15	0	27	3	216	21	4	240	3	180	1	0	184	455
5:15 PM	0	0	0	0	0	8	0	7	0	15	0	183	27	0	210	10	160	1	0	171	396
5:30 PM	2	1	0	0	3	9	0	6	1	15	1	199	22	0	222	7	146	1	0	154	394
5:45 PM	0	0	1	0	1	13	0	10	0	23	1	138	18	0	157	9	134	1	0	144	325
Hourly Total	4	1	3	0	8	42	0	38	1	80	5	736	88	4	829	29	620	4	0	653	1570

Grand Total	21	4	47	4	72	475	2	334	13	811	35	6717	491	5	7243	198	5521	49	2	5768	13894
Approach %	29.2	5.6	65.3	-	-	58.6	0.2	41.2	-	-	0.5	92.7	6.8	-	-	3.4	95.7	0.8	-	-	-
Total %	0.2	0.0	0.3	-	0.5	3.4	0.0	2.4	-	5.8	0.3	48.3	3.5	-	52.1	1.4	39.7	0.4	-	41.5	-
Lights	19	4	44	-	67	457	1	328	-	786	35	6544	472	-	7051	194	5351	39	-	5584	13488
% Lights	90.5	100.0	93.6	-	93.1	96.2	50.0	98.2	-	96.9	100.0	97.4	96.1	-	97.3	98.0	96.9	79.6	-	96.8	97.1
Other Vehicles	2	0	3	-	5	18	1	6	-	25	0	173	19	-	192	4	170	10	-	184	406
% Other Vehicles	9.5	0.0	6.4	-	6.9	3.8	50.0	1.8	-	3.1	0.0	2.6	3.9	-	2.7	2.0	3.1	20.4	-	3.2	2.9
Pedestrians	-	-	-	4	-	-	-	-	13	-	-	-	-	5	-	-	-	-	2	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-

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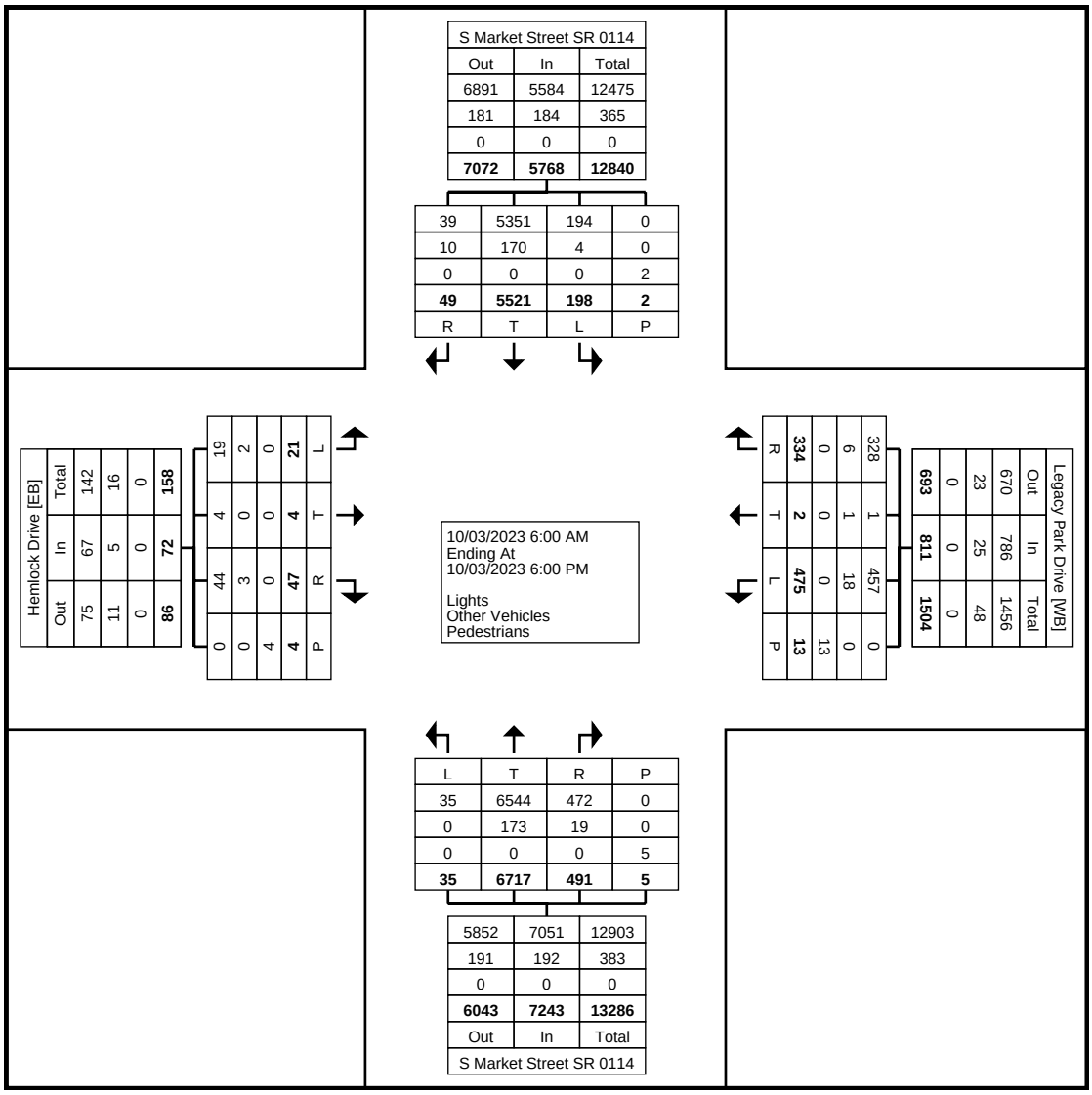
610.326.3100 kyoung@trafficpd.com

Counter: MIO:
Set up by: KY:

Count Name: (1) 12 Hour Market Street SR 0114 x Hemlock Drive/Legacy Park Drive
Site Code:
Start Date: 10/03/2023



Turning Movement Data Plot

Traffic Planning and Design, Inc
2500 East High Street
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610.326.3100 kyoung@trafficpd.com

Counter: MIO:
Set up by: KY:

Count Name: (1) 12 Hour Market Street SR 0114 x Hemlock Drive/Legacy Park Drive
Site Code:
Start Date: 10/03/2023

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Hemlock Drive Eastbound					Legacy Park Drive Westbound					S Market Street SR 0114 Northbound					S Market Street SR 0114 Southbound					
	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
7:30 AM	0	0	1	0	1	14	0	16	0	30	0	207	9	0	216	3	188	1	0	192	439
7:45 AM	0	1	5	0	6	19	0	9	0	28	0	185	13	0	198	5	156	1	2	162	394
8:00 AM	0	0	2	0	2	24	0	7	0	31	0	134	14	0	148	3	158	3	0	164	345
8:15 AM	0	0	5	0	5	16	0	7	0	23	0	179	10	0	189	7	127	1	0	135	352
Total	0	1	13	0	14	73	0	39	0	112	0	705	46	0	751	18	629	6	2	653	1530
Approach %	0.0	7.1	92.9	-	-	65.2	0.0	34.8	-	-	0.0	93.9	6.1	-	-	2.8	96.3	0.9	-	-	-
Total %	0.0	0.1	0.8	-	0.9	4.8	0.0	2.5	-	7.3	0.0	46.1	3.0	-	49.1	1.2	41.1	0.4	-	42.7	-
PHF	0.000	0.250	0.650	-	0.583	0.760	0.000	0.609	-	0.903	0.000	0.851	0.821	-	0.869	0.643	0.836	0.500	-	0.850	0.871
Lights	0	1	13	-	14	69	0	39	-	108	0	676	43	-	719	18	597	4	-	619	1460
% Lights	-	100.0	100.0	-	100.0	94.5	-	100.0	-	96.4	-	95.9	93.5	-	95.7	100.0	94.9	66.7	-	94.8	95.4
Other Vehicles	0	0	0	-	0	4	0	0	-	4	0	29	3	-	32	0	32	2	-	34	70
% Other Vehicles	-	0.0	0.0	-	0.0	5.5	-	0.0	-	3.6	-	4.1	6.5	-	4.3	0.0	5.1	33.3	-	5.2	4.6
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

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Counter: MIO:
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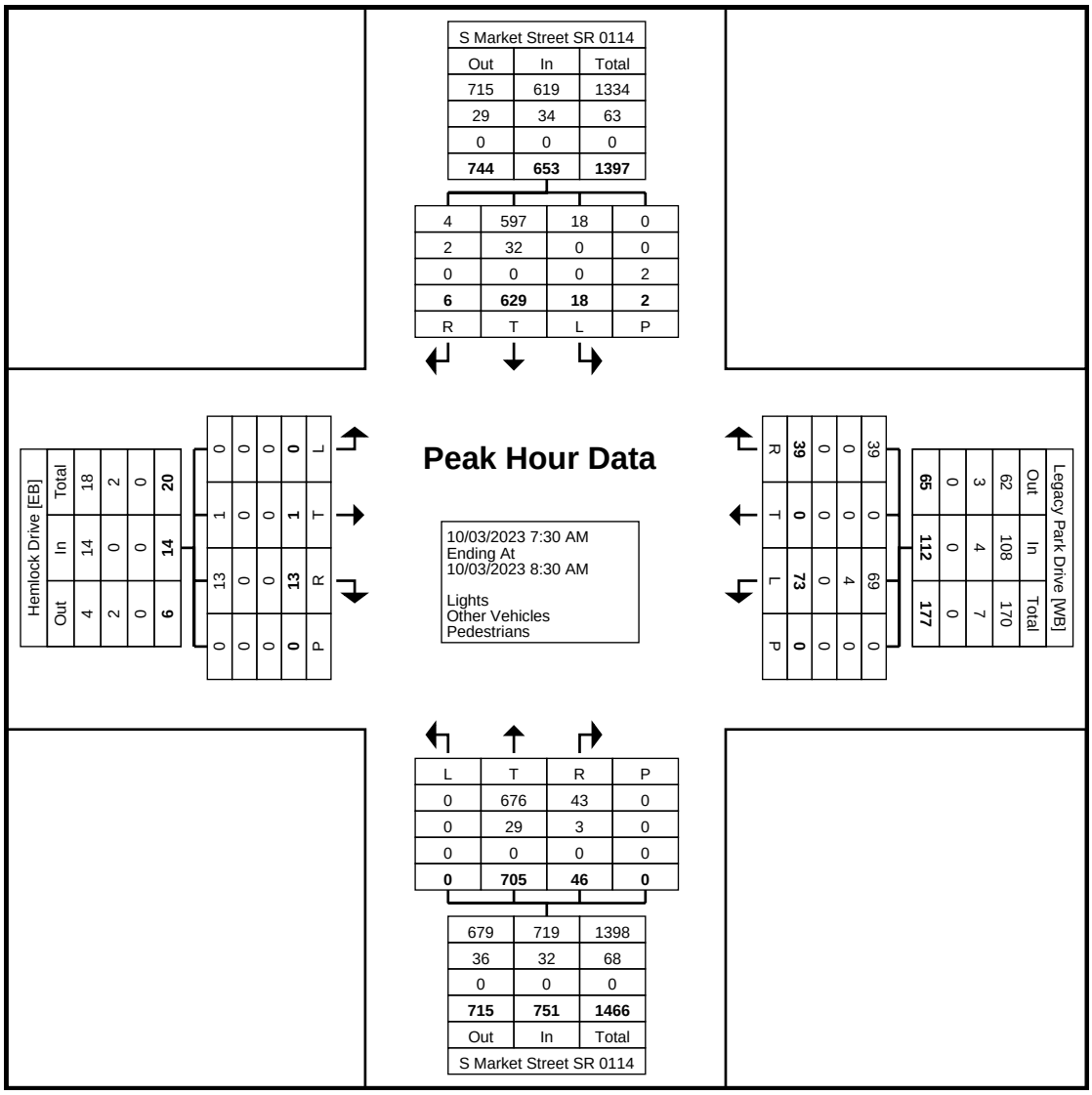
Count Name: (1) 12 Hour Market Street SR 0114 x Hemlock Drive/Legacy Park Drive
Site Code:
Start Date: 10/03/2023



