Cranston, Rhode Island

Proposed Warehouse Facility

May 2022

TRAFFIC IMPACT STUDY

BETA
701 George Washington Hwy
Lincoln, Rhode Island 02865
401.333.2382
www.BETA-Inc.com

Proposed Warehouse Facility
Cranston, Rhode Island

TRAFFIC IMPACT STUDY

Prepared by: BETA GROUP, INC.

Prepared for: Mr. Richard P. Baccari, II, President
Churchill & Banks
10 Greene Street
Providence, Rhode Island 02903

May 2022

IMPROVING COMMUNITIES TOGETHER

May 16, 2022

Mr. Richard P. Baccari, II, President
Churchill & Banks
10 Greene Street
Providence, Rhode Island 02903

Re: Proposed Commercial Land Redevelopment
Howard Industrial Park Warehouse Facility
Goddard Road, Cranston, Rhode Island

Dear Mr. Baccari:

BETA Group, Inc., in accordance with our scope of services, has completed a traffic impact study for a proposed commercial redevelopment project in the City of Cranston, Rhode Island. The project is located on the easterly side of Goddard Road within the Howard Industrial Park off of Pontiac Avenue. The parcel is defined by Assessor's Plat 13, Lot 39, which contains approximately 16.7+ acres of developed land.

Based upon information provided by your office, and a review of the current site plan prepared by *Garofalo & Associates,* it is our understanding that the former correctional facility site operated by the State of Rhode Island will be redeveloped to include a warehouse and associated parking. Access/egress to the site will be provided from two existing curb cuts, which will be modified to accommodate the new use, while closing an existing third curb cut on Goddard Road.

The study included herein, was conducted to determine the adequacy of the existing servicing roadways to accommodate anticipated traffic to be generated by the proposed warehouse facility project. An analysis of potential impacts to the roadway capacity and safety has been completed and is discussed in the following report.

Very truly yours,
BETA Group, Inc.

Paul J. Bannon
Associate

BETA GROUP, INC.
701 George Washington Highway, Lincoln, RI 02865
P: 401.333.2382 | F: 401.333.9225 | W: www.BETA-Inc.com

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1.0 INTRODUCTION

The objective of the following study is to assess the potential traffic impacts associated with a proposed warehouse facility project in the City of Cranston, Rhode Island. The subject property is situated on a parcel of land on the easterly side of Goddard Road, at its terminus, just south of Slater Road and east of Pontiac Avenue. Refer to the Figure 1, Project Vicinity Map, on the following page for the project location within the city.

The development proposal consists of razing the existing correctional facility buildings and site infrastructure to allow the construction of a single 210,000 square foot warehouse style building that will include parking (295 employee parking, 40 loading, 40 trailer storage) situated adjacent to the building. Access/egress will be provided at two modified driveways while eliminating a third existing driveway on Goddard Road.

The study summarized herein focused on both traffic flow efficiency and safety along Goddard Road, Slater Road, and Pontiac Avenue in the immediate vicinity of the subject property, and at the proposed driveways. The impacts associated with the site related traffic have been defined and evaluated in accordance with standard traffic engineering guidelines and procedures.

The traffic engineering study completed for this project included the following:

- A traffic counting program to define the existing traffic patterns and operational characteristics along the servicing roadways to the industrial park including Pontiac Avenue, Slater Road and Kenney Drive, and review of record traffic data available from the Rhode Island Department of Transportation (RIDOT). The data collection included manual turning movement counts (TMCs) at the intersections of Pontiac Avenue with Slater Road and with Kenney Drive.
- An inventory of the physical roadway characteristics of Goddard Road, Slater Road, Kenney Drive and Pontiac Avenue in the project area to determine the adequacy of the existing roadway geometric features in reference to safety and operations.
- An analysis of crash records obtained from the Cranston Police Department to determine if there are any safety concerns relative to the frequency, severity, or pattern of crashes in the project area.
- An estimate of future traffic volumes for the proposed warehouse facility was calculated using data from the "Trip Generation" Manual, an informational report published by the Institute of Transportation Engineers (ITE).
- Evaluation and analysis of the traffic safety and operational issues for existing and future traffic conditions.
- Development of recommendations where necessary, that would be required to maintain safe and efficient traffic flow in the project area.

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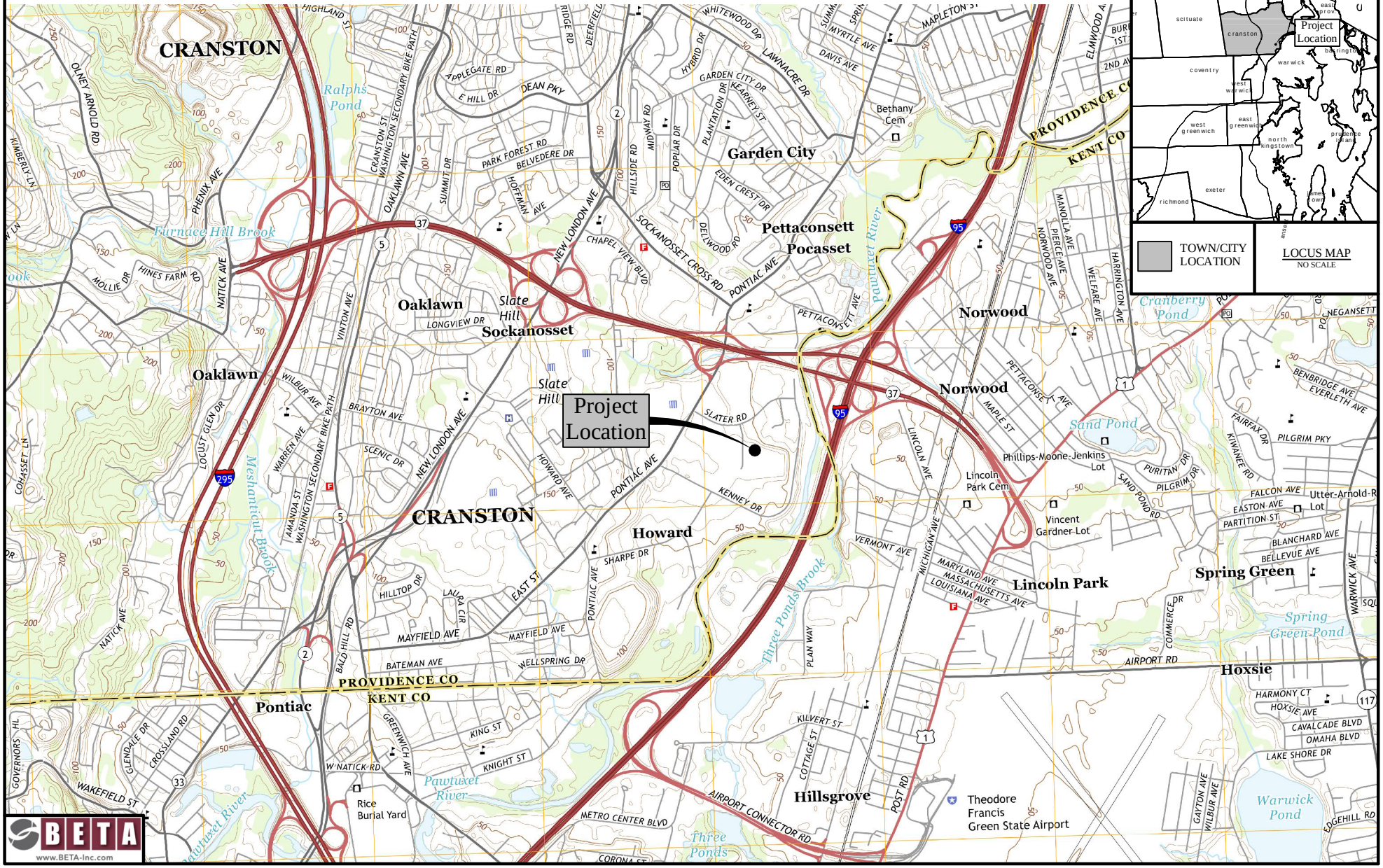
Figure 1 - Project Vicinity Map



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2.0 PROJECT AREA

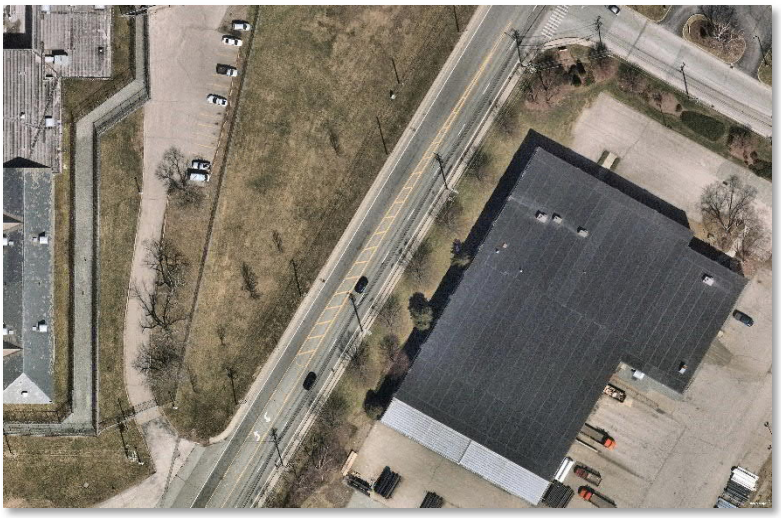
As noted in the previous section, the subject property is situated on the easterly side of Goddard Avenue off of Pontiac Avenue via Slater Road in the Howard Industrial Park. The property is currently developed, as previously discussed, with a single large building that was formerly utilized as a correctional facility operated by the State of Rhode Island. Figure 2 on the following page depicts the general project area, and the boundary lines of the subject property.

Land use in the immediate area can be described as predominantly manufacturing and industrial as the subject property is within the Howard Industrial Park that includes Goddard Road, Slater Road, and Kenney Drive. Several of the smaller buildings within the park are occupied by professional offices or service type businesses. The subject property immediately abuts industrial businesses to the north fronting Slater Road, west across Goddard Road, and south fronting Kenney Drive. To the east across Kenney Drive is the Pawtuxet River. Further north along Pontiac Avenue in the vicinity of the interchange with Route 37 are commercial properties that includes gas stations, banks, retail stores, restaurants, and a pharmacy that service this area. Further to the south along Howard Avenue is the *Pastore Center* campus that comprises State government agencies, notably, the Department of Corrections, Department of Motor Vehicles, Department of Labor & Training, and the Attorney General's office.

With the use proposed, Route 37, Pontiac Avenue, and Slater Road will serve as the primary access route to the site, with Goddard Road providing immediate local access. Based upon the good operating characteristics along these servicing roadways, and the estimated volume and type of traffic associated with the proposed warehouse facility, a study impact area was defined for the project. The limits of our analysis included Pontiac Avenue between Howard Avenue and Route 37 and specifically its intersections with Slater Road and Kenney Drive, and including the Goddard Road intersections with the site driveways.

3.0 EXISTING CONDITIONS

3.1 ROADWAYS



Pontiac Avenue

Pontiac Avenue is classified as an urban minor arterial road extending between East Street to the south and Reservoir Avenue (Route 2) in Providence to the north. Though Pontiac Avenue is identified as a major collector road for a short section between Rolfe Square and Park Avenue (Route 12). The roadway provides immediate local access to abutting properties but also links to higher order facilities including Route 37 and Route 2 to the north and Route 5 to the south.

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Figure 2 - Project Area Map

North of Slater Road, Pontiac Avenue is approximately fifty feet wide consisting of two 11-foot travel lanes and a 3-foot shoulder in each direction. The section of Pontiac Avenue south of Slater Road was recently modified as part of a road diet to install turning lanes at major junctions. Pontiac Avenue transitions to two, 11-foot travel lanes and a 3-foot shoulder on the northbound direction and one, 11-foot travel lane and a 3-foot shoulder in the southbound direction separated by a two-way center left turn lane as depicted in the aerial on page 3. Cement concrete curbing and sidewalks are provided on both side of the road.

The pavement condition can be classified as being in fair condition with visible minor rutting, and longitudinal and block cracking. Sporadic cobra-head light fixtures on utility pole are located along the corridor for nighttime illumination. The speed limit is posted at 35 mph in the project area.

Slater Road

Slater Road is a short local east/west roadway running from its westerly terminus at Pontiac Avenue through its junction with Kenney Drive to the east. Slater Road is approximately forty feet wide consisting of a 20-foot travel lane in each direction with no pavement marking delineation of centerline or shoulder. This width and infrastructure design is consistent with the heavy truck traffic use of the industrial park and was designed to accommodate these large vehicles servicing the manufacturing and industrial business uses.

Cement concrete curbing is provided on both sides with no sidewalk. The pavement condition can be classified as being in fair to good condition with visible minor longitudinal cracking. There is no lighting provided along the road for nighttime illumination. There is no posted speed limit observed and was assumed at 25 mph due to the short length of the roadway and commercial nature of the area. The adjacent photograph depicts the typical characteristics of Slater Road looking east.

Goddard Road

Goddard Road is a short local street that extends from Slater Road to the north to a cul-de-sac to the south. It provides access to a commercial business and the subject site. Similar to Slater Road, Goddard Road is approximately forty feet wide consisting of a 20-foot travel lane in each direction with no pavement marking delineation to service the commercial traffic within the industrial park. Cement concrete curbing is provided on both sides with no sidewalk. The pavement condition can be classified as being in fair to good condition with visible minor longitudinal cracking. There is no lighting provided along

the street for nighttime illumination. There is also no posted speed limit observed and was assumed at 25 mph due to the short length of the roadway and commercial nature of the area. The adjacent photograph depicts the typical characteristics of Goddard Road looking north with the subject site on the right side.

3.2 INTERSECTIONS

Pontiac Avenue at Kenney Drive

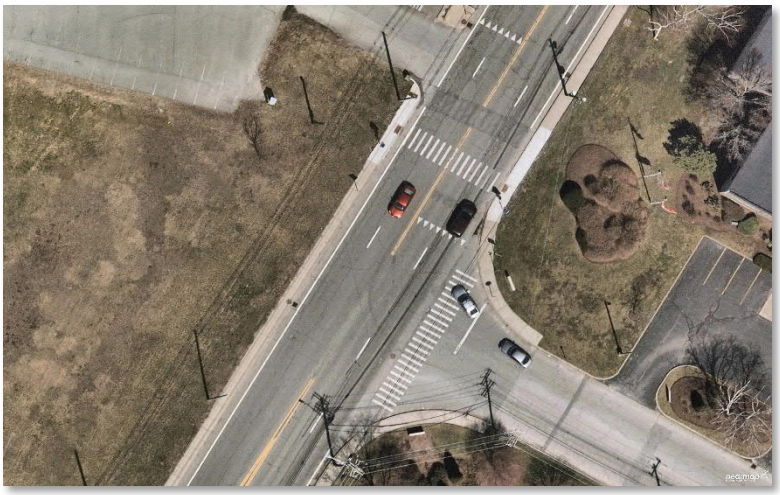
Kenney Drive intersects Pontiac Avenue to form a signalized, three-way "T"-type junction as depicted in the adjacent aerial. The Pontiac Avenue northbound approach provides a through lane and a shared through/right turn lane. The Pontiac Avenue southbound approach provides a separate left turn lane and a through lane. The Kenney Drive westbound approach provides a left turn lane and a right turn lane. Marked crosswalks with curb ramps, which seems to be ADA-compliant, are available across the southbound and westbound approaches to the intersection.

The traffic signal system appears to be in good working condition as some of the older equipment has been upgraded as part of regular maintenance and the road diet project. The layout of the equipment consists of mast arm mounted signal heads with in-road vehicle loop detectors. In addition, pedestrian signal heads with pushbuttons, which were determined to be ADA-compliant, are provided for both existing marked crosswalks.

The intersection was determined to operate in a fully actuated mode under three phases. The Pontiac Avenue northbound and southbound movements are serviced in two phases including an advanced southbound protected left turn with a Kenney Drive westbound right turn overlap, followed by through/right turn concurrent movements. The Kenney Drive westbound approach is serviced under the third phase.

Pontiac Avenue at Slater Road

Slater Road intersects Pontiac Avenue to form an unsignalized, three-way "T"-type junction with stop control on the minor Slater Road westbound approach. A *Stop* sign and stop line are provided on the Slater Road westbound approach to the intersection.



The Pontiac Avenue northbound approach provides a through lane and a shared through/right turn lane. The Pontiac Avenue southbound approache provides a a shared left turn/through lane and a through lane. The Slater Road westbound approach provides a single lane, though due to the 20-foot wide lane as previously described, was observed to operate as a two-lane approach for left and right turning vehicles, allowing for two westbound vehicles to stack side by side at the intersection.

Curb ramps with a marked crosswalk are provided on both corners of the westbound approach, though they are not ADA-compliant. In addition, a pedestrian-actuated rectangular rapid-flashing beacon with ADA-compliant push buttons including curb ramps and a marked crosswalk is provided across Pontiac Avenue just north of Slater Road as depicted in the above aerial. This signage was installed to accommodate a safer midblock crossing from the RIPTA bus sheleter to the prison complex along the westerly side of the road. A Cobra-head light fixture on a utility pole is provided for nighttime illumination of the intersection.

Slater Road at Goddard Road

Goddard Road intersects Slater Road to form an unsignalized, three-way "T"-type junction with stop control on the minor Goddard Road northbound approach. A *Stop* sign, which was observed to be damaged as depicted in the adjacent photo, is provided on the Goddard Road northbound approach to the intersection with no stop line. The *Stop* sign should be replaced/upgraded to meet current safety standards relating to reflectivity and uniformity in design and placement.

The Slater Road eastbound and westbound approaches provides a shared through/right turn lane and shared left turn/through lane, respectively. The Goddard Road northbound approach provides a single lane. Cement concrete curbing is present at the intersection with no sidewalk. In addition, there is no lighting provided at the intersection.

3.3 Traffic Flow Data

Existing traffic flow characteristics for this area were developed from a traffic counting program conducted by BETA and review of available record data from the RIDOT. The data collection included Manual Turning Movement Counts (TMC) at the Pontiac Avenue intersections with Kenney Drive and with Slater Road in May 2022. In addition, record data was reviewed from the RIDOT permanent count station on Pontiac Avenue just south of Slater Road in May 2022.

It is important to note that COVID-19-related restrictions have been lifted in Rhode Island since the end of May 2021 with businesses and schools generally running under normal conditions. Rhode Island, for the most part, has seen traffic volumes return to typical pre-pandemic conditions. Therefore, the traffic data collected in May 2022 specifically for this study was not adjusted for COVID. In addition, BETA reviewed the RIDOT seasonal adjustment factors and determined that urban arterials in the month of May typically experience lower than average daily traffic volumes. To be conservative in representing existing traffic volumes along Pontiac Avenue, the May 2022 traffic volumes were adjusted higher to reflect average traffic conditions.

Based upon the seasonally adjusted turning movement count data at the intersection of Pontiac Avenue with Slater Road, Pontiac Avenue was found to service an estimated 1,325 vehicles during the weekday morning peak hour between 8:00 and 9:00 AM with approximately 395 vehicles northbound and 930 vehicles southbound. During this same period, Slater Road services approximately 195 vehicles with approximately 140 vehicles eastbound into the industrial park and 55 vehicles westbound. During the weekday afternoon peak hour between 4:00 and 5:00 PM, Pontiac Avenue is estimated to service 1,590 vehicles with approximately 1,070 vehicles northbound and 520 vehicles southbound. During this same period, Slater Road services approximately 180 vehicles with approximately 40 vehicles eastbound and 140 vehicles westbound. Figure 3 on the following page depicts the daily peak hour turning movement volumes at the study intersections.

As noted, record ATR data just south of Slater Road was also obtained from the RIDOT. Based upon the May 2022 record ATR data, Pontiac Avenue services an estimated 15,600 vehicles per day. On a typical weekday along Pontiac Avenue, traffic volumes begin to increase at 6:00 AM with the morning peak hour occurring between 8:00 and 9:00 AM. During this hour, an average of approximately 1,130 vehicles was recorded. After 9:00 AM, volumes decreased slightly until noon time and then increased until the late afternoon peak of approximately 1,325 vehicles serviced between 4:00 and 5:00 PM. Complete count information can be found in the Appendix for reference.

