

**SUPPLEMENT TO
TRAFFIC IMPACT STUDY
for
THE GREENS**

**BLOCK 14801, LOTS 12
MONROE TOWNSHIP, GLOUCESTER COUNTY, NEW JERSEY**

CES-2264-02

**November 2020
Revised April 2021**



Benjamin Gonzalez, EIT



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Revision Notes – April 2021

This Supplement has been revised to address a letter from the Gloucester County Land Development Review Committee (LDRC) dated April 13, 2021 requesting a revised traffic signal warrant analysis for the proposed phasing of the project.

1. INTRODUCTION

The proposed development includes 117 age-restricted multi-family units in Monroe Township, Gloucester County, New Jersey, with proposed access on Fries Mill Road (CR 655) and Glassboro-Cross Keys Road (CR 689). (See Figure 1 and Figure 2 in the Appendix for a Location Map and Overall Plan.)

Consulting Engineer Services (CES) prepared a Traffic Impact Study for the project dated March 2020. This Supplement to the Traffic Impact Study has been prepared to address Comment #3 in the Gloucester County Report of Action dated 08/04/2020 regarding traffic signal warrants at the site accesses. As described herein, warrant analyses were performed to determine if traffic signals may be warranted at the following intersections:

- Fries Mill Road (CR 655) and Queensferry Drive/Stirling Glen Drive
- Glassboro-Cross Keys Road (CR 689) and Appletree Lane/Prestwick Drive

As demonstrated within this report, traffic signals are not warranted at the subject intersections.

2. TRAFFIC SIGNAL WARRANT ANALYSIS (Full Build-Out)

The analysis was performed in accordance with the standard methodology of the *Manual on Uniform Traffic Control Devices* (MUTCD), 2009. The purpose of the analysis is to identify “traffic conditions, pedestrian characteristics, and physical characteristics of the location ... to determine whether installation of a traffic control signal is justified ...” (MUTCD, 2009). However, “The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal”. In fact, a traffic signal should not be installed if it does not “improve the overall

safety and/or operation of the intersection” and should not be installed if it will “seriously disrupt progressive traffic flow”.

This investigation includes an analysis of the applicable factors contained in the MUTCD traffic signal warrants, as well as any other factors related to the operation and safety at the intersection. The nine (9) MUTCD traffic signal warrants are as follows:

- Warrant 1, Eight-Hour Vehicular Volume;
- Warrant 2, Four-Hour Vehicular Volume;
- Warrant 3, Peak Hour;
- Warrant 4, Pedestrian Volume;
- Warrant 5, School Crossing;
- Warrant 6, Coordinated Signal System;
- Warrant 7, Crash Experience;
- Warrant 8, Roadway Network; and
- Warrant 9, Intersection Near a Grade Crossing.

Upon review of the MUTCD traffic signal warrants, it was determined that Warrants 4, 5, 6, 8, and 9 are not applicable to this intersection. Warrant 7, Crash Experience, is also not utilized since the site accesses are proposed features; therefore, there is no accident data for the proposed conditions. Further, mid-day trip generation is not estimated for the site, therefore Warrants 1 and 2 were not considered. Since the peak hour periods are critical for the subject intersections, Warrant 3 (Peak Hour) was analyzed as described below.

Warrant 3 - Peak Hour

The Peak Hour Warrant is intended for use when “traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.” Delay and vehicles per hour for one peak hour of an average day on the major and minor streets are analyzed. The MUTCD states that this warrant is to be applied only for facilities that attract or discharge large numbers of vehicles over a short time. Therefore, this warrant was

applied to determine if the peak hour volumes may warrant a traffic signal.

Condition A of this warrant requires analysis of the total stopped time delay on the minor approach. This information was not recorded for existing conditions, and it cannot be accurately quantified for future conditions. Therefore, Condition A is not applied in this analysis.

Using Condition B of this warrant, the 70% option may be used based on the posted speeds (45 mph on CR 689 and 50 mph on CR 655). The 2026 build-out AM and PM peak hour volumes from Figure 7 in the Traffic Impact Study were plotted on MUTCD Figure 4C-4 for the major and minor-street approaches. Volumes plotting above the threshold curve indicate that a traffic signal may be warranted, while volumes plotting below the curve indicate that a traffic signal may not be warranted. Since the minor street approaches do not have dedicated right turn lanes, the volumes utilized for the minor streets include right turn volumes for a conservative analysis. As shown on Figures 3 and 4 in the Appendix of this report, the AM and PM peak hour traffic volumes plot below the threshold curve, indicating that traffic signals are not warranted at the subject intersections for the build-out peak hours.

In addition, as noted on Figure 8 in the Traffic Impact Study, the proposed site accesses are expected to operate at acceptable levels of service during the AM and PM peak hours, with LOS C/D for exiting movements and LOS A for left turns into the site with minimal queues (less than 1 vehicle with 95% probability).

3. TRAFFIC SIGNAL WARRANT ANALYSIS (Build-Out of Sections 1 and 2)

The “Overall Development Sectioning / Traffic Circulation Plan” illustrates the three (3) proposed sections for the development (see Figure 5 in the Appendix). The applicant proposes the following construction sequence:

- Section 1: 48 units with access to CR 655. All CR 655 improvements to be constructed with Section 1.
- Section 2: 30 units with access to CR 655 through Section 1.

- Section 3: 39 units with access to CR 689. All CR 689 improvements to be constructed with Section 3.