Turning Movement Peak Hour Data Plot (7:30 AM)

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 kyoung@trafficpd.com

Counter: MIO:
Set up by: KY:

Count Name: (1) 12 Hour Market Street SR 0114 x Hemlock Drive/Legacy Park Drive
Site Code:
Start Date: 10/03/2023

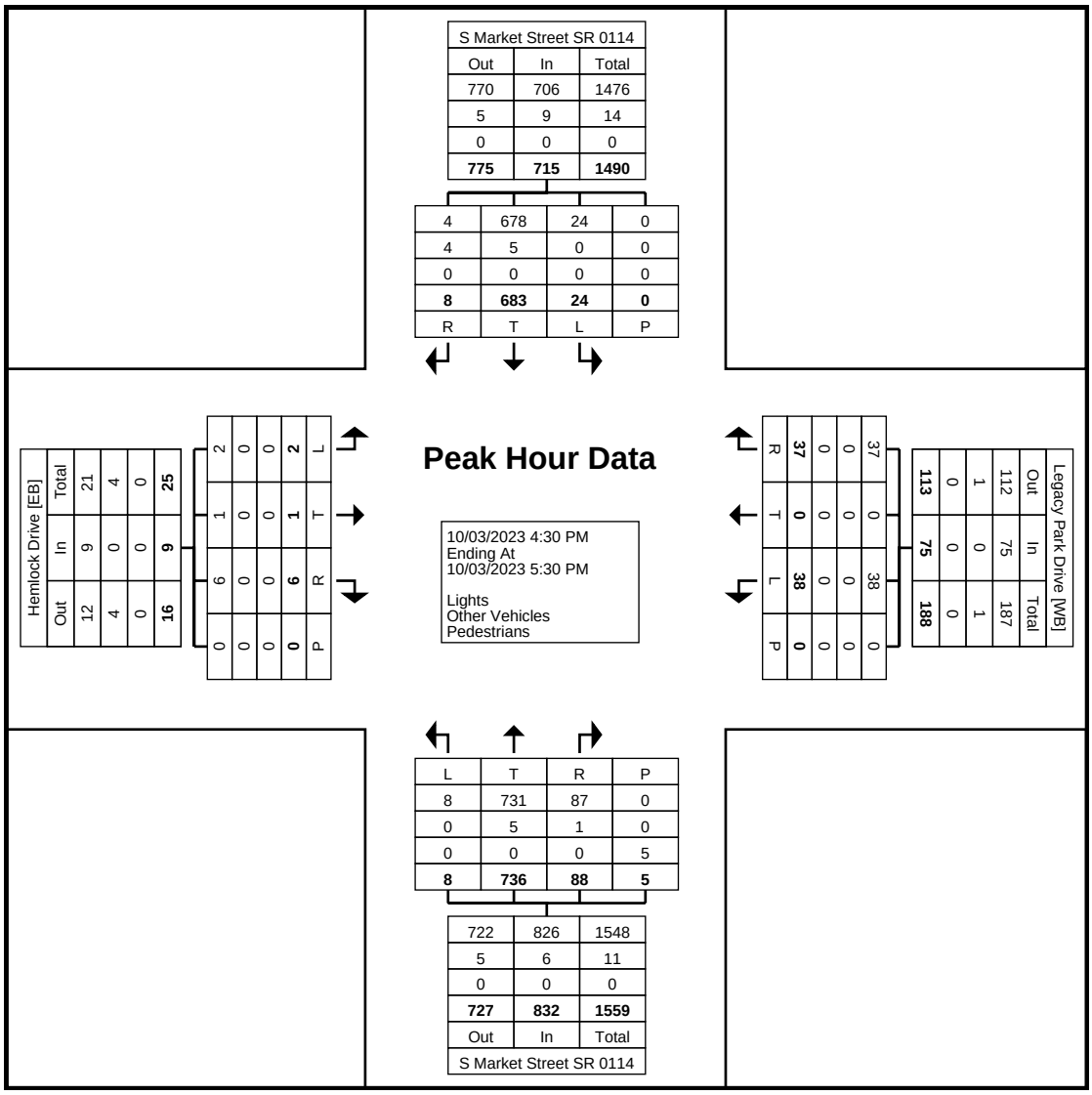
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Hemlock Drive Eastbound					Legacy Park Drive Westbound					S Market Street SR 0114 Northbound					S Market Street SR 0114 Southbound					
	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
4:30 PM	0	0	0	0	0	11	0	9	0	20	1	184	20	0	205	9	174	3	0	186	411
4:45 PM	0	1	4	0	5	7	0	6	0	13	4	153	20	1	177	2	169	3	0	174	369
5:00 PM	2	0	2	0	4	12	0	15	0	27	3	216	21	4	240	3	180	1	0	184	455
5:15 PM	0	0	0	0	0	8	0	7	0	15	0	183	27	0	210	10	160	1	0	171	396
Total	2	1	6	0	9	38	0	37	0	75	8	736	88	5	832	24	683	8	0	715	1631
Approach %	22.2	11.1	66.7	-	-	50.7	0.0	49.3	-	-	1.0	88.5	10.6	-	-	3.4	95.5	1.1	-	-	-
Total %	0.1	0.1	0.4	-	0.6	2.3	0.0	2.3	-	4.6	0.5	45.1	5.4	-	51.0	1.5	41.9	0.5	-	43.8	-
PHF	0.250	0.250	0.375	-	0.450	0.792	0.000	0.617	-	0.694	0.500	0.852	0.815	-	0.867	0.600	0.949	0.667	-	0.961	0.896
Lights	2	1	6	-	9	38	0	37	-	75	8	731	87	-	826	24	678	4	-	706	1616
% Lights	100.0	100.0	100.0	-	100.0	100.0	-	100.0	-	100.0	100.0	99.3	98.9	-	99.3	100.0	99.3	50.0	-	98.7	99.1
Other Vehicles	0	0	0	-	0	0	0	0	-	0	0	5	1	-	6	0	5	4	-	9	15
% Other Vehicles	0.0	0.0	0.0	-	0.0	0.0	-	0.0	-	0.0	0.0	0.7	1.1	-	0.7	0.0	0.7	50.0	-	1.3	0.9
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	5	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-

Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 kyoung@trafficpd.com

Counter: MIO:
Set up by: KY:

Count Name: (1) 12 Hour Market Street SR 0114 x Hemlock Drive/Legacy Park Drive
Site Code:
Start Date: 10/03/2023



Turning Movement Peak Hour Data Plot (4:30 PM)

Appendix B

Trip Generation (Remaining Build-Out)

Date: 10/17/23
Project: Legacy Park
TPD #: LMBU.0003

Trip Generation Calculations:
Remaining Build-Out

Average Weekday

Land Use	ITE #	Size (X)		Rate/Equation		Total Trips			
				a	b	Total	Enter %	Enter	Exit
Single Family Detached Homes	210	131	Units	0.92	2.68	1294	50%	647	647
Senior Adult Housing - SF Detached	251	87	Units	0.85	2.47	526	50%	263	263
Total						**1820**		**910**	**910**

Appendix C

Volume Development

Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use

Source: ITE Trip Generation Manual, 11th Edition

Land Use Code	210
Land Use	Single-Family Detached Housing
Setting	General Urban/Suburban
Time Period	Weekday
Trip Type	New Trips
# Data Sites	7

Based on 131 dwelling units

	Enter	Exit
	647	647

	% of 24-Hour Traffic		Total Trips	
Time	Entering	Exiting	Entering	Exiting
6-7 AM	1.6	5.8	10	38
7-8 AM	3.1	10.0	20	65
8-9 AM	3.8	8.5	25	55
9-10 AM	3.3	5.8	21	38
10-11 AM	4.2	5.6	27	36
11-12 PM	5.4	5.1	35	33
12-1 PM	5.7	5.7	37	37
1-2 PM	6.1	6.0	39	39
2-3 PM	7.1	6.1	46	39
3-4 PM	8.7	6.2	56	40
4-5 PM	10.5	7.4	68	48
5-6 PM	10.0	7.3	65	47

Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use

Source: ITE Trip Generation Manual, 11th Edition

Land Use Code	251
Land Use	Senior Adult Housing - Single-Family
Setting	General Urban/Suburban
Time Period	Weekday
Trip Type	New Trips
# Data Sites	8

Based on 87 dwelling units

	Enter	Exit
	263	263

	% of 24-Hour Traffic		Total Trips	
Time	Entering	Exiting	Entering	Exiting
6-7 AM	1.0	3.7	3	10
7-8 AM	2.8	8.0	7	21
8-9 AM	3.9	8.8	10	23
9-10 AM	5.2	8.4	14	22
10-11 AM	6.1	8.1	16	21
11-12 PM	7.1	7.9	19	21
12-1 PM	7.8	7.9	21	21
1-2 PM	7.3	7.3	19	19
2-3 PM	7.8	7.0	21	18
3-4 PM	9.0	6.8	24	18
4-5 PM	9.4	6.2	25	16
5-6 PM	9.4	6.1	25	16

Hourly Distribution of Entering and Exiting Vehicle Trips

Legacy Park		
Remaining Build-Out		
	Total Trips	
Time	Entering	Exiting
6-7 AM	13	47
7-8 AM	27	86
8-9 AM	35	78
9-10 AM	35	60
10-11 AM	43	58
11-12 PM	54	54
12-1 PM	57	58
1-2 PM	59	58
2-3 PM	66	58
3-4 PM	80	58
4-5 PM	93	64
5-6 PM	89	63

	Entering Trips		Exiting Trips	
Movement	SB L	NB R	WB L	WB R
Trip Distribution %	25%	30%	30%	6%
Time				
6-7 AM	3	4	14	3
7-8 AM	7	8	26	5
8-9 AM	9	10	23	5
9-10 AM	9	11	18	4
10-11 AM	11	13	17	3
11-12 PM	13	16	16	3
12-1 PM	14	17	17	3
1-2 PM	15	18	17	3
2-3 PM	17	20	17	3
3-4 PM	20	24	17	3
4-5 PM	23	28	19	4
5-6 PM	22	27	19	4

WB R reduced from 25% to 6% to account for Right Turn Volume Exclusion

Hourly Distribution of Entering and Exiting Vehicle Trips

Remaining Build-out of Legacy Park

Movement	SB L	NB R	WB R	WB L
Time				
6-7 AM	3	4	3	14
7-8 AM	7	8	5	26
8-9 AM	9	10	5	23
9-10 AM	9	11	4	18
10-11 AM	11	13	3	17
11-12 PM	13	16	3	16
12-1 PM	14	17	3	17
1-2 PM	15	18	3	17
2-3 PM	17	20	3	17
3-4 PM	20	24	3	17
4-5 PM	23	28	4	19
5-6 PM	22	27	4	19

