Proposed Mixed-Use Development
Cranston, Rhode Island

Centre at Garden Hill

October 2020

TRAFFIC IMPACT STUDY

BETA
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Center at Garden Hills

Cranston, Rhode Island

TRAFFIC IMPACT STUDY

Prepared by: BETA GROUP, INC.

Prepared for: Mr. Michael DiGuiseppe
Coastal Partner II, LLC
P.O. Box 5481
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October 2020

IMPROVING COMMUNITIES TOGETHER

October 15, 2020

Mr. Michael DiGuiseppe
Coastal Partners II, LLC
P.O. Box 5481
Beverly Farms, Massachusetts 01915

Re: Proposed Mixed-Use Development
New London Avenue (Route 2)
Cranston, Rhode Island

Dear Mr. DiGuiseppe,

BETA Group, Inc., in accordance with our scope of services, has completed a traffic impact study for a proposed mixed-use development, the *Centre at Garden Hill* project in the City of Cranston, Rhode Island. The site is located on the easterly side of New London Avenue (Route 2) adjacent to the *Pastore Center* state office campus and the Rhode Island Department of Corrections facility. The parcel is defined by Assessor's Plat 15-1, Lot 8, which contain approximately 55 acres of partially developed land.

Based upon information provided by the site engineer, *Garofalo & Associates, Inc*, and a review of the proposed development plan, it is our understanding that the new project will include a COSTCO discount club with a detached gas station and four small scale commercial uses. Access and egress to the site will be provided at a new signalized access road intersection with New London Avenue (Route 2) approximately 1,000 feet south of Howard Avenue, and at the existing *Mulligan's Island* access road on Howard Avenue.

The study included herein, was conducted to determine the adequacy of the existing servicing roadways to accommodate anticipated traffic to be generated by the mixed-use development 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

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1.0 INTRODUCTION

The objective of the following study is to assess the potential traffic impacts associated with a proposed mixed-use development project in the City of Cranston, Rhode Island. The project is proposed on a parcel of land on the easterly side of New London Avenue (Route 2) between Howard Avenue and Hilltop Drive which is currently developed as the *Mulligan's Island* golf and recreational facility. Refer to the Figure 1, Project Vicinity Map, on the following page for the project location within the city.

The mixed-use development proposal, the *Centre at Garden Hill* includes construction of a 165,000 square foot building to accommodate a COSTCO discount club and an associated fueling station as the primary anchor within the site. Other commercial uses proposed as outparcels include a 20,000 square foot retail building, a 1,000 square foot bank or fast-food use with drive-thru, and two 2,100 square foot buildings to accommodate fast-food restaurants with drive-thru. The residential component includes a 40-unit single-family neighborhood on a parcel to the rear of the COSTCO discount club to transition the mixed-use project to the adjacent existing single family neighborhoods to the south and east.

Parking will be provided separately adjacent to each of the proposed buildings. Access and egress are proposed at a new signalized access road intersection with New London Avenue (Route 2) approximately 1,000 feet south of Howard Avenue, and at the existing *Mulligan's Island* access road on Howard Avenue. All proposed commercial uses will be interconnected via an internal roadway linking the parking areas to the existing *Mulligan's Island* access road, which will be modified with additional lanes to accommodate the new uses, including the outparcels.

The study summarized herein focused on both traffic flow efficiency and safety along New London Avenue (Route 2) and Howard Avenue in the immediate vicinity of the subject property including the new site access road junction with New London Avenue (Route 2). 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:

- Traffic data collection to define the existing traffic patterns and operation characteristics along the servicing roadways. Due to the current state of emergency in place in Rhode Island and resultant traffic patterns not being consistent with typical daily traffic conditions, record data was obtained from the Rhode Island Department of Transportation (RIDOT) and from two traffic studies completed in the project area.
- An inventory of the physical roadway characteristics of New London Avenue (Route 2) and Howard Avenue in the project area to determine the adequacy of the existing roadway geometric features in reference to safety and operations.
- An analysis of accident records obtained from the local police department to define potential safety issues along the immediate servicing roadways adjacent to the site.

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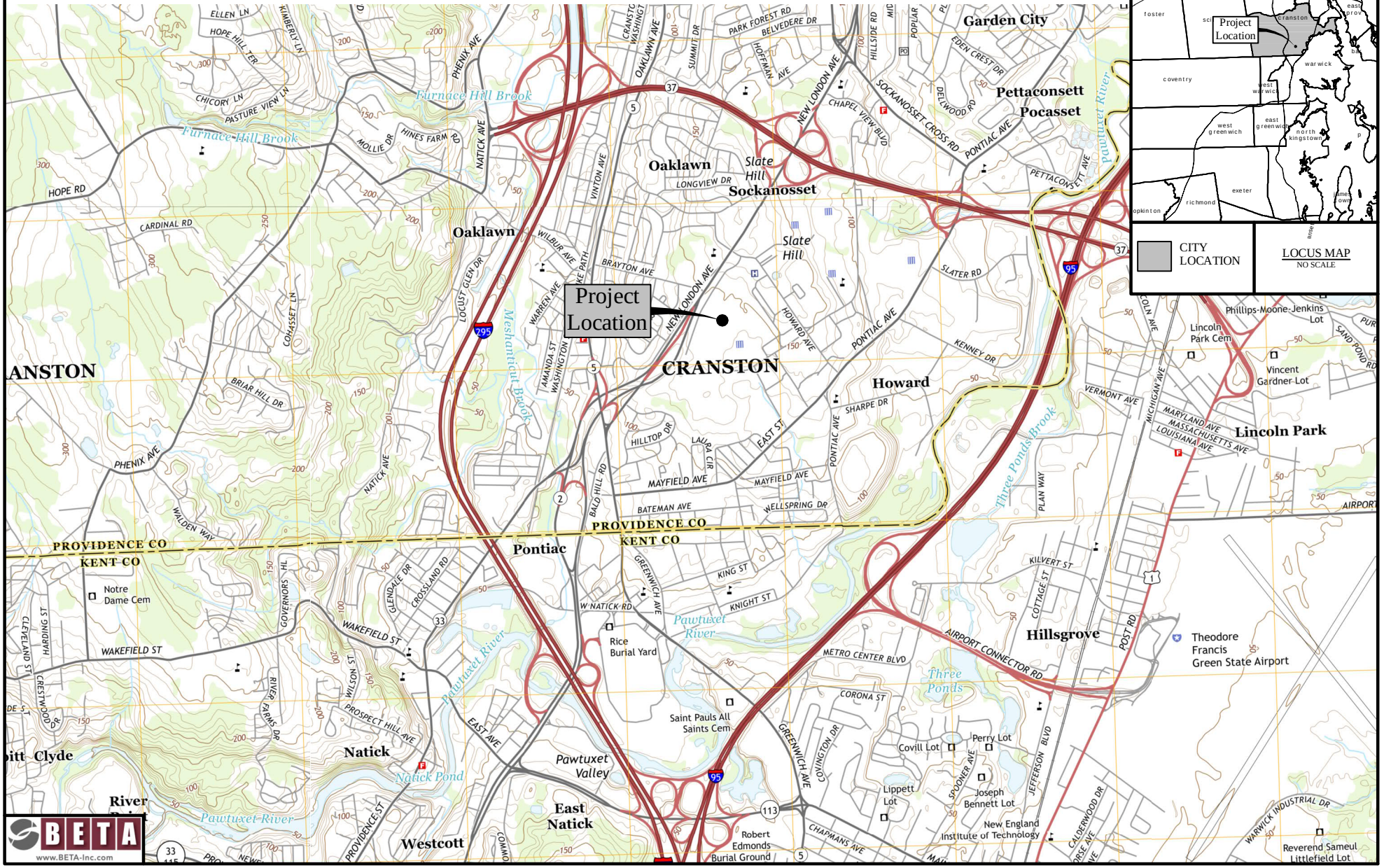
Figure 1 - Project Vicinity Map



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- An estimate of future traffic volumes for the proposed commercial development was calculated using data from the "Trip Generation Manual," an informational report published by the Institute of Transportation Engineers (ITE). Additionally, operational data provided by *Kittelson & Associates* (K&A) was used to determine the proposed trips for the COSTCO with Gas Station facility.
- Evaluation and analysis of the traffic safety and operations for existing and future traffic conditions and development of recommendations if determined necessary, to maintain safe and adequate access to the redeveloped commercial property.

2.0 PROJECT AREA

As noted in the previous section, the subject property is situated on the easterly side of New London Avenue (Route 2) adjacent to the *Pastore Center* and RI Department of Corrections facility. The partially developed 55 acre property contains an existing entertainment center, *Mulligan's Island*, and associated parking lot with access/egress via a single service road to/from Howard Avenue. The existing *Mulligan's Island* entertainment center contains batting cages, beach volleyball courts, and multiple golf amenities including a nine-hole golf course, a driving range, mini-golf, and other golf related activities. 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 defined as predominately commercial along New London Avenue (Route 2) consisting of large retail plazas with multiple buildings and tenants, and single lots containing small commercial uses. New London Avenue (Route 2) in this area is known as a major business and retail corridor in the community. In addition, the Pastore Center campus is located just north of the site along Howard Avenue that comprises multiple State government agencies, notably, the Department of Corrections, Department of Motor Vehicles, Department of Labor & Training, the Eleanor Slater Hospital, etc. Medium density residential properties are situated off intersecting side streets. Immediately abutting the property to the north and east is the Pastore Center campus. To the south and west across New London Avenue (Route 2) are medium-density residential neighborhoods. Further north and south along New London Avenue (Route 2) are the *Chapel View* shopping center and the *Warwick Mall*, respectively.

New London Avenue (Route 2) will serve as the primary access route to the mixed-use development with the site access road and Howard Avenue providing immediate local access. Based upon the operating characteristics of the servicing roadway, and the additional traffic anticipated with the development project during peak daily traffic conditions, a study impact area was defined for this project. The limits of our analysis focused on New London Avenue (Route 2) between Howard Avenue to the north and the Oaklawn Avenue (Route 5) overpass to the south, and Howard Avenue between Slate Hill Drive to the east and New London Avenue (Route 2) to the west.

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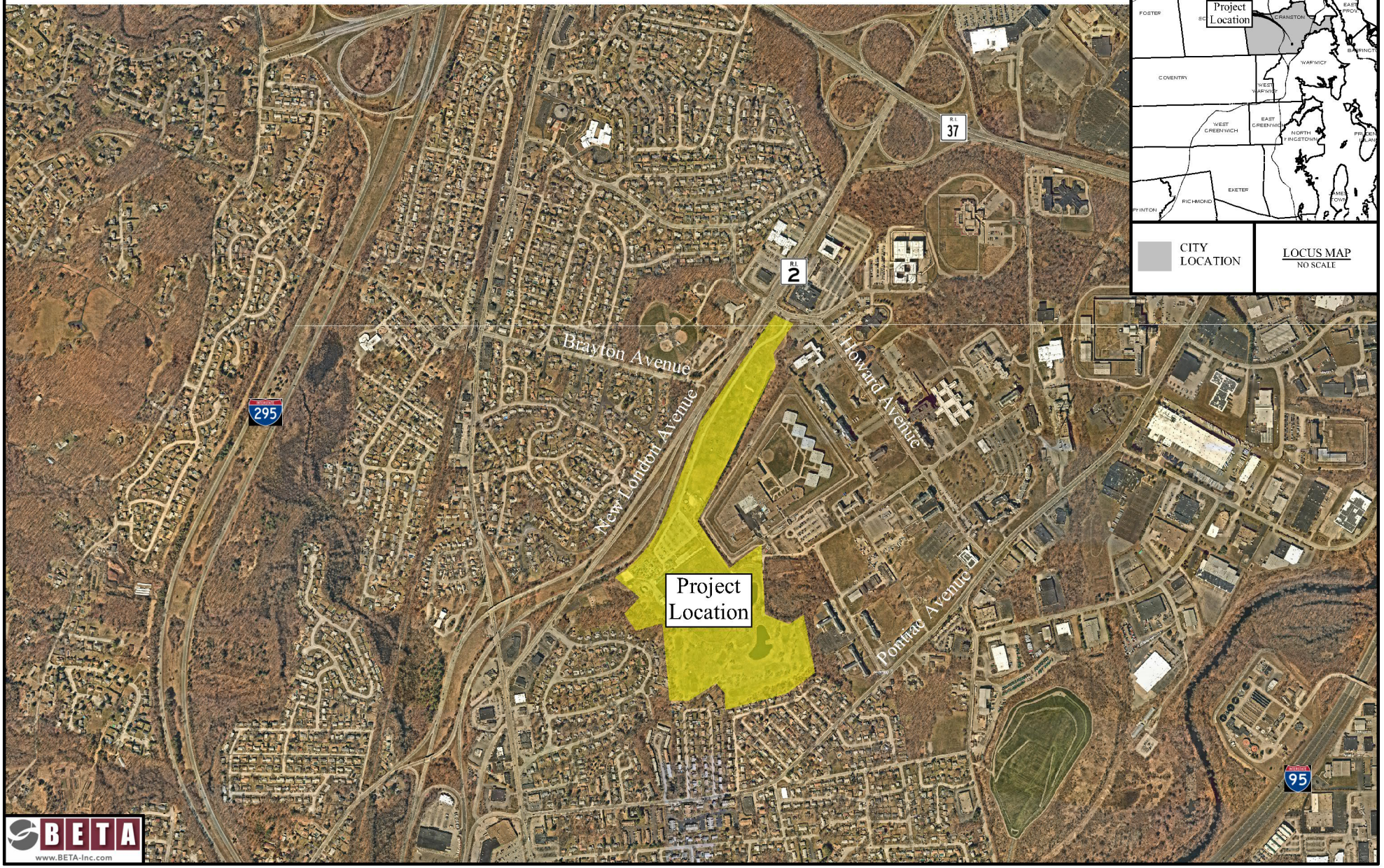
Figure 2 - Project Area Map



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3.0 EXISTING CONDITIONS

3.1 ROADWAYS

New London Avenue (Route 2)

Route 2 is a primary north/south urban principal arterial through several communities, paralleling Interstate 95 from Providence in the north to East Greenwich in the south. It varies in name, but for much of its length in the southern section of the City of Cranston south of Route 37, it is known as New London Avenue. It provides immediate local access to abutting properties but also links to higher order facilities including Route 37 to the north and I-295 to the south. In the project area, Route 2 between the Route 37 interchange and Howard Avenue north of the site, and between Howard Avenue and West Natick Road south of the site, the roadway functions as a limited access roadway. South of Howard Avenue, Route 2 has an expansive grassed median separating the northbound and southbound travel lanes, which converges to a narrower median just before it's convergence in the vicinity of Brayton Avenue. The roadway varies in width and typical section within the project limits, but typically provides two 12-foot lanes and 10-foot shoulder in each direction north and south of the site.

The pavement condition can be classified as being in fair to poor condition with block cracking, patching, and potholes. The speed limit is posted at 45 miles per hour (mph) in the northbound direction and 40 mph for southbound traffic in the site vicinity. Granite curbing is provided along the outside pavement edge with sloped-face cement concrete curbing along the raised median separating the northbound and southbound travel lanes. There are no sidewalks along this section of Route 2, which is typical of limited access highways. Cobra-head lighting is provided along the outer edge of both travel lanes of Route 2 for nighttime illumination of the roadway.

Rhode Island Public Transit Authority (RIPTA) bus service (Route No. 21) is available along Route 2 north of the site that runs between the CCRI campus in Warwick to the south and Kennedy Plaza in Providence to the north. The Route No. 21 RIPTA bus service runs along Route 2 and along Howard Avenue.

Howard Avenue

Howard Avenue is classified as a major collector that services the Pastore Center. The road generally runs in a north/south orientation extending between New London Avenue (Route 2) on the north to Pontiac Avenue to the south. Due to its orientation to New London Avenue (Route 2) and Pontiac Avenue in the project area, Howard Avenue will be referenced as an east/west roadway. Howard Avenue is approximately 28 feet wide consisting of a 12-foot lane and 2-foot shoulder in each direction; however, Howard Avenue is approximately

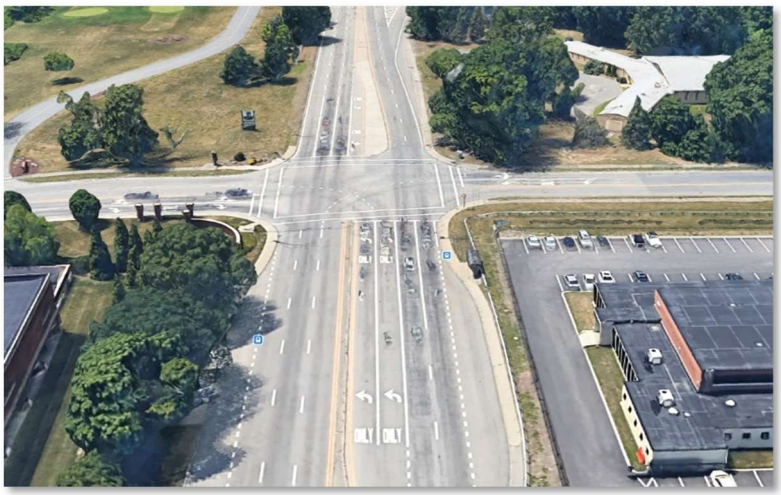
50 feet wide for a short length between New London Avenue (Route 2) and Slate Hill Drive consisting of two 12-foot lane and 1-foot shoulder in each direction as depicted on the adjacent photograph looking east along Howard Avenue. The pavement can be classified as being in fair condition with visible minor block cracking and crack sealing. There was no observed posted speed limit in the project area; however, further east in the vicinity of West Road, the speed limit is posted at 15 mph and was assumed to be the speed limit for the length of the Howard Avenue corridor.

Granite curbing is provided on both sides of the road. An offset cement concrete sidewalk with a grassed planting area is provided along the southerly side of the road only from New London Avenue (Route 2) to just north of West Road where it then transitions to a typical sidewalk abutting the curb. In addition, granite curbing with cement concrete sidewalk is provided on the northerly side for a short section between New London Avenue (Route 2) and Slate Hill Drive. Ornamental lighting is located on the northerly side of Howard Avenue for nighttime illumination of the roadway. A s previously mentioned, a RIPTA bus service runs along Howard Avenue with three signed bus stops along the roadway.

3.2 INTERSECTIONS

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

Howard Avenue and Garden Hills Parkway intersect New London Avenue (Route 2) to form a four-way, signalized intersection. The New London Avenue (Route 2) northbound approach provides a separate left turn lane, two thru lanes, and a shared thru/right turn lane including a raised median island separating the northbound approach from the southbound travel lanes. The New London Avenue (Route 2) southbound approach provides double left turn lanes, a thru lane, and a shared thru/right lane and is also separated by a raised median island from the northbound travel lanes. The Garden Hills Parkway eastbound approach includes a separate left turn lane, and an all-purpose lane. The Howard Avenue westbound approach provides a shared left turn/thru lane and a separate right turn lane.



The traffic signal system appears to be in fair condition as it was upgraded in the

last ten years as part of access improvements to the *Pastore Center*. The layout of the equipment consists of mast arm mounted signal heads with in-road vehicle loop detection including mast arm mounted pedestrian signal heads and pushbuttons, though not ADA compliant. Additional pedestrian accommodations include curb ramps, though not ADA compliant, and marked pedestrian crosswalks on all legs of the intersection. There is also a RIPTA bus stop with a bus shelter are provided on both sides of the northern leg of the intersection including bus pull outs as depicted on the photograph on the previous page looking south along New London Avenue (Route 2) with Howard Avenue to the left.

The intersection was determined to operate in a fully actuated mode consisting of four phases. New London Avenue (Route 2) northbound and southbound movements are serviced in two phases including an advanced protected left, followed by through/right concurrent movements. The Garden Hills Parkway eastbound and Howard Avenue westbound movements are served separately (split phasing) under the two remaining phases.

Howard Avenue at Mulligan's Island Access Road

Howard Avenue intersects the *Mulligan's Island* access road to form an unsignalized, "T"-type junction with *Stop* control on the minor service road northbound approach. The Howard Avenue eastbound approach provides a thru lane and a shared thru/right turn lane. The Howard Avenue westbound approach provides a shared left turn/thru lane and a thru lane. The access road northbound approach provides an all-purpose lane. A *Stop* sign with stop line is provided on the service road northbound approach to define the intersection control, though the *Stop* sign should be upgraded to meet current safety standards relating to reflectivity. Curb ramps, though not ADA compliant, and a marked crosswalk is provided on the access road northbound approach only for pedestrian accommodation. Ornamental light poles are provided for nighttime illumination of the intersection. The adjacent photograph depicts the physical characteristics of the intersection looking west on Howard Avenue towards the intersection with New London Avenue (Route 2) with the service road on the left.

Howard Avenue at Slate Hill Drive

Howard Avenue intersects Slate Hill Drive to form an unsignalized, "T"-type junction with *Stop* control on the Slate Hill Drive southbound and the Howard Avenue westbound approaches. The Howard Avenue eastbound approach provides a separate left turn lane and a thru lane. The Howard Avenue westbound approach provides an all-purpose lane. The Slate Hill Drive southbound approach provides a left turn lane and a channelized right turn lane. A *Stop* sign with stop line is provided on the Slate Hill Drive southbound and Howard Avenue westbound approaches to define the intersection control including supplemental warning signs of the uncontrolled Howard Avenue eastbound approach. This unconventional two-way control provides

for improved operation of the high volume of traffic entering during the morning peak hour where large platoons of traffic are metered to this junction from the adjacent traffic signal. This condition of a free eastbound move can be confusing to drivers due to the crosswalk markings seen in the adjacent photograph looking east on Howard Avenue with Slate Hill Drive to the left. The markings could be confused as a *Stop* line by drivers. Consideration of restriping the crosswalk to a Continental style crosswalk may help with this confusion of control.

Curb ramps, though not ADA compliant, and a marked crosswalk are provided on the Howard Avenue eastbound approach only, which continues through the channelized right lane island on the Slate Hill Drive southbound approach for pedestrian accommodations. Ornamental light poles are located within the immediate area for nighttime illumination of the intersection.

3.3 TRAFFIC DATA

Existing traffic flow characteristics for this area were obtained from record data available from RIDOT and from previous traffic studies in the vicinity of the project area. As mentioned previously, traffic count data obtained after March, 2020 is highly affected by the current state of emergency in place in Rhode Island. This condition has resulted in traffic patterns not being consistent with typical daily traffic conditions experienced along the roadways in Rhode Island. Therefore as part of our effort count data was obtained from several sources including review of a Traffic Impact and Access Study report, dated August 2007, prepared by *Vanasse Hangen Brustlin, Inc.* (VHB) for the proposed *Centre at Garden Hills* project for the same subject site; review of a Traffic Impact Study report, dated December 2004, prepared by *Edwards and Kelcey, Inc.* (EK) for the proposed *Rhode Island State Police Headquarters and State Forensic Laboratory* project for the same subject site; from the High Hazard Intersections project (RIC No. 2000-ET-027) completed by *Fuss & O'Neill, Inc*. dated May 2005; and from recent 2019 traffic data available from the RIDOT on New London Avenue (Route 2).

Based on a comparison of the traffic data obtained from multiple sources, the traffic volume data collected in 2007 had higher overall existing traffic volumes in the project area, which was also adjusted seasonally per RIDOT Seasonal Adjustment Factors. The existing traffic data collected as part of the 2007 study and supplemented with the 2019 data has been utilized as a basis of analysis for this project. The count data obtained from the earlier report found that New London Avenue (Route 2), south of Howard Avenue services approximately 28,700 vehicles per day on a typical weekday and 28,400 on a typical Saturday. On a typical weekday along New London Avenue (Route 2), 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 1,900 vehicles was recorded. After 9:00 AM, volumes decrease slightly and then increases consistently until the afternoon peak of approximately 2,600 vehicles serviced between 4:00 and 5:00 PM. On a typical Saturday along New

London Avenue (Route 2), traffic volumes begin to increase at 7:00 AM with no defined morning peak hour as the volumes consistently increases to until the midday peak hour between 1:00 and 2:00 PM, thereafter the volume decreases consistently with no defined afternoon peak hour, which is typical of Saturdays along a commercial corridor.

Record manual turning movement count data at the intersection of New London Avenue (Route 2) with Howard Avenue/Garden Hills Parkway was obtained from the study as noted. Based upon review of the TMC data, which was seasonally adjusted, New London Avenue (Route 2) along the property frontage was found to service approximately 1,940 vehicles during the weekday morning peak hour between 8:00 and 9:00 AM with approximately 1,280 vehicles northbound and 660 vehicles southbound. During the same time period, Howard Avenue was found to service 1,020 vehicles with 900 vehicles eastbound and 120 vehicles westbound. New London Avenue (Route 2), north of Howard Avenue, was found to service approximately 2,450 vehicles (1,250 NB/1,200 SB) and 2,900 vehicles (1,570 NB/1,370 SB) during the morning and afternoon peak hours, respectively from the count data. In comparison, the RIDOT 2019 ATR traffic volumes were found to be lower where New London Avenue (Route 2), north of Howard Avenue, serviced approximately 2,200 vehicles (1,100 NB/1,100 SB) and 2,700 vehicles (1,400 NB/1,300 SB) during the morning and afternoon peak hours, respectively.

During the weekday afternoon peak hour between 4:00 and 5:00 PM, New London Avenue (Route 2) serviced 2,415 vehicles with approximately 1,050 vehicles northbound and 1,365 vehicles southbound. During the same time period, Howard Avenue was found to service 745 vehicles with 135 vehicles eastbound and 610 vehicles westbound. During the Saturday midday peak hour between 12:00 and 1:00 PM, New London Avenue (Route 2) serviced 2,455 vehicles with approximately 1,260 vehicles northbound and 1,155 vehicles southbound. During the same time period, Howard Avenue was found to service 360 vehicles with 215 vehicles eastbound and 145 vehicles westbound. Figures 3a and 3b on the following pages depict the daily peak hour turning movement volumes at the study intersections. Complete count information can be found in the Appendix.

4.0 SAFETY ANALYSIS

To determine if there are any limiting factors affecting safety relating to access to the proposed mixed-use development, the physical characteristics of the project area roadways were investigated. These limiting factors would potentially include horizontal or vertical alignment changes or roadside obstructions that limit sight distances for vehicles traveling along a road or entering a 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 the site driveways and/or side street.

The vertical and horizontal alignment of Howard Avenue in the project area can be described as level and curvilinear with a gradual "S" curve in the vicinity of the *Mulligan's Island* access road as depicted on the photograph on the following page looking west. Based upon the existing roadway geometry as described, the available sight distance at the access road intersection are greater than 300 feet through the signalized junction with Route to the west and in excess of 300 feet through the two-way stop-controlled junction with

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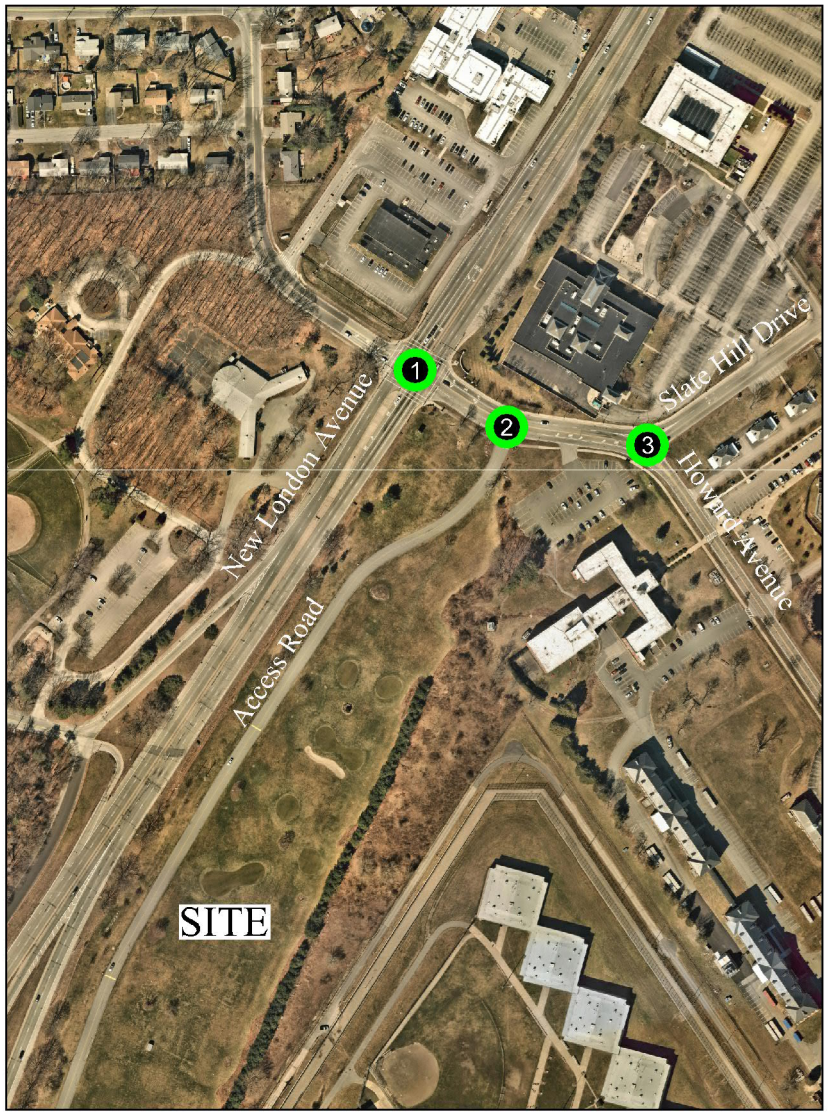
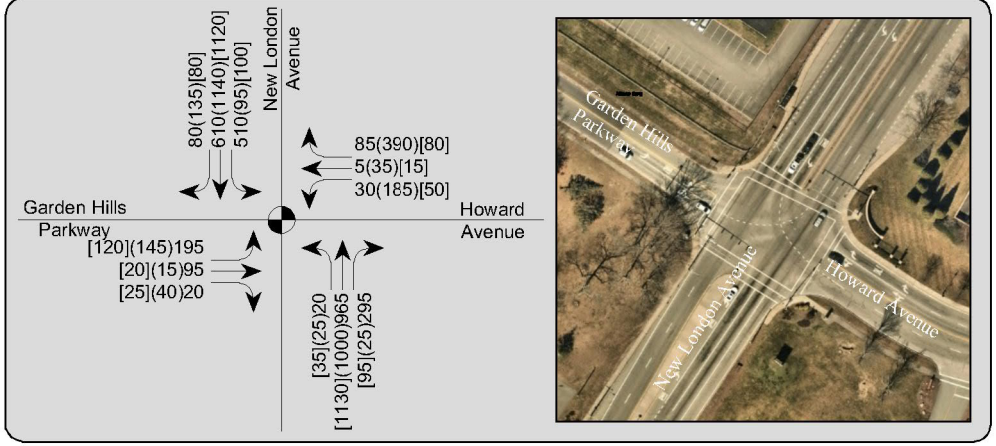
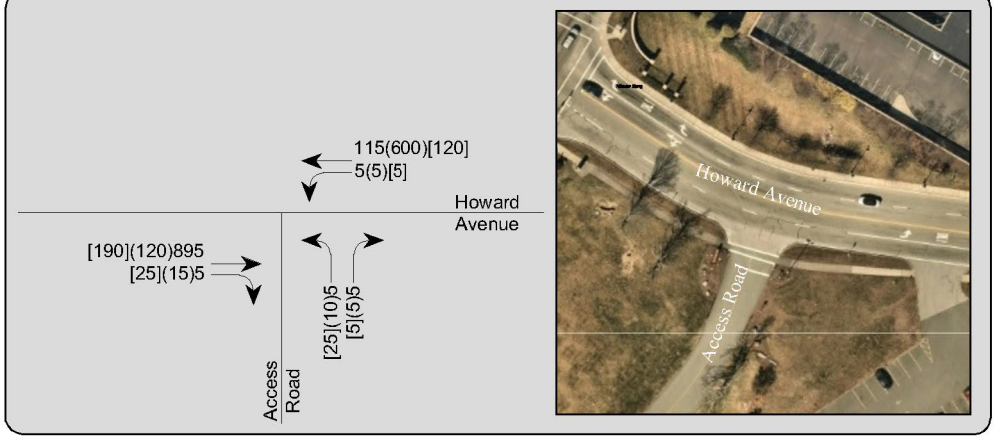
Figure 3a - Existing Traffic Volumes



1 NEW LONDON AVENUE/HOWARD AVENUE/GARDEN HILLS PARKWAY



2 HOWARD AVENUE/ACCESS ROAD



LEGEND:

- TURN LANE
- XXX WEEKDAY AM PEAK VOLUMES (8:00 AM TO 9:00 AM)
- (XXX) WEEKDAY PM PEAK VOLUMES (4:00 PM TO 5:00 PM)
- [XXX] SATURDAY MD PEAK VOLUMES (12:00 PM TO 1:00 PM)
- 1 STUDY INTERSECTION
- TRAFFIC SIGNAL

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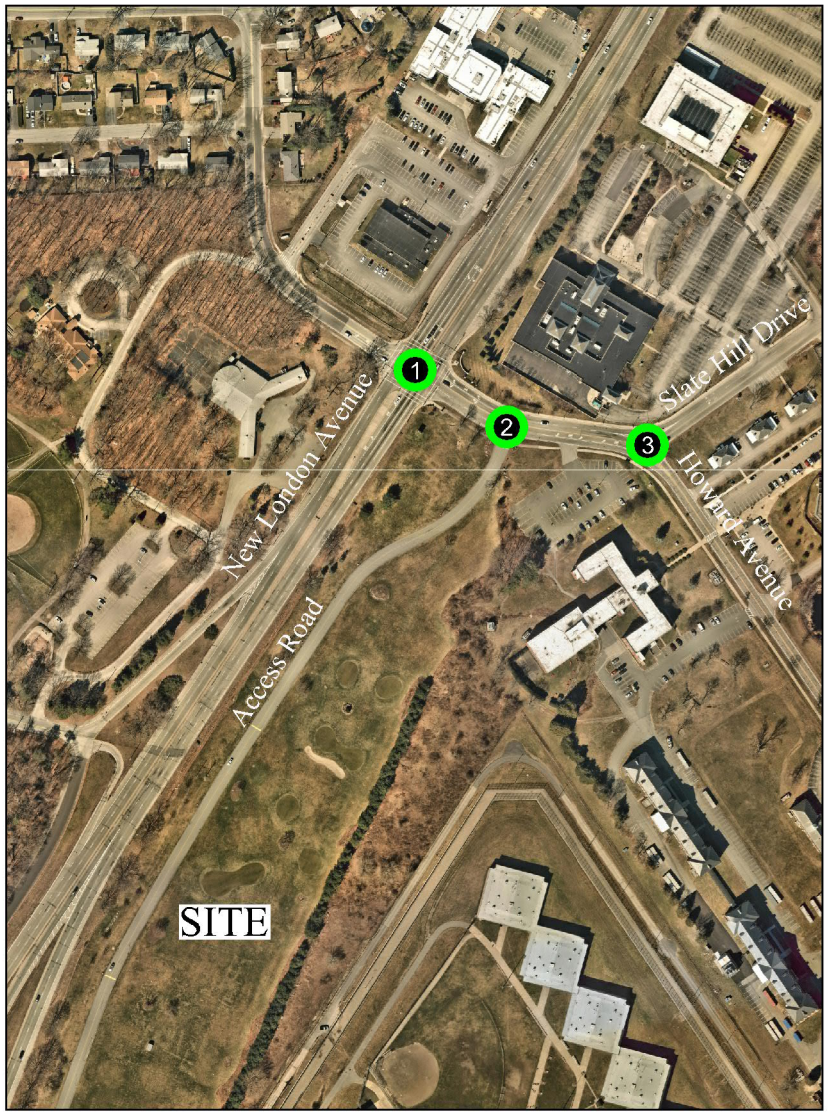
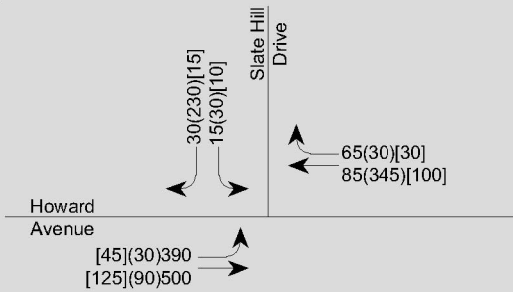
Figure 3b - Existing Traffic Volumes



3 HOWARD AVENUE/SLATE HILL DRIVE



LEGEND:

- TURN LANE
- XXX WEEKDAY AM PEAK VOLUMES (8:00 AM TO 9:00 AM)
- (XXX) WEEKDAY PM PEAK VOLUMES (4:00 PM TO 5:00 PM)
- [XXX] SATURDAY MD PEAK VOLUMES (12:00 PM TO 1:00 PM)
- 1 STUDY INTERSECTION
- TRAFFIC SIGNAL

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Slate Hill Drive. These values are in greater than AASHTO's recommended minimum sight distance of 80 feet based on the posted speed limit of 15 mph. It should be noted that speeds are highly variable due to the signal-controlled New London Avenue (Route 2) and two-way stop-controlled Slate Hill Drive junctions, where vehicles are turning off of or onto Howard Avenue at a low speed, or slowing to the stop line at the traffic signal and at the two-way way stop control.

The vertical alignment of New London Avenue (Route 2) in the project area inclines from south to north to a minor crest vertical curve just north of Howard Avenue. The horizontal alignment of New London Avenue (Route 2) can be described as generally straight along the majority of the property frontage with a gradual curve just south of Brayton Avenue and a more defined curve south of the site. Based on the existing roadway geometry, the visibility of the new signalized junction at the site access road, across from Brayton Avenue, for vehicles travelling along New London Avenue (Route 2) are greater than 1,000 feet from the north and from the south. These values are in greater than AASHTO's recommended minimum stopping sight distance of 360 feet based on the posted speed limit of 45 mph, and the 495 feet for the observed travel speeds ranging from 45 to 55 mph.

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 of existing safety conditions, a review of accident records was completed. Data was obtained from the Cranston Police Department for the latest three-year period from January 2017 to December 2019 to determine if any location in the project area experienced a high frequency or pattern of accidents.

A total of 67 crashes (avg. 22 per year) occurred in the project area over the three-year study period, with eleven involving injuries. Summarizing the data, the majority of the crashes (60) with eight involving injuries, occurred at the signalized intersection of New London Avenue (Route 2) with Howard Avenue/Garden Hills Parkway; and seven crashes with three involving injuries occurred along New London Avenue (Route 2) between the Route 5 overpass and Howard Avenue/Garden Hills Parkway. At the signalized intersection of New London Avenue (Route 2) with Howard Avenue/Garden Hills Parkway forty-three of the crashes were rear-end collisions, nine were sideswipe collisions (same direction), five were angle crashes, and three were collision with an object.

The majority of the intersection crashes were rear-end crashes, which is typical of signalized junctions due to the numerous starting and stopping movements required for the signal change intervals. Three of the nine sideswipe collisions at the signalized intersection of New London Avenue (Route 2) with Howard

Avenue/Garden Hills Parkway involved vehicles turning left side by side on the southbound double left turn lanes, three involved vehicles turning left side by side on the eastbound approach, and three involving northbound vehicles attempting to change lanes. All angle crashes occurred at the signalized intersection of New London Avenue (Route 2) with Howard Avenue/Garden Hills Parkway that can be attributed to drivers not yielding the right of way (3) and running a red light (2). The three collision with object accidents involved a vehicle losing control due to roadway conditions, one hit a rock on the road, and the other involved a vehicle taking a wide turn and hitting the curb. In addition, four sideswipe collisions occurred along New London Avenue (Route 2) between the Route 5 overpass and Howard Avenue/Garden Hills Parkway that can be attributed to vehicles changing lanes; two were collision with an object that involved a vehicle losing control and the other due to medical conditions; and one was a rea-end collision.

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 measures could be investigated to enhance safety at the signalized intersection. The clearance intervals could be reviewed by RIDOT as part of their typical maintenance program to determine if they require adjustment in an effort to reduce the number of rear-end collisions. It is also recommended that the *Stop* sign at the intersection of the Mulligan's Island access road with Howard Avenue be replaced to meet current safety standards. A summary of the accident data depicting the number, type, and severity is provided in the Appendix.

5.0 IMPACT ANALYSIS

5.1 TRIP GENERATION

To determine the potential traffic impact of a new development project, estimates of anticipated traffic to be generated by a particular land use must be calculated. As previously discussed, the development proposal consists of the construction of a 165,000 square foot building to accommodate a COSTCO discount club and an associated fueling station as the primary anchor within the site. Other commercial uses proposed as outparcels include a 20,000 square foot retail building, a 1,000 square foot bank or fast-food use with drive-thru, and two 2,100 square foot buildings to accommodate fast-food restaurants with drive-thru. The residential component includes a 40-unit single-family neighborhood on a parcel to the rear of the COSTCO discount club to transition the mixed-use project to the adjacent existing single-family neighborhoods to the south and east.

Parking will be available adjacent to each building. Access and egress will be provided via a new signalized access road intersection with New London Avenue (Route 2) approximately 1,000 feet south of Howard Avenue, and at the existing *Mulligan's Island* access road on Howard Avenue. All proposed commercial uses will be interconnected via an internal roadway linking the parking areas to the existing *Mulligan's Island* access road, which will be modified to accommodate the new uses, including the outparcels. Figure 4 on the following page depicts the site layout and access plan, prepared by *Garofalo Associates, Inc.*

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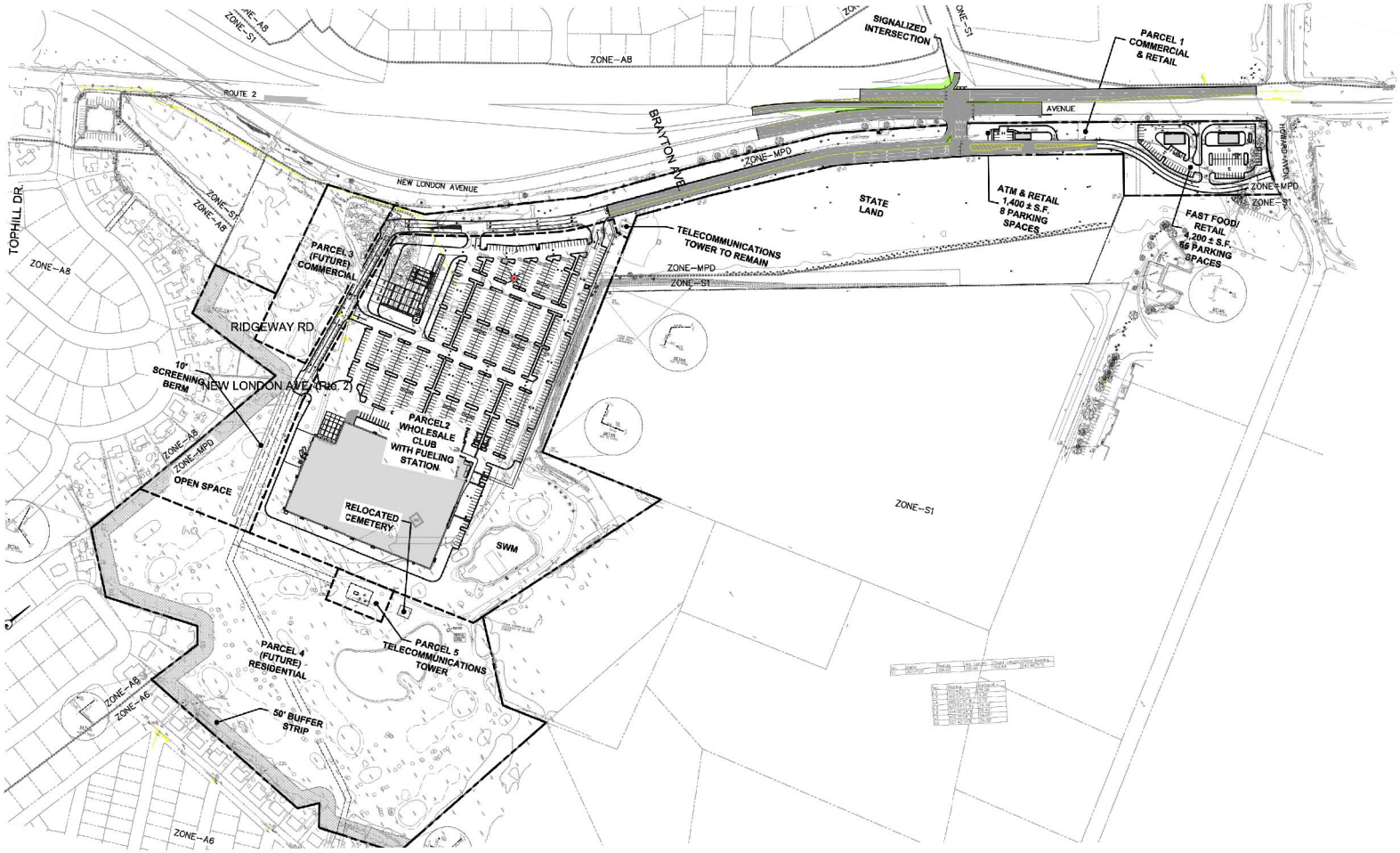
Figure 4 - Site Layout



Site Plan provided by Garofalo & Associates, Inc.

Estimated traffic volumes and trip generation rates based on operational data were provided by K&A for the COSTCO with Gas Station component of the project. Trip generation rates for the other land uses were obtained from the "Trip Generation" manual, an informational report published by the Institute of Transportation Engineers (ITE) which is a national professional organization for traffic and transportation engineers. The data provided in the ITE manual 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 new development future trips. For the proposed mixed-use plaza project Land Use Codes 210 Single-Family Detached Housing, 820 Shopping Center, 912 Drive-in Bank, 934 Fast-Food Restaurant with Drive-Through Window, 937 Coffee/Donut Shop with Drive-Through Window, and 944 Gasoline/Service Station were reviewed for applicability in developing an estimate of site related vehicles trips. The proposed COSTCO hours of operation are as follows:

Monday – Friday	10:00 AM to 8:30 PM
Saturday	9:30 AM to 6:00 PM
Sunday	10:00 AM to 6:00 PM

As can be seen, the COSTCO is not open until after 10:00 AM during the weekday so this use will not coincide with the daily morning commuter peak into the adjacent Pastore Center and will generate little traffic during this period. The proposed uses that do generate traffic during this period include the fast food restaurant and gasoline station where much of the traffic associate with these uses can be attributed to pass-by traffic that is already on the adjacent servicing roadways and is not anticipated to be new traffic generated by the site.

Trip generation rates for the COSTCO with Gas Station are based on recent counts at COSTCO warehouses nationwide. This information was reviewed for a comparison of trip volumes for this particular land use in the local community. The ITE manual suggests that if a similar or like land use is available in the region of study, data could be obtained to confirm ITE rates, or to use the independent study rates if they are more appropriate. Table 1 on the following page summarizes the peak hour site related vehicle trips estimated for this project utilizing the land use codes available from the ITE manual. The appropriate worksheets from the manual are included in the Appendix, along with the trip estimate calculations.

It is important to note that the compatibility of uses, where a single site trip is generated for the multiple uses within the same development, is referred to as "internal capture" where a driver would potentially visit two or more of the proposed uses within the proposed development. For example, a visitor to the COSTCO or a resident in the development could also stop at one of the restaurants. Consequently, these internal capture trips would allow reduction of the total trips generated by a multi-use project.

In addition to internal capture trips, it is estimated that between 30% and 60% of trips generated by the commercial uses which include the COSTCO, coffee/donut shop, and fast-food restaurant would not be new to the servicing roadways. The ITE manual provides information on what is referred to as "pass-by" trips, or those trips associated with the site that are already on the servicing roadways and turn into and out of a business and continue to their destination. To be conservative, no reduction was taken for the pass-by and internal-capture trips in our analysis, nor for the design of future roadway improvements. For reference, a summary of the pass-by calculation to define the new trips estimated for this site is provided in a table in the Appendix.

TABLE 1 – Trip Generation Estimate

	Description	Enter	Exit	Total
Weekday AM Peak Hour				
Independent Study	COSTCO with Gas Station	169	170	339
ITE Land Use Code 210	Single-Family Detached Housing	6	24	30
ITE Land Use Code 820	Shopping Center	11	8	19
ITE Land Use Code 912	Drive-in Bank	6	4	10
ITE Land Use Code 934	Fast-Food Restaurant with Drive-Through Window	43	42	85
ITE Land Use Code 937	Coffee/Donut Shop with Drive-Through Window	95	92	187
	TOTAL	**330**	**340**	**670**
Weekday PM Peak Hour				
Independent Study	COSTCO with Gas Station	374	387	761
ITE Land Use Code 210	Single-Family Detached Housing	26	14	40
ITE Land Use Code 820	Shopping Center	37	40	77
ITE Land Use Code 912	Drive-in Bank	11	10	21
ITE Land Use Code 934	Fast-Food Restaurant with Drive-Through Window	36	33	69
ITE Land Use Code 937	Coffee/Donut Shop with Drive-Through Window	46	46	92
	TOTAL	**530**	**530**	**1,060**
Saturday MD Peak Hour				
Independent Study	COSTCO with Gas Station	458	459	917
ITE Land Use Code 210	Single-Family Detached Housing	20	17	37
ITE Land Use Code 820	Shopping Center	47	43	90
ITE Land Use Code 912	Drive-in Bank	14	12	26
ITE Land Use Code 934	Fast-Food Restaurant with Drive-Through Window	58	57	115
ITE Land Use Code 937	Coffee/Donut Shop with Drive-Through Window	93	92	185
	TOTAL	**690**	**680**	**1,370**

5.2 Traffic Signal Warrant Analysis

Justification for installation of a new traffic signal or continued use of an existing traffic signal requires an engineering analysis which includes an evaluation of the intersection operations and safety to determine if a traffic control signal is warranted at the location. The Manual on Uniform Traffic Control Devices (MUTCD) contains nine *Warrants* for the installation of traffic signals. These warrants, which consider vehicular and pedestrian volumes, delay, and crash history, are listed below.

MUTCD Warrants

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

An intersection typically needs only one of these warrants to justify installation or continued operation of a traffic signal unless only the peak hour condition is satisfied. In that case other considerations should be investigated to address delay or capacity issues resulting from the limited duration situation and would be considered as a last option to mitigate adverse safety or operational conditions. Satisfaction of one or more of these warrants in itself; however, does not require either the installation or continued operation of a traffic signal.

To determine whether a signal would be required at the proposed intersection of New London Avenue (Route 2) and the Site Access Road as part of the proposed mixed-use development mitigation design, an analysis was completed using the existing hourly volumes along New London Avenue (Route 2), in combination with the new site trips. The traffic signal warrant analysis determined that Warrant 2 – Four Hour Vehicular Volume and Warrant 3 – Peak Hour for the future PM peak condition were satisfied. The results for the traffic signal warrant analysis can be found in Appendix E.

5.3 Future Traffic Conditions

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. Based on record traffic volumes in the project area that have seen little to no growth over the last twenty years, and coordination with the city where it was determined that no other development projects potentially impacting traffic are proposed in the area, a conservative annual growth rate of 1.0 percent was utilized for the future background traffic growth. This rate was applied to the existing volumes to establish a future 2025 No-Build traffic condition on the

servicing roadways. The future 2025 Build condition included traffic generated by the new mixed-use development.

In developing the intersection volumes to be analyzed under the build condition, a directional distribution of the site traffic was estimated based upon traffic patterns in the project area from record data, the type of land use proposed, and the location of higher order facilities, such as Route 37 and Route 295. For the proposed discount club with gas station, retail use, and bank, it is estimated that 55% of the site traffic will arrive from and depart to the north, 35% will arrive from and depart to the south, and 5% will arrive from and depart to the east via Howard Avenue, and 5% will arrive from and depart to the west via Garden Hills Parkway. For the coffee/donut shop and fast-food restaurant, the directional distribution was based upon the traffic pattern at the intersection of New London Avenue (Route 2) with Howard Avenue. Figures 5a and 5b on the following pages depict the Future Build traffic conditions during the weekday morning and afternoon, and Saturday midday peak hours studied for this project. Site distribution figures are provided in the Appendix.

5.4 Operation 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. Based upon the proposed commercial uses and review of record traffic data, the weekday AM and PM, and Saturday MD peak hours would represent this worst-case combination of site-generated traffic with the servicing roadway peak traffic period.

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 unsignalized and signalized intersections.

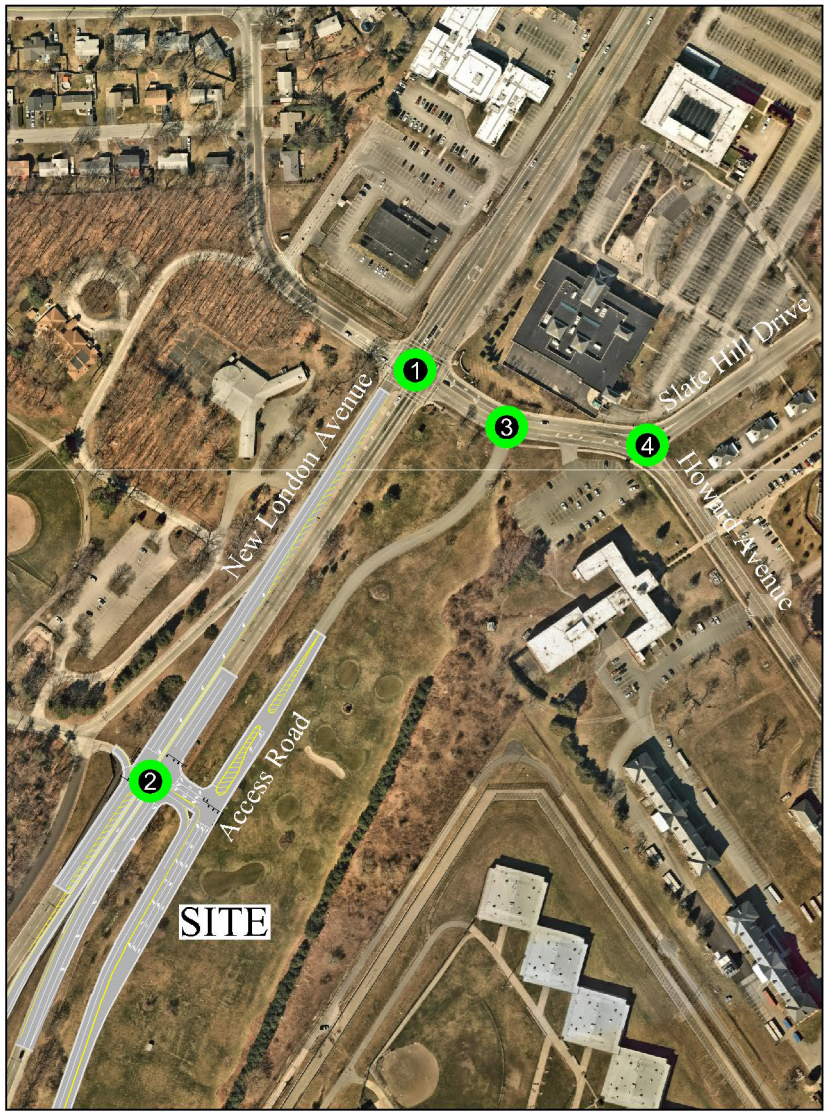
TABLE 2 – Highway Capacity Manual Criteria

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

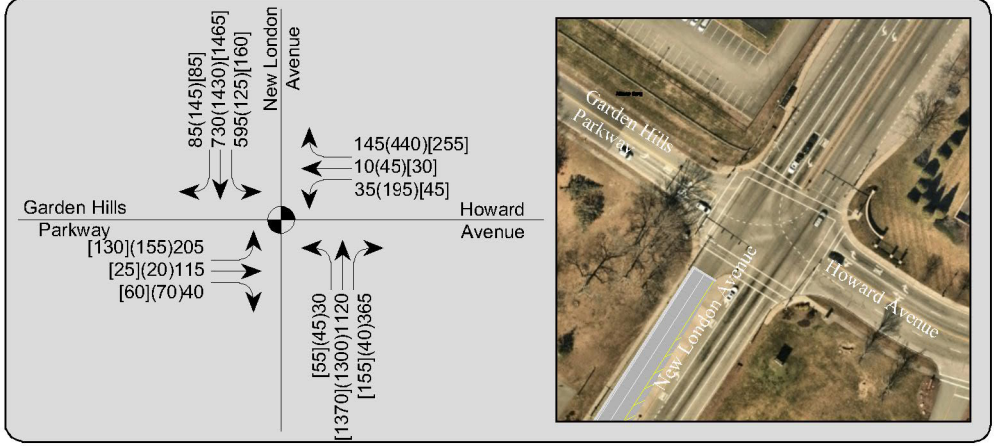
Proposed Mixed-Use Development

CRANSTON, RHODE ISLAND

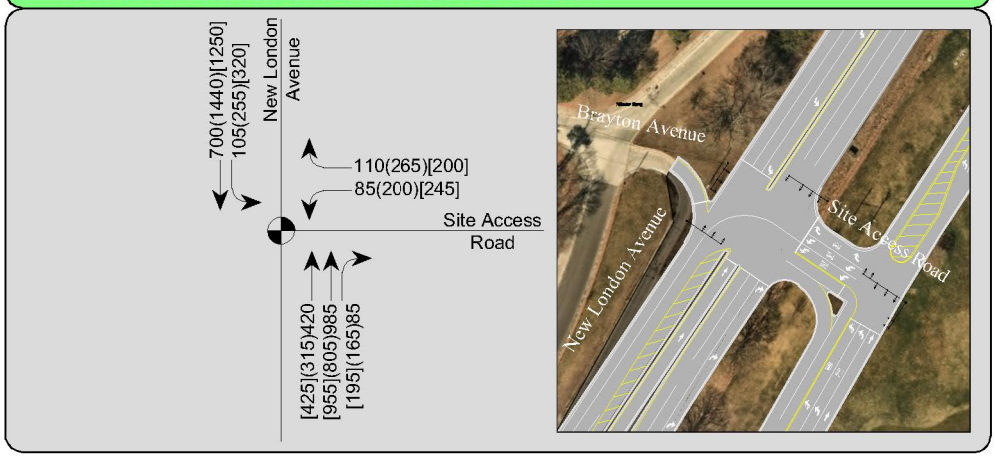
Figure 5a - Future Traffic Volumes



1 NEW LONDON AVENUE/HOWARD AVENUE/GARDEN HILLS PARKWAY



2 NEW LONDON AVENUE/SITE ACCESS ROAD



LEGEND:

- TURN LANE
- XXX WEEKDAY AM PEAK VOLUMES (8:00 AM TO 9:00 AM)
- (XXX) WEEKDAY PM PEAK VOLUMES (4:00 PM TO 5:00 PM)
- [XXX] SATURDAY MD PEAK VOLUMES (12:00 PM TO 1:00 PM)
- 1 STUDY INTERSECTION
- TRAFFIC SIGNAL

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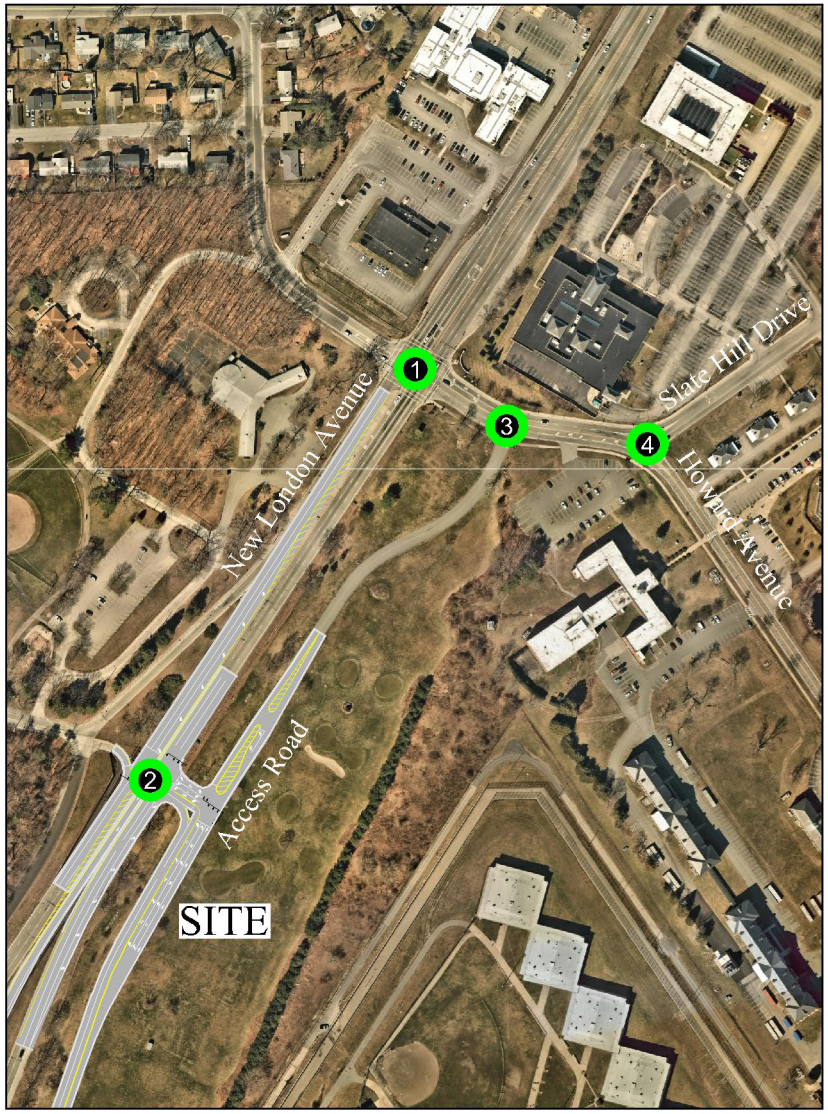
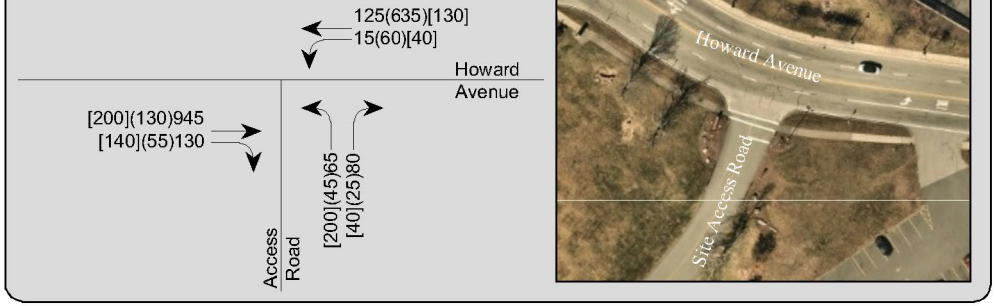
Proposed Mixed-Use Development

CRANSTON, RHODE ISLAND

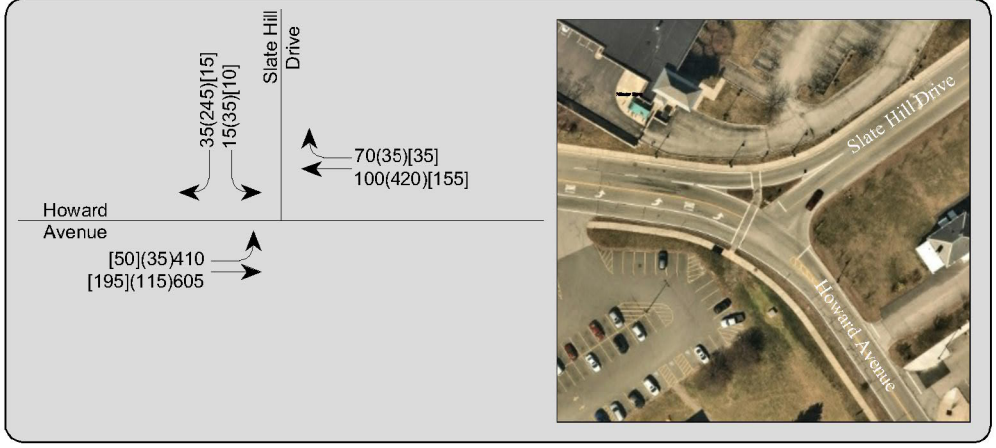
Figure 5b - Future Traffic Volumes



3 HOWARD AVENUE/SITE ACCESS ROAD



4 HOWARD AVENUE/SLATE HILL DRIVE



LEGEND:

- TURN LANE
- XXX WEEKDAY AM PEAK VOLUMES (8:00 AM TO 9:00 AM)
- (XXX) WEEKDAY PM PEAK VOLUMES (4:00 PM TO 5:00 PM)
- [XXX] SATURDAY MD PEAK VOLUMES (12:00 PM TO 1:00 PM)
- 1 STUDY INTERSECTION
- TRAFFIC SIGNAL

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The following intersections were included in the study area and analyzed for the weekday morning and afternoon, and Saturday midday peak hours:

- New London Avenue (Route 2) and Howard Avenue/Garden Hills Parkway
- Howard Avenue and *Mulligan's Island*/Service Road,
- Howard Avenue and Slate Hill Drive
- New London Avenue (Route 2) and Site Access Road (Build only)
- Site Access Road and Service Road (Internal Site Intersection - Build only)

The capacity analysis worksheets are included in the Appendix. Table 3 depicts the current operating conditions at the study intersections during the peak periods.

As can be seen in Table 3, under existing conditions, the signalized intersection of New London Avenue (Route 2) with Howard Avenue/Gardens Hills Parkway operates at an acceptable overall LOS C during both the AM and PM peak periods and LOS B during the Saturday MD peak period. All critical movements operate at an acceptable LOS D or better during all three peak periods reviewed for this project except for the Garden Hills Parkway eastbound left movement where it operates with greater delays at LOS E during the PM peak period. The Garden Hills Parkway protected eastbound left turn movement is the most constrained during this hour where maximum queueing of eight (8) vehicles was observed and is consistent with the analysis.

The critical movements at the unsignalized intersections reviewed for this project, most movements operate at LOS C or better during the three peak periods. Only during the daily morning and afternoon peak hours are greater delays realized for the Slate Hill Drive southbound left and Howard Avenue westbound movements that operate with greater delays at LOS F and LOS E, respectively. This prolonged delay on the Slate Hill Drive southbound and Howard Avenue westbound approaches occur during the busiest periods of the day when the Rhode Island Departments of Motor Vehicles, Traffic Tribunal, Attorney Generals, other state offices and Corrections employees combined with visitors are entering and exiting the three facilities along Slate Hill Drive during the morning and afternoon peak commuter hours.

Table 4 presents the future no build conditions at the study intersections where the analysis found that the estimated increase in traffic during the peak periods resulting from the base traffic growth along the servicing roadways will have minimal impact on overall traffic operations along New London Avenue (Route 2) and Howard Avenue, specifically at the defined study intersections reviewed for this project. The signalized intersection of New London Avenue (Route 2) with Howard Avenue/Gardens Hills Parkway will continue to operate in an overall acceptable manner at overall LOS C during the daily peak periods. All critical movements will operate at LOS D or better except for the Garden Hills Parkway eastbound left movement where it operates with greater delays at LOS E during the PM peak period. In addition, the unsignalized study intersections will continue to operate in an acceptable manner with critical movements operating at LOS C or better except for the Slate Hill Drive southbound left and Howard Avenue westbound approaches during the morning and afternoon peak periods, respectively, where it will continue to operate at LOS F.