For build-out of Sections 1 and 2, all site traffic will utilize the Queensferry Drive access on Fries Mill Road. Therefore, as requested by the County, we have assessed the traffic signal warrants for this build-out condition. Trip generation, trip distribution, build-out volumes, and the Peak Hour Warrant figure were revised for the intersection of Fries Mill Road (CR 655) and Queensferry Drive/Stirling Glen Drive, and they are included in the Appendix for reference. As shown on the Peak Hour Warrant figure, the AM and PM peak hour traffic volumes plot below the threshold curve, indicating that a traffic signal is not warranted at the subject intersection for build-out of Sections 1 and 2.

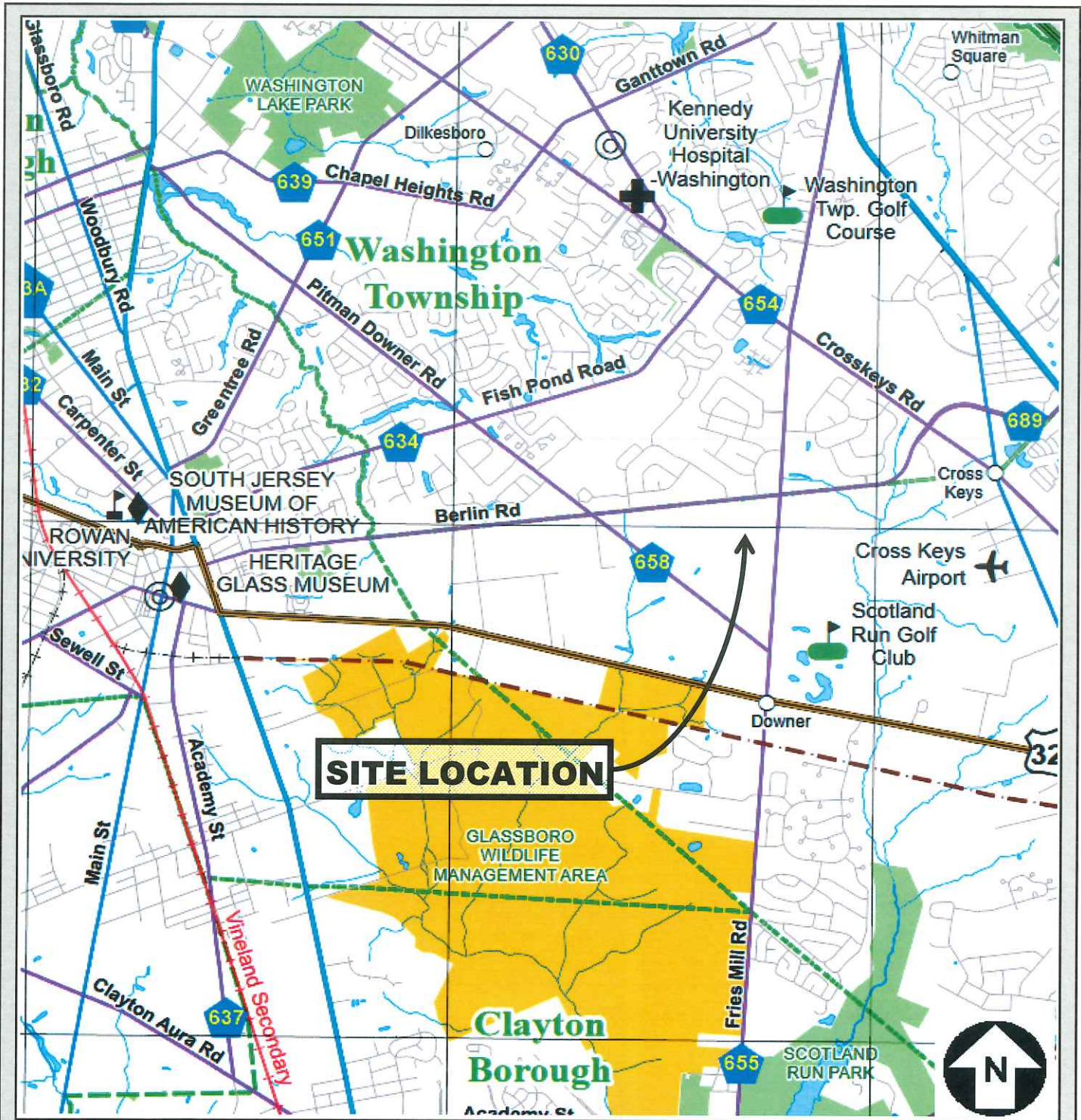
4. CONCLUSIONS

Based on a review of the MUTCD warrants noted above and other factors related to the operation and safety of the proposed intersections, traffic signals are not recommended at the subject locations considering the following:

- MUTCD warrants are not met.
- The proposed site accesses are expected to operate at acceptable levels of service.
- Traffic signals would create unnecessary delay and interruption of progressive traffic flow on the County roadways.