Hourly Volume Development for Signal Warrant Analysis

S. Market Street (SR 0114) & Legacy Park Drive

	2023 Existing Volumes					**2025 Base No-Build Conditions (Existing Volume *Growth Factor)**					**2025 Projected Build Conditions Base Volume + Site Trips**			
Time	Northbound	Southbound	Eastbound	Westbound*	Growth Rate	Northbound	Southbound	Eastbound	Westbound	**Time**	Northbound	Southbound	Eastbound	Westbound
6-7 AM	283	227	9	45	1.0108	286	229	9	45	6-7 AM	290	233	9	62
7-8 AM	767	517	9	78		775	523	9	78	7-8 AM	784	529	9	109
8-9 AM	624	479	10	69		631	484	10	69	8-9 AM	641	493	10	97
9-10 AM	495	375	1	48		500	379	1	48	9-10 AM	511	388	1	69
10-11 AM	470	362	3	26		475	366	3	26	10-11 AM	488	377	3	47
11-12 PM	552	445	5	42		558	450	5	42	11-12 PM	574	463	5	61
12-1 PM	514	459	4	47		520	464	4	47	12-1 PM	537	478	4	68
1-2 PM	572	446	2	37		578	451	2	37	1-2 PM	596	465	2	58
2-3 PM	653	567	6	34		660	573	6	34	2-3 PM	680	590	6	55
3-4 PM	719	588	8	42		727	594	8	42	3-4 PM	751	614	8	63
4-5 PM	765	650	7	45		773	657	7	45	4-5 PM	801	680	7	68
5-6 PM	829	653	8	52		838	660	8	52	5-6 PM	865	682	8	75

*= Assumes 75% Right Turns Excluded

Appendix D

Signal Warrant Analysis

Traffic Signal Warrant Analysis Workbook

2023 Existing Conditions

STUDY AND ANALYSIS INFORMATION

Municipality:	Mechanicsburg Borough	**Analysis Date:**	10/16/2023
County:	Cumberland County	**Conducted By:**	JW
PennDOT Engineering District:	8	**Agency/Company Name:**	TPD

Analysis Information

Data Collection Date:	10/3/2023
Day of the Week:	Tuesday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Major Street Information

Major Street Name and Route Number:	Market Street (SR 0114)
Major Street Approach #1 Direction:	N-Bound
Major Street Approach #2 Direction:	S-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach:	1	**LANE(S)**
Speed Limit or 85th Percentile Speed on the Major Street:	35	**MPH**

Minor Street Information

Minor Street Name and Route Number:	Hemlock Drive/Legacy Park Drive
Minor Street Approach #1 Direction:	E-Bound
Minor Street Approach #2 Direction:	W-Bound

Number of Lanes for Moving Traffic on Each Minor Street Approach:	1	**LANE(S)**

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Met?
Warrant 1, Eight-Hour Vehicular Volume	**Yes**	**No**
Warrant 2, Four-Hour Vehicular Volume	**Yes**	**No**
Warrant 3, Peak Hour	**Yes**	**No**
Warrant 4, Pedestrian Volume	**No**	**N/A**
Warrant 5, School Crossing	**No**	**N/A**
Warrant 6, Coordinated Signal System	**No**	**N/A**
Warrant 7, Crash Experience	**Yes**	**No**
Warrant 8, Roadway Network	**No**	**N/A**
Warrant 9, Intersection Near a Grade Crossing	**No**	**N/A**
Warrant PA-1, ADT Volume Warrant	**No**	**N/A**
Warrant PA-2, Midblock and Trail Crossings	**No**	**N/A**

Traffic Signal Warrant Analysis Workbook

2023 Existing Conditions

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 AM	12:14 AM			0		
12:15 AM	12:29 AM			0		
12:30 AM	12:44 AM			0		
12:45 AM	12:59 AM			0		
1:00 AM	1:14 AM			0		
1:15 AM	1:29 AM			0		
1:30 AM	1:44 AM			0		
1:45 AM	1:59 AM			0		
2:00 AM	2:14 AM			0		
2:15 AM	2:29 AM			0		
2:30 AM	2:44 AM			0		
2:45 AM	2:59 AM			0		
3:00 AM	3:14 AM			0		
3:15 AM	3:29 AM			0		
3:30 AM	3:44 AM			0		
3:45 AM	3:59 AM			0		
4:00 AM	4:14 AM			0		
4:15 AM	4:29 AM			0		
4:30 AM	4:44 AM			0		
4:45 AM	4:59 AM			0		
5:00 AM	5:14 AM			0		
5:15 AM	5:29 AM			0		
5:30 AM	5:44 AM			0		
5:45 AM	5:59 AM			0		
6:00 AM	6:14 AM	44	39	83	2	8
6:15 AM	6:29 AM	48	30	78	0	13
6:30 AM	6:44 AM	83	75	158	1	7
6:45 AM	6:59 AM	108	83	191	6	20
7:00 AM	7:14 AM	157	69	226	2	19
7:15 AM	7:29 AM	196	94	290	0	20
7:30 AM	7:44 AM	216	192	408	1	18
7:45 AM	7:59 AM	198	162	360	6	21
8:00 AM	8:14 AM	148	164	312	2	26
8:15 AM	8:29 AM	189	135	324	5	18
8:30 AM	8:44 AM	137	92	229	2	14
8:45 AM	8:59 AM	150	88	238	1	12
9:00 AM	9:14 AM	117	93	210	0	14
9:15 AM	9:29 AM	132	94	226	0	12
9:30 AM	9:44 AM	115	86	201	0	15
9:45 AM	9:59 AM	131	102	233	1	7
10:00 AM	10:14 AM	120	82	202	0	5
10:15 AM	10:29 AM	108	87	195	1	6
10:30 AM	10:44 AM	121	98	219	2	6
10:45 AM	10:59 AM	121	95	216	0	9
11:00 AM	11:14 AM	121	114	235	3	11
11:15 AM	11:29 AM	123	95	218	1	8
11:30 AM	11:44 AM	145	111	256	1	11
11:45 AM	11:59 AM	163	125	288	0	12

Traffic Signal Warrant Analysis Workbook

2023 Existing Conditions

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 PM	12:14 PM	140	118	258	1	10
12:15 PM	12:29 PM	124	108	232	1	15
12:30 PM	12:44 PM	129	113	242	1	3
12:45 PM	12:59 PM	121	120	241	1	20
1:00 PM	1:14 PM	141	120	261	0	9
1:15 PM	1:29 PM	147	112	259	2	12
1:30 PM	1:44 PM	136	115	251	0	11
1:45 PM	1:59 PM	148	99	247	0	5
2:00 PM	2:14 PM	144	118	262	4	3
2:15 PM	2:29 PM	187	135	322	0	10
2:30 PM	2:44 PM	171	165	336	2	14
2:45 PM	2:59 PM	151	149	300	0	8
3:00 PM	3:14 PM	146	152	298	1	17
3:15 PM	3:29 PM	170	146	316	2	8
3:30 PM	3:44 PM	199	168	367	2	9
3:45 PM	3:59 PM	204	122	326	3	8
4:00 PM	4:14 PM	181	142	323	1	13
4:15 PM	4:29 PM	202	148	350	1	10
4:30 PM	4:44 PM	205	186	391	0	13
4:45 PM	4:59 PM	177	174	351	5	9
5:00 PM	5:14 PM	240	184	424	4	16
5:15 PM	5:29 PM	210	171	381	0	10
5:30 PM	5:44 PM	222	154	376	3	11
5:45 PM	5:59 PM	157	144	301	1	16
6:00 PM	6:14 PM			0		
6:15 PM	6:29 PM			0		
6:30 PM	6:44 PM			0		
6:45 PM	6:59 PM			0		
7:00 PM	7:14 PM			0		
7:15 PM	7:29 PM			0		
7:30 PM	7:44 PM			0		
7:45 PM	7:59 PM			0		
8:00 PM	8:14 PM			0		
8:15 PM	8:29 PM			0		
8:30 PM	8:44 PM			0		
8:45 PM	8:59 PM			0		
9:00 PM	9:14 PM			0		
9:15 PM	9:29 PM			0		
9:30 PM	9:44 PM			0		
9:45 PM	9:59 PM			0		
10:00 PM	10:14 PM			0		
10:15 PM	10:29 PM			0		
10:30 PM	10:44 PM			0		
10:45 PM	10:59 PM			0		
11:00 PM	11:14 PM			0		
11:15 PM	11:29 PM			0		
11:30 PM	11:44 PM			0		
11:45 PM	11:59 PM			0		
	Approach Totals:	7243	5768	13011	72	572

2023 Existing Conditions

MUTCD WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Combination of Conditions A and B Necessary?*: No

**Only applicable for Warrant 1 if after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems. See Section 4C.02 of the 2009 MUTCD for application.*

Condition A - Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or More	1	600	480	420	336	150	120	105	84
2 or More	2 or More	600	480	420	336	200	160	140	112
1	2 or More	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or More	1	900	720	630	504	75	60	53	42
2 or More	2 or More	900	720	630	504	100	80	70	56
1	2 or More	750	600	525	420	100	80	70	56

Condition A Evaluation

Number of Unique Hours Met: 0 **Condition A Satisfied?** No

Condition B Evaluation

Number of Unique Hours Met: 2 **Condition B Satisfied?** No

Combination of Condition A and Condition B Evaluation

Number of Unique Hours Met for Condition A: N/A

Number of Unique Hours Met for Condition B: N/A

Combination of Condition A and Condition B Satisfied? N/A

2023 Existing Conditions

MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Total Number of Unique Hours Met On Figure 4C-1
1