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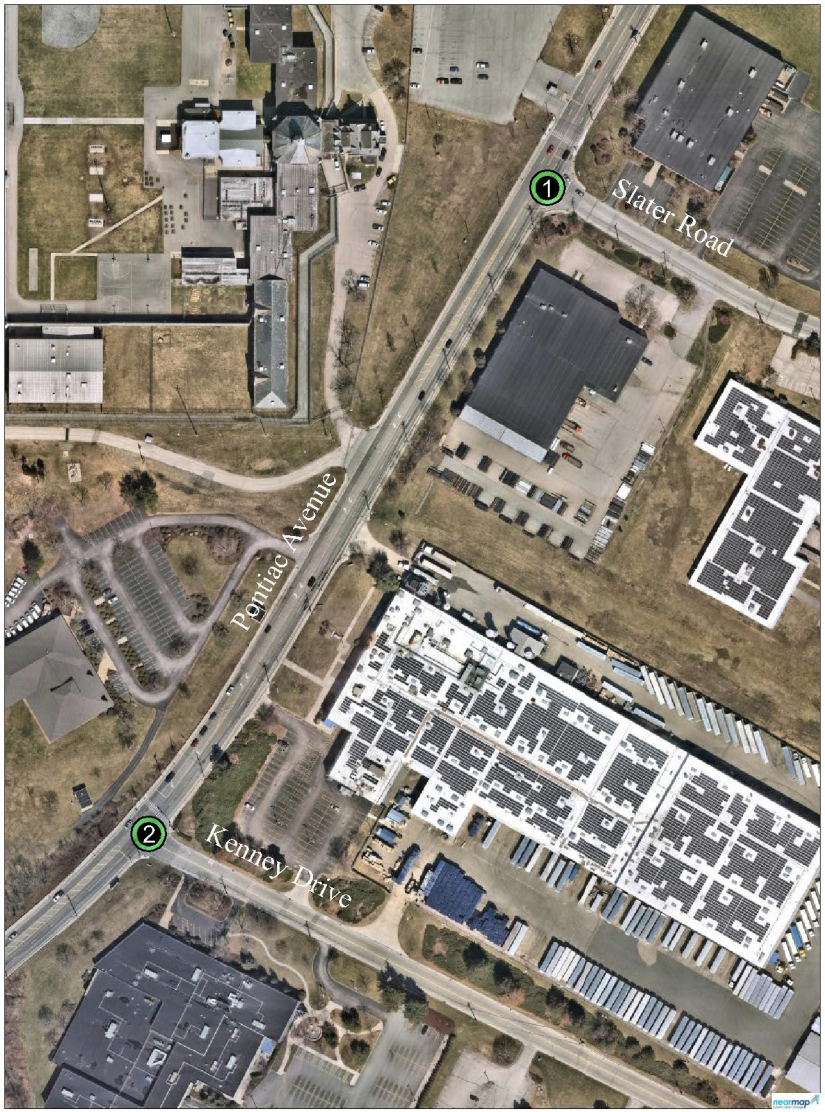
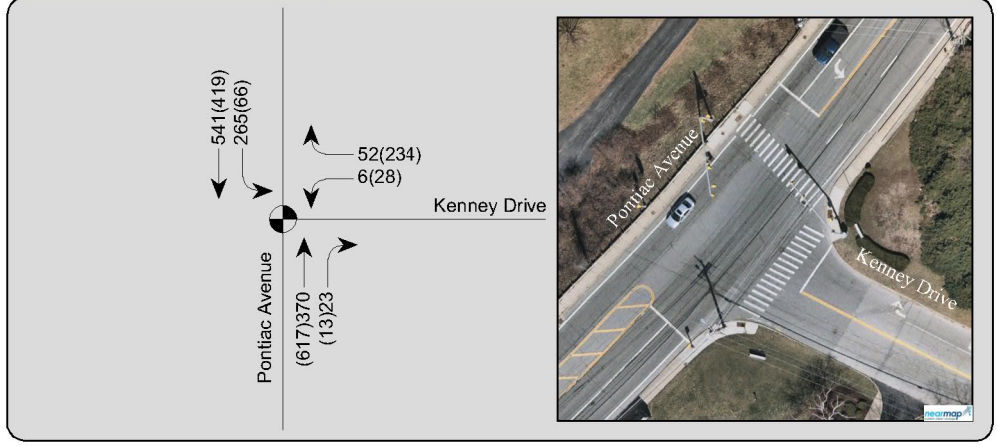
Figure 3 - Existing Traffic Volumes



1 Pontiac Avenue/Slater Road

2 Pontiac Avenue/Kenney Drive



LEGEND:

- TURN LANE
- XXX AM PEAK VOLUMES (8:00 TO 9:00)
- (XXX) PM PEAK VOLUMES (4:00 TO 5:00)
- 1 STUDY INTERSECTION
- TRAFFIC SIGNAL

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4.0 SAFETY ANALYSIS

In order to determine if there are any limiting factors affecting safety relating to access to the proposed warehouse facility project, the physical characteristics of Pontiac Avenue, Slater Road, and Goddard Road in the immediate site vicinity were investigated. These limiting factors would potentially include horizontal or vertical alignment changes or roadside obstructions that limit sight distances for vehicles traveling along the road or entering the road from a side street or driveway location. In this instance, the sight distance standard is necessary to permit turning vehicles to safely enter and exit Slater Road, Goddard Road, and the site driveways.

The horizontal and vertical alignment of Pontiac Avenue in the project area can be described as relatively straight and with a gradual north to south incline, respectively. Based upon the existing roadway geometry as described, the available sight distance at the Slater Road intersection, was determined to be greater than 600 feet to the north and south. These values are in excess of AASHTO's recommended minimum sight distance of 250 feet based on the posted speed limit of 35 mph and are sufficient for speeds greater than 55 mph.

The horizontal and vertical alignment of Slater Road can be described as curvilinear with a minor decline from west to east, respectively. Goddard Road is located along a gradual horizontal curve that provides sight distances of greater than 500 feet to the east and to the west of the Goddard Road intersection. These values are greater than AASHTO's recommended minimum stopping sight distance of 155 feet for the assumed speed of 25 mph and the 250 feet for observed travel speeds between 30 and 35 mph.

The horizontal alignment of Goddard Road can be described as generally straight with a gradual horizontal curve between Slater Road and the existing northern site driveway. In addition, the vertical alignment of Goddard Avenue can be described as relatively level for the southern half of the roadway with a minor incline from north to south on the northern half. Based upon the existing roadway geometry as defined, the available sight distances at the proposed site driveway locations on Goddard Road are greater than 300 feet to the north and south to its terminus. These values are greater than AASHTO's recommended minimum sight distance of 155 feet based on the assumed speeds of 25 mph. It should be noted that speeds are very low due to the short length of the roadway coupled with the unsignalized junction with Slater Road to the north, where vehicles are turning off or onto Goddard Road at a low speed or slowing to the stop sign.

As a result of the preliminary evaluation of the existing roadway geometry and physical features, it does not appear that any significant physical roadway safety deficiencies exist within the defined study area. Also, as part of our analysis, a review of crash statistics was completed. Data was reviewed from the City of Cranston Police Department for the latest three-year period available from January 2017 to December 2019 not impacted by COVID to determine if any location in the project area experienced a high frequency or pattern of crashes.

A total of 19 crashes (avg. 6 per year) occurred along Pontiac Avenue between the two study intersections with Slater Road and with Kenney Drive over the three-year study period, with three involving injuries. Summarizing the data, nine of the crashes with no reported injuries occurred at the unsignalized intersection of Pontiac Avenue with Slater Road and ten of the crashes with three involving injuries occurred at the signalized intersection of Pontiac Avenue with Kenney Drive.

Five crashes at the unsignalized intersection of Pontiac Avenue with Slater Road were rear end collisions that can be attributed to slow and/or stopping traffic that are turning in and/or out of Slater Road. Three were sideswipe collisions along Pontiac Avenue that can be attributed to vehicles changing lanes to avoid vehicles turning onto Slater Road, and one was an angle collision that can be attributed to a driver not yielding the right of way.

The predominant crash type at the signalized intersection of Pontiac Avenue with Kenney Drive were rear end collisions, which is typical of signalized junctions due to the numerous starting and stopping movements required for the signal change intervals; three were angle crashes that can be attributed to a few factors, including drivers not yielding the right of away during the permitted left turn phase along Pontiac Avenue southbound approach (2), and running a red light; and two were sideswipe collisions that can be were attributed to vehicles changing lanes to avoid turning vehicles while approaching the intersection. It is important to note that based on record plans, the Pontiac Avenue southbound left turn phasing at this intersection was updated to a protected phase only, mitigating the angle crashes for this movement.

Based upon the historical crash data obtained from the local police, and a review of existing roadway geometry and operations, roadway or traffic related safety enhancements could be investigated to improve safety within the immediate project area. The RIDOT could review the following safety enhancements at the signalized intersection of Pontiac Avenue with Kenney Drive:

1. The clearance intervals to determine if they require adjustment in an effort to reduce the number of rear-end collisions.
2. Addition of signal head backplates with reflectorized yellow strips to enhance traffic signal visibility.

5.0 Impact Analysis

5.1 Trip Generation

To determine the traffic impact of a proposed development, estimates of anticipated traffic to be generated by a particular land use must be calculated. As previously discussed, the development proposal consists of razing the existing building that was formerly a correctional facility operated by the State of Rhode Island to allow construction of a single 210,000 square foot warehouse style building including parking (295 employee parking, 40 loading, 40 trailer storage) situated adjacent to the building. It anticipated that the warehouse style building will accommodate tenants (i.e., manufactures, wholesalers) that require interiors with shelving to allow storage of goods and/or materials. Access/egress will be

provided at two modified driveways while eliminating a third existing driveway on Goddard Road. Figure 4 on the following page depicts the site layout and access plan provided by *Garofalo & Associates.*

For this site, projected traffic volumes for the commercial project were based on use of trip generation factors. These factors are taken from the "Trip Generation" manual, an informational report published by the Institute of Transportation Engineers (ITE), a national professional organization for traffic and transportation engineers. The data provided in the ITE report are based on extensive traffic studies for various types of land uses (residential, commercial, industrial, etc.). This data has been found to be very reliable and provides a sound basis for estimating future trips to new developments.

For the proposed warehouse facility project, Land Use Code 150 Warehousing was reviewed for applicability in developing an estimate of site related vehicle trips. In order to demonstrate the impact of the potential number of employees that correlates to the number of employee parking spaces provided for the site, the number of employees as the independent variable in the trip generation formula was utilized. This method results in a highly conservative value of site trips and potential traffic impacts to the study intersections versus a building size analysis. The appropriate worksheets from the manual are included in the Appendix along with the trip estimate calculations. Table 1 below summarizes the estimate of peak hour site trip volumes calculated for this project.

TABLE 1 – Trip Generation Estimate

	Description	Enter	Exit	Total
AM Peak Hour				
ITE Land Use Code 150	Warehousing	130	50	180
PM Peak Hour				
ITE Land Use Code 150	Warehousing	70	125	195

5.2 Future Traffic Volumes

In order to properly assess the impacts of a development, future traffic conditions of area roadways should be estimated for the period when the development is constructed and fully occupied. Typically, the expansion of base traffic is calculated when a project is to be constructed over an extended period (+3 to 5 years). In all instances, area growth that may affect capacity results should be considered. It is anticipated that this project would be constructed and occupied within a three-year period so for this project, a conservative annual growth rate 1.0 percent was utilized for the future background traffic growth, though the city has seen an annual population growth rate of less than 0.10% for the past decade. The one percent rate was applied to the existing volumes to establish a Future 2025 Build traffic condition on the servicing roadways. The Future 2025 Build condition included traffic generated by the proposed warehouse facility project.

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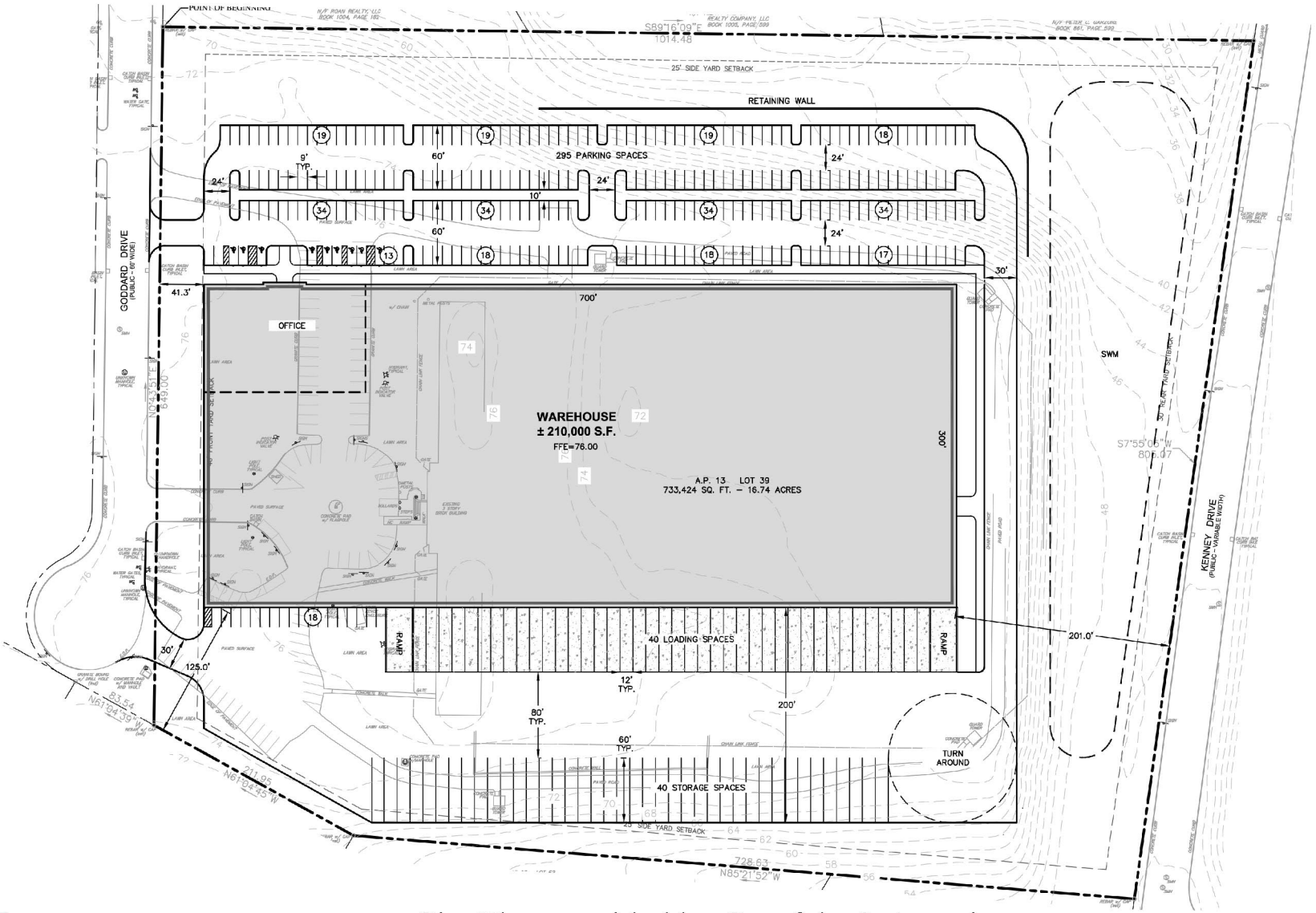
Figure 4 - Site Layout



Site Plan provided by Garofalo & Associates

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In developing the intersection volumes to be analyzed under build conditions, a directional distribution of the site traffic was estimated. The distribution was based on current traffic patterns at the intersections of Pontiac Avenue with Slater Road and with Kenney Drive including consideration of the site's land use and proximity to Route 37, Route 95, and Route 295. It is important to note that warehouse type land uses are estimated to have higher percentage of cars generated during the AM and PM peak hours compared to the trucks associated with this use, as employee are entering and exiting for work shifts. Much of the truck related traffic for this land use occurs during off-peak traffic conditions of the adjacent servicing roadways during the mid-day or evening traffic conditions. As a result, cars as percentage of total site trips during the morning and afternoon peak hours are estimated to be 70% and 80%, respectively.

Figure 5 on the following page depicts the estimated future traffic volumes at the study intersections. Site distribution figures are also provided in the Appendix for reference. It is estimated that 100% of site related truck trips will arrive and depart to the north via Route 37 during both the morning and afternoon peak hours. For employee traffic, it is estimated that 90% of car related site trips will arrive from and depart to the north and 10% will arrive from and depart to the south during both the morning and afternoon peak hours.

5.3 Operational Analysis

The key to any traffic impact analysis is the evaluation of roadway operations during peak traffic periods on the servicing roadway system. This situation would occur when the site-generated traffic, combined with the traffic volumes on the main roadway, result in the highest one-hour volume serviced along a roadway segment, or through an intersection. Review of record traffic data found that the weekday AM and PM peak hours would represent this worst-case combination of site-generated traffic with the servicing roadway peak traffic period. The Highway Capacity Manual methodology provides the most accurate means of evaluating traffic capacity and delays for roadways and intersections. The results of this procedure are expressed in terms of Level of Service (LOS). Level of Service is a qualitative measure of traffic flow efficiency based on anticipated vehicle delays. For example, LOS "A" represents the best condition with little or no delay, while LOS "F" indicates that the roadway/intersection is at full capacity resulting in extended vehicle delays and potential queuing. Table 2 outlines the Level of Service delay criteria presented in the Highway Capacity Manual for signalized and unsignalized intersections.

TABLE 2 – Highway Capacity Manual Criteria

Level of Service	Unsignalized Delay Per Vehicle (sec)	Signalized Delay Per Vehicle (sec)
A	<10	<10
B	>10 and <15	>10 and <20
C	>15 and <25	>20 and <35
D	>25 and <35	>35 and <55
E	>35 and <50	>55 and <80
F	>50	>80

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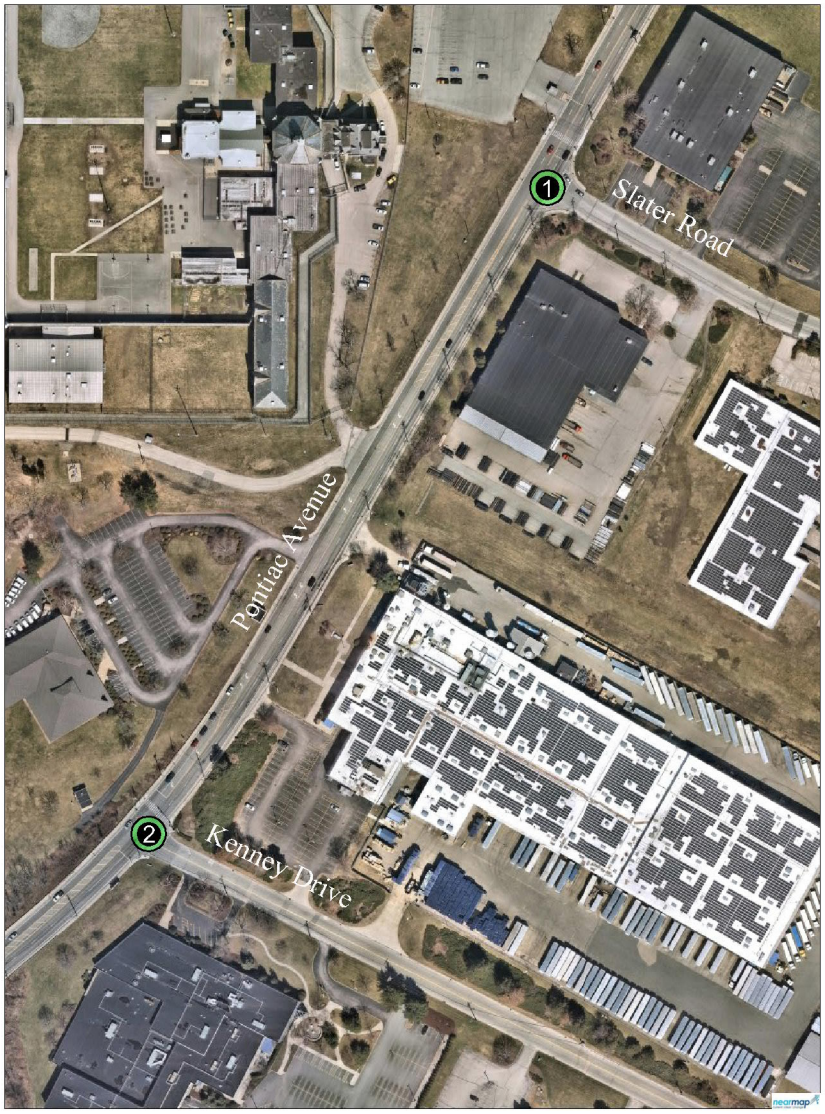
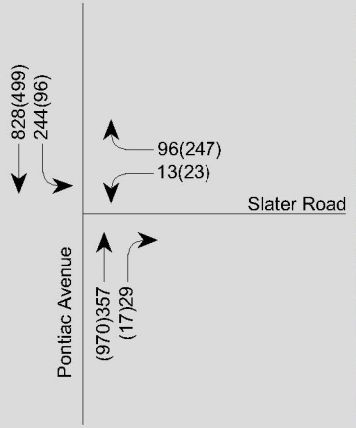
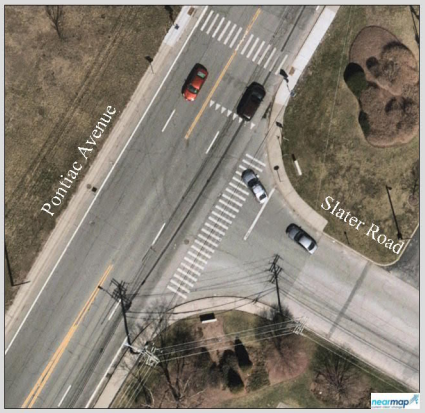
Figure 5 - Future Traffic Volumes

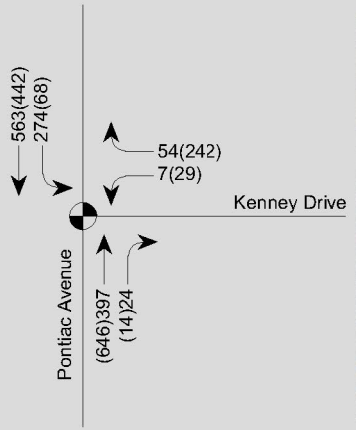


1 Pontiac Avenue/Slater Road





2 Pontiac Avenue/Kenney Drive



LEGEND:

- TURN LANE
- XXX AM PEAK VOLUMES (8:00 TO 9:00)
- (XXX) PM PEAK VOLUMES (4:00 TO 5:00)
- 1 STUDY INTERSECTION
- TRAFFIC SIGNAL

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The Pontiac Avenue intersections with Slater Road and with Kenney Drive and the intersections of Goddard Road with Slater Road and the site driveways were studied for the existing and future weekday morning and afternoon peak hours. The capacity analysis worksheets are included in the Appendix and Tables 3 and 4 summarize the results of the analyses.