Appendix

Full Build-Out



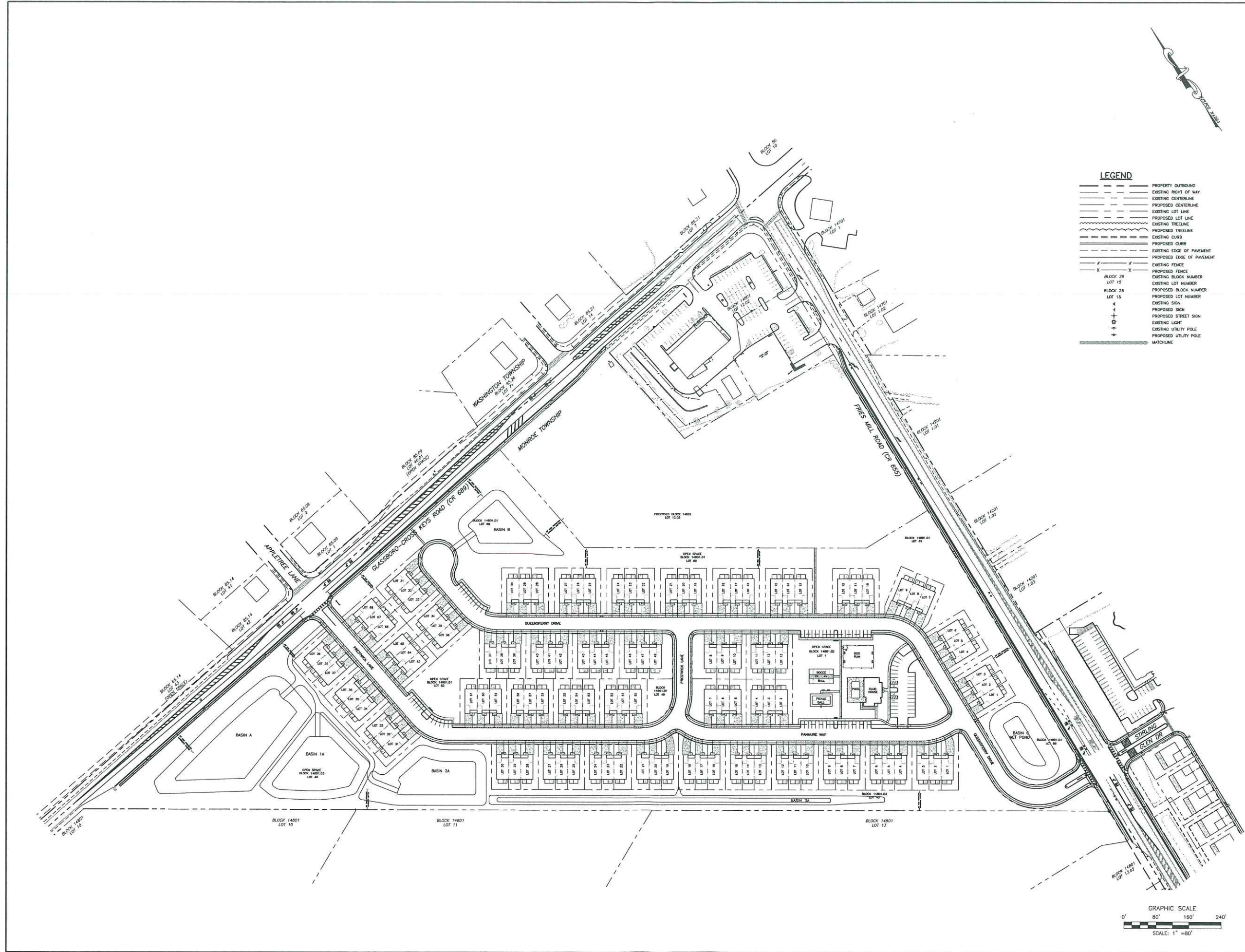
Location Map

Source: <http://www.state.nj.us/transportation/gis/map.shtm>

The Greens
 Monroe Township, Gloucester County, New Jersey

CONSULTING ENGINEER SERVICES
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 TELEPHONE: (856) 228-2200 FAX: (856) 232-2346 E-MAIL: design@ces-1.com

DWG. #	1
SCALE:	N.T.S.
DATE:	Nov-20
C.E.S. #	2264-02



<p>REVISIONS</p> <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>		NO.	DATE	DESCRIPTION										<p>DATE: _____</p> <p>PAUL A. WITTHOHN</p> <p>PROFESSIONAL ENGINEER, NEW JERSEY, LIC. NO. 246E04749300</p>
NO.	DATE	DESCRIPTION												
<p>PREPARED BY: SERVICES</p> <p>CONSULTING ENGINEERS, PLANNERS, & LAND SURVEYORS</p> <p>645 BERLIN-CROSS KEYS ROAD, SUITE 1, SICKLEVILLE, NEW JERSEY 08081</p> <p>PHONE: (609) 426-1100 FAX: (609) 426-1101</p> <p>PROJECT NO.: 2264-02</p>		<p>OVERALL PLAN</p> <p>THE GREENS</p> <p>PLATE 148, BLOCK 14801, LOT 12</p> <p>MONROE TOWNSHIP, GLoucester COUNTY, NEW JERSEY</p>												
<p>DATE: 03/22/20 DATE: 03/22/20 SCALE: 1"=80' FILE NO.: 2264-02 OVERALL DRAWN BY: JMB</p>		<p>GRAPHIC SCALE</p> <p>0' 80' 160' 240'</p> <p>SCALE: 1" = 80'</p>												