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

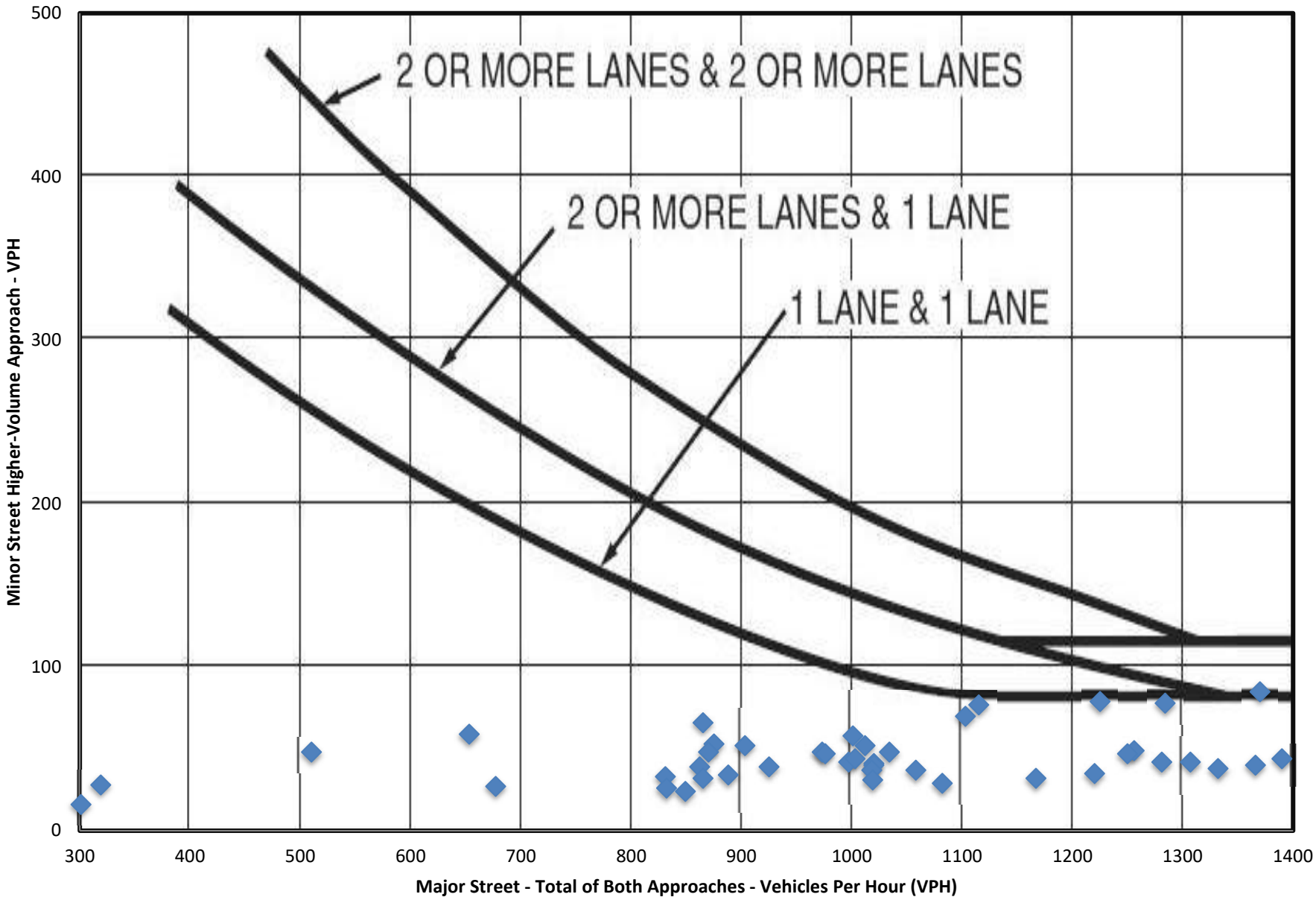
Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	83	8	
5:30 AM	161	21	
5:45 AM	319	28	
6:00 AM	510	48	
6:15 AM	653	59	
6:30 AM	865	66	
6:45 AM	1115	77	
7:00 AM	1284	78	
7:15 AM	1370	85	Met
7:30 AM	1404	83	Met
7:45 AM	1225	79	
8:00 AM	1103	70	
8:15 AM	1001	58	
8:30 AM	903	52	
8:45 AM	875	53	
9:00 AM	870	48	
9:15 AM	862	39	
9:30 AM	831	33	
9:45 AM	849	24	
10:00 AM	832	26	
10:15 AM	865	32	
10:30 AM	888	34	
10:45 AM	925	39	
11:00 AM	997	42	
11:15 AM	1020	41	
11:30 AM	1034	48	
11:45 AM	1020	40	

2023 Existing Conditions

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 PM	973	48	
12:15 PM	976	47	
12:30 PM	1003	44	
12:45 PM	1012	52	
1:00 PM	1018	37	
1:15 PM	1019	31	
1:30 PM	1082	29	
1:45 PM	1167	32	
2:00 PM	1220	35	
2:15 PM	1256	49	
2:30 PM	1250	47	
2:45 PM	1281	42	
3:00 PM	1307	42	
3:15 PM	1332	38	
3:30 PM	1366	40	
3:45 PM	1390	44	
4:00 PM	1415	45	
4:15 PM	1516	48	
4:30 PM	1547	48	
4:45 PM	1532	46	
5:00 PM	1482	53	
5:15 PM	1058	37	
5:30 PM	677	27	
5:45 PM	301	16	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

2023 Existing Conditions

MUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



2023 Existing Conditions

MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No
Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	Yes

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	No
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	N/A
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	N/A
**If applicable, attach all supporting calculations and documentation.*	

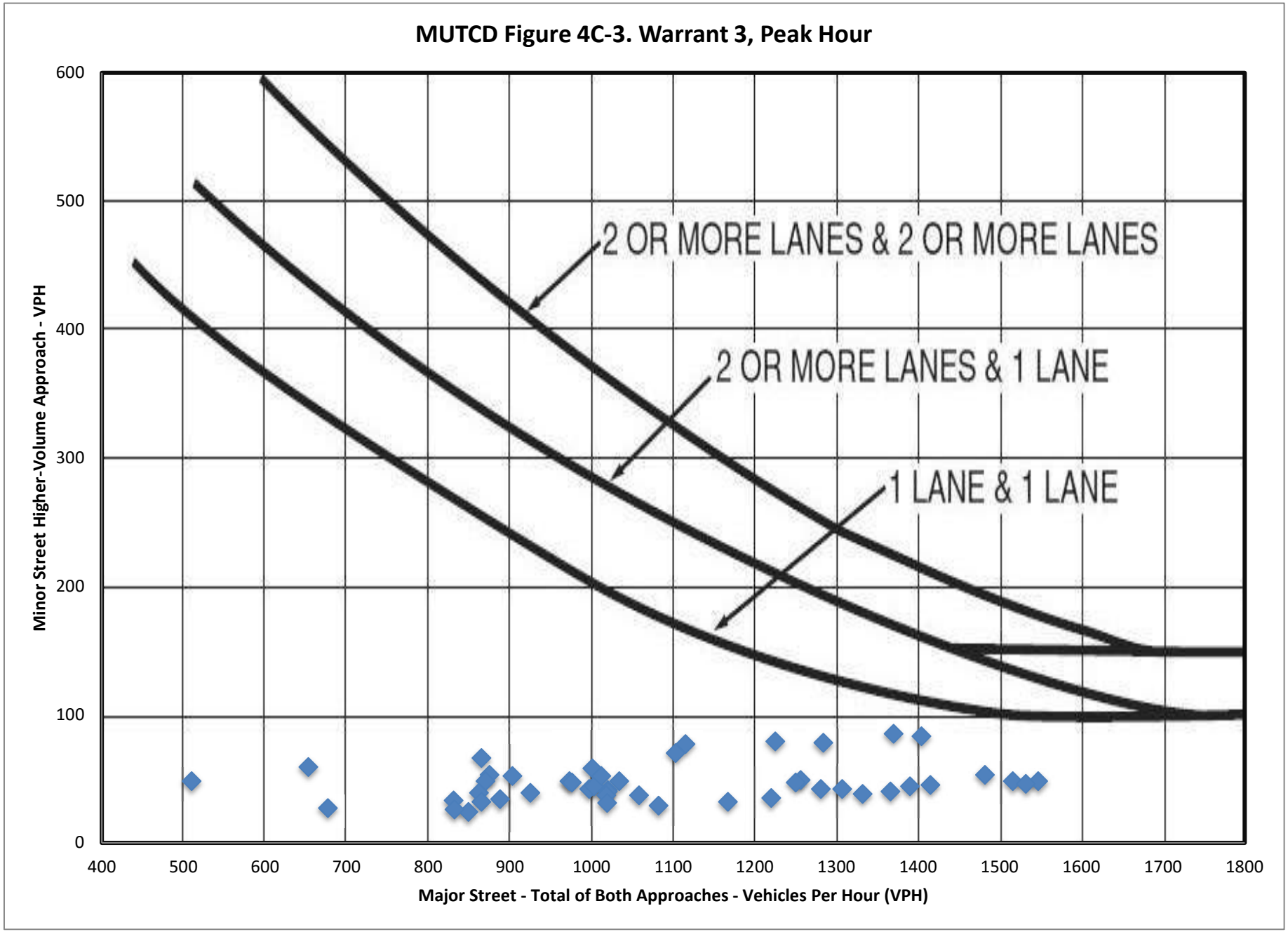
Total Number of Unique Hours Met On Figure 4C-3
0

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	83	8	
5:30 AM	161	21	
5:45 AM	319	28	
6:00 AM	510	48	
6:15 AM	653	59	
6:30 AM	865	66	
6:45 AM	1115	77	
7:00 AM	1284	78	
7:15 AM	1370	85	
7:30 AM	1404	83	
7:45 AM	1225	79	
8:00 AM	1103	70	
8:15 AM	1001	58	

2023 Existing Conditions

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
8:30 AM	903	52	
8:45 AM	875	53	
9:00 AM	870	48	
9:15 AM	862	39	
9:30 AM	831	33	
9:45 AM	849	24	
10:00 AM	832	26	
10:15 AM	865	32	
10:30 AM	888	34	
10:45 AM	925	39	
11:00 AM	997	42	
11:15 AM	1020	41	
11:30 AM	1034	48	
11:45 AM	1020	40	
12:00 PM	973	48	
12:15 PM	976	47	
12:30 PM	1003	44	
12:45 PM	1012	52	
1:00 PM	1018	37	
1:15 PM	1019	31	
1:30 PM	1082	29	
1:45 PM	1167	32	
2:00 PM	1220	35	
2:15 PM	1256	49	
2:30 PM	1250	47	
2:45 PM	1281	42	
3:00 PM	1307	42	
3:15 PM	1332	38	
3:30 PM	1366	40	
3:45 PM	1390	44	
4:00 PM	1415	45	
4:15 PM	1516	48	
4:30 PM	1547	48	
4:45 PM	1532	46	
5:00 PM	1482	53	
5:15 PM	1058	37	
5:30 PM	677	27	
5:45 PM	301	16	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

2023 Existing Conditions



2023 Existing Conditions

MUTCD WARRANT 7, CRASH EXPERIENCE

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Has adequate trial of alternatives with satisfactory observance and enforcement failed to reduce the crash frequency? No

Five or more reportable and/or non-reportable crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period during the most recent 3 years of available crash data.* No

**If applicable, attach a summary of the crash data analysis used for this criterion.*

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition A in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection. **No**

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection. **No**

The volume of pedestrian traffic is not less than 80% of the requirements specified in Warrant 4, the Pedestrian Volume warrant.* N/A

**If applicable, attach all supporting calculations and documentation.*

MUTCD WARRANT 8, ROADWAY NETWORK*

Is the major street classified as an Urban Extension, Principal Arterial, or Minor Arterial that is a reasonable connection between two Principal Arterials and/or Urban Extensions as shown on the official Functional Classification Map? No

Does the intersection have a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1,2, and 3 during an average weekday? No

Does the intersection have a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)? No

Is the major street part of the street or highway system that serves as the principal roadway network for through traffic flow? No

Does the major street include rural or suburban highways outside, entering, or traversing a city? No

Does the major street appear as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study? No

**Refer to Section 4.3 of PennDOT Publication 46 (Traffic Engineering Manual) for additional Department documentation requirements to justify the installation of a signal under Warrant 8. Attach all supplementary documentation and calculations, especially those relating to traffic volume projections and subsequent Warrant analyses.*

Traffic Signal Warrant Analysis Workbook

2025 Projected (Build) Conditions

STUDY AND ANALYSIS INFORMATION

Municipality:	Mechanicsburg Borough	**Analysis Date:**	10/16/2023
County:	Cumberland County	**Conducted By:**	JW
PennDOT Engineering District:	8	**Agency/Company Name:**	TPD

Analysis Information

Data Collection Date:	10/3/2023
Day of the Week:	Tuesday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Major Street Information

Major Street Name and Route Number:	Market Street (SR 0114)
Major Street Approach #1 Direction:	N-Bound
Major Street Approach #2 Direction:	S-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach:	1	**LANE(S)**
Speed Limit or 85th Percentile Speed on the Major Street:	35	**MPH**

Minor Street Information

Minor Street Name and Route Number:	Hemlock Drive/Legacy Park Drive
Minor Street Approach #1 Direction:	E-Bound
Minor Street Approach #2 Direction:	W-Bound