Table 3 below depicts the current conditions at the study intersections. As can be seen in the table, the signalized intersection of Pontiac Avenue with Kenney Drive was determined to operate overall at an acceptable LOS A and LOS B during the AM and PM peak hours, respectively, with critical movements experiencing LOS B or better. The unsignalized intersection of Pontiac Avenue with Slater Road analysis found that all critical movements currently operate at LOS D or better, except for the Slater Road westbound left turn movement during the afternoon peak hour where it experiences greater delays of more than 45 seconds representing LOS E, though due to the low movement volumes, results in typically only one to two vehicles waiting to turn onto Pontiac Avenue at any one time with no congestion.

TABLE 3 – Level of Service Summary (Existing Conditions)

Location / Movement	EXISTING CONDITIONS							
	AM Peak Hour				PM Peak Hour			
	LOS	Delay	95th % Queue Length (veh.)	v/c	LOS	Delay	95th % Queue Length (veh.)	v/c
Pontiac Avenue at Kenney Drive (S)								
Pontiac Avenue NB	B	11.5	3	0.38	B	14.1	6	0.55
Pontiac Avenue SB Left	B	19.5	7	0.54	B	19.9	2	0.23
Pontiac Avenue SB Thru	A	4.0	5	0.33	A	6.6	4	0.36
Kenney Drive WB Left	B	15.8	1	0.02	B	12.8	2	0.11
Kenney Drive WB Right	B	10.0	1	0.10	B	12.9	4	0.51
OVERALL	A	9.9	-	-	B	11.8	-	-
Pontiac Avenue at Slater Road (U)								
Pontiac Avenue SB Left	A	8.6	1	0.12	B	12.1	1	0.08
Slater Road WB Left	D	32.2	1	0.06	E	49.8	1	0.16
Slater Road WB Right	B	10.0	1	0.07	C	17.2	2	0.35

(S) – Signalized
(U) – Unsignalized

One condition that does have a positive impact on the available gaps in traffic are the adjacent signalized intersections at the Route 37 interchange ramps to the north and Kenney Drive to the south. The traffic signals help create gaps in Pontiac Avenue traffic during the through traffic phases on the intersecting side streets and the change intervals that driveway and side street traffic can utilize to access the main road. The positive effect of the adjacent signals cannot be adequately modeled into the HCS analysis to show this lower delay that actually occurs. It should also be noted that Kenney Drive provides an alternative route to the south out of the industrial park and if left turn exiting traffic at Slater Road during the

afternoon peak experienced excessive delays, safe and efficient signalized southbound access out of the industrial park is available at that intersection.

Table 4 presents the future design period analysis taking into consideration base traffic growth along with the site redevelopment as noted earlier along the servicing roadways. The results of the analysis found that the Pontiac Avenue signalized intersection with Kenney Drive will continue to operate overall in an efficient manner at LOS B during both the morning and afternoon peak hours of traffic with critical movements experiencing LOS C or better.

TABLE 4 – Level of Service Summary (Future Build Conditions)

Location / Movement	FUTURE 2025 BUILD CONDITIONS							
	AM Peak Hour				PM Peak Hour			
	LOS	Delay	95th % Queue Length (veh.)	v/c	LOS	Delay	95th % Queue Length (veh.)	v/c
Pontiac Avenue at Kenney Drive (S)								
Pontiac Avenue NB	B	11.9	4	0.41	B	14.4	6	0.57
Pontiac Avenue SB Left	C	20.4	7	0.56	C	20.6	2	0.23
Pontiac Avenue SB Thru	A	4.1	5	0.35	A	6.8	4	0.31
Kenney Drive WB Left	B	15.9	1	0.02	B	13.1	2	0.11
Kenney Drive WB Right	A	9.9	1	0.10	B	13.2	4	0.53
OVERALL	B	10.3	-	-	B	12.1	-	-
Pontiac Avenue at Slater Road (U)								
Pontiac Avenue SB Left	A	9.3	1	0.25	B	13.8	1	0.23
Slater Road WB Left	F	88.7	1	0.26	F	142.1	2	0.56
Slater Road WB Right	B	10.5	1	0.14	D	30.5	5	0.70

(S) – Signalized
(U) – Unsignalized

Under the future build condition, all critical movements at the unsignalized intersection of Pontiac Avenue with Slater Road were estimated to operate in an acceptable manner at LOS D or better except for the Slater Road westbound left turn movement during both the morning and afternoon peak hours where it will continue to experience greater delays, though due to the low movement volumes, results in typically only one to two vehicles waiting to turn onto Pontiac Avenue at any one time with no congestion as defined under existing conditions.

The unsignalized capacity analysis results for the minor approach delays are consistent with most unsignalized driveways or side street intersections along Pontiac Avenue in the project area due to the higher main street volumes and limitations of the unsignalized analysis as previously discussed. It is also

noted that a signalized secondary outlet (Kenney Drive) is available for the industrial park that vehicles destined to the south can utilize to access Pontiac Avenue in the future to balance minor approach delays from the industrial park during the short afternoon peak traffic condition.

Within the industrial park, the unsignalized intersections of Goddard Road with Slater Road and with both site driveways are expected to operate efficiently with negligible delays during both the morning and afternoon peak conditions due to the estimated minor volume on the site driveways, coupled with the low volume of traffic along both Goddard Road and Slater Road. These low volume conditions do not require analysis to demonstrate acceptable operations.

As previously noted, the analysis completed at the study intersections, utilized the higher trip values realized with using of the number of employees as an independent variable in estimating trip values. The operational analysis is provided in Appendix for reference and demonstrates that the Pontiac Avenue study intersections should operate in an acceptable manner during the busiest periods of the day using the conservative hourly trip values for the warehouse land use.

6.0 CONCLUSIONS AND RECOMMENDATIONS

In summary, the study has shown that the proposed commercial project access and circulation has been designed to provide a level of traffic safety and efficiency on the servicing roadway system. The safety of the study intersections of Slater Road with Pontiac Avenue and with Goddard Road and at the Goddard Road intersections with both site driveways were reviewed for geometry and sight distances. The study intersections were determined to provide sufficient sight distances in accordance with AASHTO criteria for visibility and decision making of drivers attempting to enter/exit main street traffic from the proposed driveways.

In reference to safety, as previously noted, The RIDOT could review the following safety enhancements at the signalized intersection of Pontiac Avenue with Kenney Drive as part of their general signal maintenance and optimization program:

1. The clearance intervals to determine if they require adjustment in an effort to reduce the number of rear-end collisions.
2. Addition of signal head backplates with reflectorized yellow strips to enhance traffic signal visibility.

In addition, as noted earlier in the report, it is recommended that the city as part of their infrastructure maintenance program, review the *Stop* sign for the intersection of Slater Road with Goddard Road for potential replacement if not presently scheduled, to meet current standards for placement, color, shape, and reflectivity.

The results of the operational analysis determined that the estimated increase in traffic during the peak periods resulting from the proposed warehouse facility project will have a minor impact on overall traffic operations along Pontiac Avenue, Slater Road, and Goddard Road in the project area, particularly during the weekday morning and afternoon peak hours when the site would service its greatest daily volumes.

Therefore, based upon the data collected on the servicing roadways, the analysis completed as part of this study, along with the access design and other recommendations proposed, the proposed warehouse facility project was determined to have adequate and safe access to a public street, and will not have an adverse impact on public safety and welfare in the study area.

i

[i]Aerial Images provided in this document were obtained from Nearmap

APPENDIX

A. Traffic Volume Data

B. Traffic Crash Data

C. Trip Generation

D. Operational Analysis

APPENDIX A – Traffic Volume Data

Automatic Traffic Recorder Count

Pontiac Avenue

Intersection Turning Movement Count

Pontiac Avenue at Kenney Drive

Pontiac Avenue at Slater Road

A

Automatic Traffic Recorder Count

Pontiac Avenue

Pontiac Avenue

(Source; Rhode Island Department of Transportation)

State of Rhode Island Department of Transportation

Volume By Hour By Week for 5/9/2022 - 5/14/2022
Criteria: Location ID = 070047

District : **Location ID :** 070047 **County :** Providence **SF Group :**

Located On : Pontiac Ave **Functional Class :** Minor Arterial **Area Type :** Urban

YEAR	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AADT													4594			14522	15799	12797	13190	

Start Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Avg	Avg Volume Graph	Pct. of Total
	5/9/2022	5/10/2022	5/11/2022	5/12/2022	5/13/2022	5/14/2022			
12:00 AM	62	45	61	57	61	79	61		0.4%
1:00 AM	27	55	48	36	43	57	44		0.3%
2:00 AM	31	45	59	65	66	35	50		0.3%
3:00 AM	53	91	90	84	77	32	71		0.5%
4:00 AM	151	165	186	152	150	44	141		1.0%
5:00 AM	386	398	413	398	398	108	350		2.4%
6:00 AM	658	669	678	691	646	266	601		4.1%
7:00 AM	954	1048	914	953	968	354	865		6.0%
8:00 AM	1167	1177	1115	1142	1056	476	1,022		7.0%
9:00 AM	918	958	841	874	865	558	836		5.8%
10:00 AM	935	945	881	839	873	709	864		5.9%
11:00 AM	963	973	981	894	1037	723	929		6.4%
12:00 PM	1071	1211	1135	1098	1185	763	1,077		7.4%
1:00 PM	1039	1118	1089	1124	1159	730	1,043		7.2%
2:00 PM	1231	1226	1257	1217	1268	690	1,148		7.9%
3:00 PM	1254	1255	1267	1259	1284	626	1,158		8.0%
4:00 PM	1332	1388	1381	1314	1199	593	1,201		8.3%
5:00 PM	955	999	968	1030	932	578	910		6.3%
6:00 PM	578	687	676	695	638	458	622		4.3%
7:00 PM	448	505	517	541	536	408	493		3.4%
8:00 PM	382	383	395	464	418	357	400		2.8%
9:00 PM	234	213	253	267	312	244	254		1.7%
10:00 PM	229	223	221	247	307	215	240		1.7%
11:00 PM	129	147	130	127	192	148	146		1.0%
Total	**15187**	**15924**	**15556**	**15568**	**15670**	**9251**	**Avg**		
AM Pk Hr	8:00 AM	8:00 AM	8:00 AM	8:00 AM	8:00 AM	11:00 AM			
AM Peak	1167	1177	1115	1142	1056	723	1063		
PM Pk Hr	4:00 PM	4:00 PM	4:00 PM	4:00 PM	3:00 PM	12:00 PM			
PM Peak	1332	1388	1381	1314	1284	763	1244		
Peak %	8.77%	8.72%	8.88%	8.44%	8.19%	8.25%	8.54%		

Count Start:	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
Start	5/9/2022	5/10/2022	5/11/2022	5/12/2022	5/13/2022	5/14/2022
End	5/10/2022	5/11/2022	5/12/2022	5/13/2022	5/14/2022	5/15/2022
24h Total	15187	15924	15556	15568	15670	9251

Generated 5/16/2022

A

Intersection Turning Movement Counts

Pontiac Avenue at Kenney Drive

Pontiac Avenue at Slater Road

Pontiac Avenue at Kenney Drive

BETA Group, Inc.

701 George Washington Highway
Lincoln, Rhode Island 02865
P: 401.333.2382 | W: www.BETA-inc.com

Project: Proposed Warehouse Facility
Town/City: Cranston, RI
Location: Pontiac Ave. at Kenney Dr.
Weather: 70s/Partly Cloudy

File Name : Pontiac at Kenney
Site Code : 01044102
Start Date : 5/12/2022
Page No : 1

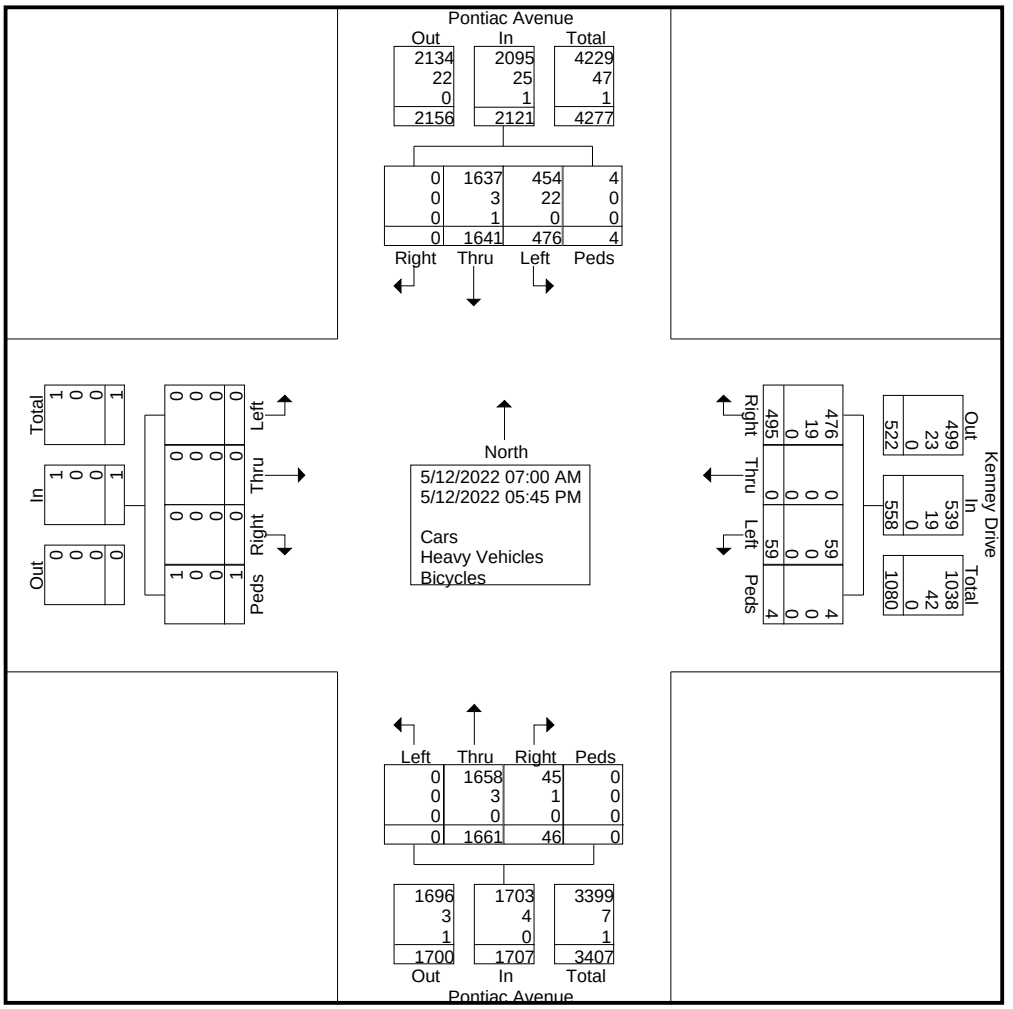
Groups Printed- Cars - Heavy Vehicles - Bicycles

	Pontiac Avenue Southbound					Kenney Drive Westbound					Pontiac Avenue Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	78	36	0	114	10	0	0	0	10	2	75	0	0	77	0	0	0	0	0	201
07:15 AM	0	73	37	3	113	17	0	0	3	20	1	93	0	0	94	0	0	0	0	0	227
07:30 AM	0	85	42	0	127	8	0	1	0	9	6	81	0	0	87	0	0	0	0	0	223
07:45 AM	0	110	70	0	180	12	0	1	0	13	6	88	0	0	94	0	0	0	0	0	287
Total	0	346	185	3	534	47	0	2	3	52	15	337	0	0	352	0	0	0	0	0	938
08:00 AM	0	117	56	0	173	12	0	3	0	15	5	80	0	0	85	0	0	0	0	0	273
08:15 AM	0	138	59	0	197	13	0	0	0	13	3	82	0	0	85	0	0	0	1	1	296
08:30 AM	0	140	62	0	202	11	0	1	0	12	7	95	0	0	102	0	0	0	0	0	316
08:45 AM	0	113	31	0	144	9	0	2	0	11	2	83	0	0	85	0	0	0	0	0	240
Total	0	508	208	0	716	45	0	6	0	51	17	340	0	0	357	0	0	0	1	1	1125
*** BREAK ***																					
04:00 PM	0	100	8	0	108	58	0	6	0	64	3	202	0	0	205	0	0	0	0	0	377
04:15 PM	0	102	21	0	123	47	0	3	0	50	4	114	0	0	118	0	0	0	0	0	291
04:30 PM	0	100	13	0	113	70	0	9	0	79	3	153	0	0	156	0	0	0	0	0	348
04:45 PM	0	89	19	0	108	43	0	8	0	51	2	107	0	0	109	0	0	0	0	0	268
Total	0	391	61	0	452	218	0	26	0	244	12	576	0	0	588	0	0	0	0	0	1284
05:00 PM	0	108	6	0	114	117	0	13	0	130	1	104	0	0	105	0	0	0	0	0	349
05:15 PM	0	100	4	1	105	28	0	7	1	36	0	103	0	0	103	0	0	0	0	0	244
05:30 PM	0	100	9	0	109	24	0	3	0	27	0	109	0	0	109	0	0	0	0	0	245
05:45 PM	0	88	3	0	91	16	0	2	0	18	1	92	0	0	93	0	0	0	0	0	202
Total	0	396	22	1	419	185	0	25	1	211	2	408	0	0	410	0	0	0	0	0	1040
Grand Total	0	1641	476	4	2121	495	0	59	4	558	46	1661	0	0	1707	0	0	0	1	1	4387
Apprch %	0	77.4	22.4	0.2		88.7	0	10.6	0.7		2.7	97.3	0	0		0	0	0	100		
Total %	0	37.4	10.9	0.1	48.3	11.3	0	1.3	0.1	12.7	1	37.9	0	0	38.9	0	0	0	0	0	
Cars	0	1637	454	4	2095	476	0	59	4	539	45	1658	0	0	1703	0	0	0	1	1	4338
% Cars	0	99.8	95.4	100	98.8	96.2	0	100	100	96.6	97.8	99.8	0	0	99.8	0	0	0	100	100	98.9
Heavy Vehicles	0	3	22	0	25	19	0	0	0	19	1	3	0	0	4	0	0	0	0	0	48
% Heavy Vehicles	0	0.2	4.6	0	1.2	3.8	0	0	0	3.4	2.2	0.2	0	0	0.2	0	0	0	0	0	1.1
Bicycles	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BETA Group, Inc.