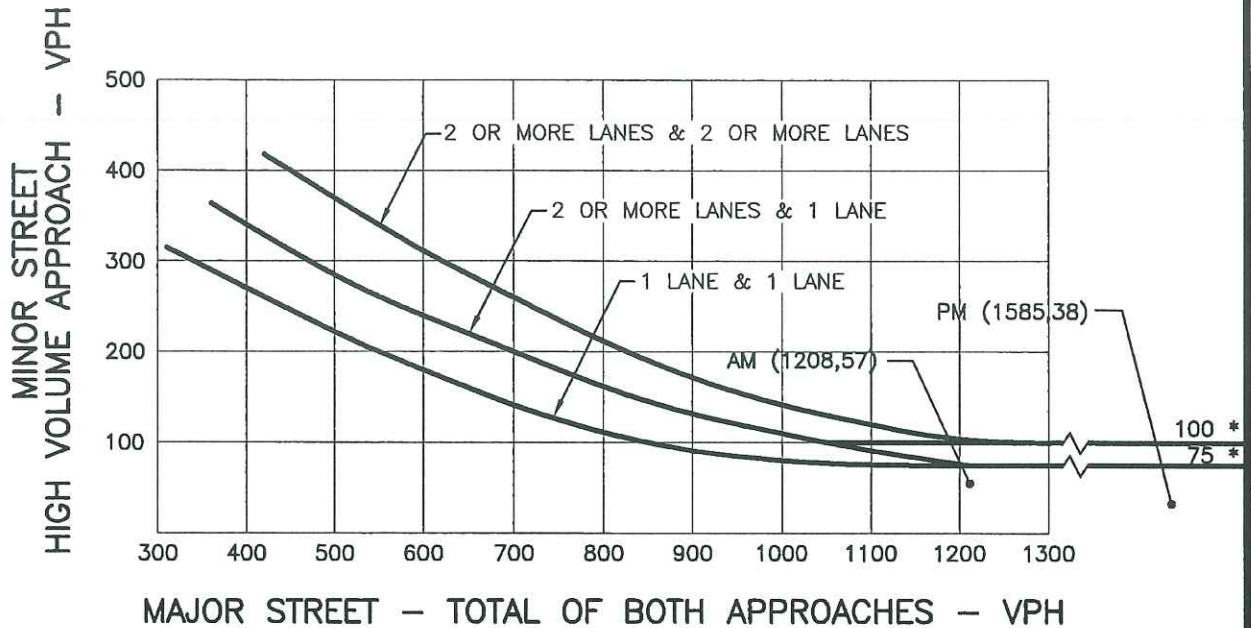
FIGURE 2

2026 BUILD-OUT

INTERSECTION AT GLASSBORO-CROSS KEYS ROAD
(CR 689) & APPLETREE LANE/PRESTWICK LANE

FIGURE 4C-4. WARRANT 3, PEAK HOUR

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

P:\Projects\2264-02\reports\traffic\Signal Warrant Analysis 11-20\Warrant Figure 2264-02.dwg, CR689, 11/3/2020 8:27:49 AM, gonzaez, 1:1

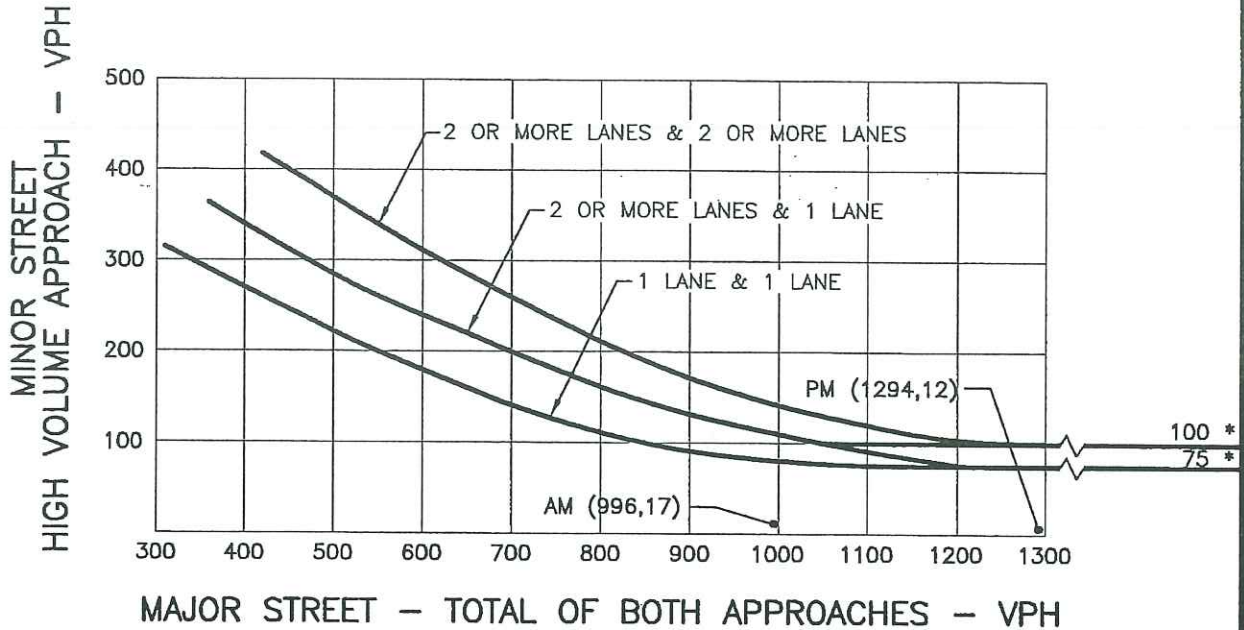
PROJECT <b style="text-align: center;">THE GREENS SUPPLEMENT TO TRAFFIC IMPACT STUDY MONROE TOWNSHIP GLOUCESTER COUNTY, NEW JERSEY	FIG. No. <h1 style="text-align: center;">3</h1>	TITLE <h2 style="text-align: center;">PEAK HOUR WARRANT</h2>
CONSULTING ENGINEER SERVICES PROFESSIONAL ENGINEERS, PLANNERS, & LAND SURVEYORS 645 BERLIN-CROSS KEYS ROAD, SICKLERVILLE, NJ 08081 (856) 228-2200	DATE NOV 2020	PROJ #2264-02

2026 BUILD-OUT

INTERSECTION AT FRIES MILL ROAD (CR 655) &
QUEENSFERRY DRIVE/STIRLING GLEN DRIVE


FIGURE 4C-4. WARRANT 3, PEAK HOUR

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

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PROJECT THE GREENS SUPPLEMENT TO TRAFFIC IMPACT STUDY MONROE TOWNSHIP GLOUCESTER COUNTY, NEW JERSEY	FIG. No. 4	TITLE PEAK HOUR WARRANT
 CONSULTING ENGINEER SERVICES PROFESSIONAL ENGINEERS, PLANNERS, & LAND SURVEYORS 645 BERLIN-CROSS KEYS ROAD, SICKLERVILLE, NJ 08081 (856) 228-2200	DATE NOV 2020	PROJ #2264-02