Number of Lanes for Moving Traffic on Each Minor Street Approach:	1	**LANE(S)**

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Met?
Warrant 1, Eight-Hour Vehicular Volume	**Yes**	**No**
Warrant 2, Four-Hour Vehicular Volume	**Yes**	**No**
Warrant 3, Peak Hour	**Yes**	**No**
Warrant 4, Pedestrian Volume	**No**	**N/A**
Warrant 5, School Crossing	**No**	**N/A**
Warrant 6, Coordinated Signal System	**No**	**N/A**
Warrant 7, Crash Experience	**Yes**	**No**
Warrant 8, Roadway Network	**No**	**N/A**
Warrant 9, Intersection Near a Grade Crossing	**No**	**N/A**
Warrant PA-1, ADT Volume Warrant	**No**	**N/A**
Warrant PA-2, Midblock and Trail Crossings	**No**	**N/A**

Traffic Signal Warrant Analysis Workbook

2025 Projected (Build) Conditions

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 AM	12:14 AM			0		
12:15 AM	12:29 AM			0		
12:30 AM	12:44 AM			0		
12:45 AM	12:59 AM			0		
1:00 AM	1:14 AM			0		
1:15 AM	1:29 AM			0		
1:30 AM	1:44 AM			0		
1:45 AM	1:59 AM			0		
2:00 AM	2:14 AM			0		
2:15 AM	2:29 AM			0		
2:30 AM	2:44 AM			0		
2:45 AM	2:59 AM			0		
3:00 AM	3:14 AM			0		
3:15 AM	3:29 AM			0		
3:30 AM	3:44 AM			0		
3:45 AM	3:59 AM			0		
4:00 AM	4:14 AM			0		
4:15 AM	4:29 AM			0		
4:30 AM	4:44 AM			0		
4:45 AM	4:59 AM			0		
5:00 AM	5:14 AM			0		
5:15 AM	5:29 AM			0		
5:30 AM	5:44 AM			0		
5:45 AM	5:59 AM			0		
6:00 AM	6:14 AM	290	233	523	9	62
6:15 AM	6:29 AM	0	0	0	0	0
6:30 AM	6:44 AM	0	0	0	0	0
6:45 AM	6:59 AM	0	0	0	0	0
7:00 AM	7:14 AM	784	529	1313	9	109
7:15 AM	7:29 AM	0	0	0	0	0
7:30 AM	7:44 AM	0	0	0	0	0
7:45 AM	7:59 AM	0	0	0	0	0
8:00 AM	8:14 AM	641	493	1134	10	97
8:15 AM	8:29 AM	0	0	0	0	0
8:30 AM	8:44 AM	0	0	0	0	0
8:45 AM	8:59 AM	0	0	0	0	0
9:00 AM	9:14 AM	511	388	899	1	69
9:15 AM	9:29 AM	0	0	0	0	0
9:30 AM	9:44 AM	0	0	0	0	0
9:45 AM	9:59 AM	0	0	0	0	0
10:00 AM	10:14 AM	488	377	865	3	47
10:15 AM	10:29 AM	0	0	0	0	0
10:30 AM	10:44 AM	0	0	0	0	0
10:45 AM	10:59 AM	0	0	0	0	0
11:00 AM	11:14 AM	574	463	1037	5	61
11:15 AM	11:29 AM	0	0	0	0	0
11:30 AM	11:44 AM	0	0	0	0	0
11:45 AM	11:59 AM	0	0	0	0	0

Traffic Signal Warrant Analysis Workbook

2025 Projected (Build) Conditions

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH

Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (E-Bound)	Minor Street Approach #2 (W-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 PM	12:14 PM	537	478	1015	4	68
12:15 PM	12:29 PM	0	0	0	0	0
12:30 PM	12:44 PM	0	0	0	0	0
12:45 PM	12:59 PM	0	0	0	0	0
1:00 PM	1:14 PM	596	465	1061	2	58
1:15 PM	1:29 PM	0	0	0	0	0
1:30 PM	1:44 PM	0	0	0	0	0
1:45 PM	1:59 PM	0	0	0	0	0
2:00 PM	2:14 PM	680	590	1270	6	55
2:15 PM	2:29 PM	0	0	0	0	0
2:30 PM	2:44 PM	0	0	0	0	0
2:45 PM	2:59 PM	0	0	0	0	0
3:00 PM	3:14 PM	751	614	1365	8	63
3:15 PM	3:29 PM	0	0	0	0	0
3:30 PM	3:44 PM	0	0	0	0	0
3:45 PM	3:59 PM	0	0	0	0	0
4:00 PM	4:14 PM	801	680	1481	7	68
4:15 PM	4:29 PM	0	0	0	0	0
4:30 PM	4:44 PM	0	0	0	0	0
4:45 PM	4:59 PM	0	0	0	0	0
5:00 PM	5:14 PM	865	682	1547	8	75
5:15 PM	5:29 PM	0	0	0	0	0
5:30 PM	5:44 PM	0	0	0	0	0
5:45 PM	5:59 PM	0	0	0	0	0
6:00 PM	6:14 PM			0		
6:15 PM	6:29 PM			0		
6:30 PM	6:44 PM			0		
6:45 PM	6:59 PM			0		
7:00 PM	7:14 PM			0		
7:15 PM	7:29 PM			0		
7:30 PM	7:44 PM			0		
7:45 PM	7:59 PM			0		
8:00 PM	8:14 PM			0		
8:15 PM	8:29 PM			0		
8:30 PM	8:44 PM			0		
8:45 PM	8:59 PM			0		
9:00 PM	9:14 PM			0		
9:15 PM	9:29 PM			0		
9:30 PM	9:44 PM			0		
9:45 PM	9:59 PM			0		
10:00 PM	10:14 PM			0		
10:15 PM	10:29 PM			0		
10:30 PM	10:44 PM			0		
10:45 PM	10:59 PM			0		
11:00 PM	11:14 PM			0		
11:15 PM	11:29 PM			0		
11:30 PM	11:44 PM			0		
11:45 PM	11:59 PM			0		
Approach Totals:		7518	5992	13510	72	832

2025 Projected (Build) Conditions

MUTCD WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Combination of Conditions A and B Necessary?*: No

**Only applicable for Warrant 1 if after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems. See Section 4C.02 of the 2009 MUTCD for application.*

Condition A - Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or More	1	600	480	420	336	150	120	105	84
2 or More	2 or More	600	480	420	336	200	160	140	112
1	2 or More	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or More	1	900	720	630	504	75	60	53	42
2 or More	2 or More	900	720	630	504	100	80	70	56
1	2 or More	750	600	525	420	100	80	70	56

Condition A Evaluation

Number of Unique Hours Met: 0 **Condition A Satisfied?** No

Condition B Evaluation

Number of Unique Hours Met: 3 **Condition B Satisfied?** No

Combination of Condition A and Condition B Evaluation

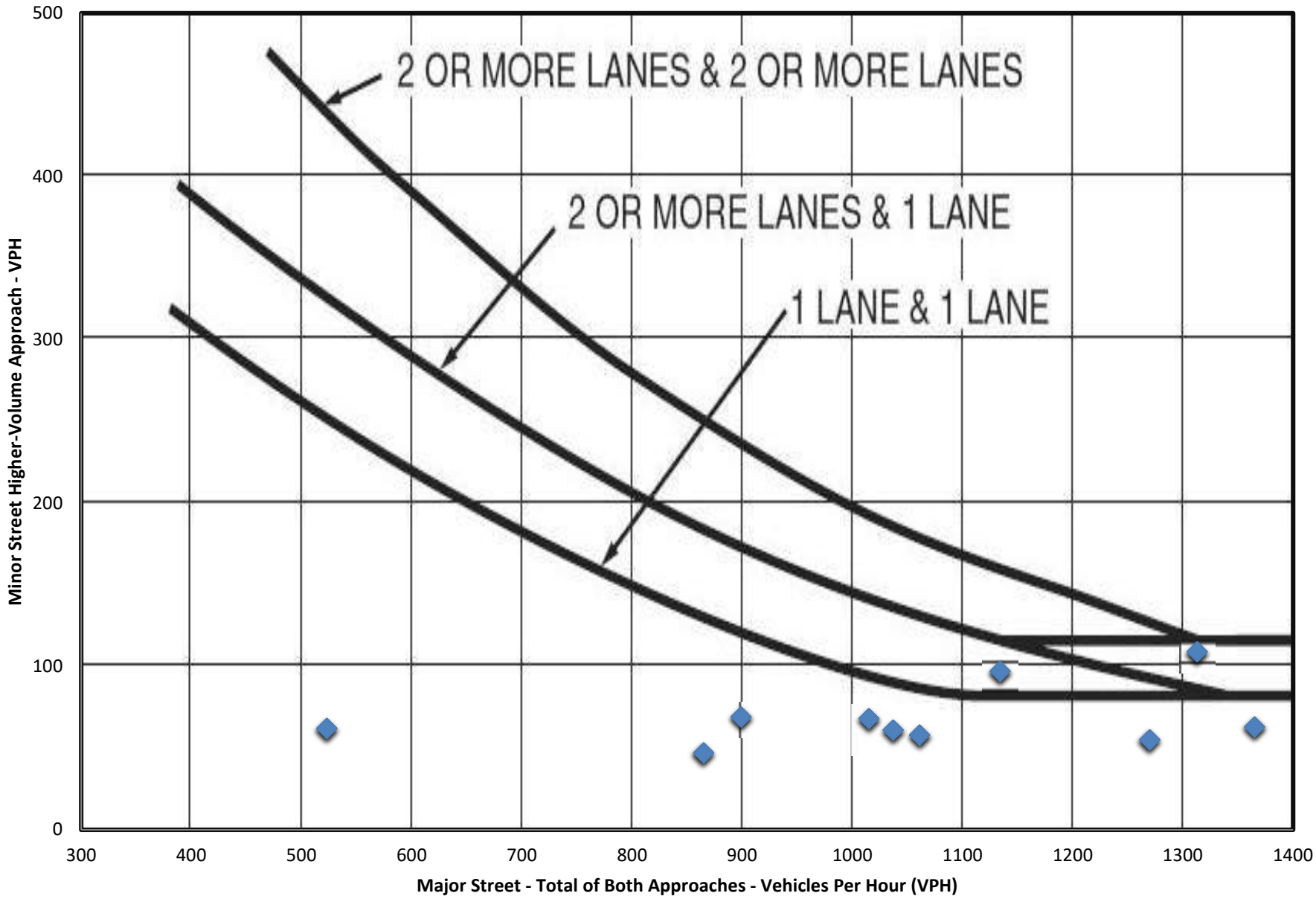
Number of Unique Hours Met for Condition A: N/A

Number of Unique Hours Met for Condition B: N/A

Combination of Condition A and Condition B Satisfied? N/A

2025 Projected (Build) Conditions

MUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



2025 Projected (Build) Conditions

MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Total Number of Unique Hours Met On Figure 4C-1
2

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	523	62	
5:30 AM	523	62	
5:45 AM	523	62	
6:00 AM	523	62	
6:15 AM	1313	109	Met
6:30 AM	1313	109	Met
6:45 AM	1313	109	Met
7:00 AM	1313	109	Met
7:15 AM	1134	97	Met
7:30 AM	1134	97	Met
7:45 AM	1134	97	Met
8:00 AM	1134	97	Met
8:15 AM	899	69	
8:30 AM	899	69	
8:45 AM	899	69	
9:00 AM	899	69	
9:15 AM	865	47	
9:30 AM	865	47	
9:45 AM	865	47	
10:00 AM	865	47	
10:15 AM	1037	61	
10:30 AM	1037	61	
10:45 AM	1037	61	
11:00 AM	1037	61	
11:15 AM	1015	68	
11:30 AM	1015	68	
11:45 AM	1015	68	