701 George Washington Highway
Lincoln, Rhode Island 02865
P: 401.333.2382 | W: www.BETA-inc.com

File Name : Pontiac at Kenney
Site Code : 01044102
Start Date : 5/12/2022
Page No : 2



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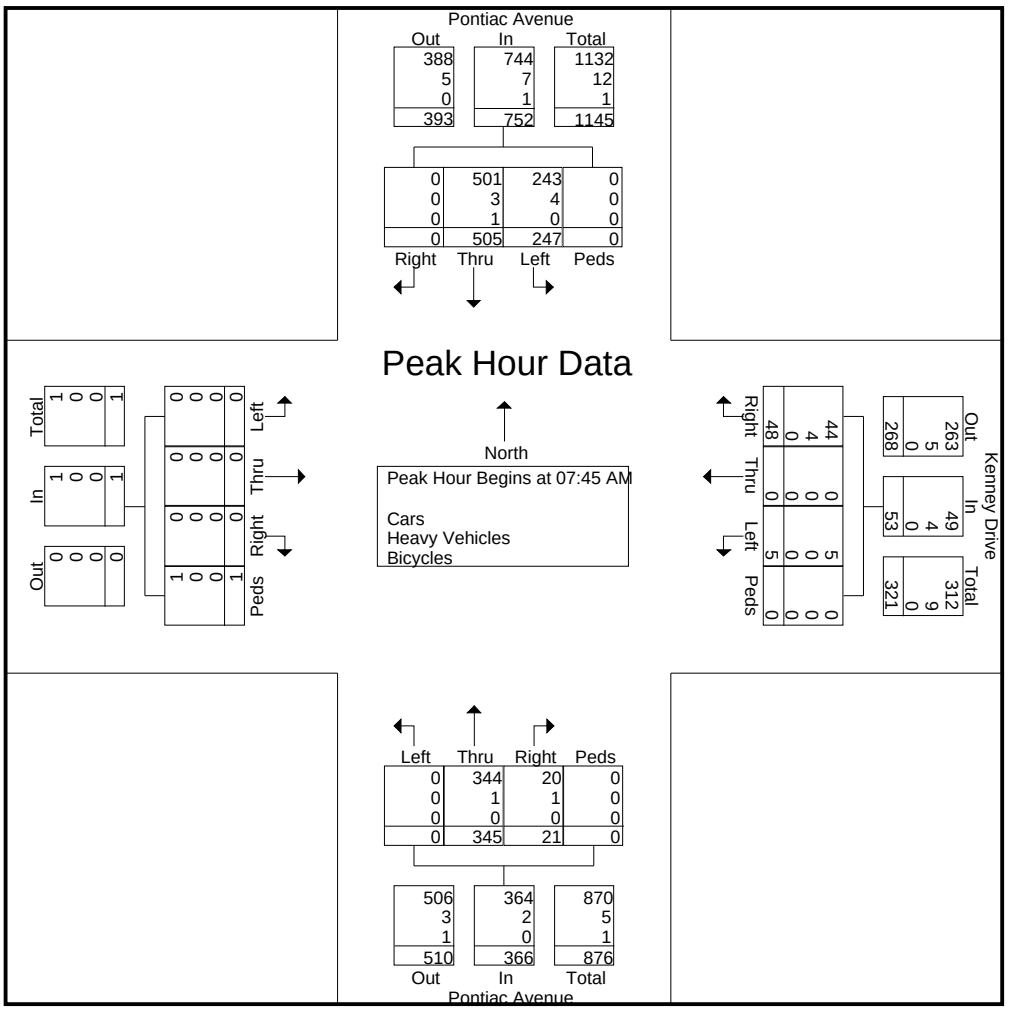
File Name : Pontiac at Kenney
Site Code : 01044102
Start Date : 5/12/2022
Page No : 3

	Pontiac Avenue Southbound					Kenney Drive Westbound					Pontiac Avenue Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	110	**70**	0	180	12	0	1	0	13	6	88	0	0	94	0	0	0	0	0	287
08:00 AM	0	117	56	0	173	12	0	**3**	0	**15**	5	80	0	0	85	0	0	0	0	0	273
08:15 AM	0	138	59	0	197	**13**	0	0	0	13	3	82	0	0	85	0	0	0	**1**	**1**	296
08:30 AM	0	**140**	62	0	**202**	11	0	1	0	12	**7**	**95**	0	0	**102**	0	0	0	0	0	**316**
Total Volume	0	505	247	0	752	48	0	5	0	53	21	345	0	0	366	0	0	0	1	1	1172
% App. Total	0	67.2	32.8	0		90.6	0	9.4	0		5.7	94.3	0	0		0	0	0	100		
PHF	.000	.902	.882	.000	.931	.923	.000	.417	.000	.883	.750	.908	.000	.000	.897	.000	.000	.000	.250	.250	.927
Cars	0	501	243	0	744	44	0	5	0	49	20	344	0	0	364	0	0	0	1	1	1158
% Cars	0	99.2	98.4	0	98.9	91.7	0	100	0	92.5	95.2	99.7	0	0	99.5	0	0	0	100	100	98.8
Heavy Vehicles	0	3	4	0	7	4	0	0	0	4	1	1	0	0	2	0	0	0	0	0	13
% Heavy Vehicles	0	0.6	1.6	0	0.9	8.3	0	0	0	7.5	4.8	0.3	0	0	0.5	0	0	0	0	0	1.1
Bicycles	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	0	0.2	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1



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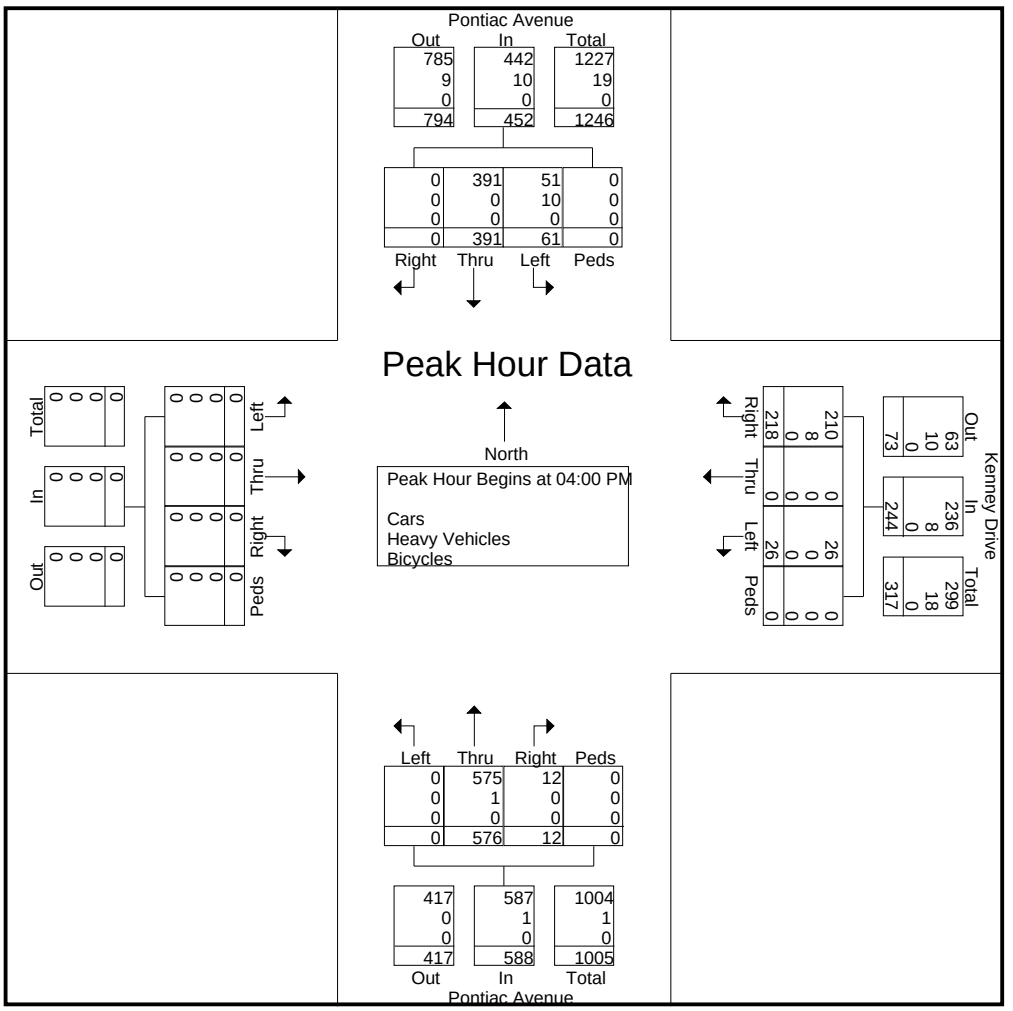
Lincoln, Rhode Island 02865
P: 401.333.2382 | W: www.BETA-inc.com

File Name : Pontiac at Kenney
Site Code : 01044102
Start Date : 5/12/2022
Page No : 4

	Pontiac Avenue Southbound					Kenney Drive Westbound					Pontiac Avenue Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	100	8	0	108	58	0	6	0	64	3	**202**	0	0	**205**	0	0	0	0	0	**377**
04:15 PM	0	**102**	**21**	0	**123**	47	0	3	0	50	**4**	114	0	0	118	0	0	0	0	0	291
04:30 PM	0	100	13	0	113	**70**	0	**9**	0	**79**	3	153	0	0	156	0	0	0	0	0	348
04:45 PM	0	89	19	0	108	43	0	8	0	51	2	107	0	0	109	0	0	0	0	0	268
Total Volume	0	391	61	0	452	218	0	26	0	244	12	576	0	0	588	0	0	0	0	0	1284
% App. Total	0	86.5	13.5	0		89.3	0	10.7	0		2	98	0	0		0	0	0	0		
PHF	.000	.958	.726	.000	.919	.779	.000	.722	.000	.772	.750	.713	.000	.000	.717	.000	.000	.000	.000	.000	.851
Cars	0	391	51	0	442	210	0	26	0	236	12	575	0	0	587	0	0	0	0	0	1265
% Cars	0	100	83.6	0	97.8	96.3	0	100	0	96.7	100	99.8	0	0	99.8	0	0	0	0	0	98.5
Heavy Vehicles	0	0	10	0	10	8	0	0	0	8	0	1	0	0	1	0	0	0	0	0	19
% Heavy Vehicles	0	0	16.4	0	2.2	3.7	0	0	0	3.3	0	0.2	0	0	0.2	0	0	0	0	0	1.5
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Pontiac Avenue at Slater Road

BETA Group, Inc.

701 George Washington Highway
Lincoln, Rhode Island 02865
P: 401.333.2382 | W: www.BETA-inc.com

Project: Proposed Warehouse Facility
Town/City: Cranston, RI
Location: Pontiac Ave. at Slater Rd.
Weather: 70s/Partly Sunny

File Name : Pontiac at Slater
Site Code : 01044101
Start Date : 5/11/2022

Groups Printed- Cars - Heavy Vehicles - Bicycles

	Pontiac Avenue Southbound					Slater Road Westbound					Pontiac Avenue Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	103	27	0	130	6	0	0	0	6	6	78	0	0	84	0	0	0	2	2	222
07:15 AM	0	127	29	0	156	11	0	0	1	12	2	77	0	0	79	0	0	0	0	0	247
07:30 AM	0	134	28	1	163	9	0	0	0	9	6	86	0	0	92	0	0	0	0	0	264
07:45 AM	0	182	43	0	225	6	0	3	1	10	5	70	0	0	75	0	0	0	0	0	310
Total	0	546	127	1	674	32	0	3	2	37	19	311	0	0	330	0	0	0	2	2	1043
08:00 AM	0	176	32	0	208	9	0	1	1	11	3	72	0	0	75	0	0	0	0	0	294
08:15 AM	0	215	23	2	240	18	0	2	0	20	3	91	0	0	94	0	0	0	0	0	354
08:30 AM	0	177	18	0	195	12	0	0	0	12	1	90	0	0	91	0	0	0	0	0	298
08:45 AM	0	144	32	0	176	14	0	1	1	16	1	96	0	0	97	0	0	0	0	0	289
Total	0	712	105	2	819	53	0	4	2	59	8	349	0	0	357	0	0	0	0	0	1235
*** BREAK ***																					
04:00 PM	0	120	13	0	133	45	0	2	0	47	3	277	0	0	280	0	0	0	0	0	460
04:15 PM	0	117	6	0	123	26	0	2	0	28	0	211	0	0	211	0	0	0	0	0	362
04:30 PM	0	98	6	1	105	28	0	6	0	34	0	227	0	0	227	0	0	0	0	0	366
04:45 PM	0	117	6	0	123	20	0	1	0	21	2	164	0	0	166	0	0	0	0	0	310
Total	0	452	31	1	484	119	0	11	0	130	5	879	0	0	884	0	0	0	0	0	1498
05:00 PM	0	96	3	0	99	28	0	3	0	31	0	194	0	0	194	0	0	0	0	0	324
05:15 PM	0	97	7	0	104	24	0	2	0	26	1	151	0	0	152	0	0	0	0	0	282
05:30 PM	0	87	3	0	90	27	0	3	0	30	1	129	0	0	130	0	0	0	0	0	250
05:45 PM	0	89	4	0	93	13	0	0	0	13	0	103	0	0	103	0	0	0	0	0	209
Total	0	369	17	0	386	92	0	8	0	100	2	577	0	0	579	0	0	0	0	0	1065
Grand Total	0	2079	280	4	2363	296	0	26	4	326	34	2116	0	0	2150	0	0	0	2	2	4841
Apprch %	0	88	11.8	0.2		90.8	0	8	1.2		1.6	98.4	0	0		0	0	0	100		
Total %	0	42.9	5.8	0.1	48.8	6.1	0	0.5	0.1	6.7	0.7	43.7	0	0	44.4	0	0	0	0	0	
Cars	0	2052	271	4	2327	283	0	24	4	311	34	2094	0	0	2128	0	0	0	2	2	4768
% Cars	0	98.7	96.8	100	98.5	95.6	0	92.3	100	95.4	100	99	0	0	99	0	0	0	100	100	98.5
Heavy Vehicles	0	27	9	0	36	13	0	2	0	15	0	21	0	0	21	0	0	0	0	0	72
% Heavy Vehicles	0	1.3	3.2	0	1.5	4.4	0	7.7	0	4.6	0	1	0	0	1	0	0	0	0	0	1.5
Bicycles	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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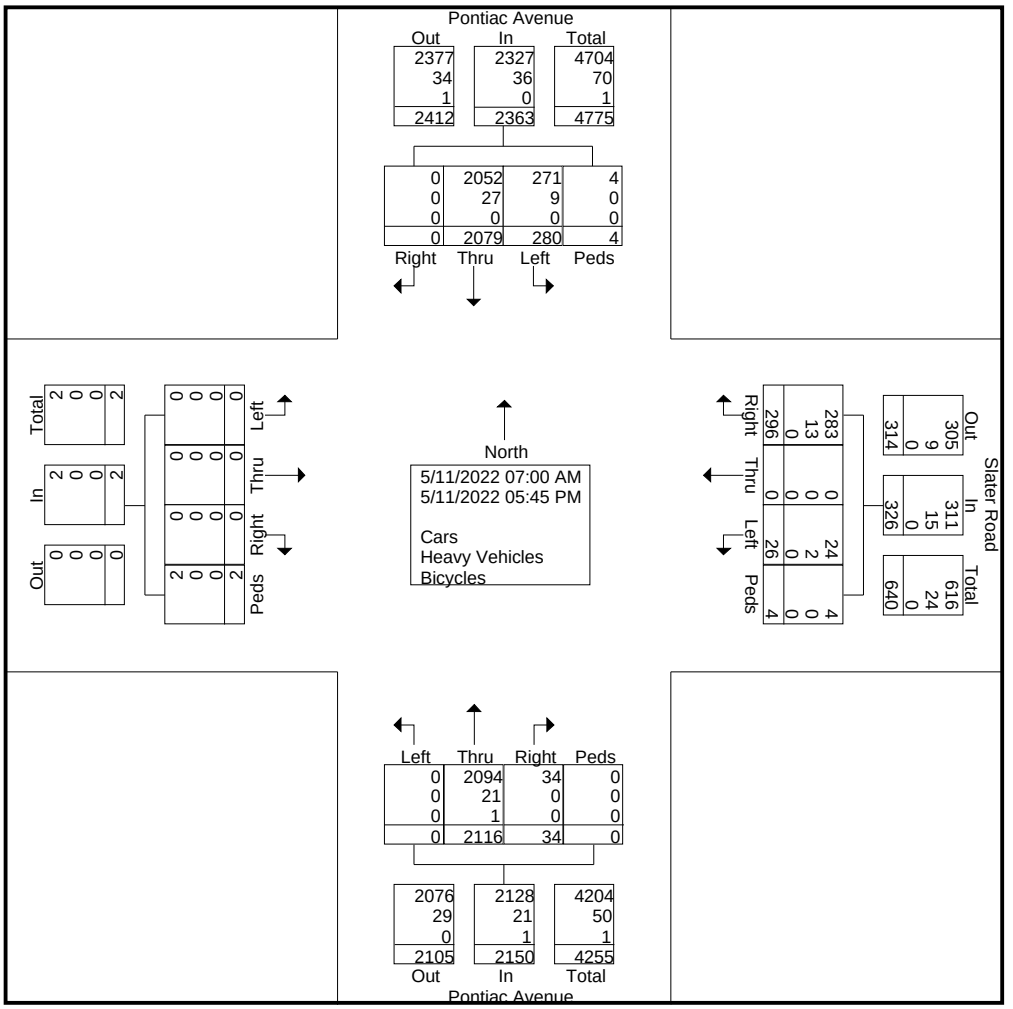
Site Code : 01044101
Start Date : 5/11/2022
Page No : 2



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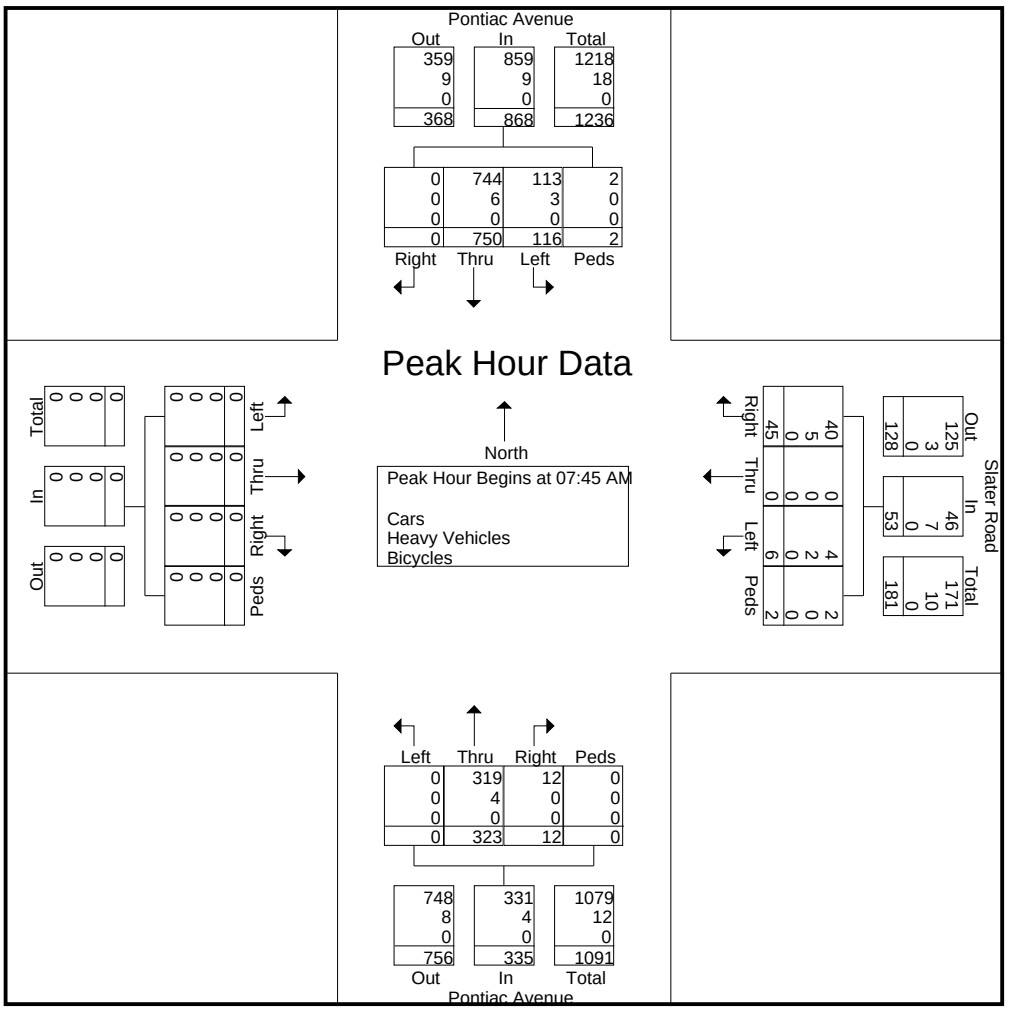
Page No : 3

	Pontiac Avenue Southbound					Slater Road Westbound					Pontiac Avenue Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	182	**43**	0	225	6	0	**3**	**1**	10	**5**	70	0	0	75	0	0	0	0	0	310
08:00 AM	0	176	32	0	208	9	0	1	1	11	3	72	0	0	75	0	0	0	0	0	294
08:15 AM	0	**215**	23	**2**	**240**	**18**	0	2	0	**20**	3	**91**	0	0	**94**	0	0	0	0	0	**354**
08:30 AM	0	177	18	0	195	12	0	0	0	12	1	90	0	0	91	0	0	0	0	0	298
Total Volume	0	750	116	2	868	45	0	6	2	53	12	323	0	0	335	0	0	0	0	0	1256
% App. Total	0	86.4	13.4	0.2		84.9	0	11.3	3.8		3.6	96.4	0	0		0	0	0	0		
PHF	.000	.872	.674	.250	.904	.625	.000	.500	.500	.663	.600	.887	.000	.000	.891	.000	.000	.000	.000	.000	.887
Cars	0	744	113	2	859	40	0	4	2	46	12	319	0	0	331	0	0	0	0	0	1236
% Cars	0	99.2	97.4	100	99.0	88.9	0	66.7	100	86.8	100	98.8	0	0	98.8	0	0	0	0	0	98.4
Heavy Vehicles	0	6	3	0	9	5	0	2	0	7	0	4	0	0	4	0	0	0	0	0	20
% Heavy Vehicles	0	0.8	2.6	0	1.0	11.1	0	33.3	0	13.2	0	1.2	0	0	1.2	0	0	0	0	0	1.6
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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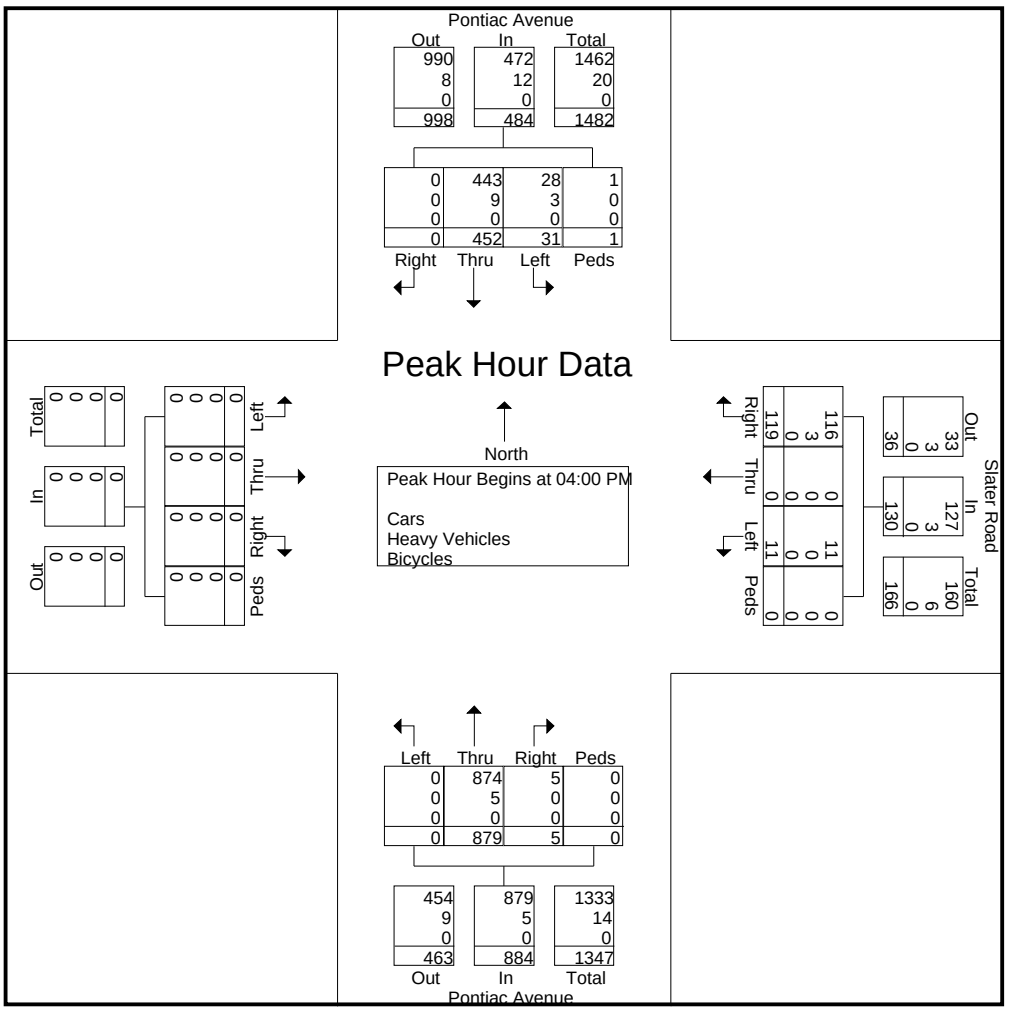
Page No : 4