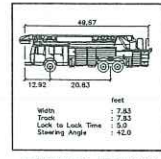
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Appendix

Build-Out of Sections 1 and 2



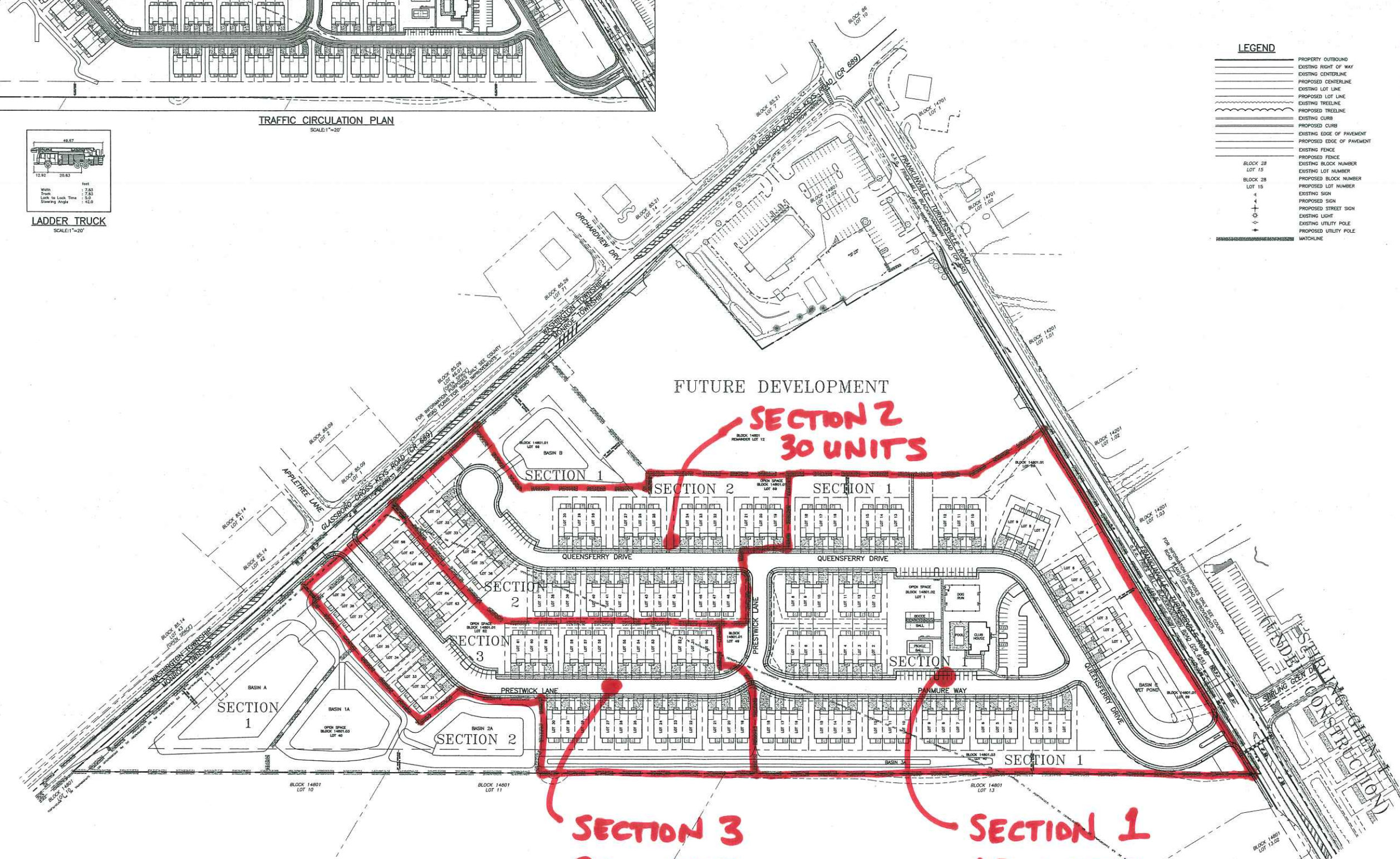
TRAFFIC CIRCULATION PLAN
SCALE: 1" = 20'



LADDER TRUCK
SCALE: 1" = 20'

LEGEND

- PROPERTY OUTBOUND
- EXISTING RIGHT OF WAY
- PROPOSED CENTERLINE
- EXISTING LOT LINE
- PROPOSED LOT LINE
- EXISTING TREELINE
- PROPOSED TREELINE
- EXISTING CURB
- PROPOSED CURB
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING FENCE
- PROPOSED FENCE
- EXISTING BLOCK NUMBER
- EXISTING LOT NUMBER
- PROPOSED BLOCK NUMBER
- PROPOSED LOT NUMBER
- +— EXISTING SIGN
- +— PROPOSED SIGN
- +— PROPOSED STREET SIGN
- +— EXISTING LIGHT
- +— EXISTING UTILITY POLE
- +— PROPOSED UTILITY POLE
- MATCHLINE



REVISIONS

NO.	DATE	DESCRIPTION
1	11/14/00	ISSUED FOR REVIEW LETTERS FOR FINAL APPROVAL
2	11/17/02	REVISED SECTIONS
3	01/18/04	REVISED SECTIONS