2025 Projected (Build) Conditions

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 PM	1015	68	
12:15 PM	1061	58	
12:30 PM	1061	58	
12:45 PM	1061	58	
1:00 PM	1061	58	
1:15 PM	1270	55	
1:30 PM	1270	55	
1:45 PM	1270	55	
2:00 PM	1270	55	
2:15 PM	1365	63	
2:30 PM	1365	63	
2:45 PM	1365	63	
3:00 PM	1365	63	
3:15 PM	1481	68	
3:30 PM	1481	68	
3:45 PM	1481	68	
4:00 PM	1481	68	
4:15 PM	1547	75	
4:30 PM	1547	75	
4:45 PM	1547	75	
5:00 PM	1547	75	
5:15 PM	0	0	
5:30 PM	0	0	
5:45 PM	0	0	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

2025 Projected (Build) Conditions

MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No
Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	Yes

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	No
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	N/A
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	N/A
**If applicable, attach all supporting calculations and documentation.*	

Total Number of Unique Hours Met On Figure 4C-3
0

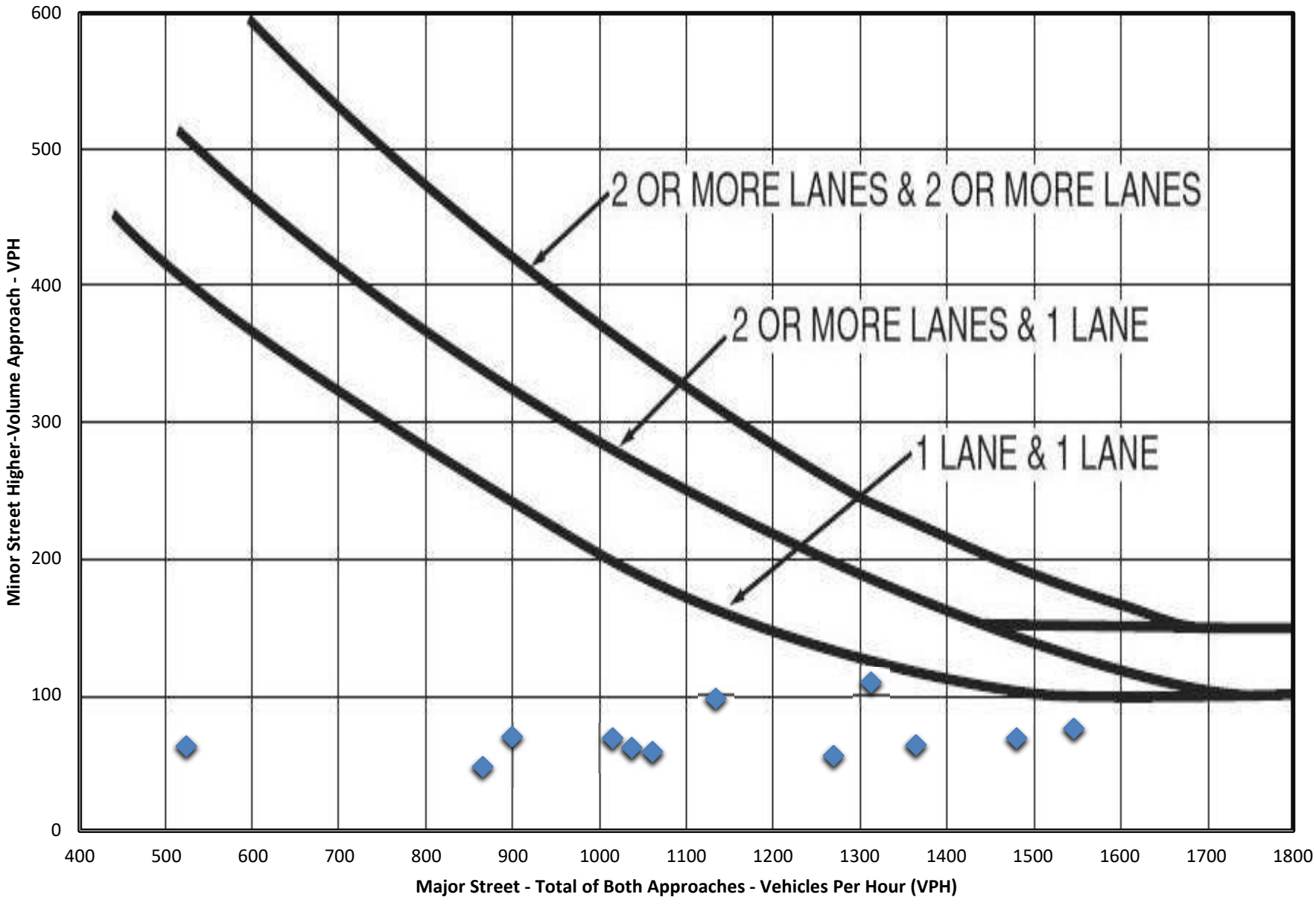
Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	523	62	
5:30 AM	523	62	
5:45 AM	523	62	
6:00 AM	523	62	
6:15 AM	1313	109	
6:30 AM	1313	109	
6:45 AM	1313	109	
7:00 AM	1313	109	
7:15 AM	1134	97	
7:30 AM	1134	97	
7:45 AM	1134	97	
8:00 AM	1134	97	
8:15 AM	899	69	

2025 Projected (Build) Conditions

Hourly Vehicular Volume			
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
8:30 AM	899	69	
8:45 AM	899	69	
9:00 AM	899	69	
9:15 AM	865	47	
9:30 AM	865	47	
9:45 AM	865	47	
10:00 AM	865	47	
10:15 AM	1037	61	
10:30 AM	1037	61	
10:45 AM	1037	61	
11:00 AM	1037	61	
11:15 AM	1015	68	
11:30 AM	1015	68	
11:45 AM	1015	68	
12:00 PM	1015	68	
12:15 PM	1061	58	
12:30 PM	1061	58	
12:45 PM	1061	58	
1:00 PM	1061	58	
1:15 PM	1270	55	
1:30 PM	1270	55	
1:45 PM	1270	55	
2:00 PM	1270	55	
2:15 PM	1365	63	
2:30 PM	1365	63	
2:45 PM	1365	63	
3:00 PM	1365	63	
3:15 PM	1481	68	
3:30 PM	1481	68	
3:45 PM	1481	68	
4:00 PM	1481	68	
4:15 PM	1547	75	
4:30 PM	1547	75	
4:45 PM	1547	75	
5:00 PM	1547	75	
5:15 PM	0	0	
5:30 PM	0	0	
5:45 PM	0	0	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

2025 Projected (Build) Conditions

MUTCD Figure 4C-3. Warrant 3, Peak Hour



2025 Projected (Build) Conditions

MUTCD WARRANT 7, CRASH EXPERIENCE

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Has adequate trial of alternatives with satisfactory observance and enforcement failed to reduce the crash frequency? No

Five or more reportable and/or non-reportable crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period during the most recent 3 years of available crash data.* No

**If applicable, attach a summary of the crash data analysis used for this criterion.*

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition A in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection. **No**

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection. **Yes**

The volume of pedestrian traffic is not less than 80% of the requirements specified in Warrant 4, the Pedestrian Volume warrant.* N/A

**If applicable, attach all supporting calculations and documentation.*

MUTCD WARRANT 8, ROADWAY NETWORK*

Is the major street classified as an Urban Extension, Principal Arterial, or Minor Arterial that is a reasonable connection between two Principal Arterials and/or Urban Extensions as shown on the official Functional Classification Map? No

Does the intersection have a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1,2, and 3 during an average weekday? No

Does the intersection have a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)? No

Is the major street part of the street or highway system that serves as the principal roadway network for through traffic flow? No

Does the major street include rural or suburban highways outside, entering, or traversing a city? No

Does the major street appear as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study? No

**Refer to Section 4.3 of PennDOT Publication 46 (Traffic Engineering Manual) for additional Department documentation requirements to justify the installation of a signal under Warrant 8. Attach all supplementary documentation and calculations, especially those relating to traffic volume projections and subsequent Warrant analyses.*

Appendix E

Excerpts from Legacy Park TIS

TRAFFIC PLANNING AND DESIGN, INC.

Est. 1989

Legacy Park (Formerly Hess Farm)

Transportation Impact Study

Mechanicsburg Borough, Cumberland County

For Submission To:

PennDOT District 8-0 &

Mechanicsburg Borough

Last Revised: February 11, 2014

TPD# LMBU.A.00003

Landmark Homes

1426 N. Third Street | Suite 250 | Harrisburg, PA | 17102 | 717.234.1430 | TPD@TrafficPD.com

LEGACY PARK
(FORMERLY HESS FARM)
TRANSPORTATION IMPACT STUDY

For Submission to:

Mechanicsburg Borough, Cumberland County, PA
& PennDOT District 8-0

Prepared For:

Landmark Homes
Lee Bothell
1737 W. Main Street
Ephrata, Pennsylvania 17522

Phone: (717) 733-1536
Fax: (717) 738-4183

May 16, 2014
Revised August 26, 2014
Revised October 15, 2014
Revised December 29, 2014
Revised February 11, 2015
TPD # LMBU.A.00003

Prepared By:

Traffic Planning and Design, Inc.
1426 North Third Street, Suite 250
Harrisburg, Pennsylvania 17102

Phone: (717) 234-1430
Fax: (717) 234-4490
E-mail: TPD@TrafficPD.com
Web Site: www.trafficpd.com

2/11/15

Craig Mellott, P.E., PTOE
Principal, Central PA Regional Leader
Pennsylvania License Number PE071485

EXECUTIVE SUMMARY

The purpose of this study is to examine the potential traffic impact associated with the proposed Legacy Park development on the roadway network in Mechanicsburg Borough, Cumberland County, PA. Based on this evaluation, the following conclusions were reached:

1. A formal Transportation Impact Study (TIS) for this site was previously prepared by TPD in 2006/2007 for a proposed development (Hess Farm) very similar in scope to the proposed Legacy Farm project. This previous TIS was reviewed extensively by both PennDOT and Mechanicsburg Borough. Since the former project did not move forward, TPD has updated the TIS for the Legacy Park project in order to incorporate current traffic volumes and to account for PennDOT's current TIS standards.
2. The project scope and the extent of the study area were confirmed with representatives of PennDOT and Township staff at a meeting on January 7, 2014. The study area intersections included in this TIS are as follows:
    - Market Street (SR 0114) and Main Street (SR 0641);
    - Market Street and Simpson Street (SR 2014);
    - Market Street and Marble Street (SR 2011/Boro);
    - Market Street and Shepherdstown Road (SR 2023);
    - Market Street and Hemlock Drive;
    - Market Street and Cumberland Parkway/Market Plaza Way;
    - Shepherdstown Road and Simpson Street;
    - Shepherdstown Road and Marble Street (Boro);
    - Walnut Street (SR 1011) and Main Street;
    - Walnut Street and Simpson Street;
    - Filbert Street and Simpson Street;
    - Norway Street and Marble Street (Boro);
    - Allendale Road and Simpson Street;
    - Allendale Road and Apple Drive;
    - Allendale Road and Charles Street;
    - Allendale Road and Alison Avenue.

2. The project site is located on the eastern side of S. Market Street (SR 0114), just south of the S. Market Street (SR 0114)/Shepherdstown Road (SR 2023) intersection. The proposed development is expected to consist of the following uses at full build-out:
    - Single Family-Detached Homes (209 dwelling units);
    - Age-Qualified Single Family-Detached Homes (97 dwelling units);
    - Apartments (216 dwelling units);
    - Residential Townhomes/Condominiums (171 dwelling units);
    - Strip Retail/Commercial (36,744 s.f.).