	Pontiac Avenue Southbound					Slater Road Westbound					Pontiac Avenue Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	**120**	**13**	0	**133**	**45**	0	2	0	**47**	**3**	**277**	0	0	**280**	0	0	0	0	0	**460**
04:15 PM	0	117	6	0	123	26	0	2	0	28	0	211	0	0	211	0	0	0	0	0	362
04:30 PM	0	98	6	**1**	105	28	0	**6**	0	34	0	227	0	0	227	0	0	0	0	0	366
04:45 PM	0	117	6	0	123	20	0	1	0	21	2	164	0	0	166	0	0	0	0	0	310
Total Volume	0	452	31	1	484	119	0	11	0	130	5	879	0	0	884	0	0	0	0	0	1498
% App. Total	0	93.4	6.4	0.2		91.5	0	8.5	0		0.6	99.4	0	0		0	0	0	0		
PHF	.000	.942	.596	.250	.910	.661	.000	.458	.000	.691	.417	.793	.000	.000	.789	.000	.000	.000	.000	.000	.814
Cars	0	443	28	1	472	116	0	11	0	127	5	874	0	0	879	0	0	0	0	0	1478
% Cars	0	98.0	90.3	100	97.5	97.5	0	100	0	97.7	100	99.4	0	0	99.4	0	0	0	0	0	98.7
Heavy Vehicles	0	9	3	0	12	3	0	0	0	3	0	5	0	0	5	0	0	0	0	0	20
% Heavy Vehicles	0	2.0	9.7	0	2.5	2.5	0	0	0	2.3	0	0.6	0	0	0.6	0	0	0	0	0	1.3
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



APPENDIX B – Traffic Crash Data

January 2017 through December 2019

Pontiac Avenue at Kenney Drive

Pontiac Avenue at Slater Road

Crash Data Summary

	Year			Total	Average per Year
	2017	2018	2019		
Intersections					
Pontiac Avenue at Slater Road	3	1	5	9	3
Pontiac Avenue at Kenney Drive	2	7	1	10	3
Total	**5**	**8**	**6**	**19**	**6**

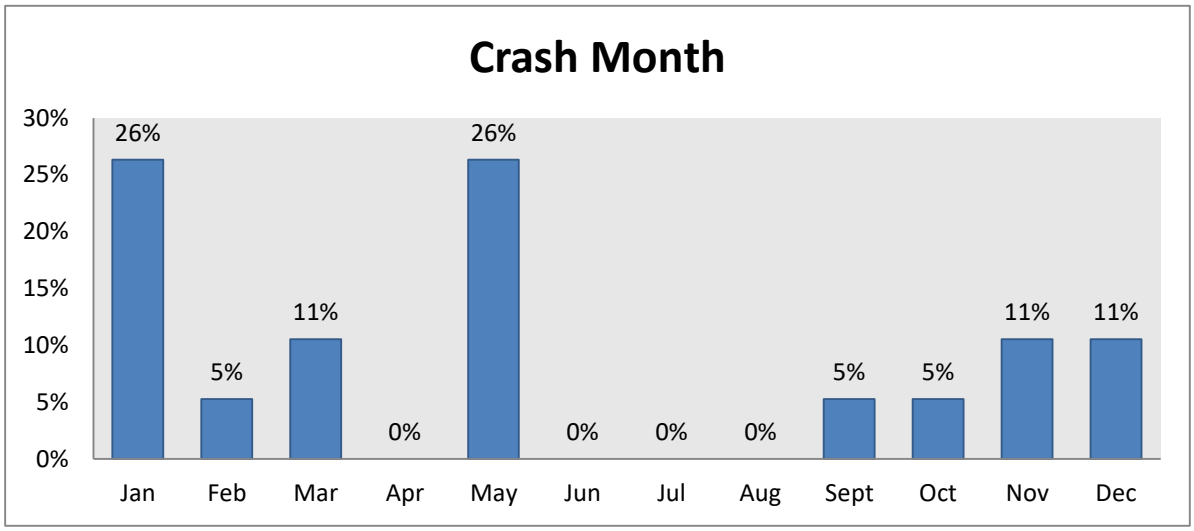
Pontiac Avenue at Slater Road

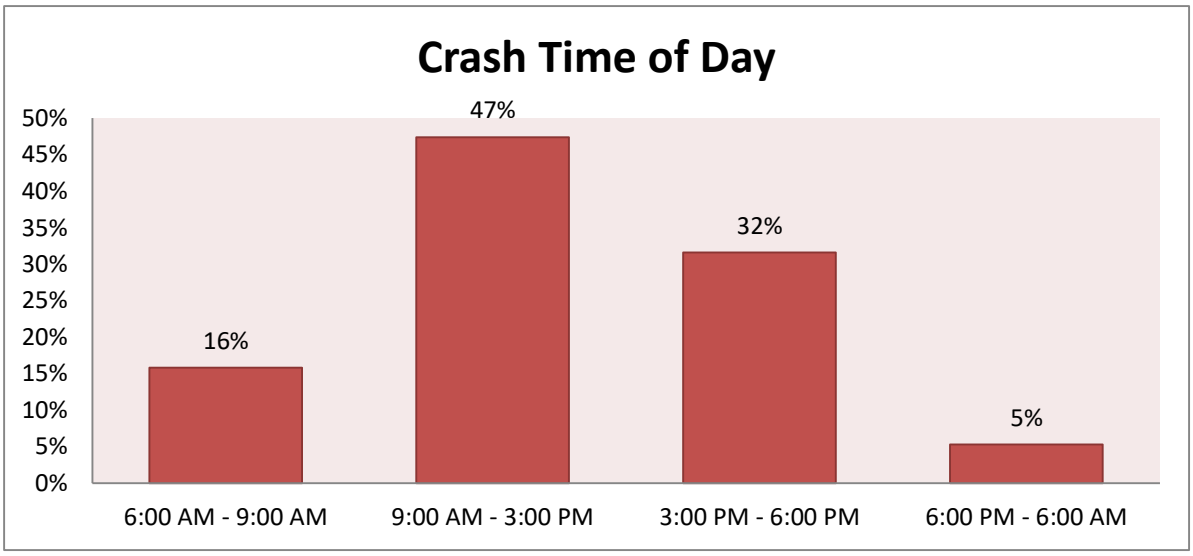
		2017	2018	2019	Total	Percent
Collision Type						
	Rear End	1	1	3	**5**	56%
	Angle	0	0	1	**1**	11%
	Head-On	0	0	0	**0**	0%
	Pedestrian	0	0	0	**0**	0%
	Sideswipe, Same Direction	1	0	1	**2**	22%
	Sideswipe, Opposite Direction	1	0	0	**1**	11%
	Other	0	0	0	**0**	0%
	Unknown	0	0	0	**0**	0%
Crash Severity						
	Property	3	1	5	**9**	100%
	Injury	0	0	0	**0**	0%
Light Condition						
	Daylight	3	0	5	**8**	89%
	Dawn	0	0	0	**0**	0%
	Dusk	0	0	0	**0**	0%
	Dark - Lighted	0	1	0	**1**	11%
	Dark - Not Lighted	0	0	0	**0**	0%
	Dark - Unknown Lighting	0	0	0	**0**	0%
	Other	0	0	0	**0**	0%
	Unknown	0	0	0	**0**	0%
Road Condition						
	Dry	1	1	5	**7**	78%
	Wet	1	0	0	**1**	11%
	Snow	1	0	0	**1**	11%
	Other	0	0	0	**0**	0%
	Unknown	0	0	0	**0**	0%
Hour of Day						
	6:00 AM - 9:00 AM	0	0	1	**1**	11%
	9:00 AM - 3:00 PM	2	0	2	**4**	44%
	3:00 PM - 6:00 PM	1	0	2	**3**	33%
	6:00 PM - 6:00 AM	0	1	0	**1**	11%
	Total Crashes:	**3**	**1**	**5**	**9**	

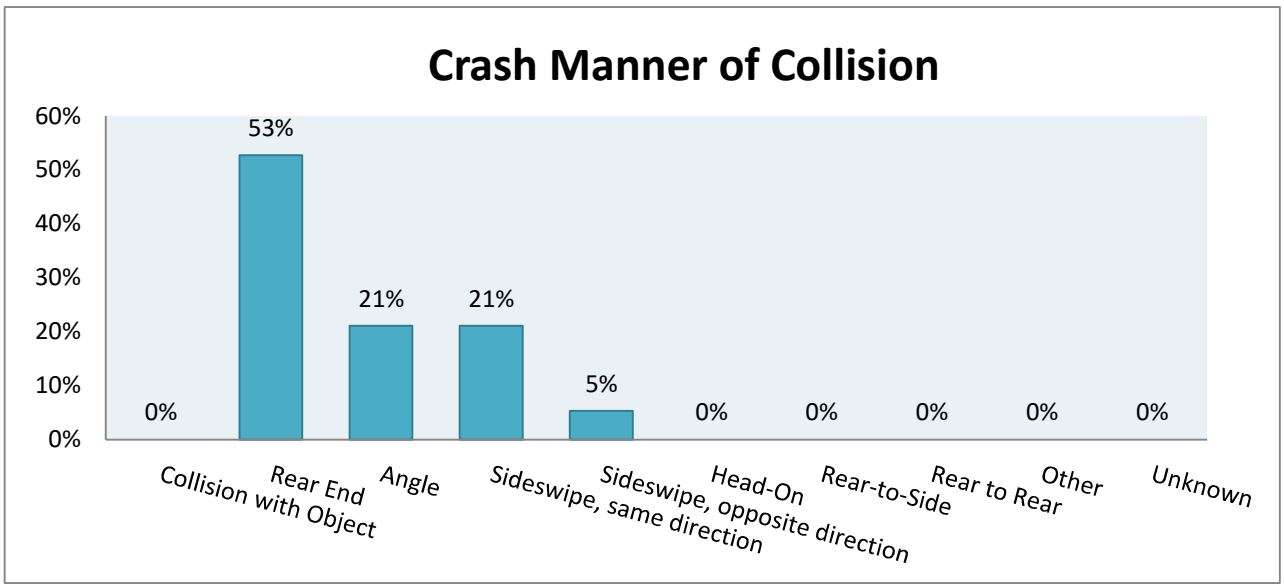
Pontiac Avenue at Kenney Drive

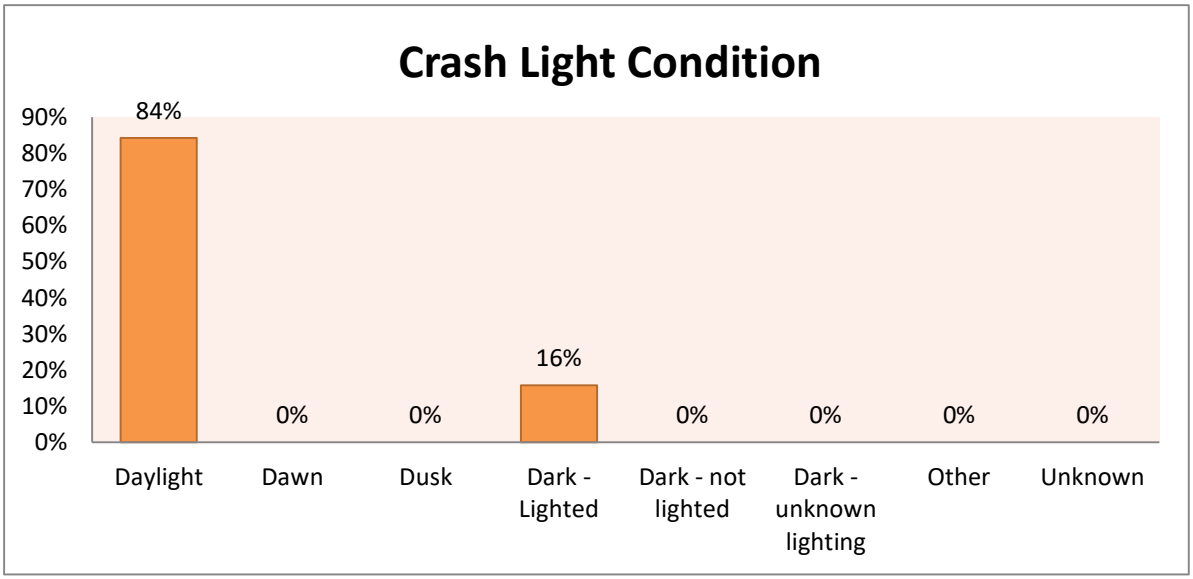
		2017	2018	2019	Total	Percent
Collision Type						
	Rear End	0	4	1	**5**	50%
	Angle	1	2	0	**3**	30%
	Head-On	0	0	0	**0**	0%
	Pedestrian	0	0	0	**0**	0%
	Sideswipe, Same Direction	1	1	0	**2**	20%
	Sideswipe, Opposite Direction	0	0	0	**0**	0%
	Other	0	0	0	**0**	0%
	Unknown	0	0	0	**0**	0%
Crash Severity						
	Property	1	5	1	**7**	70%
	Injury	1	2	0	**3**	30%
Light Condition						
	Daylight	1	6	1	**8**	80%
	Dawn	0	0	0	**0**	0%
	Dusk	0	0	0	**0**	0%
	Dark - Lighted	1	1	0	**2**	20%
	Dark - Not Lighted	0	0	0	**0**	0%
	Dark - Unknown Lighting	0	0	0	**0**	0%
	Other	0	0	0	**0**	0%
	Unknown	0	0	0	**0**	0%
Road Condition						
	Dry	1	6	0	**7**	70%
	Wet	1	1	1	**3**	30%
	Snow	0	0	0	**0**	0%
	Other	0	0	0	**0**	0%
	Unknown	0	0	0	**0**	0%
Hour of Day						
	6:00 AM - 9:00 AM	0	2	0	**2**	20%
	9:00 AM - 3:00 PM	1	3	1	**5**	50%
	3:00 PM - 6:00 PM	1	2	0	**3**	30%
	6:00 PM - 6:00 AM	0	0	0	**0**	0%
	Total Crashes:	**2**	**7**	**1**	**10**	

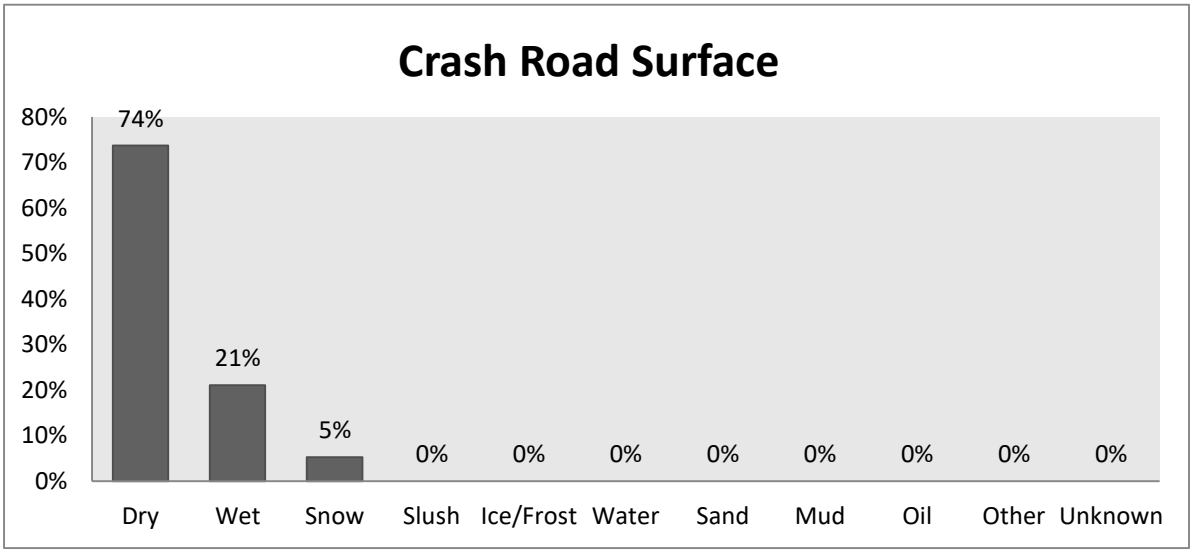
Crash Data Summary Charts








Crash Light Condition
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
84%
0%
0%
16%
0%
0%
0%
0%
Daylight
Dawn
Dusk
Dark - Lighted
Dark - not lighted
Dark - unknown lighting
Other
Unknown


Crash Road Surface
80%
70%
60%
50%
40%
30%
20%
10%
0%
74%
21%
5%
0%
0%
0%
0%
0%
0%
0%
0%
Dry
Wet
Snow
Slush
Ice/Frost
Water
Sand
Mud
Oil
Other
Unknown

APPENDIX C – Trip Generation

ITE Trip Generation Summary

Site Trip Distribution

ITE Land Use Code

ITE Land Use Code 150 – Warehousing

C

ITE Trip Generation Summary

Trip Generation Summary

Summary;

	Description	Enter	Exit	Total
Weekday AM Peak Hour				
ITE Land Use Code 150	Warehousing	130	50	180
Weekday PM Peak Hour				
ITE Land Use Code 150	Warehousing	70	125	195

Calculations;

ITE Land Use Code 150 Warehousing (295 Employees)

Independent Variable (X) = Number of Employees X = 295

AM Peak Hour Directional Distribution: 72% Entering 28% Exiting

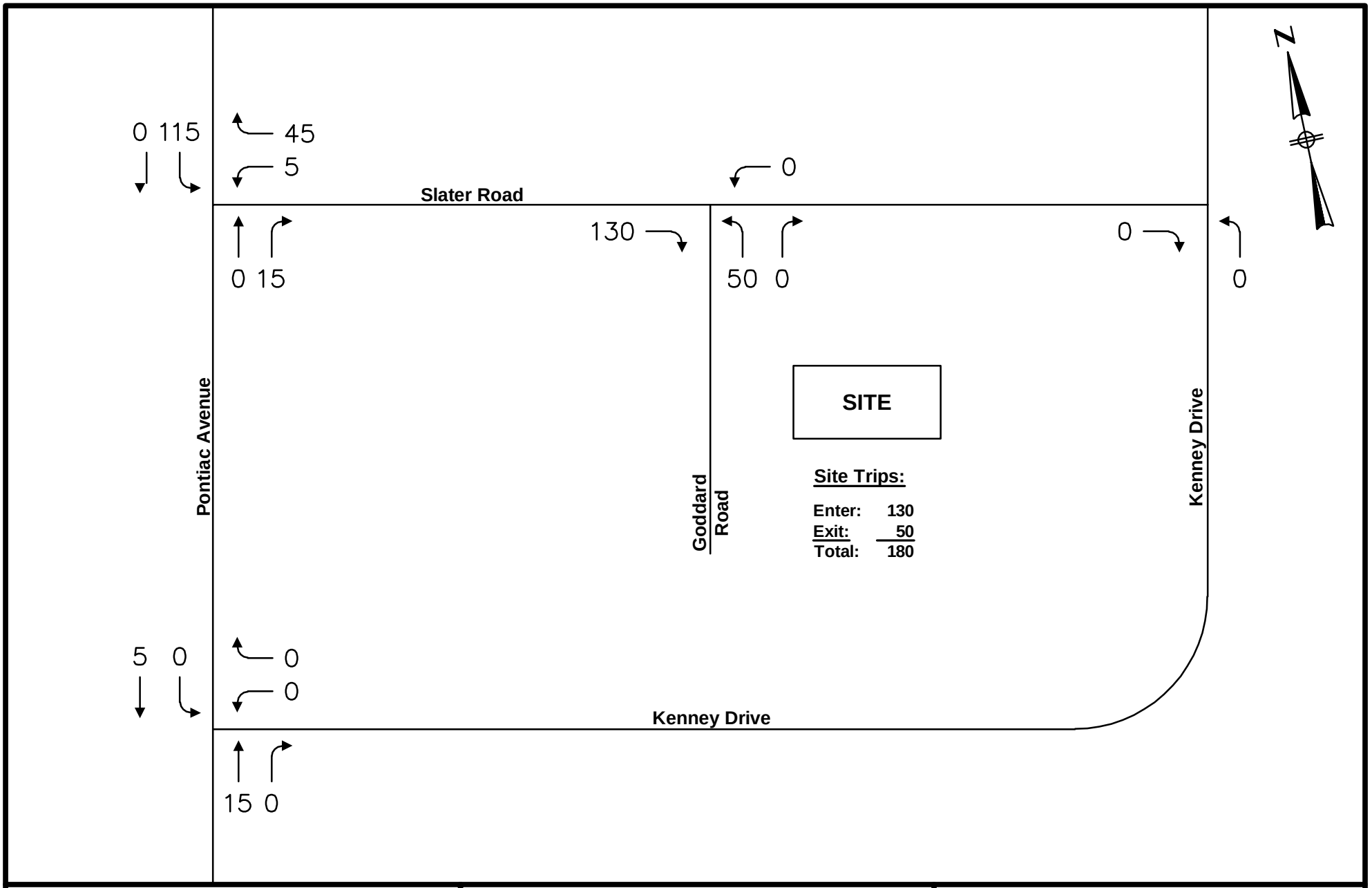
T = 0.61 (X) Enter: 130
T = 0.61 295 Exit: 50
T = 180 Total: 180