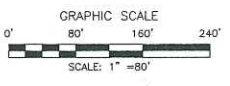
**OVERALL DEVELOPMENT SECTIONING/
TRAFFIC CIRCULATION PLAN**
THE GREENS
PLATE 148, BLOCK 14801, LOT 12
MONROE TOWNSHIP, GLoucester COUNTY, NEW JERSEY

PREPARED BY
CONSULTING ENGINEER SERVICES
PROFESSIONAL ENGINEERS, PLANNERS, & LAND SURVEYORS
645 BERRY STREET, SUITE 200
PRINCIPAL (609) 295-2320 FAX (609) 232-2344 E-MAIL HAWKINS@CES-NJ.COM
NJ CERTIFICATE OF AUTHORIZATION No. 24609976700

DATE: 10/25/06 SCALE: 1" = 80' FILE NO.: 2005-03-0001 DRAWN BY: LAM



11/14/00 DATE
PAUL A. WITHOHN
PROFESSIONAL ENGINEER, NEW JERSEY LIC. NO. 246504749300



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FIGURE 5

A7

Table 1

Trip Generation

The Greens Subdivision - Sections 1 and 2

Age-Restricted Mutli-Family 78 dwelling units

- Trip Generation Reference: *ITE Trip Generation, 10th Edition, Sept 2017*
Land Use Code 252 - Senior Adult Housing - Attached

Weekday AM Peak Hour

Fitted Curve Equation: $T = 0.20(X) - 0.18$
Total Number of Trips: 15 vph

35% Enter = 5
65% Exit = 10

Weekday PM Peak Hour

Fitted Curve Equation: $T = 0.24(X) + 2.26$
Total Number of Trips: 21 vph

55% Enter = 12
45% Exit = 9

Table 1.1

Trip Distribution

The Greens Subdivision - Sections 1 and 2

Common Zone	%	# of Trips		
		AM	PM	
To/From CR 655 N	55.0%	8	12	Total
		3	6	Enter
		6 5*	5	Exit
To/From CR 655 S	45.0%	7	9	Total
		2	5 6*	Enter
		5	4	Exit
	100.0%	15	21	Total
		5	12	Enter
		10	9	Exit

* - ROUNDED TO MATCH TOTALS

Weekday AM Peak Hour Volumes

x (years) = 7
 % per year = 1.00% (CR 655 Urban Minor Arterial, CR 689 Urban Principal Arterial)
 0.00% (Stirling Glen Dr, Appletree Ln - since using trip gen for volumes for build-out)

Roadway Approach	Lane Group	2019 Existing	Stirling Glen I	Smithfield	2026 Base	Site Traffic	2026 Build-Out
CR 655 & Stirling Glen Drive / Queensferry Drive							
CR 655 - NB	Left	569	2	3	613	2	2
	Through						
	Right				2		2
CR 655 - SB	Left	338	7	8	7		7
	Through						
	Right				370		370
						3	3
Queensferry Dr - EB	Left					5	5
	Through						
	Right					5	0
							5
Stirling Glen Dr - WB	Left		4		4		4
	Through						
	Right		13		13		0
							13