TABLE 3 – Level of Service Summary (Existing Conditions)

Location / Movement	EXISTING CONDITIONS								
	AM Peak Hour			PM Peak Hour			Sat. MD Peak Hour		
	LOS	Delay	95th % Queue Length (veh.)	LOS	Delay	95th % Queue Length (veh.)	LOS	Delay	95th % Queue Length (veh.)
New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway (S)									
Garden Hills Pkwy. EB Left	D	47.2	8	E	66.1	8	D	40.0	4
Garden Hills Pkwy. EB L/Th/R	D	45.3	8	D	50.9	6	C	34.0	4
Howard Ave. WB Left/Thru	D	47.7	2	D	50.4	9	D	40.1	4
Howard Ave. WB Right	A	5.8	2	C	32.0	12	A	7.9	2
New London Ave. NB Left	D	47.9	2	D	48.0	2	D	40.8	2
New London Ave. NB Th/R	C	29.1	16	C	22.5	11	B	17.4	10
New London Ave. SB Left	D	38.0	10	D	44.3	3	D	38.5	2
New London Ave. SB Th/R	B	12.7	9	C	28.1	26	B	17.7	16
OVERALL	**C**	**28.3**		**C**	**30.8**		**B**	**20.0**	
Howard Avenue at Mulligan's Island/Service Road (U)									
Howard Ave. WB Left/Thru	B	10.5	0	A	7.6	0	A	7.8	0
Site Access Rd. NB Left/Right	C	18.3	1	B	12.3	1	B	11	1
Howard Avenue at Slate Hill Drive (U)									
Howard Ave. EB Left	B	10.1	2	A	8.2	1	A	8.3	1
Howard Ave. WB	C	15.1	2	E	45.2	11	B	10.0	1
Slate Hill Dr. SB Left	F	65.6	1	B	10.8	1	B	11.1	1
Slate Hill Dr. SB Right	A	9.1	1	B	10.9	2	A	9.0	1

(S) – Signalized
(U) – Unsignalized

TABLE 4 – Level of Service Summary (No Build Conditions)

Location / Movement	FUTURE 2025 NO BUILD CONDITIONS								
	AM Peak Hour			PM Peak Hour			Sat. MD Peak Hour		
	LOS	Delay	95th % Queue Length (veh.)	LOS	Delay	95th % Queue Length (veh.)	LOS	Delay	95th % Queue Length (veh.)
New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway (S)									
Garden Hills Pkwy. EB Left	D	50.6	8	E	72.2	8	D	42.5	5
Garden Hills Pkwy. EB L/Th/R	D	48.4	8	D	53.5	7	D	36.6	4
Howard Ave. WB Left/Thru	D	50.0	3	D	50.7	10	D	42.6	4
Howard Ave. WB Right	A	6.7	2	C	32.5	13	A	8.2	2
New London Ave. NB Left	D	49.6	2	D	48.6	2	D	43.5	2
New London Ave. NB Th/R	C	30.8	19	C	24.1	12	B	17.7	11
New London Ave. SB Left	D	40.0	11	D	44.2	2	D	40.9	3
New London Ave. SB Th/R	B	12.9	10	C	31.9	29	B	18.1	18
OVERALL	**C**	**29.8**		**C**	**33.2**		**C**	**20.5**	
Howard Avenue at Mulligan's Island/Service Road (U)									
Howard Ave. WB Left/Thru	B	10.8	0	A	7.6	0	A	7.8	0
Site Access Rd. NB Left/Right	C	19.6	1	B	12.7	1	B	11.1	1
Howard Avenue at Slate Hill Drive (U)									
Howard Ave. EB Left	B	10.2	2	A	8.2	1	A	8.3	1
Howard Ave. WB	C	16.5	2	F	70.7	15	B	10.2	1
Slate Hill Dr. SB Left	F	78.3	1	B	11.0	1	B	11.3	1
Slate Hill Dr. SB Right	A	9.1	1	B	11.2	2	A	9.0	1

(S) – Signalized
(U) – Unsignalized

TABLE 5 – Level of Service Summary (Build Conditions)

Location / Movement	FUTURE 2025 BUILD CONDITIONS								
	AM Peak Hour			PM Peak Hour			Sat. MD Peak Hour		
	LOS	Delay	95th % Queue Length (veh.)	LOS	Delay	95th % Queue Length (veh.)	LOS	Delay	95th % Queue Length (veh.)
New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway (S) [1]									
Garden Hills Pkwy. EB Left	E	56.0	9	E	79.1	9	D	51.8	6
Garden Hills Pkwy. EB L/Th/R	D	52.3	9	D	40.2	6	C	28.7	4
Howard Ave. WB Left/Thru	D	53.0	3	D	53.5	11	D	52.4	4
Howard Ave. WB Right	B	11.8	3	C	30.1	13	C	29.6	7
New London Ave. NB Left	D	52.6	2	D	48.1	3	D	49.2	3
New London Ave. NB Th/R	D	41.2	24	C	29.5	15	C	17.2	11
New London Ave. SB Left	D	44.0	12	D	39.4	3	D	43.2	3
New London Ave. SB Th/R	B	16.3	12	E	68.1	34	C	21.0	20
OVERALL	**D**	**36.2**		**D**	**48.6**		**C**	**23.1**	
Howard Avenue at Service Road (U)									
Howard Ave. WB Left/Thru	B	11.3	1	A	7.9	1	A	8.4	1
Site Access Rd. NB Left/Right	E	39.6	4	C	9.2	1	D	27.1	5
Howard Avenue at Slate Hill Drive (U)									
Howard Ave. EB Left	B	10.2	2	A	8.2	1	A	8.3	1
Howard Ave. WB	C	17.5	2	F	116.6	22	B	10.7	1
Slate Hill Dr. SB Left	F	91.3	1	B	11.3	1	B	12.0	1
Slate Hill Dr. SB Right	A	9.1	1	B	11.2	2	A	9.0	1
New London Avenue (Route 2) at Site Access Road (S)									
Site Access Rd. WB Left	C	31.1	2	C	34.1	4	D	47.2	6
Site Access Rd. WB Right	B	16.4	3	C	31.4	9	E	68.1	8
New London Ave. NB Thru from Route 5	A	9.9	7	B	17.3	8	C	25.3	14
New London Ave. NB Thru	D	36.9	16	C	34.0	14	E	64.0	25
New London Ave. NB Right	A	0.4	1	A	4.0	2	A	4.4	2
New London Ave. SB Left	D	46.7	5	D	50.5	11	D	49.7	16
New London Ave. SB Thru	A	3.1	2	A	7.5	10	A	5.5	10
OVERALL	**C**	**20.9**		**C**	**21.0**		**C**	**33.6**	
Site Access Road at Service Road (S)									
Site Access Road EB Left	C	28.3	1	C	21.1	1	C	20.8	1
Site Access Road EB Right	A	0.2	1	A	1.1	1	A	2.0	2
Site Access Road NB Left	A	2.6	1	A	6.0	2	A	9.5	3
Site Access Road NB Thru	A	6.7	1	B	13.2	1	B	19.5	5
Service Road SB Thru/Right	A	3.6	1	A	8.2	2	A	8.0	2
OVERALL	**A**	**3.7**		**A**	**4.9**		**A**	**7.7**	

Table 5 presents the future condition where the analysis found that the New London Avenue (Route 2) signalized intersection with Howard Avenue/Gardens Hills Parkway with optimization will operate overall in an acceptable manner at LOS D or better during the daily peak hours of traffic with minor additional delays realized as a result of the development related traffic. All critical movements will operate at LOS D or better except for the Garden Hills Parkway eastbound left and New London Avenue (Route 2) southbound through movements where it operates with greater delays at LOS E during the PM peak period. The signal timing optimization will be coordinated with the Rhode Island Department of Transportation (RIDOT) through the Physical Alteration Permit process if future traffic conditions are realized and warrant the modification.

The existing unsignalized study intersections will continue to operate in an acceptable manner with critical movements operating at LOS C or better except for the Slate Hill Drive southbound left and Howard Avenue westbound approaches during the morning and afternoon peak periods respectively, where it will continue to operate at LOS F. In addition, the Service Road northbound approach will experience greater delays at LOS E during the morning peak hour. One condition that does have a positive impact on the available gaps in traffic is the adjacent signalized intersection at New London Avenue (Route 2) with Howard Avenue. The traffic signals help create gaps in Howard Avenue traffic during the change intervals that driveway and side street traffic can utilize to access Howard Avenue.

In addition, a new three-way signalized junction is proposed approximately 1,000 feet south of the existing New London Avenue (Route 2) and Howard Avenue intersection. An east/west connector road (Site Access Road) will link New London Avenue (Route 2) to the existing Site Access Road/Service Road intersection which runs parallel to New London Avenue (Route 2) and extends between Howard Avenue and the subject lot located at the existing *Mulligan's Island* facility. The Site Access Road and a portion of the Service Road will be upgraded as needed to include additional lanes to accommodate the estimated traffic demands. The New London Avenue (Route 2) southbound approach will include two through travel lanes and a separate left turn lane into the site. The northbound lanes include two through travel lanes from New London Avenue (Route 2) and a separate exclusive right turn lane into the site. The northbound Route 5 movement will be accommodated in a single lane as it does today, merging with New London Avenue (Route 2) at the signal. This lane will be restricted to a through movement only. Access to the site from Route 5 will be limited to entry only from Howard Avenue to the north. See Appendix F for conceptual figures.

The two adjacent intersections of New London Avenue (Route 2) and the Site Access Road and the Site Access Road and Service Road intersection will operate under the same traffic signal controller as a single four phase operation to accommodate the intersection movements. Phase 1 will service the southbound movements on New London Avenue (Route 2) including an advanced protected left turn, followed by an advanced northbound through for Route 5. The New London Avenue (Route 2) northbound movements will then be serviced concurrently with southbound New London Avenue (Route 2) along with the northbound Site Access Road movement and southbound Service Road. The final phase will include the Site Access Road approach to New London Avenue (Route 2) that runs concurrently with the northbound Site Access Road protected left-turn phase at its intersection with the Service Road.

The results of the analysis determined that the new signalized intersection of New London Avenue (Route 2) and the Site Access Road and Service Road will operate overall in an acceptable manner at LOS C or better during the daily peak hours of traffic reviewed for this project. All critical movements will operate at LOS D or better except for the Site Access Road westbound right and the New London Avenue (Route 2) northbound thru movements where it operates with greater delays at LOS E during the Saturday MD peak period, typical of major retail centers in the area.

6.0 CONCLUSIONS AND RECOMMENDATIONS

In summary, the study has shown that the proposed mixed-use project access and circulation plan has been designed to provide a level of traffic safety and efficiency on the servicing roadway system. The safety of the servicing roadways and specifically the study intersections were also reviewed for geometry and sight distances. The intersections reviewed 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 a side street or driveway location.

Several design options were investigated to provide access to the development project and were coordinated with the Rhode Island Department of Transportation during the early planning phase of our study. The designs were developed to address concerns related to the project impact on the New London Avenue (Route 2) intersection with Howard Avenue into the Pastore Center complex. Specifically, the need for a separate intersection to accommodate the increase in traffic was reviewed as part of the design considerations to mitigate any impact to the servicing roadways. As part of that effort a traffic signal warrant analysis for the new intersection of New London Avenue (Route 2) and the Site Access Road determined that Warrant 2 – Four Hour Vehicular Volume and Warrant 3 – Peak Hour for the future PM peak condition were satisfied based upon the estimated demand.

The results of the operational analysis determined that the estimated increase in traffic during the afternoon peak period resulting from the proposed mixed-use project will have a negligible effect on overall traffic operations along the servicing roadways, particularly during the daily peak hours reviewed for this project the site services its greatest daily volumes. The proposed access to the development has been designed to include the new signalized intersection with New London Avenue (Route 2) approximately 1,000 feet south of Howard Avenue. This new intersection will link to the existing Site Access Road that will be upgraded to include additional travel and turning lanes to accommodate the estimated traffic demands. The Site Access Road and Service Road junction will be included in the traffic signal operation that will provide four phases to service New London Avenue (Route 2), the Site Access Road and the Service Road. Refer to the conceptual plan provided in the Appendix depicting the upgrades proposed to New London Avenue (Route 2), the Service Road, and the Site Access Road to accommodate the new development project.

Therefore, based upon the data collected on the servicing roadways, the analysis completed as part of this study, along with the access design proposed, the commercial redevelopment 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.

APPENDIX

A. Traffic Volume Data

B. Traffic Crash Data

C. Trip Generation

D. Traffic Signal Warrant Analysis

E. Operational Analysis

F. Conceptual Figures

APPENDIX A – Traffic Volume Data

Automatic Traffic Recorder Count

New London Avenue (Route 2)

Howard Avenue

Intersection Turning Movement Count

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

Howard Avenue at Slate Hill Drive

A

Automatic Traffic Recorder Count

New London Avenue (Route 2)

Howard Avenue

New London Avenue (Route 2)

(Source; *Proposed Centre at Garden Hills* Traffic Study Report, dated August 2007, by Vanasse Hangen Brustlin, Inc.)

Transportation Data Corporation
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New London Avenue (Route 2)
just south of Howard Avenue
City/State: Cranston, RI
Client: VHB/T. Welch

Start Time	NB A.M.		NB P.M.		SB A.M.		SB P.M.		Combined A.M.		Combined P.M.		01-Mar-07 Thu
12:00	18		215		13		256		31		471		
12:15	15		**269**		18		250		33		519		
12:30	10		**300**		8		240		18		540		
12:45	6	49	**288**	1072	9	48	246	992	15	97	534	2064	
01:00	12		**268**		7		268		19		536		
01:15	13		226		2		234		15		460		
01:30	0		250		10		252		10		502		
01:45	6	31	264	1008	9	28	246	1000	15	59	510	2008	
02:00	6		270		2		227		8		497		
02:15	7		262		0		231		7		493		
02:30	2		276		2		288		4		564		
02:45	5	20	276	1084	5	9	306	1052	10	29	582	2136	
03:00	6		230		4		302		10		532		
03:15	3		268		0		293		3		561		
03:30	3		271		6		276		9		547		
03:45	4	16	235	1004	7	17	325	1196	11	33	560	2200	
04:00	7		298		5		**376**		12		**674**		
04:15	5		270		2		**320**		7		**590**		
04:30	9		261		7		**366**		16		**627**		
04:45	11	32	241	1070	9	23	**365**	1427	20	55	**606**	2497	
05:00	18		273		18		336		36		609		
05:15	26		284		16		360		42		644		
05:30	36		250		18		298		54		548		
05:45	37	117	234	1041	25	77	280	1274	62	194	514	2315	
06:00	47		254		26		248		73		502		
06:15	91		250		40		249		131		499		
06:30	131		220		74		234		205		454		
06:45	154	423	174	898	86	226	246	977	240	649	420	1875	
07:00	134		198		79		184		213		382		
07:15	206		202		82		148		288		350		
07:30	252		160		128		146		380		306		
07:45	**290**	882	174	734	154	443	134	612	**444**	1325	308	1346	
08:00	**293**		164		168		134		**461**		298		
08:15	**304**		139		180		94		**484**		233		
08:30	**284**		136		145		99		**429**		235		
08:45	240	1121	126	565	195	688	83	410	435	1809	209	975	
09:00	194		99		172		109		366		208		
09:15	174		102		174		100		348		202		
09:30	180		82		168		61		348		143		
09:45	177	725	88	371	196	710	58	328	373	1435	146	699	
10:00	189		86		164		62		353		148		
10:15	190		72		**208**		57		398		129		
10:30	206		76		**202**		47		408		123		
10:45	198	783	44	278	**212**	786	46	212	410	1569	90	490	
11:00	212		62		**210**		39		422		101		
11:15	192		31		188		36		380		67		
11:30	208		45		209		20		417		65		
11:45	219	831	23	161	216	823	20	115	435	1654	43	276	
Total	5030		9286		3878		9595		8908		18881		
Percent	56.5%		49.2%		43.5%		50.8%						
Day Total		14316				13473				27789			
Peak	07:45		00:15		10:15		04:00		07:45		04:00		
Vol.	1171		1125		832		1427		1818		2497		
P.H.F.	0.963		0.938		0.963		0.949		0.939		0.926		

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just south of Howard Avenue
City/State: Cranston, RI
Client: VHB/T. Welch

Start Time	NB A.M.		NB P.M.		SB A.M.		SB P.M.		Combined A.M.		Combined P.M.		02-Mar-07 Fri
12:00	21		231		17		250		38		481		
12:15	22		204		25		194		47		398		
12:30	15		216		8		211		23		427		
12:45	11	69	258	909	10	60	233	888	21	129	491	1797	
01:00	23		222		10		194		33		416		
01:15	24		234		11		194		35		428		
01:30	11		196		14		192		25		388		
01:45	5	63	232	884	7	42	198	778	12	105	430	1662	
02:00	9		225		9		207		18		432		
02:15	5		238		2		216		7		454		
02:30	8		220		13		232		21		452		
02:45	8	30	212	895	1	25	243	898	9	55	455	1793	
03:00	8		212		5		281		13		493		
03:15	8		230		4		262		12		492		
03:30	3		222		2		276		5		498		
03:45	5	24	230	894	8	19	320	1139	13	43	550	2033	
04:00	4		263		6		326		10		589		
04:15	4		234		5		304		9		538		
04:30	12		244		6		**314**		18		558		
04:45	12	32	234	975	10	27	**328**	1272	22	59	**562**	2247	
05:00	13		**278**		7		**332**		20		**610**		
05:15	20		**271**		16		**336**		36		**607**		
05:30	32		**261**		17		302		49		**563**		
05:45	41	106	**237**	1047	23	63	234	1204	64	169	471	2251	
06:00	50		248		30		246		80		494		
06:15	66		248		36		229		102		477		
06:30	132		197		83		206		215		403		
06:45	158	406	212	905	77	226	191	872	235	632	403	1777	
07:00	157		191		95		175		252		366		
07:15	209		236		82		180		291		416		
07:30	256		158		118		149		374		307		
07:45	**266**	888	139	724	158	453	152	656	**424**	1341	291	1380	
08:00	**266**		172		139		140		**405**		312		
08:15	**312**		129		160		127		**472**		256		
08:30	**276**		134		148		115		**424**		249		
08:45	258	1112	146	581	154	601	88	470	412	1713	234	1051	
09:00	194		190		158		116		352		306		
09:15	153		145		143		88		296		233		
09:30	155		144		124		92		279		236		
09:45	144	646	131	610	206	631	78	374	350	1277	209	984	
10:00	184		127		176		86		360		213		
10:15	173		115		171		60		344		175		
10:30	175		84		180		60		355		144		
10:45	172	704	84	410	154	681	74	280	326	1385	158	690	
11:00	170		80		**199**		73		369		153		
11:15	179		67		**186**		58		365		125		
11:30	221		52		**202**		55		423		107		
11:45	223	793	45	244	**240**	827	42	228	463	1620	87	472	
Total	4873		9078		3655		9059		8528		18137		
Percent	57.1%		50.1%		42.9%		49.9%						
Day Total		13951				12714				26665			
Peak	07:45		05:00		11:00		04:30		07:45		04:45		
Vol.	1120		1047		827		1310		1725		2342		
P.H.F.	0.897		0.942		0.861		0.975		0.914		0.960		

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New London Avenue (Route 2)
just south of Howard Avenue
City/State: Cranston, RI
Client: VHB/T. Welch

Start Time	NB A.M.		NB P.M.		SB A.M.		SB P.M.		Combined A.M.		Combined P.M.		03-Mar-07 Sat
12:00	47		290		33		278		80		568		
12:15	42		294		29		302		71		596		
12:30	36		280		26		277		62		557		
12:45	38	163	302	1166	24	112	268	1125	62	275	570	2291	
01:00	50		**333**		20		273		70		**606**		
01:15	42		**292**		20		246		62		**538**		
01:30	25		**350**		15		298		40		**648**		
01:45	12	129	**308**	1283	14	69	280	1097	26	198	**588**	2380	
02:00	15		304		12		**270**		27		574		
02:15	15		293		9		**256**		24		549		
02:30	7		304		16		**289**		23		593		
02:45	5	42	282	1183	10	47	**312**	1127	15	89	594	2310	
03:00	7		308		5		246		12		554		
03:15	8		304		9		276		17		580		
03:30	8		312		11		253		19		565		
03:45	4	27	322	1246	9	34	272	1047	13	61	594	2293	
04:00	4		318		7		253		11		571		
04:15	10		302		3		244		13		546		
04:30	10		270		7		234		17		504		
04:45	4	28	302	1192	7	24	247	978	11	52	549	2170	
05:00	3		284		10		264		13		548		
05:15	8		273		8		212		16		485		
05:30	19		249		9		215		28		464		
05:45	22	52	280	1086	15	42	212	903	37	94	492	1989	
06:00	17		240		14		200		31		440		
06:15	20		245		20		216		40		461		
06:30	52		214		29		201		81		415		
06:45	72	161	220	919	49	112	190	807	121	273	410	1726	
07:00	58		206		45		156		103		362		
07:15	68		172		60		132		128		304		
07:30	82		200		69		150		151		350		
07:45	87	295	158	736	110	284	133	571	197	579	291	1307	
08:00	86		152		79		118		165		270		
08:15	92		156		119		102		211		258		
08:30	114		153		125		121		239		274		
08:45	139	431	176	637	140	463	92	433	279	894	268	1070	
09:00	130		151		147		103		277		254		
09:15	154		114		128		90		282		204		
09:30	161		161		175		68		336		229		
09:45	174	619	127	553	218	668	74	335	392	1287	201	888	
10:00	189		130		182		78		371		208		
10:15	195		92		208		74		403		166		
10:30	208		91		204		69		412		160		
10:45	234	826	85	398	266	860	80	301	500	1686	165	699	
11:00	**284**		85		**238**		77		**522**		162		
11:15	**220**		80		**268**		46		**488**		126		
11:30	**288**		72		**248**		60		**536**		132		
11:45	**291**	1083	51	288	**308**	1062	55	238	**599**	2145	106	526	
Total	3856		10687		3777		8962		7633		19649		
Percent	50.5%		54.4%		49.5%		45.6%						
Day Total		14543				12739				27282			
Peak	11:00		01:00		11:00		02:00		11:00		01:00		
Vol.	1083		1283		1062		1127		2145		2380		
P.H.F.	0.930		0.916		0.862		0.903		0.895		0.918		

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New London Avenue (Route 2)
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City/State: Cranston, RI
Client: VHB/T. Welch

Start	NB				SB				Combined				04-Mar-07
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Sun
12:00	29		198		36		196		65		394		
12:15	44		210		28		208		72		418		
12:30	37		207		23		**236**		60		443		
12:45	50	160	233	848	18	105	**252**	892	68	265	485	1740	
01:00	60		248		26		**242**		86		490		
01:15	46		240		22		**234**		68		474		
01:30	17		230		18		234		35		464		
01:45	17	140	244	962	16	82	244	954	33	222	488	1916	
02:00	17		225		14		228		31		453		
02:15	6		222		17		202		23		424		
02:30	20		**244**		16		220		36		**464**		
02:45	5	48	**274**	965	10	57	244	894	15	105	**518**	1859	
03:00	11		**270**		4		220		15		**490**		
03:15	9		**272**		2		227		11		**499**		
03:30	10		236		12		205		22		441		
03:45	6	36	222	1000	8	26	219	871	14	62	441	1871	
04:00	7		251		4		188		11		439		
04:15	6		274		3		210		9		484		
04:30	4		252		5		173		9		425		
04:45	9	26	224	1001	8	20	174	745	17	46	398	1746	
05:00	1		208		6		167		7		375		
05:15	10		186		8		139		18		325		
05:30	12		212		5		132		17		344		
05:45	15	38	229	835	10	29	130	568	25	67	359	1403	
06:00	11		208		4		140		15		348		
06:15	22		158		15		114		37		272		
06:30	31		160		26		96		57		256		
06:45	53	117	125	651	31	76	106	456	84	193	231	1107	
07:00	38		122		35		86		73		208		
07:15	33		119		27		88		60		207		
07:30	38		82		39		76		77		158		
07:45	40	149	91	414	35	136	64	314	75	285	155	728	
08:00	38		84		39		68		77		152		
08:15	34		78		50		72		84		150		
08:30	62		62		62		56		124		118		
08:45	75	209	52	276	77	228	46	242	152	437	98	518	
09:00	74		66		74		52		148		118		
09:15	83		50		74		45		157		95		
09:30	80		63		75		55		155		118		
09:45	102	339	30	209	94	317	38	190	196	656	68	399	
10:00	96		57		113		23		209		80		
10:15	110		47		108		34		218		81		
10:30	130		31		136		29		266		60		
10:45	133	469	39	174	152	509	36	122	285	978	75	296	
11:00	**128**		33		**130**		16		**258**		49		
11:15	**142**		27		**152**		25		**294**		52		
11:30	**165**		23		**146**		21		**311**		44		
11:45	**193**	628	24	107	**183**	611	11	73	**376**	1239	35	180	
Total	2359		7442		2196		6321		4555		13763		
Percent	51.8%		54.1%		48.2%		45.9%						
Day Total		9801				8517				18318			
Peak	11:00		02:30		11:00		00:30		11:00		02:30		
Vol.	628		1060		611		964		1239		1971		
P.H.F.	0.813		0.967		0.835		0.956		0.824		0.951		

New London Avenue (Route 2)

(Source; *Proposed Rhode Island State Police Headquarters and State Forensic Laboratory* Traffic Study Report, dated December 2004, by Edwards and Kelcey, Inc.)

TDC
Transportation Data Corporation
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Office: 508-651-1610 Fax: 508-651-1229

Site Code: 03175
03175Avolume

w London Avenue (Route 2)
ıth of Howard Avenue
y, State: Cranston, RI
ent: Edwards & Kelcey/D. Cabral

Start	NB				SB				Combined				09-Nov-04
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Tue
12:00	21		252		22		271		43		523		
12:15	19		233		21		256		40		489		
12:30	18		230		19		238		37		468		
12:45	20	78	261	976	10	72	259	1024	30	150	520	2000	
01:00	14		276		9		254		23		530		
01:15	7		259		8		204		15		463		
01:30	12		248		7		216		19		464		
01:45	8	41	268	1051	5	29	238	912	13	70	506	1963	
02:00	4		253		3		254		7		507		
02:15	3		260		5		221		8		481		
02:30	3		246		4		270		7		516		
02:45	4	14	251	1010	7	19	271	1016	11	33	522	2026	
03:00	5		253		1		327		6		580		
03:15	6		246		5		264		11		510		
03:30	4		259		5		310		9		569		
03:45	6	21	232	990	4	15	308	1209	10	36	540	2199	
04:00	5		263		1		336		6		599		
04:15	13		267		9		325		22		592		
04:30	8		269		11		330		19		599		
04:45	10	36	260	1059	12	33	366	1357	22	69	626	2416	
05:00	16		278		12		347		28		625		
05:15	17		274		19		324		36		598		
05:30	32		264		20		292		52		556		
05:45	54	119	254	1070	18	69	260	1223	72	188	514	2293	
06:00	56		208		36		279		92		487		
06:15	82		204		58		232		140		436		
06:30	138		220		64		206		202		426		
06:45	166	442	192	824	100	258	207	924	266	700	399	1748	
07:00	164		176		92		194		256		370		
07:15	216		183		106		148		322		331		
07:30	294		174		132		140		426		314		
07:45	328	1002	146	679	142	472	114	596	470	1474	260	1275	
08:00	321		160		148		110		469		270		
08:15	308		142		174		94		482		236		
08:30	295		142		192		104		487		246		
08:45	226	1150	134	578	172	686	79	387	398	1836	213	965	
09:00	184		126		154		78		338		204		
09:15	208		106		185		74		393		180		
09:30	186		100		175		50		361		150		
09:45	154	732	96	428	184	698	46	248	338	1430	142	676	
10:00	188		69		202		45		390		114		
10:15	208		61		187		56		395		117		
10:30	190		38		179		44		369		82		
10:45	212	798	39	207	234	802	40	185	446	1600	79	392	
11:00	223		48		213		54		436		102		
11:15	199		30		220		35		419		65		
11:30	235		26		220		26		455		52		
11:45	258	915	19	123	226	879	26	141	484	1794	45	264	
Total	5348		8995		4032		9222		9380		18217		
ercent	57.0%		49.4%		43.0%		50.6%						
Day Total		14343				13254				27597			
Peak	07:45		04:30		10:45		04:15		07:45		04:30		
Vol.	1252		1081		887		1368		1908		2448		
P.H.F.	0.954		0.972		0.948		0.934		0.979		0.978		

TDC
Transportation Data Corporation
P.O. Box 734 Natick, MA 01760
Office: 508-651-1610 Fax: 508-651-1229

Site Code: 03175
03175Avolume

iew London Avenue (Route 2)
outh of Howard Avenue
ity, State: Cranston, RI
lient: Edwards & Kelcey/D. Cabral

Start Time	NB A.M.		NB P.M.		SB A.M.		SB P.M.		Combined A.M.		Combined P.M.		10-Nov-04 Wed
12:00	22		251		15		272		37		523		
12:15	16		233		20		244		36		477		
12:30	11		250		10		258		21		508		
12:45	12	61	290	1024	8	53	274	1048	20	114	564	2072	
01:00	9		285		10		250		19		535		
01:15	12		252		8		252		20		504		
01:30	4		264		10		214		14		478		
01:45	5	30	242	1043	3	31	243	959	8	61	485	2002	
02:00	5		261		6		244		11		505		
02:15	3		286		3		248		6		534		
02:30	8		262		3		237		11		499		
02:45	3	19	264	1073	7	19	246	975	10	38	510	2048	
03:00	3		240		2		272		5		512		
03:15	2		260		4		268		6		528		
03:30	4		256		3		296		7		552		
03:45	7	16	249	1005	3	12	314	1150	10	28	563	2155	
04:00	6		278		5		334		11		612		
04:15	8		264		4		307		12		571		
04:30	8		252		9		322		17		574		
04:45	11	33	266	1060	8	26	347	1310	19	59	613	2370	
05:00	15		294		9		363		24		657		
05:15	16		255		19		340		35		595		
05:30	34		246		16		312		50		558		
05:45	54	119	264	1059	30	74	286	1301	84	193	550	2360	
06:00	58		224		30		262		88		486		
06:15	67		218		47		212		114		430		
06:30	128		182		77		228		205		410		
06:45	178	431	208	832	84	238	202	904	262	669	410	1736	
07:00	165		186		90		218		255		404		
07:15	200		184		109		170		309		354		
07:30	262		141		161		148		423		289		
07:45	345	972	168	679	152	512	114	650	497	1484	282	1329	
08:00	255		162		138		112		393		274		
08:15	350		174		156		118		506		292		
08:30	278		164		180		122		458		286		
08:45	252	1135	140	640	174	648	97	449	426	1783	237	1089	
09:00	172		150		175		98		347		248		
09:15	166		142		176		72		342		214		
09:30	161		142		174		68		335		210		
09:45	179	678	112	546	188	713	69	307	367	1391	181	853	
10:00	176		110		192		85		368		195		
10:15	179		81		198		56		377		137		
10:30	206		66		220		54		426		120		
10:45	211	772	71	328	200	810	60	255	411	1582	131	583	
11:00	195		52		214		70		409		122		
11:15	219		41		221		43		440		84		
11:30	194		30		208		28		402		58		
11:45	270	878	32	155	239	882	29	170	509	1760	61	325	
Total	5144		9444		4018		9478		9162		18922		
ercent	56.1%		49.9%		43.9%		50.1%						
Day Total		14588				13496				28084			
Peak	07:45		00:45		11:00		04:30		07:45		04:30		
Vol.	1228		1091		882		1372		1854		2439		
P.H.F.	0.877		0.928		0.923		0.945		0.911		0.928		

New London Avenue (Route 2)

(Source; RIDOT August 2019)

State of Rhode Island Department of Transportation

Volume by Hour by Day for 8/1/2019 - 8/31/2019
Criteria: Location ID = 070023

District : **County :** Providence **Community :** Cranston **Collection Type :** RVD
Roadbed : ML **Location 1:** RI-2 New London Ave **Location 2:** Between Route 37 and Howard Ave.
Location ID : 070023 **Lane Direction :** 2-WAY

8/2019																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28	30	31	Total
12-1A	137	173	276	286	142	114	144	139	166	225	240	135	113	129	158	160	247	254	115	115	133	147	249	266	104	114	103	151	147	**4,882**
1-2A	75	120	140	145	95	81	84	65	76	165	169	74	59	62	95	99	147	134	85	76	77	84	158	145	88	66	81	102	151	**2,998**
2-3A	56	48	89	94	47	45	51	43	52	89	67	42	42	35	40	51	88	103	43	37	33	52	75	76	28	34	57	56	93	**1,666**
3-4A	49	53	59	55	47	66	51	60	62	59	55	48	48	48	47	56	69	53	46	46	57	57	59	49	43	48	58	47	62	**1,557**
4-5A	93	89	66	54	79	101	92	91	100	70	43	86	87	95	80	99	77	56	94	94	80	99	79	44	111	87	86	107	73	**2,412**
5-6A	274	274	141	80	264	268	299	270	277	154	97	203	289	304	278	262	125	97	270	307	283	251	137	92	67	284	287	274	144	**6,352**
6-7A	914	843	447	272	816	882	869	878	852	390	286	600	852	872	855	824	417	276	830	851	871	815	404	287	671	870	888	871	403	**19,906**
7-8A	1,600	1,516	737	461	1,560	1,680	1,653	1,672	1,585	746	413	994	1,602	1,529	1,606	1,551	657	407	1,545	1,645	1,554	1,609	683	408	1,635	1,681	1,668	1,650	677	**36,724**
8-9A	2,136	2,063	1,079	654	2,170	2,192	2,216	2,170	2,077	1,049	612	1,309	2,031	2,176	2,053	2,089	1,011	629	2,108	2,097	2,135	1,921	982	603	2,058	2,158	2,178	2,208	1,023	**49,187**
9-10A	1,947	2,072	1,336	922	1,841	1,832	1,925	1,907	2,055	1,522	974	1,416	2,021	1,740	1,897	1,987	1,355	947	1,865	1,846	1,863	1,997	1,356	946	1,865	1,909	1,885	2,099	1,487	**48,814**
10-11A	2,056	2,075	1,706	1,210	2,006	2,027	2,077	2,096	2,234	1,816	1,172	1,552	2,110	2,098	2,106	2,265	1,730	1,233	1,919	1,982	2,041	2,146	1,740	1,304	2,004	2,049	2,057	2,169	1,750	**54,730**
11-12A	2,389	2,496	2,019	1,499	2,142	2,250	2,181	2,268	2,351	2,000	1,470	1,852	2,228	2,420	2,244	2,383	1,956	1,548	2,017	2,246	2,288	2,344	1,984	1,603	2,260	2,260	2,234	2,503	2,051	**61,486**
12-1P	2,421	2,581	1,868	1,750	2,261	2,334	2,530	2,502	2,577	2,231	1,612	1,820	2,538	2,441	2,363	2,589	2,169	1,737	2,387	2,450	2,283	2,577	2,171	1,838	2,453	2,494	2,493	2,678	2,061	**66,209**
1-2P	2,367	2,357	1,934	1,715	2,349	2,423	2,268	2,477	2,540	2,091	1,655	1,913	2,214	2,327	2,402	2,541	2,061	1,739	2,235	2,323	2,402	2,552	1,971	1,834	2,530	2,445	2,436	2,619	2,079	**64,799**
2-3P	2,352	2,650	1,919	1,735	2,261	2,298	2,437	2,599	2,591	2,076	1,874	1,809	2,453	2,481	2,399	2,703	2,130	1,878	2,390	2,363	2,352	2,461	2,177	1,831	2,569	2,477	2,460	2,616	2,381	**66,722**
3-4P	2,501	2,636	1,941	1,734	2,427	2,615	2,552	2,610	2,604	1,945	1,801	1,918	2,542	2,412	2,535	2,696	2,049	1,701	2,338	2,478	2,307	2,666	1,987	1,909	2,752	2,577	2,455	2,875	1,982	**67,545**
4-5P	2,596	2,730	1,818	1,465	2,882	2,836	2,606	2,871	2,718	698	1,604	1,875	2,541	2,599	2,732	2,821	1,816	1,614	2,465	2,613	2,778	2,675	1,921	1,739	2,899	2,765	2,621	2,803	1,877	**67,978**
5-6P	2,584	2,520	1,615	1,459	2,365	2,607	2,635	2,530	2,508	1,752	1,507	1,701	2,458	2,403	2,537	2,431	1,722	1,515	2,399	2,575	2,416	2,457	1,671	1,595	2,472	2,584	2,441	2,363	1,684	**63,506**
6-7P	1,993	1,880	1,550	1,248	748	1,857	1,889	1,944	1,968	1,668	1,322	1,510	1,737	1,904	2,006	1,894	1,673	1,355	1,569	1,851	1,767	1,955	1,583	1,464	1,837	1,954	1,801	1,960	1,628	**49,515**
7-8P	1,549	1,663	1,297	1,102	1,391	1,469	1,541	1,632	1,627	1,428	1,085	1,354	1,276	1,581	1,520	1,733	1,412	1,186	1,219	1,527	1,583	1,561	1,437	1,059	1,482	1,555	1,362	1,628	1,457	**41,716**
8-9P	1,383	1,418	1,138	912	1,226	1,251	1,223	1,294	1,430	1,230	974	1,153	1,087	1,279	1,304	1,268	1,132	1,036	1,082	1,232	1,158	1,267	1,085	848	1,167	1,139	982	1,372	1,104	**34,174**
9-10P	916	1,050	925	591	786	818	822	916	1,078	875	586	700	667	868	815	947	782	561	726	356	839	910	896	533	736	792	727	969	844	**23,031**
10-11P	573	760	705	430	486	567	549	523	668	633	479	443	488	536	517	690	602	423	490	470	498	700	694	417	449	465	499	686	702	**16,142**
11-12P	377	464	507	299	290	324	337	327	459	487	314	291	319	332	230	456	489	288	302	338	358	432	476	292	286	306	293	455	479	**10,607**
Total:	**33338**	**34531**	**25312**	**20172**	**30681**	**32937**	**33031**	**33884**	**34655**	**25399**	**20411**	**24798**	**31802**	**32671**	**32819**	**34595**	**25916**	**20770**	**30539**	**31918**	**32156**	**33735**	**25975**	**21182**	**32566**	**33113**	**32152**	**35261**	**26339**	**862,658**

State of Rhode Island Department of Transportation

Volume by Hour by Day for 8/1/2019 - 8/31/2019
Criteria: Location ID = 070023

District : **County :** Providence **Community :** Cranston **Collection Type :** RV
Roadbed : ML **Location :** RI-2 New London Ave **Route :**
Location ID : 070023_NB **Lane Direction :** NB

8/2019																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28	30	31	Total
12-1A	67	76	150	154	71	56	80	87	89	127	119	69	57	69	97	84	127	128	57	63	74	83	139	162	58	58	55	72	87	**2,615**
1-2A	40	67	75	85	45	46	52	38	48	97	92	43	34	32	58	53	90	96	45	35	39	34	88	86	59	28	47	53	89	**1,694**
2-3A	31	30	41	45	22	25	28	18	26	40	33	27	19	17	23	24	38	43	26	19	17	31	34	36	16	20	27	31	45	**832**
3-4A	33	34	33	32	27	40	27	42	42	34	24	25	32	26	33	41	36	25	24	30	35	30	27	24	18	30	37	26	25	**892**
4-5A	61	57	43	28	51	72	63	65	59	47	25	55	58	68	50	63	51	37	65	68	59	67	54	23	76	59	65	70	53	**1,612**
5-6A	165	180	90	40	166	166	190	175	175	98	54	126	187	184	164	156	74	62	159	193	166	152	85	51	35	172	173	165	69	**3,872**
6-7A	492	442	210	110	430	459	458	463	459	189	130	341	423	450	469	439	200	116	445	430	468	432	201	127	327	453	462	484	190	**10,299**
7-8A	881	872	411	252	885	953	920	932	921	409	229	588	917	883	879	873	379	233	845	923	855	880	379	227	906	934	923	907	385	**20,581**
8-9A	999	950	556	384	1,035	1,029	1,080	1,066	961	581	355	752	952	1,037	954	1,013	571	366	987	967	978	924	535	345	964	1,049	1,030	1,037	527	**23,984**
9-10A	1,065	1,034	677	497	933	997	1,010	1,017	1,107	750	539	734	1,052	937	1,049	1,029	674	518	981	975	1,005	1,057	697	520	989	992	989	1,115	776	**25,715**
10-11A	1,070	1,034	868	601	1,030	1,020	1,080	1,090	1,151	931	588	787	1,062	1,089	1,122	1,108	864	650	964	996	1,053	1,075	852	652	1,077	1,048	1,066	1,102	856	**27,886**
11-12A	1,240	1,343	1,042	752	1,094	1,167	1,129	1,226	1,242	1,014	742	959	1,140	1,252	1,189	1,260	993	792	1,012	1,123	1,144	1,168	986	784	1,168	1,158	1,154	1,289	1,031	**31,593**
12-1P	1,242	1,296	923	836	1,155	1,230	1,347	1,330	1,318	1,133	830	915	1,325	1,248	1,178	1,348	1,098	840	1,232	1,257	1,159	1,296	1,084	912	1,253	1,256	1,253	1,331	1,022	**33,647**
1-2P	1,226	1,174	966	826	1,179	1,257	1,116	1,216	1,290	1,046	803	967	1,082	1,171	1,167	1,223	1,052	907	1,105	1,157	1,227	1,267	1,010	948	1,222	1,259	1,241	1,314	1,058	**32,476**
2-3P	1,183	1,312	994	892	1,122	1,210	1,227	1,290	1,327	1,012	968	947	1,273	1,290	1,252	1,386	1,112	957	1,143	1,242	1,166	1,262	1,136	926	1,321	1,274	1,297	1,353	1,123	**33,997**
3-4P	1,331	1,444	1,037	950	1,335	1,394	1,394	1,407	1,424	994	951	990	1,349	1,317	1,377	1,492	1,084	936	1,273	1,365	1,264	1,454	1,036	1,034	1,461	1,423	1,364	1,520	976	**36,376**
4-5P	1,385	1,444	987	781	1,456	1,516	1,385	1,503	1,438	354	851	956	1,329	1,381	1,498	1,501	989	875	1,311	1,397	1,452	1,400	1,015	963	1,459	1,461	1,414	1,447	973	**35,921**
5-6P	1,200	1,269	891	849	1,018	1,265	1,297	1,260	1,129	930	830	864	1,231	1,195	1,337	1,245	951	860	1,235	1,293	1,143	1,208	952	872	1,143	1,274	1,203	1,164	938	**32,046**
6-7P	966	937	863	690	383	928	972	969	982	878	744	790	911	926	963	994	897	773	818	895	849	1,011	811	805	923	998	895	981	845	**25,397**
7-8P	808	884	680	657	763	782	796	865	826	785	618	737	671	836	804	900	816	654	660	833	821	810	800	614	786	828	695	857	815	**22,401**
8-9P	797	829	668	533	694	693	611	721	841	723	577	660	607	701	744	749	665	548	621	697	678	714	616	487	671	632	551	733	632	**19,393**
9-10P	521	598	529	342	440	441	464	524	635	516	317	414	368	479	485	531	440	306	420	212	469	503	539	294	407	448	425	563	497	**13,127**
10-11P	323	439	388	230	268	316	302	276	364	346	247	234	258	296	277	388	324	231	288	255	274	377	378	249	272	258	287	392	400	**8,937**
11-12P	215	273	270	173	164	194	196	189	246	283	173	175	193	203	135	262	273	182	189	205	198	250	264	164	177	173	172	270	284	**6,145**
Total:	**17341**	**18018**	**13392**	**10739**	**15766**	**17256**	**17224**	**17769**	**18100**	**13317**	**10839**	**13155**	**16530**	**17087**	**17304**	**18162**	**13798**	**11135**	**15905**	**16630**	**16593**	**17485**	**13718**	**11305**	**16788**	**17285**	**16825**	**18276**	**13696**	**451,438**

State of Rhode Island Department of Transportation

Volume by Hour by Day for 8/1/2019 - 8/31/2019
Criteria: Location ID = 070023

District : **County :** Providence **Community :** Cranston **Collection Type :** RV
Roadbed : ML **Location :** RI-2 New London Ave **Route :**
Location ID : 070023_SB **Lane Direction :** SB

8/2019																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28	30	31	Total
12-1A	70	97	126	132	71	58	64	52	77	98	121	66	56	60	61	76	120	126	58	52	59	64	110	104	46	56	48	79	60	**2,267**
1-2A	35	53	65	60	50	35	32	27	28	68	77	31	25	30	37	46	57	38	40	41	38	50	70	59	29	38	34	49	62	**1,304**
2-3A	25	18	48	49	25	20	23	25	26	49	34	15	23	18	17	27	50	60	17	18	16	21	41	40	12	14	30	25	48	**834**
3-4A	16	19	26	23	20	26	24	18	20	25	31	23	16	22	14	15	33	28	22	16	22	27	32	25	25	18	21	21	37	**665**
4-5A	32	32	23	26	28	29	29	26	41	23	18	31	29	27	30	36	26	19	29	26	21	32	25	21	35	28	21	37	20	**800**
5-6A	109	94	51	40	98	102	109	95	102	56	43	77	102	120	114	106	51	35	111	114	117	99	52	41	32	112	114	109	75	**2,480**
6-7A	422	401	237	162	386	423	411	415	393	201	156	259	429	422	386	385	217	160	385	421	403	383	203	160	344	417	426	387	213	**9,607**
7-8A	719	644	326	209	675	727	733	740	664	337	184	406	685	646	727	678	278	174	700	722	699	729	304	181	729	747	745	743	292	**16,143**
8-9A	1,137	1,113	523	270	1,135	1,163	1,136	1,104	1,116	468	257	557	1,079	1,139	1,099	1,076	440	263	1,121	1,130	1,157	997	447	258	1,094	1,109	1,148	1,171	496	**25,203**
9-10A	882	1,038	659	425	908	835	915	890	948	772	435	682	969	803	848	958	681	429	884	871	858	940	659	426	876	917	896	984	711	**23,099**
10-11A	986	1,041	838	609	976	1,007	997	1,006	1,083	885	584	765	1,048	1,009	984	1,157	866	583	955	986	988	1,071	888	652	927	1,001	991	1,067	894	**26,844**
11-12A	1,149	1,153	977	747	1,048	1,083	1,052	1,042	1,109	986	728	893	1,088	1,168	1,055	1,123	963	756	1,005	1,123	1,144	1,176	998	819	1,092	1,102	1,080	1,214	1,020	**29,893**
12-1P	1,179	1,285	945	914	1,106	1,104	1,183	1,172	1,259	1,098	782	905	1,213	1,193	1,185	1,241	1,071	897	1,155	1,193	1,124	1,281	1,087	926	1,200	1,238	1,240	1,347	1,039	**32,562**
1-2P	1,141	1,183	968	889	1,170	1,166	1,152	1,261	1,250	1,045	852	946	1,132	1,156	1,235	1,318	1,009	832	1,130	1,166	1,175	1,285	961	886	1,308	1,186	1,195	1,305	1,021	**32,323**
2-3P	1,169	1,338	925	843	1,139	1,088	1,210	1,309	1,264	1,064	906	862	1,180	1,191	1,147	1,317	1,018	921	1,247	1,121	1,186	1,199	1,041	905	1,248	1,203	1,163	1,263	1,258	**32,725**
3-4P	1,170	1,192	904	784	1,092	1,221	1,158	1,203	1,180	951	850	928	1,193	1,095	1,158	1,204	965	765	1,065	1,113	1,043	1,212	951	875	1,291	1,154	1,091	1,355	1,006	**31,169**
4-5P	1,211	1,286	831	684	1,426	1,320	1,221	1,368	1,280	344	753	919	1,212	1,218	1,234	1,320	827	739	1,154	1,216	1,326	1,275	906	776	1,440	1,304	1,207	1,356	904	**32,057**
5-6P	1,384	1,251	724	610	1,347	1,342	1,338	1,270	1,379	822	677	837	1,227	1,208	1,200	1,186	771	655	1,164	1,282	1,273	1,249	719	723	1,329	1,310	1,238	1,199	746	**31,460**
6-7P	1,027	943	687	558	365	929	917	975	986	790	578	720	826	978	1,043	900	776	582	751	956	918	944	772	659	914	956	906	979	783	**24,118**
7-8P	741	779	617	445	628	687	745	767	801	643	467	617	605	745	716	833	596	532	559	694	762	751	637	445	696	727	667	771	642	**19,315**
8-9P	586	589	470	379	532	558	612	573	589	507	397	493	480	578	560	519	467	488	461	535	480	553	469	361	496	507	431	639	472	**14,781**
9-10P	395	452	396	249	346	377	358	392	443	359	269	286	299	389	330	416	342	255	306	144	370	407	357	239	329	344	302	406	347	**9,904**
10-11P	250	321	317	200	218	251	247	247	304	287	232	209	230	240	240	302	278	192	202	215	224	323	316	168	177	207	212	294	302	**7,205**
11-12P	162	191	237	126	126	130	141	138	213	204	141	116	126	129	95	194	216	106	113	133	160	182	212	128	109	133	121	185	195	**4,462**
Total:	**15997**	**16513**	**11920**	**9433**	**14915**	**15681**	**15807**	**16115**	**16555**	**12082**	**9572**	**11643**	**15272**	**15584**	**15515**	**16433**	**12118**	**9635**	**14634**	**15288**	**15563**	**16250**	**12257**	**9877**	**15778**	**15828**	**15327**	**16985**	**12643**	**411,220**

Howard Avenue

(Source; *Proposed Centre at Garden Hills* Traffic Study Report, dated August 2007, by Vanasse Hangen Brustlin, Inc.)

Transportation Data Corporation
P.O. Box 334 Wakefield, MA 01880
Tel. (781) 587-0086 Fax (781) 587-0189
Email: mperone1@comcast.net

Howard Avenue 200' east of
New London Avenue (Route 2)
City/State: Cranston, RI
Client: VHB/T. Welch

Start Time	WB A.M.		WB P.M.		EB A.M.		EB P.M.		Combined A.M.		Combined P.M.		01-Mar-07 Thu
12:00	3		144		1		78		4		222		
12:15	1		86		0		78		1		164		
12:30	1		85		0		**96**		1		181		
12:45	1	6	86	401	1	2	**128**	380	2	8	214	781	
01:00	1		96		0		**113**		1		209		
01:15	1		68		0		**84**		1		152		
01:30	0		68		0		86		0		154		
01:45	2	4	64	296	1	1	81	364	3	5	145	660	
02:00	2		81		1		78		3		159		
02:15	0		84		1		70		1		154		
02:30	1		108		1		94		2		202		
02:45	0	3	144	417	1	4	100	342	1	7	244	759	
03:00	1		148		0		64		1		212		
03:15	2		**142**		1		98		3		**240**		
03:30	1		**137**		0		54		1		**191**		
03:45	6	10	**110**	537	4	5	48	264	10	15	**158**	801	
04:00	0		**216**		1		166		1		**382**		
04:15	0		109		1		32		1		141		
04:30	0		132		2		28		2		160		
04:45	3	3	67	524	2	6	26	252	5	9	93	776	
05:00	1		79		6		20		7		99		
05:15	3		57		3		28		6		85		
05:30	1		49		11		24		12		73		
05:45	5	10	48	233	12	32	24	96	17	42	72	329	
06:00	3		54		18		32		21		86		
06:15	7		42		30		32		37		74		
06:30	9		56		96		20		105		76		
06:45	30	49	23	175	136	280	23	107	166	329	46	282	
07:00	42		32		72		21		114		53		
07:15	28		13		85		16		113		29		
07:30	18		18		112		13		130		31		
07:45	21	109	16	79	**158**	427	8	58	179	536	24	137	
08:00	27		24		**168**		10		**195**		34		
08:15	44		24		**263**		11		**307**		35		
08:30	34		36		**214**		13		**248**		49		
08:45	73	178	26	110	138	783	8	42	**211**	961	34	152	
09:00	66		12		79		8		145		20		
09:15	82		8		76		6		158		14		
09:30	79		7		55		2		134		9		
09:45	74	301	7	34	72	282	5	21	146	583	12	55	
10:00	72		7		58		8		130		15		
10:15	92		6		59		4		151		10		
10:30	67		12		52		21		119		33		
10:45	64	295	34	59	55	224	17	50	119	519	51	109	
11:00	**74**		43		51		20		125		63		
11:15	**73**		14		56		5		129		19		
11:30	**78**		12		54		2		132		14		
11:45	**93**	318	3	72	70	231	1	28	163	549	4	100	
Total	1286		2937		2277		2004		3563		4941		
Percent	36.1%		59.4%		63.9%		40.6%						
Day Total		4223				4281				8504			
Peak	11:00		03:15		07:45		00:30		08:00		03:15		
Vol.	318		605		803		421		961		971		
P.H.F.	0.855		0.700		0.763		0.634		0.783		0.635		

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Howard Avenue 200' east of
New London Avenue (Route 2)
City/State: Cranston, RI
Client: VHB/T. Welch

Start Time	WB A.M.		WB P.M.		EB A.M.		EB P.M.		Combined A.M.		Combined P.M.		02-Mar-07 Fri
12:00	6		115		4		90		10		205		
12:15	3		86		2		70		5		156		
12:30	1		64		0		**94**		1		158		
12:45	1	11	69	334	1	7	**106**	360	2	18	175	694	
01:00	0		79		0		**97**		0		176		
01:15	0		62		0		**80**		0		142		
01:30	1		76		0		88		1		164		
01:45	2	3	75	292	1	1	82	347	3	4	157	639	
02:00	4		92		1		72		5		164		
02:15	0		74		1		66		1		140		
02:30	5		90		3		88		8		178		
02:45	1	10	150	406	1	6	61	287	2	16	211	693	
03:00	1		142		1		63		2		205		
03:15	1		**101**		1		60		2		**161**		
03:30	2		**128**		1		37		3		**165**		
03:45	1	5	**119**	490	2	5	27	187	3	10	**146**	677	
04:00	2		**212**		2		179		4		**391**		
04:15	1		96		1		24		2		120		
04:30	0		132		2		52		2		184		
04:45	1	4	56	496	1	6	20	275	2	10	76	771	
05:00	4		66		4		27		8		93		
05:15	3		66		5		40		8		106		
05:30	6		41		12		18		18		59		
05:45	2	15	32	205	11	32	26	111	13	47	58	316	
06:00	5		38		16		23		21		61		
06:15	5		35		25		32		30		67		
06:30	16		44		75		16		91		60		
06:45	19	45	17	134	139	255	22	93	158	300	39	227	
07:00	42		17		95		25		137		42		
07:15	26		15		66		12		92		27		
07:30	20		16		89		14		109		30		
07:45	28	116	12	60	127	377	8	59	155	493	20	119	
08:00	27		19		**170**		8		**197**		27		
08:15	33		15		**252**		8		**285**		23		
08:30	33		28		**203**		12		**236**		40		
08:45	50	143	20	82	**145**	770	10	38	**195**	913	30	120	
09:00	38		9		100		6		138		15		
09:15	46		12		67		10		113		22		
09:30	46		2		58		2		104		4		
09:45	68	198	4	27	67	292	6	24	135	490	10	51	
10:00	84		13		48		5		132		18		
10:15	76		7		58		7		134		14		
10:30	56		6		70		19		126		25		
10:45	64	280	40	66	54	230	28	59	118	510	68	125	
11:00	**76**		41		57		16		133		57		
11:15	**62**		16		55		10		117		26		
11:30	**65**		13		46		2		111		15		
11:45	**90**	293	1	71	76	234	5	33	166	527	6	104	
Total	1123		2663		2215		1873		3338		4536		
Percent	33.6%		58.7%		66.4%		41.3%						
Day Total		3786				4088				7874			
Peak	11:00		03:15		08:00		00:30		08:00		03:15		
Vol.	293		560		770		377		913		863		
P.H.F.	0.814		0.660		0.764		0.527		0.801		0.552		

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Howard Avenue 200' east of
New London Avenue (Route 2)
City/State: Cranston, RI
Client: VHB/T. Welch

Start Time	WB A.M.		WB P.M.		EB A.M.		EB P.M.		Combined A.M.		Combined P.M.		03-Mar-07 Sat
12:00	2		30		0		20		2		50		
12:15	1		25		3		35		4		60		
12:30	4		18		1		33		5		51		
12:45	0	7	22	95	1	5	40	128	1	12	62	223	
01:00	2		27		3		38		5		65		
01:15	0		18		0		27		0		45		
01:30	1		20		3		24		4		44		
01:45	0	3	31	96	1	7	30	119	1	10	61	215	
02:00	1		34		2		23		3		57		
02:15	2		31		1		36		3		67		
02:30	1		**50**		2		**53**		3		**103**		
02:45	2	6	**66**	181	1	6	**40**	152	3	12	**106**	333	
03:00	1		**58**		0		**29**		1		**87**		
03:15	1		**53**		1		**47**		2		**100**		
03:30	3		18		2		28		5		46		
03:45	1	6	25	154	1	4	19	123	2	10	44	277	
04:00	0		15		0		14		0		29		
04:15	0		10		1		14		1		24		
04:30	2		15		3		20		5		35		
04:45	1	3	19	59	1	5	18	66	2	8	37	125	
05:00	1		30		3		30		4		60		
05:15	1		17		1		17		2		34		
05:30	3		18		4		11		7		29		
05:45	6	11	19	84	10	18	24	82	16	29	43	166	
06:00	3		37		10		20		13		57		
06:15	5		22		9		26		14		48		
06:30	9		32		**45**		24		**54**		56		
06:45	17	34	17	108	**76**	140	23	93	**93**	174	40	201	
07:00	26		15		**22**		14		**48**		29		
07:15	32		10		**18**		11		**50**		21		
07:30	11		13		16		11		27		24		
07:45	12	81	12	50	14	70	2	38	26	151	14	88	
08:00	3		18		17		16		20		34		
08:15	8		16		9		7		17		23		
08:30	14		21		10		7		24		28		
08:45	8	33	15	70	11	47	6	36	19	80	21	106	
09:00	14		7		13		10		27		17		
09:15	13		7		12		1		25		8		
09:30	16		3		26		5		42		8		
09:45	16	59	7	24	12	63	8	24	28	122	15	48	
10:00	12		7		17		4		29		11		
10:15	**41**		4		20		8		61		12		
10:30	**17**		9		24		14		41		23		
10:45	**21**	91	26	46	32	93	22	48	53	184	48	94	
11:00	**40**		38		38		22		78		60		
11:15	20		19		23		8		43		27		
11:30	22		5		22		0		44		5		
11:45	16	98	3	65	20	103	4	34	36	201	7	99	
Total	432		1032		561		943		993		1975		
Percent	43.5%		52.3%		56.5%		47.7%						
Day Total		1464				1504				2968			
Peak	10:15		02:30		06:30		02:30		06:30		02:30		
Vol.	119		227		161		169		245		396		
P.H.F.	0.726		0.860		0.530		0.797		0.659		0.934		

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Howard Avenue 200' east of
New London Avenue (Route 2)
City/State: Cranston, RI
Client: VHB/T. Welch

Start Time	WB A.M.		WB P.M.		EB A.M.		EB P.M.		Combined A.M.		Combined P.M.	04-Mar-07 Sun
12:00	2		18		4		32		6		50	
12:15	2		14		0		21		2		35	
12:30	2		16		0		22		2		38	
12:45	1	7	16	64	0	4	37	112	1	11	53	176
01:00	2		22		3		32		5		54	
01:15	4		14		2		24		6		38	
01:30	1		6		0		18		1		24	
01:45	0	7	20	62	2	7	29	103	2	14	49	165
02:00	0		18		1		14		1		32	
02:15	1		**32**		3		26		4		58	
02:30	0		**38**		3		**44**		3		**82**	
02:45	1	2	**52**	140	3	10	**36**	120	4	12	**88**	260
03:00	1		**77**		4		**22**		5		**99**	
03:15	1		30		4		**32**		5		**62**	
03:30	2		22		1		20		3		42	
03:45	1	5	12	141	2	11	20	94	3	16	32	235
04:00	1		12		0		11		1		23	
04:15	0		10		0		18		0		28	
04:30	1		9		1		18		2		27	
04:45	1	3	18	49	1	2	22	69	2	5	40	118
05:00	0		9		2		13		2		22	
05:15	1		13		1		10		2		23	
05:30	0		12		8		12		8		24	
05:45	3	4	33	67	8	19	22	57	11	23	55	124
06:00	2		18		4		16		6		34	
06:15	6		33		**17**		12		**23**		45	
06:30	4		34		**40**		22		**44**		56	
06:45	**19**	31	16	101	**64**	125	23	73	**83**	156	39	174
07:00	**36**		12		**18**		18		**54**		30	
07:15	**12**		12		7		14		19		26	
07:30	**8**		11		4		12		12		23	
07:45	10	66	10	45	16	45	7	51	26	111	17	96
08:00	8		22		8		8		16		30	
08:15	6		11		8		6		14		17	
08:30	8		35		13		11		21		46	
08:45	5	27	12	80	8	37	5	30	13	64	17	110
09:00	4		8		7		5		11		13	
09:15	7		4		8		7		15		11	
09:30	19		7		11		5		30		12	
09:45	3	33	7	26	10	36	2	19	13	69	9	45
10:00	10		4		8		8		18		12	
10:15	29		7		8		7		37		14	
10:30	12		10		18		20		30		30	
10:45	15	66	39	60	14	48	14	49	29	114	53	109
11:00	14		26		20		16		34		42	
11:15	24		21		12		9		36		30	
11:30	16		5		14		0		30		5	
11:45	18	72	1	53	11	57	2	27	29	129	3	80
Total	323		888		401		804		724		1692	
Percent	44.6%		52.5%		55.4%		47.5%					
Day Total		1211				1205				2416		
Peak	06:45		02:15		06:15		02:30		06:15		02:30	
Vol.	75		199		139		134		204		331	
P.H.F.	0.521		0.646		0.543		0.761		0.614		0.836	

Howard Avenue)

(Source; *Proposed Rhode Island State Police Headquarters and State Forensic Laboratory* Traffic Study Report, dated December 2004, by Edwards and Kelcey, Inc.)