3. Access to the site is proposed via one new full-movement local road to Market Street (SR 0114), located opposite Hemlock Drive, and a second full-movement local road to Allendale Road (T-608), south of Jenna Court. In addition, the development will be linked to the adjacent (existing) community roadway network via the extension of Norway Street and Despania Drive southward into the site.
4. Under the 2025 and 2030 projected conditions, with implementation of the site-related recommendations, all approaches and turning movements at the site driveway intersections with the external roadway network will operate at LOS C or better during the weekday A.M., weekday P.M., and Saturday midday peak hours.
5. All proposed driveway location sight distances will exceed PennDOT's Desirable and Safe Stopping Sight Distance (SSSD) criteria.
6. Upon full build-out, the proposed Legacy Park development is expected to generate 416 new vehicle-trips during the weekday A.M. peak hour, 543 new vehicle-trips during the weekday P.M. peak hour, and 516 new vehicle-trips during the Saturday midday peak hour.
7. Traffic Planning and Design Inc. (TPD) recommends the following roadway improvements as outlined at the study area intersections:

Elmwood Avenue and Despania Drive (Proposed Site Access)

- Erect a "Stop" sign on the existing Despania Drive approach to control exiting traffic.

Allendale Road and Proposed Site Access Road

- Erect a "Stop" sign on the Site Access Road approach to control exiting traffic;
- It is proposed to realign Allendale Road along the site frontage to provide a smooth horizontal curve at the northeastern tip of the site, which will eliminate the sharp reverse curves that presently exist in this area. The Allendale Road realignment should be designed in a manner that provides adequate sight distances at the site access road intersection.

Market Street (SR 0114) and Hemlock Drive/Proposed Site Access Road

- Design the site access in accordance with PennDOT's local road standards and obtain a Highway Occupancy Permit (HOP).
- Construct a 150' dedicated left turn lane with a 75' taper on the southbound Market Street approach.
- Construct a 150' dedicated right turn lane with a 100' taper on the northbound Market Street approach.
- Construct a 75' dedicated left turn lane with a 75' taper on the northbound Market Street approach.
- Construct an additional thru lane with a 150' lane opening taper on the northbound Market Street approach to the intersection.
- Monitor signal warrants as development progresses on the site; at the time applicable signal warrants are met, install a fully-actuated traffic signal with permitted/protected advance left turn phasing on the southbound Market Street approach.

- Design the proposed site access road to accommodate one ingress lane and two egress lanes near its intersection with Market Street. Under the initial unsignalized control, the driveway egress should be striped as a single lane and a "Stop" sign should be erected on the egress driveway approach. Upon signalization of the intersection, the driveway egress should be striped to provide a 100' dedicated right turn lane and a shared through/left lane.
- If the driveway is initially constructed with unsignalized control, install underground conduit in conjunction with construction of the proposed local road and auxiliary turn lanes.

Market Street (SR 0114) and Shepherdstown Road (SR 2023)

- Install a fully-actuated, two-phase traffic signal.
- Coordinate this new signal with the proposed signal at the Market Street/Hemlock Drive/Proposed Site Driveway intersection.
- Widen northbound Market Street to provide a right turn lane. The inner northbound thru lane from the Market Street/Hemlock Drive/Site Driveway intersection should drop into this right turn lane.

Market Street (SR 0114) and Cumberland Parkway/Market Plaza Way

- Extend the existing southbound left turn lane on Market Street to provide 285' of additional storage (485' total storage bay with lengthening).

Market Street (SR 0114) and Marble Street (SR 2011/Boro)

- The Developer will provide a fair-share contribution towards potential future improvements at this intersection.

Main Street (SR 0641) and Walnut Street (SR 1011)

- The Developer will provide a fair-share contribution towards potential future improvements at this intersection.

Simpson Street (SR 2014) and Walnut Street (SR 1011)

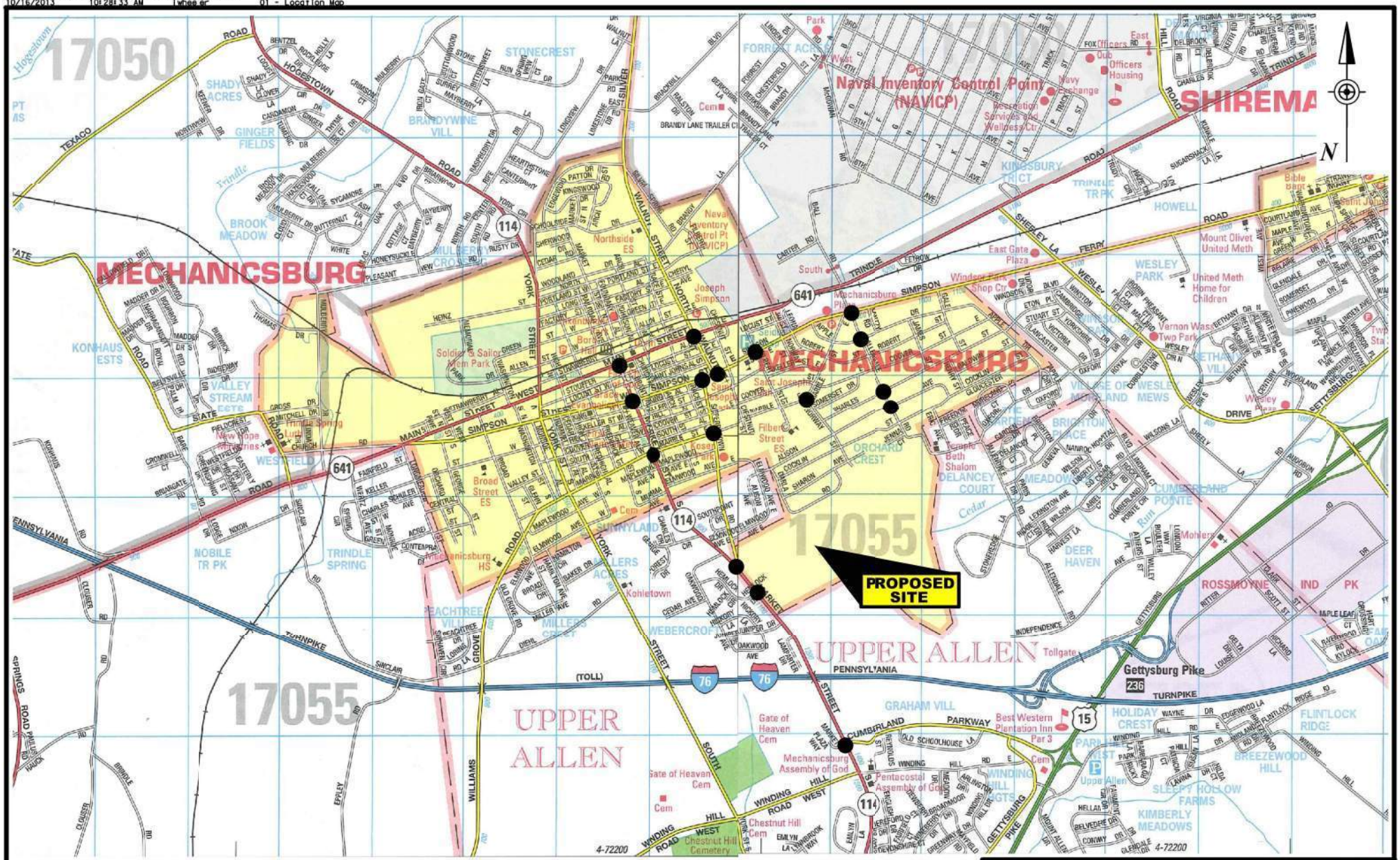
- The Developer will provide a fair-share contribution towards potential future improvements at this intersection.

As part of PennDOT's HOP process, the applicant will coordinate and fund the implementation of the recommended roadway improvements. All improvements will be designed and constructed in full compliance with ADA requirements unless otherwise directed or approved by the Department.

In accordance with §22-513.B(5) of the Mechanicsburg Borough Subdivision and Land Development Ordinance, the applicant shall, as a condition of approval of the final plat, agree to construct the traffic improvements noted above at the applicant's cost or in lieu thereof, and with the written consent of the Borough, reimburse the Borough for the cost of the improvements.

Preliminary construction costs have not been determined at this time, conceptual plans for the

J:\LMBU\00003 (Hess Farm)\Planning\Figs\Figs.dgn
10/16/2013 10:28:33 AM lwhee.er 01 - Location Map



KEY: ● = STUDY AREA INTERSECTION

TRAFFIC PLANNING AND DESIGN, INC.

PITTSBURGH (412)765-3717
HARRISBURG (717)234-1430
LEHIGH VALLEY (610)625-4242
POTTSTOWN (610)326-3100
SOUTH JERSEY (856)966-4242
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FIGURE 1

LOCATION AND STUDY AREA MAP

J:\LMBU\00003 (Hess Farm)\Planning\Figs\Figs.dgn
11/12/2013 4:13:20 PM lwheeler 02 - site plan

N

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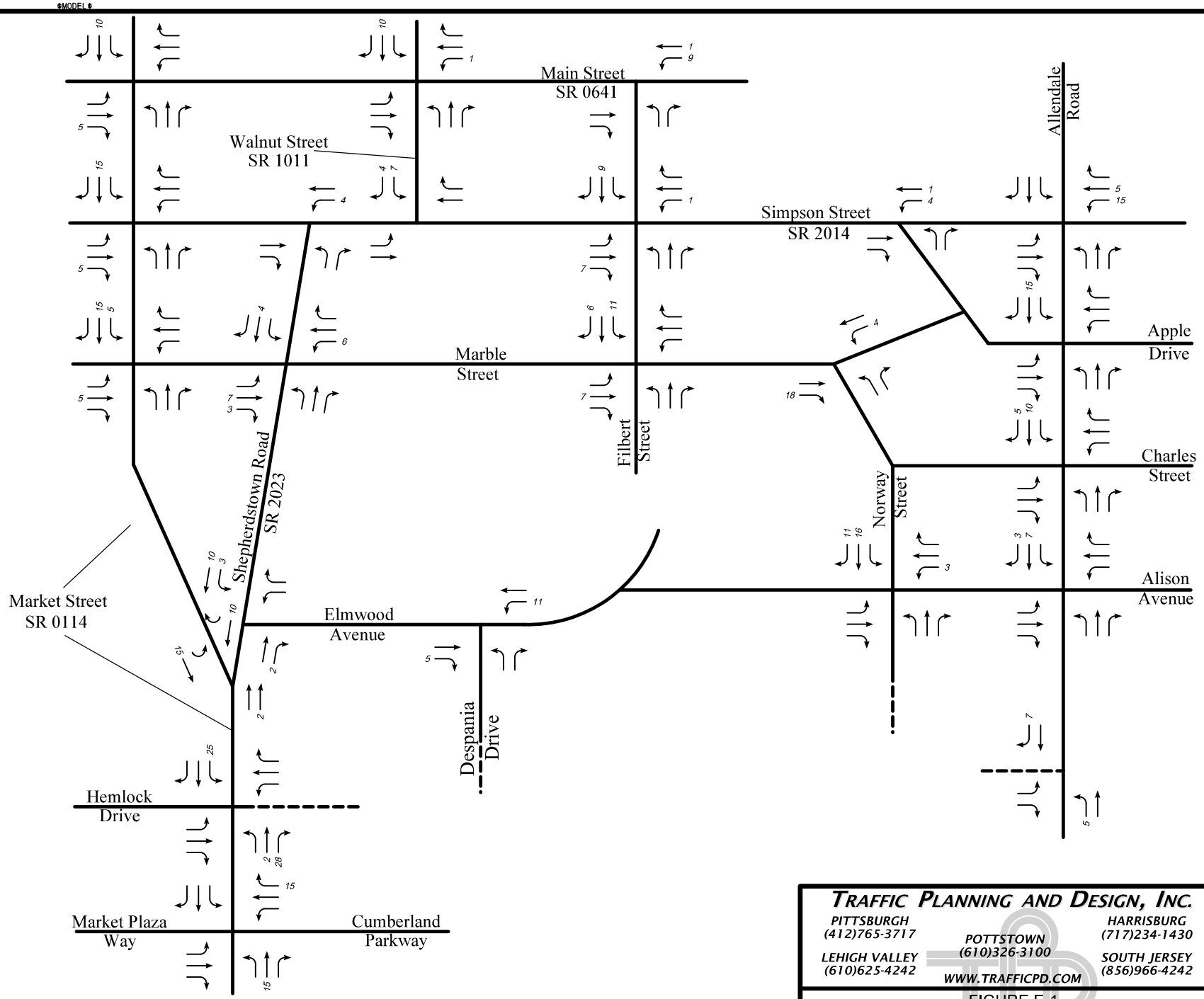
FIGURE 2