PM Peak Hour Directional Distribution: 36% Entering 64% Exiting

T = 0.66 (X) Enter: 70
T = 0.66 295 Exit: 125
T = 195 Total: 195

C

Site Trip Distribution



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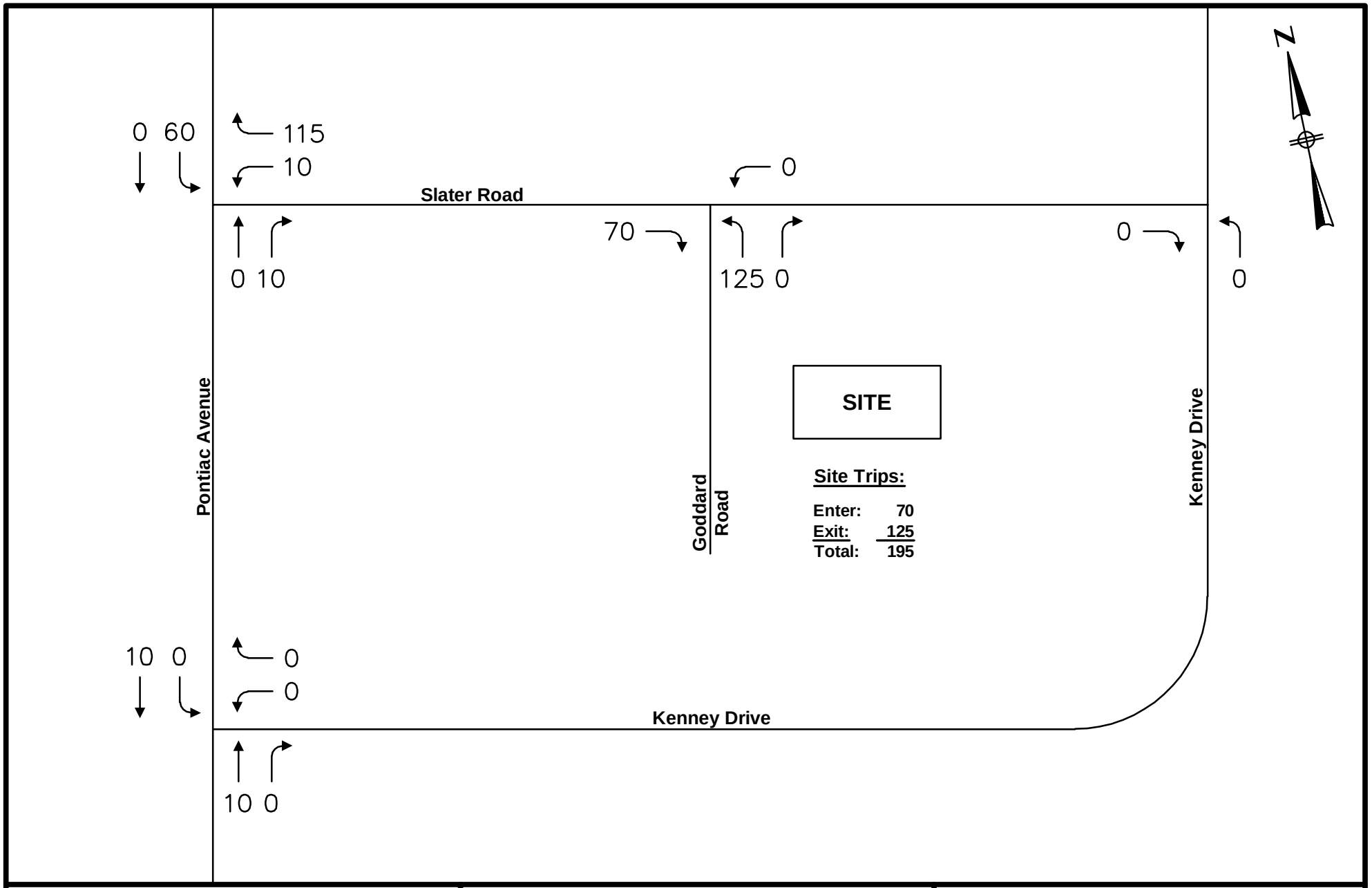
SITE TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR

PROPOSED WAREHOUSE FACILITY
CRANSTON, RHODE ISLAND

2025 Build Condition



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SITE TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR

PROPOSED WAREHOUSE FACILITY
CRANSTON, RHODE ISLAND

2025 Build Condition

C

ITE Land Use Code

ITE Land Use Code 150 – Warehousing

Land Use: 150
Warehousing

Description

A warehouse is primarily devoted to the storage of materials, but it may also include office and maintenance areas. High-cube transload and short-term storage warehouse (Land Use 154), high-cube fulfillment center warehouse (Land Use 155), high-cube parcel hub warehouse (Land Use 156), and high-cube cold storage warehouse (Land Use 157) are related uses.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania, and Texas.

Source Numbers

184, 331, 406, 411, 443, 579, 583, 596, 598, 611, 619, 642, 752, 869, 875, 876, 914, 940, 1050

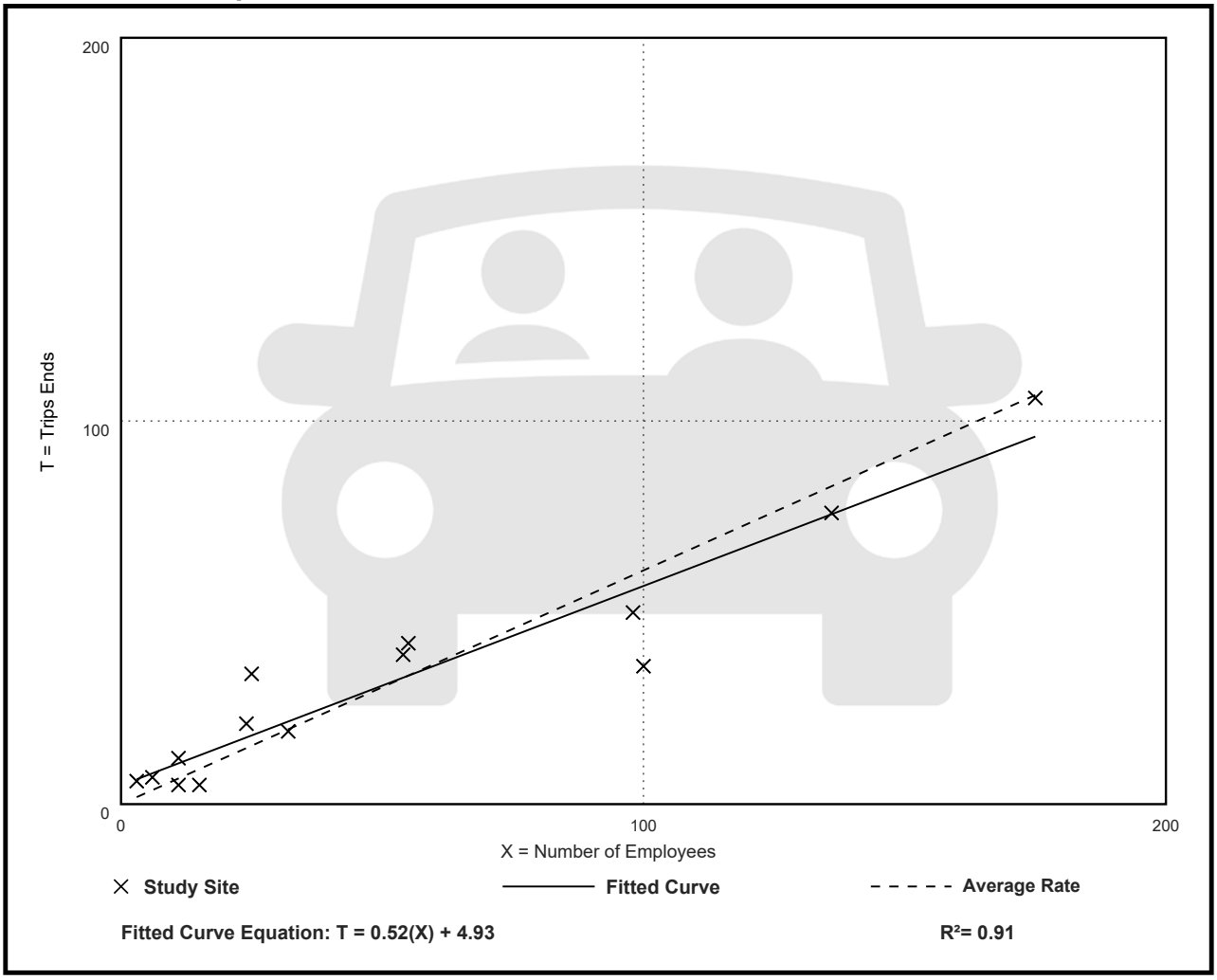
Warehousing
(150)

Vehicle Trip Ends vs: Employees
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 14
Avg. Num. of Employees: 53
Directional Distribution: 72% entering, 28% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.61	0.33 - 2.00	0.23

Data Plot and Equation



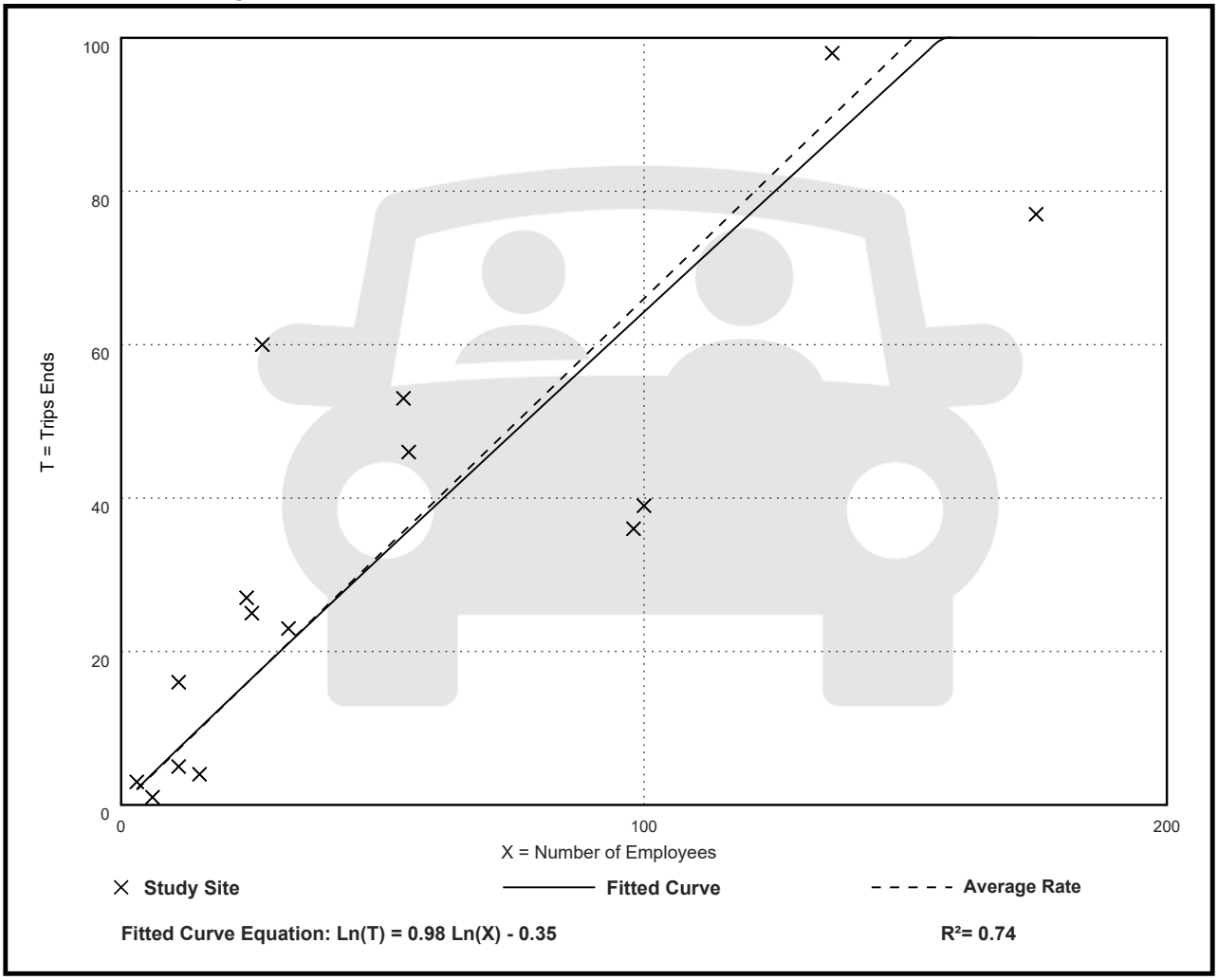
Warehousing
(150)

Vehicle Trip Ends vs: Employees
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 15
Avg. Num. of Employees: 51
Directional Distribution: 36% entering, 64% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.66	0.17 - 2.22	0.40

Data Plot and Equation



APPENDIX D – Operational Analysis

Existing Conditions

- Pontiac Avenue at Kenney Drive
- Pontiac Avenue at Slater Road

Future Build Conditions

- Pontiac Avenue at Kenney Drive
- Pontiac Avenue at Slater Road

D

Existing Weekday AM/ PM Peak Hour

Pontiac Avenue at Kenney Drive

Pontiac Avenue at Slater Road

Pontiac Avenue at Kenney Drive

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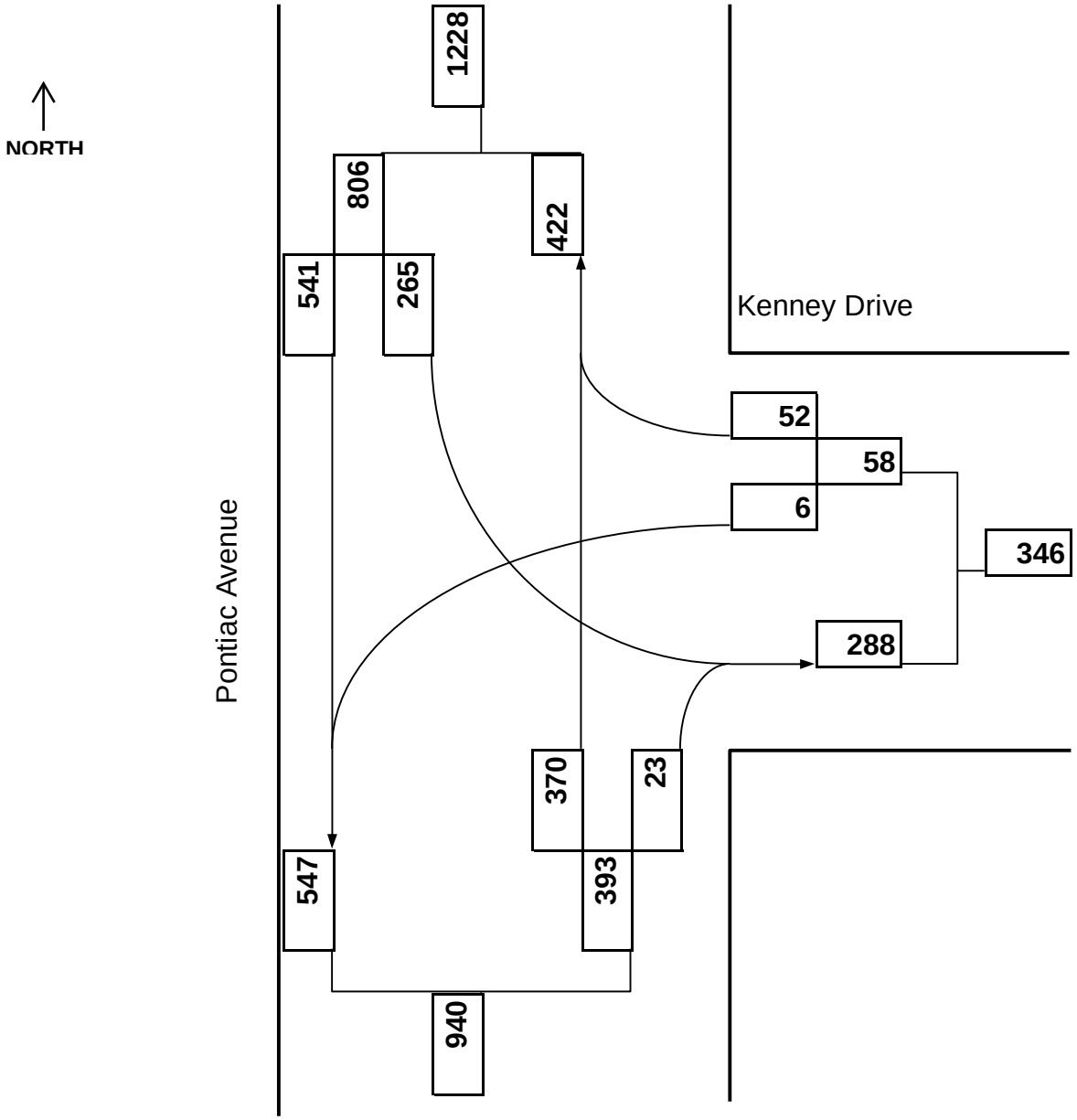
Turning Movement Diagram

Major Street:	Pontiac Avenue	**Minor Street**:	Kenney Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	10441	**Peak Period**:	8:00 AM - 9:00 AM
Existing:	AM Peak Hour	**Future**:	n/a



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	52	370	23	265	541
Future Volume (veh/h)	6	52	370	23	265	541
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1781	1885	1826	1870	1885
Adj Flow Rate, veh/h	6	56	398	25	285	582
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	8	1	5	2	1
Cap, veh/h	139	419	934	58	357	1175
Arrive On Green	0.08	0.08	0.27	0.27	0.20	0.62
Sat Flow, veh/h	1810	1510	3517	214	1781	1885
Grp Volume(v), veh/h	6	56	208	215	285	582
Grp Sat Flow(s),veh/h/ln	1810	1510	1791	1847	1781	1885
Q Serve(g_s), s	0.1	1.0	3.5	3.5	5.6	6.2
Cycle Q Clear(g_c), s	0.1	1.0	3.5	3.5	5.6	6.2
Prop In Lane	1.00	1.00		0.12	1.00	
Lane Grp Cap(c), veh/h	139	419	488	504	357	1175
V/C Ratio(X)	0.04	0.13	0.42	0.43	0.80	0.50
Avail Cap(c_a), veh/h	740	921	1710	1763	486	2622
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.7	9.9	11.0	11.0	13.9	3.8
Incr Delay (d2), s/veh	0.1	0.1	0.5	0.5	5.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.3	1.1	1.1	2.4	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.8	10.0	11.5	11.5	19.5	4.0
LnGrp LOS	B	B	B	B	B	A
Approach Vol, veh/h	62		423			867
Approach Delay, s/veh	10.6		11.5			9.1
Approach LOS	B		B			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	12.9	16.0			28.9	7.8
Change Period (Y+Rc), s	5.5	6.0			* 6	5.0
Max Green Setting (Gmax), s	10.0	35.0			* 51	15.0
Max Q Clear Time (g_c+I1), s	7.6	5.5			8.2	3.0
Green Ext Time (p_c), s	0.2	1.3			1.7	0.1

Intersection Summary	
HCM 6th Ctrl Delay	9.9
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	6	52	370	265	541
Future Volume (vph)	6	52	370	265	541
Lane Group Flow (vph)	6	56	423	285	582
Turn Type	Prot	pm+ov	NA	Prot	NA
Protected Phases	8	1	2	1	6
Permitted Phases		8			
Detector Phase	8	1	2	1	6
Switch Phase					
Minimum Initial (s)	6.0	6.0	10.0	6.0	6.0
Minimum Split (s)	11.0	11.5	16.0	11.5	11.5
Total Split (s)	20.0	15.5	41.0	15.5	56.5
Total Split (%)	26.1%	20.3%	53.6%	20.3%	73.9%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0
All-Red Time (s)	2.0	2.5	1.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.5	6.0	5.5	5.5
Lead/Lag		Lead	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	
Recall Mode	None	None	Min	None	Min
v/c Ratio	0.02	0.10	0.38	0.54	0.33
Control Delay	14.5	3.1	10.9	18.3	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.5	3.1	10.9	18.3	2.2
Queue Length 50th (ft)	1	0	26	37	0
Queue Length 95th (ft)	9	12	76	#161	112
Internal Link Dist (ft)	769		403		939
Turn Bay Length (ft)		250		100	
Base Capacity (vph)	800	552	3380	523	1881
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.01	0.10	0.13	0.54	0.31