TDC
Transportation Data Corporation
P.O. Box 734 Natick, MA 01760
Office: 508-651-1610 Fax: 508-651-1229

Site Code: 03175
03175Bvolume

ɔward Avenue east of
ɛw London Avenue (Route 2)
ty, State: Cranston, RI
ient: Edwards & Kelcey/D. Cabral

Start	EB				WB				Combined				09-Nov-04
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Tue
12:00	1		64		6		136		7		200		
12:15	1		92		0		80		1		172		
12:30	2		99		2		80		4		179		
12:45	0	4	129	384	2	10	79	375	2	14	208	759	
01:00	1		104		4		98		5		202		
01:15	1		106		2		73		3		179		
01:30	0		70		2		46		2		116		
01:45	0	2	61	341	0	8	64	281	0	10	125	622	
02:00	4		55		2		61		6		116		
02:15	0		54		0		66		0		120		
02:30	0		74		0		105		0		179		
02:45	0	4	90	273	1	3	170	402	1	7	260	675	
03:00	0		52		0		146		0		198		
03:15	1		30		0		114		1		144		
03:30	0		28		2		124		2		152		
03:45	5	6	40	150	2	4	141	525	7	10	181	675	
04:00	0		28		2		232		2		260		
04:15	4		35		0		142		4		177		
04:30	1		39		0		120		1		159		
04:45	1	6	31	133	1	3	91	585	2	9	122	718	
05:00	3		25		0		114		3		139		
05:15	4		34		3		72		7		106		
05:30	8		23		0		66		8		89		
05:45	16	31	16	98	4	7	44	296	20	38	60	394	
06:00	25		25		4		46		29		71		
06:15	44		22		2		47		46		69		
06:30	92		28		12		35		104		63		
06:45	149	310	29	104	45	63	43	171	194	373	72	275	
07:00	20		22		130		40		150		62		
07:15	76		17		74		14		150		31		
07:30	110		13		58		32		168		45		
07:45	126	332	14	66	46	308	24	110	172	640	38	176	
08:00	149		12		48		21		197		33		
08:15	200		14		53		22		253		36		
08:30	166		10		59		24		225		34		
08:45	98	613	11	47	54	214	20	87	152	827	31	134	
09:00	77		11		50		7		127		18		
09:15	67		8		42		6		109		14		
09:30	56		4		45		2		101		6		
09:45	46	246	6	29	34	171	2	17	80	417	8	46	
10:00	33		4		42		12		75		16		
10:15	35		4		56		5		91		9		
10:30	34		22		55		8		89		30		
10:45	56	158	15	45	63	216	36	61	119	374	51	106	
11:00	49		21		58		26		107		47		
11:15	31		7		78		11		109		18		
11:30	46		6		86		5		132		11		
11:45	60	186	2	36	110	332	3	45	170	518	5	81	
Total	1898		1706		1339		2955		3237		4661		
ercent	58.6%		36.6%		41.4%		63.4%						
Day Total		3604				4294				7898			
Peak	07:45		00:30		11:00		03:30		07:45		02:30		
Vol.	641		438		332		639		847		781		
P.H.F.	0.801		0.849		0.638		0.689		0.837		0.751		

TDC
Transportation Data Corporation
P.O. Box 734 Natick, MA 01760
Office: 508-651-1610 Fax: 508-651-1229

Site Code: 03175
03175Bvolume

)ward Avenue east of
:w London Avenue (Route 2)
ty, State: Cranston, RI
ient: Edwards & Kelcey/D. Cabral

Start	EB				WB				Combined				10-Nov-04
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Wed
12:00	1		64		6		136		7		200		
12:15	7		65		1		80		8		145		
12:30	2		99		2		82		4		181		
12:45	0	10	133	361	0	9	68	366	0	19	201	727	
01:00	1		103		2		86		3		189		
01:15	0		80		0		72		0		152		
01:30	0		72		0		72		0		144		
01:45	0	1	60	315	1	3	72	302	1	4	132	617	
02:00	1		54		1		72		2		126		
02:15	3		57		0		68		3		125		
02:30	1		74		0		82		1		156		
02:45	0	5	63	248	0	1	152	374	0	6	215	622	
03:00	1		42		0		150		1		192		
03:15	0		24		0		116		0		140		
03:30	0		32		0		124		0		156		
03:45	3	4	35	133	0	0	126	516	3	4	161	649	
04:00	1		34		0		262		1		296		
04:15	0		32		0		119		0		151		
04:30	4		35		0		105		4		140		
04:45	6	11	27	128	0	0	72	558	6	11	99	686	
05:00	0		39		0		118		0		157		
05:15	7		39		0		64		7		103		
05:30	13		49		0		66		13		115		
05:45	17	37	19	146	0	0	48	296	17	37	67	442	
06:00	17		20		0		40		17		60		
06:15	27		20		0		34		27		54		
06:30	80		17		2		36		82		53		
06:45	148	272	25	82	4	6	38	148	152	278	63	230	
07:00	69		24		42		41		111		65		
07:15	98		16		35		30		133		46		
07:30	98		12		38		16		136		28		
07:45	132	397	15	67	38	153	22	109	170	550	37	176	
08:00	136		13		36		18		172		31		
08:15	201		10		56		14		257		24		
08:30	166		17		57		21		223		38		
08:45	100	603	9	49	42	191	21	74	142	794	30	123	
09:00	61		8		41		14		102		22		
09:15	47		6		36		11		83		17		
09:30	57		7		34		7		91		14		
09:45	50	215	4	25	39	150	6	38	89	365	10	63	
10:00	37		4		48		10		85		14		
10:15	39		7		64		8		103		15		
10:30	34		20		44		16		78		36		
10:45	42	152	22	53	58	214	60	94	100	366	82	147	
11:00	34		15		48		36		82		51		
11:15	37		11		62		24		99		35		
11:30	38		1		62		7		100		8		
11:45	58	167	3	30	92	264	2	69	150	431	5	99	
Total	1874		1637		991		2944		2865		4581		
'ercent	65.4%		35.7%		34.6%		64.3%						
Day Total		3511				3935				7446			
Peak	07:45		00:30		11:00		03:30		07:45		03:30		
Vol.	635		415		264		631		822		764		
P.H.F.	0.790		0.780		0.717		0.602		0.800		0.645		

A

Intersection Turning Movement Count

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

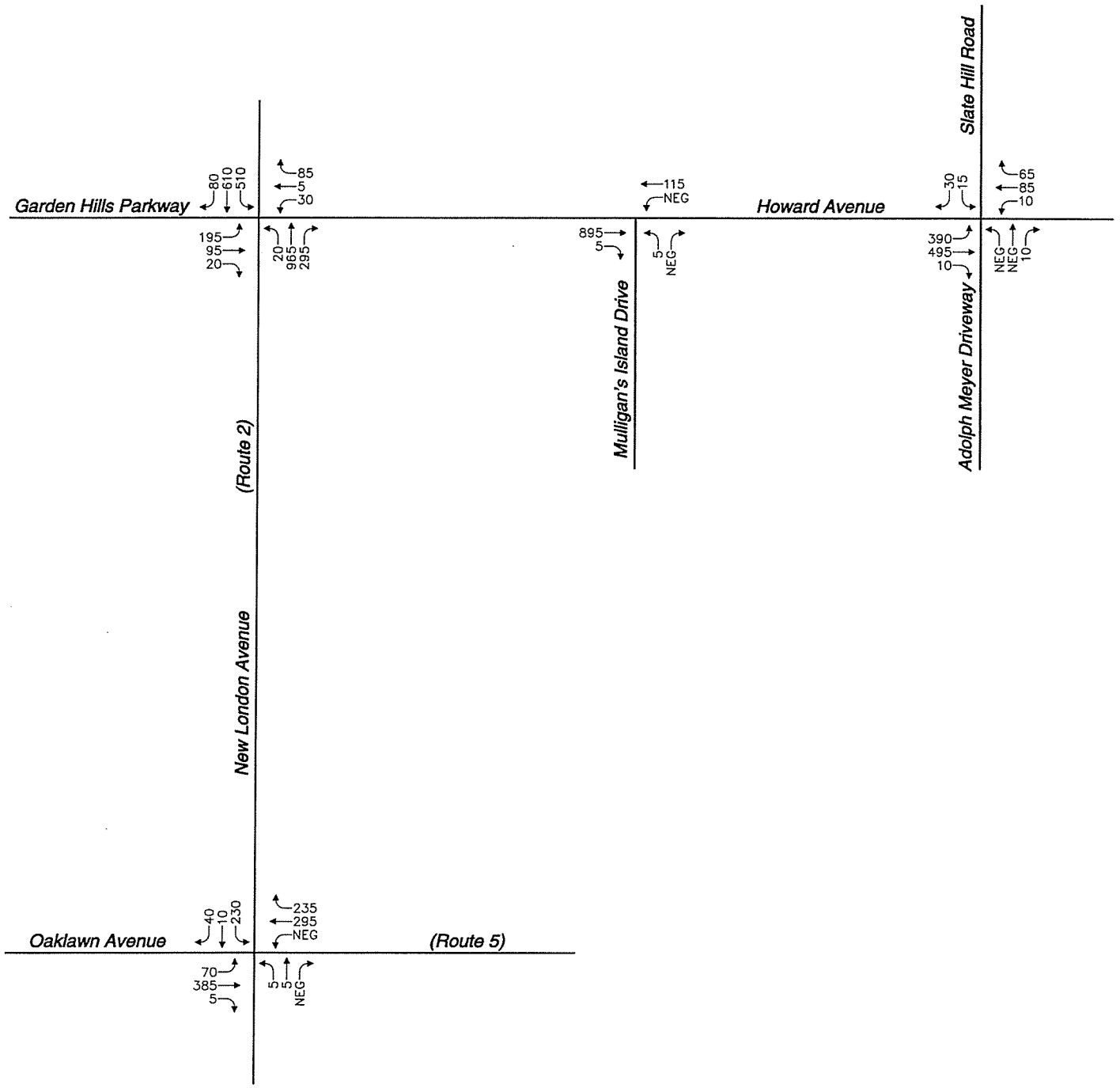
Howard Avenue at Slate Hill Drive

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

(Source; *Proposed Centre at Garden Hills* Traffic Study Report, dated August 2007, by Vanasse Hangen Brustlin, Inc.)

J:\71973.00\graphics\FIGURES\Traffic\71973-tv.dwg

NEG = Negligible



Not to Scale

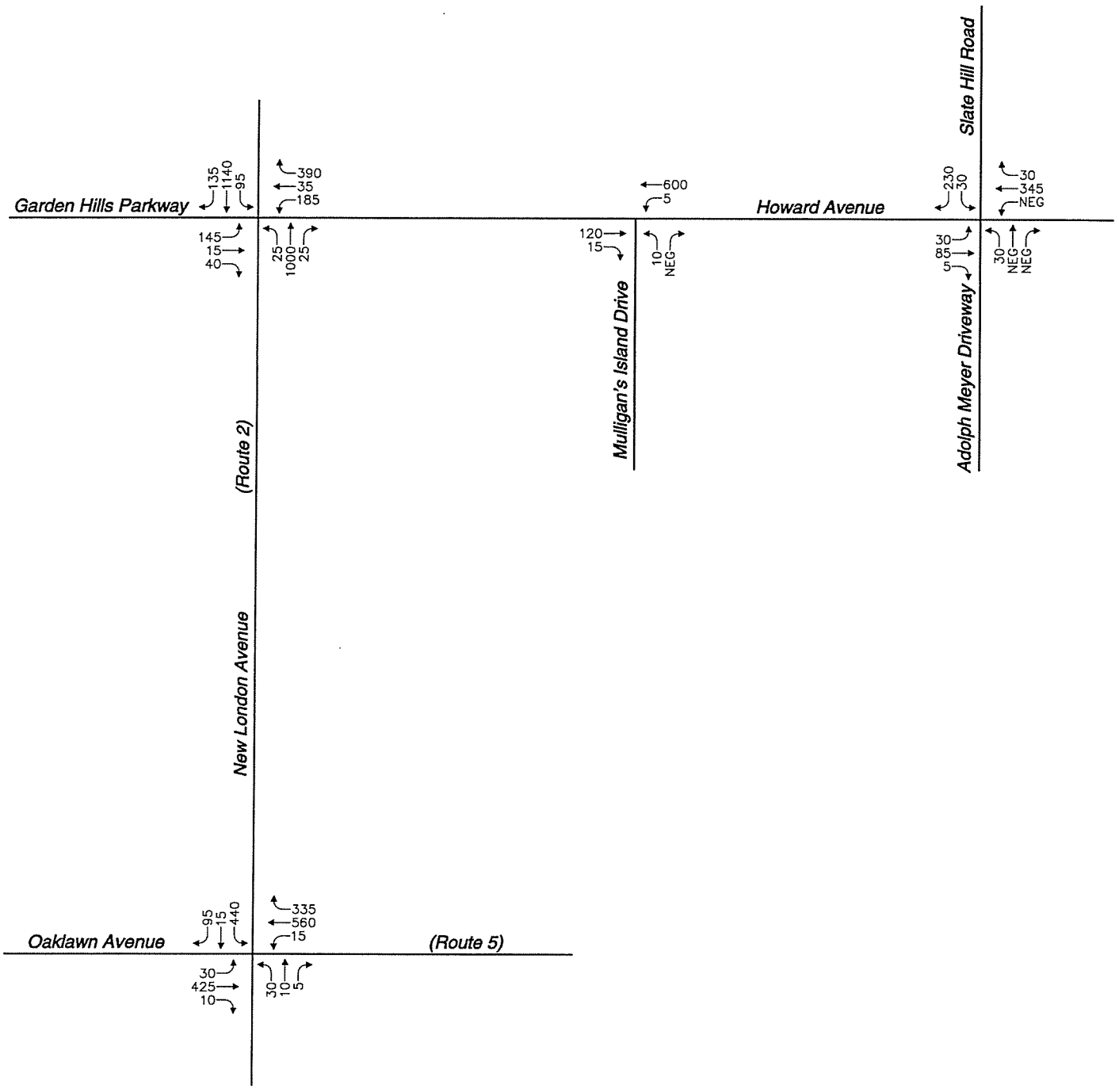
Vanasse Hangen Brustlin, Inc.

2007 Existing Weekday Morning Peak Hour Traffic Volumes
Cranston, Rhode Island

Figure 2

J:\71973.00\graphics\FIGURES\Traffic\71973-tv.dwg

NEG = Negligible



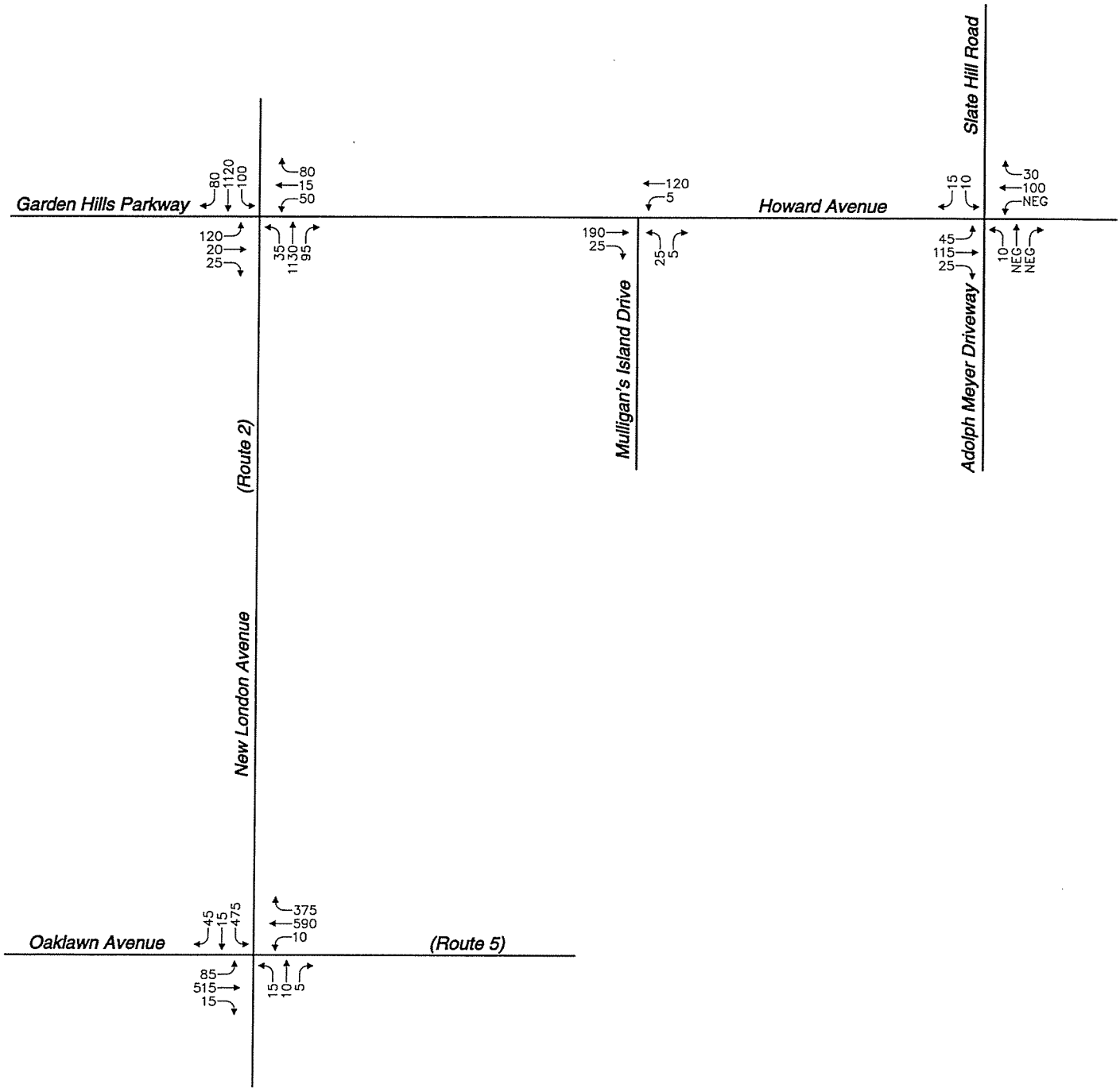
Not to Scale

Vanasse Hangen Brustlin, Inc.

2007 Existing Weekday Evening Peak Hour Traffic Volumes
Cranston, Rhode Island

Figure 3

NEG = Negligible



Not to Scale

Vanasse Hangen Brustlin, Inc.

2007 Existing Saturday Midday Peak Hour Traffic Volumes
Cranston, Rhode Island

Figure 4

Transportation Data Corporation
P.O. Box 334 Wakefield, MA 01880
Tel. (781) 587-0086 Fax (781) 587-0189

N/S: New London Avenue (Route 2)
E/W: Howard Avenue/Garden Hills Parkway
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689B
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

Groups Printed- Cars - Trucks

	New London (Route 2) From North			Howard Avenue From East			New London (Route 2) From South			Garden Hills Parkway From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	35	84	32	26	1	14	24	133	5	3	10	40	407
07:15 AM	20	104	40	16	3	7	24	169	10	3	12	50	458
07:30 AM	13	98	55	18	3	7	37	236	7	3	8	47	532
07:45 AM	17	144	92	12	1	8	57	259	5	6	25	48	674
Total	85	430	219	72	8	36	142	797	27	15	55	185	2071
08:00 AM	17	136	115	16	3	4	315 69	244	2	3	19	48	676
08:15 AM	25	158	161	13	0	5	79	227	1	6	31	42	748
08:30 AM	344 18	152	102	22	0	6	64	204	11	5	19	53	656
08:45 AM	25	155	107	78 47	3	28	47	177	6	8	15	50	668
Total	85	601	485	98	6	43	259	852	20	22	84	193	2748
Grand Total	170	1031	704	170	14	79	401	1649	47	37	139	378	4819
Apprch %	8.9	54.1	37	64.6	5.3	30	19.1	78.6	2.2	6.7	25.1	68.2	
Total %	3.5	21.4	14.6	3.5	0.3	1.6	8.3	34.2	1	0.8	2.9	7.8	
Cars	170	1017	704	170	14	79	399	1638	47	37	139	377	4791
% Cars	100	98.6	100	100	100	100	99.5	99.3	100	100	100	99.7	99.4
Trucks	0	14	0	0	0	0	2	11	0	0	0	1	28
% Trucks	0	1.4	0	0	0	0	0.5	0.7	0	0	0	0.3	0.6

$\frac{1171}{(4)344} = \frac{1171}{1376} = .85$ $\frac{147}{4(78)} = \frac{147}{312} = .47$ $\frac{1131}{4(315)} = \frac{1131}{1260} = .90$ $\frac{299}{4(79)} = \frac{299}{316} = .95$

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	17	144	92	253	12	1	8	21	57	259	5	321	6	25	48	79	674
08:00 AM	17	136	115	268	16	3	4	23	69	244	2	315	3	19	48	70	676
08:15 AM	25	158	161	344	13	0	5	18	79	227	1	307	6	31	42	79	748
08:30 AM	18	152	102	272	22	0	6	28	64	204	11	279	5	19	53	77	656
Total Volume	77	590	470	1137	63	4	23	90	269	934	19	1222	20	94	191	305	2754
% App. Total	6.8	51.9	41.3		70	4.4	25.6		22	76.4	1.6		6.6	30.8	62.6		
PHF	.770	.934	.730	.826	.716	.333	.719	.804	.851	.902	.432	.952	.833	.758	.901	.965	.920
Cars	77	582	470	1129	63	4	23	90	267	927	19	1213	20	94	190	304	2736
% Cars	100	98.6	100	99.3	100	100	100	100	99.3	99.3	100	99.3	100	100	99.5	99.7	99.3
Trucks	0	8	0	8	0	0	0	0	2	7	0	9	0	0	1	1	18
% Trucks	0	1.4	0	0.7	0	0	0	0	0.7	0.7	0	0.7	0	0	0.5	0.3	0.7

Transportation Data Corporation
P.O. Box 334 Wakefield, MA 01880
Tel. (781) 587-0086 Fax (781) 587-0189

N/S: New London Avenue (Route 2)
E/W: Howard Avenue/Garden Hills Parkway
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689B
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

Groups Printed- Trucks

	New London (Route 2) From North			Howard Avenue From East			New London (Route 2) From South			Garden Hills Parkway From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	0	1	0	0	0	0	0	1	0	0	0	0	2
07:15 AM	0	1	0	0	0	0	0	1	0	0	0	0	2
07:30 AM	0	3	0	0	0	0	0	1	0	0	0	0	4
07:45 AM	0	2	0	0	0	0	0	3	0	0	0	0	5
Total	0	7	0	0	0	0	0	6	0	0	0	0	13
08:00 AM	0	3	0	0	0	0	1	2	0	0	0	1	7
08:15 AM	0	2	0	0	0	0	1	2	0	0	0	0	5
08:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	0	1	0	0	0	0	0	1	0	0	0	0	2
Total	0	7	0	0	0	0	2	5	0	0	0	1	15
Grand Total	0	14	0	0	0	0	2	11	0	0	0	1	28
Apprch %	0	100	0	0	0	0	15.4	84.6	0	0	0	100	
Total %	0	50	0	0	0	0	7.1	39.3	0	0	0	3.6	

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	**3**	0	**3**	0	0	0	0	0	1	0	1	0	0	0	0	4
07:45 AM	0	2	0	2	0	0	0	0	0	**3**	0	**3**	0	0	0	0	5
08:00 AM	0	3	0	3	0	0	0	0	**1**	2	0	3	0	0	**1**	**1**	**7**
08:15 AM	0	2	0	2	0	0	0	0	1	2	0	3	0	0	0	0	5
Total Volume	0	10	0	10	0	0	0	0	2	8	0	10	0	0	1	1	21
% App. Total	0	100	0		0	0	0		20	80	0		0	0	100		
PHF	.000	.833	.000	.833	.000	.000	.000	.000	.500	.667	.000	.833	.000	.000	.250	.250	.750

Transportation Data Corporation
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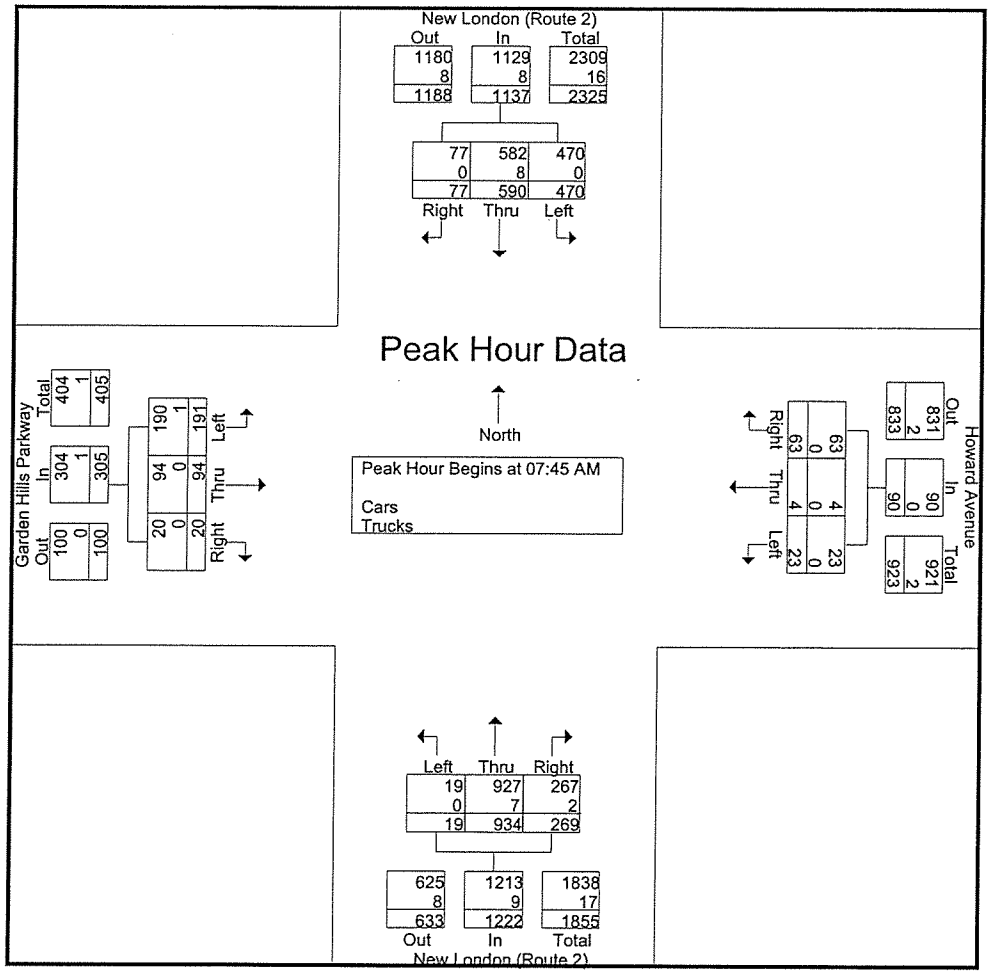
N/S: New London Avenue (Route 2)
E/W: Howard Avenue/Garden Hills Parkway
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689B
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	17	144	92	253	12	1	**8**	21	57	**259**	5	**321**	**6**	25	48	**79**	674
08:00 AM	17	136	115	268	16	**3**	4	23	69	244	2	315	3	19	48	70	676
08:15 AM	**25**	**158**	**161**	**344**	13	0	5	18	**79**	227	1	307	6	**31**	42	79	**748**
08:30 AM	18	152	102	272	**22**	0	6	**28**	64	204	**11**	279	5	19	**53**	77	656
Total Volume	77	590	470	1137	63	4	23	90	269	934	19	1222	20	94	191	305	2754
% App. Total	6.8	51.9	41.3		70	4.4	25.6		22	76.4	1.6		6.6	30.8	62.6		
PHF	.770	.934	.730	.826	.716	.333	.719	.804	.851	.902	.432	.952	.833	.758	.901	.965	.920
Cars	77	582	470	1129	63	4	23	90	267	927	19	1213	20	94	190	304	2736
% Cars	100	98.6	100	99.3	100	100	100	100	99.3	99.3	100	99.3	100	100	99.5	99.7	99.3
Trucks	0	8	0	8	0	0	0	0	2	7	0	9	0	0	1	1	18
% Trucks	0	1.4	0	0.7	0	0	0	0	0.7	0.7	0	0.7	0	0	0.5	0.3	0.7



Transportation Data Corporation
P.O. Box 334 Wakefield, MA 01880
Tel. (781) 587-0086 Fax (781) 587-0189

N/S: New London Avenue (Route 2)
E/W: Howard Avenue/Garden Hills Parkway
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689BB
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

Groups Printed- Cars - Trucks

	New London (Route 2) From North			Howard Avenue From East			New London (Route 2) From South			Garden Hills Parkway From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
04:00 PM	19	281	21	133	18	70	7	258	4	8	4	39	862
04:15 PM	36	281	22	81	7	41	3	211	5	11	4	31	733
04:30 PM	36	256	19	104	5	37	5	240	8	11	2	38	761
04:45 PM	40	283	19	57	5	26	7	257	5	10	3	33	745
Total	131	1101	81	375	35	174	22	966	22	40	13	141	3101
05:00 PM	36	290	10	41	7	28	7	249	8	14	8	39	737
05:15 PM	35	294	18	28	4	20	5	239	7	5	2	40	697
05:30 PM	43	286	16	25	5	27	5	210	7	12	5	53	694
05:45 PM	25	254	15	36	2	21	9	227	6	12	3	56	666
Total	139	1124	59	130	18	96	26	925	28	43	18	188	2794
Grand Total	270	2225	140	505	53	270	48	1891	50	83	31	329	5895
Apprch %	10.2	84.4	5.3	61	6.4	32.6	2.4	95.1	2.5	18.7	7	74.3	
Total %	4.6	37.7	2.4	8.6	0.9	4.6	0.8	32.1	0.8	1.4	0.5	5.6	
Cars	270	2220	138	504	53	270	48	1886	50	83	31	329	5882
% Cars	100	99.8	98.6	99.8	100	100	100	99.7	100	100	100	100	99.8
Trucks	0	5	2	1	0	0	0	5	0	0	0	0	13
% Trucks	0	0.2	1.4	0.2	0	0	0	0.3	0	0	0	0	0.2

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	19	281	21	321	**133**	**18**	**70**	**221**	**7**	**258**	4	**269**	8	**4**	**39**	**51**	**862**
04:15 PM	36	281	**22**	339	81	7	41	129	3	211	5	219	**11**	4	31	46	733
04:30 PM	36	256	19	311	104	5	37	146	5	240	**8**	253	11	2	38	51	761
04:45 PM	**40**	**283**	19	**342**	57	5	26	88	7	257	5	269	10	3	33	46	745
Total Volume	131	1101	81	1313	375	35	174	584	22	966	22	1010	40	13	141	194	3101
% App. Total	10	83.9	6.2		64.2	6	29.8		2.2	95.6	2.2		20.6	6.7	72.7		
PHF	.819	.973	.920	.960	.705	.486	.621	.661	.786	.936	.688	.939	.909	.813	.904	.951	.899
Cars	131	1097	79	1307	374	35	174	583	22	963	22	1007	40	13	141	194	3091
% Cars	100	99.6	97.5	99.5	99.7	100	100	99.8	100	99.7	100	99.7	100	100	100	100	99.7
Trucks	0	4	2	6	1	0	0	1	0	3	0	3	0	0	0	0	10
% Trucks	0	0.4	2.5	0.5	0.3	0	0	0.2	0	0.3	0	0.3	0	0	0	0	0.3

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N/S: New London Avenue (Route 2)
E/W: Howard Avenue/Garden Hills Parkway
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689BB
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

Groups Printed- Trucks

	New London (Route 2) From North			Howard Avenue From East			New London (Route 2) From South			Garden Hills Parkway From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
04:00 PM	0	0	0	0	0	0	0	3	0	0	0	0	3
04:15 PM	0	1	1	0	0	0	0	0	0	0	0	0	2
04:30 PM	0	2	1	1	0	0	0	0	0	0	0	0	4
04:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	4	2	1	0	0	0	3	0	0	0	0	10
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	0	1	0	0	0	0	0	2	0	0	0	0	3
Grand Total	0	5	2	1	0	0	0	5	0	0	0	0	13
Apprch %	0	71.4	28.6	100	0	0	0	100	0	0	0	0	
Total %	0	38.5	15.4	7.7	0	0	0	38.5	0	0	0	0	

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	3
04:15 PM	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2
04:30 PM	0	2	1	3	1	0	0	1	0	0	0	0	0	0	0	0	4
04:45 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	4	2	6	1	0	0	1	0	3	0	3	0	0	0	0	10
% App. Total	0	66.7	33.3		100	0	0		0	100	0		0	0	0		
PHF	.000	.500	.500	.500	.250	.000	.000	.250	.000	.250	.000	.250	.000	.000	.000	.000	.625

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N/S: New London Avenue (Route 2)
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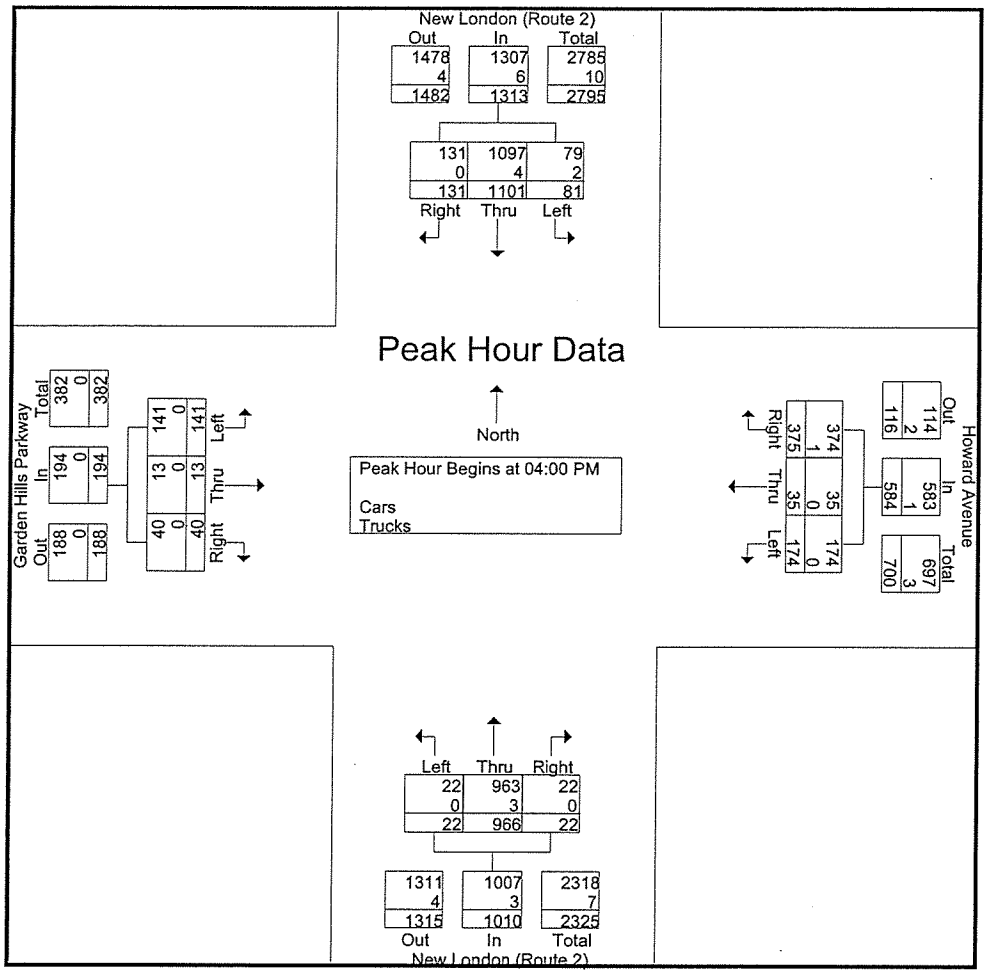
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689BB
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	19	281	21	321	**133**	**18**	**70**	**221**	**7**	**258**	4	**269**	8	**4**	**39**	**51**	**862**
04:15 PM	36	281	**22**	339	81	7	41	129	3	211	5	219	**11**	4	31	46	733
04:30 PM	36	256	19	311	104	5	37	146	5	240	**8**	253	11	2	38	51	761
04:45 PM	**40**	**283**	19	**342**	57	5	26	88	7	257	5	269	10	3	33	46	745
Total Volume	131	1101	81	1313	375	35	174	584	22	966	22	1010	40	13	141	194	3101
% App. Total	10	83.9	6.2		64.2	6	29.8		2.2	95.6	2.2		20.6	6.7	72.7		
PHF	.819	.973	.920	.960	.705	.486	.621	.661	.786	.936	.688	.939	.909	.813	.904	.951	.899
Cars	131	1097	79	1307	374	35	174	583	22	963	22	1007	40	13	141	194	3091
% Cars	100	99.6	97.5	99.5	99.7	100	100	99.8	100	99.7	100	99.7	100	100	100	100	99.7
Trucks	0	4	2	6	1	0	0	1	0	3	0	3	0	0	0	0	10
% Trucks	0	0.4	2.5	0.5	0.3	0	0	0.2	0	0.3	0	0.3	0	0	0	0	0.3



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N/S: New London Avenue (Route 2)
E/W: Howard Avenue/Garden Hills Parkway
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689BBB
Site Code : 03689
Start Date : 3/3/2007
Page No : 1

Groups Printed- Cars - Trucks

	New London (Route 2) From North			Howard Avenue From East			New London (Route 2) From South			Garden Hills Parkway From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
11:00 AM	28	226	16	26	2	12	11	282	4	9	3	33	652
11:15 AM	27	243	13	16	2	8	9	210	6	12	3	37	586
11:30 AM	21	253	7	12	5	7	10	278	4	8	5	38	648
11:45 AM	20	282	10	13	2	9	10	270	6	7	0	44	673
Total	96	1004	46	67	11	36	40	1040	20	36	11	152	2559
12:00 PM	31	263	16	11	7	17	13	278	7	8	5	32	688
12:15 PM	19	295	18	17	5	7	20	274	5	7	3	17	687
12:30 PM	12	269	28	8	1	12	17	268	11	3	4	29	662
12:45 PM	16	256	22	23	0	7	25	270	12	4	6	39	680
Total	78	1083	84	59	13	43	75	1090	35	22	18	117	2717
01:00 PM	27	249	22	16	3	11	14	300	10	8	6	37	703
01:15 PM	31	246	17	13	1	14	12	282	5	5	12	38	676
01:30 PM	34	276	19	10	3	11	14	336	6	8	9	31	757
01:45 PM	19	264	20	17	3	14	17	305	4	7	3	36	709
Total	111	1035	78	56	10	50	57	1223	25	28	30	142	2845
Grand Total	285	3122	208	182	34	129	172	3353	80	86	59	411	8121
Apprch %	7.9	86.4	5.8	52.8	9.9	37.4	4.8	93	2.2	15.5	10.6	73.9	
Total %	3.5	38.4	2.6	2.2	0.4	1.6	2.1	41.3	1	1.1	0.7	5.1	
Cars	283	3117	208	182	34	128	171	3348	80	86	59	410	8106
% Cars	99.3	99.8	100	100	100	99.2	99.4	99.9	100	100	100	99.8	99.8
Trucks	2	5	0	0	0	1	1	5	0	0	0	1	15
% Trucks	0.7	0.2	0	0	0	0.8	0.6	0.1	0	0	0	0.2	0.2

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	**31**	263	16	310	11	**7**	**17**	**35**	13	**278**	7	298	**8**	5	32	45	**688**
12:15 PM	19	**295**	18	**332**	17	5	7	29	20	274	5	299	7	3	17	27	687
12:30 PM	12	269	**28**	309	8	1	12	21	17	268	11	296	3	4	29	36	662
12:45 PM	16	256	22	294	**23**	0	7	30	**25**	270	**12**	**307**	4	**6**	**39**	**49**	680
Total Volume	78	1083	84	1245	59	13	43	115	75	1090	35	1200	22	18	117	157	2717
% App. Total	6.3	87	6.7		51.3	11.3	37.4		6.2	90.8	2.9		14	11.5	74.5		
PHF	.629	.918	.750	.938	.641	.464	.632	.821	.750	.980	.729	.977	.688	.750	.750	.801	.987
Cars	78	1079	84	1241	59	13	43	115	75	1089	35	1199	22	18	117	157	2712
% Cars	100	99.6	100	99.7	100	100	100	100	100	99.9	100	99.9	100	100	100	100	99.8
Trucks	0	4	0	4	0	0	0	0	0	1	0	1	0	0	0	0	5
% Trucks	0	0.4	0	0.3	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0.2

Transportation Data Corporation
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N/S: New London Avenue (Route 2)
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City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689BBB
Site Code : 03689
Start Date : 3/3/2007
Page No : 1

Groups Printed- Trucks

	New London (Route 2) From North			Howard Avenue From East			New London (Route 2) From South			Garden Hills Parkway From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
11:00 AM	0	0	0	0	0	1	0	1	0	0	0	0	2
11:15 AM	1	0	0	0	0	0	0	1	0	0	0	0	2
11:30 AM	1	0	0	0	0	0	0	2	0	0	0	0	3
11:45 AM	0	1	0	0	0	0	1	0	0	0	0	1	3
Total	2	1	0	0	0	1	1	4	0	0	0	1	10
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	3	0	0	0	0	0	1	0	0	0	0	4
12:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	4	0	0	0	0	0	1	0	0	0	0	5
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	2	5	0	0	0	1	1	5	0	0	0	1	15
Apprch %	28.6	71.4	0	0	0	100	16.7	83.3	0	0	0	100	
Total %	13.3	33.3	0	0	0	6.7	6.7	33.3	0	0	0	6.7	

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:00 AM																	
11:00 AM	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	0	2
11:15 AM	1	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
11:30 AM	1	0	0	1	0	0	0	0	0	2	0	2	0	0	0	0	3
11:45 AM	0	1	0	1	0	0	0	0	1	0	0	1	0	0	1	1	3
Total Volume	2	1	0	3	0	0	1	1	1	4	0	5	0	0	1	1	10
% App. Total	66.7	33.3	0		0	0	100		20	80	0		0	0	100		
PHF	.500	.250	.000	.750	.000	.000	.250	.250	.250	.500	.000	.625	.000	.000	.250	.250	.833

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File Name : 03689BBB
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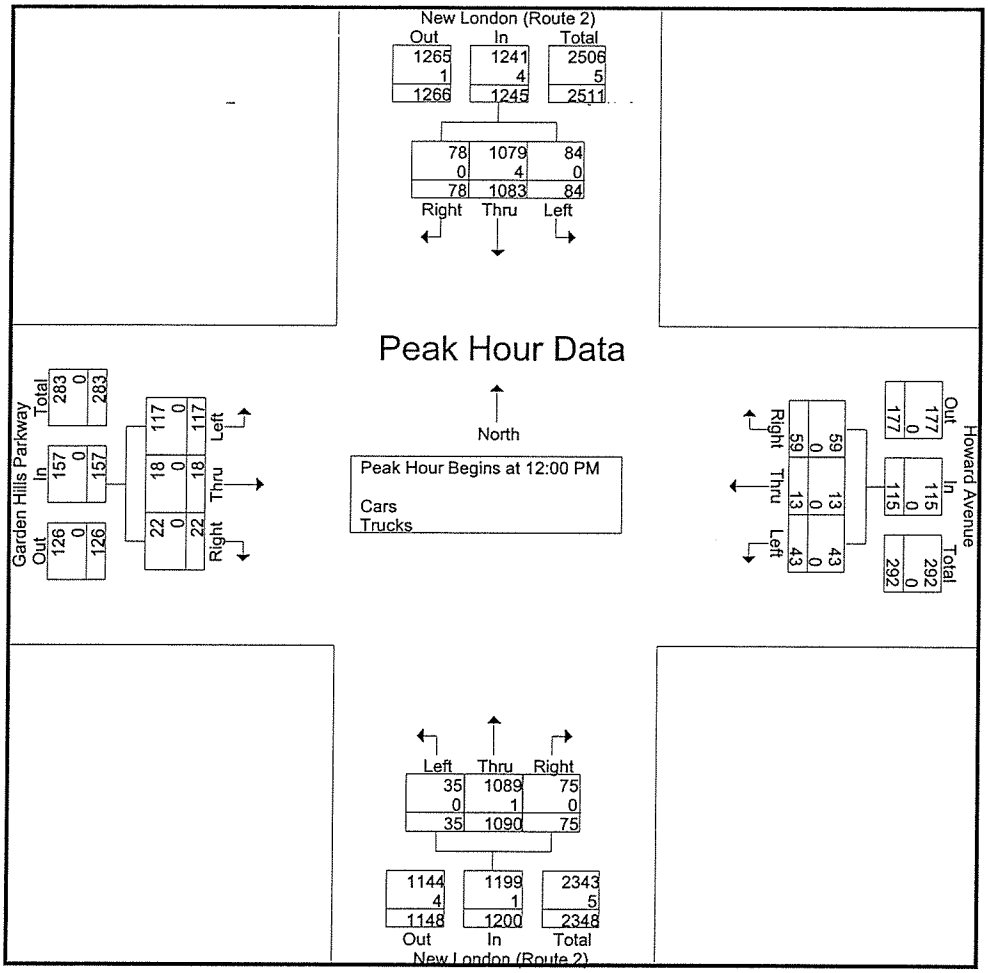
Start Date : 3/3/2007
Page No : 1

	New London (Route 2) From North				Howard Avenue From East				New London (Route 2) From South				Garden Hills Parkway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	**31**	263	16	310	11	**7**	**17**	**35**	13	**278**	7	298	**8**	5	32	45	**688**
12:15 PM	19	**295**	18	**332**	17	5	7	29	20	274	5	299	7	3	17	27	687
12:30 PM	12	269	**28**	309	8	1	12	21	17	268	11	296	3	4	29	36	662
12:45 PM	16	256	22	294	**23**	0	7	30	**25**	270	**12**	**307**	4	**6**	**39**	**49**	680
Total Volume	78	1083	84	1245	59	13	43	115	75	1090	35	1200	22	18	117	157	2717
% App. Total	6.3	87	6.7		51.3	11.3	37.4		6.2	90.8	2.9		14	11.5	74.5		
PHF	.629	.918	.750	.938	.641	.464	.632	.821	.750	.980	.729	.977	.688	.750	.750	.801	.987
Cars	78	1079	84	1241	59	13	43	115	75	1089	35	1199	22	18	117	157	2712
% Cars	100	99.6	100	99.7	100	100	100	100	100	99.9	100	99.9	100	100	100	100	99.8
Trucks	0	4	0	4	0	0	0	0	0	1	0	1	0	0	0	0	5
% Trucks	0	0.4	0	0.3	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0.2



New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

(Source; *Proposed Rhode Island State Police Headquarters and State Forensic Laboratory* Traffic Study Report, dated December 2004, by Edwards and Kelcey, Inc.)

1 1

R.I. Department of Transportation
Traffic Research Unit
2 Capitol Hill - Room 126
Providence RI 02903

File Name : I040700
Site Code : 1111111
Start Date : 09/02/20
Page No : 1

Counted By: RIDOT
Weather: Clear

Groups Printed- Cars - Trucks

	New London Ave Southbound				Howard Ave. Westbound				New London Ave Northbound				Garden Hills Dr Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
07:00 AM	17	89	46	152	27	6	13	46	20	127	9	156	0	10	34	44	398
07:15 AM	7	80	37	124	17	4	8	29	26	167	2	195	4	14	53	71	419
07:30 AM	7	119	39	165	14	3	6	23	28	191	4	223	7	7	58	72	483
07:45 AM	18	124	65	207	13	2	6	21	43	254	4	301	6	30	64	100	629
Total	49	412	187	648	71	15	33	119	117	739	19	875	17	61	209	287	1929
08:00 AM	7	134	58	199	13	2	6	21	50	210	4	264	8	16	54	78	562
08:15 AM	12	123	82	217	14	2	10	26	66	186	7	259	6	28	45	79	581
08:30 AM	9	129	76	214	16	2	2	20	44	187	9	240	5	16	40	61	535
08:45 AM	18	135	54	207	18	1	9	28	29	167	2	198	11	7	37	55	488
Total	46	521	270	837	61	7	27	95	189	750	22	961	30	67	176	273	2166
09:00 AM	20	140	29	189	17	3	10	30	15	134	4	154	5	6	45	56	429
09:15 AM	14	133	42	189	20	3	3	26	8	142	4	154	6	12	35	53	422
09:30 AM	15	157	28	200	21	5	12	38	15	135	9	159	8	7	36	51	448
09:45 AM	16	181	38	235	17	2	10	29	18	139	6	163	3	6	37	46	473
Total	65	611	137	813	75	13	35	123	57	550	23	630	22	31	153	206	1772
10:00 AM	14	141	20	175	30	6	10	46	12	139	7	158	1	6	21	28	407
10:15 AM	29	183	34	246	41	3	19	63	7	161	2	170	8	6	34	48	527
10:30 AM	18	177	15	210	19	2	16	37	12	175	5	192	6	4	29	39	478
10:45 AM	17	162	22	201	25	6	14	45	10	159	5	174	7	5	25	37	457
Total	78	663	91	832	115	17	59	191	41	634	19	694	22	21	109	152	1869
11:00 AM	21	154	21	196	11	7	13	31	15	169	12	196	4	7	23	34	457
11:15 AM	13	189	28	230	30	5	27	62	14	184	6	204	4	2	28	34	530
11:30 AM	13	158	24	195	47	16	29	92	19	195	4	218	3	10	34	47	552
11:45 AM	12	196	30	238	58	9	32	99	11	193	6	210	9	12	24	45	592
Total	59	697	103	859	146	37	101	284	59	741	28	828	20	31	109	160	2131
12:00 PM	13	181	33	227	49	17	34	100	21	244	5	270	2	10	27	39	636
12:15 PM	10	206	41	257	61	9	31	101	18	219	9	246	6	15	34	55	659
12:30 PM	35	211	40	286	37	9	21	67	20	229	10	259	8	12	30	50	662
12:45 PM	13	229	55	297	32	7	39	78	19	226	9	254	4	13	26	43	672
Total	71	827	169	1067	179	42	125	346	78	918	33	1029	20	50	117	187	2629
01:00 PM	14	197	64	275	29	11	24	64	36	195	3	234	10	14	21	45	618
01:15 PM	26	216	36	278	26	4	13	43	24	252	8	284	3	23	29	55	660
01:30 PM	21	196	43	260	38	3	21	62	23	204	10	237	5	13	32	50	609
01:45 PM	24	200	41	265	27	14	23	64	19	211	7	237	4	12	29	45	611
Total	85	809	184	1078	120	32	81	233	102	862	28	992	22	62	111	195	2498
02:00 PM	22	206	35	263	27	5	15	47	18	244	10	272	3	8	30	41	623
02:15 PM	34	206	35	275	35	7	18	60	18	232	8	258	7	4	30	41	634
02:30 PM	14	203	43	260	46	6	23	75	13	243	7	263	4	8	26	38	636
02:45 PM	31	202	48	281	73	16	43	132	7	205	5	217	6	14	33	53	683
Total	101	817	161	1079	181	34	99	314	56	924	30	1010	20	34	119	173	2576
03:00 PM	31	225	31	287	85	8	36	129	17	251	7	275	9	2	28	39	730
03:15 PM	31	211	23	265	49	15	35	99	17	199	11	227	6	6	31	43	634
03:30 PM	26	212	28	266	63	15	44	122	10	232	7	249	6	5	46	57	694
03:45 PM	17	280	19	316	68	17	50	135	8	251	12	271	10	5	44	59	781
Total	105	928	101	1134	265	55	165	485	52	933	37	1022	31	18	149	198	2839
04:00 PM	44	278	39	361	109	19	60	188	7	265	12	284	10	2	37	49	882
04:15 PM	24	239	33	296	58	11	44	113	8	272	8	288	8	11	40	59	756
04:30 PM	32	288	41	361	63	12	42	117	14	265	15	294	6	5	39	50	822
04:45 PM	27	310	26	363	42	10	34	86	5	273	15	293	15	9	40	64	806
Total	127	1115	139	1381	272	52	180	504	34	1075	50	1159	39	27	156	222	3266
05:00 PM	41	308	22	371	44	14	37	95	14	321	7	342	8	10	25	43	851
05:15 PM	35	346	29	410	28	13	24	65	7	240	7	254	6	3	22	31	760
05:30 PM	41	303	27	371	25	3	20	48	10	269	7	286	9	9	39	57	762
05:45 PM	20	271	17	308	29	6	22	57	5	224	6	235	4	6	33	43	643
Total	137	1228	95	1460	126	36	103	265	36	1054	27	1117	27	28	119	174	3016
06:00 PM	20	270	31	321	22	4	20	46	13	232	2	247	3	2	40	45	659
06:15 PM	24	236	33	293	41	4	25	70	11	208	5	224	5	4	36	45	632
06:30 PM	30	214	25	269	36	12	19	67	12	229	4	245	8	4	19	31	612
06:45 PM	26	191	26	243	15	3	10	28	8	212	2	222	3	8	27	38	531
Total	100	911	115	1126	114	23	74	211	44	881	13	938	19	18	122	159	2434
Grand Total	1023	9539	1752	12314	1725	363	1082	3170	865	10051	329	11255	289	448	1649	2386	29125
Apprch %	8.3	77.5	14.2		54.4	11.5	34.1		7.7	89.4	2.9		12.1	18.8	69.1		
Total %	3.5	32.8	6.0	42.3	5.9	1.2	3.7	10.9	3.0	34.5	1.1	38.6	1.0	1.5	5.7	8.2	

R.I. Department of Transportation
Traffic Research Unit
2 Capitol Hill - Room 126
Providence RI 02903

File Name : I0407001
Site Code : 11111111
Start Date : 09/02/200
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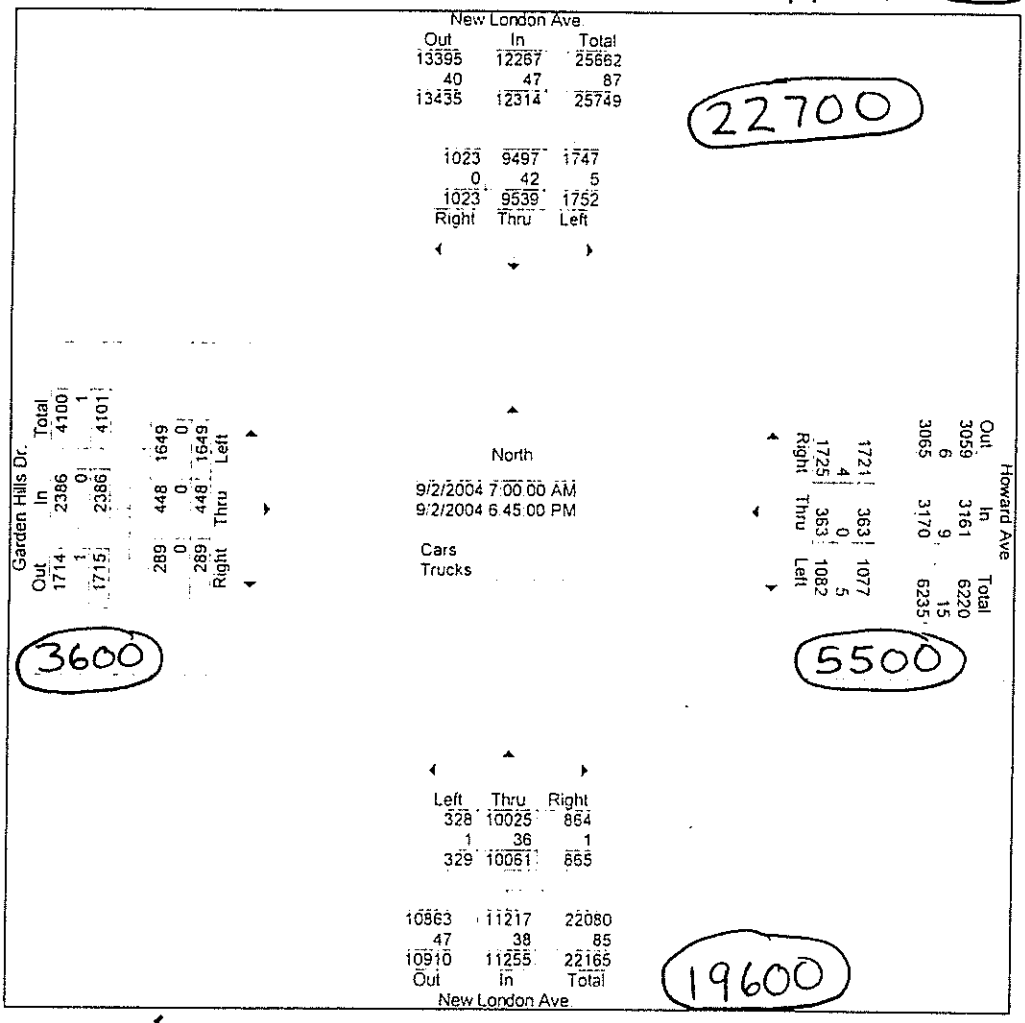

.791 / 1.059 / 1.058

	New London Ave. Southbound				Howard Ave. Westbound				New London Ave Northbound				Garden Hills Dr. Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App Total	Right	Thru	Left	App. Total	Int. Total
Hour From 07:00 AM to 11:45 AM - Peak 1 of 1																	
By Approach	09:45 AM				11:00 AM				07:45 AM				07:30 AM				
Volume	77	682	107	866	146	37	101	284	203	837	24	1064	27	81	221	329	
Percent	8.9	78.8	12.4		51.4	13.0	35.6		19.1	78.7	2.3		8.2	24.6	67.2		
High Int.	10:15 AM				11:45 AM				07:45 AM				07:45 AM				
Volume	29	183	34	246	58	9	32	99	43	254	4	301	6	30	64	100	
Peak Factor				0.880				0.717				0.884				0.823	
Hour From 12:00 PM to 06:45 PM - Peak 1 of 1																	
By Approach	04:45 PM				03:30 PM				04:15 PM				03:30 PM				
Volume	144	1267	104	1515	298	62	198	558	41	1131	45	1217	34	23	167	224	
Percent	9.5	83.6	6.9		53.4	11.1	35.5		3.4	92.9	3.7		15.2	10.3	74.6		
High Int.	05:15 PM				04:00 PM				05:00 PM				03:45 PM				
Volume	35	346	29	410	109	19	60	188	14	321	7	342	10	5	44	59	
Peak Factor				0.924				0.742				0.890				0.949	

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R.I. Department of Transportation
Traffic Research Unit
2 Capitol Hill - Room 126
Providence RI 02903

File Name : I0407001
Site Code : 11111111
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ounted By: RIDOT
'eather: Clear

Groups Printed- Cars

	New London Ave. Southbound				Howard Ave. Westbound				New London Ave Northbound				Garden Hills Dr. Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
07:00 AM	17	87	44	148	27	6	13	46	20	124	9	153	0	10	34	44	391
07:15 AM	7	76	37	120	16	4	7	27	26	161	2	189	4	14	53	71	407
07:30 AM	7	116	39	162	14	3	5	22	28	190	4	222	7	7	58	72	478
07:45 AM	18	123	65	206	12	2	5	19	42	253	4	299	6	30	64	100	624
Total	49	402	185	636	69	15	30	114	116	728	19	863	17	61	209	287	1900
08:00 AM	7	134	58	199	12	2	6	20	50	209	4	263	8	16	54	78	560
08:15 AM	12	123	82	217	14	2	9	25	66	186	7	259	6	28	45	79	580
08:30 AM	9	126	76	211	16	2	2	20	44	186	8	238	5	16	40	61	530
08:45 AM	18	131	54	203	18	1	9	28	29	165	2	196	11	7	37	55	482
Total	46	514	270	830	60	7	26	93	189	746	21	956	30	67	176	273	2152
09:00 AM	20	139	29	188	16	3	10	29	16	133	4	153	5	6	45	56	426
09:15 AM	14	132	41	187	20	3	3	26	8	142	4	154	6	12	35	53	420
09:30 AM	15	156	28	199	21	5	11	37	15	133	9	157	8	7	36	51	444
09:45 AM	16	180	38	234	17	2	10	29	18	139	6	163	3	6	37	46	472
Total	65	607	136	808	74	13	34	121	57	547	23	627	22	31	153	206	1762
10:00 AM	14	141	20	175	30	6	10	46	12	139	7	158	1	6	21	28	407
10:15 AM	29	181	33	243	41	3	19	63	7	160	2	169	8	6	34	48	523
10:30 AM	18	175	15	208	19	2	16	37	12	173	5	190	6	4	29	39	474
10:45 AM	17	162	22	201	25	6	14	45	10	159	5	174	7	5	25	37	457
Total	78	659	90	827	115	17	59	191	41	631	19	691	22	21	109	152	1861
11:00 AM	21	154	21	196	11	7	13	31	15	168	12	195	4	7	23	34	456
11:15 AM	13	186	28	227	30	5	27	62	14	183	6	203	4	2	28	34	526
11:30 AM	13	156	24	193	47	16	29	92	19	195	4	218	3	10	34	47	550
11:45 AM	12	195	30	237	58	9	32	99	11	191	6	208	9	12	24	45	589
Total	59	691	103	853	146	37	101	284	59	737	28	824	20	31	109	160	2121
12:00 PM	13	180	33	226	49	17	34	100	21	244	5	270	2	10	27	39	635
12:15 PM	10	206	41	257	61	9	31	101	18	216	9	243	6	15	34	55	656
12:30 PM	35	211	40	286	37	9	21	67	20	229	10	259	8	12	30	50	662
12:45 PM	13	227	55	295	32	7	39	78	19	225	9	253	4	13	26	43	669
Total	71	824	169	1064	179	42	125	346	78	914	33	1025	20	50	117	187	2622
01:00 PM	14	197	64	275	29	11	24	64	36	194	3	233	10	14	21	45	617
01:15 PM	26	215	36	277	26	4	13	43	24	251	8	283	3	23	29	55	658
01:30 PM	21	195	42	258	38	3	21	62	23	203	10	236	5	13	32	50	606
01:45 PM	24	199	41	264	27	14	23	64	19	211	7	237	4	12	29	45	610
Total	85	806	183	1074	120	32	81	233	102	859	28	989	22	62	111	195	2491
02:00 PM	22	204	35	261	27	5	15	47	18	242	10	270	3	8	30	41	619
02:15 PM	34	206	35	275	35	7	18	60	18	232	8	258	7	4	30	41	634
02:30 PM	14	200	43	257	46	6	23	75	13	241	7	261	4	8	26	38	631
02:45 PM	31	202	48	281	73	16	43	132	7	205	5	217	6	14	33	53	683
Total	101	812	161	1074	181	34	99	314	56	920	30	1006	20	34	119	173	2567
03:00 PM	31	225	31	287	85	8	36	129	17	251	7	275	9	2	28	39	730
03:15 PM	31	211	23	265	49	15	35	99	17	199	11	227	6	6	31	43	634
03:30 PM	26	212	28	266	63	15	44	122	10	232	7	249	6	5	46	57	694
03:45 PM	17	280	19	316	68	17	50	135	8	251	12	271	10	5	44	59	781
Total	105	928	101	1134	265	55	165	485	52	933	37	1022	31	18	149	198	2839
04:00 PM	44	278	39	361	109	19	60	188	7	265	12	284	10	2	37	49	882
04:15 PM	24	239	33	296	58	11	44	113	8	272	8	288	8	11	40	59	756
04:30 PM	32	288	41	361	63	12	42	117	14	265	15	294	6	5	39	50	822
04:45 PM	27	310	26	363	42	10	34	86	5	273	15	293	15	9	40	64	806
Total	127	1115	139	1381	272	52	180	504	34	1075	50	1159	39	27	156	222	3266
05:00 PM	41	308	22	371	44	14	37	95	14	321	7	342	8	10	25	43	851
05:15 PM	35	346	29	410	28	13	24	65	7	240	7	254	6	3	22	31	760
05:30 PM	41	303	27	371	25	3	20	48	10	269	7	286	9	9	39	57	762
05:45 PM	20	271	17	308	29	6	22	57	5	224	6	235	4	6	33	43	643
Total	137	1228	95	1460	126	36	103	265	36	1054	27	1117	27	28	119	174	3016
06:00 PM	20	270	31	321	22	4	20	46	13	232	2	247	3	2	40	45	659
06:15 PM	24	236	33	293	41	4	25	70	11	208	5	224	5	4	36	45	632
06:30 PM	30	214	25	269	36	12	19	67	12	229	4	245	8	4	19	31	612
06:45 PM	26	191	26	243	15	3	10	28	8	212	2	222	3	8	27	38	531
Total	100	911	115	1126	114	23	74	211	44	881	13	938	19	18	122	159	2434
Grand Total	1023	9497	1747	12267	1721	363	1077	3161	854	10025	328	11217	299	448	1649	2386	29031
Apprch %	8.3	77.4	14.2		54.4	11.5	34.1		7.7	89.4	2.9		12.1	18.8	69.1		
Total %	3.5	32.7	6.0	42.3	5.9	1.3	3.7	10.9	3.0	34.5	1.1	38.6	1.0	1.5	5.7	8.2	

R.I. Department of Transportation
Traffic Research Unit
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File Name : I0407001
Site Code : 11111111
Start Date : 09/02/200
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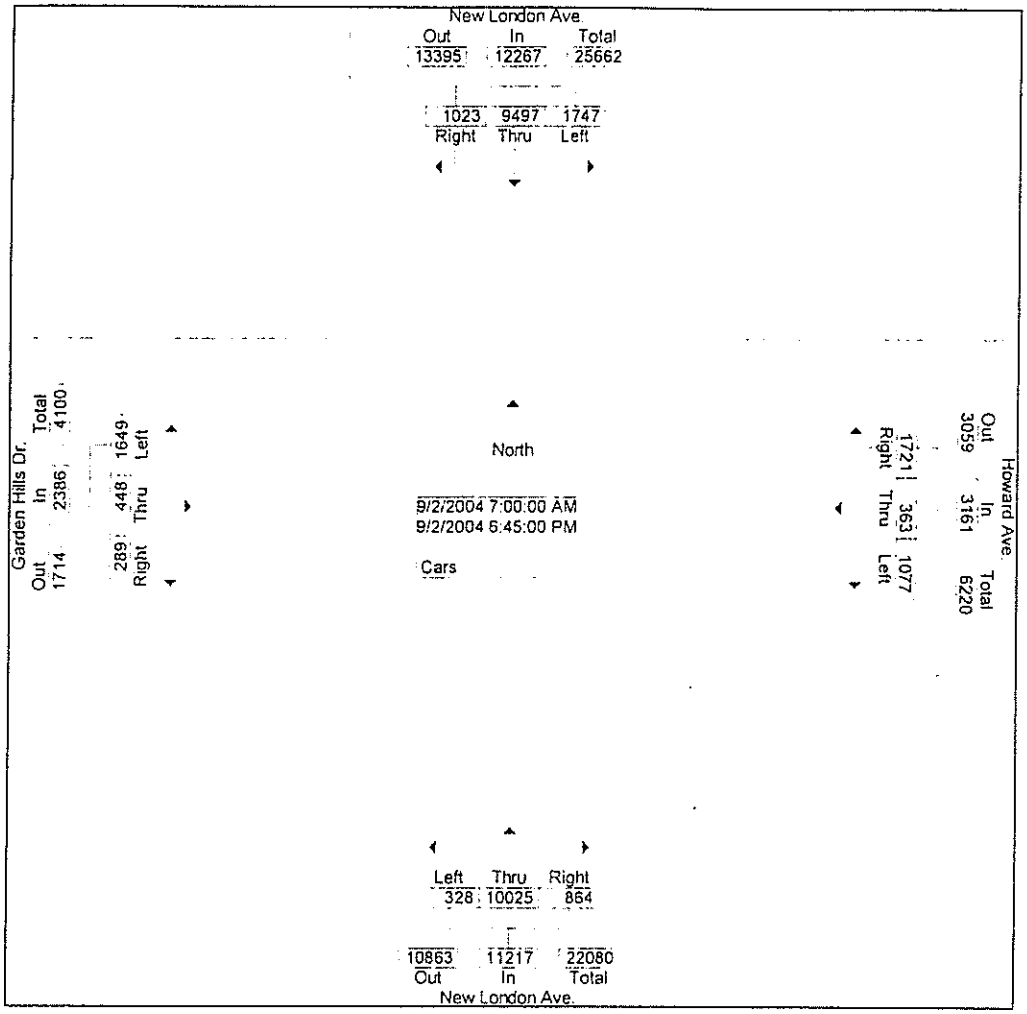

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R.I. Department of Transportation
Traffic Research Unit
2 Capitol Hill - Room 126
Providence RI 02903

File Name : I0407001
Site Code : 1111111
Start Date : 09/02/20
Page No : 1

Counted By: RIDOT
Weather: Clear

Groups Printed- Trucks

	New London Ave Southbound				Howard Ave Westbound				New London Ave Northbound				Garden Hills Dr Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
07:00 AM	0	2	2	4	0	0	0	0	0	3	0	3	0	0	0	0	7
07:15 AM	0	4	0	4	1	0	1	2	0	6	0	6	0	0	0	0	12
07:30 AM	0	3	0	3	0	0	1	1	0	1	0	1	0	0	0	0	5
07:45 AM	0	1	0	1	1	0	1	2	1	1	0	2	0	0	0	0	5
Total	0	10	2	12	2	0	3	5	1	11	0	12	0	0	0	0	29
08:00 AM	0	0	0	0	1	0	0	1	0	1	0	1	0	0	0	0	2
08:15 AM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
08:30 AM	0	3	0	3	0	0	0	0	0	1	1	2	0	0	0	0	5
08:45 AM	0	4	0	4	0	0	0	0	0	2	0	2	0	0	0	0	6
Total	0	7	0	7	1	0	1	2	0	4	1	5	0	0	0	0	14
09:00 AM	0	1	0	1	1	0	0	1	0	1	0	1	0	0	0	0	3
09:15 AM	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2
09:30 AM	0	1	0	1	0	0	1	1	0	2	0	2	0	0	0	0	4
09:45 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	4	1	5	1	0	1	2	0	3	0	3	0	0	0	0	10
*** BREAK ***																	
10:15 AM	0	2	1	3	0	0	0	0	0	1	0	1	0	0	0	0	4
10:30 AM	0	2	0	2	0	0	0	0	0	2	0	2	0	0	0	0	4
*** BREAK ***																	
Total	0	4	1	5	0	0	0	0	0	3	0	3	0	0	0	0	8
11:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
11:15 AM	0	3	0	3	0	0	0	0	0	1	0	1	0	0	0	0	4
11:30 AM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
11:45 AM	0	1	0	1	0	0	0	0	0	2	0	2	0	0	0	0	3
Total	0	6	0	6	0	0	0	0	0	4	0	4	0	0	0	0	10
12:00 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
12:15 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	3
*** BREAK ***																	
12:45 PM	0	2	0	2	0	0	0	0	0	1	0	1	0	0	0	0	3
Total	0	3	0	3	0	0	0	0	0	4	0	4	0	0	0	0	7
01:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
01:15 PM	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
01:30 PM	0	1	1	2	0	0	0	0	0	1	0	1	0	0	0	0	3
01:45 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	3	1	4	0	0	0	0	0	3	0	3	0	0	0	0	7
02:00 PM	0	2	0	2	0	0	0	0	0	2	0	2	0	0	0	0	4
*** BREAK ***																	
02:30 PM	0	3	0	3	0	0	0	0	0	2	0	2	0	0	0	0	5
*** BREAK ***																	
Total	0	5	0	5	0	0	0	0	0	4	0	4	0	0	0	0	9
*** BREAK ***																	
Grand Total	0	42	5	47	4	0	5	9	1	36	1	38	0	0	0	0	94
Apprch %	0.0	89.4	10.6		44.4	0.0	55.6		2.6	94.7	2.6		0.0	0.0	0.0		
Total %	0.0	44.7	5.3	50.0	4.3	0.0	5.3	9.6	1.1	38.3	1.1	40.4	0.0	0.0	0.0	0.0	

R.I. Department of Transportation
Traffic Research Unit
2 Capitol Hill - Room 126
Providence RI 02903

File Name : I0407001
Site Code : 11111111
Start Date : 09/02/200
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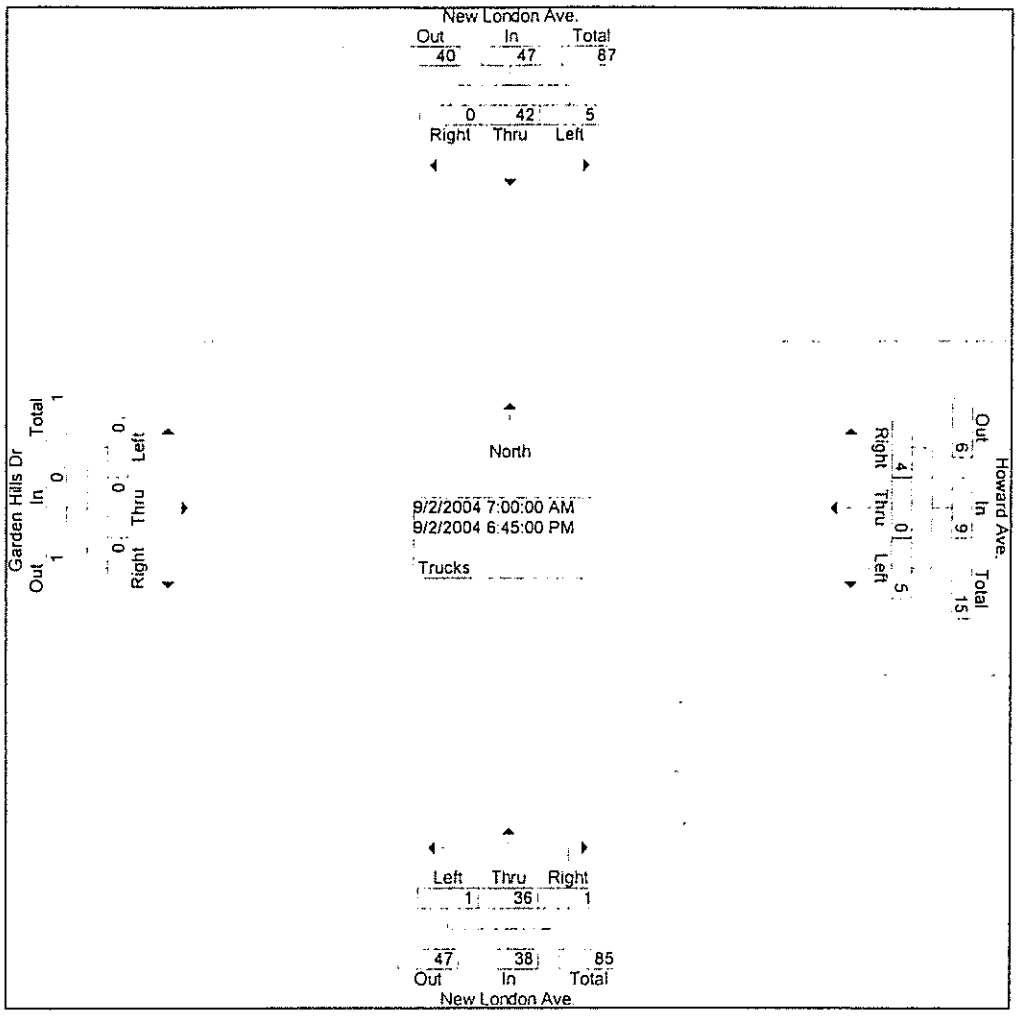


New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

(Source; High Hazard Intersections study, dated May 2005, by Fuss & O'Neil, Inc.)