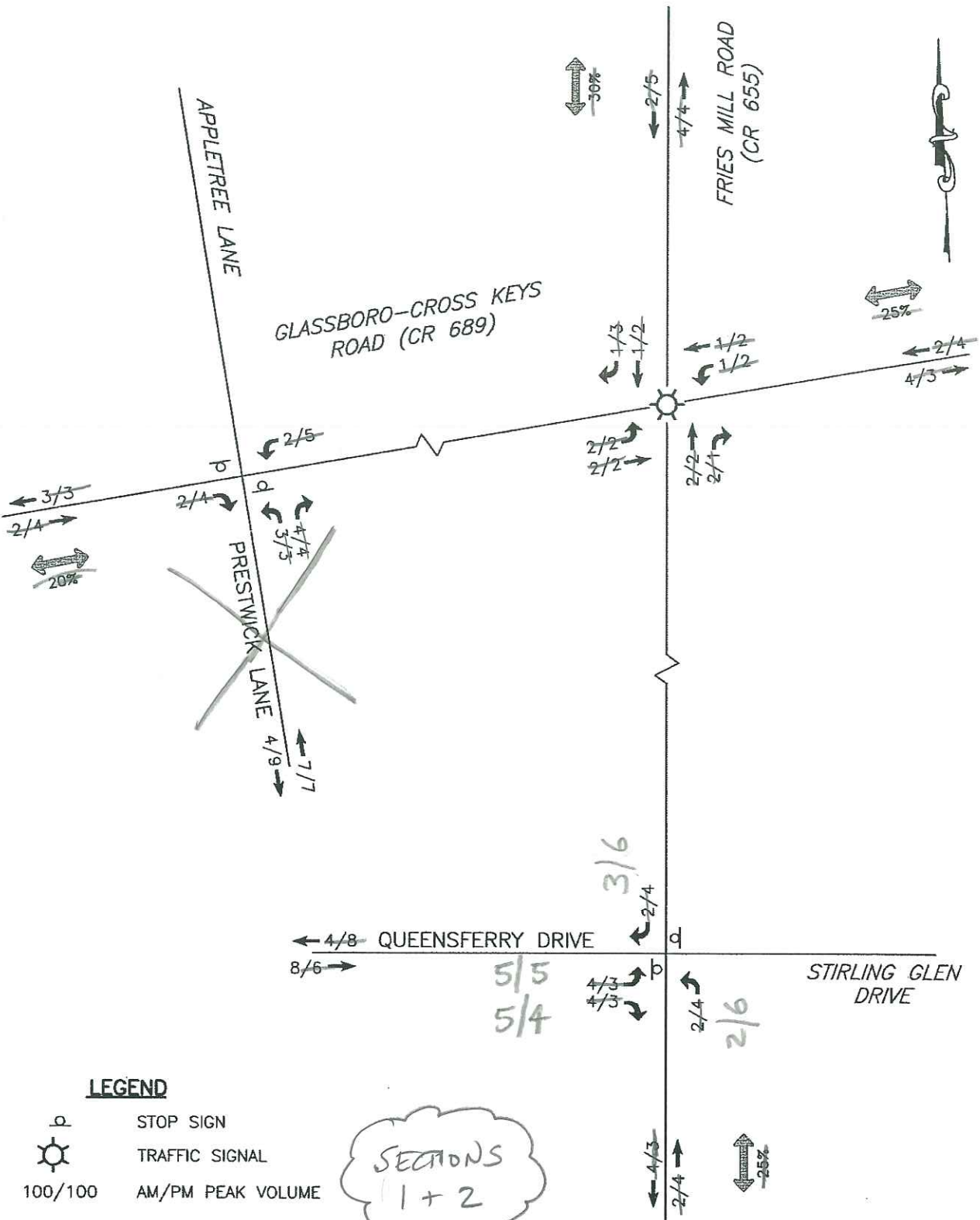
Weekday PM Peak Hour Volumes

x (years) = 7
 % per year = 1.00% (CR 655 Urban Minor Arterial, CR 689 Urban Principal Arterial)
 0.00% (Stirling Glen Dr, Appletree Ln - since using trip gen for volumes for build-out)

Roadway Approach	Lane Group	2019 Existing	Stirling Glen I	Smithfield	2026 Base	Site Traffic	2026 Build-Out
<u>CR 655 & Stirling Glen Drive / Queensferry Drive</u>							
CR 655 - NB	Left	558	5	9	607	6	6
	Through						607
	Right				5		5
CR 655 - SB	Left	611	14	5	14	6	14
	Through						660
	Right						6
Queensferry Dr - EB	Left					5	5
	Through						0
	Right					4	4
Stirling Glen Dr - WB	Left		3		3		3
	Through						0
	Right		9		9		9

All

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PROJECT **THE GREENS**
TRAFFIC IMPACT STUDY
 MONROE TOWNSHIP
 GLOUCESTER COUNTY, NEW JERSEY

FIG. No.
~~6~~

TITLE
SITE TRAFFIC
AM/PM PEAK
VOLUMES

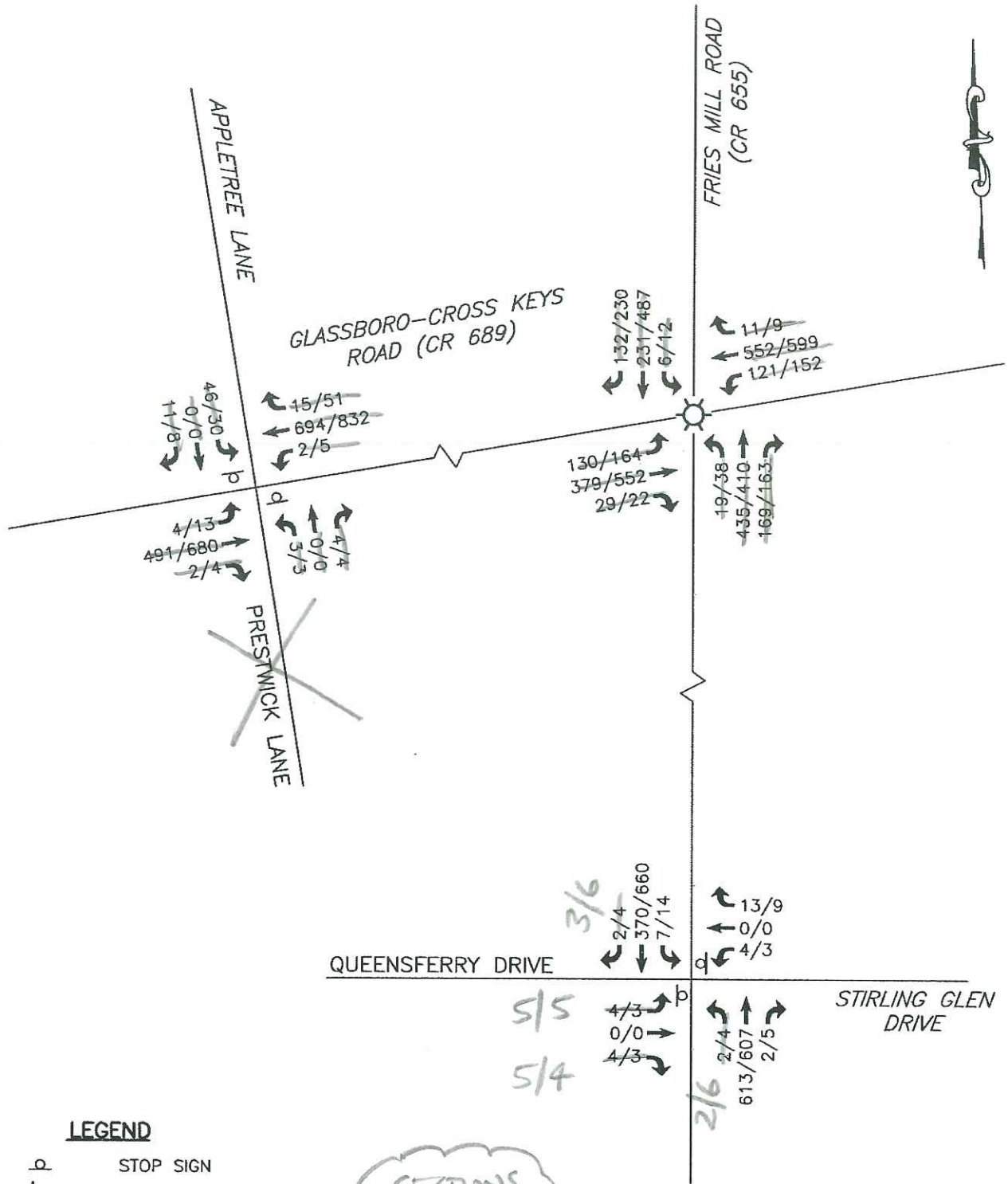
CE CONSULTING ENGINEER SERVICES
 PROFESSIONAL ENGINEERS, PLANNERS, & LAND SURVEYORS
 645 BERLIN CROSS KEYS RD, SICKLERVILLE, NJ 08081 856-228-2200