Intersection Summary

Cycle Length: 76.5
Actuated Cycle Length: 34.5
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4:

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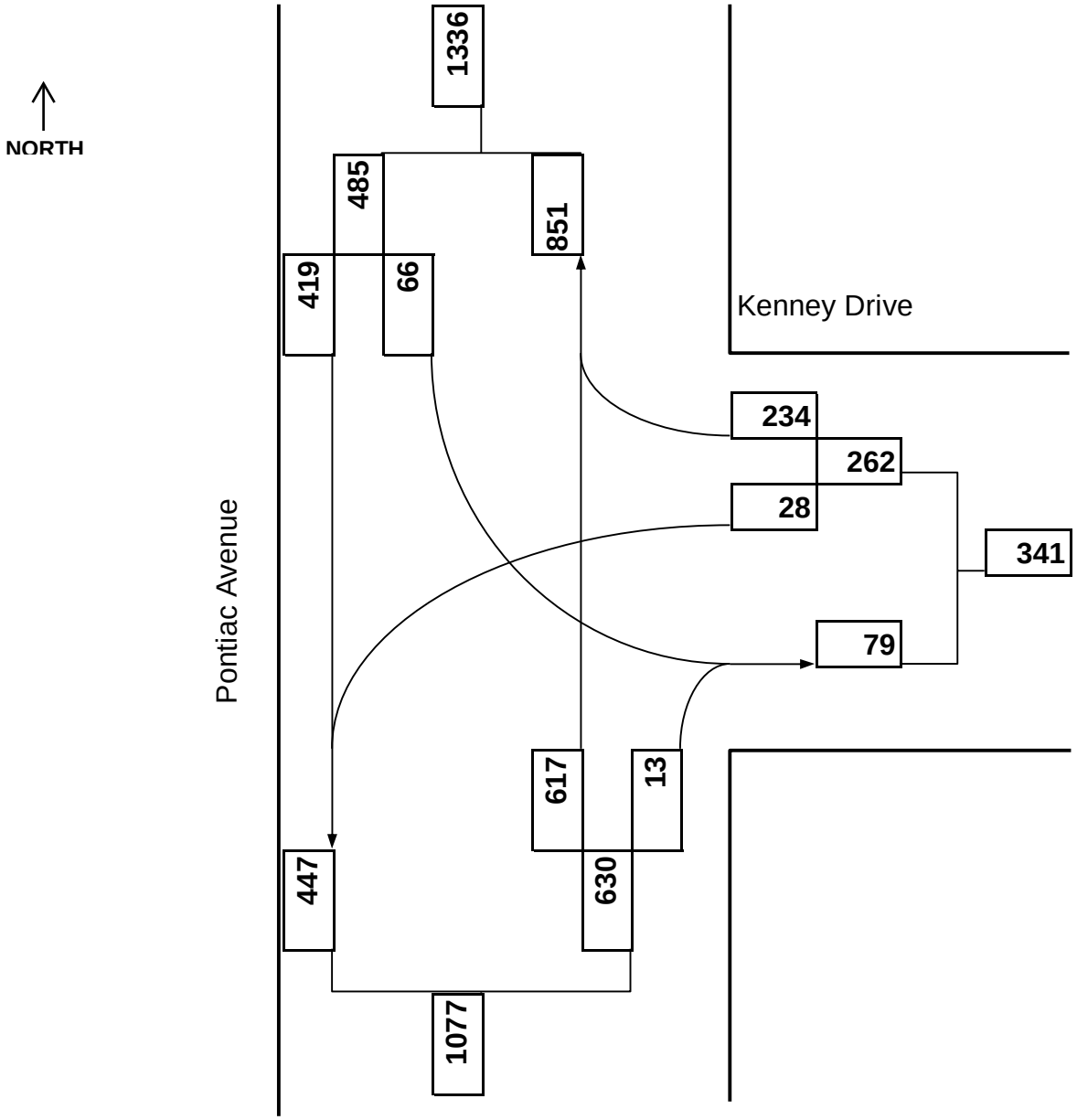
Turning Movement Diagram

Major Street:	Pontiac Avenue	**Minor Street**:	Kenney Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	10441	**Peak Period**:	4:00 PM - 5:00 PM
Existing:	PM Peak Hour	**Future**:	n/a



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	28	234	617	13	66	419
Future Volume (veh/h)	28	234	617	13	66	419
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1841	1885	1900	1663	1900
Adj Flow Rate, veh/h	33	275	726	15	78	493
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	4	1	0	16	0
Cap, veh/h	375	459	1045	22	138	981
Arrive On Green	0.21	0.21	0.29	0.29	0.09	0.52
Sat Flow, veh/h	1810	1560	3683	74	1584	1900
Grp Volume(v), veh/h	33	275	362	379	78	493
Grp Sat Flow(s),veh/h/ln	1810	1560	1791	1872	1584	1900
Q Serve(g_s), s	0.6	6.0	7.2	7.2	1.9	6.7
Cycle Q Clear(g_c), s	0.6	6.0	7.2	7.2	1.9	6.7
Prop In Lane	1.00	1.00		0.04	1.00	
Lane Grp Cap(c), veh/h	375	459	522	545	138	981
V/C Ratio(X)	0.09	0.60	0.69	0.69	0.57	0.50
Avail Cap(c_a), veh/h	682	723	1574	1645	994	3149
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.7	12.0	12.5	12.5	17.5	6.3
Incr Delay (d2), s/veh	0.1	0.9	1.5	1.5	2.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.7	2.4	2.5	0.7	1.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.8	12.9	14.1	14.0	19.9	6.6
LnGrp LOS	B	B	B	B	B	A
Approach Vol, veh/h	308		741			571
Approach Delay, s/veh	12.9		14.0			8.4
Approach LOS	B		B			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	9.0	17.6			26.6	13.3
Change Period (Y+Rc), s	5.5	6.0			* 6	5.0
Max Green Setting (Gmax), s	25.0	35.0			* 66	15.0
Max Q Clear Time (g_c+I1), s	3.9	9.2			8.7	8.0
Green Ext Time (p_c), s	0.2	2.4			1.4	0.5

Intersection Summary	
HCM 6th Ctrl Delay	11.8
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	28	234	617	66	419
Future Volume (vph)	28	234	617	66	419
Lane Group Flow (vph)	33	275	741	78	493
Turn Type	Prot	pm+ov	NA	Prot	NA
Protected Phases	8	1	2	1	6
Permitted Phases		8			
Detector Phase	8	1	2	1	6
Switch Phase					
Minimum Initial (s)	6.0	6.0	10.0	6.0	6.0
Minimum Split (s)	11.0	11.5	16.0	11.5	11.5
Total Split (s)	20.0	30.5	41.0	30.5	71.5
Total Split (%)	21.9%	33.3%	44.8%	33.3%	78.1%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0
All-Red Time (s)	2.0	2.5	1.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.5	6.0	5.5	5.5
Lead/Lag		Lead	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	
Recall Mode	None	None	Min	None	None
v/c Ratio	0.11	0.51	0.55	0.23	0.36
Control Delay	19.9	11.3	12.3	18.5	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	11.3	12.3	18.5	4.0
Queue Length 50th (ft)	5	30	43	12	0
Queue Length 95th (ft)	29	81	133	51	86
Internal Link Dist (ft)	769		403		939
Turn Bay Length (ft)		250		100	
Base Capacity (vph)	743	1228	3091	1069	1900
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.04	0.22	0.24	0.07	0.26

Intersection Summary

Cycle Length: 91.5
Actuated Cycle Length: 39.3
Natural Cycle: 40
Control Type: Actuated-Uncoordinated

Splits and Phases: 4:

Pontiac Avenue at Slater Road

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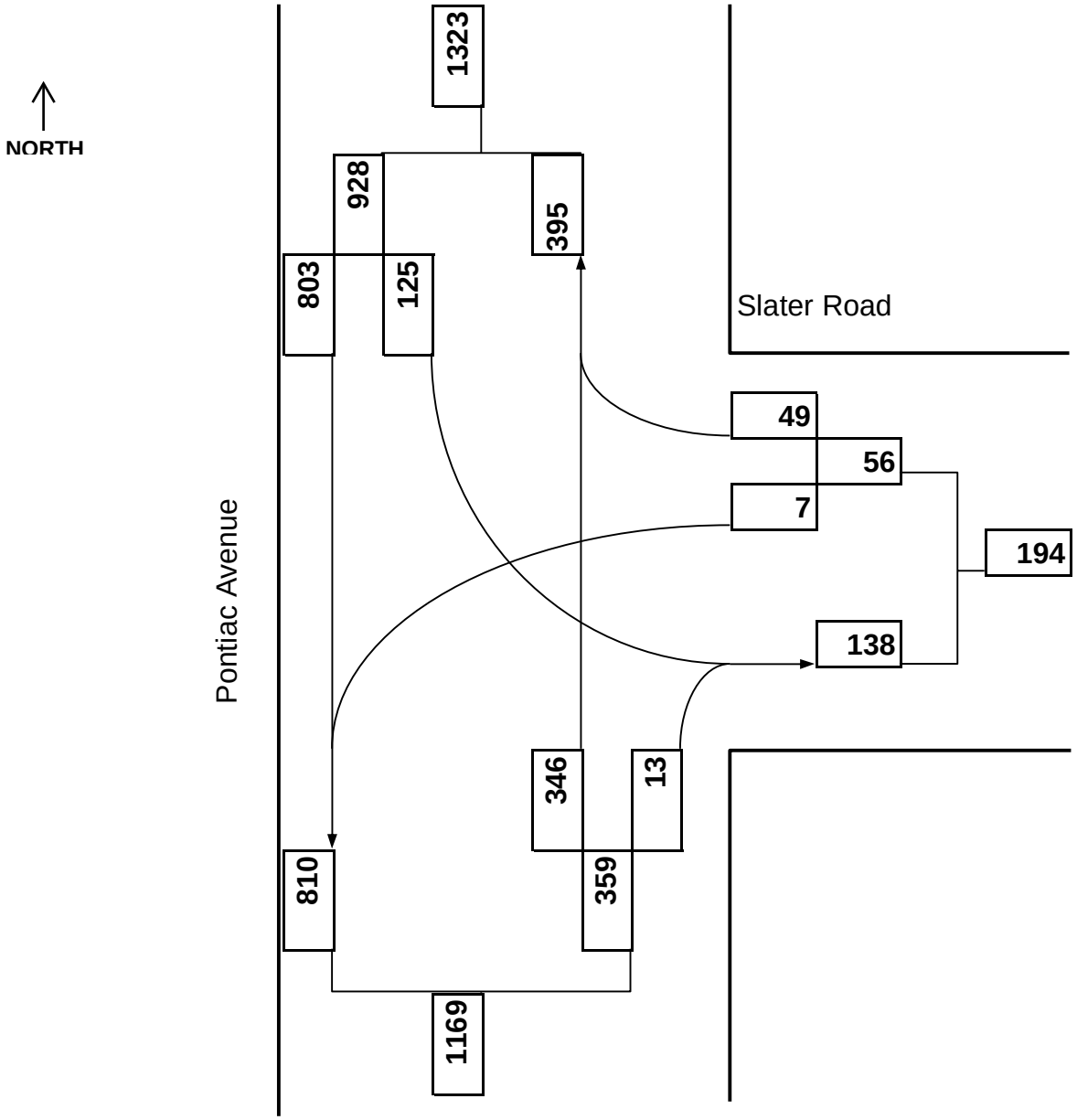
Turning Movement Diagram

Major Street:	Pontiac Avenue	**Minor Street**:	Slater Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	10441	**Peak Period**:	8:00 AM - 9:00 AM
Existing:	AM Peak Hour	**Future**:	n/a



Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	49	346	13	125	803
Future Vol, veh/h	7	49	346	13	125	803
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	250	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	10	10	1	0	3	1
Mvmt Flow	8	55	389	15	140	902

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1128	202	0	0	404	0
Stage 1	397	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Critical Hdwy	7	7.1	-	-	4.16	-
Critical Hdwy Stg 1	6	-	-	-	-	-
Critical Hdwy Stg 2	6	-	-	-	-	-
Follow-up Hdwy	3.6	3.4	-	-	2.23	-
Pot Cap-1 Maneuver	186	781	-	-	1144	-
Stage 1	625	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	140	781	-	-	1144	-
Mov Cap-2 Maneuver	140	-	-	-	-	-
Stage 1	625	-	-	-	-	-
Stage 2	315	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	1.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	140	781	1144	-
HCM Lane V/C Ratio	-	-	0.056	0.07	0.123	-
HCM Control Delay (s)	-	-	32.2	10	8.6	0.8
HCM Lane LOS	-	-	D	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.2	0.4	-

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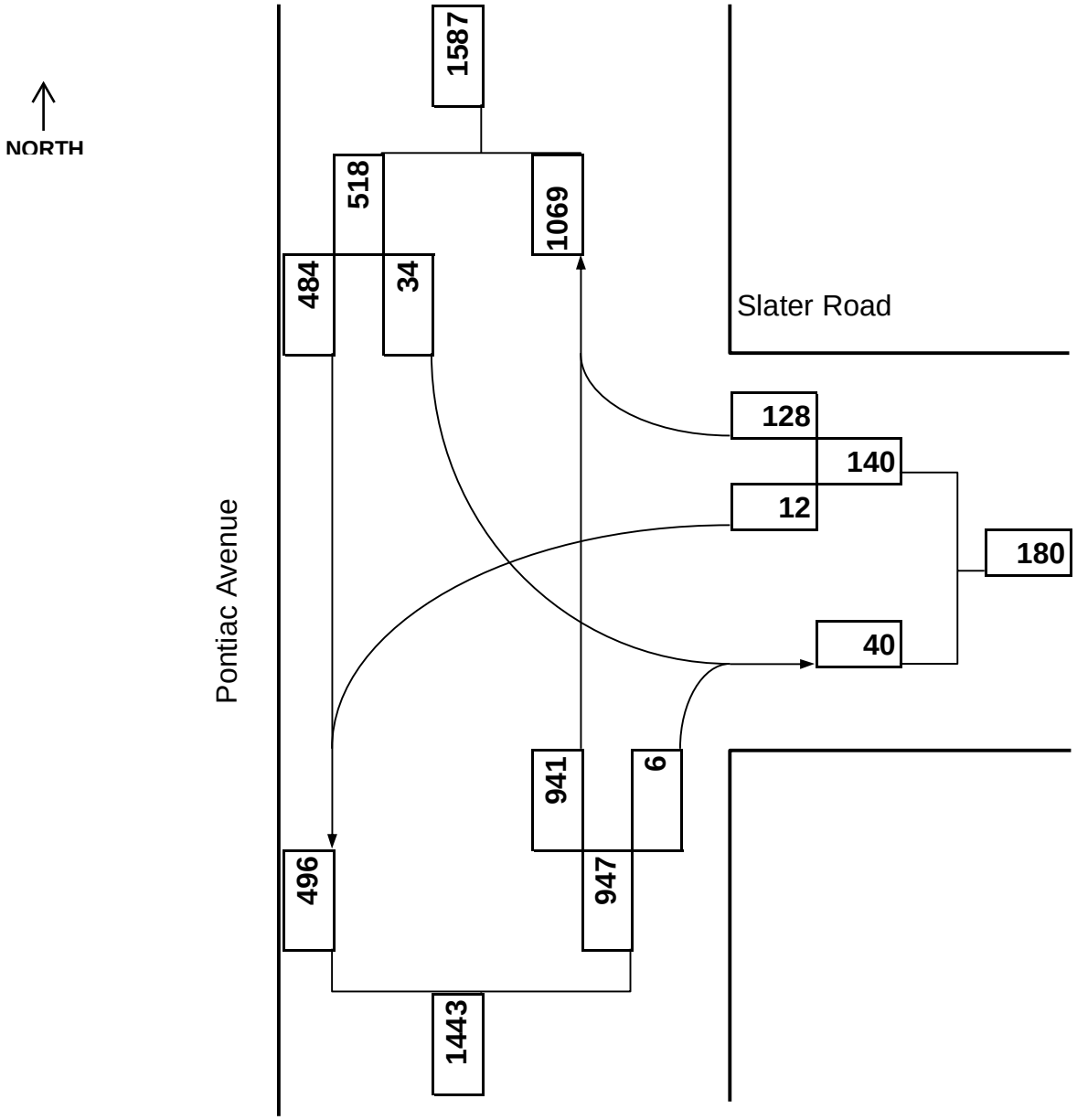
Turning Movement Diagram

Major Street:	Pontiac Avenue	**Minor Street**:	Slater Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	10441	**Peak Period**:	4:00 PM - 5:00 PM
Existing:	PM Peak Hour	**Future**:	n/a



Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	128	941	6	34	484
Future Vol, veh/h	12	128	941	6	34	484
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	250	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	3	1	0	10	2
Mvmt Flow	15	158	1162	7	42	598

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1549	585	0	0	1169	0
Stage 1	1166	-	-	-	-	-
Stage 2	383	-	-	-	-	-
Critical Hdwy	6.8	6.96	-	-	4.3	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.33	-	-	2.3	-
Pot Cap-1 Maneuver	107	452	-	-	550	-
Stage 1	263	-	-	-	-	-
Stage 2	665	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	95	452	-	-	550	-
Mov Cap-2 Maneuver	95	-	-	-	-	-
Stage 1	263	-	-	-	-	-
Stage 2	589	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	95	452	550	-
HCM Lane V/C Ratio	-	-	0.156	0.35	0.076	-
HCM Control Delay (s)	-	-	49.8	17.2	12.1	0.6
HCM Lane LOS	-	-	E	C	B	A
HCM 95th %tile Q(veh)	-	-	0.5	1.5	0.2	-

D

Future Build Weekday AM / PM Peak Hour

Pontiac Avenue at Kenney Drive

Pontiac Avenue at Slater Road

Pontiac Avenue at Kenney Drive

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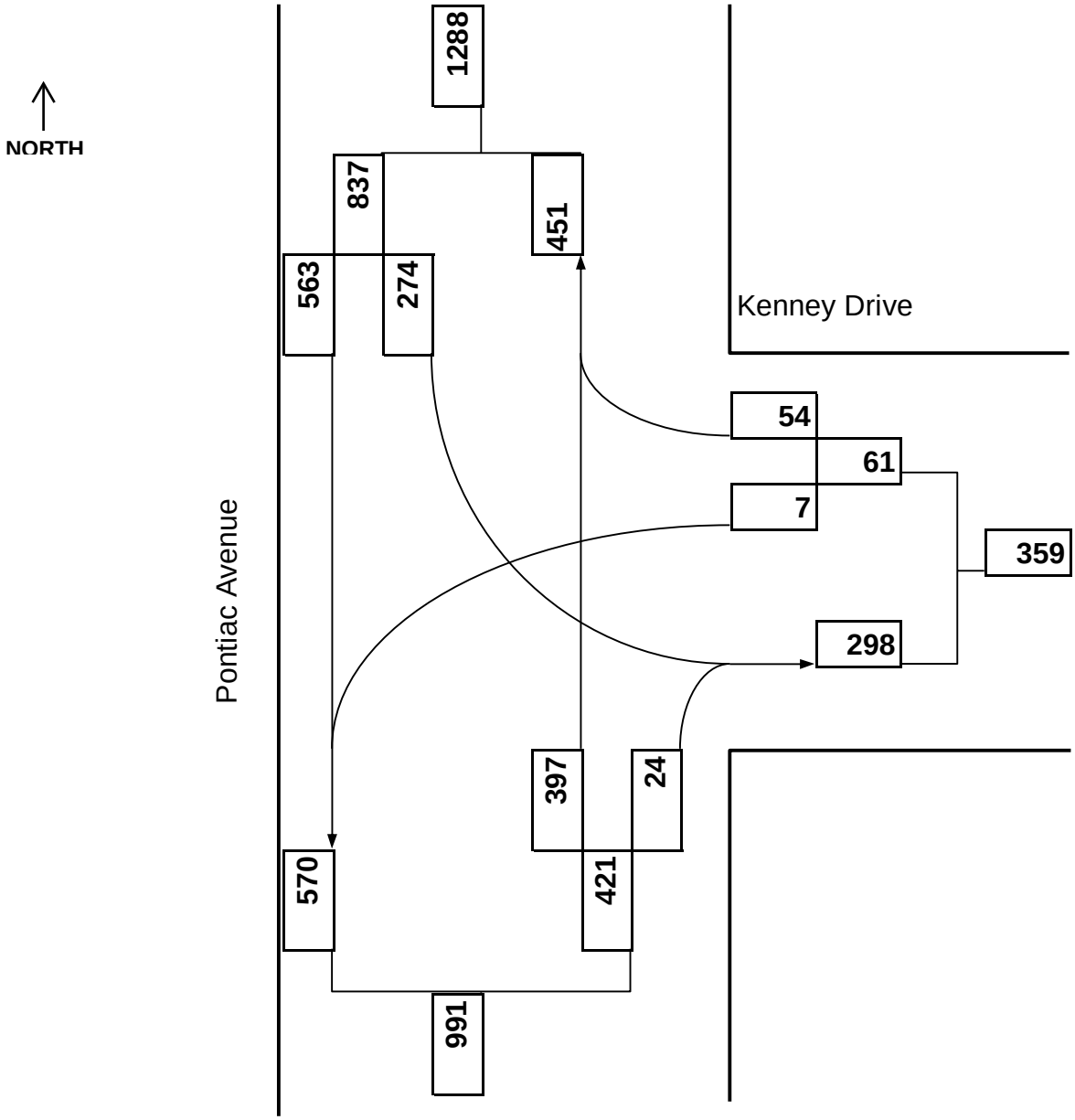
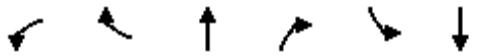
Turning Movement Diagram