RAB Professional Engineers, Inc.
10 Ross Simons Drive
Cranston, Rhode Island 02920

Project: RIDOT Count Intersection
Town: Cranston
Intersection: Howard at Rte 2
Weather: Sunny/Hot

File Name : Howard at New London
Site Code : 00000111
Start Date : 07/01/2008
Page No : 1

Groups Printed- Automobiles - Heavy Trucks - Buses

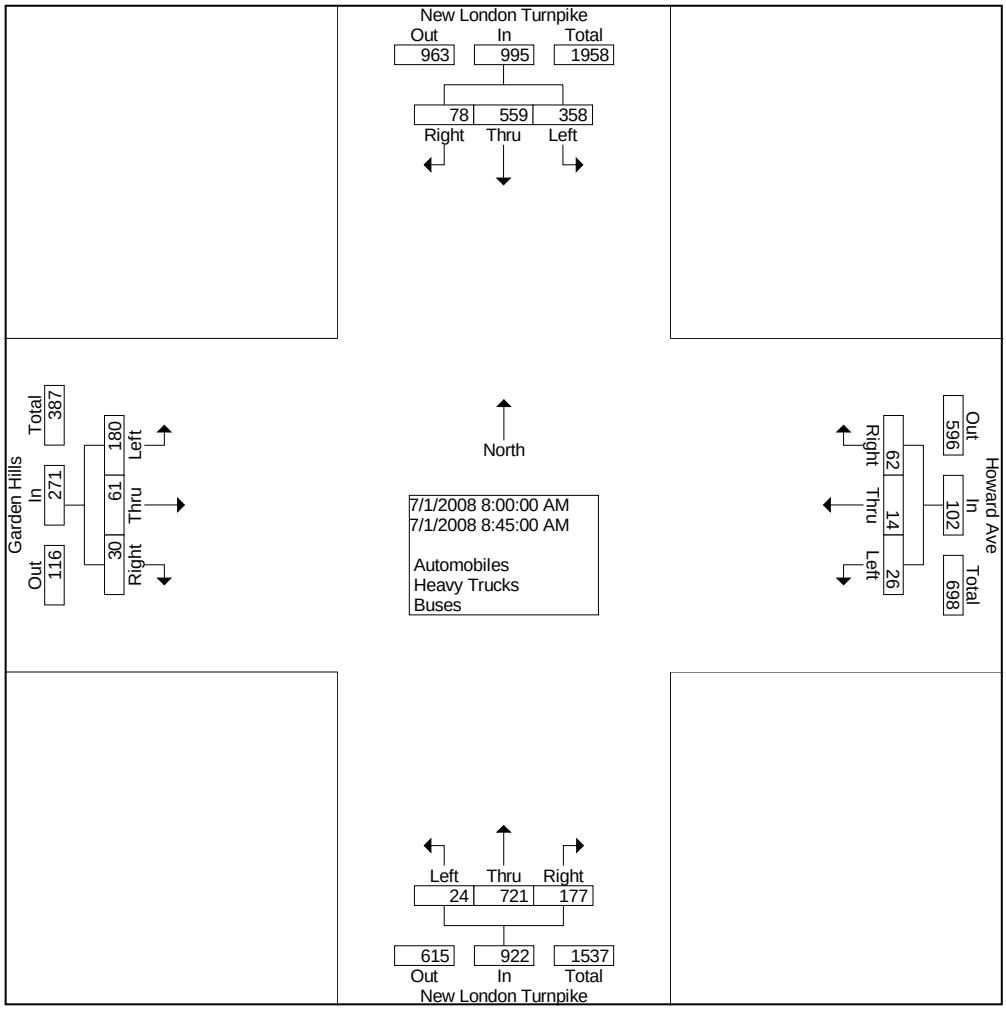
	New London Turnpike Southbound					Howard Ave Westbound					New London Turnpike Northbound					Garden Hills Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0				
07:00 AM	47	61	21	0	129	11	3	25	0	39	13	99	28	0	140	25	7	1	0	33	0	341	341
07:15 AM	29	68	17	0	114	5	3	12	0	20	10	141	18	0	169	37	11	6	0	54	0	357	357
07:30 AM	41	96	17	0	154	4	1	17	0	22	5	180	28	0	213	40	9	4	0	53	0	442	442
07:45 AM	75	138	17	0	230	7	0	9	0	16	6	213	41	0	260	40	17	7	0	64	0	570	570
Total	192	363	72	0	627	27	7	63	0	97	34	633	115	0	782	142	44	18	0	204	0	1710	1710
08:00 AM	52	119	9	1	180	4	4	11	0	19	6	155	36	0	197	45	10	3	0	58	1	454	455
08:15 AM	131	143	21	0	295	6	3	8	0	17	4	210	67	0	281	54	26	8	0	88	0	681	681
08:30 AM	104	134	27	0	265	6	5	20	1	31	7	163	46	0	216	37	15	8	0	60	1	572	573
08:45 AM	71	163	21	0	255	10	2	23	0	35	7	193	28	0	228	44	10	11	0	65	0	583	583
Total	358	559	78	1	995	26	14	62	1	102	24	721	177	0	922	180	61	30	0	271	2	2290	2292
*** BREAK ***																							
11:00 AM	41	161	38	0	240	25	7	35	2	67	7	185	24	0	216	35	6	7	0	48	2	571	573
11:15 AM	28	200	21	0	249	22	4	43	0	69	6	200	18	0	224	24	4	6	0	34	0	576	576
11:30 AM	30	201	11	1	242	21	8	45	0	74	8	218	17	1	243	36	7	12	1	55	3	614	617
11:45 AM	38	193	19	0	250	27	8	66	0	101	16	214	17	0	247	43	5	7	0	55	0	653	653
Total	137	755	89	1	981	95	27	189	2	311	37	817	76	1	930	138	22	32	1	192	5	2414	2419
12:00 PM	48	211	25	1	284	57	13	57	0	127	15	226	23	0	264	22	12	5	0	39	1	714	715
12:15 PM	49	205	24	0	278	38	4	46	0	88	13	199	22	0	234	27	13	3	0	43	0	643	643
12:30 PM	44	227	20	0	291	30	9	39	0	78	4	255	33	0	292	33	16	7	0	56	0	717	717
12:45 PM	62	227	28	1	317	23	3	40	2	66	35	226	36	0	297	41	24	6	0	71	3	751	754
Total	203	870	97	2	1170	148	29	182	2	359	67	906	114	0	1087	123	65	21	0	209	4	2825	2829
01:00 PM	51	196	20	1	267	21	9	38	2	68	10	236	41	2	287	39	8	2	0	49	5	671	676
01:15 PM	56	202	27	0	285	18	5	29	2	52	12	209	40	0	261	33	9	4	0	46	2	644	646
01:30 PM	52	197	25	0	274	17	10	23	0	50	11	247	34	0	292	41	12	3	0	56	0	672	672
01:45 PM	58	214	28	1	300	14	9	46	0	69	6	240	26	0	272	27	10	6	0	43	1	684	685
Total	217	809	100	2	1126	70	33	136	4	239	39	932	141	2	1112	140	39	15	0	194	8	2671	2679
*** BREAK ***																							
04:00 PM	14	291	34	1	339	108	10	109	0	227	15	333	16	0	364	39	2	7	0	48	1	978	979
04:15 PM	10	278	40	0	328	39	6	77	1	122	13	257	6	0	276	47	1	11	0	59	1	785	786
04:30 PM	24	338	36	1	398	23	10	63	2	96	14	322	11	0	347	47	1	10	0	58	3	899	902
04:45 PM	26	338	48	0	412	27	6	37	1	70	10	310	10	0	330	37	6	14	0	57	1	869	870
Total	74	1245	158	2	1477	197	32	286	4	515	52	1222	43	0	1317	170	10	42	0	222	6	3531	3537
05:00 PM	34	369	36	0	439	22	11	36	0	69	13	335	14	0	362	35	3	14	0	52	0	922	922
05:15 PM	39	319	30	0	388	23	3	34	1	60	11	319	9	0	339	49	8	24	0	81	1	868	869
05:30 PM	19	320	24	3	363	16	5	47	0	68	12	304	12	0	328	39	4	3	0	46	3	805	808
05:45 PM	23	250	39	0	312	22	6	32	0	60	13	257	9	0	279	33	1	8	0	42	0	693	693
Total	115	1258	129	3	1502	83	25	149	1	257	49	1215	44	0	1308	156	16	49	0	221	4	3288	3292
Grand Total	1296	5859	723	11	7878	646	167	1067	14	1880	302	6446	710	3	7458	1049	257	207	1	1513	29	18729	18758
Apprch %	16.5	74.4	9.2			34.4	8.9	56.8			4.0	86.4	9.5			69.3	17.0	13.7					
Total %	6.9	31.3	3.9		42.1	3.4	0.9	5.7		10.0	1.6	34.4	3.8		39.8	5.6	1.4	1.1		8.1	0.2	99.8	

RAB Professional Engineers, Inc.
10 Ross Simons Drive
Cranston, Rhode Island 02920

Project: RIDOT Count Intersection
Town: Cranston
Intersection: Howard at Rte 2
Weather: Sunny/Hot

File Name : Howard at New London
Site Code : 00000111
Start Date : 07/01/2008
Page No : 2

	New London Turnpike Southbound				Howard Ave Westbound				New London Turnpike Northbound				Garden Hills Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Intersection	08:00 AM																
Volume	358	559	78	995	26	14	62	102	24	721	177	922	180	61	30	271	2290
Percent	36.0	56.2	7.8		25.5	13.7	60.8		2.6	78.2	19.2		66.4	22.5	11.1		
08:15 Volume	131	143	21	295	6	3	8	17	4	210	67	281	54	26	8	88	681
Peak Factor																	0.841
High Int.	08:15 AM				08:45 AM				08:15 AM				08:15 AM				
Volume	131	143	21	295	10	2	23	35	4	210	67	281	54	26	8	88	
Peak Factor				0.843				0.729				0.820				0.770	

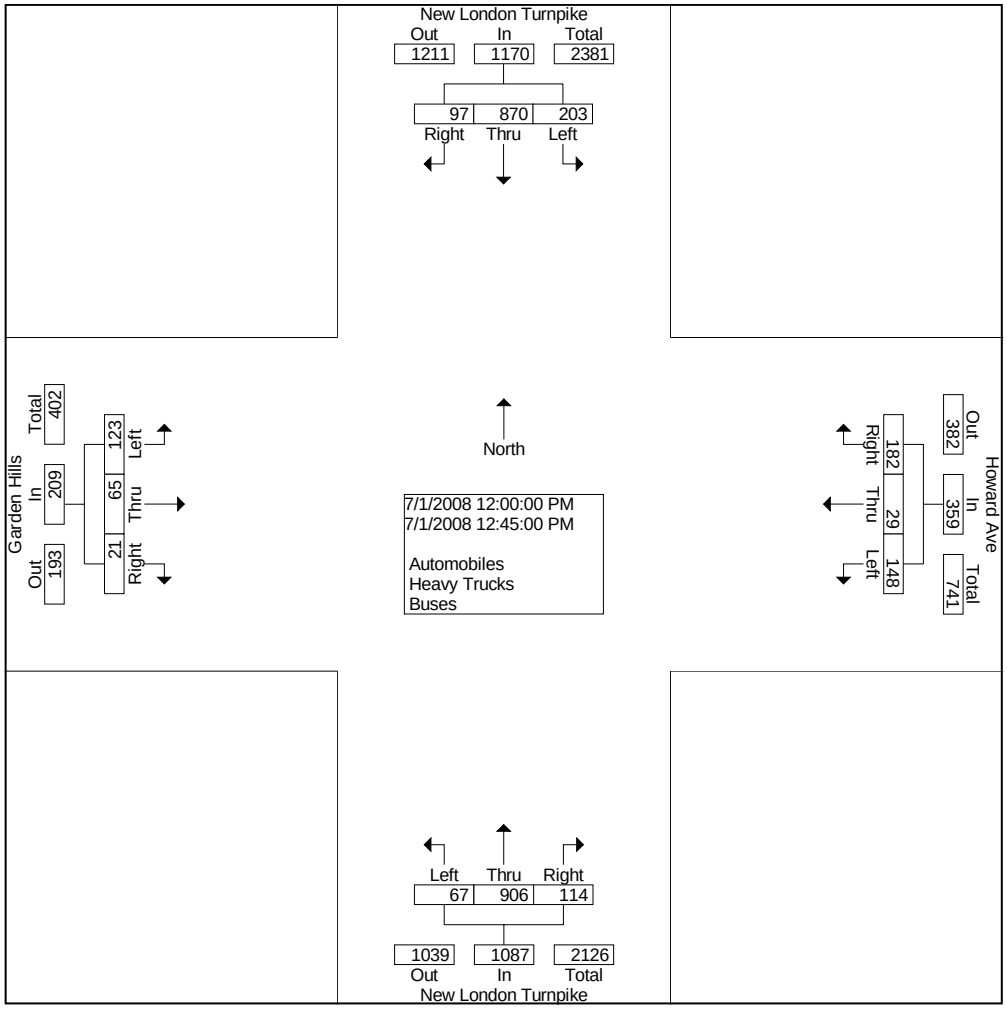


RAB Professional Engineers, Inc.
10 Ross Simons Drive
Cranston, Rhode Island 02920

Project: RIDOT Count Intersection
Town: Cranston
Intersection: Howard at Rte 2
Weather: Sunny/Hot

File Name : Howard at New London
Site Code : 00000111
Start Date : 07/01/2008
Page No : 3

	New London Turnpike Southbound				Howard Ave Westbound				New London Turnpike Northbound				Garden Hills Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Intersection	12:00 PM																
Volume	203	870	97	1170	148	29	182	359	67	906	114	1087	123	65	21	209	2825
Percent	17.4	74.4	8.3		41.2	8.1	50.7		6.2	83.3	10.5		58.9	31.1	10.0		
12:45 Volume	62	227	28	317	23	3	40	66	35	226	36	297	41	24	6	71	751
Peak Factor																	0.940
High Int.	12:45 PM				12:00 PM				12:45 PM				12:45 PM				
Volume	62	227	28	317	57	13	57	127	35	226	36	297	41	24	6	71	
Peak Factor				0.923				0.707				0.915				0.736	

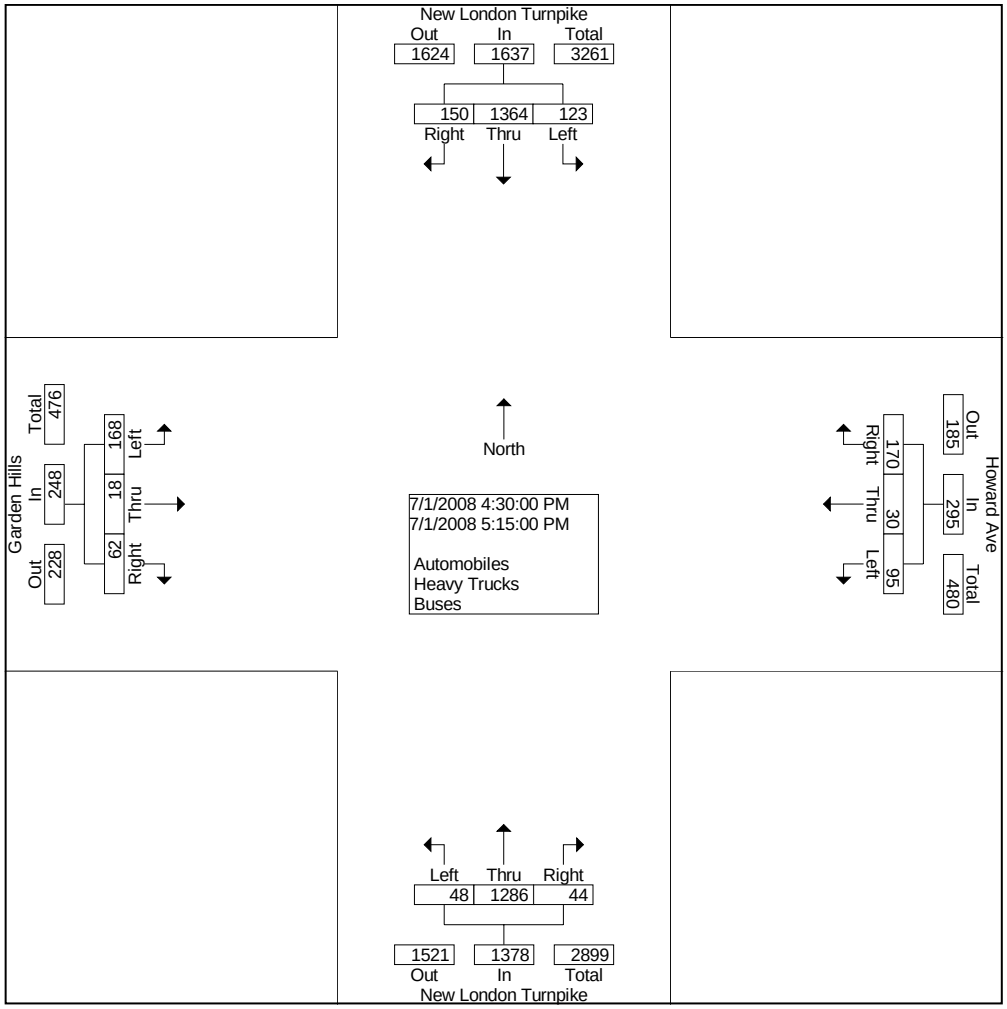


RAB Professional Engineers, Inc.
10 Ross Simons Drive
Cranston, Rhode Island 02920

Project: RIDOT Count Intersection
Town: Cranston
Intersection: Howard at Rte 2
Weather: Sunny/Hot

File Name : Howard at New London
Site Code : 00000111
Start Date : 07/01/2008
Page No : 4

	New London Turnpike Southbound				Howard Ave Westbound				New London Turnpike Northbound				Garden Hills Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Intersection	04:30 PM																
Volume	123	1364	150	1637	95	30	170	295	48	1286	44	1378	168	18	62	248	3558
Percent	7.5	83.3	9.2		32.2	10.2	57.6		3.5	93.3	3.2		67.7	7.3	25.0		
05:00 Volume	34	369	36	439	22	11	36	69	13	335	14	362	35	3	14	52	922
Peak Factor																	0.965
High Int.	05:00 PM				04:30 PM				05:00 PM				05:15 PM				
Volume	34	369	36	439	23	10	63	96	13	335	14	362	49	8	24	81	
Peak Factor				0.932				0.768				0.952				0.765	



Howard Avenue at Slate Hill Drive

(Source; *Proposed Centre at Garden Hills* Traffic Study Report, dated August 2007, by Vanasse Hangen Brustlin, Inc.)

Transportation Data Corporation
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Tel. (781) 587-0086 Fax (781) 587-0189

N: Slate Hill Road
E/W: Howard Avenue
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689C
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

Groups Printed- Cars - Trucks

	Slate Hill Road From North		Howard Avenue From East		Howard Avenue From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
07:00 AM	16	2	3	32	46	10	109
07:15 AM	2	1	6	18	54	16	97
07:30 AM	5	3	3	22	73	30	136
07:45 AM	3	3	6	21	131	46	210
Total	26	9	18	93	304	102	552
08:00 AM	6	4	12	22	97	106	247
08:15 AM	6	1	27	17	140	130	321
08:30 AM	14	5	17	23	113	96	268
08:45 AM	43	17	12	41	88	72	273
Total	69	27	68	103	438	404	1109
Grand Total	95	36	86	196	742	506	1661
Apprch %	72.5	27.5	30.5	69.5	59.5	40.5	
Total %	5.7	2.2	5.2	11.8	44.7	30.5	
Cars	94	36	86	194	739	506	1655
% Cars	98.9	100	100	99	99.6	100	99.6
Trucks	1	0	0	2	3	0	6
% Trucks	1.1	0	0	1	0.4	0	0.4

	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	6	4	10	12	22	34	97	106	203	247
08:15 AM	6	1	7	**27**	17	44	**140**	**130**	**270**	**321**
08:30 AM	14	5	19	17	23	40	113	96	209	268
08:45 AM	**43**	**17**	**60**	12	**41**	**53**	88	72	160	273
Total Volume	69	27	96	68	103	171	438	404	842	1109
% App. Total	71.9	28.1		39.8	60.2		52	48		
PHF	.401	.397	.400	.630	.628	.807	.782	.777	.780	.864

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Client: VHB/T. Welch

File Name : 03689C
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

Groups Printed- Trucks

	Slate Hill Road From North		Howard Avenue From East		Howard Avenue From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
07:00 AM	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0
07:30 AM	1	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0
Total	1	0	0	0	0	0	1
08:00 AM	0	0	0	1	1	0	2
08:15 AM	0	0	0	0	2	0	2
08:30 AM	0	0	0	1	0	0	1
08:45 AM	0	0	0	0	0	0	0
Total	0	0	0	2	3	0	5
Grand Total	1	0	0	2	3	0	6
Apprch %	100	0	0	100	100	0	
Total %	16.7	0	0	33.3	50	0	

	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	**1**	0	**1**	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	**1**	**1**	1	0	1	**2**
08:15 AM	0	0	0	0	0	0	**2**	0	**2**	2
Total Volume	1	0	1	0	1	1	3	0	3	5
% App. Total	100	0		0	100		100	0		
PHF	.250	.000	.250	.000	.250	.250	.375	.000	.375	.625

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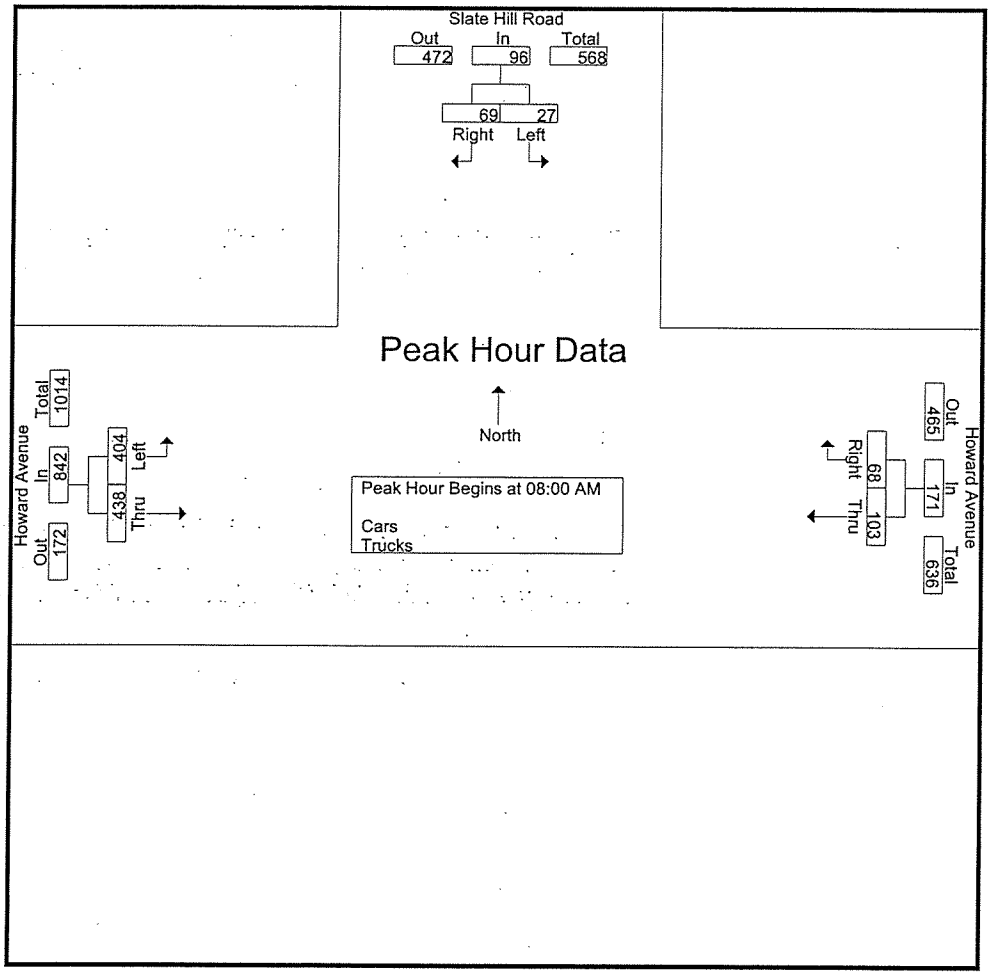
	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	6	4	10	12	22	34	97	106	203	247
08:15 AM	6	1	7	**27**	17	44	**140**	**130**	**270**	**321**
08:30 AM	14	5	19	17	23	40	113	96	209	268
08:45 AM	**43**	**17**	**60**	12	**41**	**53**	88	72	160	273
Total Volume	69	27	96	68	103	171	438	404	842	1109
% App. Total	71.9	28.1		39.8	60.2		52	48		
PHF	.401	.397	.400	.630	.628	.807	.782	.777	.780	.864



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N: Slate Hill Road
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Client: VHB/T. Welch

File Name : 03689CC
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

Groups Printed- Cars - Trucks

	Slate Hill Road From North		Howard Avenue From East		Howard Avenue From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
04:00 PM	76	9	5	132	21	7	250
04:15 PM	39	4	8	74	23	4	152
04:30 PM	73	7	9	68	18	9	184
04:45 PM	37	9	5	56	21	7	135
Total	225	29	27	330	83	27	721
05:00 PM	28	7	6	45	19	5	110
05:15 PM	13	3	6	42	15	4	83
05:30 PM	21	4	3	33	18	3	82
05:45 PM	13	4	7	37	15	8	84
Total	75	18	22	157	67	20	359
Grand Total	300	47	49	487	150	47	1080
Apprch %	86.5	13.5	9.1	90.9	76.1	23.9	
Total %	27.8	4.4	4.5	45.1	13.9	4.4	
Cars	300	47	49	487	149	47	1079
% Cars	100	100	100	100	99.3	100	99.9
Trucks	0	0	0	0	1	0	1
% Trucks	0	0	0	0	0.7	0	0.1

	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	**76**	**9**	**85**	5	**132**	**137**	21	7	**28**	**250**
04:15 PM	39	4	43	8	74	82	**23**	4	27	152
04:30 PM	73	7	80	**9**	68	77	18	**9**	27	184
04:45 PM	37	9	46	5	56	61	21	7	28	135
Total Volume	225	29	254	27	330	357	83	27	110	721
% App. Total	88.6	11.4		7.6	92.4		75.5	24.5		
PHF	.740	.806	.747	.750	.625	.651	.902	.750	.982	.721

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Client: VHB/T. Welch

File Name : 03689CC
Site Code : 03689
Start Date : 2/28/2007
Page No : 1

Groups Printed- Trucks

	Slate Hill Road From North		Howard Avenue From East		Howard Avenue From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
04:00 PM	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	1	0	1
04:30 PM	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	1	0	1
05:00 PM	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Grand Total	0	0	0	0	1	0	1
Apprch %	0	0	0	0	100	0	
Total %	0	0	0	0	100	0	

	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	1	0	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	1	0	1	1
% App. Total	0	0		0	0		100	0		
PHF	.000	.000	.000	.000	.000	.000	.250	.000	.250	.250

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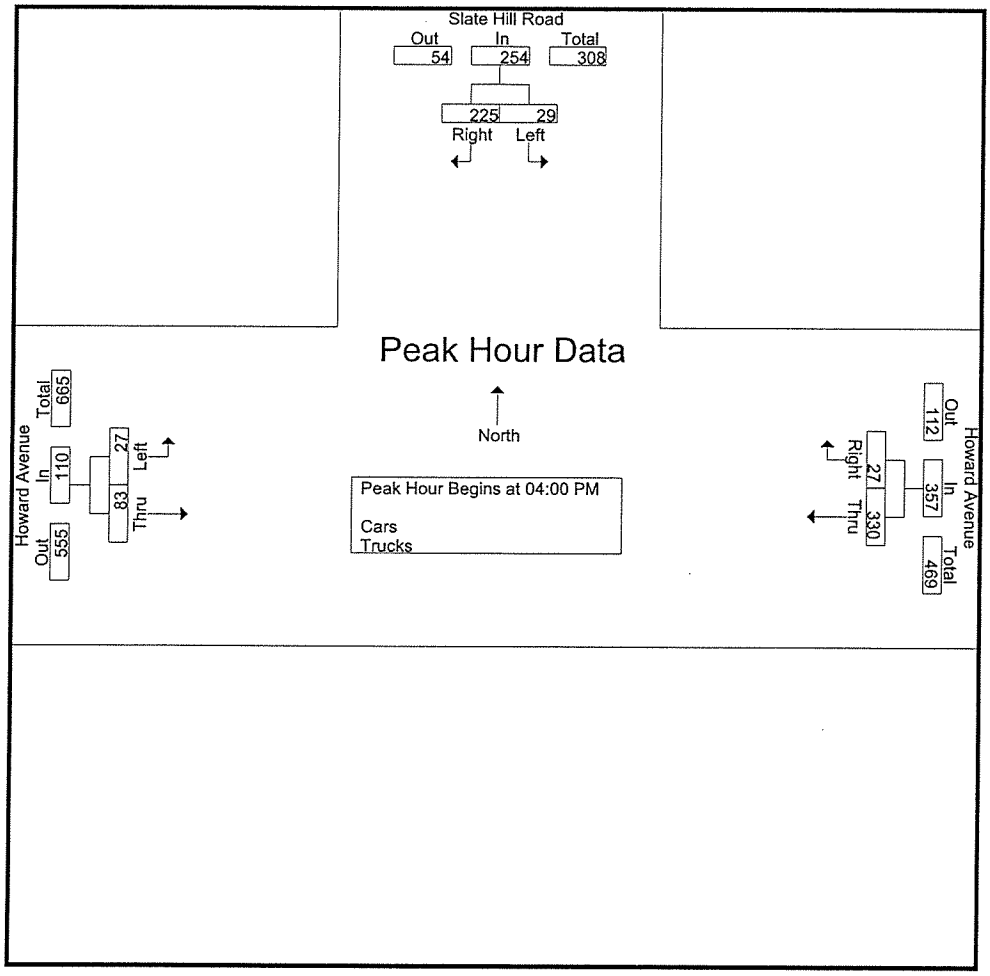
	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	**76**	**9**	**85**	5	**132**	**137**	21	7	**28**	**250**
04:15 PM	39	4	43	8	74	82	**23**	4	27	152
04:30 PM	73	7	80	**9**	68	77	18	**9**	27	184
04:45 PM	37	9	46	5	56	61	21	7	28	135
Total Volume	225	29	254	27	330	357	83	27	110	721
% App. Total	88.6	11.4		7.6	92.4		75.5	24.5		
PHF	.740	.806	.747	.750	.625	.651	.902	.750	.982	.721



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N: Slate Hill Road
E/W: Howard Avenue
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689CCC
Site Code : 03689
Start Date : 3/3/2007
Page No : 1

Groups Printed- Cars - Trucks

	Slate Hill Road From North		Howard Avenue From East		Howard Avenue From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
11:00 AM	4	0	8	33	23	13	81
11:15 AM	2	5	4	21	19	8	59
11:30 AM	6	2	1	19	20	5	53
11:45 AM	6	0	2	15	21	6	50
Total	18	7	15	88	83	32	243
12:00 PM	2	1	4	32	20	5	64
12:15 PM	4	3	5	22	28	10	72
12:30 PM	4	2	8	17	27	12	70
12:45 PM	4	6	14	21	34	17	96
Total	14	12	31	92	109	44	302
01:00 PM	3	5	7	26	28	12	81
01:15 PM	4	1	6	19	26	6	62
01:30 PM	1	0	7	21	23	6	58
01:45 PM	5	1	2	27	27	8	70
Total	13	7	22	93	104	32	271
Grand Total	45	26	68	273	296	108	816
Apprch %	63.4	36.6	19.9	80.1	73.3	26.7	
Total %	5.5	3.2	8.3	33.5	36.3	13.2	
Cars	45	25	67	273	296	108	814
% Cars	100	96.2	98.5	100	100	100	99.8
Trucks	0	1	1	0	0	0	2
% Trucks	0	3.8	1.5	0	0	0	0.2

	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	2	1	3	4	**32**	**36**	20	5	25	64
12:15 PM	**4**	3	7	5	22	27	28	10	38	72
12:30 PM	4	2	6	8	17	25	27	12	39	70
12:45 PM	4	**6**	**10**	**14**	21	35	**34**	**17**	**51**	**96**
Total Volume	14	12	26	31	92	123	109	44	153	302
% App. Total	53.8	46.2		25.2	74.8		71.2	28.8		
PHF	.875	.500	.650	.554	.719	.854	.801	.647	.750	.786

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E/W: Howard Avenue
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689CCC
Site Code : 03689
Start Date : 3/3/2007
Page No : 1

Groups Printed- Trucks

	Slate Hill Road From North		Howard Avenue From East		Howard Avenue From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
11:00 AM	0	0	0	0	0	0	0
11:15 AM	0	1	0	0	0	0	1
11:30 AM	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	1
12:00 PM	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0
12:30 PM	0	0	1	0	0	0	1
12:45 PM	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	1
01:00 PM	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Grand Total	0	1	1	0	0	0	2
Apprch %	0	100	100	0	0	0	
Total %	0	50	50	0	0	0	

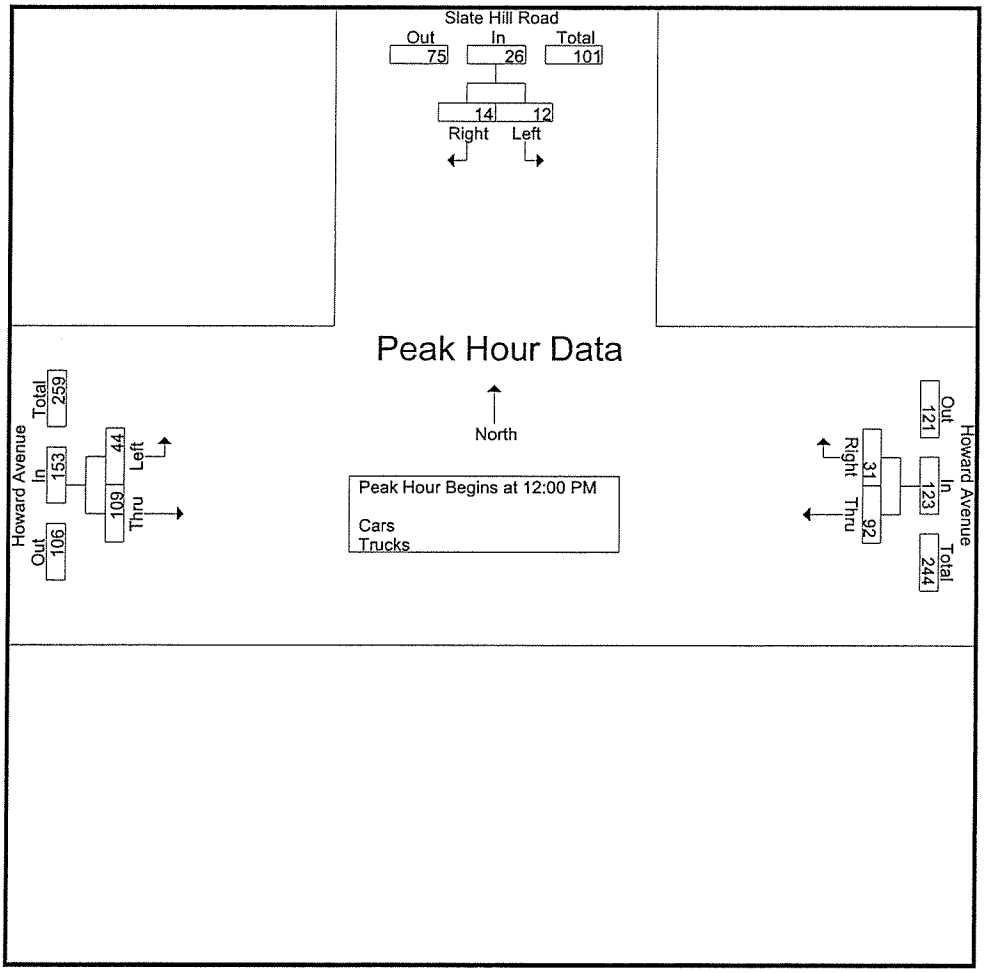
	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:00 AM										
11:00 AM	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	1	1	0	0	0	0	0	0	1
11:30 AM	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	1	0	0	0	0	0	0	1
% App. Total	0	100		0	0		0	0		
PHF	.000	.250	.250	.000	.000	.000	.000	.000	.000	.250

Transportation Data Corporation
P.O. Box 334 Wakefield, MA 01880
Tel. (781) 587-0086 Fax (781) 587-0189

N: Slate Hill Road
E/W: Howard Avenue
City/State: Cranston, RI
Client: VHB/T. Welch

File Name : 03689CCC
Site Code : 03689
Start Date : 3/3/2007
Page No : 1

	Slate Hill Road From North			Howard Avenue From East			Howard Avenue From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	2	1	3	4	**32**	**36**	20	5	25	64
12:15 PM	**4**	3	7	5	22	27	28	10	38	72
12:30 PM	4	2	6	8	17	25	27	12	39	70
12:45 PM	4	**6**	**10**	**14**	21	35	**34**	**17**	**51**	**96**
Total Volume	14	12	26	31	92	123	109	44	153	302
% App. Total	53.8	46.2		25.2	74.8		71.2	28.8		
PHF	.875	.500	.650	.554	.719	.854	.801	.647	.750	.786



Howard Avenue at Slate Hill Drive

(Source; High Hazard Intersections study, dated May 2005, by Fuss & O'Neil, Inc.)

RAB Professional Engineers, Inc.
10 Ross Simons Drive
Cranston, Rhode Island 02920

Project: RIDOT Count Intersection
Town: Cranston
Intersection: Howard at Slate Hill
Weather: Sunny/Hot

File Name : Howard at Slate Hill Rd
Site Code : 00000728
Start Date : 07/02/2008
Page No : 1

Groups Printed- Automobiles - Heavy Trucks - Buses

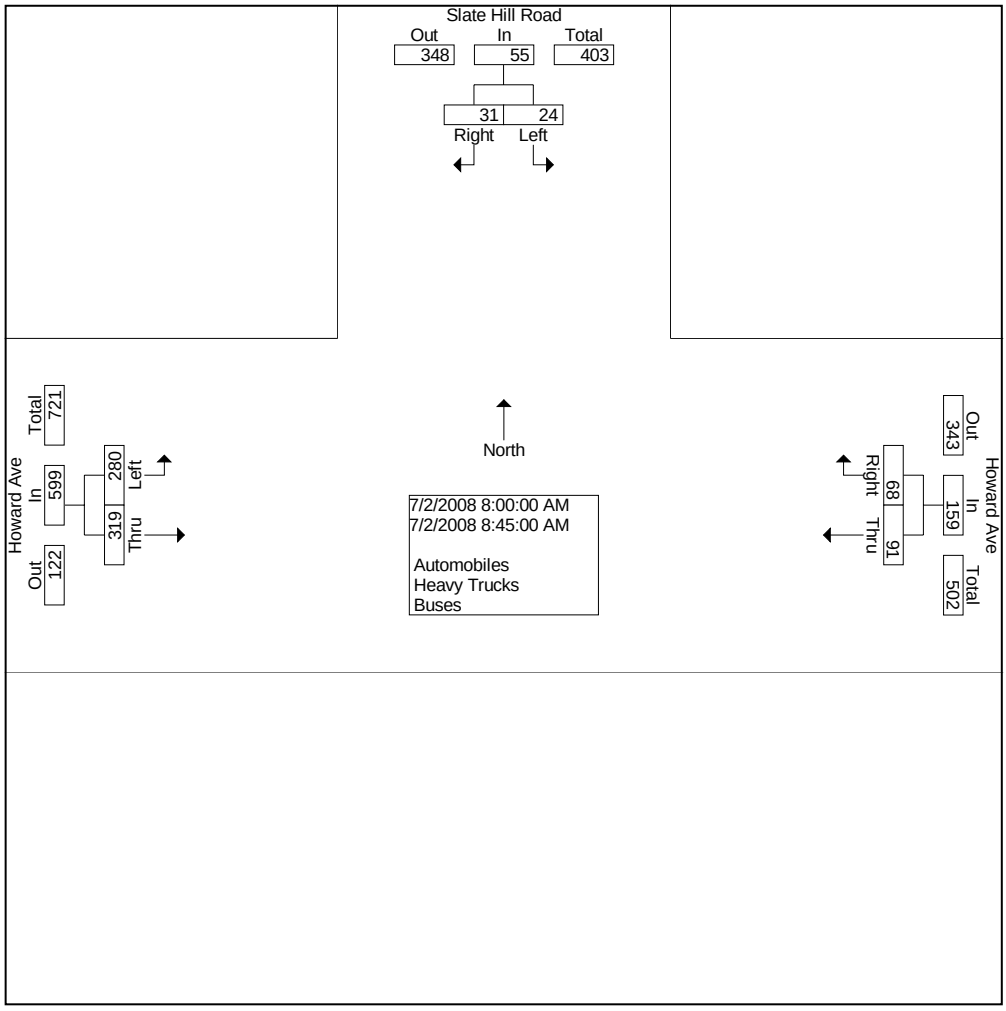
	Slate Hill Road Southbound					Howard Ave Westbound					Northbound					Howard Ave Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0				
07:00 AM	2	0	12	1	14	0	29	5	0	34	0	0	0	0	0	9	41	0	0	50	1	98	99
07:15 AM	1	0	5	0	6	0	22	3	0	25	0	0	0	0	0	23	45	0	1	68	1	99	100
07:30 AM	3	0	3	1	6	0	17	4	0	21	0	0	0	0	0	29	47	0	0	76	1	103	104
07:45 AM	2	0	1	0	3	0	12	7	1	19	0	0	0	0	0	34	80	0	0	114	1	136	137
Total	8	0	21	2	29	0	80	19	1	99	0	0	0	0	0	95	213	0	1	308	4	436	440
08:00 AM	1	0	5	0	6	0	14	10	0	24	0	0	0	0	0	65	78	0	0	143	0	173	173
08:15 AM	5	0	4	1	9	0	24	22	0	46	0	0	0	0	0	102	108	0	0	210	1	265	266
08:30 AM	8	0	16	0	24	0	31	18	0	49	0	0	0	0	0	68	84	0	0	152	0	225	225
08:45 AM	10	0	6	0	16	0	22	18	0	40	0	0	0	0	0	45	49	0	0	94	0	150	150
Total	24	0	31	1	55	0	91	68	0	159	0	0	0	0	0	280	319	0	0	599	1	813	814
*** BREAK ***																							
11:00 AM	12	1	14	0	27	0	37	7	0	44	0	0	0	0	0	28	32	0	1	60	1	131	132
11:15 AM	8	0	20	1	28	0	42	11	0	53	0	0	0	0	0	17	25	2	1	44	2	125	127
11:30 AM	5	0	14	1	19	0	50	7	0	57	0	0	0	0	0	17	44	1	0	62	1	138	139
11:45 AM	20	0	28	1	48	0	63	11	0	74	0	0	0	0	0	15	43	0	0	58	1	180	181
Total	45	1	76	3	122	0	192	36	0	228	0	0	0	0	0	77	144	3	2	224	5	574	579
12:00 PM	9	0	39	1	48	0	78	10	0	88	0	0	0	0	0	22	49	0	1	71	2	207	209
12:15 PM	6	0	24	0	30	0	75	16	0	91	0	0	0	0	0	18	46	1	0	65	0	186	186
12:30 PM	13	0	26	0	39	0	46	12	0	58	0	0	0	1	0	37	59	2	1	98	2	195	197
12:45 PM	15	0	9	0	24	0	58	13	0	71	0	0	0	0	0	36	75	0	0	111	0	206	206
Total	43	0	98	1	141	0	257	51	0	308	0	0	0	1	0	113	229	3	2	345	4	794	798
01:00 PM	7	0	22	1	29	0	43	13	0	56	0	0	0	1	0	32	66	0	0	98	2	183	185
01:15 PM	8	0	21	0	29	0	37	13	0	50	0	0	0	0	0	24	64	0	0	88	0	167	167
01:30 PM	13	0	18	0	31	0	36	10	0	46	0	0	0	0	0	24	32	0	0	56	0	133	133
01:45 PM	11	0	15	0	26	0	35	12	0	47	0	0	0	0	0	13	49	0	0	62	0	135	135
Total	39	0	76	1	115	0	151	48	0	199	0	0	0	1	0	93	211	0	0	304	2	618	620
*** BREAK ***																							
04:00 PM	17	0	57	0	74	0	103	5	0	108	0	0	0	0	0	7	27	0	0	34	0	216	216
04:15 PM	6	0	23	0	29	0	69	4	0	73	0	0	0	0	0	3	14	2	0	19	0	121	121
04:30 PM	1	0	17	0	18	0	78	4	0	82	0	0	0	0	0	5	19	1	0	25	0	125	125
04:45 PM	2	0	23	0	25	0	46	7	0	53	0	0	0	0	0	5	16	0	0	21	0	99	99
Total	26	0	120	0	146	0	296	20	0	316	0	0	0	0	0	20	76	3	0	99	0	561	561
05:00 PM	4	0	21	0	25	0	50	4	0	54	0	0	0	0	0	3	16	1	0	20	0	99	99
05:15 PM	1	0	10	0	11	0	16	7	0	23	0	0	0	0	0	4	25	0	0	29	0	63	63
05:30 PM	0	0	14	0	14	0	32	3	0	35	0	0	0	0	0	4	22	0	0	26	0	75	75
05:45 PM	2	0	15	0	17	0	18	2	0	20	0	0	0	0	0	3	14	0	0	17	0	54	54
Total	7	0	60	0	67	0	116	16	0	132	0	0	0	0	0	14	77	1	0	92	0	291	291
Grand Total	192	1	482	8	675	0	1183	258	1	1441	0	0	0	2	0	692	1269	10	5	1971	16	4087	4103
Apprch %	28.4	0.1	71.4			0.0	82.1	17.9			0.0	0.0	0.0			35.1	64.4	0.5					
Total %	4.7	0.0	11.8		16.5	0.0	28.9	6.3		35.3	0.0	0.0	0.0		0.0	16.9	31.0	0.2		48.2	0.4	99.6	

RAB Professional Engineers, Inc.
10 Ross Simons Drive
Cranston, Rhode Island 02920

Project: RIDOT Count Intersection
Town: Cranston
Intersection: Howard at Slate Hill
Weather: Sunny/Hot

File Name : Howard at Slate Hill Rd
Site Code : 00000728
Start Date : 07/02/2008
Page No : 2

	Slate Hill Road Southbound				Howard Ave Westbound				Northbound				Howard Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Intersection	08:00 AM																
Volume	24	0	31	55	0	91	68	159	0	0	0	0	280	319	0	599	813
Percent	43.6	0.0	56.4		0.0	57.2	42.8		0.0	0.0	0.0		46.7	53.3	0.0		
08:15 Volume	5	0	4	9	0	24	22	46	0	0	0	0	102	108	0	210	265
Peak Factor																	0.767
High Int.	08:30 AM				08:30 AM				6:45:00 AM				08:15 AM				
Volume	8	0	16	24	0	31	18	49	0	0	0	0	102	108	0	210	
Peak Factor				0.573				0.811								0.713	

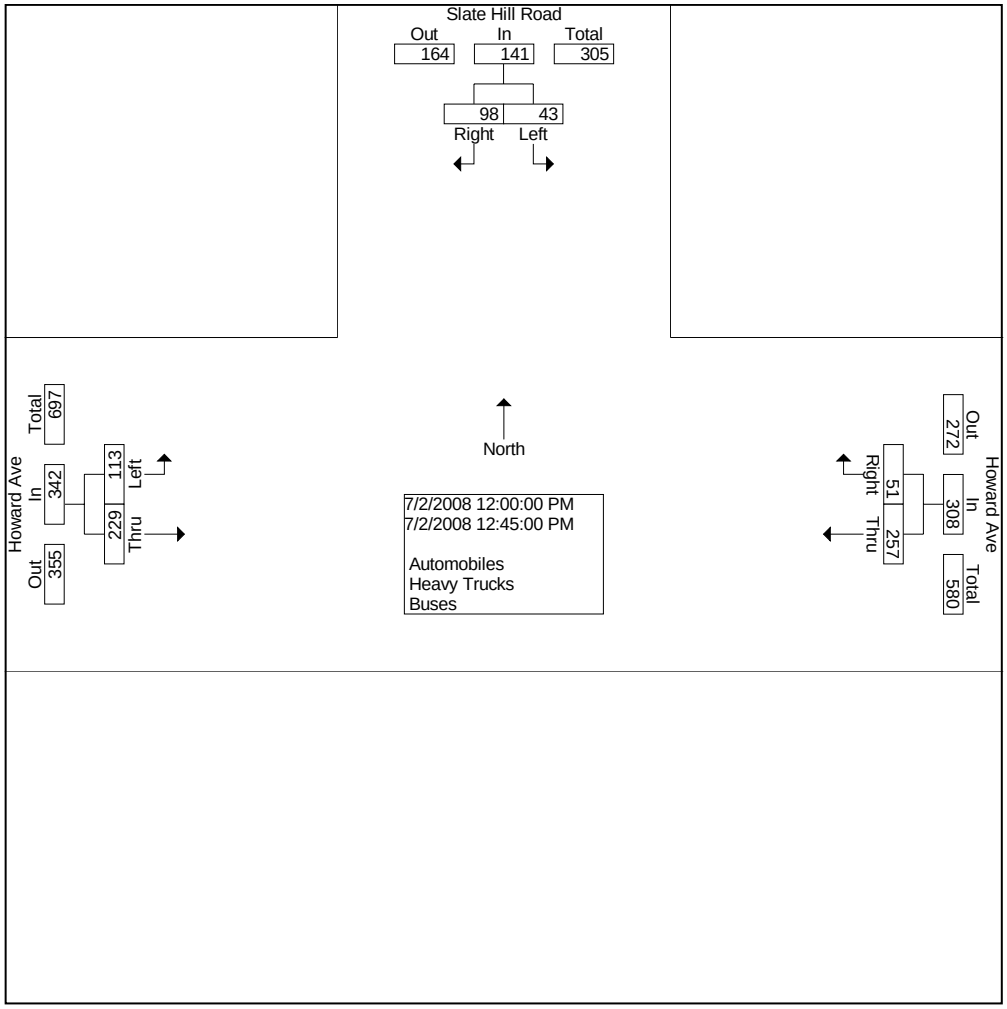


RAB Professional Engineers, Inc.
10 Ross Simons Drive
Cranston, Rhode Island 02920

Project: RIDOT Count Intersection
Town: Cranston
Intersection: Howard at Slate Hill
Weather: Sunny/Hot

File Name : Howard at Slate Hill Rd
Site Code : 00000728
Start Date : 07/02/2008
Page No : 3

	Slate Hill Road Southbound				Howard Ave Westbound				Northbound				Howard Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 10:00 AM to 01:45 PM - Peak 1 of 1																	
Intersection	12:00 PM																
Volume	43	0	98	141	0	257	51	308	0	0	0	0	113	229	3	345	794
Percent	30.5	0.0	69.5		0.0	83.4	16.6		0.0	0.0	0.0		32.8	66.4	0.9		
12:00 Volume	9	0	39	48	0	78	10	88	0	0	0	0	22	49	0	71	207
Peak Factor																	0.959
High Int.	12:00 PM				12:15 PM								12:45 PM				
Volume	9	0	39	48	0	75	16	91	0	0	0	0	36	75	0	111	
Peak Factor				0.734				0.846								0.777	

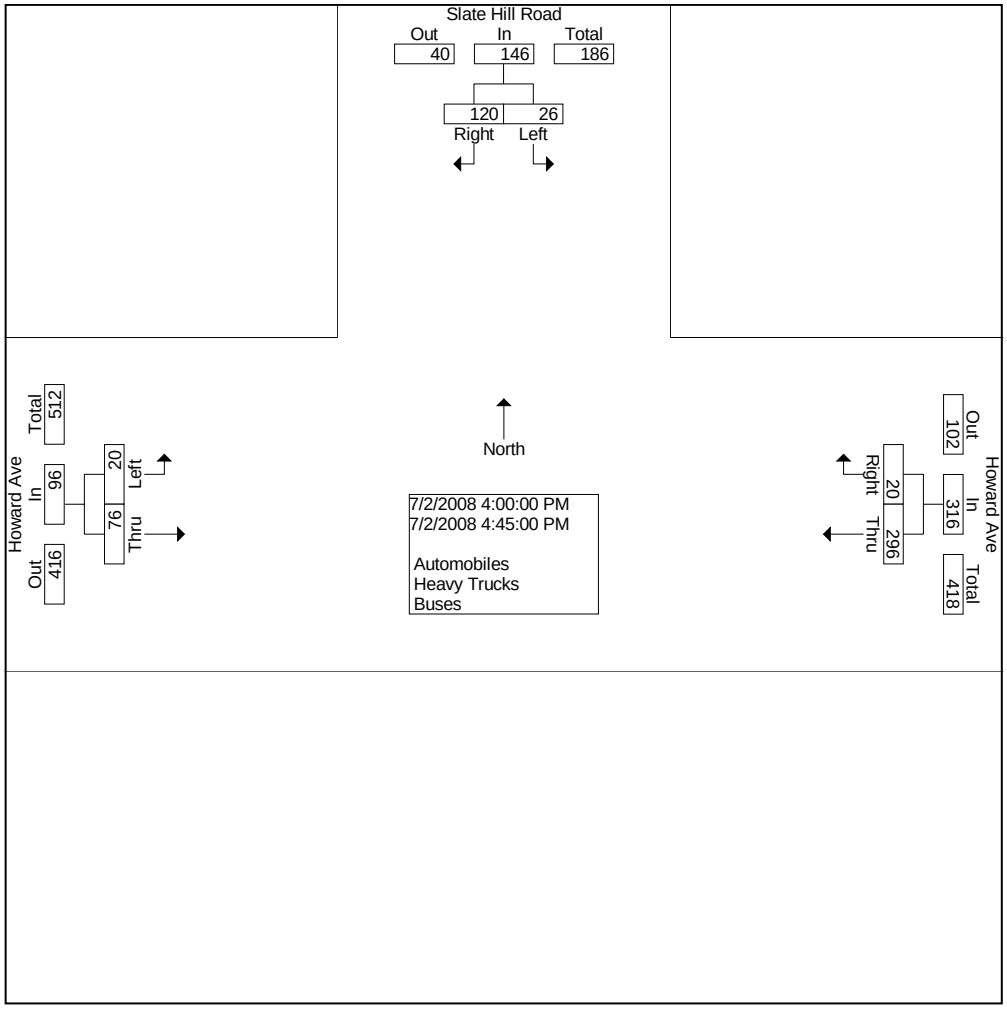


RAB Professional Engineers, Inc.
10 Ross Simons Drive
Cranston, Rhode Island 02920

Project: RIDOT Count Intersection
Town: Cranston
Intersection: Howard at Slate Hill
Weather: Sunny/Hot

File Name : Howard at Slate Hill Rd
Site Code : 00000728
Start Date : 07/02/2008
Page No : 4

	Slate Hill Road Southbound				Howard Ave Westbound				Northbound				Howard Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Intersection 04:00 PM																	
Volume	26	0	120	146	0	296	20	316	0	0	0	0	20	76	3	99	561
Percent	17.8	0.0	82.2		0.0	93.7	6.3		0.0	0.0	0.0		20.2	76.8	3.0		
04:00 Volume	17	0	57	74	0	103	5	108	0	0	0	0	7	27	0	34	216
Peak Factor																	0.649
High Int.	04:00 PM				04:00 PM								04:00 PM				
Volume	17	0	57	74	0	103	5	108	0	0	0	0	7	27	0	34	
Peak Factor				0.493				0.731								0.728	



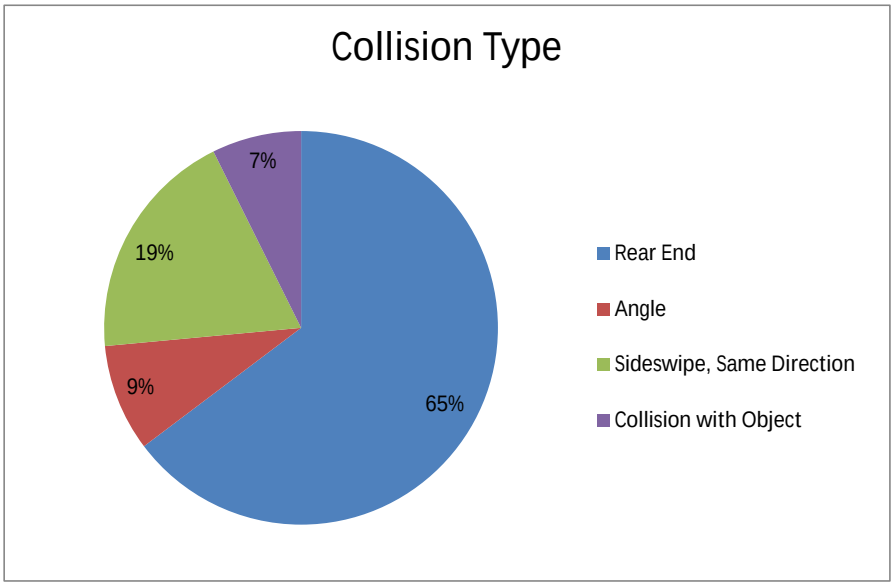
APPENDIX B – Traffic Crash Data

January 2017 through December 2019

New London Avenue (Route 2) – Route 5 overpass to Howard Avenue/Garden Hills Parkway

Accident Data Summary

	Year			Total	Average per Year
	2017	2018	2019		
Corridor					
New London Avenue (Route 2) - Route 5 Overpass to Howard Avenue	0	4	3	7	2
Intersection					
New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway	19	23	18	60	20
Total	19	27	21	67	22



New London Avenue (Route 2) - Route 5 Overpass to Howard Avenue

		2017	2018	2019	Total	Percent
Collision Type						
	Rear End	0	0	1	1	14%
	Angle	0	0	0	0	0%
	Head-On	0	0	0	0	0%
	Pedestrian	0	0	0	0	0%
	Sideswipe, Same Direction	0	2	2	4	57%
	Sideswipe, Opposite Direction	0	0	0	0	0%
	Collision with Object	0	2	0	2	29%
	Collision with Deer	0	0	0	0	0%
	Other	0	0	0	0	0%
	Unknown	0	0	0	0	0%
Accident Severity						
	Property	0	2	2	4	57%
	Injury	0	2	1	3	43%
	Unknown	0	0	0	0	0%
Light Condition						
	Daylight	0	3	2	5	71%
	Dawn	0	0	0	0	0%
	Dusk	0	0	0	0	0%
	Dark - Lighted	0	1	1	2	29%
	Dark - Not Lighted	0	0	0	0	0%
	Dark - Unknown Lighting	0	0	0	0	0%
Road Condition						
	Dry	0	3	3	6	86%
	Wet	0	1	0	1	14%
	Snow	0	0	0	0	0%
	Slush	0	0	0	0	0%
	Ice/Frost	0	0	0	0	0%
	Water	0	0	0	0	0%
	Sand, Mud, Dirt, Oil, Gravel	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	0	0	0	0%
	9:00 AM - 3:00 PM	0	2	2	4	57%
	3:00 PM - 6:00 PM	0	1	1	2	29%
	6:00 PM - 6:00 AM	0	1	0	1	14%
	Total Accidents:	0	4	3	7	

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

		2017	2018	2019	Total	Percent
Collision Type						
	Rear End	15	16	12	43	72%
	Angle	0	1	4	5	8%
	Head-On	0	0	0	0	0%
	Pedestrian	0	0	0	0	0%
	Sideswipe, Same Direction	3	4	2	9	15%
	Sideswipe, Opposite Direction	0	0	0	0	0%
	Collision with Object	1	2	0	3	5%
	Collision with Deer	0	0	0	0	0%
	Other	0	0	0	0	0%
	Unknown	0	0	0	0	0%
Accident Severity						
	Property	15	23	14	52	87%
	Injury	4	0	4	8	13%
	Unknown	0	0	0	0	0%
Light Condition						
	Daylight	18	19	15	52	87%
	Dawn	0	0	0	0	0%
	Dusk	1	0	0	1	2%
	Dark - Lighted	0	4	3	7	12%
	Dark - Not Lighted	0	0	0	0	0%
	Dark - Unknown Lighting	0	0	0	0	0%
Road Condition						
	Dry	14	21	14	49	82%
	Wet	2	2	4	8	13%
	Snow	2	0	0	2	3%
	Slush	1	0	0	1	2%
	Ice/Frost	0	0	0	0	0%
	Water	0	0	0	0	0%
	Sand, Mud, Dirt, Oil, Gravel	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	1	1	1	3	5%
	9:00 AM - 3:00 PM	10	14	8	32	53%
	3:00 PM - 6:00 PM	5	6	7	18	30%
	6:00 PM - 6:00 AM	3	2	2	7	12%
	Total Accidents:	19	23	18	60	

APPENDIX C – Trip Generation

ITE Trip Generation Summary

Site Trip Distribution

COSTCO Trip Generation Estimate Memo (Source; *Kittelson & Associates, October 2020)*

ITE Land Use Code

ITE Land Use Code 210 – Single-Family Detached Housing

ITE Land Use Code 820 – Shopping Center

ITE Land Use Code 912 – Drive-in Bank

ITE Land Use Code 934 – Fast-Food Restaurant with Drive-Through Window

ITE Land Use Code 937 – Coffee/Donut Shop with Drive-Through Window

C

ITE Trip Generation Summary

Trip Generation Summary

Summary;

	Description	Enter	Exit	Total
AM Peak Hour				
Independent Study	COSTCO with Gas Station	169	170	339
ITE Land Use Code 210	Single-Family Detached Housing	6	24	30
ITE Land Use Code 820	Shopping Center	11	8	19
ITE Land Use Code 912	Drive-in Bank	6	4	10
ITE Land Use Code 934	Fast-Food Restaurant with Drive-Through Window	43	42	85
ITE Land Use Code 937	Coffee/Donut Shop with Drive-Through Window	95	92	187
	TOTAL	**330**	**340**	**670**
PM Peak Hour				
Independent Study	COSTCO with Gas Station	374	387	761
ITE Land Use Code 210	Single-Family Detached Housing	26	14	40
ITE Land Use Code 820	Shopping Center	37	40	77
ITE Land Use Code 912	Drive-in Bank	11	10	21
ITE Land Use Code 934	Fast-Food Restaurant with Drive-Through Window	36	33	69
ITE Land Use Code 937	Coffee/Donut Shop with Drive-Through Window	46	46	92
	TOTAL	**530**	**530**	**1060**

	Description	Enter	Exit	Total
Saturday MD Peak Hour				
Independent Study	COSTCO with Gas Station	458	459	917
ITE Land Use Code 210	Single-Family Detached Housing	20	17	37
ITE Land Use Code 820	Shopping Center	47	43	90
ITE Land Use Code 912	Drive-in Bank	14	12	26
ITE Land Use Code 934	Fast-Food Restaurant with Drive-Through Window	58	57	115
ITE Land Use Code 937	Coffee/Donut Shop with Drive-Through Window	93	92	185
	TOTAL	**690**	**680**	**1370**