DATE
 MAR 2020
 APR 2021



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A12


P:\Projects\2264-02\reports\traffic\TIS 3-20\Fig 8.5x11-2264-02.dwg, 7, 4/7/2020 8:29:28 AM, clark, 1:1



LEGEND

-  STOP SIGN
-  TRAFFIC SIGNAL
- 100/100 AM/PM PEAK VOLUME

SECTIONS
1 + 2

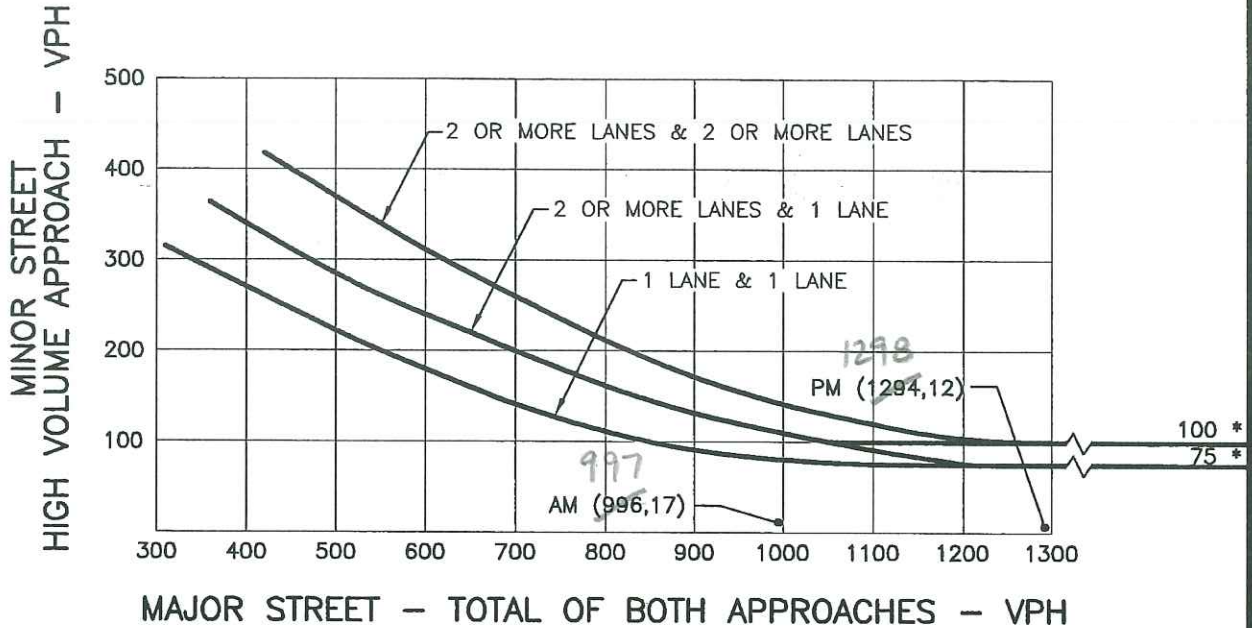
<p>PROJECT</p> <p style="text-align: center;">THE GREENS TRAFFIC IMPACT STUDY</p> <p style="text-align: center;">MONROE TOWNSHIP GLOUCESTER COUNTY, NEW JERSEY</p>	<p>FIG. No.</p> <p style="text-align: center;">7</p>	<p>TITLE</p> <p style="text-align: center;">2026 BUILD-OUT AM/PM PEAK VOLUMES</p>
<p> CONSULTING ENGINEER SERVICES</p> <p>PROFESSIONAL ENGINEERS, PLANNERS, & LAND SURVEYORS 645 BERLIN CROSS KEYS RD, SICKLERVILLE, NJ 08081 856-228-2200</p>	<p>DATE</p> <p style="text-align: center;">MAR 2020 APR 2021</p>	<p style="text-align: right;">BB</p>

2026 BUILD-OUT

INTERSECTION AT FRIES MILL ROAD (CR 655) &
QUEENSFERRY DRIVE/STIRLING GLEN DRIVE

FIGURE 4C-4. WARRANT 3, PEAK HOUR

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

SECTIONS 1 + 2

P:\Projects\2264-02\Reports\Traffic\Signal Warrant Analysis 11-20\Warrant Figure 2264-02.dwg, CR655, 11/3/2020 11:32:11 AM, brown, 1:1

PROJECT THE GREENS SUPPLEMENT TO TRAFFIC IMPACT STUDY MONROE TOWNSHIP GLOUCESTER COUNTY, NEW JERSEY	FIG. No. 4	TITLE PEAK HOUR WARRANT
CS CONSULTING ENGINEER SERVICES PROFESSIONAL ENGINEERS, PLANNERS, & LAND SURVEYORS 645 BERLIN-CROSS KEYS ROAD, SICKLERVILLE, NJ 08081 (856) 228-2200	DATE NOV 2020 APR 2021	PROJ #2264-02

A14