SITE PLAN

$FILE$
$DATE$ $TIME$ $USER$ $MODEL$



KEY:

- - - - - - PROPOSED DRIVEWAY

SCHEMATIC DRAWING:NOT TO SCALE

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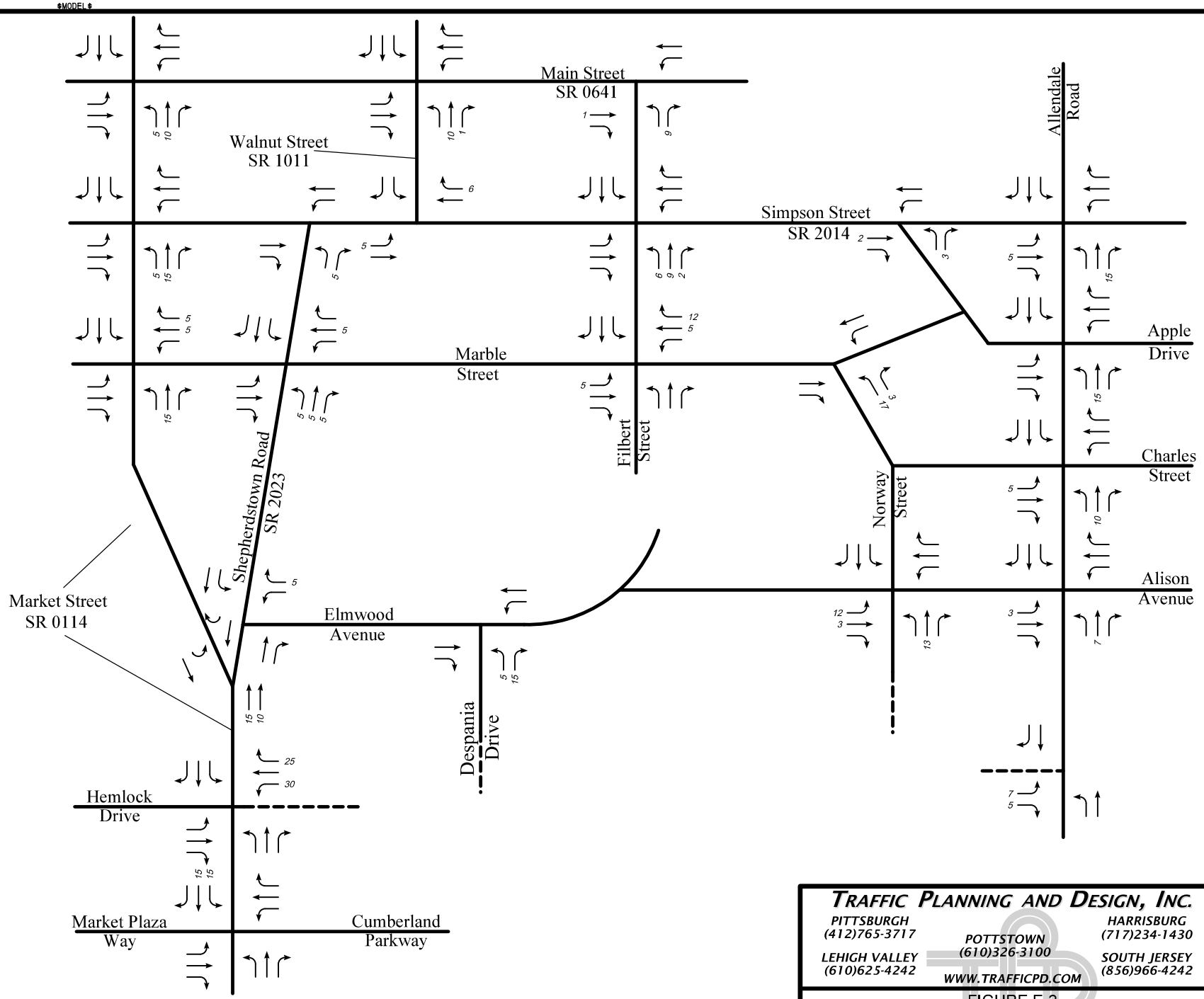
FIGURE E-1

HESS FARM TND
NEW TRIP DISTRIBUTION AND ASSIGNMENT
ENTERING PERCENTAGES

$FILE$
$DATE$ $TIME$ $USER$ $MODEL$



KEY:

- - - - - - PROPOSED DRIVEWAY

SCHEMATIC DRAWING:NOT TO SCALE

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POTTSTOWN (610)326-3100
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LEHIGH VALLEY (610)625-4242
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FIGURE E-2

HESS FARM TND
NEW TRIP DISTRIBUTION AND ASSIGNMENT
EXITING PERCENTAGES

Appendix F

Phasing/Circulation Plans

N

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FIGURE F-1

DESPINA DRIVE CLOSURE
NORTHBOUND EGRESS APPROACH

LEGEND

PROPOSED PHASING LINE ▬ ▬ ▬

TENTATIVE CONSTRUCTION SCHEDULE

PHASE	ESTIMATED COMPLETION
PHASE 1	BEGINNING SPRING OF 2016
PHASE 2	BEGINNING SPRING OF 2018
PHASE 3	BEGINNING SPRING OF 2020
PHASE 4	BEGINNING FALL OF 2022
PHASE 5	BEGINNING SPRING OF 2023
	(SCHEDULE SUBJECT TO CHANGE)

THE SOLE PURPOSE OF THIS PLAN IS TO IDENTIFY THE ANTICIPATED PHASING SCHEDULE FOR THIS PROJECT.

DWELLING SCHEDULE

PHASE 1 ----- 325 DWELLING UNITS TOTAL
- 216 MULTI–FAMILY DWELLING UNITS (APTS.)
- 17 SINGLE–FAMILY DETACHED (ESTATE LOTS–75' WIDE LOTS)
- 10 SINGLE–FAMILY DETACHED (FRONT–LOAD GARAGES)
- 33 SINGLE–FAMILY ATTACHED (FRONT–LOAD GARAGES FROM LANE, MODIFICATION REQUESTED AS A PART OF VOZ CONDITIONAL USE APP.)
- 49 SINGLE–FAMILY ATTACHED (REAR–LOAD GARAGES)

PHASE 2 -----
- 0 DWELLING UNITS TOTAL
- 1 COMMERCIAL LOT (NO DWELLING UNITS)

PHASE 3 ----- 143 DWELLING UNITS TOTAL
- 9 SINGLE–FAMILY DETACHED (ESTATE LOTS–75' WIDE LOTS)
- 14 SINGLE–FAMILY DETACHED (FRONT–LOAD GARAGES)
- 36 SINGLE–FAMILY DETACHED (REAR–LOAD GARAGES)
- 84 SINGLE–FAMILY ATTACHED (REAR–LOAD GARAGES)

PHASE 4 ----- 131 DWELLING UNITS TOTAL
- 22 SINGLE–FAMILY DETACHED (ESTATE LOTS–75' WIDE LOTS)
- 77 SINGLE–FAMILY DETACHED (FRONT–LOAD GARAGES)
- 32 SINGLE–FAMILY DETACHED (REAR–LOAD GARAGES)

PHASE 5 ----- 87 DWELLING UNITS TOTAL
- 46 SINGLE–FAMILY DETACHED (AGE–QUALIFIED FRONT–LOAD GARAGES)
- 41 SINGLE–FAMILY DETACHED (AGE–QUALIFIED REAR–LOAD GARAGES)

Remaining Build-out as of October 2023
Single Family - Detached: 131 units
Senior Adult Detached: 87 units

PH4: STREET NAMES & LANE NAMES

STREETS	LANES
MORRIS DRIVE	
BRANTWOOD DRIVE	SHEFFIELD LANE
EAST VIEW DRIVE	LAYNE RUN
MEDWAY DRIVE	
INTEGRITY DRIVE	
ESTATE DRIVE 'SECTION B'	
ALLENDALE ROAD (RE–ALIGNED)	
OLD ALLENDALE RD./CUL–DE–SAC 'A'	

THIS SHEET SHALL SERVE AS A REVISED PRELIMINARY PLAN SHEET. THIS SHEET WILL SUPERCEDE THE OVERALL PHASING PLAN (PRELIMINARY PLAN SHEET 7 OF 179) IN THE APPROVED PRELIMINARY PLAN. CONDITIONAL PRELIMINARY PLAN APPROVAL WAS OBTAINED ON NOVEMBER 17, 2015.

NO.	DATE	REVISION

FOR PIONEER MANAGEMENT BY:

MANAGER: JAMES C. HENKE | SURV. CHIEF: RC | FIELDBOOK NO. VALUE
DESIGN BY: JDB/KWG | CHKD BY: TMS | DRAWN BY: RC | CHKD BY: RC

DRAWING REFERENCE: F:\11\11-0950-01\CAD\Ph4-Final\Phasing.dwg

XREFS:
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Street Alignments [F:\11\11-0950-01\CAD\Ph4-Final\C3D-Bases\Street Alignments.dwg]
As-Built Block - Phase 1-2-3 Water & Sewer [F:\11\11-0950-01\CAD\Ph4-Final\X-Refs\As-Built Block - Phase 1-2-3 Water & Sewer.dwg]
Street Alignments-PH4&5 [F:\11\11-0950-01\CAD\Ph4-Final\C3D-Bases\Street Alignments-PH4&5.dwg]

CLIENT
LANDMARK HOMES
c/o MR. CLIFF WEAVER
1737 WEST MAIN STREET
EPHRATA, PA 17522
(717) 733–1536

SCALE 1" = 200'
0 100' 200' 400' 600'

PIONEER Management, LLC
111 Millersville Road, Lancaster, PA 17603
Phone (717) 481–5500 · Fax (717) 481–4955
Email: jh@pioneermanagementllc.com
Website: www.pioneermanagementllc.com

OVERALL PHASING PLAN & REVISED PRELIMINARY PLAN

PHASE 4 FINAL SUBDIVISION PLAN/REVISED PRELIMINARY SUBDIVISION PLAN & LOT ADD–ON PLAN FOR

LEGACY PARK

MECHANICSBURG BOROUGH CUMBERLAND COUNTY, PA

DATE: AUGUST 12, 2022

SHEET NO. 8 OF 76

DWG. NO. 11–0950–01–E