Proposed Mixed-Use Development

Time Period/ Movement	Gross Trips	Pass-By Trips [1-5]	Internal Capture Trips	Total New Trips
Morning Peak				
Enter	330	137	35	158
Exit	340	133	35	172
Total	**670**	**270**	**70**	**330**
Afternoon Peak				
Enter	530	180	80	270
Exit	530	184	80	266
Total	**1060**	**364**	**160**	**536**
Saturday Peak				
Enter	690	232	not estimated	458
Exit	680	229	not estimated	451
Total	**1370**	**461**	**n/a**	**909**

[1] Pass-By Trips for LUC 820 (25% Weekday AM, PM, and Saturday MD)

[2] Pass-By Trips for LUC 857 (33.3% Weekday AM & PM, 29.3% Saturday MD)*

[3] Pass-By Trips for LUC 912 (25% Weekday AM, PM, Saturday MD)

[4] Pass-By Trips for LUC 934 (40% Weekday AM, PM, Saturday MD)

[5] Pass-By Trips for LUC 937 (60% Weekday AM, PM, Saturday MD)

Source: ITE Trip Generation Handbook, 3rd Edition, 2012

* Source: Kittelson & Associates, 2020

Calculations;

Independent Study COSTCO with Gas Station* (165,000 SF)

Independent Variable (X) = 1000 SF Gross Floor Area X = 165

AM Peak *Directional Distribution: 50% Entering 50% Exiting*

T	=	2.05	x	(X)	Enter:	169
T	=	2.05	x	165	Exit:	170
T	=	339			Total:	339

PM Peak *Directional Distribution: 49% Entering 51% Exiting*

T	=	4.61	x	(X)	Enter:	374
T	=	4.61	x	165	Exit:	387
T	=	761			Total:	761

Sat. MD Peak *Directional Distribution: 50% Entering 50% Exiting*

T	=	5.56	x	(X)	Enter:	458
T	=	5.56	x	165	Exit:	459
T	=	917			Total:	917

* Trip Rate and Directional Distribution based on Independent Study by Kittelson & Associates

ITE Land Use Code 210 Single-Family Detached Housing (40 Dwelling units)

Independent Variable (X) = Number of Dwelling Units X = 40

AM Peak *Directional Distribution: 25% Entering 75% Exiting*

T	=	0.74	x	(X)	Enter:	6
T	=	0.74	x	40	Exit:	24
T	=	30			Total:	30

PM Peak *Directional Distribution: 63% Entering 37% Exiting*

T	=	0.99	x	(X)	Enter:	26
T	=	0.99	x	40	Exit:	14
T	=	40			Total:	40

Sat. MD Peak *Directional Distribution: 54% Entering 46% Exiting*

T	=	0.93	x	(X)	Enter:	20
T	=	0.93	x	40	Exit:	17
T	=	37			Total:	37

ITE Land Use Code 820 Shopping Center (20,000 SF)

Independent Variable (X) = 1000 SF Gross Floor Area X = 20

AM Peak *Directional Distribution:* *62% Entering* *38% Exiting*

T	=	0.94	x	(X)	Enter:	11
T	=	0.94	x	20	Exit:	8
T	=	19			Total:	19

PM Peak *Directional Distribution:* *48% Entering* *52% Exiting*

T	=	3.81	x	(X)	Enter:	37
T	=	3.81	x	20	Exit:	40
T	=	77			Total:	77

Sat. MD Peak *Directional Distribution:* *52% Entering* *48% Exiting*

T	=	4.5	x	(X)	Enter:	47
T	=	4.5	x	20	Exit:	43
T	=	90			Total:	90

ITE Land Use Code 912 Drive-in Bank (1,000 SF)

Independent Variable (X) = 1000 SF Gross Floor Area X = 1

AM Peak *Directional Distribution:* *58% Entering* *42% Exiting*

T	=	9.5	x	(X)	Enter:	6
T	=	9.5	x	1	Exit:	4
T	=	10			Total:	10

PM Peak *Directional Distribution:* *50% Entering* *50% Exiting*

T	=	20.45	x	(X)	Enter:	11
T	=	20.45	x	1	Exit:	10
T	=	21			Total:	21

Sat. MD Peak *Directional Distribution:* *51% Entering* *49% Exiting*

T	=	26.35	x	(X)	Enter:	14
T	=	26.35	x	1	Exit:	12
T	=	26			Total:	26

ITE Land Use Code 934 Fast-Food Restaurant with Drive-Through Window (2,100 SF)

Independent Variable (X) = 1000 SF Gross Floor Area X = 2.1

AM Peak *Directional Distribution:* *51% Entering* *49% Exiting*

T	=	40.19	x	(X)	Enter:	43
T	=	40.19	x	2.1	Exit:	42
T	=	85			Total:	85

PM Peak *Directional Distribution:* *52% Entering* *48% Exiting*

T	=	32.67	x	(X)	Enter:	36
T	=	32.67	x	2.1	Exit:	33
T	=	69			Total:	69

Sat. MD Peak *Directional Distribution:* *51% Entering* *49% Exiting*

T	=	54.86	x	(X)	Enter:	58
T	=	54.86	x	2.1	Exit:	57
T	=	115			Total:	115

ITE Land Use Code 937 Coffee/Donut Shop with Drive-Through Window (2,100 SF)

Independent Variable (X) = 1000 SF Gross Floor Area X = 2.1

AM Peak *Directional Distribution:* *51% Entering* *49% Exiting*

T	=	88.99	x	(X)	Enter:	95
T	=	88.99	x	2.1	Exit:	92
T	=	187			Total:	187

PM Peak *Directional Distribution:* *50% Entering* *50% Exiting*

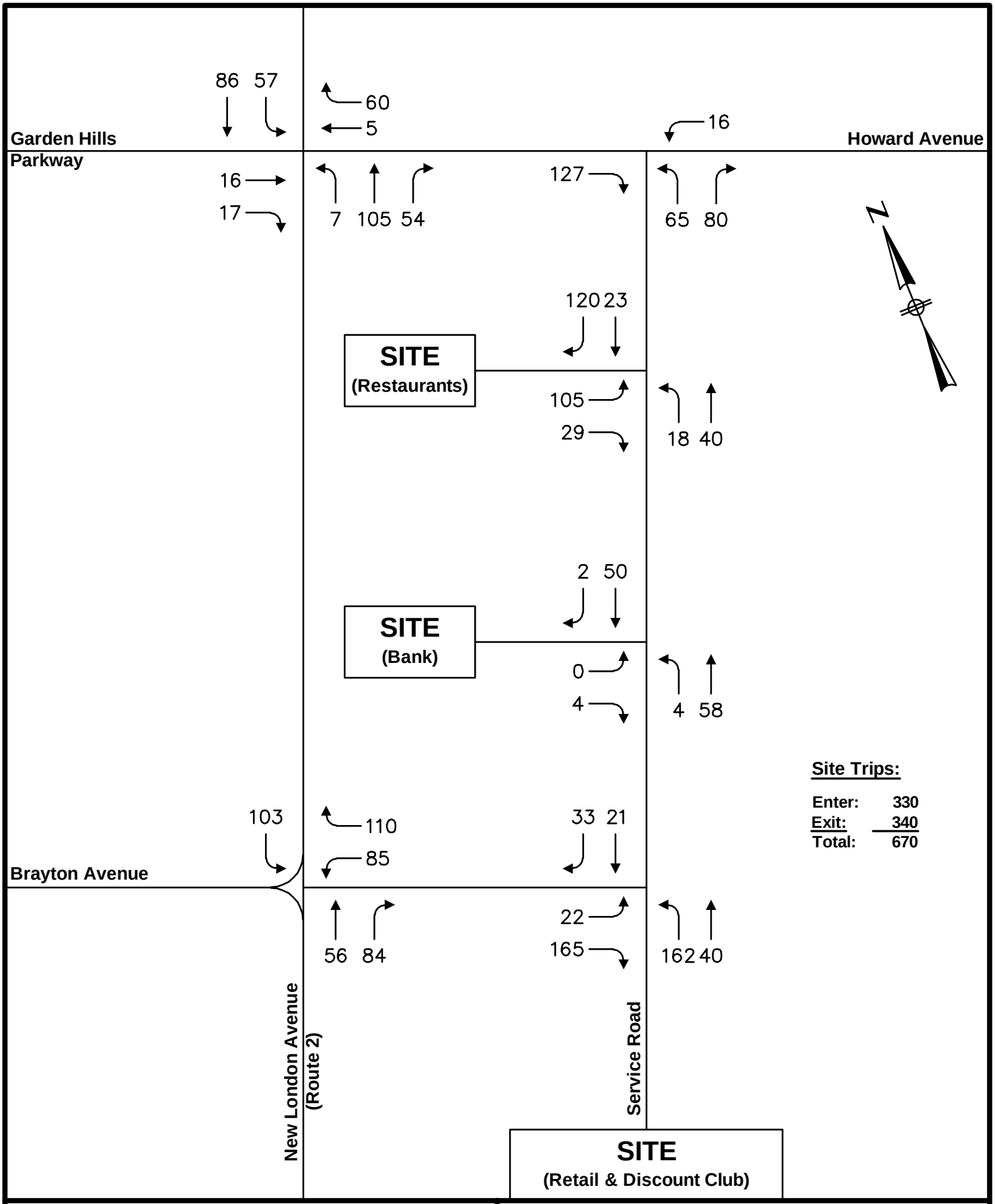
T	=	43.38	x	(X)	Enter:	46
T	=	43.38	x	2.1	Exit:	46
T	=	92			Total:	92

Sat. MD Peak *Directional Distribution:* *50% Entering* *50% Exiting*

T	=	87.70	x	(X)	Enter:	93
T	=	87.70	x	2.1	Exit:	92
T	=	185			Total:	185

C

Site Trip Distribution



BETA

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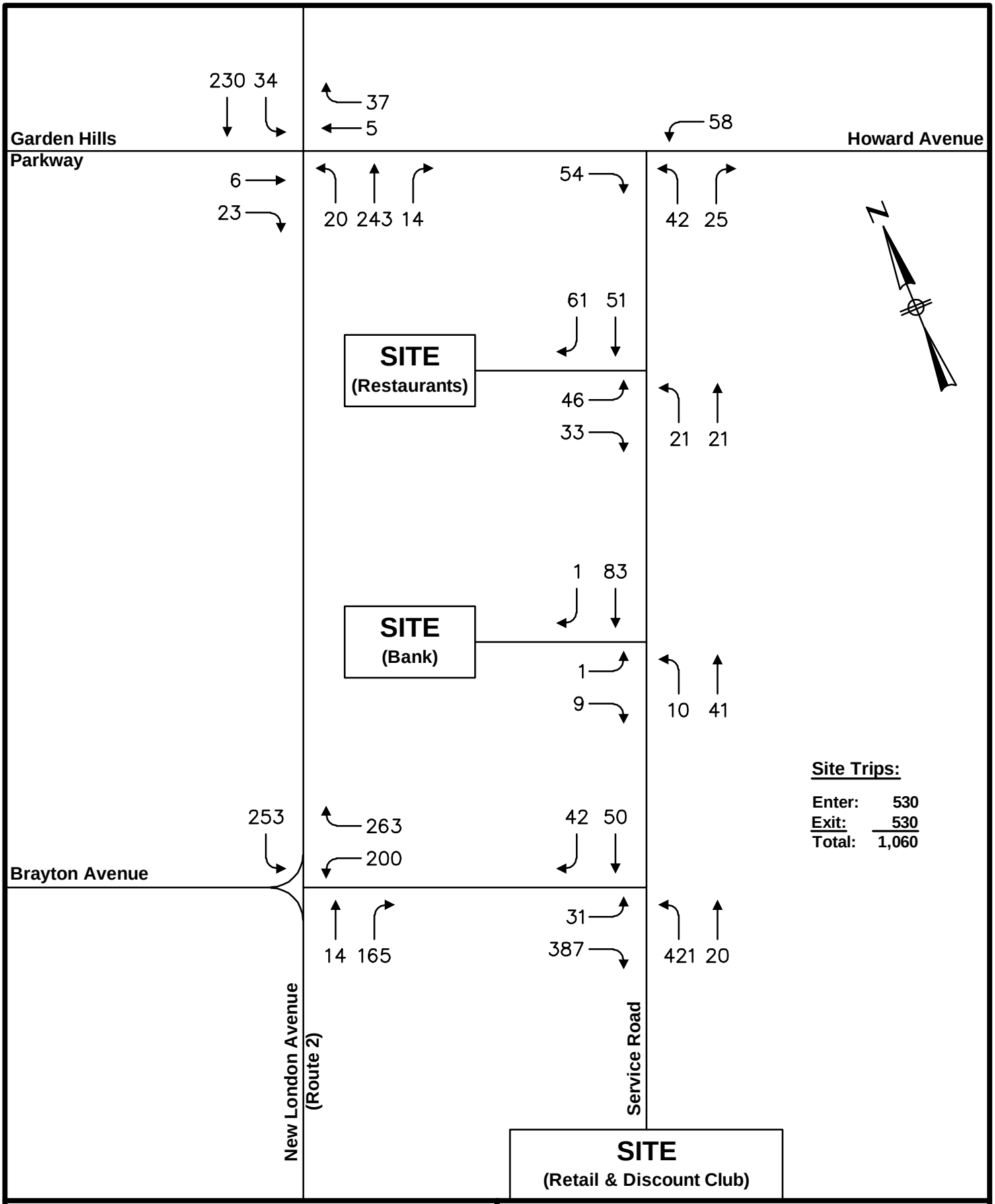
WEEKDAY TRAFFIC DISTRIBUTION
AM PEAK HOUR BUILD

PROPOSED MIXED-USE DEVELOPMENT
CRANSTON, RHODE ISLAND

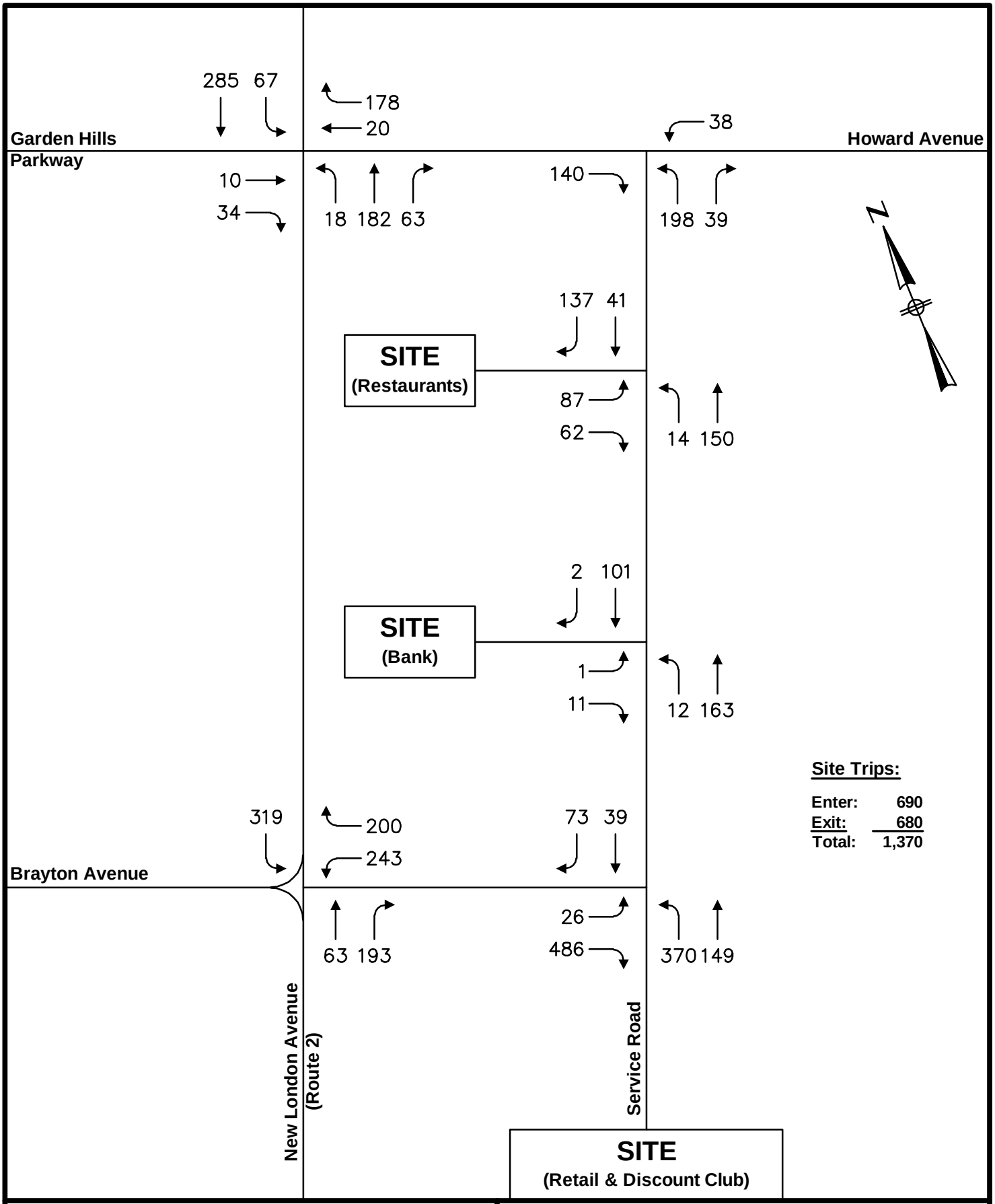


BETA

www.BETA-Inc.com

WEEKDAY TRAFFIC DISTRIBUTION
PM PEAK HOUR BUILD

PROPOSED MIXED-USE DEVELOPMENT
CRANSTON, RHODE ISLAND



BETA

www.BETA-Inc.com

SATURDAY TRAFFIC DISTRIBUTION
MD PEAK HOUR BUILD

PROPOSED MIXED-USE DEVELOPMENT
CRANSTON, RHODE ISLAND

C

COSTCO Trip Generation Estimate Memo (Source; *Kittelson & Associates, October 2020)*

KITTELSON & ASSOCIATES
11480 COMMERCE PARK DRIVE, SUITE 450
RESTON, VA 20191
P 703.885.8970

MEMORANDUM

Date: October 15, 2020 Project #: 24886

To: Mark Marchisano, Costco Wholesale

From: Chris Tiesler & Amelia Martin

Project: Cranston Costco

Subject: Costco Trip Generation Estimate

Costco Wholesale is proposing to develop a Costco warehouse and Costco Gasoline fuel station on property in the development east of New London Avenue in Cranston, Rhode Island. This memorandum provides a summary of the trip generation rates and characteristics of Costco Warehouses with fuel stations based on surveys of similar Costco locations.

PROPOSED DEVELOPMENT PLAN

Costco Wholesale is planning to construct a new warehouse and fuel station as part of a development located east of New London Avenue and south of Howard Avenue in Cranston, Rhode Island. The site is currently occupied by a golf course and would be accessed from the roadway adjacent to New London Avenue, south of Howard Avenue.

The proposed Costco warehouse is anticipated to be approximately 165,000 square-feet and the site will include a three-island fuel station with six fueling positions on each island, for a total of 18 fueling positions. Both the Costco warehouse and Costco Gasoline fuel station will only be available to Costco members.

COSTCO SITE TRIP GENERATION ESTIMATE

Kittelson & Associates, Inc. (Kittelson) has maintained a database of traffic data and travel characteristics for Costco Wholesale for over 20 years. This database includes trip generation studies conducted at Costco Wholesale sites using industry standard engineering practices consistent with guidance provided within the Institute of Transportation Engineers (ITE) standard reference, *Trip Generation Handbook*.

The resulting Costco trip database includes facilities with gas stations and the gas station trips are inherently included in the overall trip generation for the Costco development (warehouse and fuel station). The database includes trip rates, trip type percentages, and parking demand for Costco locations in the United States as well as Canada and Mexico. The database is updated and refined as new Costco traffic counts or information become available to Kittelson.

Costco has invested significant effort into developing this site-specific trip generation database for both their warehouses and their fuel stations because of the unique characteristics of Costco customer travel that exist due to membership requirements and the nature of Costco sales. These unique elements apply to the trip generation and distribution for Costco warehouses, Costco Gasoline fuel stations, and the interaction of trips between the two. Based on the database, Costco sites typically generate higher traffic volumes than other land uses with similar building sizes.

Costco Gasoline fuel stations all function as ancillary uses to the main Costco Warehouses. Like other Costco services, fuel can only be purchased by Costco members. Payment at the Costco fuel stations can only be made with a credit card and, unlike traditional gas/service station operations, there are no other automotive services (such as repairs) or other type of sales (including food or sundries) associated with the Costco Gasoline fuel stations. The Costco Gasoline fuel station will have a minimum of one attendant working at all times. The attendant(s) is responsible for safety, expediting members' use of the fuel positions, directing entering vehicles to available positions, and managing on-site queues.

COSTCO WHOLESALE TRIP GENERATION

The Costco database includes customer survey information to provide the percentage of primary, pass-by, and diverted trips, as further described below.

- Primary Trips (an entirely new trip on the roadway system for the express purpose of driving to and from Costco),
- Pass-by Trips (existing trips that are on roadways adjacent to the site that allow the motorist to turn into the Costco development, and then continue on to their ultimate destination when their shopping is concluded), and
- Diverted Trips (existing trips on nearby roadways in which the motorist makes a decision to drive out-of-direction for a distance to stop at Costco, and when their shopping is concluded, continue on their trip to the ultimate destination).
- Net New Trips: Net new trips represent members (and trips) that are exclusively traveling on the surrounding transportation system with the primary purpose to go to Costco. As such, net new trips do affect the surrounding transportation system. The net new trips are calculated by deducting internal, pass-by, and diverted trips from total trips.

Trip characteristic data was calculated from the Costco database to calculate the percentage of primary trips, pass-by trips and diverted trips. The resulting percentages are shown in **Table 1**.

Table 1. Average Trip Characteristics for a Costco Warehouse with Fuel Station

Trip Type	Weekday PM Peak Hour	Saturday Midday Peak Hour
Primary Trips	*35.1%*	*50.0%*
Pass-by Trips	*33.3%*	*29.3%*
Diverted Trips	*31.5%*	*20.7%*

TRIP GENERATION ESTIMATE

Three existing Costco warehouses with fuel stations were identified in New England to inform the expected trip generation for the Cranston location. Trip generation counts were conducted at the three sites on Thursday, March 12th from 4:00 PM to 7:00 PM and Saturday, March 14th from 11:00 AM to 2:00 PM. It is important to note that activity at the warehouses was high at these times, due to the COVID-19 outbreak. Additional door counts were reviewed for the Brookfield site and extrapolated to adjust the trip generation data.

Table 2 summarizes the trip generation recorded at the three representative Costco warehouses. Note data is not provided for the weekday AM peak hour because Costco warehouses typically open after 10:00 AM on weekdays, meaning there are only Costco fuel station trips during the weekday AM peak hour.

In addition to analyzing the traditional weekday PM peak hour, the Saturday midday data is offered because Costco warehouses typical experience the highest customer volumes during the Saturday midday peak. As shown in **Table 2**, the weekday PM peak hour trip generation was higher at all three sites. This is again likely due to events surrounding the COVID-19 outbreak. This daily spike was more likely tied to the Governor signing an executive order on March 12th that prohibited events with 250 people or more. The raw count data collected at the three sites is included in **Attachment A**.

Table 2. Costco Warehouse with Fuel Station Trip Generation Estimate

		Weekday PM Peak Hour				Saturday Midday Peak Hour			
Location	Size (KSF)	Trip Rate (per KSF)	Total	In	Out	Trip Rate (per KSF)	Total	In	Out
New Britain, CT	148	10.67	1,579	773	806	7.53	1,115	555	560
East Lyme, CT	161	6.62	1,066	531	535	4.96	798	399	399
Brookfield, CT	145	10.97	1,591	777	814	9.35	1,355	673	682
Average	147	9.61	1,412	694 (49%)	718 (51%)	7.41	1,089	542 (50%)	547 (50%)
Average Adjusted for COVID-19	147	4.61	678	333 (49%)	345 (51%)	5.56	817	407 (50%)	410 (50%)

Source: Kittelson & Associates, 2020

Door counts were also obtained at the Brookfield site to account for COVID-19 impacts and the Governor's signing an executive order. Data was obtained for March 2018, March 2019, and the first week of March 2020. Based on the year-to-year comparisons and accounting for general growth in Costco's customer base, it is estimated traffic volumes were 25% higher in March 2020 due to the outbreak.

Door counts for the first week of March 2020 suggest that volumes during the Weekday PM peak hour should represent approximately 83% of the Saturday Midday volumes. This is further supported by historical door counts from 2018 and 2019, as well as Costco's typical experience with other sites. Therefore, the averages in **Table 2** were adjusted so that Saturday peak hour trips were reduced by 25% and Weekday PM peak hour trips were reduced to be approximately 80% of the revised Saturday volume.

Table 3 presents trip generation estimates for the proposed Cranston Costco Warehouse and fuel station based on the data shown in **Table 1** and **Table 2**. The diverted trips in the study area are expected to travel to/from New London Avenue. While treated as new trips at some nearby intersections, diverted trips result in fewer system capacity and environmental impacts as compared to new trips to the system because these trips generally have no impact once traced back onto the system they divert from (New London Avenue in this case).

Table 3. Cranston Costco Warehouse with Fuel Station Trip Generation Estimate

Land Use/Trip Type	Size (KSF)	Weekday PM Peak Hour Trips				Saturday Middy Peak Hour Trips			
		Total Trip Rate (per KSF)	Total	In	Out	Total Trip Rate (per KSF)	Total	In	Out
Costco Warehouse with Fuel Station	165	4.61	761	373	388	5.56	917	458	459
Pass-by Trips (33.3% weekday PM, 29.3% Sat mid)			*253*	*127*	*127*		*269*	*135*	*135*
Diverted Trips (31.5% weekday PM,20.7% Sat mid)			*240*	*120*	*120*		*190*	*95*	*95*
Primary Trips			**268**	**127**	**142**		**458**	**229**	**230**

Source: Kittelson & Associates, 2020

It is our professional judgment that the Costco trip rates derived from the New England United States Costco sites are representative of the expected trip generation for the proposed new Cranston Costco. By comparison, the *Trip Generation Manual* Discount Club data was collected at:

- unidentified retail businesses,
- in unidentified communities,
- at sites that may or may not include on-site fueling pumps,
- and that are located in Alabama, Alberta (Canada), California, Connecticut, Delaware, Florida, Maryland, Massachusetts, Ohio, Oregon, Pennsylvania, and Washington.

We therefore recommend using them for evaluating the impact of the proposed Costco site on the surrounding roadway network. We also note that Costco makes a significant long-term investment in each of their development sites and, as a member-based retailer, it is in Costco's best interest to be certain that transportation facilities that will serve the site are appropriate to facilitate access for members as well as to serve the needs of the surrounding community.

AM PEAK HOUR TRIP GENERATION

The Costco warehouse does not open for members until 10 AM (after the typical weekday AM peak period on the street system). As such, it does not generate significant traffic during the AM peak hour. However, the Costco Gasoline fuel station is open during the weekday AM peak hour. An estimate of the weekday AM peak hour trip generation for the Costco Gasoline fuel station is provided in **Table 4**.

Table 4. Cranston Costco Fuel Station AM Peak Hour Trip Generation Estimate

Land Use/Trip Type	Size	Weekday AM Peak Hour Trips		
		Total	In	Out
Costco Gasoline Fuel Station	18 FP	338	169	169
Internal Trips (0% weekday AM)		*-0*	*-0*	*-0*
Pass-by Trips (36% weekday AM)		*-122*	*-61*	*-61*
Diverted Trips (41% weekday AM)		*-138*	*-69*	*-69*
Net New Trips		**78**	**39**	**39**

Source: Kittelson & Associates, 2020; FP: fueling positions

Please contact us at 571.384.3943 or ctiesler@kittelson.com if you have questions and/or want to discuss this information.

Attachment A

Raw Trip Generation Count Data

Quality Counts
DATA THAT DRIVES COMMUNITIES

Location: Brookfield, CT Costco Warehouse
Date: 3/12/2020 (Thursday)

	Ins			Outs			Total
Start Time	North Dwy	Middle Dwy	South Dwy	North Dwy	Middle Dwy	South Dwy	
4:00 PM	3	55	7	13	47	3	128
4:05 PM	11	43	12	10	53	6	135
4:10 PM	10	36	16	8	39	5	114
4:15 PM	8	46	21	9	58	7	149
4:20 PM	8	40	13	13	41	8	123
4:25 PM	5	54	13	11	44	6	133
4:30 PM	5	48	16	16	35	8	128
4:35 PM	7	38	21	9	45	11	131
4:40 PM	10	45	12	8	53	4	132
4:45 PM	7	49	8	11	50	5	130
4:50 PM	4	39	9	14	43	6	115
4:55 PM	7	41	16	8	41	8	121
5:00 PM	7	46	16	11	38	6	124
5:05 PM	10	43	11	18	49	5	136
5:10 PM	16	43	14	17	42	7	139
5:15 PM	8	36	15	12	50	8	129
5:20 PM	8	47	8	14	58	6	141
5:25 PM	12	52	18	8	49	5	144
5:30 PM	5	41	10	9	56	5	126
5:35 PM	12	47	8	14	43	8	132
5:40 PM	6	45	11	13	55	4	134
5:45 PM	4	38	15	16	43	8	124
5:50 PM	8	40	10	13	39	3	113
5:55 PM	9	38	18	13	55	4	137
6:00 PM	7	47	17	15	48	2	136
6:05 PM	6	38	17	9	39	10	119
6:10 PM	7	42	19	16	44	11	139
6:15 PM	10	36	16	13	51	6	132
6:20 PM	7	53	8	13	49	8	138
6:25 PM	6	47	3	7	45	4	112
6:30 PM	12	57	2	16	46	6	139
6:35 PM	12	48	3	10	39	5	117
6:40 PM	5	63	2	10	37	6	123
6:45 PM	1	44	3	13	44	3	108
6:50 PM	9	49	0	12	30	8	108
6:55 PM	11	48	1	8	27	9	104
Total	**283**	**1622**	**409**	**430**	**1625**	**224**	**4593**

Quality Counts
DATA THAT DRIVES COMMUNITIES

Location: East Lyme, CT Costco Warehouse
Date: 3/12/2020 (Thursday)

	Ins		Outs		
Start Time	North Dwy	South Dwy	North Dwy	South Dwy	Total
4:00 PM	29	10	28	1	68
4:05 PM	15	11	35	4	65
4:10 PM	34	18	39	6	97
4:15 PM	34	17	27	5	83
4:20 PM	27	19	35	5	86
4:25 PM	30	14	30	7	81
4:30 PM	32	17	30	7	86
4:35 PM	25	10	31	12	78
4:40 PM	32	18	37	17	104
4:45 PM	31	10	39	2	82
4:50 PM	31	16	39	6	92
4:55 PM	26	19	30	8	83
5:00 PM	31	11	39	15	96
5:05 PM	21	17	36	5	79
5:10 PM	25	18	33	5	81
5:15 PM	33	15	29	9	86
5:20 PM	25	18	40	10	93
5:25 PM	28	16	47	11	102
5:30 PM	28	16	34	6	84
5:35 PM	32	14	32	6	84
5:40 PM	30	22	33	10	95
5:45 PM	29	8	38	5	80
5:50 PM	25	11	45	12	93
5:55 PM	24	12	33	6	75
6:00 PM	31	16	41	6	94
6:05 PM	24	16	37	9	86
6:10 PM	15	13	30	6	64
6:15 PM	29	15	37	7	88
6:20 PM	18	10	34	3	65
6:25 PM	26	5	33	8	72
6:30 PM	19	12	27	6	64
6:35 PM	20	10	27	9	66
6:40 PM	25	7	33	5	70
6:45 PM	13	7	33	5	58
6:50 PM	18	13	20	3	54
6:55 PM	20	7	34	5	66
Total	**935**	**488**	**1225**	**252**	**2900**

Quality Counts
DATA THAT DRIVES COMMUNITIES

Location: New Britain, CT Costco Warehouse
Date: 3/12/2020 (Thursday)

Start Time	Ins	Outs	Total
4:00 PM	66	65	131
4:05 PM	66	45	111
4:10 PM	64	66	130
4:15 PM	68	59	127
4:20 PM	66	56	122
4:25 PM	62	67	129
4:30 PM	65	51	116
4:35 PM	69	58	127
4:40 PM	61	64	125
4:45 PM	61	65	126
4:50 PM	76	64	140
4:55 PM	69	70	139
5:00 PM	65	69	134
5:05 PM	63	63	126
5:10 PM	66	55	121
5:15 PM	61	65	126
5:20 PM	65	74	139
5:25 PM	61	66	127
5:30 PM	64	57	121
5:35 PM	62	70	132
5:40 PM	68	67	135
5:45 PM	70	49	119
5:50 PM	69	52	121
5:55 PM	60	57	117
6:00 PM	72	65	137
6:05 PM	59	67	126
6:10 PM	71	58	129
6:15 PM	63	72	135
6:20 PM	69	78	147
6:25 PM	58	63	121
6:30 PM	71	60	131
6:35 PM	64	72	136
6:40 PM	62	64	126
6:45 PM	61	72	133
6:50 PM	63	71	134
6:55 PM	60	64	124
Total	**2340**	**2280**	**4620**

Location: Brookfield, CT Costco Warehouse
Date: 3/14/2020 (Saturday)

	Ins			Outs			
Start Time	North Dwy	Middle Dwy	South Dwy	North Dwy	Middle Dwy	South Dwy	Total
11:00 AM	6	40	11	14	31	5	107
11:05 AM	5	28	7	16	36	4	96
11:10 AM	6	44	10	15	45	9	129
11:15 AM	8	37	9	22	32	8	116
11:20 AM	5	40	8	15	44	7	119
11:25 AM	5	37	12	15	36	9	114
11:30 AM	7	40	14	9	30	4	104
11:35 AM	9	33	12	14	40	4	112
11:40 AM	11	46	11	11	32	5	116
11:45 AM	5	40	13	13	35	2	108
11:50 AM	7	33	14	13	43	3	113
11:55 AM	5	42	13	13	39	9	121
12:00 PM	1	35	15	14	35	5	105
12:05 PM	5	28	14	14	25	3	89
12:10 PM	7	28	13	12	37	11	108
12:15 PM	2	22	3	14	28	10	79
12:20 PM	4	35	10	19	34	8	110
12:25 PM	4	40	17	9	41	2	113
12:30 PM	12	35	12	15	31	5	110
12:35 PM	4	28	8	11	31	10	92
12:40 PM	6	30	7	11	24	5	83
12:45 PM	4	30	17	13	24	4	92
12:50 PM	3	24	11	13	40	5	96
12:55 PM	6	29	12	12	41	4	104
1:00 PM	11	30	13	18	25	6	103
1:05 PM	9	21	11	15	36	5	97
1:10 PM	2	24	9	13	26	10	84
1:15 PM	6	27	10	15	21	2	81
1:20 PM	5	33	13	11	27	6	95
1:25 PM	4	35	5	16	33	4	97
1:30 PM	6	33	11	16	24	8	98
1:35 PM	2	33	10	8	24	3	80
1:40 PM	3	34	10	14	23	6	90
1:45 PM	2	29	9	17	30	7	94
1:50 PM	5	37	14	14	31	5	106
1:55 PM	8	23	11	10	41	8	101
Total	**200**	**1183**	**399**	**494**	**1175**	**211**	**3662**

Quality Counts
DATA THAT DRIVES COMMUNITIES

Location: East Lyme, CT Costco Warehouse
Date: 3/14/2020 (Saturday)

	Ins		Outs		
Start Time	North Dwy	South Dwy	North Dwy	South Dwy	Total
11:00 AM	21	6	16	5	48
11:05 AM	26	10	30	7	73
11:10 AM	22	16	29	9	76
11:15 AM	19	13	18	6	56
11:20 AM	21	10	34	8	73
11:25 AM	21	15	30	5	71
11:30 AM	23	10	26	3	62
11:35 AM	15	10	24	5	54
11:40 AM	26	11	33	2	72
11:45 AM	28	14	28	5	75
11:50 AM	22	18	25	2	67
11:55 AM	15	9	28	3	55
12:00 PM	14	11	35	4	64
12:05 PM	10	5	36	6	57
12:10 PM	27	10	26	5	68
12:15 PM	21	16	31	9	77
12:20 PM	25	10	31	7	73
12:25 PM	18	5	26	4	53
12:30 PM	21	13	31	4	69
12:35 PM	24	12	19	4	59
12:40 PM	29	11	22	3	65
12:45 PM	13	19	20	5	57
12:50 PM	8	7	28	3	46
12:55 PM	16	10	30	4	60
1:00 PM	22	8	24	4	58
1:05 PM	22	14	27	8	71
1:10 PM	22	8	30	6	66
1:15 PM	28	15	37	3	83
1:20 PM	14	12	31	5	62
1:25 PM	13	13	27	4	57
1:30 PM	31	12	28	5	76
1:35 PM	20	9	23	3	55
1:40 PM	16	14	25	4	59
1:45 PM	16	6	22	2	46
1:50 PM	14	14	29	8	65
1:55 PM	16	7	29	5	57
Total	**719**	**403**	**988**	**175**	**2285**

Quality Counts
DATA THAT DRIVES COMMUNITIES

Location: New Britain, CT Costco Warehouse
Date: 3/14/2020 (Saturday)

Start Time	Ins	Outs	Total
11:00 AM	62	45	107
11:05 AM	44	54	98
11:10 AM	43	52	95
11:15 AM	54	59	113
11:20 AM	43	48	91
11:25 AM	39	35	74
11:30 AM	47	48	95
11:35 AM	38	46	84
11:40 AM	51	35	86
11:45 AM	51	43	94
11:50 AM	39	47	86
11:55 AM	44	48	92
12:00 PM	36	43	79
12:05 PM	39	47	86
12:10 PM	41	46	87
12:15 PM	33	41	74
12:20 PM	42	42	84
12:25 PM	32	44	76
12:30 PM	45	41	86
12:35 PM	45	42	87
12:40 PM	28	35	63
12:45 PM	48	51	99
12:50 PM	35	41	76
12:55 PM	45	45	90
1:00 PM	35	59	94
1:05 PM	36	42	78
1:10 PM	38	32	70
1:15 PM	50	37	87
1:20 PM	28	37	65
1:25 PM	30	42	72
1:30 PM	31	29	60
1:35 PM	37	42	79
1:40 PM	36	44	80
1:45 PM	36	39	75
1:50 PM	41	34	75
1:55 PM	22	44	66
Total	**1444**	**1559**	**3003**

C

ITE Land Use Code

ITE Land Use Code 210 – Single-Family Detached Housing

ITE Land Use Code 820 – Shopping Center

ITE Land Use Code 912 – Drive-in Bank

ITE Land Use Code 934 – Fast-Food Restaurant with Drive-Through Window

ITE Land Use Code 937 – Coffee/Donut Shop with Drive-Through Window

ITE Land Use Code 210 – Single-Family Detached Housing

Land Use: 210
Single-Family Detached Housing

Description

Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.

Additional Data

The number of vehicles and residents had a high correlation with average weekday vehicle trip ends. The use of these variables was limited, however, because the number of vehicles and residents was often difficult to obtain or predict. The number of dwelling units was generally used as the independent variable of choice because it was usually readily available, easy to project, and had a high correlation with average weekday vehicle trip ends.

This land use included data from a wide variety of units with different sizes, price ranges, locations, and ages. Consequently, there was a wide variation in trips generated within this category. Other factors, such as geographic location and type of adjacent and nearby development, may also have had an effect on the site trip generation.

Single-family detached units had the highest trip generation rate per dwelling unit of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than other residential land uses; they were generally located farther away from shopping centers, employment areas, and other trip attractors than other residential land uses; and they generally had fewer alternative modes of transportation available because they were typically not as concentrated as other residential land uses.

Time-of-day distribution data for this land use are presented in Appendix A. For the six general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:00 and 5:00 p.m., respectively. For the two sites with Saturday data, the overall highest vehicle volume was counted between 3:00 and 4:00 p.m. For the one site with Sunday data, the overall highest vehicle volume was counted between 10:15 and 11:15 a.m.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Illinois, Indiana, Maryland, Minnesota, Montana, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 903, 925, 936

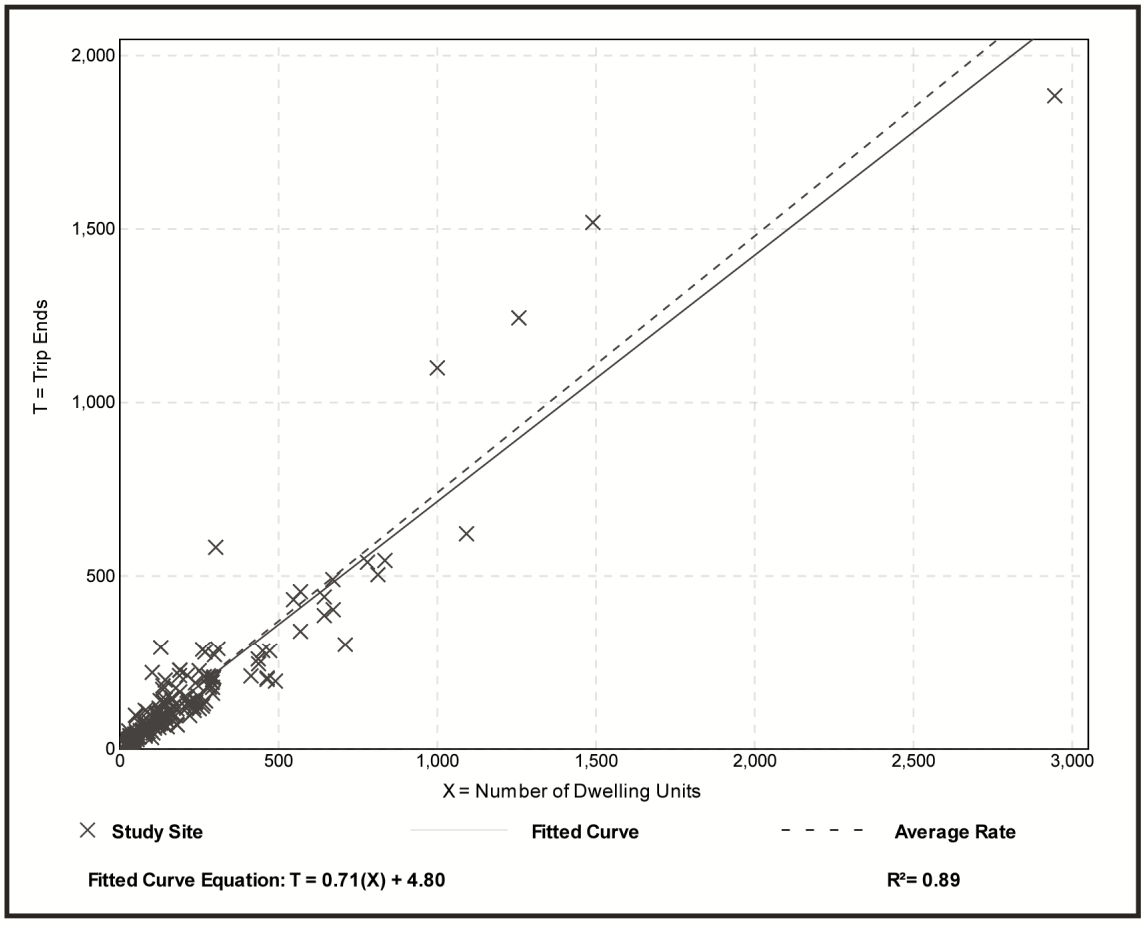
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
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: 173
Avg. Num. of Dwelling Units: 219
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



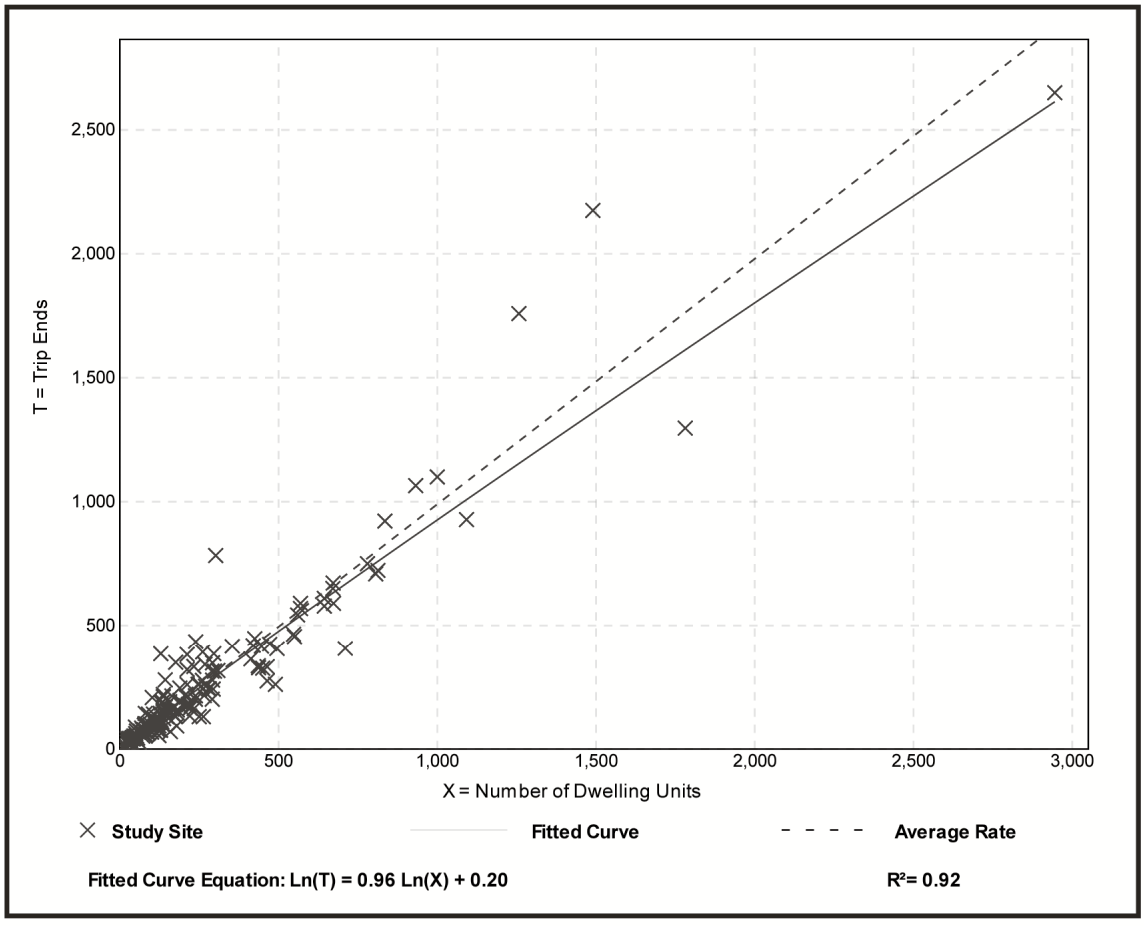
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
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: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Single-Family Detached Housing
(210)

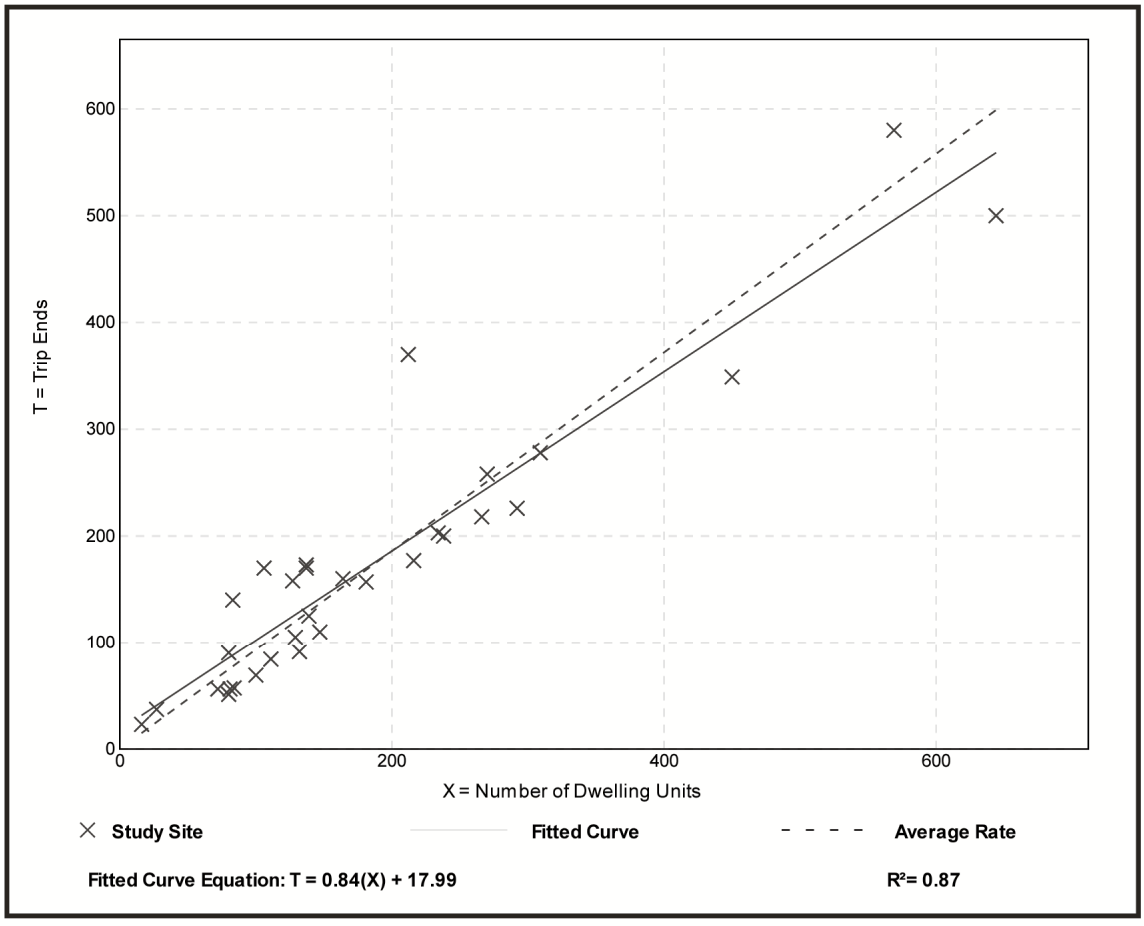
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 31
Avg. Num. of Dwelling Units: 188
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.93	0.64 - 1.75	0.26

Data Plot and Equation



ITE Land Use Code 820 – Shopping Center

Land Use: 820
Shopping Center

Description

A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands. Factory outlet center (Land Use 823) is a related use.

Additional Data

Shopping centers, including neighborhood centers, community centers, regional centers, and super regional centers, were surveyed for this land use. Some of these centers contained non-merchandising facilities, such as office buildings, movie theaters, restaurants, post offices, banks, health clubs, and recreational facilities (for example, ice skating rinks or indoor miniature golf courses).

Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied included peripheral buildings, it can be assumed that some of the data show their effect.

The vehicle trips generated at a shopping center are based upon the total GLA of the center. In cases of smaller centers without an enclosed mall or peripheral buildings, the GLA could be the same as the gross floor area of the building.

Time-of-day distribution data for this land use are presented in Appendix A. For the 10 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 11:45 a.m. and 12:45 p.m. and 12:15 and 1:15 p.m., respectively.

The average numbers of person trips per vehicle trip at the 27 general urban/suburban sites at which both person trip and vehicle trip data were collected were as follows:

- 1.31 during Weekday, AM Peak Hour of Generator
- 1.43 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 1.46 during Weekday, PM Peak Hour of Generator

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), British Columbia (CAN), California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Nevada, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

Source Numbers

105, 110, 154, 156, 159, 186, 190, 198, 199, 202, 204, 211, 213, 239, 251, 259, 260, 269, 294, 295, 299, 300, 301, 304, 305, 307, 308, 309, 310, 311, 314, 315, 316, 317, 319, 358, 365, 376, 385, 390, 400, 404, 414, 420, 423, 428, 437, 440, 442, 444, 446, 507, 562, 580, 598, 629, 658, 702, 715, 728, 868, 870, 871, 880, 899, 908, 912, 915, 926, 936, 944, 946, 960, 961, 962, 973, 974, 978

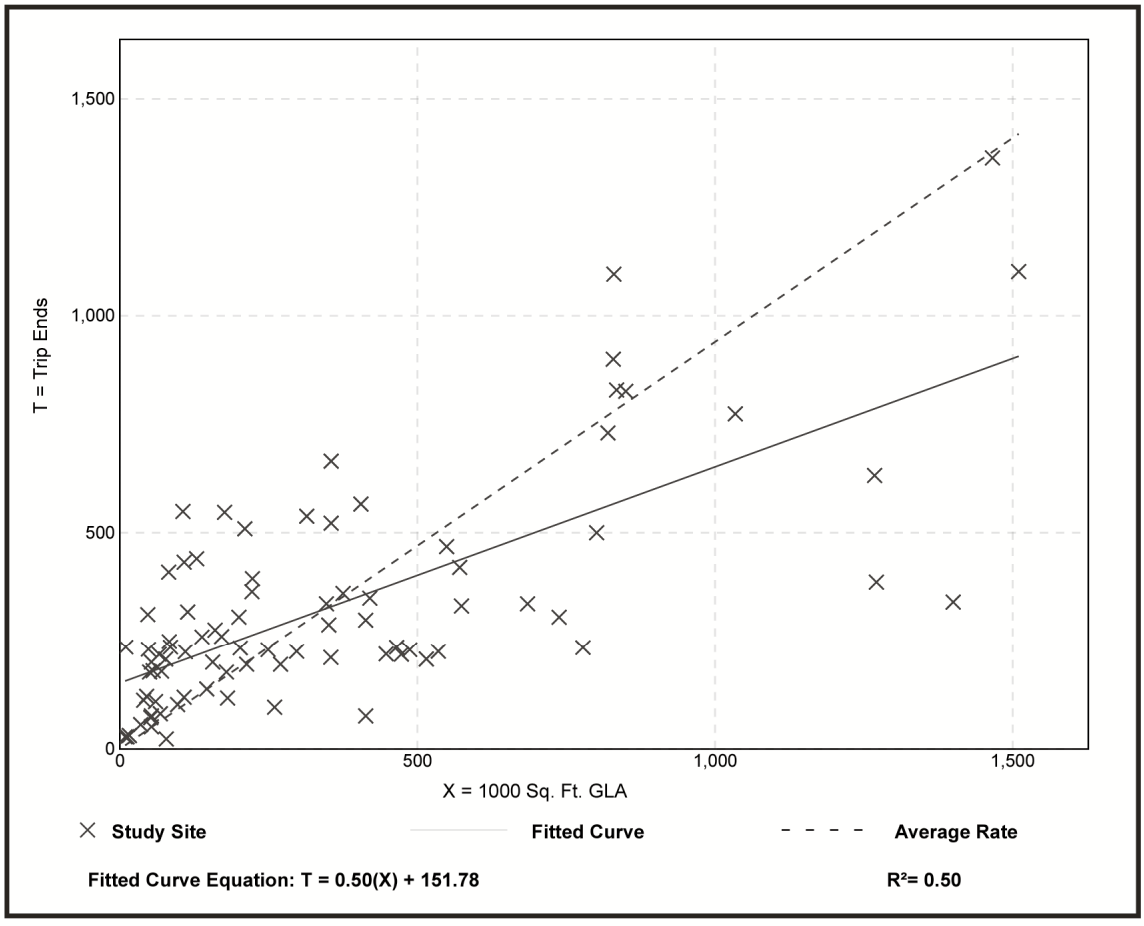
Shopping Center
(820)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
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: 84
1000 Sq. Ft. GLA: 351
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

Data Plot and Equation



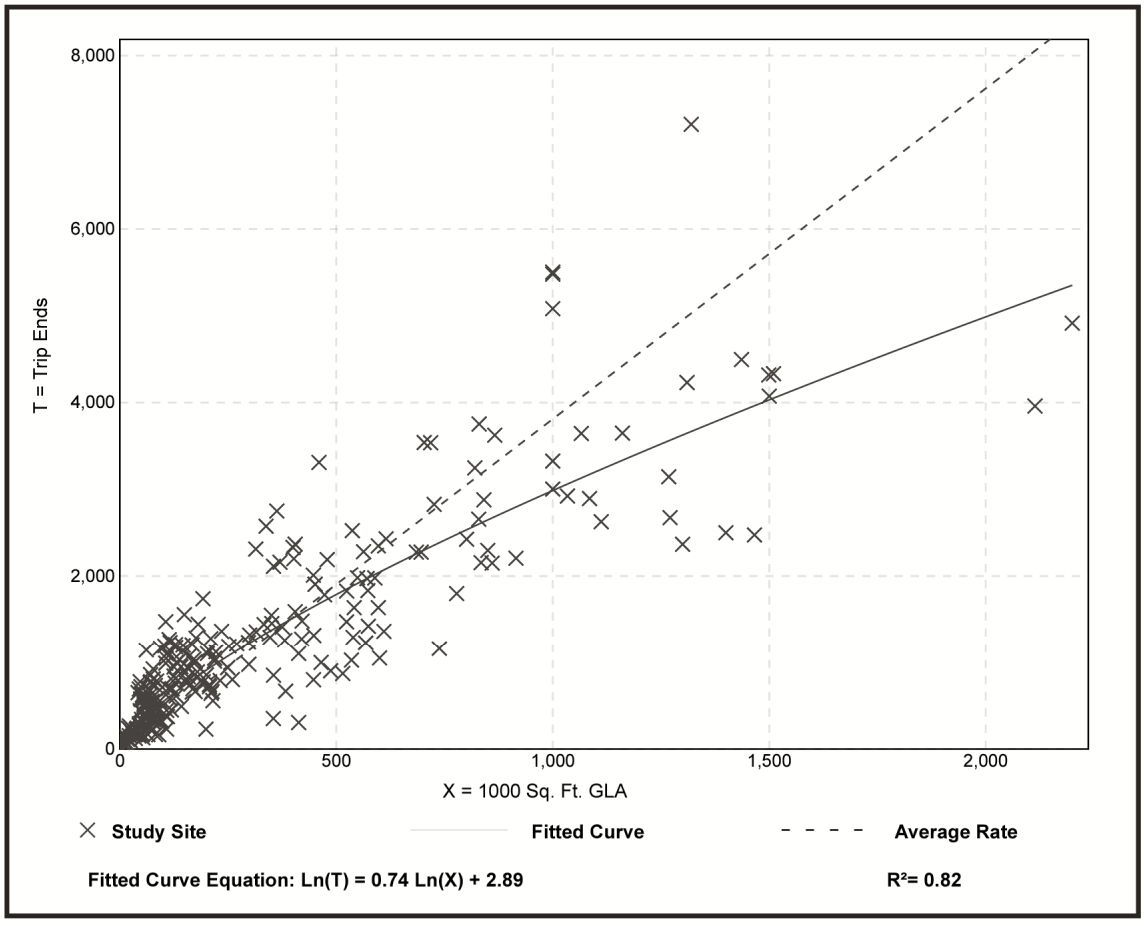
Shopping Center
(820)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
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: 261
1000 Sq. Ft. GLA: 327
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation



Shopping Center
(820)

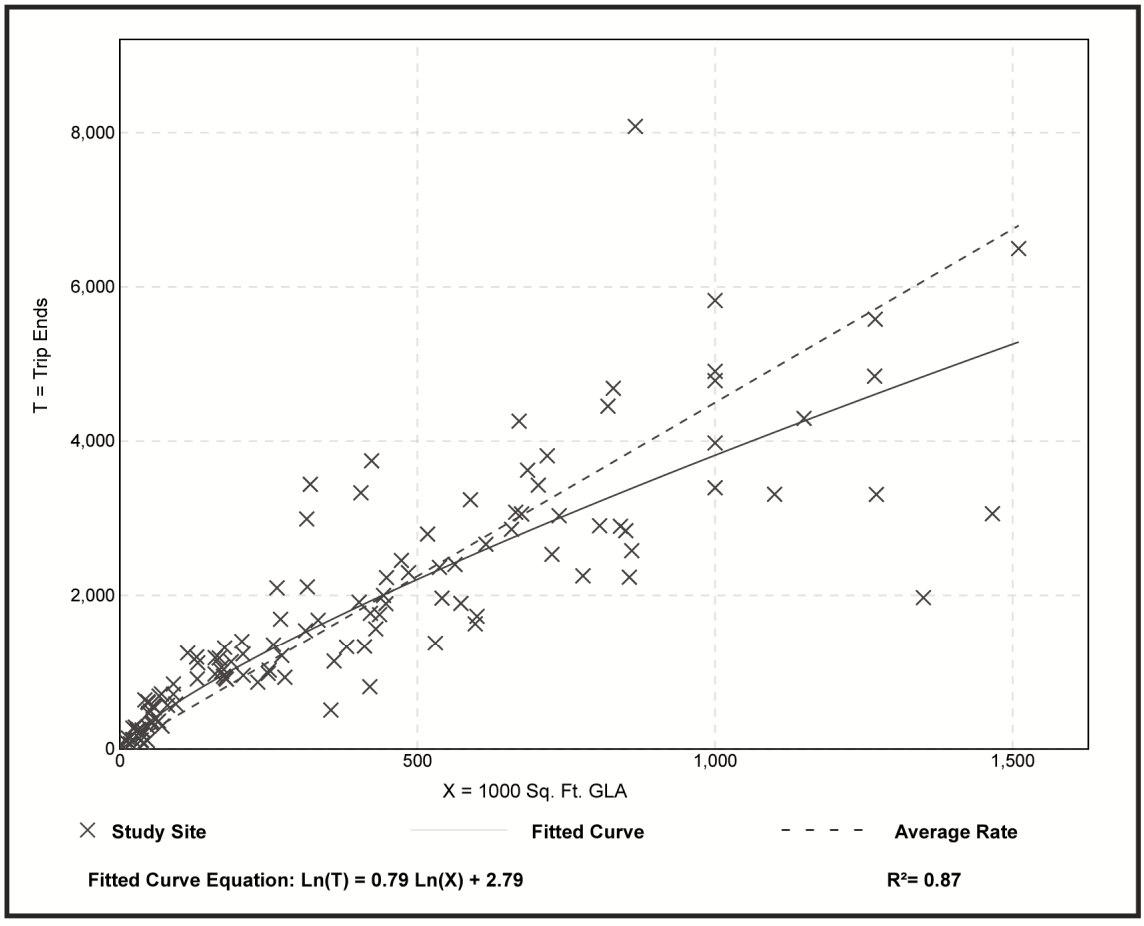
Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 119
1000 Sq. Ft. GLA: 416
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
4.50	1.42 - 15.10	1.88

Data Plot and Equation



ITE Land Use Code 912 – Drive-in Bank

Land Use: 912
Drive-in Bank

Description

A drive-in bank provides banking facilities for motorists who conduct financial transactions from their vehicles; many also serve patrons who walk into the building. The drive-in lanes may or may not provide automatic teller machines (ATMs). Walk-in bank (Land Use 911) is a related use.

Additional Data

The independent variable, drive-in lanes, refers to all lanes at a banking facility used for financial transactions, including ATM-only lanes.

Time-of-day distribution data for this land use are presented in Appendix A. For the 18 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 11:45 a.m. and 12:45 p.m. and 12:15 and 1:15 p.m., respectively. For the one center city core site with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 11:15 a.m. and 12:15 p.m. and 12:45 and 1:45 p.m., respectively.

The sites were surveyed in the 2000s and the 2010s in Colorado, Kentucky, Minnesota, Nebraska, New Jersey, New York, Oregon, Pennsylvania, Texas, Vermont, Virginia, Washington, and Wisconsin.

To assist in the future analysis of this land use, it is important that Friday data be collected and reported separately from weekday data. It is also important to specify the date and month of the data collection period and the number of drive-through lanes that are open at the time of the study.