Major Street:	Pontiac Avenue	**Minor Street**:	Kenney Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	10441	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 Build





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	7	54	397	24	274	563
Future Volume (veh/h)	7	54	397	24	274	563
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1781	1885	1826	1870	1885
Adj Flow Rate, veh/h	8	58	427	26	295	605
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	8	1	5	2	1
Cap, veh/h	144	432	924	56	367	1176
Arrive On Green	0.08	0.08	0.27	0.27	0.21	0.62
Sat Flow, veh/h	1810	1510	3525	208	1781	1885
Grp Volume(v), veh/h	8	58	222	231	295	605
Grp Sat Flow(s),veh/h/ln	1810	1510	1791	1848	1781	1885
Q Serve(g_s), s	0.2	1.1	3.8	3.9	5.8	6.6
Cycle Q Clear(g_c), s	0.2	1.1	3.8	3.9	5.8	6.6
Prop In Lane	1.00	1.00		0.11	1.00	
Lane Grp Cap(c), veh/h	144	432	483	498	367	1176
V/C Ratio(X)	0.06	0.13	0.46	0.46	0.80	0.51
Avail Cap(c_a), veh/h	731	921	1689	1742	480	2590
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.8	9.8	11.3	11.3	14.0	3.9
Incr Delay (d2), s/veh	0.1	0.1	0.6	0.6	6.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.3	1.2	1.3	2.6	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.9	9.9	11.9	11.9	20.4	4.1
LnGrp LOS	B	A	B	B	C	A
Approach Vol, veh/h	66		453			900
Approach Delay, s/veh	10.7		11.9			9.4
Approach LOS	B		B			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	13.2	16.0			29.2	8.0
Change Period (Y+Rc), s	5.5	6.0			* 6	5.0
Max Green Setting (Gmax), s	10.0	35.0			* 51	15.0
Max Q Clear Time (g_c+I1), s	7.8	5.9			8.6	3.1
Green Ext Time (p_c), s	0.2	1.4			1.8	0.1

Intersection Summary	
HCM 6th Ctrl Delay	10.3
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	7	54	397	274	563
Future Volume (vph)	7	54	397	274	563
Lane Group Flow (vph)	8	58	453	295	605
Turn Type	Prot	pm+ov	NA	Prot	NA
Protected Phases	8	1	2	1	6
Permitted Phases		8			
Detector Phase	8	1	2	1	6
Switch Phase					
Minimum Initial (s)	6.0	6.0	10.0	6.0	6.0
Minimum Split (s)	11.0	11.5	16.0	11.5	11.5
Total Split (s)	20.0	15.5	41.0	15.5	56.5
Total Split (%)	26.1%	20.3%	53.6%	20.3%	73.9%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0
All-Red Time (s)	2.0	2.5	1.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.5	6.0	5.5	5.5
Lead/Lag		Lead	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	
Recall Mode	None	None	Min	None	Min
v/c Ratio	0.02	0.10	0.41	0.56	0.35
Control Delay	14.6	3.2	11.1	19.1	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.6	3.2	11.1	19.1	2.2
Queue Length 50th (ft)	1	0	28	38	0
Queue Length 95th (ft)	10	13	81	#171	118
Internal Link Dist (ft)	769		403		939
Turn Bay Length (ft)		250		100	
Base Capacity (vph)	803	554	3372	525	1881
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.01	0.10	0.13	0.56	0.32

Intersection Summary

Cycle Length: 76.5
Actuated Cycle Length: 34.4
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4:

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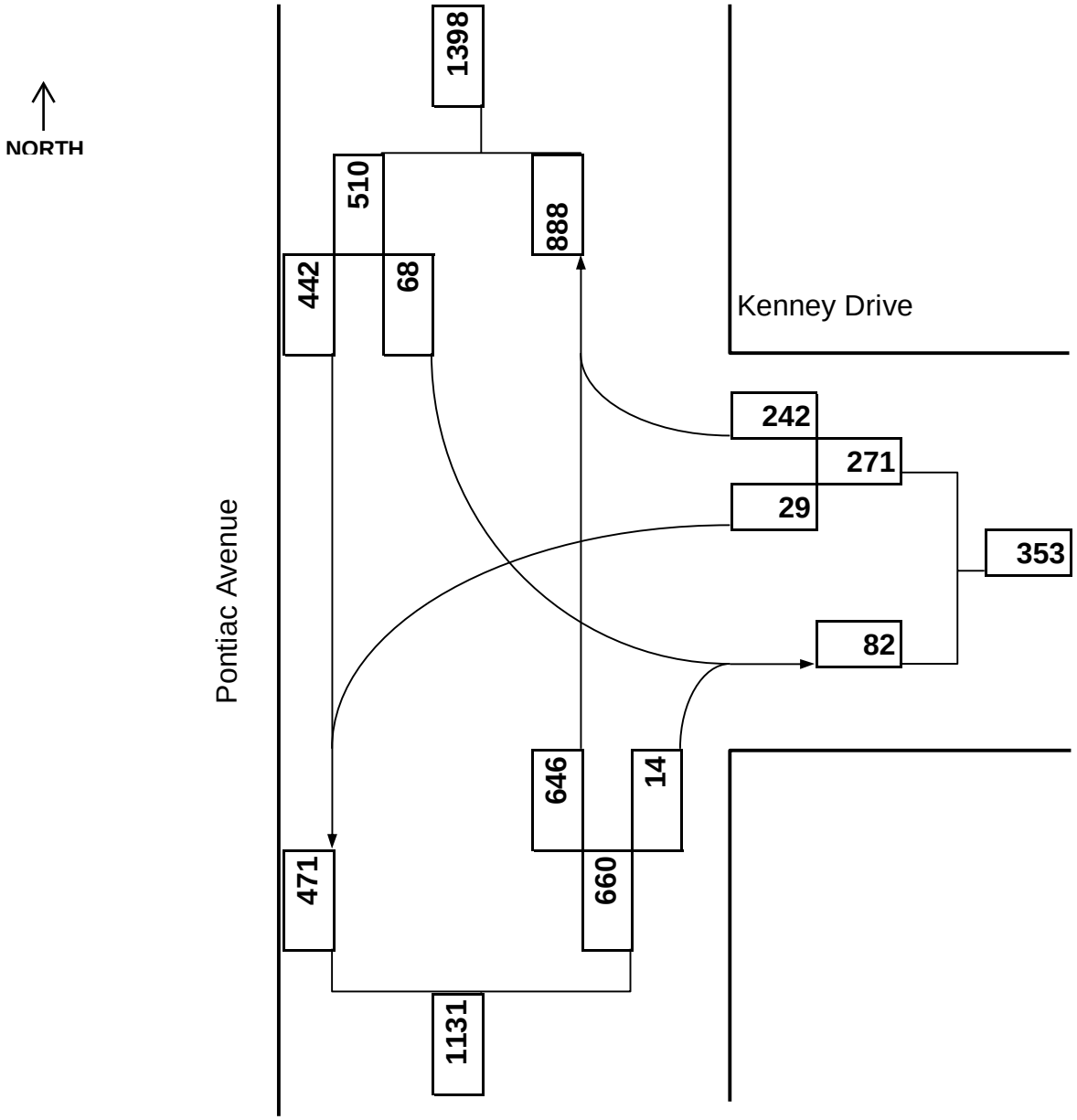
Turning Movement Diagram

Major Street:	Pontiac Avenue	**Minor Street**:	Kenney Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	10441	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	29	242	646	14	68	442
Future Volume (veh/h)	29	242	646	14	68	442
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1841	1885	1900	1663	1900
Adj Flow Rate, veh/h	34	285	760	16	80	520
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	4	1	0	16	0
Cap, veh/h	384	467	1074	23	138	989
Arrive On Green	0.21	0.21	0.30	0.30	0.09	0.52
Sat Flow, veh/h	1810	1560	3681	76	1584	1900
Grp Volume(v), veh/h	34	285	379	397	80	520
Grp Sat Flow(s),veh/h/ln	1810	1560	1791	1872	1584	1900
Q Serve(g_s), s	0.6	6.4	7.8	7.8	2.0	7.4
Cycle Q Clear(g_c), s	0.6	6.4	7.8	7.8	2.0	7.4
Prop In Lane	1.00	1.00		0.04	1.00	
Lane Grp Cap(c), veh/h	384	467	536	561	138	989
V/C Ratio(X)	0.09	0.61	0.71	0.71	0.58	0.53
Avail Cap(c_a), veh/h	659	705	1523	1591	962	3046
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.0	12.4	12.8	12.8	18.1	6.5
Incr Delay (d2), s/veh	0.1	0.9	1.6	1.5	2.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.8	2.6	2.7	0.8	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.1	13.2	14.4	14.3	20.6	6.8
LnGrp LOS	B	B	B	B	C	A
Approach Vol, veh/h	319		776			600
Approach Delay, s/veh	13.2		14.3			8.7
Approach LOS	B		B			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	9.1	18.3			27.4	13.7
Change Period (Y+Rc), s	5.5	6.0			* 6	5.0
Max Green Setting (Gmax), s	25.0	35.0			* 66	15.0
Max Q Clear Time (g_c+I1), s	4.0	9.8			9.4	8.4
Green Ext Time (p_c), s	0.2	2.6			1.5	0.5

Intersection Summary	
HCM 6th Ctrl Delay	12.1
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	29	242	646	68	442
Future Volume (vph)	29	242	646	68	442
Lane Group Flow (vph)	34	285	776	80	520
Turn Type	Prot	pm+ov	NA	Prot	NA
Protected Phases	8	1	2	1	6
Permitted Phases		8			
Detector Phase	8	1	2	1	6
Switch Phase					
Minimum Initial (s)	6.0	6.0	10.0	6.0	6.0
Minimum Split (s)	11.0	11.5	16.0	11.5	11.5
Total Split (s)	20.0	30.5	41.0	30.5	71.5
Total Split (%)	21.9%	33.3%	44.8%	33.3%	78.1%
Yellow Time (s)	3.0	3.0	4.5	3.0	3.0
All-Red Time (s)	2.0	2.5	1.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.5	6.0	5.5	5.5
Lead/Lag		Lead	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	
Recall Mode	None	None	Min	None	None
v/c Ratio	0.11	0.53	0.57	0.23	0.31
Control Delay	20.5	12.3	12.7	18.7	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	12.3	12.7	18.7	2.9
Queue Length 50th (ft)	6	35	46	12	0
Queue Length 95th (ft)	31	91	144	53	92
Internal Link Dist (ft)	769		403		939
Turn Bay Length (ft)		250		100	
Base Capacity (vph)	728	1255	3065	1103	1900
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.05	0.23	0.25	0.07	0.27

Intersection Summary

Cycle Length: 91.5
Actuated Cycle Length: 40.3
Natural Cycle: 45
Control Type: Actuated-Uncoordinated

Splits and Phases: 4:

Pontiac Avenue at Slater Road

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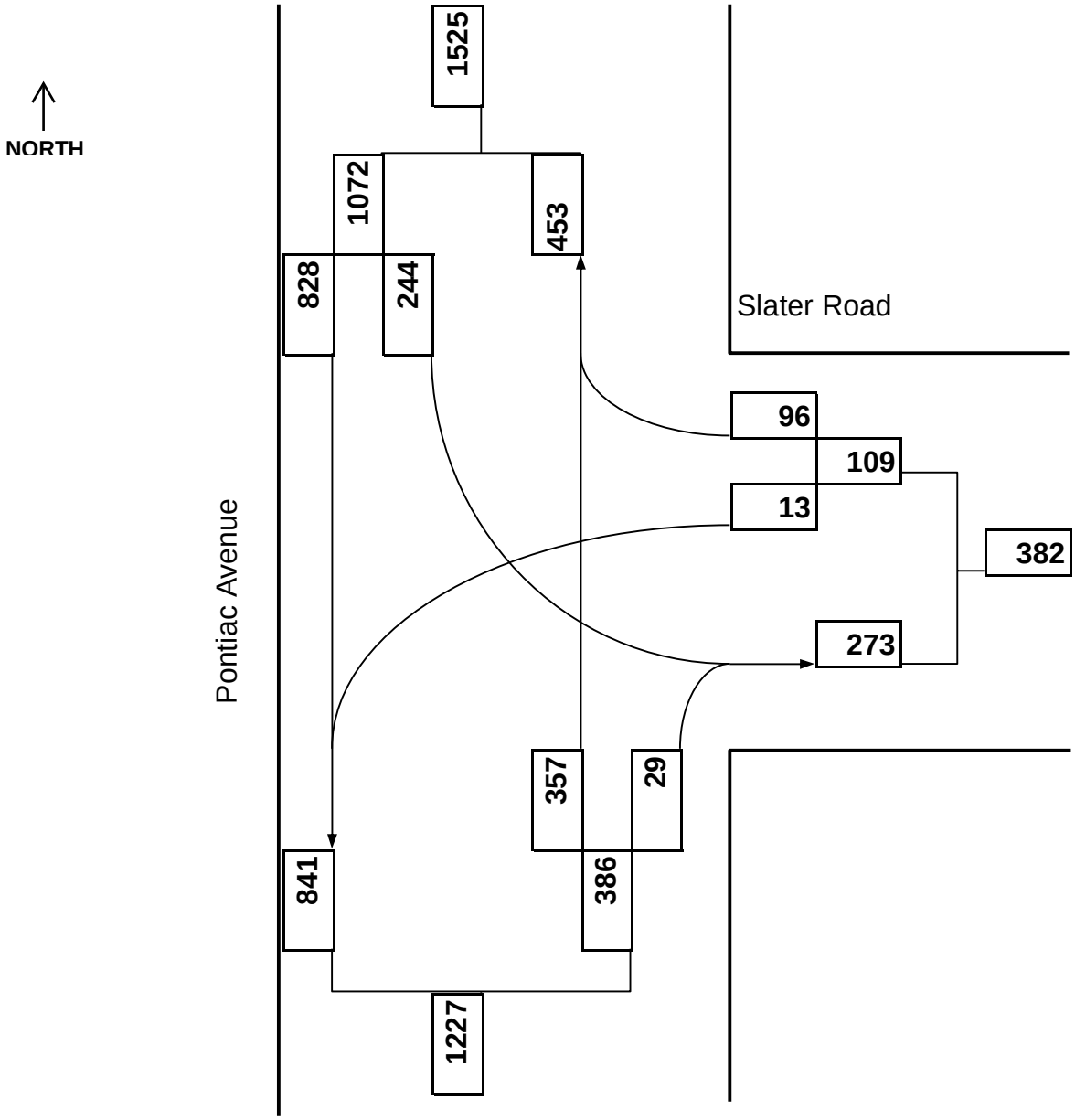
Turning Movement Diagram

Major Street:	Pontiac Avenue	**Minor Street**:	Slater Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	10441	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	96	357	29	244	828
Future Vol, veh/h	13	96	357	29	244	828
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	250	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	10	10	1	0	3	1
Mvmt Flow	15	108	401	33	274	930

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1431	217	0	0	434	0
Stage 1	418	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Critical Hdwy	7	7.1	-	-	4.16	-
Critical Hdwy Stg 1	6	-	-	-	-	-
Critical Hdwy Stg 2	6	-	-	-	-	-
Follow-up Hdwy	3.6	3.4	-	-	2.23	-
Pot Cap-1 Maneuver	116	763	-	-	1115	-
Stage 1	610	-	-	-	-	-
Stage 2	294	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	57	763	-	-	1115	-
Mov Cap-2 Maneuver	57	-	-	-	-	-
Stage 1	610	-	-	-	-	-
Stage 2	144	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.8	0	3.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	57	763	1115	-
HCM Lane V/C Ratio	-	-	0.256	0.141	0.246	-
HCM Control Delay (s)	-	-	88.7	10.5	9.3	1.5
HCM Lane LOS	-	-	F	B	A	A
HCM 95th %tile Q(veh)	-	-	0.9	0.5	1	-

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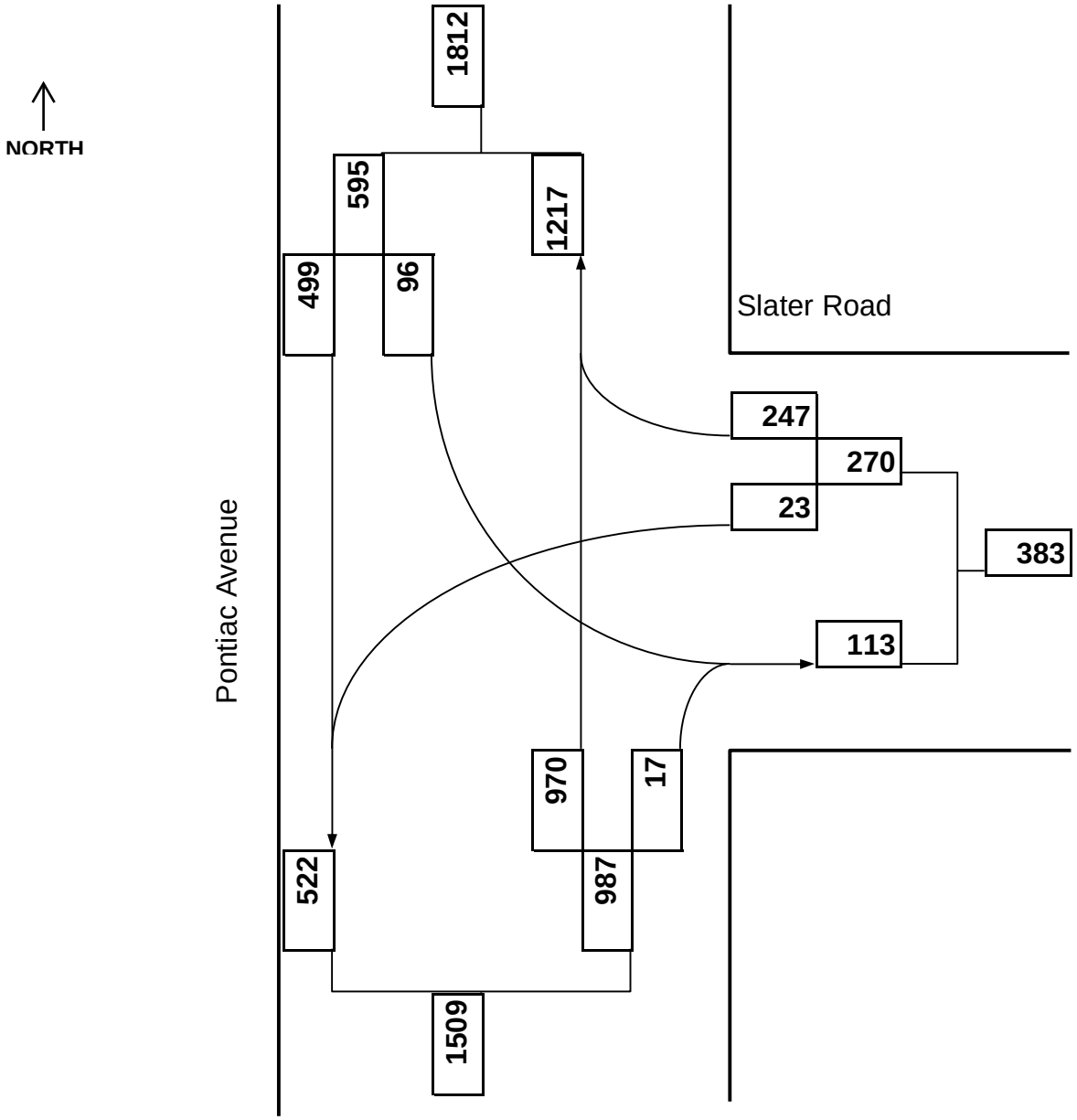
Turning Movement Diagram

Major Street:	Pontiac Avenue	**Minor Street**:	Slater Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	10441	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Intersection	
Int Delay, s/veh	7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	247	970	17	96	499
Future Vol, veh/h	23	247	970	17	96	499
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	250	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	3	1	0	10	2
Mvmt Flow	28	305	1198	21	119	616

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1755	610	0	0	1219	0
Stage 1	1209	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Critical Hdwy	6.8	6.96	-	-	4.3	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.33	-	-	2.3	-
Pot Cap-1 Maneuver	78	435	-	-	525	-
Stage 1	249	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	51	435	-	-	525	-
Mov Cap-2 Maneuver	51	-	-	-	-	-
Stage 1	249	-	-	-	-	-
Stage 2	360	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	40	0	3.7
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	51	435	525	-
HCM Lane V/C Ratio	-	-	0.557	0.701	0.226	-
HCM Control Delay (s)	-	-	142.1	30.5	13.8	1.7
HCM Lane LOS	-	-	F	D	B	A
HCM 95th %tile Q(veh)	-	-	2.1	5.3	0.9	-