Source Numbers

535, 539, 553, 555, 573, 577, 600, 624, 626, 629, 630, 637, 656, 657, 710, 724, 728, 866, 869, 883, 884, 927, 935, 961

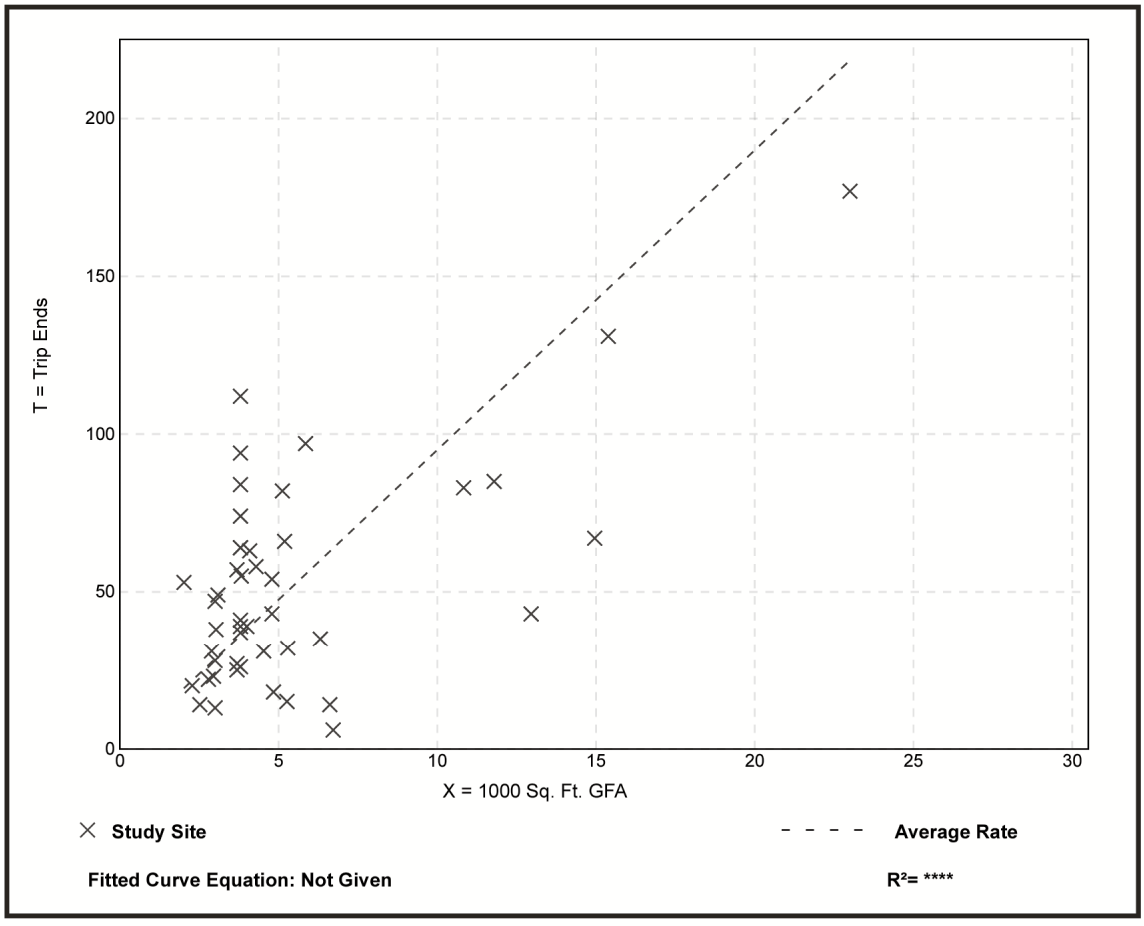
Drive-in Bank
(912)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
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: 46
1000 Sq. Ft. GFA: 5
Directional Distribution: 58% entering, 42% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.50	0.89 - 29.47	5.85

Data Plot and Equation



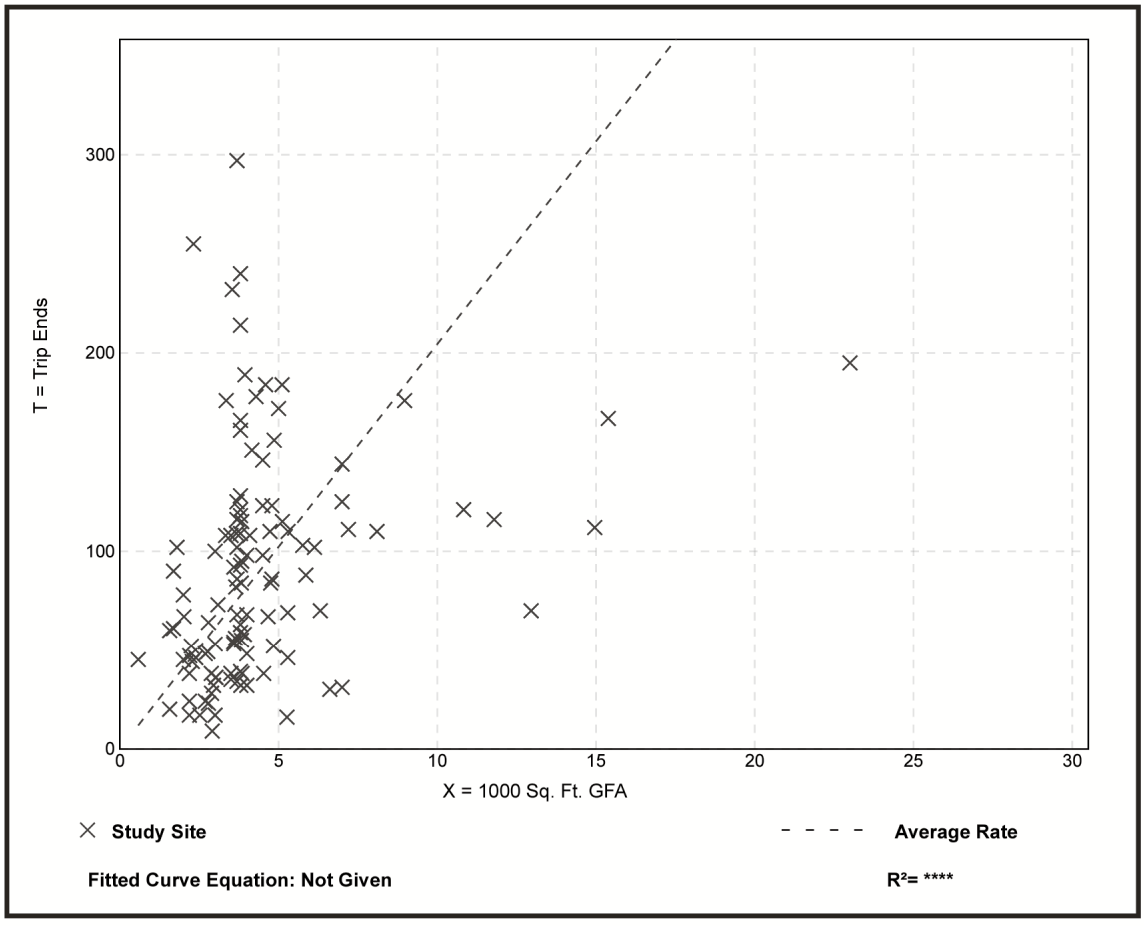
Drive-in Bank
(912)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
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:	115
1000 Sq. Ft. GFA:	4
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
20.45	3.04 - 109.91	15.01

Data Plot and Equation



Drive-in Bank
(912)

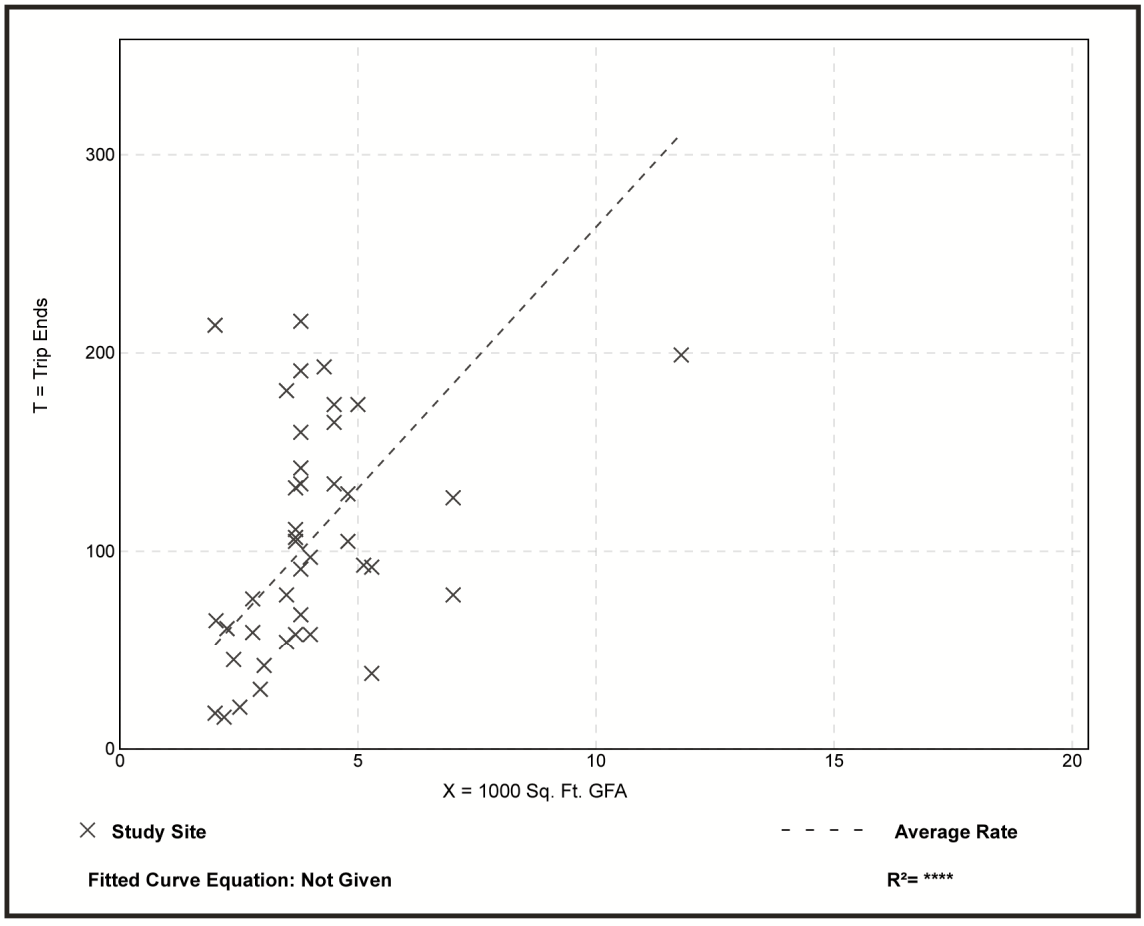
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 41
1000 Sq. Ft. GFA: 4
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
26.35	7.18 - 107.00	15.32

Data Plot and Equation



ITE Land Use Code 934 – Fast-Food Restaurant with Drive-Through Window

Land Use: 934
Fast-Food Restaurant with Drive-Through Window

Description

This category includes fast-food restaurants with drive-through windows. This type of restaurant is characterized by a large drive-through clientele, long hours of service (some are open for breakfast, all are open for lunch and dinner, some are open late at night or 24 hours a day) and high turnover rates for eat-in customers. These limited-service eating establishments do not provide table service. Non-drive-through patrons generally order at a cash register and pay before they eat. Fast casual restaurant (Land Use 930), high-turnover (sit-down) restaurant (Land Use 932), fast-food restaurant without drive-through window (Land Use 933), and fast-food restaurant with drive-through window and no indoor seating (Land Use 935) are related uses.

Additional Data

Users should exercise caution when applying statistics during the AM peak periods, as the sites contained in the database for this land use may or may not be open for breakfast. In cases where it was confirmed that the sites were not open for breakfast, data for the AM peak hour of the adjacent street traffic were removed from the database.

The outdoor seating area is not included in the overall gross floor area. Therefore, the number of seats may be a more reliable independent variable on which to establish trip generation rates for facilities having significant outdoor seating.

Time-of-day distribution data for this land use for a weekday, Saturday, and Sunday are presented in Appendix A. For the 46 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 11:45 a.m. and 12:45 p.m. and 12:00 and 1:00 p.m., respectively. For the one dense multi-use urban site with data, the same AM and PM peak hours were observed.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alaska, Alberta (CAN), California, Colorado, Florida, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Dakota, Texas, Vermont, Virginia, Washington, and Wisconsin.

Source Numbers

163, 164, 168, 180, 181, 241, 245, 278, 294, 300, 301, 319, 338, 340, 342, 358, 389, 438, 502, 552, 577, 583, 584, 617, 640, 641, 704, 715, 728, 810, 866, 867, 869, 885, 886, 927, 935, 962, 977

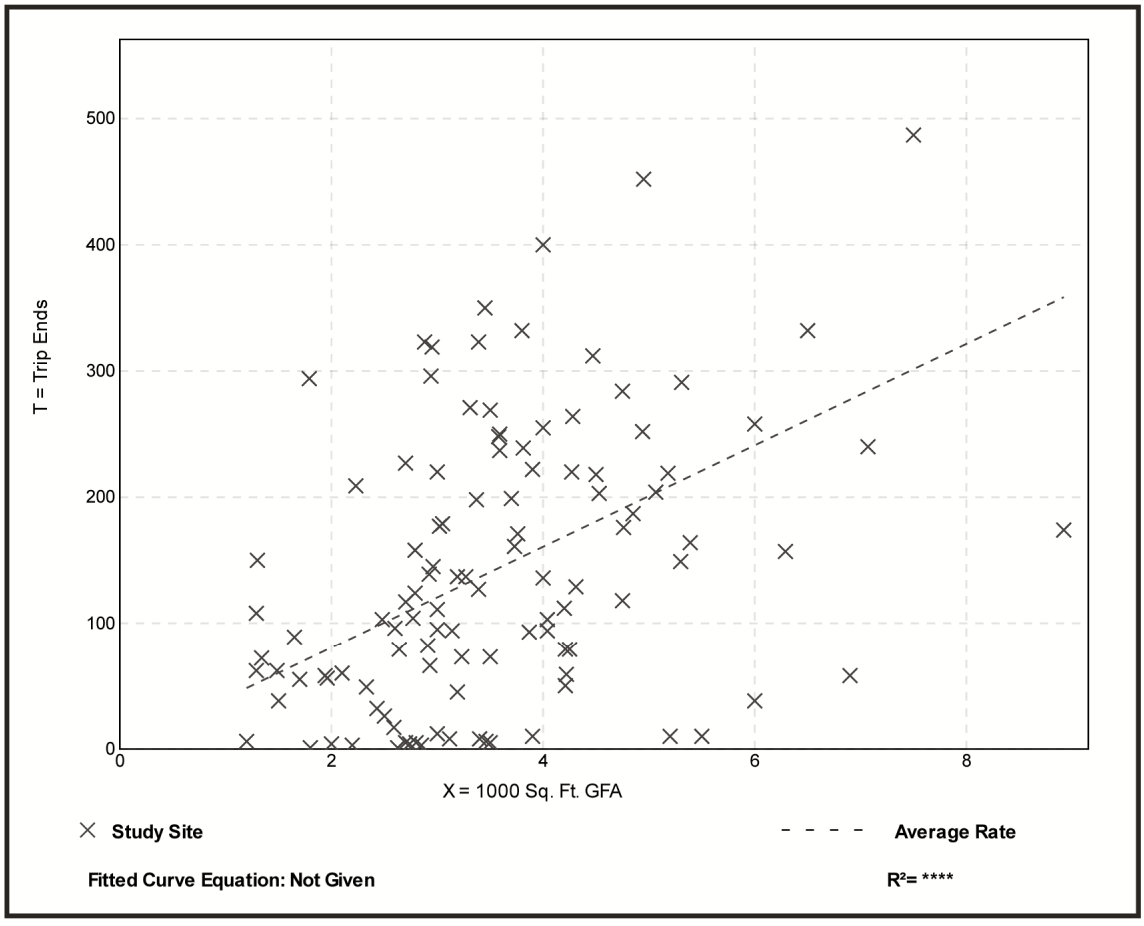
Fast-Food Restaurant with Drive-Through Window
(934)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
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: 111
1000 Sq. Ft. GFA: 4
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
40.19	0.38 - 164.25	28.78

Data Plot and Equation



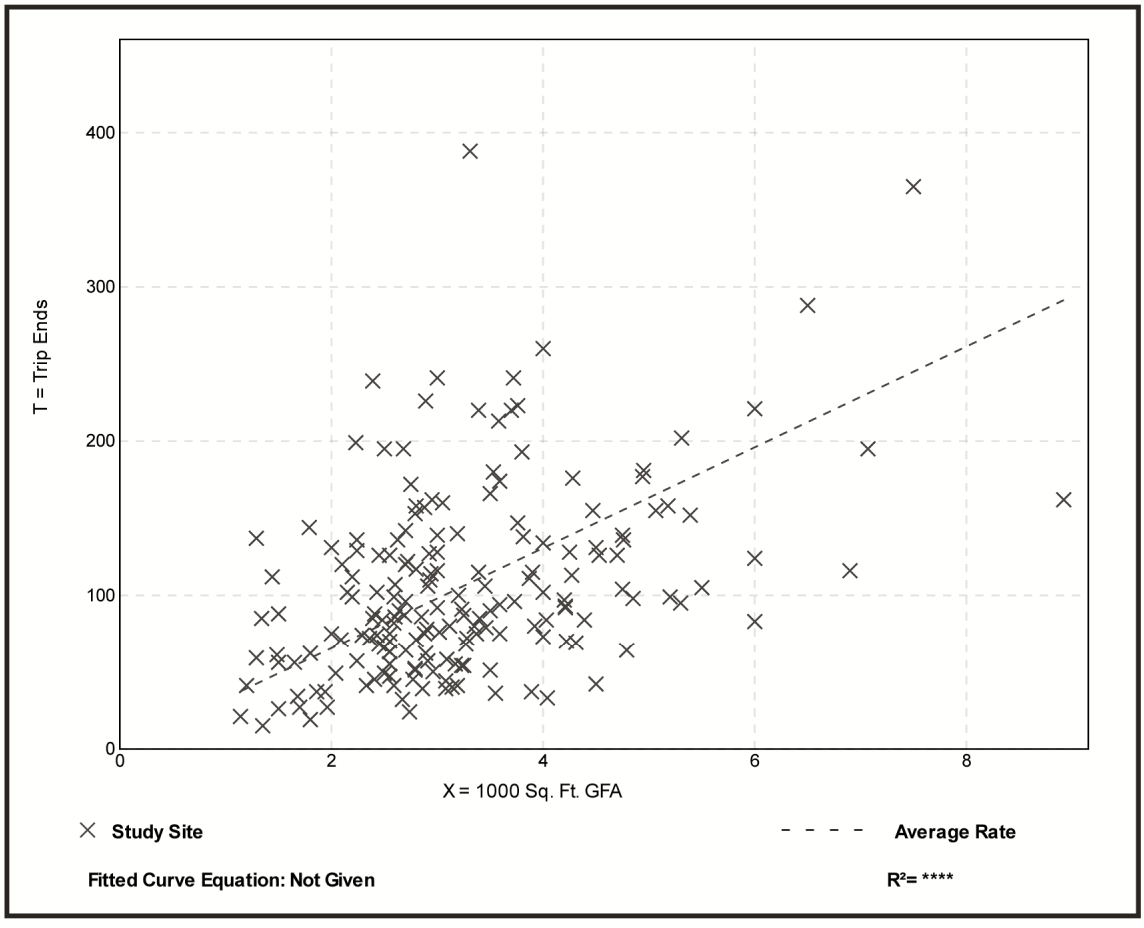
Fast-Food Restaurant with Drive-Through Window
(934)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
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:	185
1000 Sq. Ft. GFA:	3
Directional Distribution:	52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
32.67	8.17 - 117.22	17.87

Data Plot and Equation



Fast-Food Restaurant with Drive-Through Window
(934)

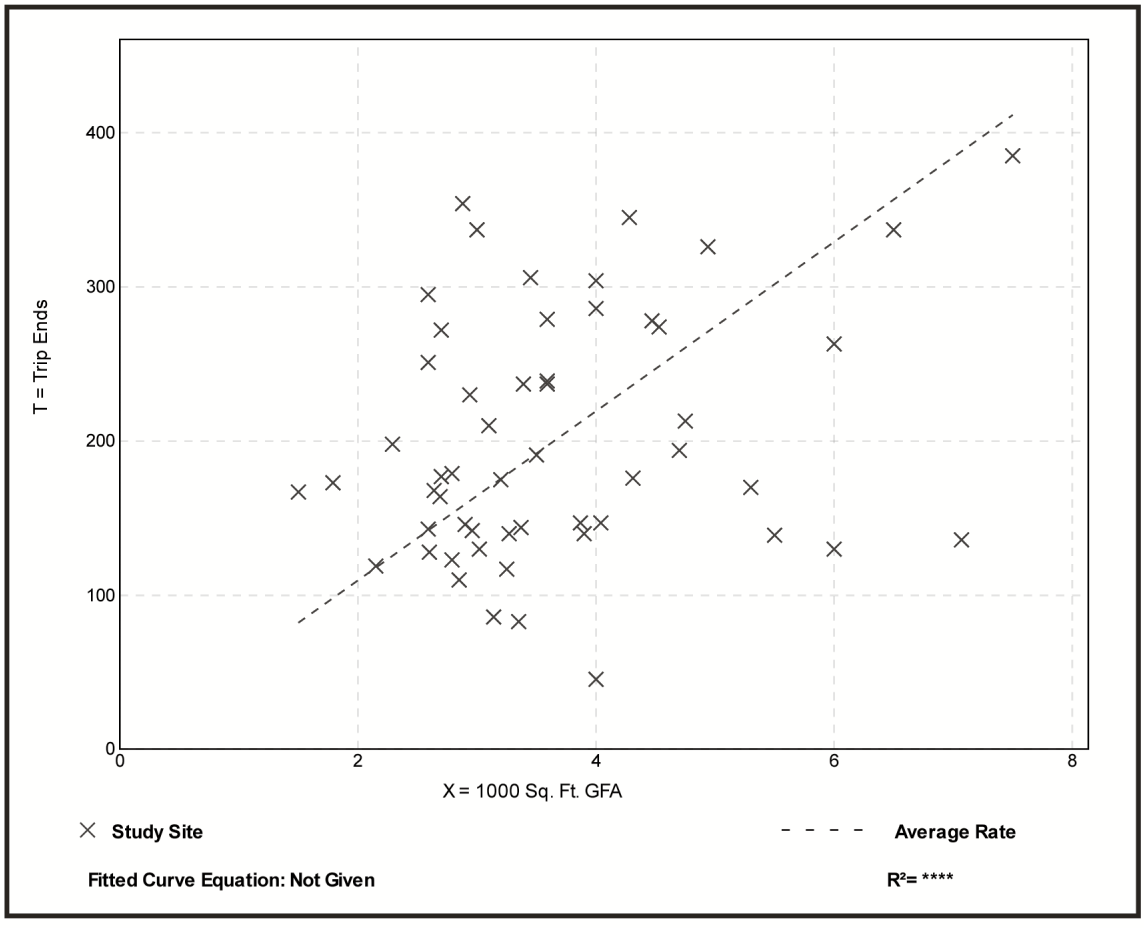
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 54
1000 Sq. Ft. GFA: 4
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
54.86	11.25 - 122.92	24.51

Data Plot and Equation



ITE Land Use Code 937 – Coffee/Donut Shop with Drive-Through Window

Land Use: 937
Coffee/Donut Shop with Drive-Through Window

Description

This land use includes single-tenant coffee and donut restaurants with drive-through windows. Freshly brewed coffee and a variety of coffee-related accessories are the primary retail products sold at these sites. They may also sell other refreshment items, such as donuts, bagels, muffins, cakes, sandwiches, wraps, salads, and other hot and cold beverages. Some sites may also sell newspapers, music, CDs, and books. The coffee and donut shops contained in this land use typically hold long store hours (more than 15 hours) with an early morning opening. Also, limited indoor seating is generally provided for patrons; however, table service is not provided. Coffee/donut shop without drive-through window (Land Use 936), coffee/donut shop with drive-through window and no indoor seating (Land Use 938), bread/donut/bagel shop without drive-through window (Land Use 939), and bread/donut/bagel shop with drive-through window (Land Use 940) are related uses.

Additional Data

The sites were surveyed in the 1990s, the 2000s, and the 2010s in California, Colorado, Connecticut, Illinois, Massachusetts, Minnesota, Nevada, New Hampshire, New Jersey, New York, Ontario (CAN), Pennsylvania, Quebec (CAN), Tennessee, Vermont, Washington, and Wisconsin.

Specialized Land Use Data

One study provided data for a coffee/donut shop with a drive-through window that also sells donuts and ice cream (source 617). The trip generating characteristics of this site differed from the sites included in this land use; therefore, trip generation information for this site is presented here and was excluded from the data plots. The site had a gross floor area of 3,300 square feet. It generated 425 vehicle trips during the weekday AM peak hour of adjacent street traffic, and 236 vehicle trips during the weekday PM peak hour of adjacent street traffic.

Source Numbers

594, 599, 615, 617, 618, 621, 622, 635, 639, 712, 714, 725, 726, 728, 853, 854, 892, 903, 928, 959, 979, 982

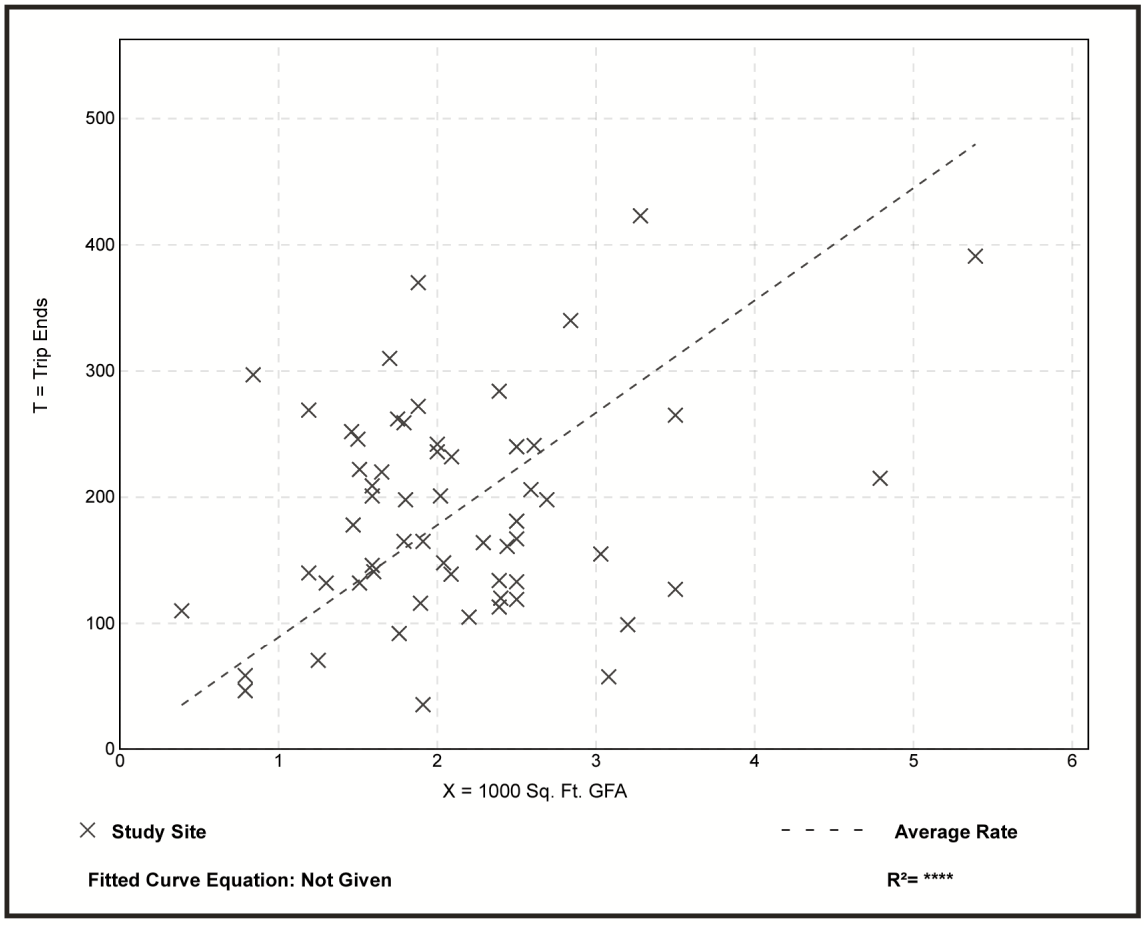
Coffee/Donut Shop with Drive-Through Window
(937)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
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:	61
1000 Sq. Ft. GFA:	2
Directional Distribution:	51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
88.99	18.32 - 353.57	48.19

Data Plot and Equation



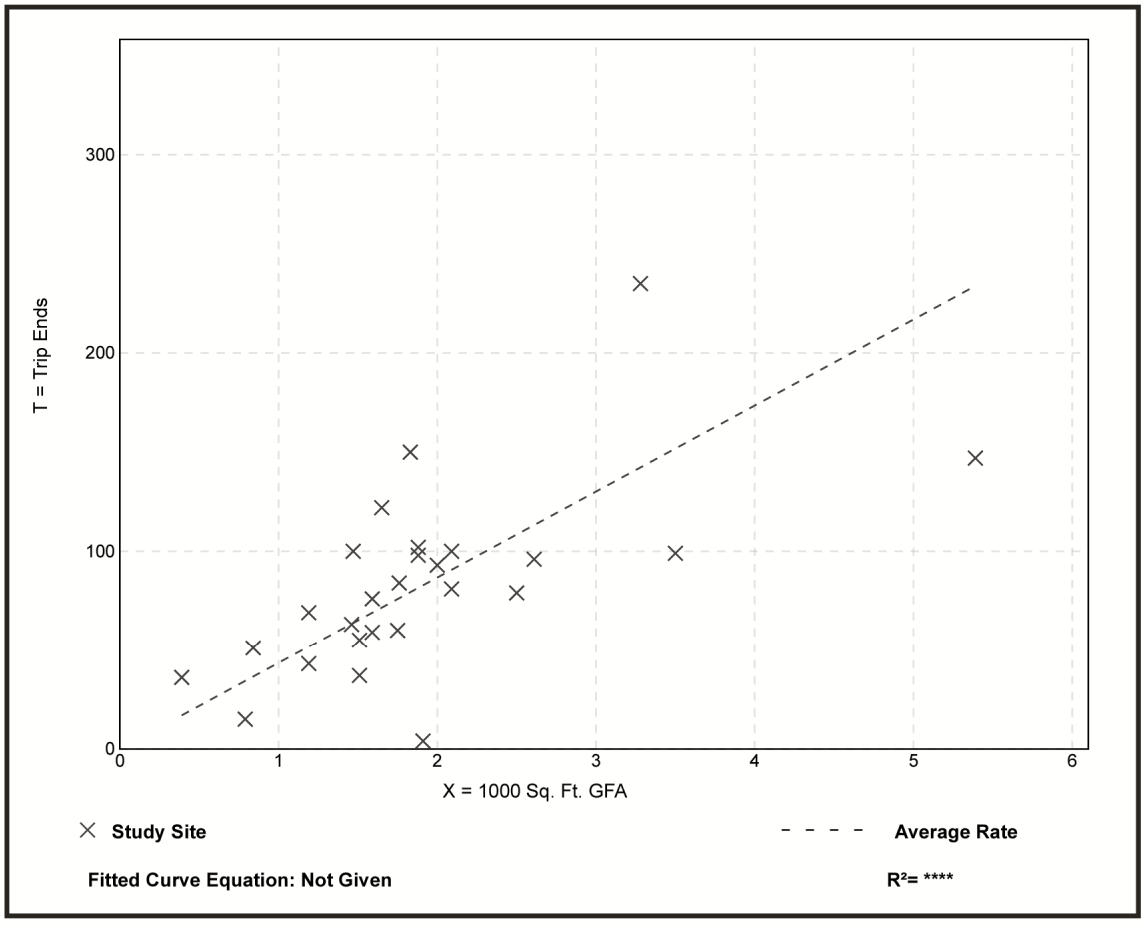
Coffee/Donut Shop with Drive-Through Window
(937)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
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:	26
1000 Sq. Ft. GFA:	2
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
43.38	2.09 - 92.31	18.88

Data Plot and Equation



Coffee/Donut Shop with Drive-Through Window
(937)

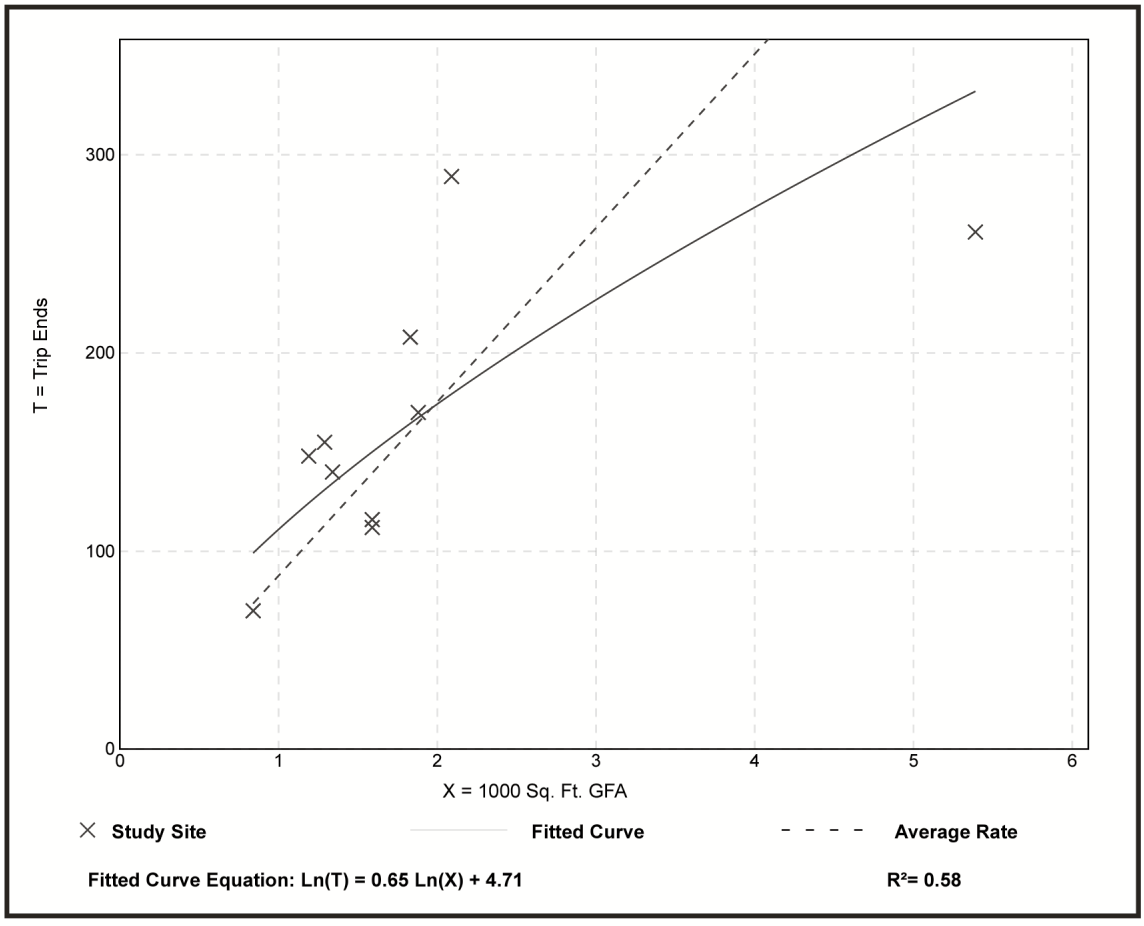
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 10
1000 Sq. Ft. GFA: 2
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
87.70	48.42 - 138.28	33.38

Data Plot and Equation



APPENDIX D – Traffic Signal Warrant Analysis

Traffic Signal Warrant Analysis

New London Avenue (Route 2) at Site Access Road

BETA GROUP, INC.

Signal Warrant Summary

Town: Cranston, RI

Location: New London Avenue (Route 2) at Site Access Road

Hour	Main Street vph 2 Directions	Side Street vph 1 Direction	Warrant 1 Condition A (70%) 420 / 140 vph	Warrant 1 Condition B (70%) 630 / 70 vph	Warrant 1 Combination A/B n/a
7 - 8 AM					
8 - 9					
9 - 10					
10 - 11					
11 - 12					
12 -1 PM					
1 - 2					
2 - 3					
3 - 4	2640	155			
4 - 5	3015	200			
5 - 6	2705	140			
6 - 7	2240	130			

Summary of Warrants

- ☐ **WARRANT 1** — *Eight-Hour Vehcicular Volume*
- ☐ **WARRANT 5 (N/A)** — *School Crossing*
- ■ **WARRANT 2** — *Four-Hour Vehicular Volume*
- ☐ **WARRANT 6 (N/A)** — *Coordinated Signal System*
- ■ **WARRANT 3** — *Peak Hour*
- ☐ **WARRANT 7 (N/A)** — *Crash Experience*
- ☐ **WARRANT 4 (N/A)** — *Pedestrian Volume*
- ☐ **WARRANT 8 (N/A)** — *Roadway Network*

Summary of Roadway Data

Accidents:

Accidents Correctable by Signalization

n/a	Year:	Total:	n/a	n/a	Correctable
n/a	Year:	Total:	n/a	n/a	Correctable
n/a	Year:	Total:	n/a	n/a	Correctable

Roadway Features:

Major Road	3 lanes
Minor Road	2 lanes
Speed	S > 40 mph
Population	P > 10,000

TRAFFIC SIGNAL WARRANT SUMMARY

Community: **Cranston** Engineer: **BETA Group, Inc.**
State: **Rhode Island** Date: **October 2020**

Major Street: **New London Avenue (Route 2)** Lanes: **3** Critical Approach Speed: **40**
Minor Street: **Site Access Road** Lanes: **2**

Volume Level Criteria

1. Is the critical speed of major street traffic > 70 km/h (40 mph) ? ■ Yes ☐ No
2. Is the intersection in a built-up area of isolated community of <10,000 population? ☐ Yes ■ No

If Question 1 or 2 above is answered "Yes", then use "70%" volume level ■ 70% ☐ 100%

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

Applicable: ☐ Yes ■ No
Satisfied: ☐ Yes ☐ No

Warrant 1 is satisfied if Condition A or Condition B is "100%" satisfied.
Warrant is also satisfied if both Condition A and Condition B are "80%" satisfied.

Condition A - Minimum Vehicular Volume

100% Satisfied: ☐ Yes ☐ No
80% Satisfied: ☐ Yes ☐ No

(volumes in veh/hr)	Minimum Requirements (80% Shown in Brackets)				Eight Highest Hours							
Approach Lanes	**1**		**2 or more**									
Volume Level	**100%**	**70%**	**100%**	**70%**								
Both Approaches on Major Street	500 (400)	350	600 (480)	420								
Highest Approach on Minor Street	150 (120)	105	200 (160)	140								

Record 8 highest hours and the corresponding volumes in boxes provided. Condition is 100% satisfied if the minimum volumes are met for eight hours . Condition is 80% satisfied if parenthetical volumes are met for eight hours.

Condition B - Interruption of Continuous Traffic

Condition B is intended for application where the traffic volume is so heavy that traffic on the minor street suffers excessive delay.

Applicable: ☐ Yes ■ No
Excessive Delay: ☐ Yes ☐ No
100% Satisfied: ☐ Yes ☐ No
80% Satisfied: ☐ Yes ☐ No

(volumes in veh/hr)	Minimum Requirements (80% Shown in Brackets)				Eight Highest Hours							
Approach Lanes	**1**		**2 or more**									
Volume Level	**100%**	**70%**	**100%**	**70%**								
Both Approaches on Major Street	750 (600)	525	900 (720)	630								
Highest Approach on Minor Street	75 (60)	53	100 (80)	70								

Record 8 highest hours and the corresponding volumes in boxes provided. Condition is 100% satisfied if the minimum volumes are met for eight hours . Condition is 80% satisfied if parenthetical volumes are met for eight hours.

Source: Revised from NCHRP Report 457

TRAFFIC SIGNAL WARRANT SUMMARY

Community: **Cranston** Engineer: **BETA Group, Inc.**
State: **Rhode Island** Date: **October 2020**

Major Street: **New London Avenue (Route 2)** Lanes: **3** Critical Approach Speed: **40**
Minor Street: **Site Access Road** Lanes: **2**

Volume Level Criteria

1. Is the critical speed of major street traffic > 70 km/h (40 mph) ? ■ Yes ☐ No
2. Is the intersection in a built-up area of isolated community of <10,000 population? ☐ Yes ■ No

If Question 1 or 2 above is answered "Yes", then use "70%" volume level ■ 70% ☐ 100%

WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME

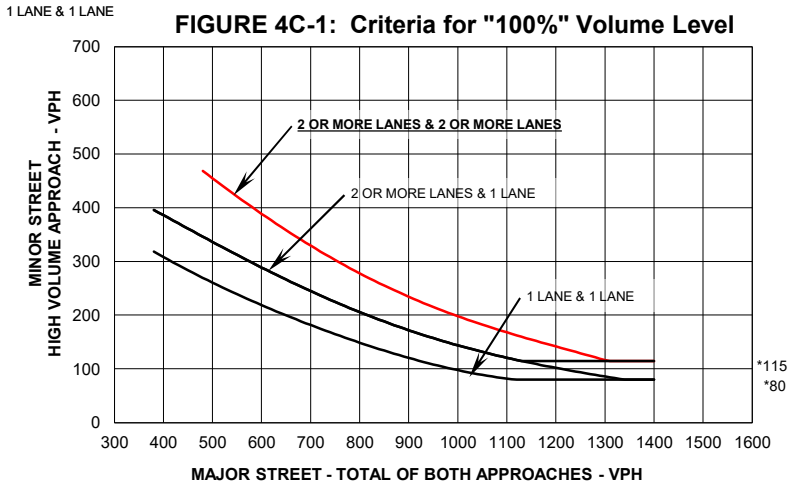
Applicable: ■ Yes ☐ No
Satisfied: ■ Yes ☐ No

If all four points lie above the appropriate line, then the warrant is satisfied.

Plot four volume combinations on the applicable figure below.

Four Highest Hours	Volumes	
	Major Street	Minor Street
3 - 4 PM	2,640	155
4 - 5 PM	3,015	200
5 - 6 PM	2,705	140
6 - 7 PM	2,240	130

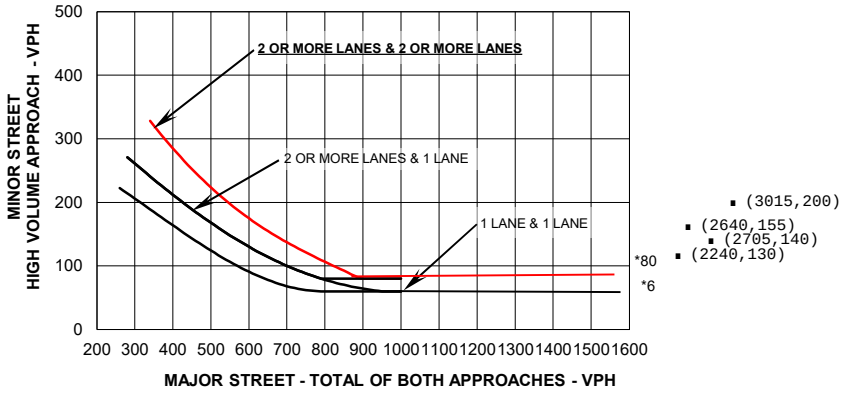
FIGURE 4C-1: Criteria for "100%" Volume Level



** Note: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

FIGURE 4C-2: Criteria for "70%" Volume Level

(Community Less than 10,000 population or above 70 km/hr (40 mph))



** Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

Source: Revised from NCHRP Report 457

TRAFFIC SIGNAL WARRANT SUMMARY

Community: **Cranston** | Engineer: **BETA Group, Inc.**
State: **Rhode Island** | Date: **October 2020**

Major Street: **New London Avenue (Route 2)** | Lanes: **3** | Critical Approach Speed: **40**
Minor Street: **Site Access Road** | Lanes: **2**

Volume Level Criteria

1. Is the critical speed of major street traffic > 70 km/h (40 mph) ? ■ Yes ☐ No
2. Is the intersection in a built-up area of isolated community of <10,000 population? ☐ Yes ■ No

If Question 1 or 2 above is answered "Yes", then use "70%" volume level ■ 70% ☐ 100%

WARRANT 3 - PEAK HOUR

Applicable: ■ Yes ☐ No
Satisfied: ■ Yes ☐ No

If all three criteria are fullfilled or the plotted point lies above the appropriate line, then the warrant is satisfied.

Unusual condition justifying use of warrant: NONE

Record hour when criteria are fulfilled and the corresponding delay or volume in boxes provided.

Peak Hour		
4 - 5 PM	3,015	200

Criteria

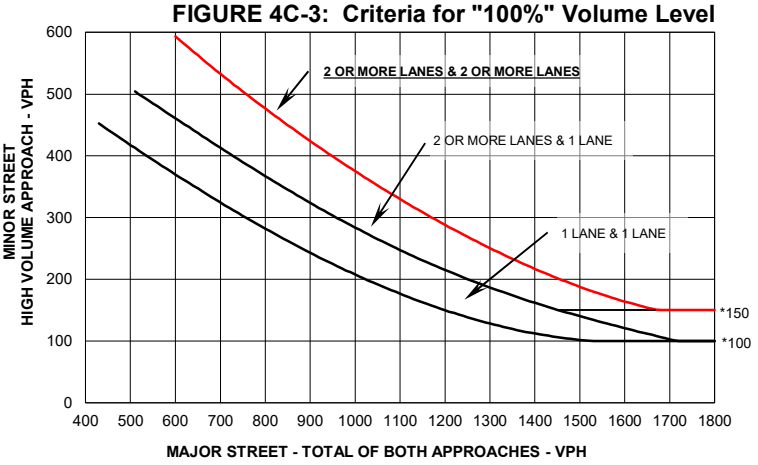
1. Delay on Minor Approach *(vehicle-hours)		
Approach Lanes	1	2
Delay Criteria*	4.0	5.0
Delay*		
Fulfilled?: ☐ Yes ☐ No		

2. Volume on Minor Approach *(vehicles per hour)		
Approach Lanes	1	2
Volume Criteria*	100	150
Volume*		200
Fulfilled?: ■ Yes ☐ No		

3. Total Entering Volume *(vehicles per hour)		
No. of Approaches	3	4
Volume Criteria*	650	800
Volume*	3,215	
Fulfilled?: ■ Yes ☐ No		

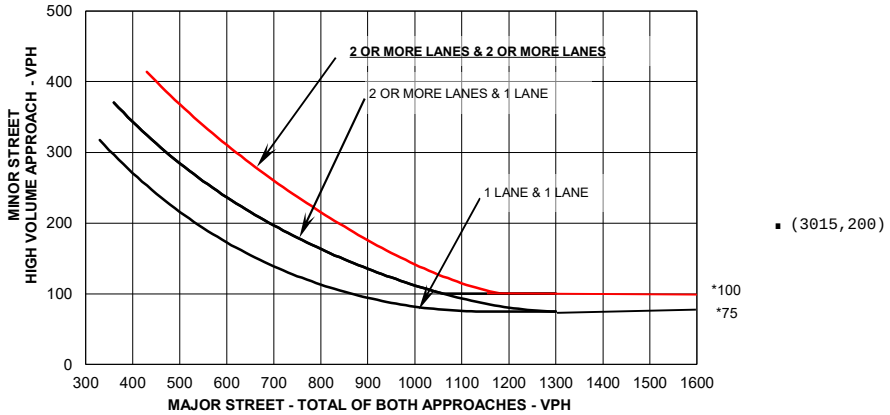
Plot volume combination on the applicable figure below.

FIGURE 4C-3: Criteria for "100%" Volume Level



** Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume threshold for a minor street approach with one lane.*

FIGURE 4C-4: Criteria for "70%" Volume Level
(Community Less than 10,000 population or above 70 km/hr (40 mph) on Major



** 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 threshold for a minor street approach with one lane.*

APPENDIX E – Operational Analysis

Existing Conditions

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway
Howard Avenue at Mulligan's Island Access Road
Howard Avenue at Slate Hill Drive

Future 2025 No Build Conditions

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway
Howard Avenue at Mulligan's Island Access Road
Howard Avenue at Slate Hill Drive

Future 2025 Build Conditions

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway
Howard Avenue at Site Access Road
Howard Avenue at Slate Hill Drive
New London Avenue (Route 2) at Site Access Road
Internal Site Access Intersection

E

Existing Weekday AM / PM / Saturday MD Peak Hour

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

Howard Avenue at Mulligan's Island Access Road

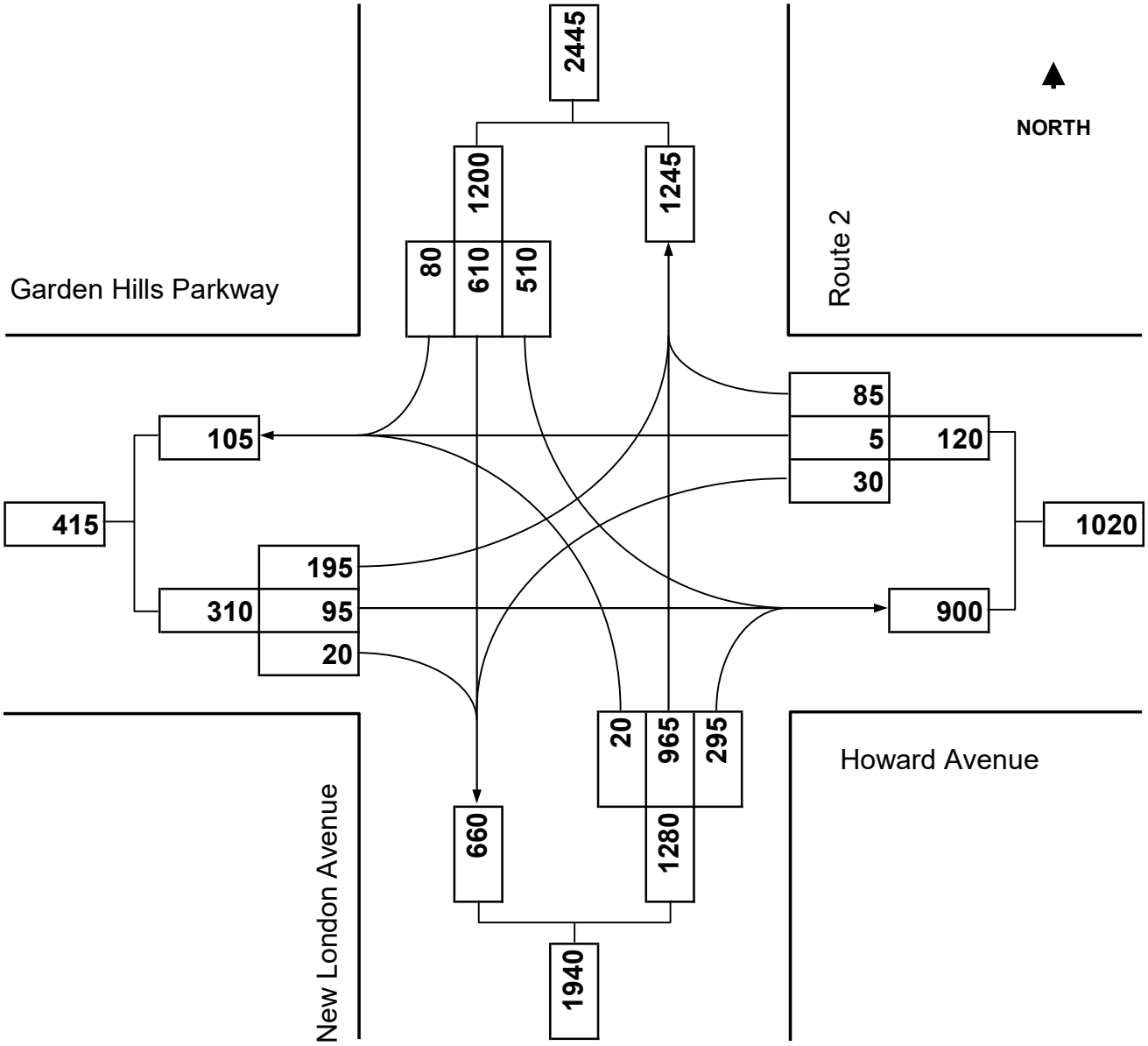
Howard Avenue at Slate Hill Drive

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	8:00 AM - 9:00 AM
Existing:	AM Peak Hour	**Future**:	n/a

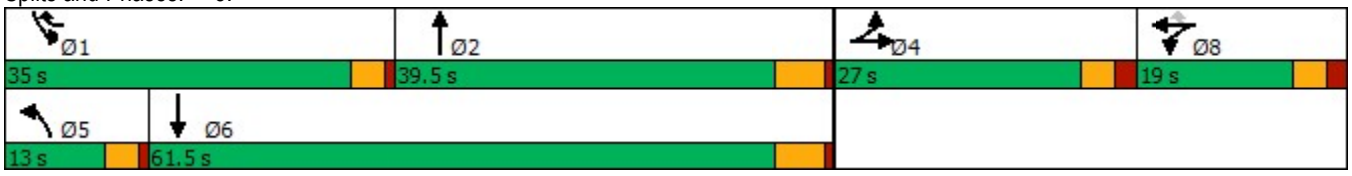


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	95	20	30	5	85	20	965	295	510	610	80
Future Volume (vph)	195	95	20	30	5	85	20	965	295	510	610	80
Satd. Flow (prot)	1715	1748	0	0	1820	1615	1805	4967	0	3502	3518	0
Flt Permitted	0.950	0.987			0.958		0.950			0.950		
Satd. Flow (perm)	1715	1748	0	0	1820	1615	1805	4967	0	3502	3518	0
Satd. Flow (RTOR)		5				92		64			16	
Lane Group Flow (vph)	167	170	0	0	38	92	22	1370	0	554	750	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	27.0	27.0		19.0	19.0	35.0	13.0	39.5		35.0	61.5	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	14.0	14.0			8.1	26.3	7.7	30.7		19.6	50.8	
Actuated g/C Ratio	0.16	0.16			0.09	0.30	0.09	0.35		0.23	0.59	
v/c Ratio	0.60	0.59			0.22	0.17	0.14	0.76		0.70	0.36	
Control Delay	47.2	45.3			47.7	5.8	47.9	29.1		38.0	12.7	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	47.2	45.3			47.7	5.8	47.9	29.1		38.0	12.7	
LOS	D	D			D	A	D	C		D	B	
Approach Delay		46.2			18.1			29.4			23.4	
Approach LOS		D			B			C			C	
Queue Length 50th (ft)	100	98			22	0	13	247		161	104	
Queue Length 95th (ft)	190	189			61	33	42	#405		245	233	
Internal Link Dist (ft)		467			175			1057			283	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	467	480			315	794	201	2129		1345	2458	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.36	0.35			0.12	0.12	0.11	0.64		0.41	0.31	

Intersection Summary

Cycle Length: 120.5
Actuated Cycle Length: 86.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 28.3 — Intersection LOS: C
Intersection Capacity Utilization 67.0% — ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

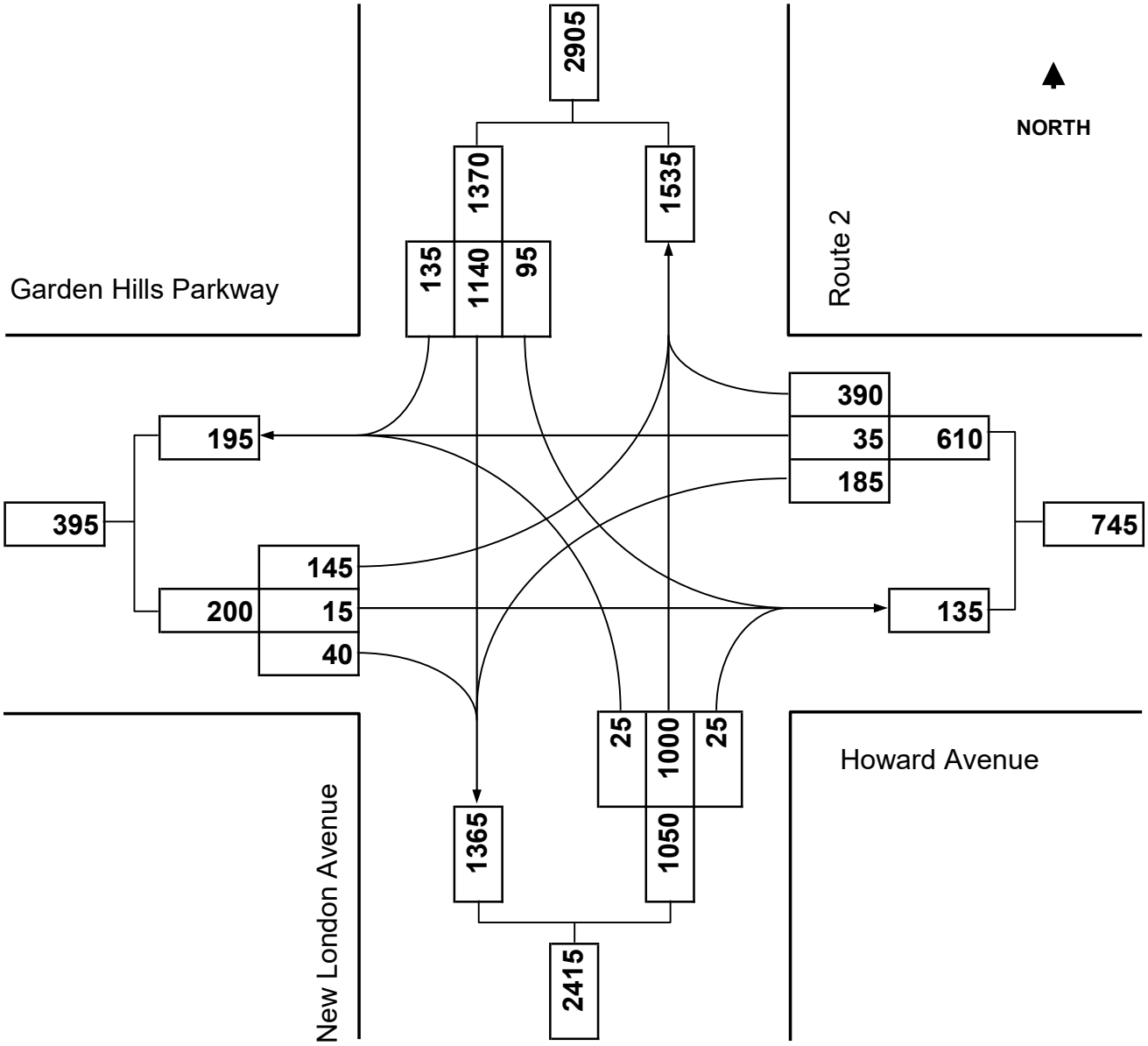
Splits and Phases: 5:



ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	4:00 PM - 5:00 PM
Existing:	PM Peak Hour	**Future**:	n/a



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	15	40	185	35	390	25	1000	25	95	1140	135
Future Volume (vph)	145	15	40	185	35	390	25	1000	25	95	1140	135
Satd. Flow (prot)	1715	1658	0	0	1824	1615	1805	5116	0	3502	3521	0
Flt Permitted	0.950	0.978			0.960		0.950			0.950		
Satd. Flow (perm)	1715	1658	0	0	1824	1615	1805	5116	0	3502	3521	0
Satd. Flow (RTOR)		22				68		3			12	
Lane Group Flow (vph)	113	109	0	0	245	433	28	1139	0	106	1417	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	14.0	14.0		37.0	37.0	19.0	19.0	50.5		19.0	50.5	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	9.1	9.1			17.2	31.2	7.4	39.1		8.9	45.6	
Actuated g/C Ratio	0.10	0.10			0.18	0.33	0.08	0.42		0.09	0.49	
v/c Ratio	0.68	0.61			0.73	0.75	0.20	0.54		0.32	0.83	
Control Delay	66.1	50.9			50.4	32.0	48.0	22.5		44.3	28.1	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	66.1	50.9			50.4	32.0	48.0	22.5		44.3	28.1	
LOS	E	D			D	C	D	C		D	C	
Approach Delay		58.6			38.6			23.1			29.2	
Approach LOS		E			D			C			C	
Queue Length 50th (ft)	73	55			146	210	17	178		32	405	
Queue Length 95th (ft)	#184	#148			233	304	47	276		61	#649	
Internal Link Dist (ft)		467			175			1057			283	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	166	180			629	685	291	2482		566	1713	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.68	0.61			0.39	0.63	0.10	0.46		0.19	0.83	

Intersection Summary

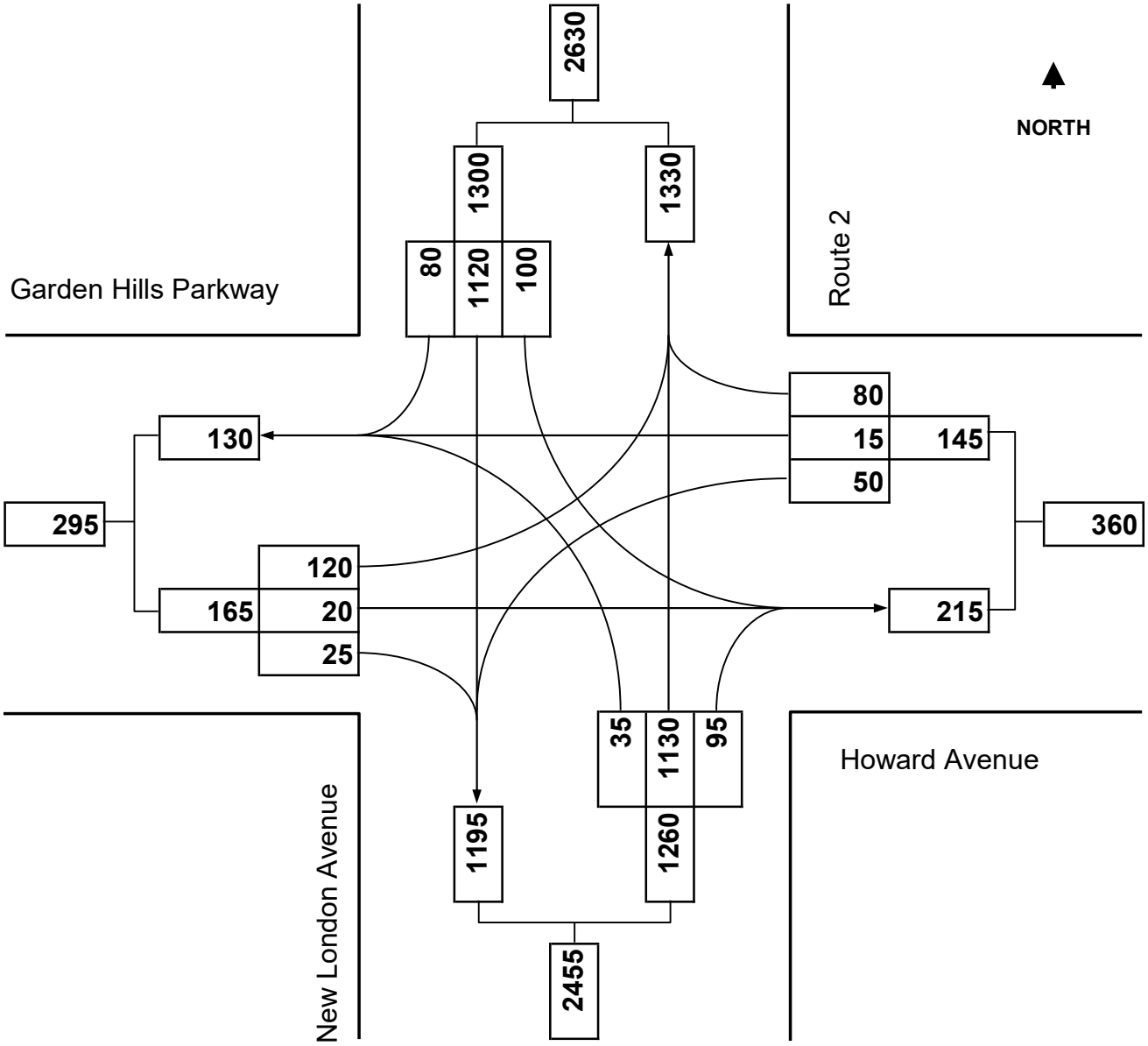
Cycle Length: 120.5
Actuated Cycle Length: 94
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 30.8 — Intersection LOS: C
Intersection Capacity Utilization 68.2% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5:

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

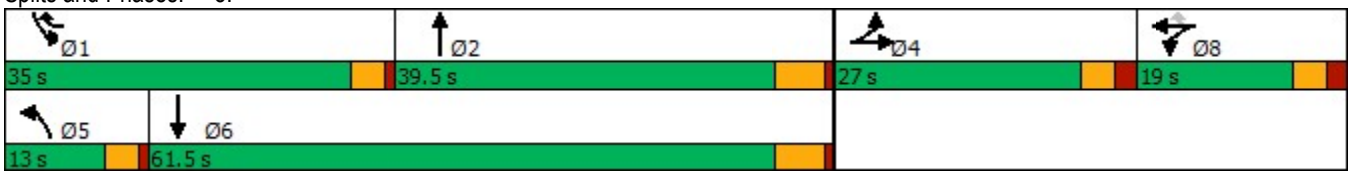
Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	12:00 PM - 1:00 PM
Existing:	MD Peak Hour	**Future**:	n/a



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	20	25	50	15	80	35	1130	95	100	1120	80
Future Volume (vph)	120	20	25	50	15	80	35	1130	95	100	1120	80
Satd. Flow (prot)	1715	1686	0	0	1830	1615	1805	5078	0	3502	3541	0
Flt Permitted	0.950	0.978			0.963		0.950			0.950		
Satd. Flow (perm)	1715	1686	0	0	1830	1615	1805	5078	0	3502	3541	0
Satd. Flow (RTOR)		16				81		11			8	
Lane Group Flow (vph)	83	83	0	0	66	81	35	1237	0	101	1212	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	27.0	27.0		19.0	19.0	35.0	13.0	39.5		35.0	61.5	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	10.2	10.2			9.4	18.9	8.5	31.8		8.8	41.8	
Actuated g/C Ratio	0.14	0.14			0.13	0.26	0.12	0.44		0.12	0.58	
v/c Ratio	0.35	0.33			0.28	0.17	0.17	0.55		0.24	0.59	
Control Delay	40.0	34.0			40.1	7.9	40.8	17.4		38.5	17.7	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	40.0	34.0			40.1	7.9	40.8	17.4		38.5	17.7	
LOS	D	C			D	A	D	B		D	B	
Approach Delay		37.0			22.3			18.1			19.3	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	38	31			30	0	16	155		23	250	
Queue Length 95th (ft)	104	92			84	36	54	248		59	407	
Internal Link Dist (ft)		467			175			1057			283	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	601	602			408	1052	259	2948		1731	2713	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.14	0.14			0.16	0.08	0.14	0.42		0.06	0.45	

Intersection Summary	
Cycle Length: 120.5	
Actuated Cycle Length: 72.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 20.0	Intersection LOS: B
Intersection Capacity Utilization 62.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5:



Howard Avenue at Mulligan's Island Access Road

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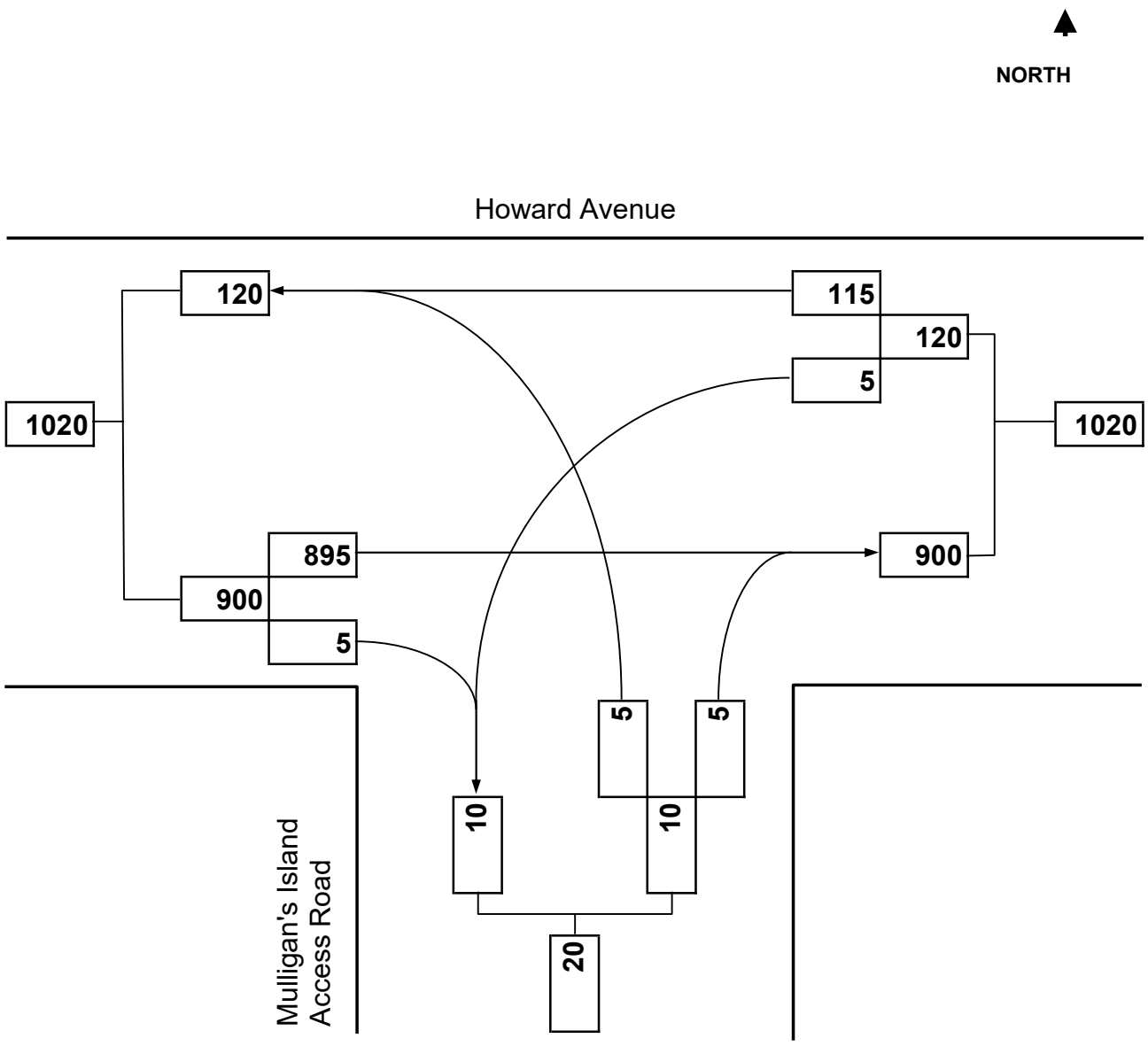
Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Mulligan's Island Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	8:00 AM - 9:00 AM
Existing:	AM Peak Hour	**Future**:	n/a



Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	895	5	5	115	5	5
Future Vol, veh/h	895	5	5	115	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1053	6	6	135	6	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1059	0	1136	530
Stage 1	-	-	-	-	1056	-
Stage 2	-	-	-	-	80	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	665	-	199	499
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	665	-	197	499
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	931	-

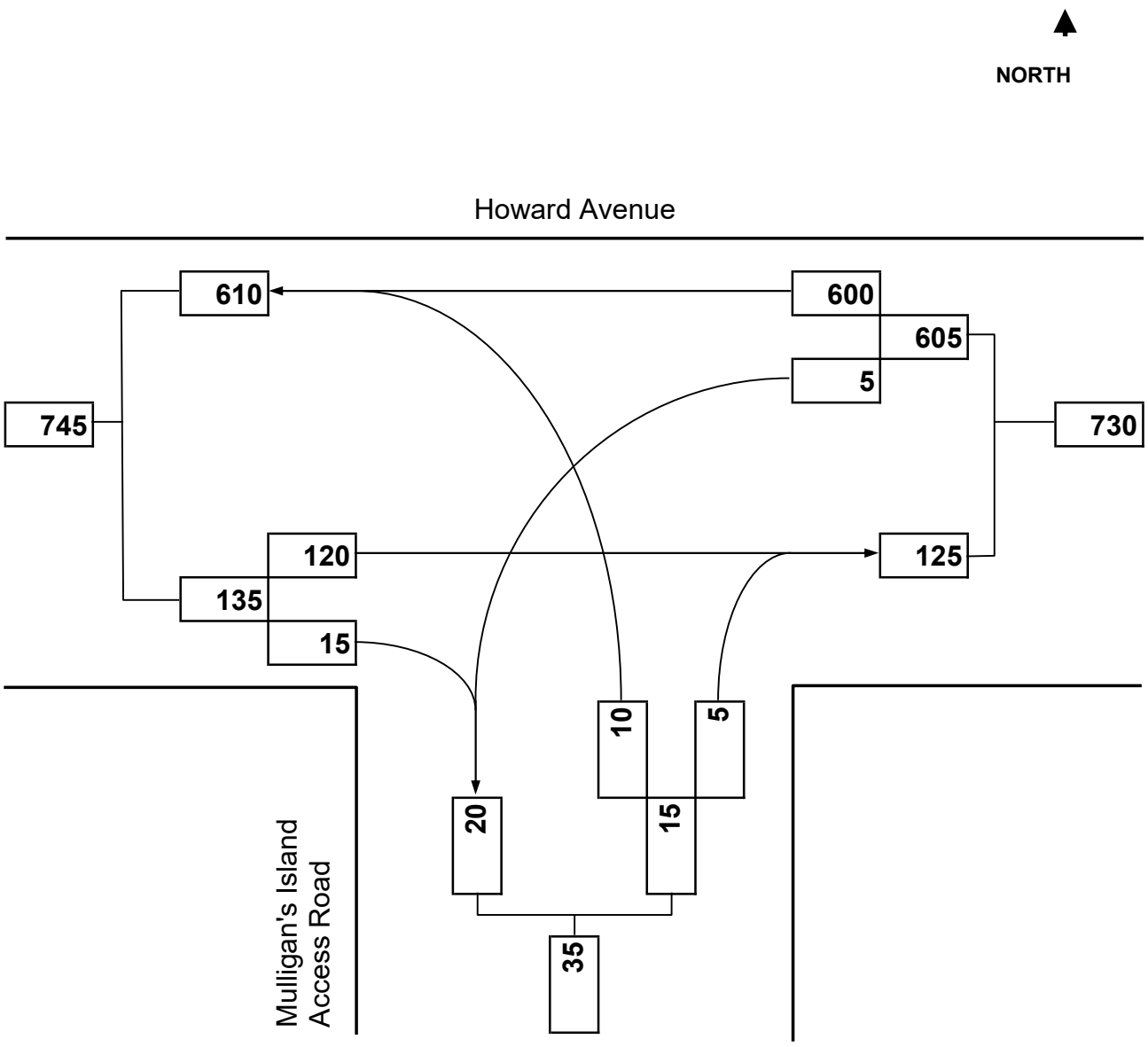
Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	18.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	282	-	-	665	-
HCM Lane V/C Ratio	0.042	-	-	0.009	-
HCM Control Delay (s)	18.3	-	-	10.5	0
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Mulligan's Island Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	4:00 PM - 5:00 PM
Existing:	PM Peak Hour	**Future**:	n/a



Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	120	15	5	600	10	5
Future Vol, veh/h	120	15	5	600	10	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	171	21	7	857	14	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	192	0	625	96
Stage 1	-	-	-	-	182	-
Stage 2	-	-	-	-	443	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1394	-	422	948
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	620	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1394	-	418	948
Mov Cap-2 Maneuver	-	-	-	-	418	-
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	614	-

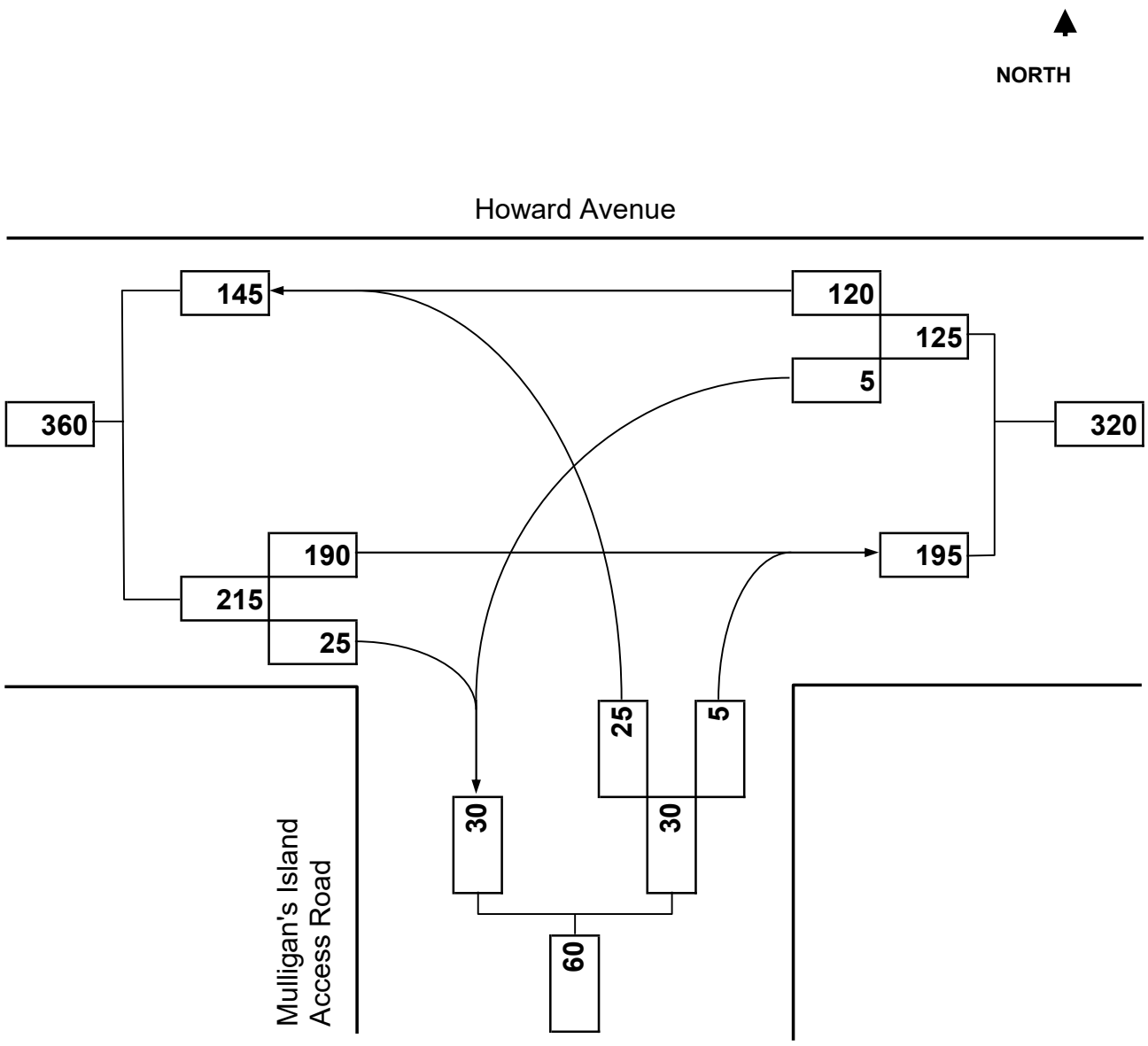
Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	514	-	-	1394	-
HCM Lane V/C Ratio	0.042	-	-	0.005	-
HCM Control Delay (s)	12.3	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Mulligan's Island Access Road
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	12:00 PM - 1:00 PM
Existing:	MD Peak Hour	**Future**:	n/a



Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	190	25	5	120	25	5
Future Vol, veh/h	190	25	5	120	25	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	253	33	7	160	33	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	286	0	364	143
Stage 1	-	-	-	-	270	-
Stage 2	-	-	-	-	94	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1288	-	614	885
Stage 1	-	-	-	-	757	-
Stage 2	-	-	-	-	925	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1288	-	610	885
Mov Cap-2 Maneuver	-	-	-	-	610	-
Stage 1	-	-	-	-	757	-
Stage 2	-	-	-	-	919	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	11
HCM LOS			B

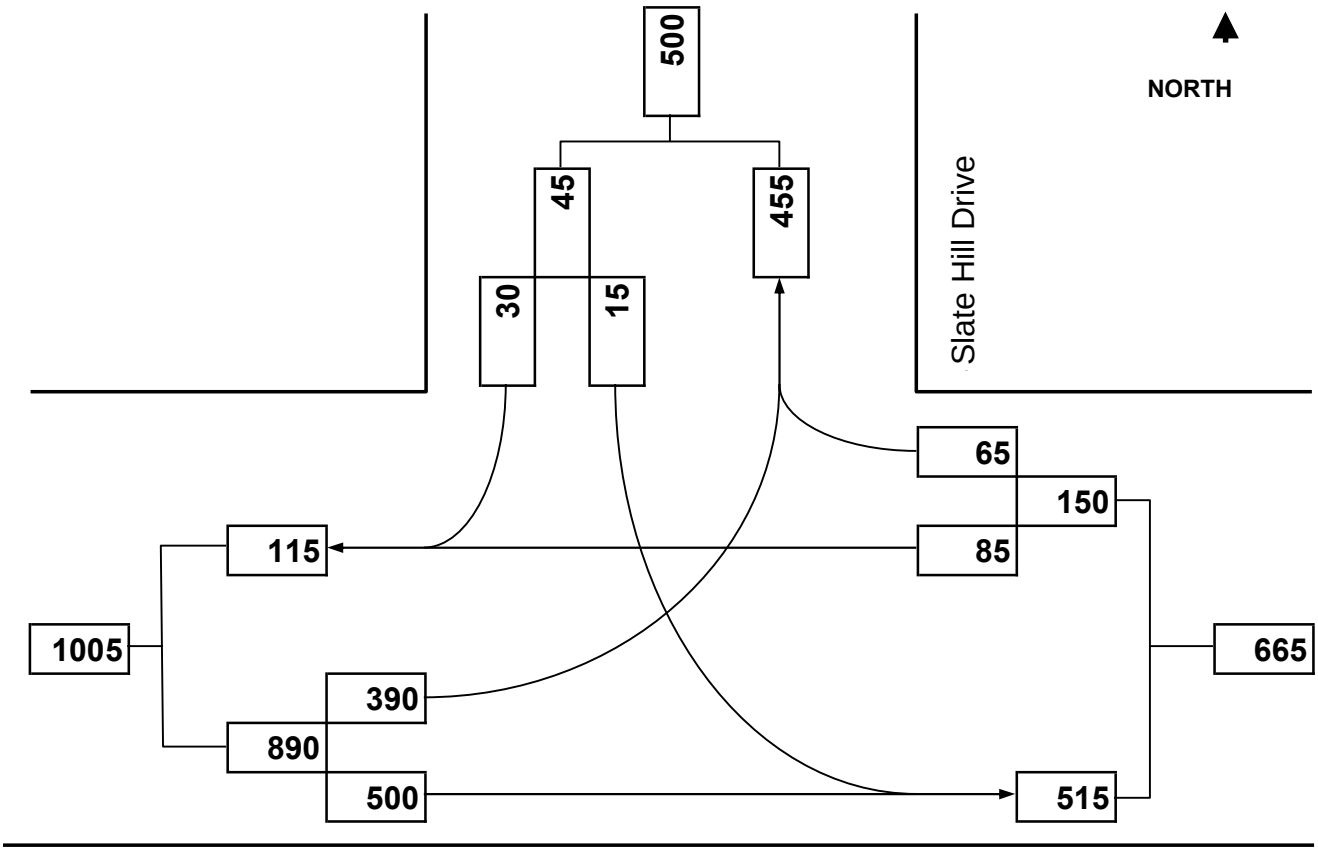
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	643	-	-	1288	-
HCM Lane V/C Ratio	0.062	-	-	0.005	-
HCM Control Delay (s)	11	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Howard Avenue at Slate Hill Drive

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	8:00 AM - 9:00 AM
Existing:	AM Peak Hour	**Future**:	n/a



HCS7 Two-Way Stop-Control Report

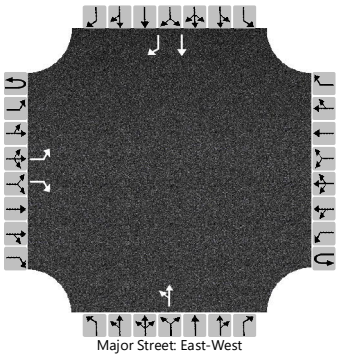
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	7/10/2020
Analysis Year	2020
Time Analyzed	AM Peak Existing
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.86
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		390		500						85	65				15	30
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

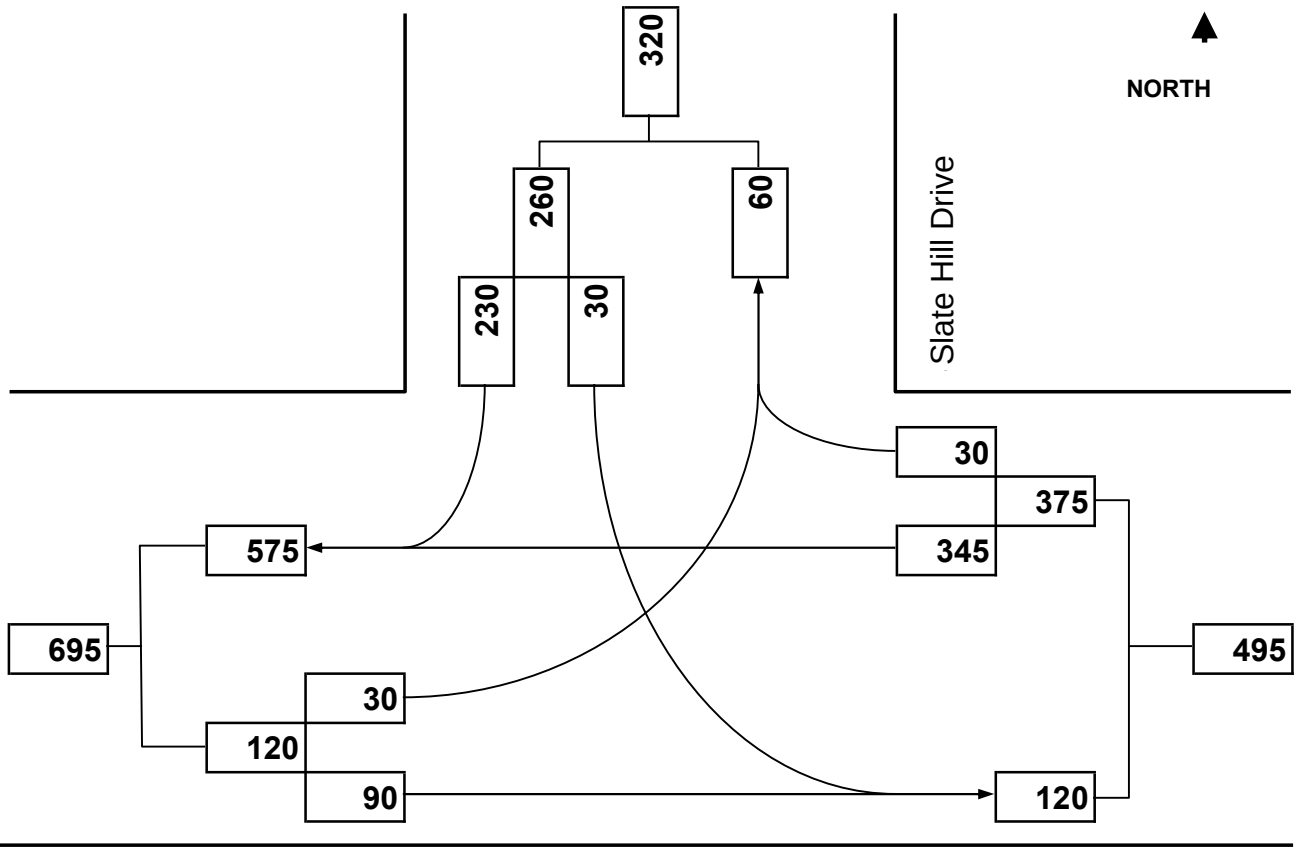
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		453								174					17	35
Capacity, c (veh/h)		1161								530					76	923
v/c Ratio		0.39								0.33					0.23	0.04
95% Queue Length, Q_{95} (veh)		1.9								1.4					0.8	0.1
Control Delay (s/veh)		10.1								15.1					65.6	9.1
Level of Service (LOS)		B								C					F	A
Approach Delay (s/veh)		4.4								15.1				27.9		
Approach LOS										C				D		

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	4:00 PM - 5:00 PM
Existing:	PM Peak Hour	**Future**:	n/a



HCS7 Two-Way Stop-Control Report

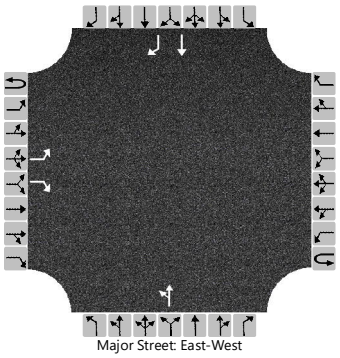
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	7/10/2020
Analysis Year	2020
Time Analyzed	PM Peak Existing
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.72
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		30		90						345	30				30	230
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

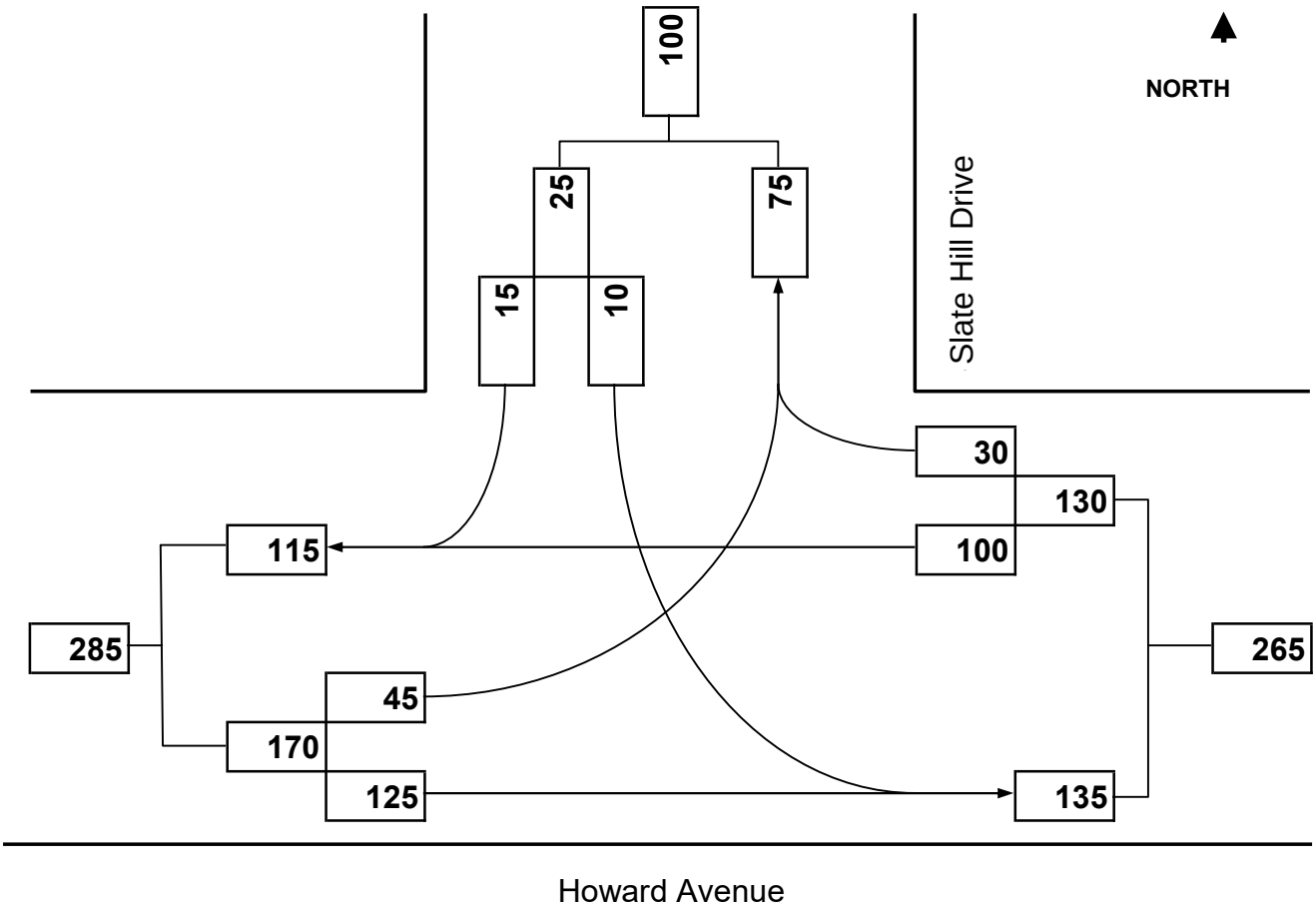
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		42								521					42	319
Capacity, c (veh/h)		1161								574					667	923
v/c Ratio		0.04								0.91					0.06	0.35
95% Queue Length, Q_{95} (veh)		0.1								11.0					0.2	1.6
Control Delay (s/veh)		8.2								45.2					10.8	10.9
Level of Service (LOS)		A								E					B	B
Approach Delay (s/veh)		2.1								45.2				10.9		
Approach LOS										E				B		

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	12:00 PM - 1:00 PM
Existing:	MD Peak Hour	**Future**:	n/a



HCS7 Two-Way Stop-Control Report

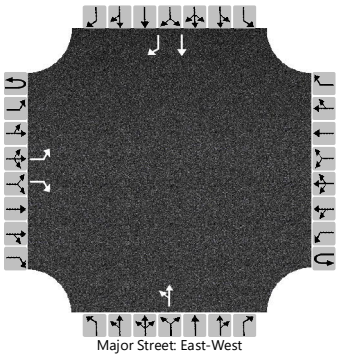
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	7/10/2020
Analysis Year	2020
Time Analyzed	Sat. MD Peak Existing
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.79
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		45		125						100	30				10	15
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		57								165					13	19
Capacity, c (veh/h)		1161								879					607	923
v/c Ratio		0.05								0.19					0.02	0.02
95% Queue Length, Q_{95} (veh)		0.2								0.7					0.1	0.1
Control Delay (s/veh)		8.3								10.0					11.1	9.0
Level of Service (LOS)		A								B					B	A
Approach Delay (s/veh)		2.2								10.0				9.8		
Approach LOS										B				A		

E

Future 2025 No Build Weekday AM / PM / Saturday MD Peak Hour

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

Howard Avenue at Mulligan's Island Access Road

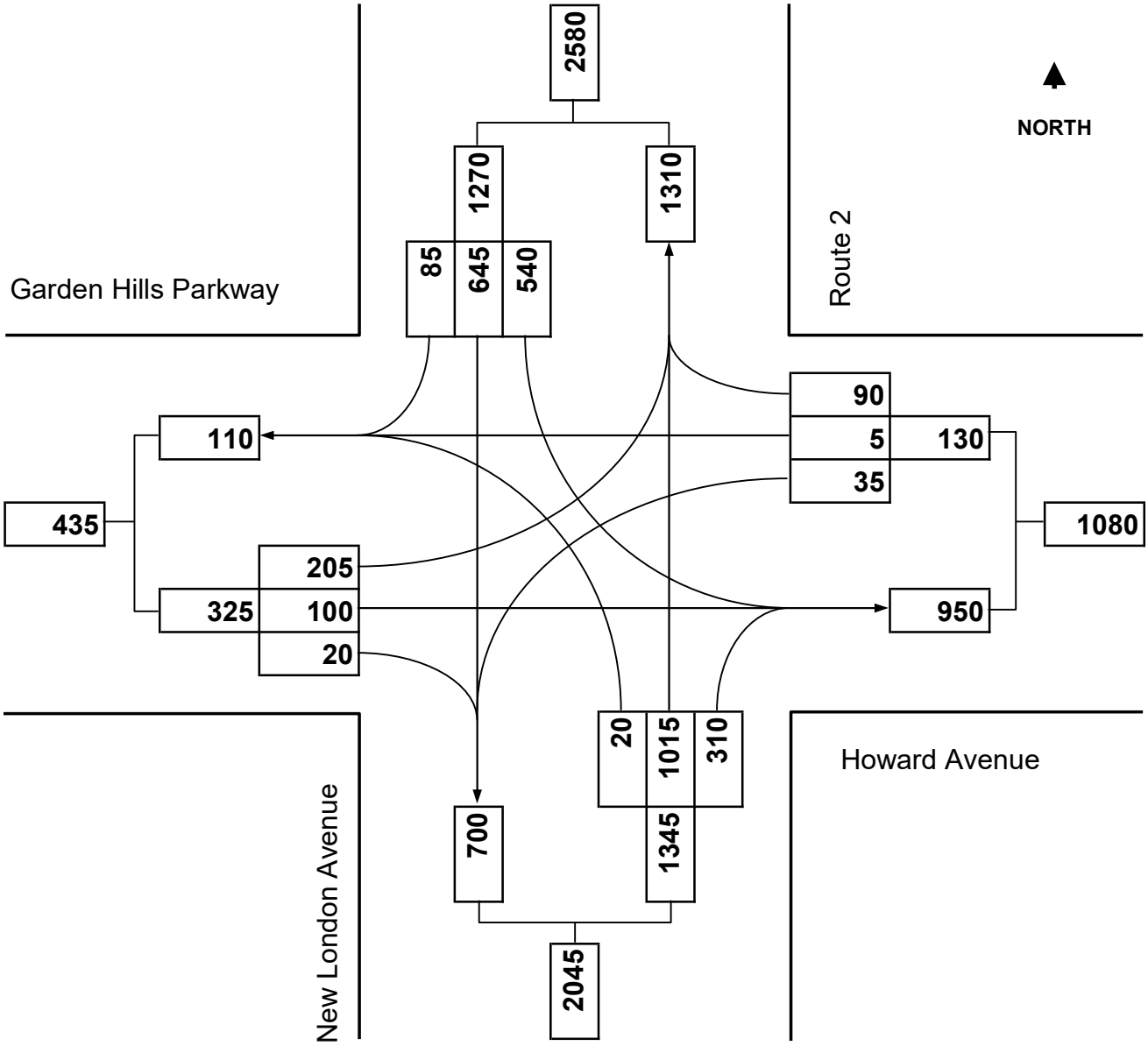
Howard Avenue at Slate Hill Drive

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 No Build

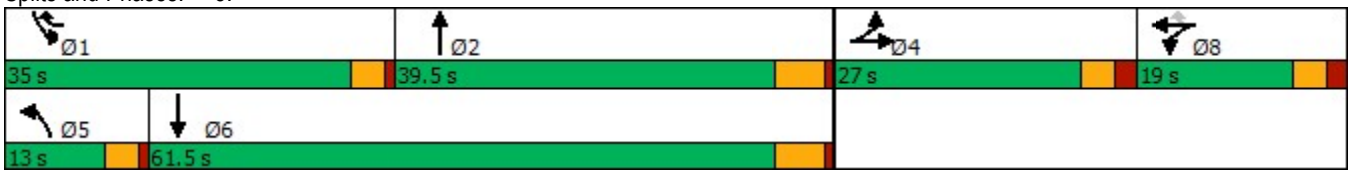


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	100	20	35	5	90	20	1015	310	540	645	85
Future Volume (vph)	205	100	20	35	5	90	20	1015	310	540	645	85
Satd. Flow (prot)	1715	1748	0	0	1820	1615	1805	4967	0	3502	3518	0
Flt Permitted	0.950	0.987			0.958		0.950			0.950		
Satd. Flow (perm)	1715	1748	0	0	1820	1615	1805	4967	0	3502	3518	0
Satd. Flow (RTOR)		5				90		64			16	
Lane Group Flow (vph)	176	178	0	0	43	98	22	1440	0	587	793	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	27.0	27.0		19.0	19.0	35.0	13.0	39.5		35.0	61.5	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	14.7	14.7			8.2	28.4	7.5	33.9		21.2	55.4	
Actuated g/C Ratio	0.16	0.16			0.09	0.31	0.08	0.37		0.23	0.60	
v/c Ratio	0.64	0.63			0.27	0.18	0.15	0.77		0.73	0.37	
Control Delay	50.6	48.4			50.0	6.7	49.6	30.8		40.0	12.9	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	50.6	48.4			50.0	6.7	49.6	30.8		40.0	12.9	
LOS	D	D			D	A	D	C		D	B	
Approach Delay		49.5			19.9			31.1			24.4	
Approach LOS		D			B			C			C	
Queue Length 50th (ft)	108	106			25	3	13	276		175	115	
Queue Length 95th (ft)	204	202			68	38	43	#478		262	252	
Internal Link Dist (ft)		467			175			1057			283	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	428	440			289	745	184	1958		1233	2266	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.41	0.40			0.15	0.13	0.12	0.74		0.48	0.35	

Intersection Summary

Cycle Length: 120.5
Actuated Cycle Length: 92.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 29.8 — Intersection LOS: C
Intersection Capacity Utilization 69.6% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

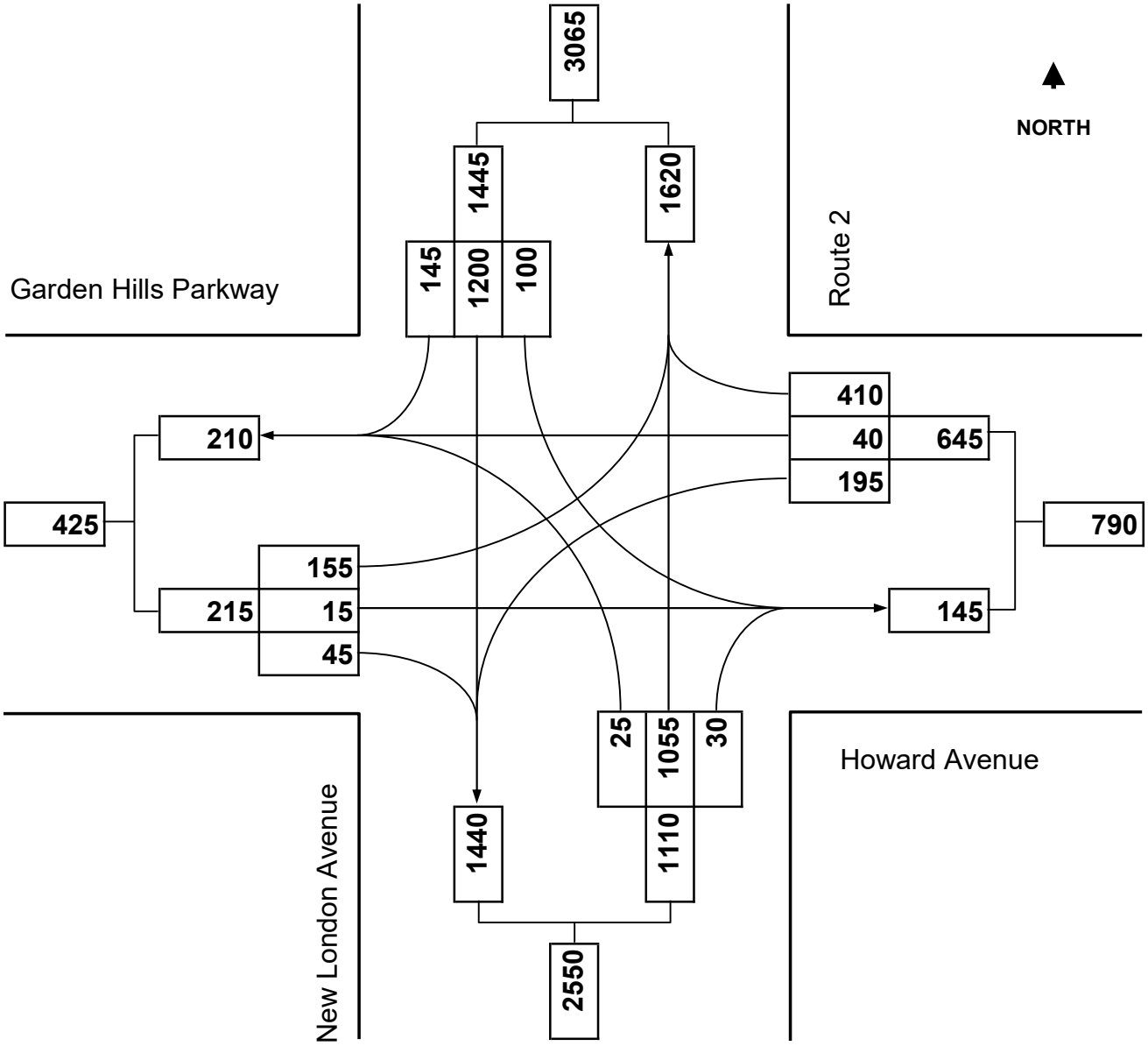
Splits and Phases: 5:



ENGINEERING SUCCESS **TOGETHER**

Turning Movement Diagram

Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 No Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	15	45	195	40	410	25	1055	30	100	1200	145
Future Volume (vph)	155	15	45	195	40	410	25	1055	30	100	1200	145
Satd. Flow (prot)	1715	1654	0	0	1824	1615	1805	5116	0	3502	3521	0
Flt Permitted	0.950	0.979			0.960		0.950			0.950		
Satd. Flow (perm)	1715	1654	0	0	1824	1615	1805	5116	0	3502	3521	0
Satd. Flow (RTOR)		24				68		4			12	
Lane Group Flow (vph)	122	117	0	0	261	456	28	1205	0	111	1494	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	14.0	14.0		37.0	37.0	19.0	19.0	50.5		19.0	50.5	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	9.1	9.1			18.2	32.6	7.5	38.7		9.3	45.6	
Actuated g/C Ratio	0.10	0.10			0.19	0.34	0.08	0.41		0.10	0.48	
v/c Ratio	0.74	0.65			0.75	0.76	0.20	0.58		0.32	0.88	
Control Delay	72.2	53.5			50.7	32.5	48.6	24.1		44.2	31.9	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	72.2	53.5			50.7	32.5	48.6	24.1		44.2	31.9	
LOS	E	D			D	C	D	C		D	C	
Approach Delay		63.1			39.1			24.6			32.7	
Approach LOS		E			D			C			C	
Queue Length 50th (ft)	81	61			158	225	17	198		34	453	
Queue Length 95th (ft)	#203	#164			248	322	48	305		63	#723	
Internal Link Dist (ft)		467			175			1057			283	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	164	180			622	694	288	2456		560	1695	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.74	0.65			0.42	0.66	0.10	0.49		0.20	0.88	

Intersection Summary

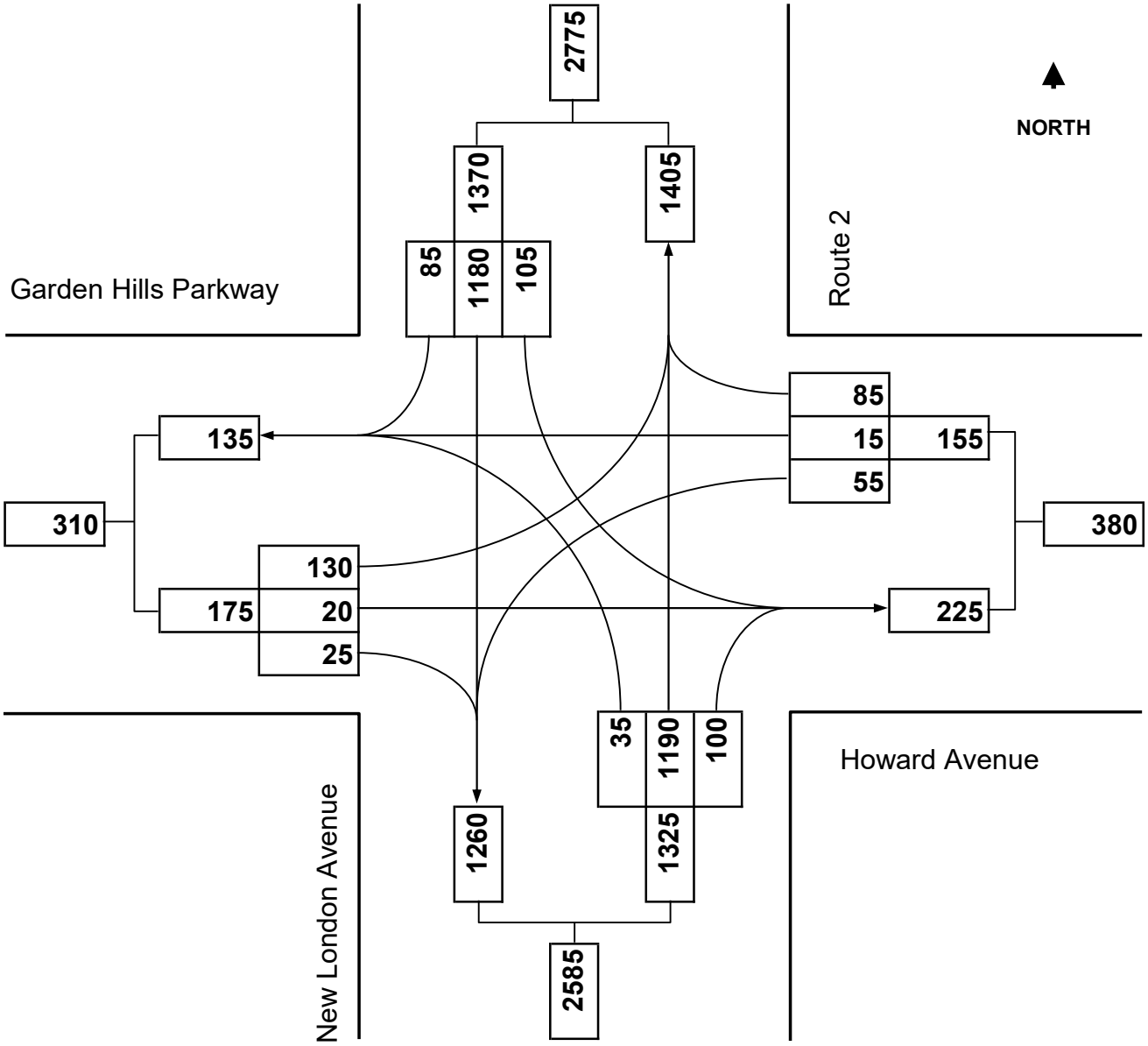
Cycle Length: 120.5
Actuated Cycle Length: 95.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 33.2 — Intersection LOS: C
Intersection Capacity Utilization 71.1% — ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5:

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

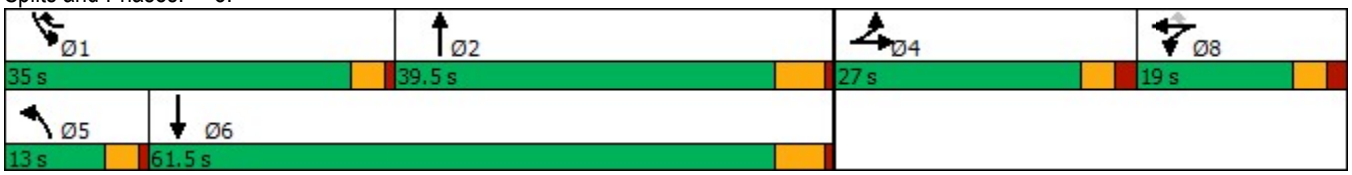
Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	MD Peak Hour
Existing:	n/a	**Future**:	2025 No Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	20	25	55	15	85	35	1190	100	105	1180	85
Future Volume (vph)	130	20	25	55	15	85	35	1190	100	105	1180	85
Satd. Flow (prot)	1715	1686	0	0	1828	1615	1805	5078	0	3502	3541	0
Flt Permitted	0.950	0.976			0.962		0.950			0.950		
Satd. Flow (perm)	1715	1686	0	0	1828	1615	1805	5078	0	3502	3541	0
Satd. Flow (RTOR)		15				86		11			8	
Lane Group Flow (vph)	89	87	0	0	71	86	35	1303	0	106	1278	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	27.0	27.0		19.0	19.0	35.0	13.0	39.5		35.0	61.5	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	10.8	10.8			9.9	19.5	8.7	34.1		9.2	44.8	
Actuated g/C Ratio	0.14	0.14			0.13	0.26	0.11	0.45		0.12	0.59	
v/c Ratio	0.37	0.35			0.30	0.18	0.17	0.57		0.25	0.61	
Control Delay	42.5	36.6			42.6	8.2	43.5	17.7		40.9	18.1	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	42.5	36.6			42.6	8.2	43.5	17.7		40.9	18.1	
LOS	D	D			D	A	D	B		D	B	
Approach Delay		39.6			23.7			18.4			19.8	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	44	35			34	0	17	171		25	278	
Queue Length 95th (ft)	115	103			94	39	57	271		64	447	
Internal Link Dist (ft)		467			175			1057			283	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	591	591			401	1035	254	2959		1702	2610	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.15	0.15			0.18	0.08	0.14	0.44		0.06	0.49	

Intersection Summary	
Cycle Length: 120.5	
Actuated Cycle Length: 76.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 20.5	Intersection LOS: C
Intersection Capacity Utilization 64.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5:

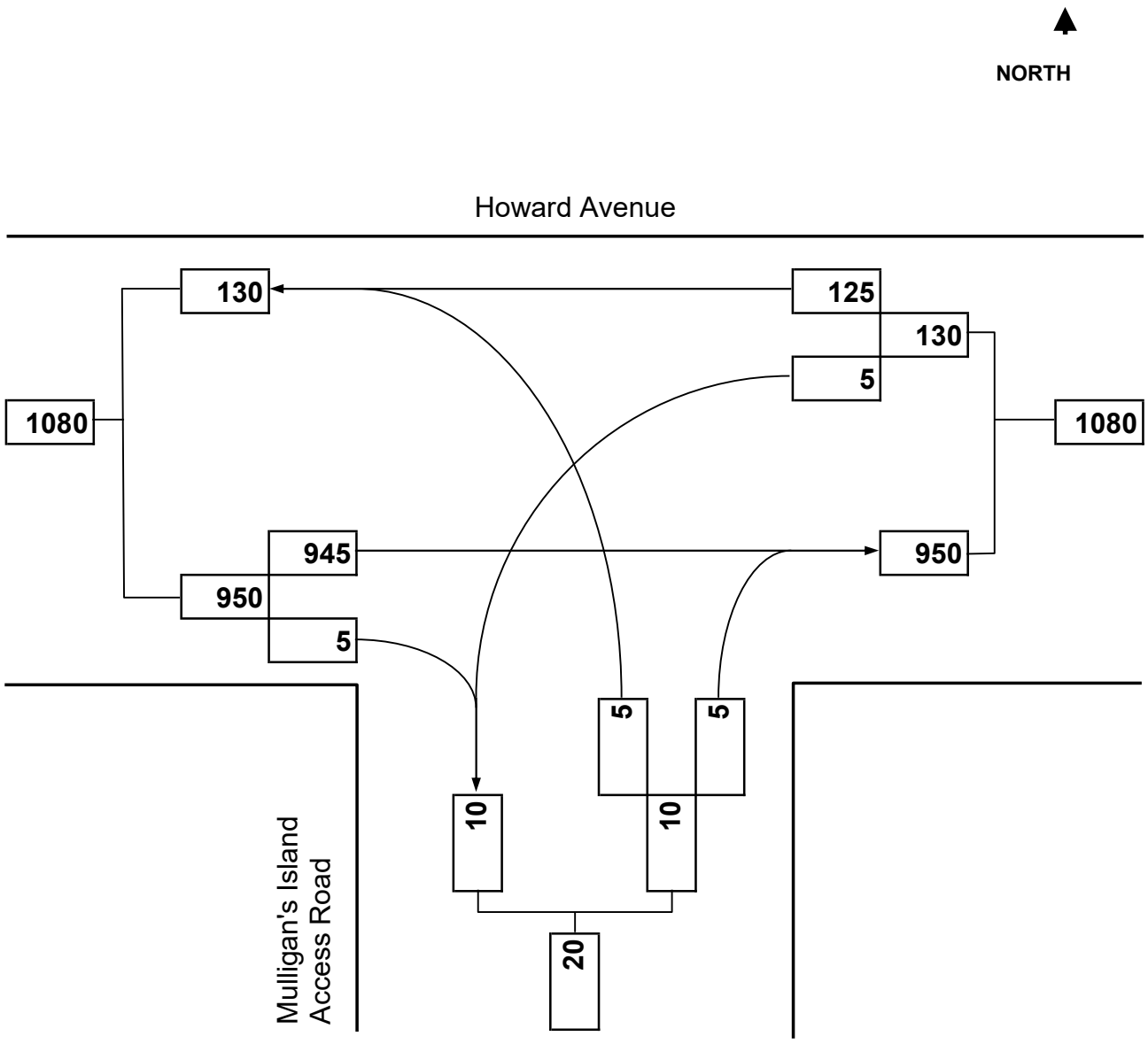


Howard Avenue at Mulligan's Island Access Road

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Mulligan's Island Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 No Build



Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	945	5	5	125	5	5
Future Vol, veh/h	945	5	5	125	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1112	6	6	147	6	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1118	0	1201	559
Stage 1	-	-	-	-	1115	-
Stage 2	-	-	-	-	86	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	632	-	180	478
Stage 1	-	-	-	-	280	-
Stage 2	-	-	-	-	933	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	632	-	178	478
Mov Cap-2 Maneuver	-	-	-	-	178	-
Stage 1	-	-	-	-	280	-
Stage 2	-	-	-	-	924	-

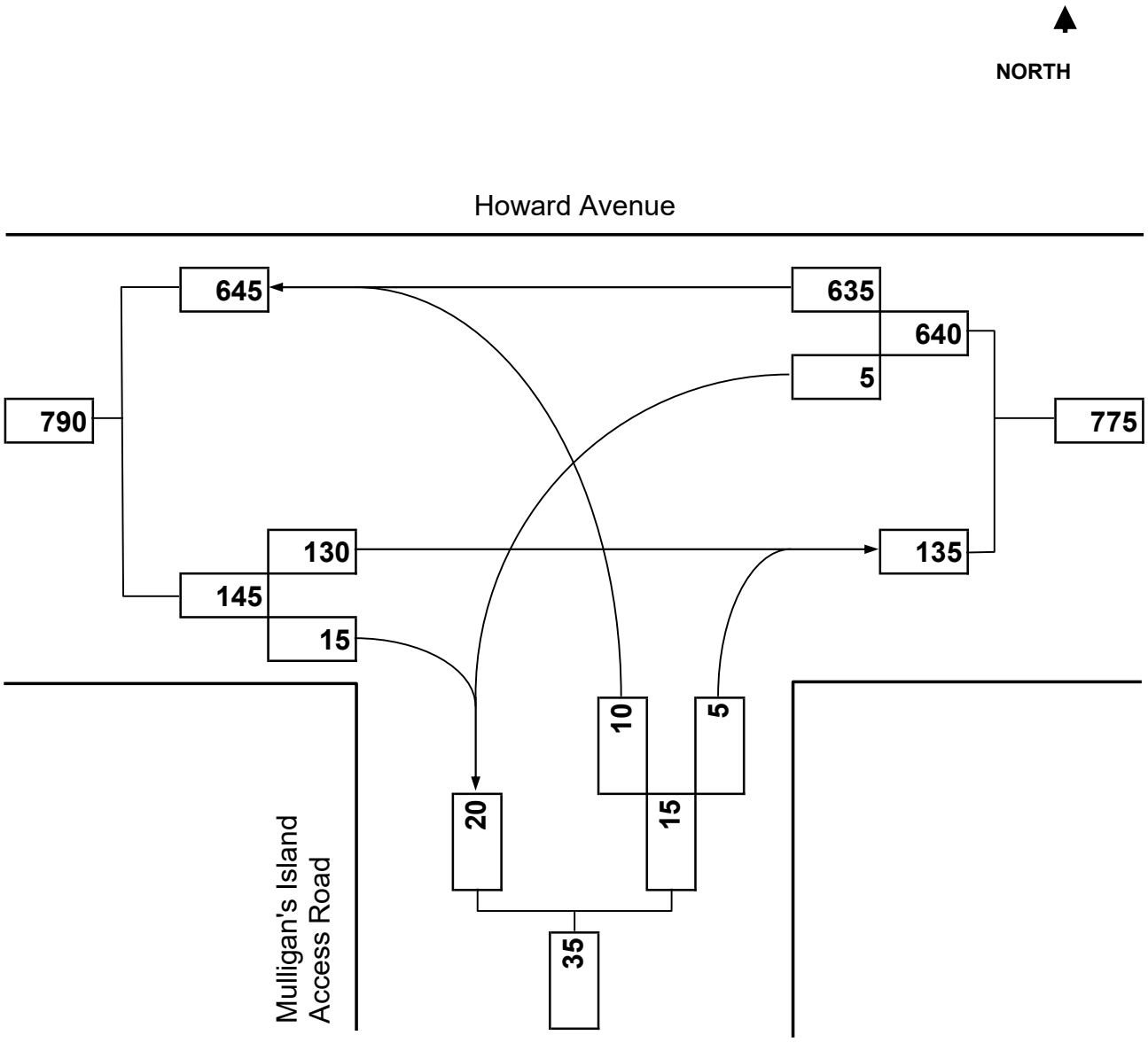
Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	19.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	259	-	-	632	-
HCM Lane V/C Ratio	0.045	-	-	0.009	-
HCM Control Delay (s)	19.6	-	-	10.8	0
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Mulligan's Island Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 No Build



Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	130	15	5	635	10	5
Future Vol, veh/h	130	15	5	635	10	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	186	21	7	907	14	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	207	0	665	104
Stage 1	-	-	-	-	197	-
Stage 2	-	-	-	-	468	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1376	-	398	937
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1376	-	394	937
Mov Cap-2 Maneuver	-	-	-	-	394	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	596	-

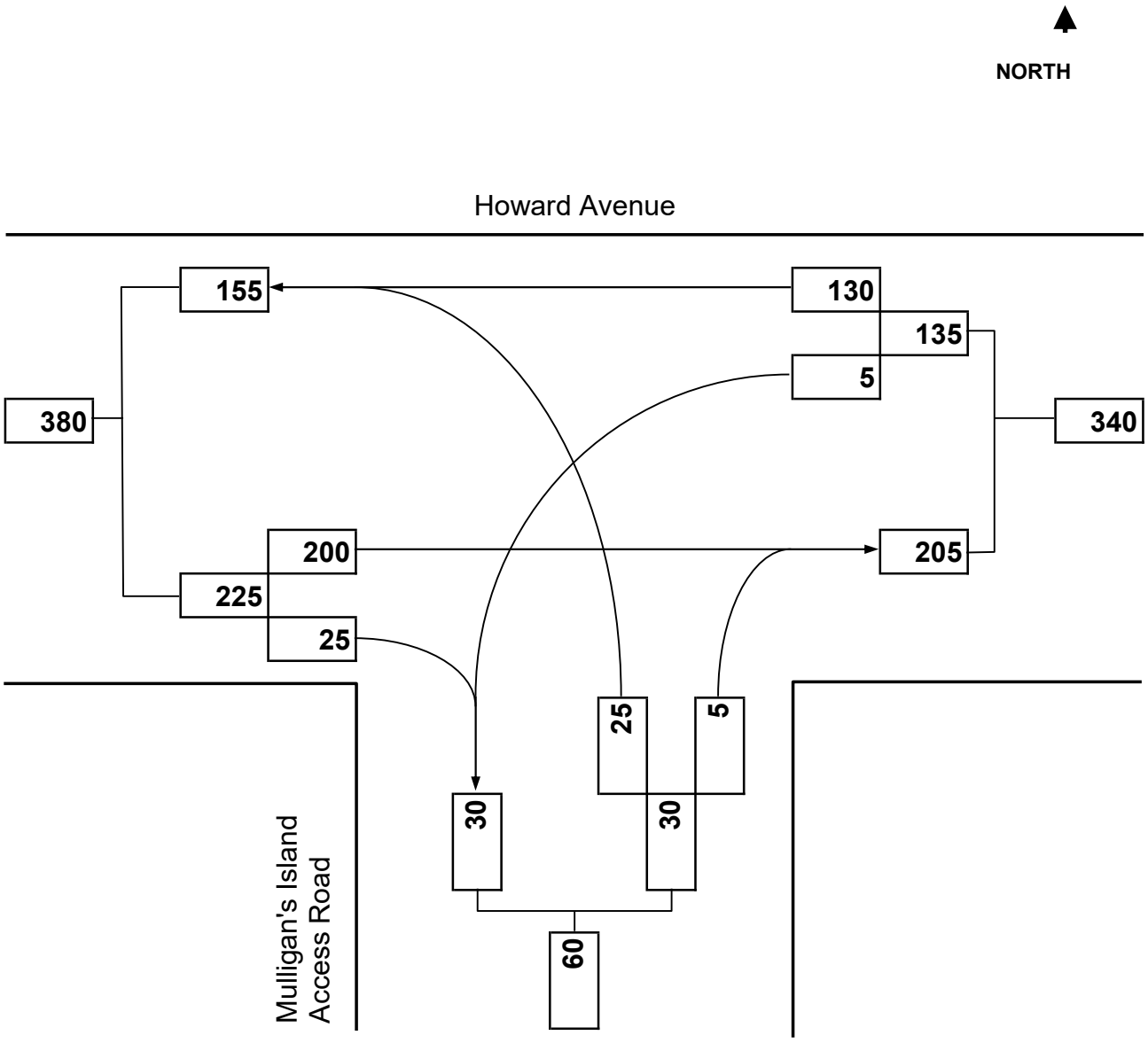
Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	488	-	-	1376	-
HCM Lane V/C Ratio	0.044	-	-	0.005	-
HCM Control Delay (s)	12.7	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Mulligan's Island Access Road
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	MD Peak Hour
Existing:	n/a	**Future**:	2025 No Build



Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	200	25	5	130	25	5
Future Vol, veh/h	200	25	5	130	25	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	267	33	7	173	33	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	300	0	385	150
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	101	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1273	-	596	876
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	918	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1273	-	592	876
Mov Cap-2 Maneuver	-	-	-	-	592	-
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	912	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	11.1
HCM LOS			B

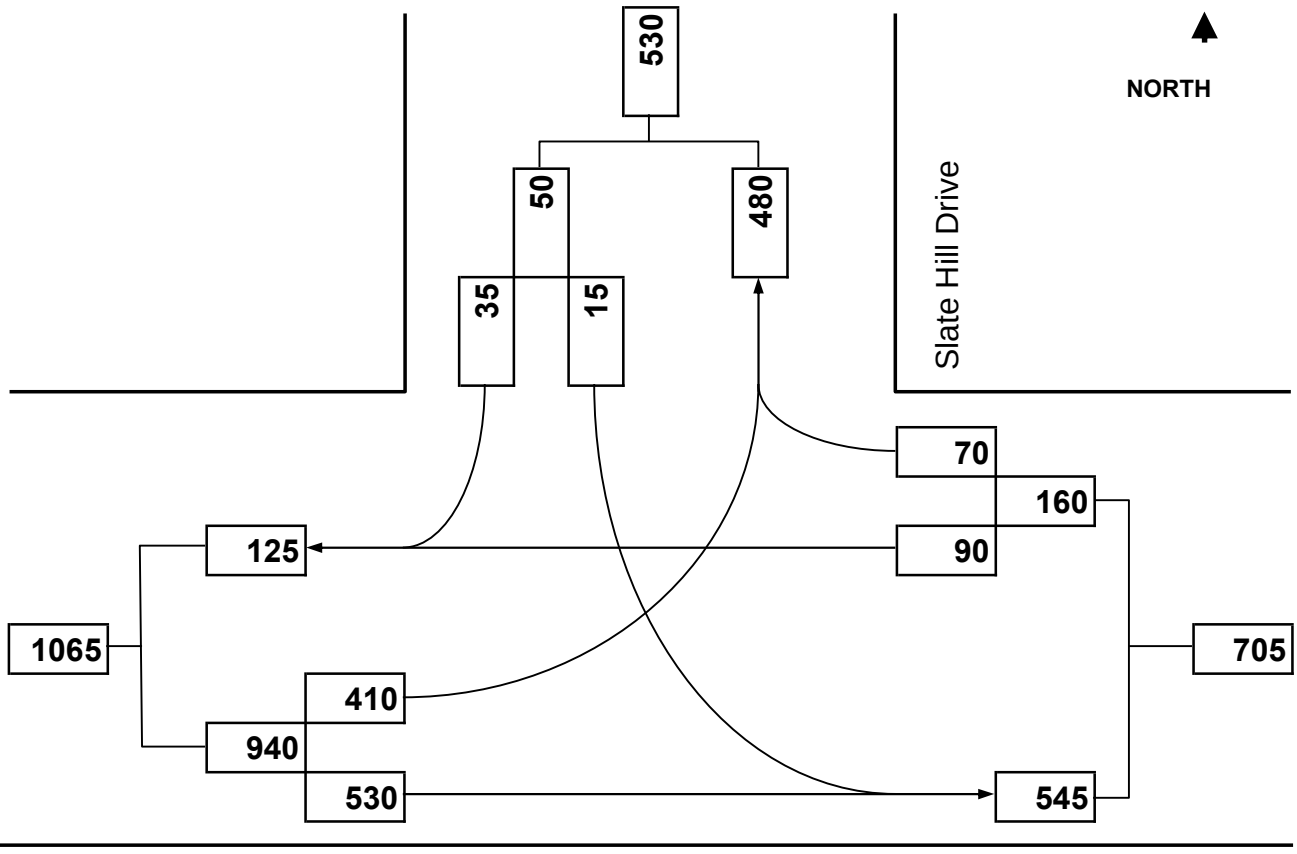
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	626	-	-	1273	-
HCM Lane V/C Ratio	0.064	-	-	0.005	-
HCM Control Delay (s)	11.1	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Howard Avenue at Slate Hill Drive

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 No Build



HCS7 Two-Way Stop-Control Report

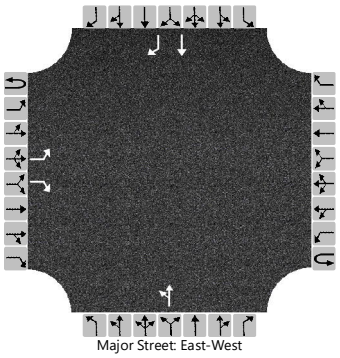
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	7/10/2020
Analysis Year	2020
Time Analyzed	AM Peak No Build
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.86
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		410		530						90	70				15	35
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

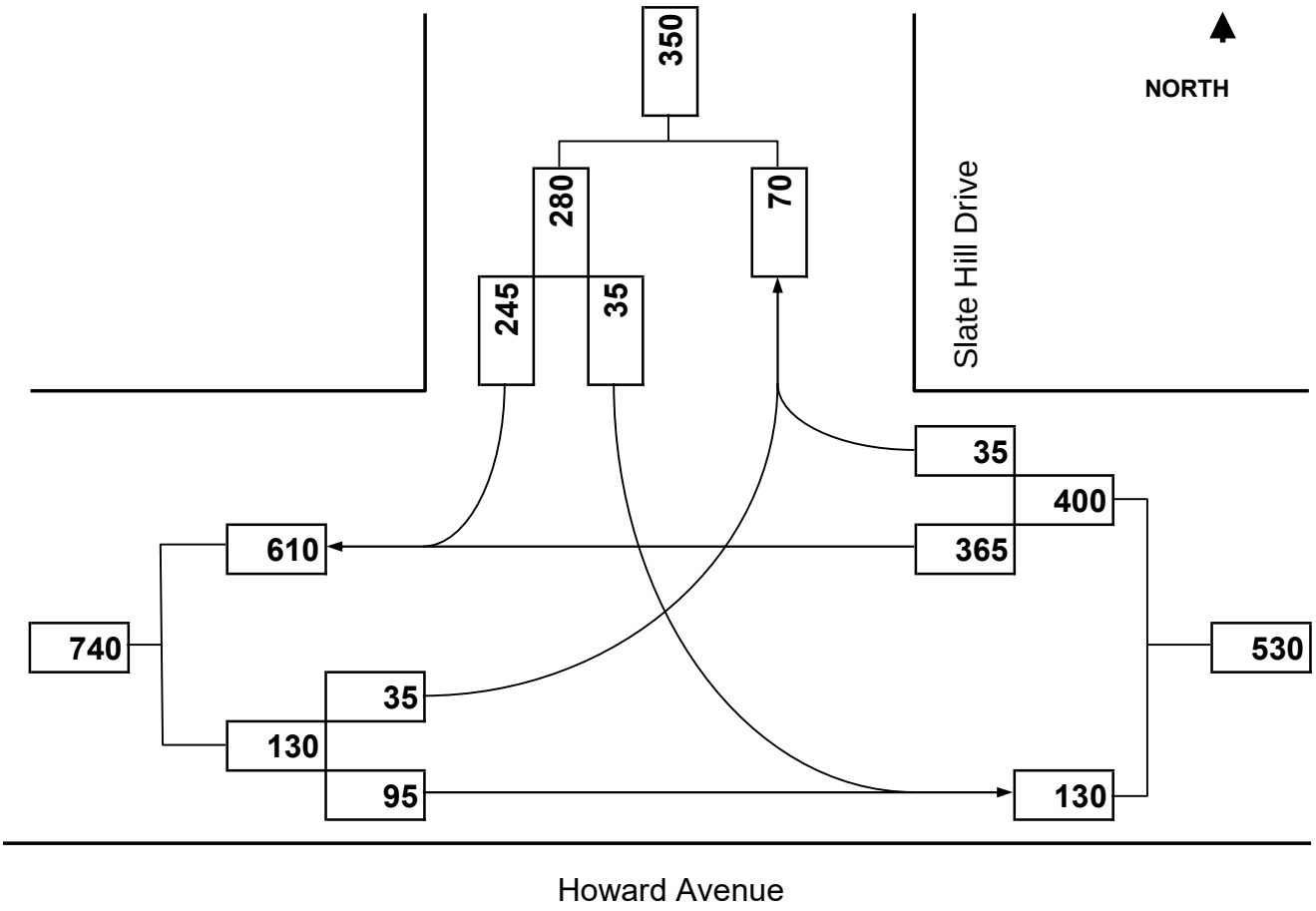
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		477								186					17	41
Capacity, c (veh/h)		1161								499					66	923
v/c Ratio		0.41								0.37					0.26	0.04
95% Queue Length, Q_{95} (veh)		2.0								1.7					0.9	0.1
Control Delay (s/veh)		10.2								16.5					78.3	9.1
Level of Service (LOS)		B								C					F	A
Approach Delay (s/veh)		4.5								16.5				29.8		
Approach LOS										C				D		

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 No Build



HCS7 Two-Way Stop-Control Report

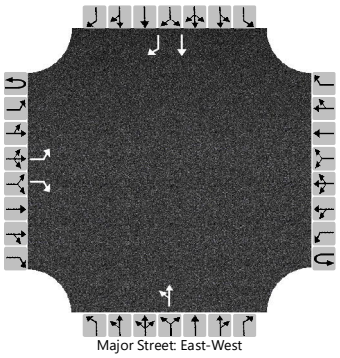
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	7/10/2020
Analysis Year	2020
Time Analyzed	PM Peak No Build
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.72
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		35		95						365	35				35	245
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

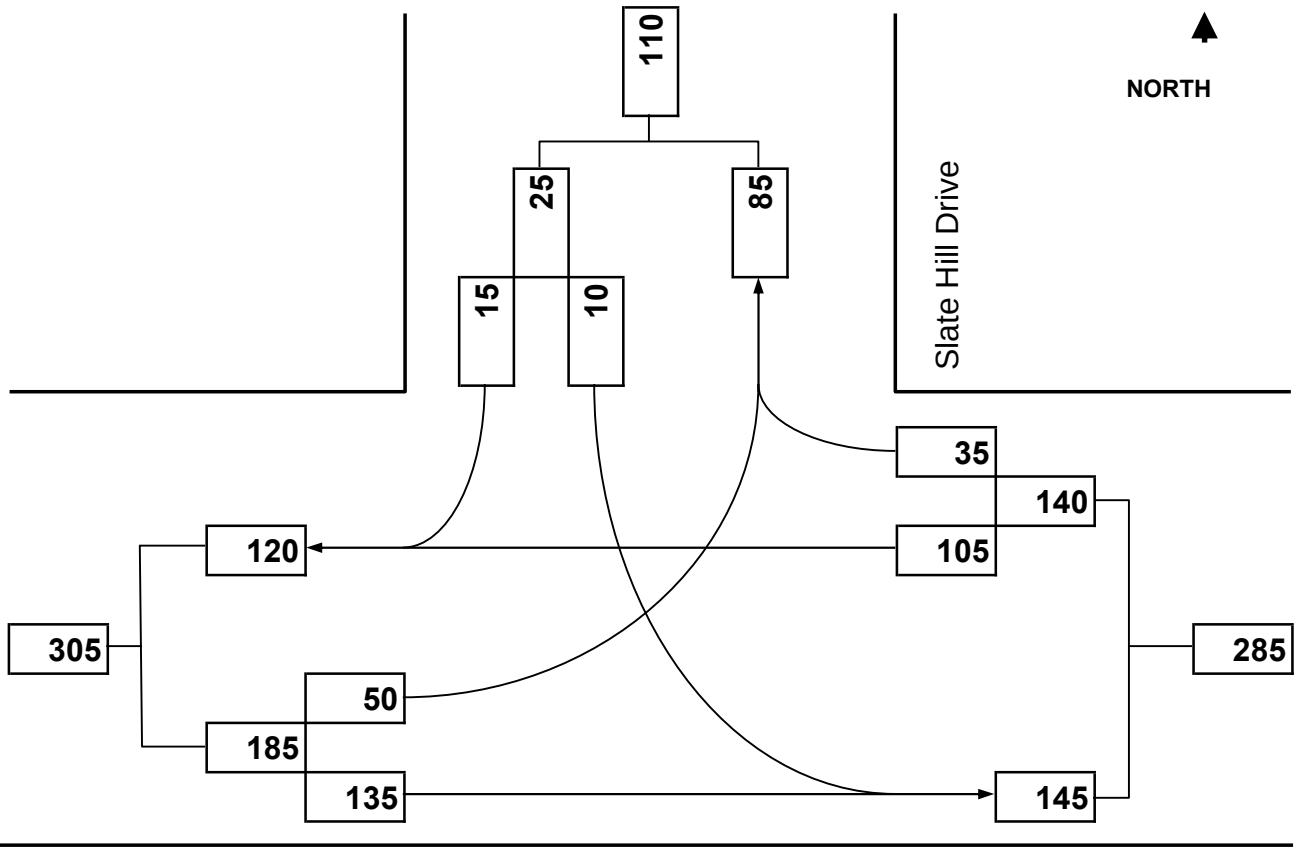
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		49								556					49	340
Capacity, c (veh/h)		1161								546					646	923
v/c Ratio		0.04								1.02					0.08	0.37
95% Queue Length, Q_{95} (veh)		0.1								15.0					0.2	1.7
Control Delay (s/veh)		8.2								70.7					11.0	11.2
Level of Service (LOS)		A								F					B	B
Approach Delay (s/veh)		2.2								70.7				11.1		
Approach LOS										F				B		

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	MD Peak Hour
Existing:	n/a	**Future**:	2025 No Build



HCS7 Two-Way Stop-Control Report

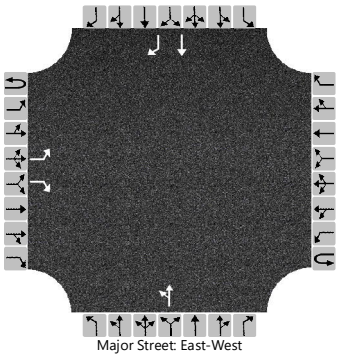
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	7/10/2020
Analysis Year	2020
Time Analyzed	Sat. MD Peak No Build
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.79
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		50		135						105	35				10	15
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		63								177					13	19
Capacity, c (veh/h)		1161								875					584	923
v/c Ratio		0.05								0.20					0.02	0.02
95% Queue Length, Q_{95} (veh)		0.2								0.8					0.1	0.1
Control Delay (s/veh)		8.3								10.2					11.3	9.0
Level of Service (LOS)		A								B					B	A
Approach Delay (s/veh)		2.2								10.2				9.9		
Approach LOS										B				A		

E

Future 2025 Build Weekday AM / PM / Saturday MD Peak Hour

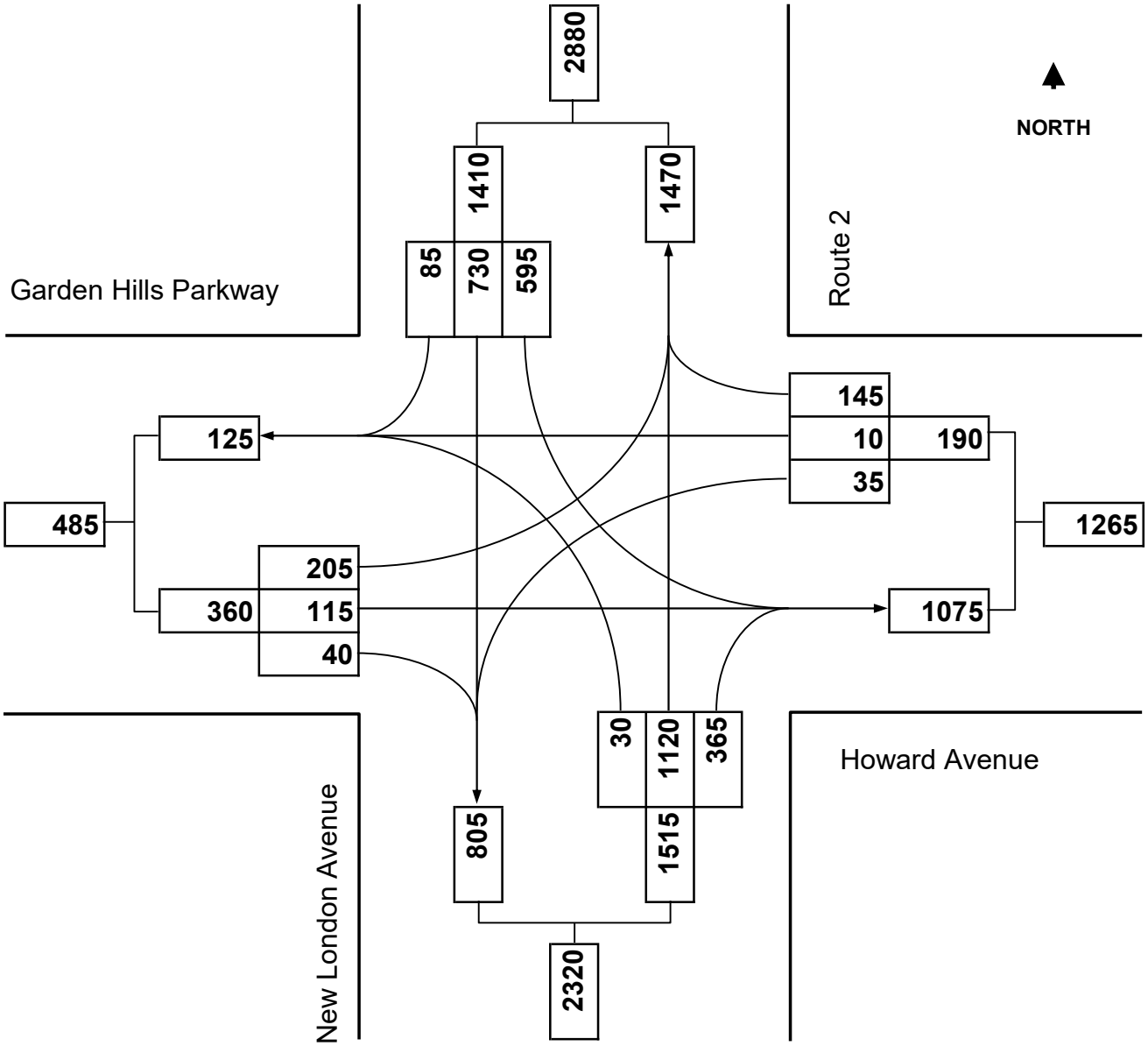
New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway
Howard Avenue at Site Access Road
Howard Avenue at Slate Hill Drive
New London Avenue (Route 2) at Site Access Road
Internal Site Access Intersection

New London Avenue (Route 2) at Howard Avenue/Garden Hills Parkway

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	115	40	35	10	145	30	1120	365	595	730	85
Future Volume (vph)	205	115	40	35	10	145	30	1120	365	595	730	85
Satd. Flow (prot)	1715	1733	0	0	1830	1599	1805	4921	0	3467	3490	0
Flt Permitted	0.950	0.993			0.963		0.950			0.950		
Satd. Flow (perm)	1715	1733	0	0	1830	1599	1805	4921	0	3467	3490	0
Satd. Flow (RTOR)		10				89		68			14	
Lane Group Flow (vph)	194	197	0	0	49	158	33	1614	0	647	885	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	27.0	27.0		19.0	19.0	35.0	13.0	39.0		35.0	61.0	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	15.7	15.7			8.4	33.5	7.7	34.5		23.3	55.4	
Actuated g/C Ratio	0.16	0.16			0.09	0.34	0.08	0.35		0.24	0.56	
v/c Ratio	0.71	0.69			0.32	0.26	0.24	0.91		0.79	0.45	
Control Delay	56.2	52.3			53.0	11.8	52.6	41.2		44.0	16.3	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	56.2	52.3			53.0	11.8	52.6	41.2		44.0	16.3	
LOS	E	D			D	B	D	D		D	B	
Approach Delay		54.2			21.5			41.4			28.0	
Approach LOS		D			C			D			C	
Queue Length 50th (ft)	126	121			31	29	21	360		202	188	
Queue Length 95th (ft)	226	221			75	78	57	#595		293	296	
Internal Link Dist (ft)		486			170			911			368	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	394	405			267	733	169	1765		1122	2044	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.49	0.49			0.18	0.22	0.20	0.91		0.58	0.43	

Intersection Summary

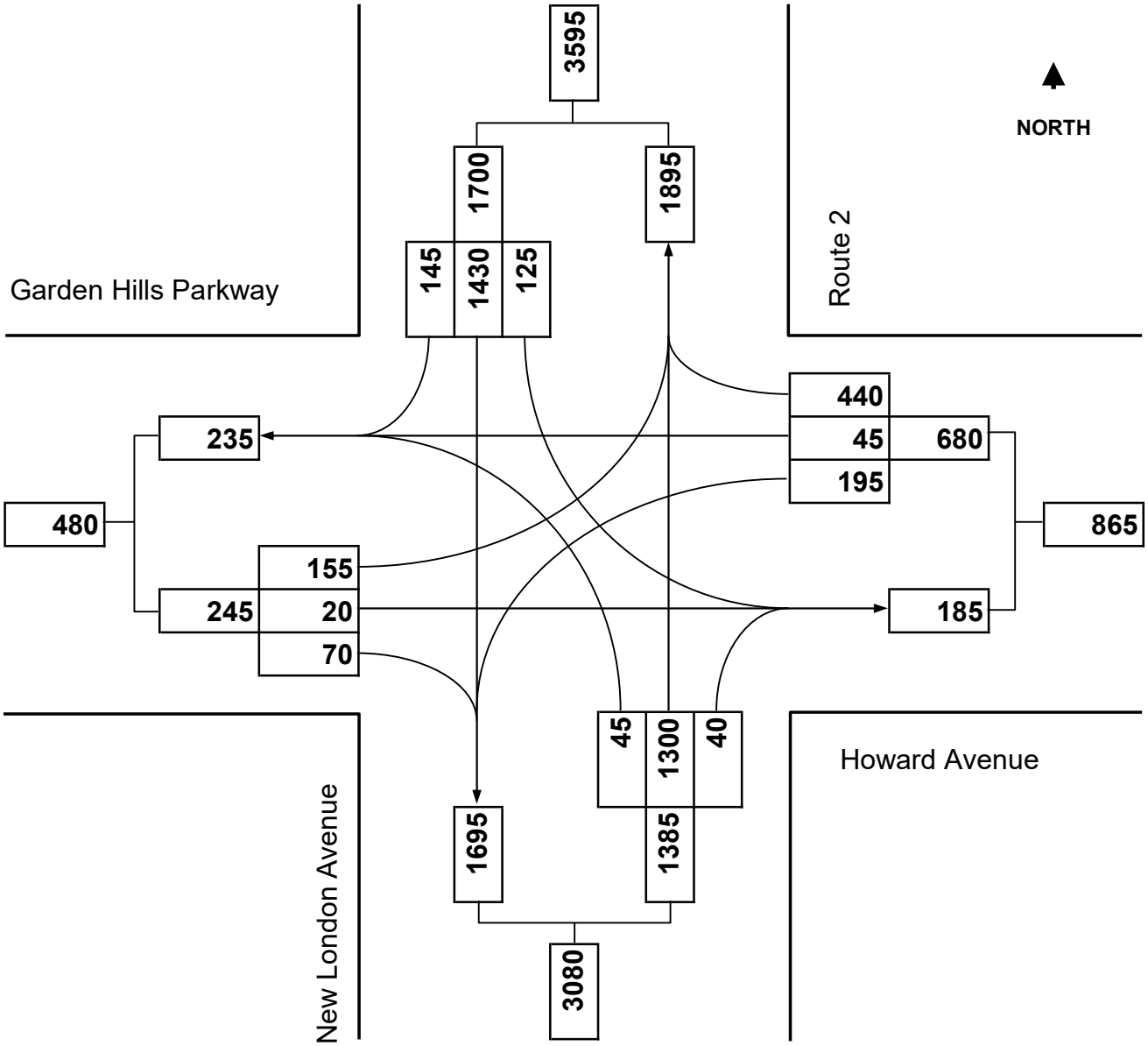
Cycle Length: 120
Actuated Cycle Length: 98.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 36.2 Intersection LOS: D
Intersection Capacity Utilization 78.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5:

ENGINEERING SUCCESS **TOGETHER**

Turning Movement Diagram

Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	20	70	195	45	440	45	1300	40	125	1430	145
Future Volume (vph)	155	20	70	195	45	440	45	1300	40	125	1430	145
Satd. Flow (prot)	1715	1626	0	0	1826	1599	1805	5068	0	3467	3496	0
Flt Permitted	0.950	0.988			0.961		0.950			0.950		
Satd. Flow (perm)	1715	1626	0	0	1826	1599	1805	5068	0	3467	3496	0
Satd. Flow (RTOR)		56				82		5			13	
Lane Group Flow (vph)	139	133	0	0	267	489	50	1488	0	139	1750	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	14.0	14.0		25.0	25.0	21.0	13.0	40.0		21.0	48.0	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	9.1	9.1			17.1	33.4	7.8	34.5		11.3	43.0	
Actuated g/C Ratio	0.10	0.10			0.19	0.36	0.09	0.38		0.12	0.47	
v/c Ratio	0.82	0.63			0.79	0.77	0.32	0.78		0.33	1.06	
Control Delay	79.1	40.2			53.5	30.1	48.1	29.5		39.4	68.1	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	79.1	40.2			53.5	30.1	48.1	29.5		39.4	68.1	
LOS	E	D			D	C	D	C		D	E	
Approach Delay		60.1			38.4			30.1			66.0	
Approach LOS		E			D			C			E	
Queue Length 50th (ft)	91	48			158	227	30	279		42	~676	
Queue Length 95th (ft)	#214	#136			#270	327	68	379		68	#846	
Internal Link Dist (ft)		572			170			911			368	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	169	211			402	732	179	1997		649	1644	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.82	0.63			0.66	0.67	0.28	0.75		0.21	1.06	

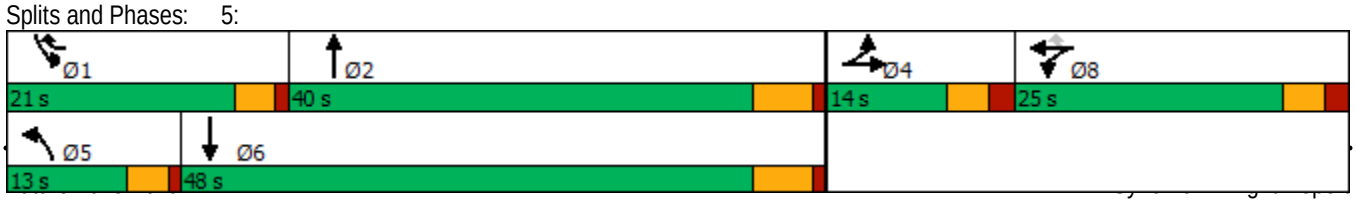
Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 91.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 48.6 — Intersection LOS: D
Intersection Capacity Utilization 81.9% — ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

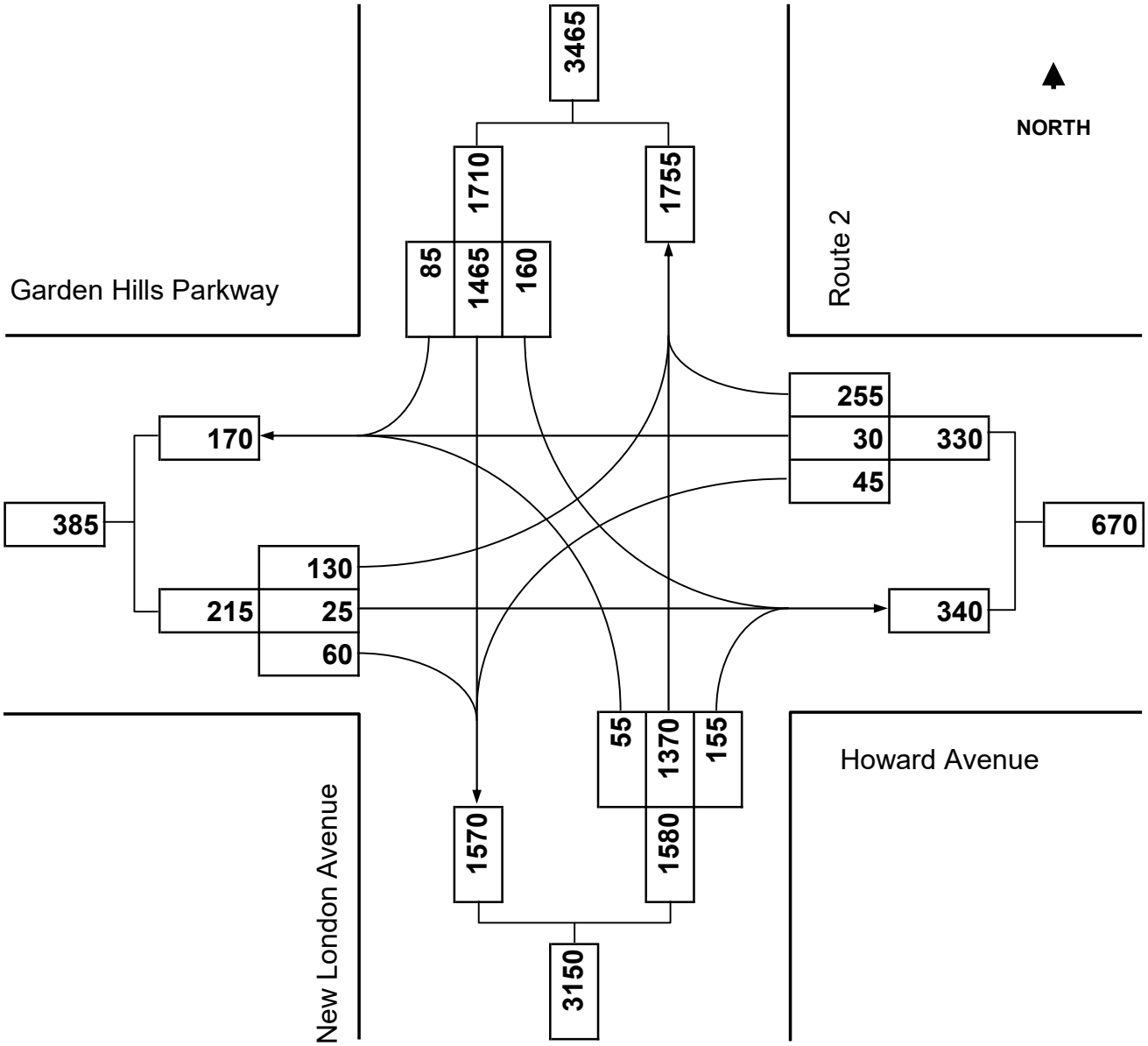
Splits and Phases: 5:



ENGINEERING SUCCESS **TOGETHER**

Turning Movement Diagram

Major Street:	New London Ave. (Rte. 2)	**Minor Street**:	Howard Ave./Garden Hills Pkwy.
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	MD Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	25	60	45	30	255	55	1370	155	160	1465	85
Future Volume (vph)	130	25	60	45	30	255	55	1370	155	160	1465	85
Satd. Flow (prot)	1715	1635	0	0	1845	1599	1805	5019	0	3467	3515	0
Flt Permitted	0.950	0.991			0.971		0.950			0.950		
Satd. Flow (perm)	1715	1635	0	0	1845	1599	1805	5019	0	3467	3515	0
Satd. Flow (RTOR)		55				82		29			9	
Lane Group Flow (vph)	111	106	0	0	75	258	56	1541	0	162	1566	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Total Split (s)	16.0	16.0		12.0	12.0	15.0	11.0	57.0		15.0	61.0	
Total Lost Time (s)	5.0	5.0			5.0	4.0	4.0	5.5		4.0	5.5	
Act Effct Green (s)	9.9	9.9			7.6	18.1	7.6	40.4		9.5	46.2	
Actuated g/C Ratio	0.12	0.12			0.09	0.21	0.09	0.48		0.11	0.55	
v/c Ratio	0.55	0.44			0.45	0.63	0.35	0.64		0.42	0.81	
Control Delay	51.8	28.7			52.8	29.6	49.2	17.2		43.2	21.0	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	51.8	28.7			52.8	29.6	49.2	17.2		43.2	21.0	
LOS	D	C			D	C	D	B		D	C	
Approach Delay		40.5			34.8			18.3			23.1	
Approach LOS		D			C			B			C	
Queue Length 50th (ft)	65	29			43	91	32	223		46	392	
Queue Length 95th (ft)	#140	87			#106	184	76	281		82	493	
Internal Link Dist (ft)		469			170			911			368	
Turn Bay Length (ft)	150						150			200		
Base Capacity (vph)	242	278			166	453	162	3236		490	2383	
Starvation Cap Reductn	0	0			0	0	0	0		0	0	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.46	0.38			0.45	0.57	0.35	0.48		0.33	0.66	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 84.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 23.1 — Intersection LOS: C
Intersection Capacity Utilization 73.9% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

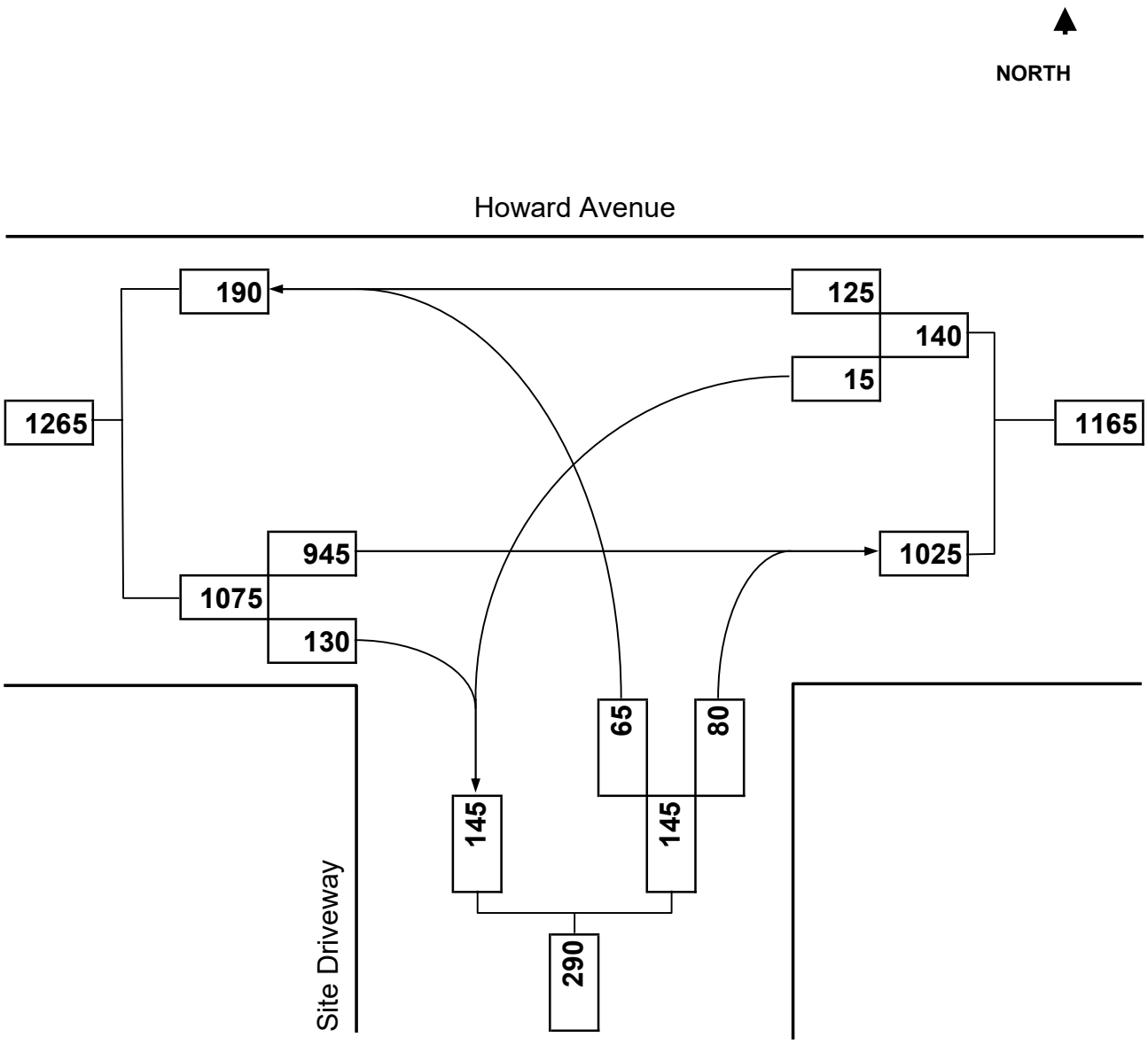
Splits and Phases: 5:

Howard Avenue at Site Access Road

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Site Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	945	130	15	125	65	80
Future Vol, veh/h	945	130	15	125	65	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	1050	144	17	139	72	89

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1194	0	1226	597
Stage 1	-	-	-	-	1122	-
Stage 2	-	-	-	-	104	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	592	-	174	451
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	915	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	592	-	169	451
Mov Cap-2 Maneuver	-	-	-	-	169	-
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	887	-

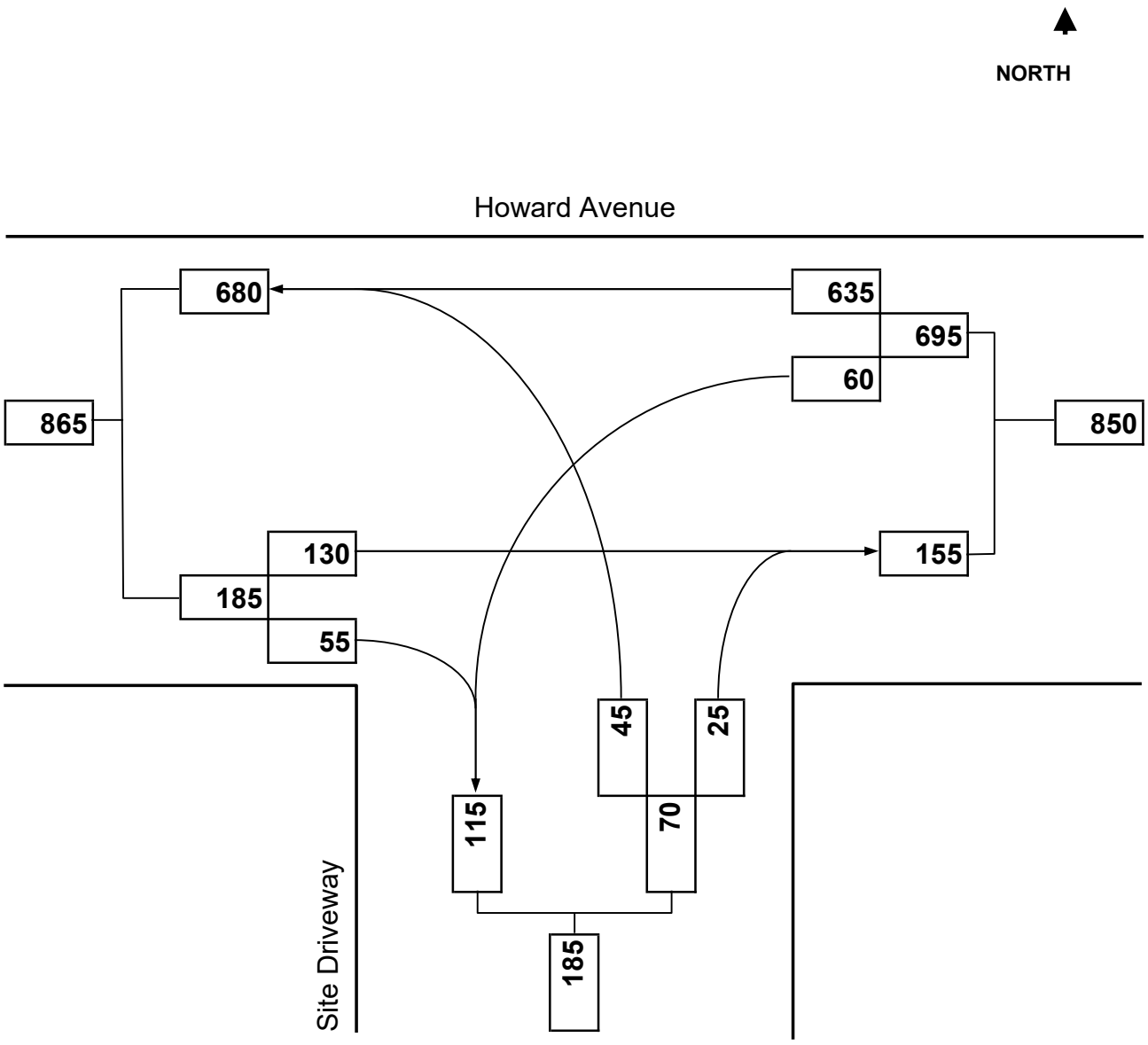
Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	39.6
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	258	-	-	592	-
HCM Lane V/C Ratio	0.624	-	-	0.028	-
HCM Control Delay (s)	39.6	-	-	11.3	0.1
HCM Lane LOS	E	-	-	B	A
HCM 95th %tile Q(veh)	3.8	-	-	0.1	-

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Site Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	130	55	60	635	45	25
Future Vol, veh/h	130	55	60	635	45	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	186	79	86	907	64	36

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	265	0	852	133
Stage 1	-	-	-	-	226	-
Stage 2	-	-	-	-	626	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1311	-	303	898
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	501	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1311	-	263	898
Mov Cap-2 Maneuver	-	-	-	-	263	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	435	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	19.2
HCM LOS			C

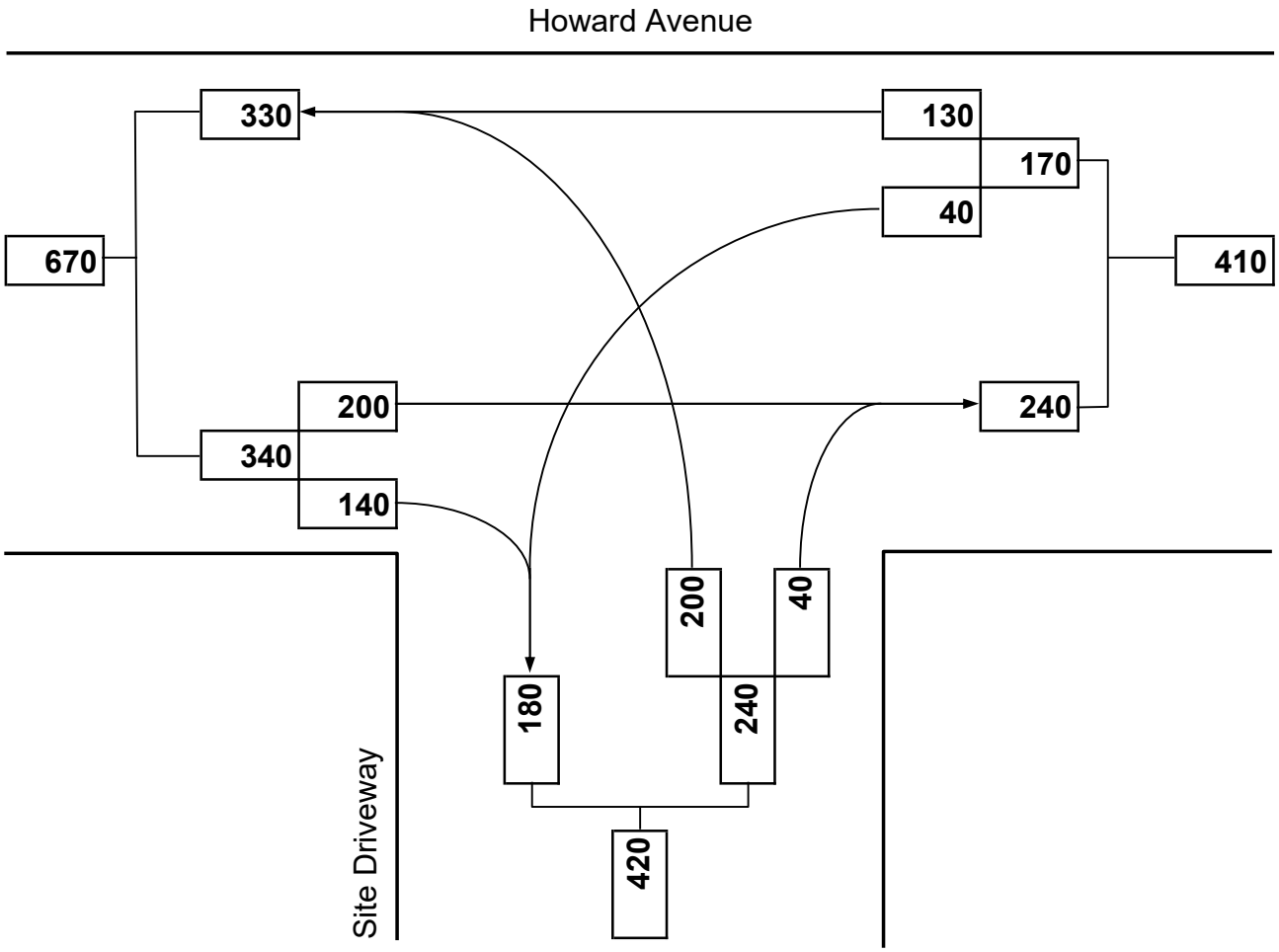
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	352	-	-	1311	-
HCM Lane V/C Ratio	0.284	-	-	0.065	-
HCM Control Delay (s)	19.2	-	-	7.9	0.4
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.1	-	-	0.2	-

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Site Access Road
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	MD Peak Hour
Existing:	n/a	**Future**:	2025 Build

NORTH



Intersection	
Int Delay, s/veh	9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	200	140	40	140	200	40
Future Vol, veh/h	200	140	40	140	200	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	267	187	53	187	267	53

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	454	0	561	227
Stage 1	-	-	-	-	361	-
Stage 2	-	-	-	-	200	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1117	-	462	782
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	820	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1117	-	438	782
Mov Cap-2 Maneuver	-	-	-	-	438	-
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	777	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	27.1
HCM LOS			D

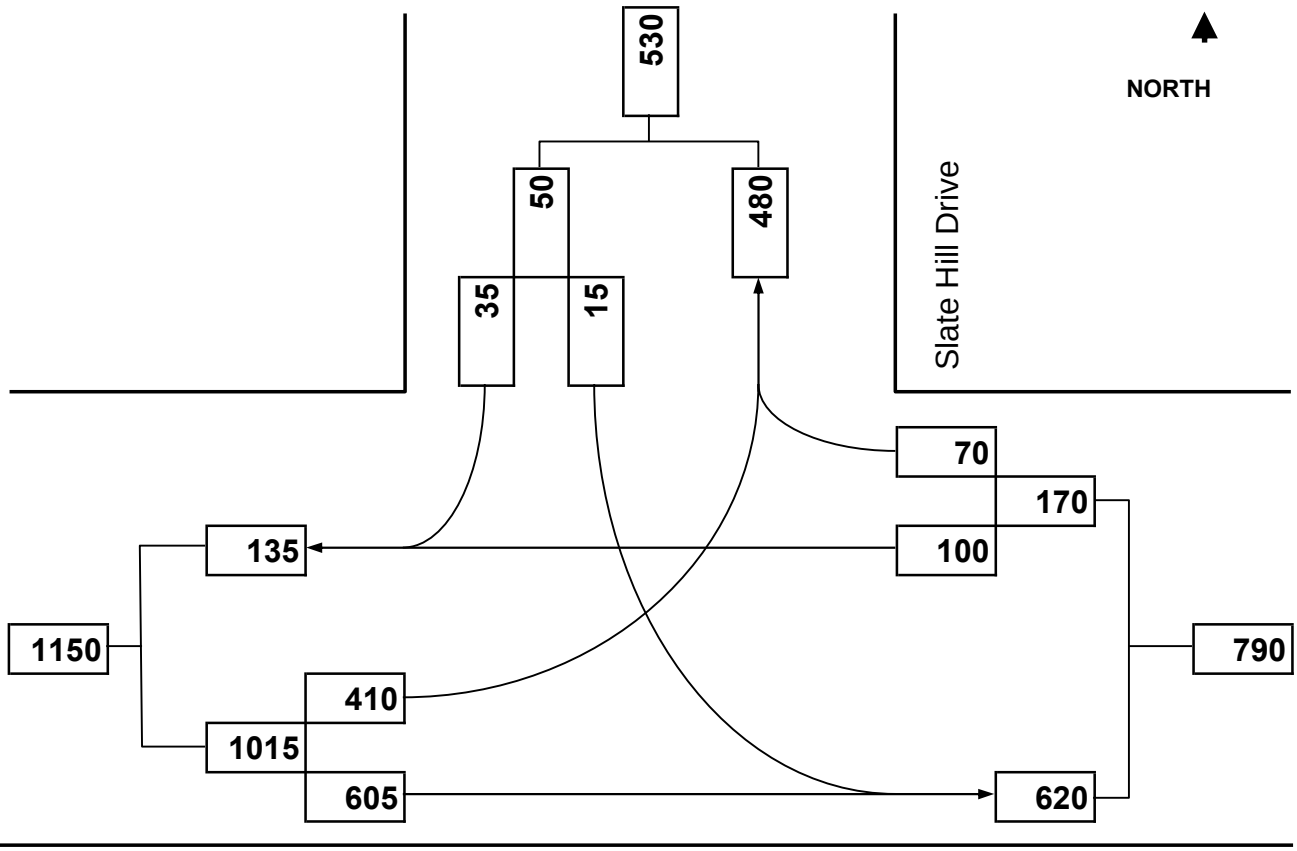
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	473	-	-	1117	-
HCM Lane V/C Ratio	0.677	-	-	0.048	-
HCM Control Delay (s)	27.1	-	-	8.4	0.1
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	5	-	-	0.1	-

Howard Avenue at Slate Hill Drive

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 Build



HCS7 Two-Way Stop-Control Report

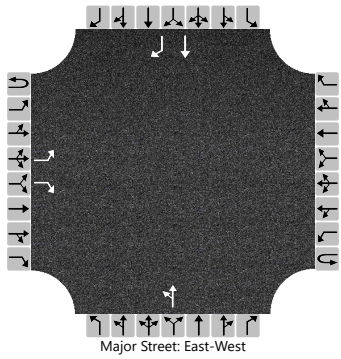
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	10/15/2020
Analysis Year	2025
Time Analyzed	AM Peak Build
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.86
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		410		605						100	70				15	35
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

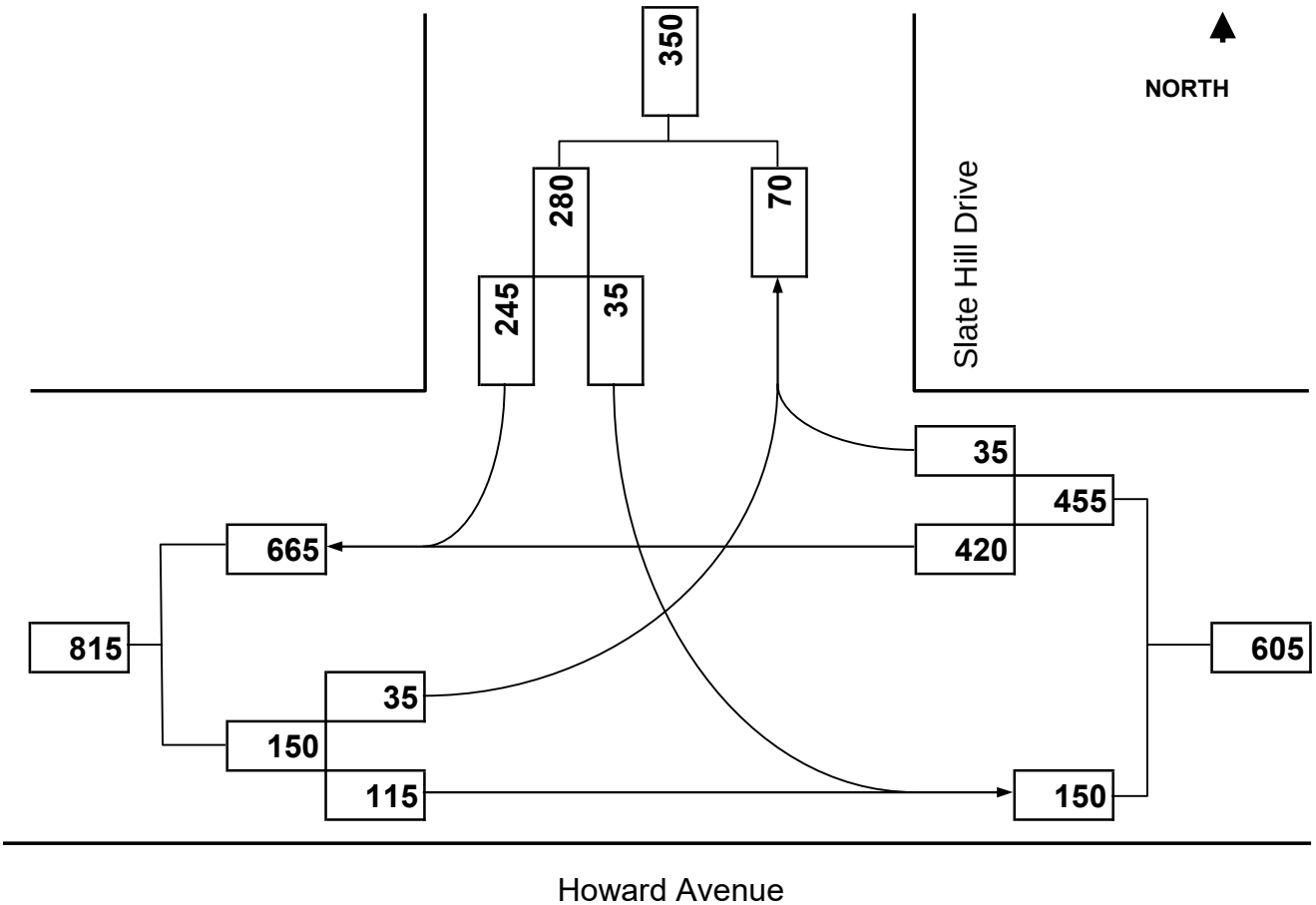
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		477								198					17	41
Capacity, c (veh/h)		1161								483					58	923
v/c Ratio		0.41								0.41					0.30	0.04
95% Queue Length, Q_{95} (veh)		2.0								2.0					1.1	0.1
Control Delay (s/veh)		10.2								17.5					91.3	9.1
Level of Service (LOS)		B								C					F	A
Approach Delay (s/veh)		4.1								17.5				33.7		
Approach LOS										C				D		

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 Build



HCS7 Two-Way Stop-Control Report

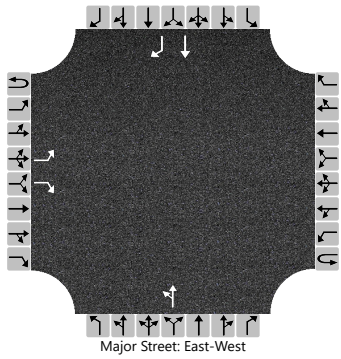
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	10/15/2020
Analysis Year	2025
Time Analyzed	PM Peak Build
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.72
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		35		115						420	35				35	245
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

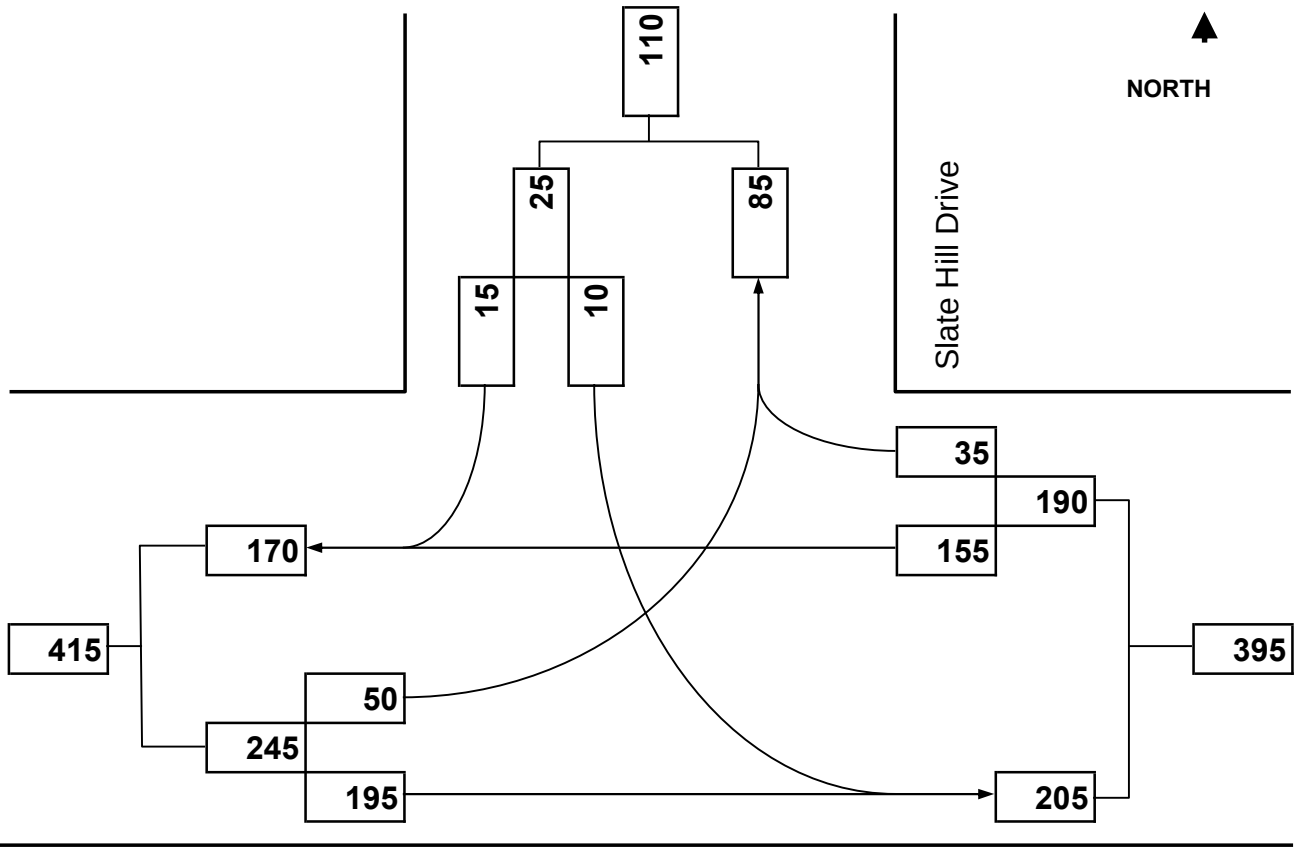
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		49								632					49	340
Capacity, c (veh/h)		1161								545					623	923
v/c Ratio		0.04								1.16					0.08	0.37
95% Queue Length, Q_{95} (veh)		0.1								21.8					0.3	1.7
Control Delay (s/veh)		8.2								116.6					11.3	11.2
Level of Service (LOS)		A								F					B	B
Approach Delay (s/veh)		1.9								116.6				11.2		
Approach LOS										F				B		

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Howard Avenue	**Minor Street**:	Slate Hill Drive
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	MD Peak Hour
Existing:	n/a	**Future**:	2025 Build



HCS7 Two-Way Stop-Control Report

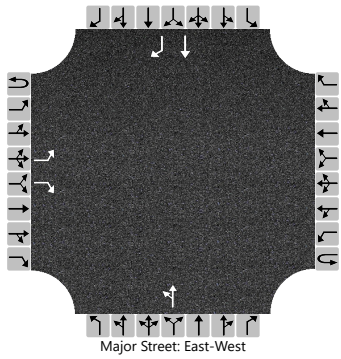
General Information

Analyst	Traffic Department
Agency/Co.	BETA Group, Inc.
Date Performed	10/15/2020
Analysis Year	2025
Time Analyzed	Sat. MD Peak Build
Intersection Orientation	East-West
Project Description	Proposed Mixed-Use Development

Site Information

Intersection	Howard Ave at Slate Hill
Jurisdiction	Cranston, RI
East/West Street	Howard Avenue
North/South Street	Slate Hill Drive
Peak Hour Factor	0.79
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	0	1	0	0	0	0		0	1	0		0	1	1
Configuration		L		R						LT					T	R
Volume (veh/h)		50		195						155	35				10	15
Percent Heavy Vehicles (%)		0								0	0				0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No												Yes		
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3								6.4	6.5				6.5	7.1
Critical Headway (sec)		5.30								6.40	6.50				6.50	7.10
Base Follow-Up Headway (sec)		3.1								3.8	4.0				4.0	3.9
Follow-Up Headway (sec)		3.10								3.80	4.00				4.00	3.90

Delay, Queue Length, and Level of Service

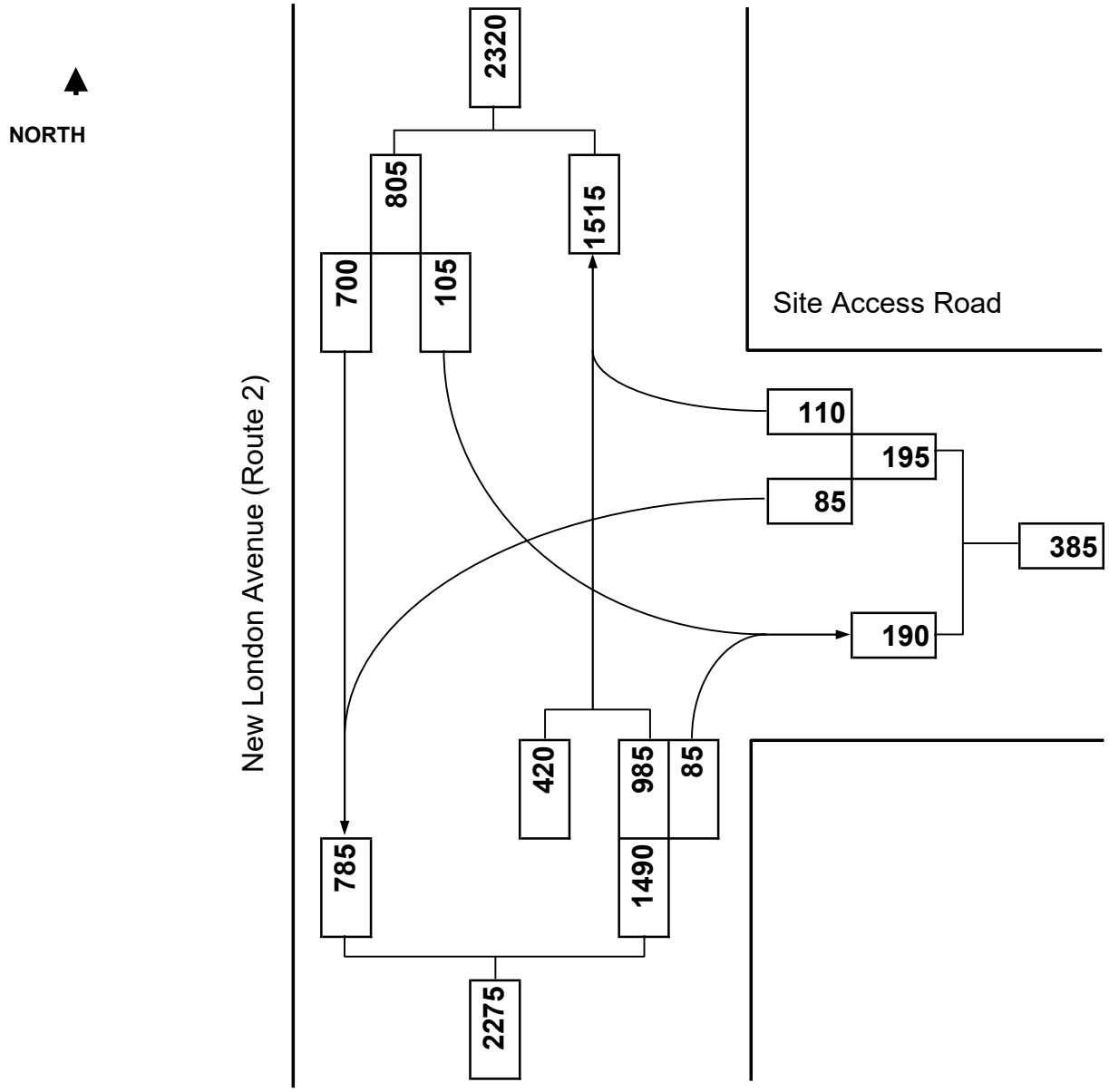
Flow Rate, v (veh/h)		63								241					13	19
Capacity, c (veh/h)		1161								873					530	923
v/c Ratio		0.05								0.28					0.02	0.02
95% Queue Length, Q_{95} (veh)		0.2								1.1					0.1	0.1
Control Delay (s/veh)		8.3								10.7					12.0	9.0
Level of Service (LOS)		A								B					B	A
Approach Delay (s/veh)		1.7								10.7				10.2		
Approach LOS										B				B		

New London Avenue (Route 2) at Site Access Road

ENGINEERING SUCCESS **TOGETHER**

Turning Movement Diagram

Major Street:	New London Ave. (Route 2)	**Minor Street**:	Site Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	WBL	WBR	NBT	NBR	SBL2	SBL	SBT	NWL	NWR	NWR2	Ø2
Lane Configurations											
Traffic Volume (vph)	85	110	420	0	105	0	700	0	985	85	
Future Volume (vph)	85	110	420	0	105	0	700	0	985	85	
Satd. Flow (prot)	3467	1599	1881	0	1787	0	3539	0	2787	1599	
Flt Permitted	0.950				0.950						
Satd. Flow (perm)	3467	1599	1881	0	1787	0	3539	0	2787	1599	
Satd. Flow (RTOR)		102								175	
Lane Group Flow (vph)	92	120	457	0	114	0	761	0	1071	92	
Turn Type	Prot	pm+ov	NA		Prot		NA		Perm	Perm	
Protected Phases	4	1	2 3		1		1 2 3				2
Permitted Phases		4							3	3	
Total Split (s)	13.0	13.0			13.0				36.0	36.0	13.0
Total Lost Time (s)	5.0	5.0			5.0				5.0	5.0	
Act Effct Green (s)	8.0	21.0	44.0		8.0		57.0		31.0	31.0	
Actuated g/C Ratio	0.11	0.28	0.59		0.11		0.76		0.41	0.41	
v/c Ratio	0.25	0.23	0.41		0.60		0.28		0.93	0.12	
Control Delay	31.1	14.5	9.9		46.7		3.1		36.9	0.4	
Queue Delay	0.0	1.9	0.0		0.0		0.0		0.0	0.0	
Total Delay	31.1	16.4	9.9		46.7		3.1		36.9	0.4	
LOS	C	B	A		D		A		D	A	
Approach Delay	22.8		9.9				8.7	34.0			
Approach LOS	C		A				A	C			
Queue Length 50th (ft)	21	19	105		52		42		260	0	
Queue Length 95th (ft)	42	63	165		#115		58		#406	2	
Internal Link Dist (ft)	85		794				911	832			
Turn Bay Length (ft)					400				300	300	
Base Capacity (vph)	369	521	1103		190		2689		1151	763	
Starvation Cap Reductn	0	280	0		0		0		0	0	
Spillback Cap Reductn	0	0	0		0		0		0	0	
Storage Cap Reductn	0	0	0		0		0		0	0	
Reduced v/c Ratio	0.25	0.50	0.41		0.60		0.28		0.93	0.12	

Intersection Summary

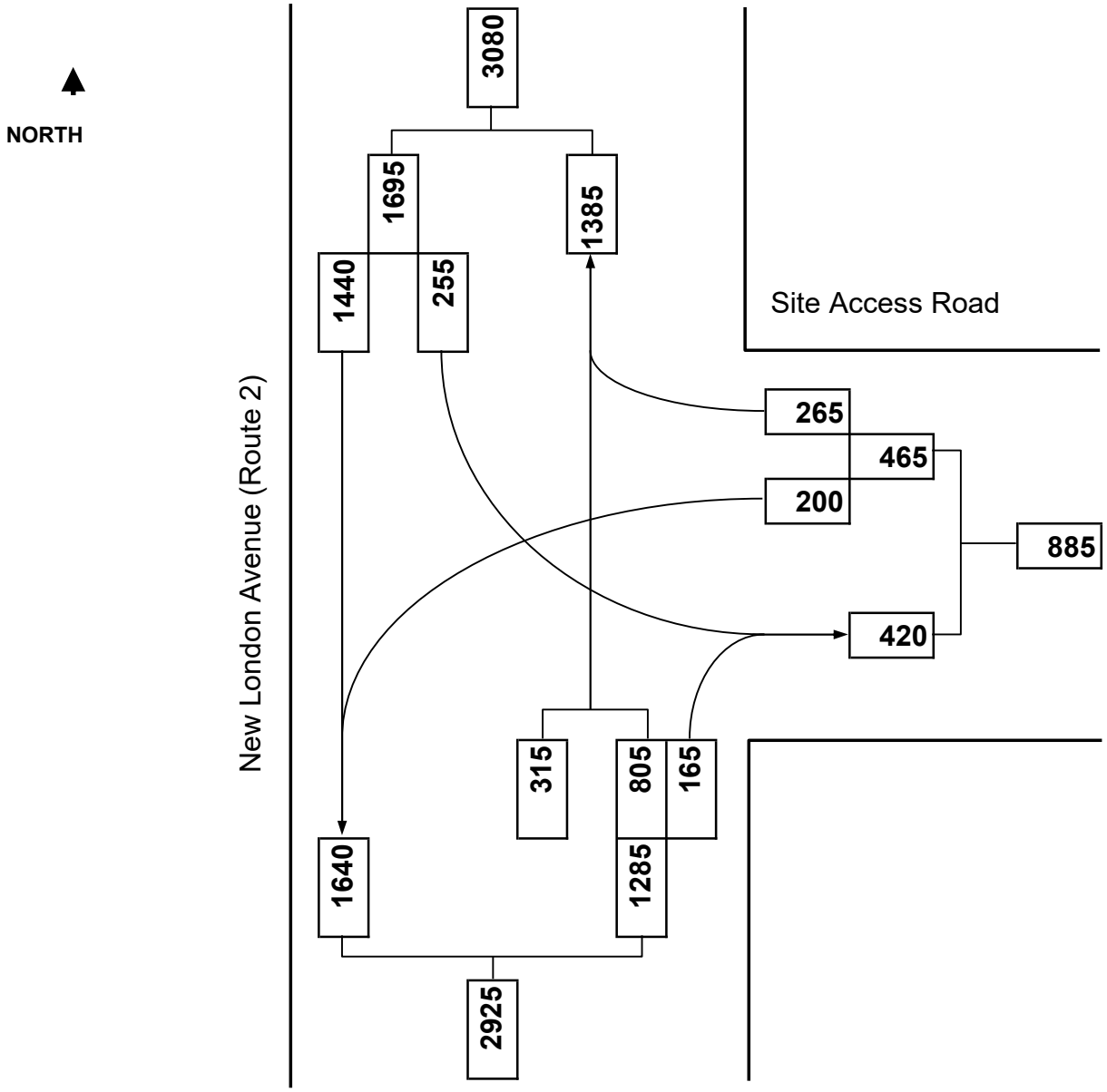
Cycle Length: 75
Actuated Cycle Length: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 20.9 — Intersection LOS: C
Intersection Capacity Utilization 75.9% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4:

ENGINEERING SUCCESS **TOGETHER**

Turning Movement Diagram

Major Street:	New London Ave. (Route 2)	**Minor Street**:	Site Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	WBL	WBR	NBT	NBR	SBL2	SBL	SBT	NWL	NWR	NWR2	Ø2
Lane Configurations											
Traffic Volume (vph)	200	265	315	0	255	0	1440	0	805	165	
Future Volume (vph)	200	265	315	0	255	0	1440	0	805	165	
Satd. Flow (prot)	3467	1599	1881	0	1787	0	3539	0	2787	1599	
Flt Permitted	0.950				0.950						
Satd. Flow (perm)	3467	1599	1881	0	1787	0	3539	0	2787	1599	
Satd. Flow (RTOR)		85								179	
Lane Group Flow (vph)	217	288	342	0	277	0	1565	0	875	179	
Turn Type	Prot	pm+ov	NA		Prot		NA		Perm	Perm	
Protected Phases	4	1	2 3		1		1 2 3				2
Permitted Phases		4							3	3	
Total Split (s)	20.0	23.0			23.0				39.0	39.0	8.0
Total Lost Time (s)	5.0	5.0			5.0				5.0	5.0	
Act Effct Green (s)	15.0	38.0	41.9		18.0		64.9		33.9	33.9	
Actuated g/C Ratio	0.17	0.42	0.47		0.20		0.72		0.38	0.38	
v/c Ratio	0.38	0.40	0.39		0.78		0.61		0.83	0.25	
Control Delay	30.5	23.4	17.3		50.5		7.5		34.0	4.0	
Queue Delay	3.5	8.0	0.0		0.0		0.0		0.0	0.0	
Total Delay	34.1	31.4	17.3		50.5		7.5		34.0	4.0	
LOS	C	C	B		D		A		C	A	
Approach Delay	32.6		17.3				14.0	28.9			
Approach LOS	C		B				B	C			
Queue Length 50th (ft)	58	117	122		150		195		251	0	
Queue Length 95th (ft)	92	211	189		#271		248		#347	40	
Internal Link Dist (ft)	85		794				911	832			
Turn Bay Length (ft)					400				300	300	
Base Capacity (vph)	578	725	878		357		2559		1053	716	
Starvation Cap Reductn	271	389	0		0		0		0	0	
Spillback Cap Reductn	0	0	0		0		0		0	0	
Storage Cap Reductn	0	0	0		0		0		0	0	
Reduced v/c Ratio	0.71	0.86	0.39		0.78		0.61		0.83	0.25	

Intersection Summary

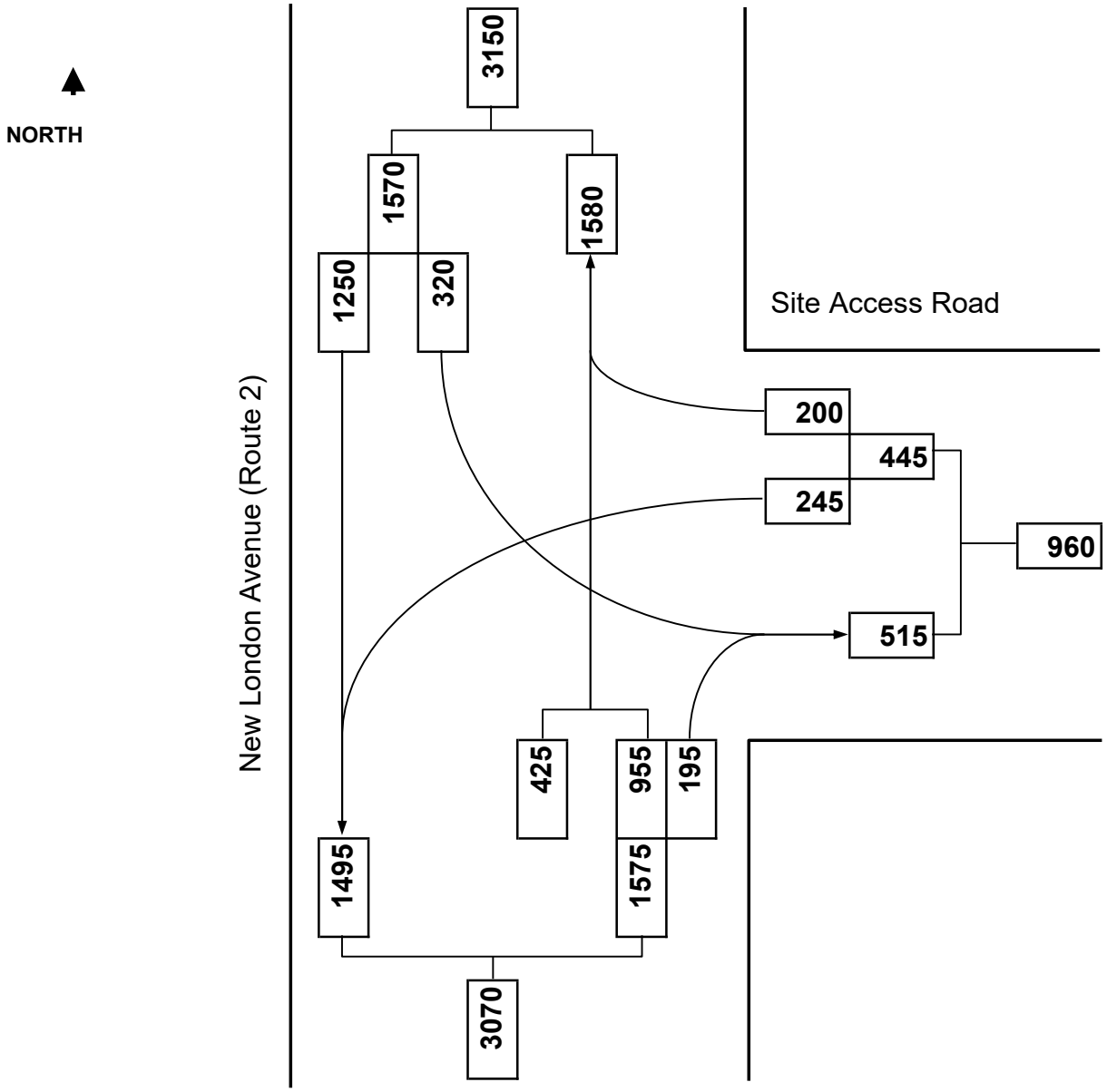
Cycle Length: 90
Actuated Cycle Length: 89.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 21.0 — Intersection LOS: C
Intersection Capacity Utilization 73.6% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4:

ENGINEERING SUCCESS **TOGETHER**

Turning Movement Diagram

Major Street:	New London Ave. (Route 2)	**Minor Street**:	Site Access Road
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	MD Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	WBL	WBR	NBT	NBR	SBL2	SBL	SBT	NWL	NWR	NWR2	Ø2
Lane Configurations											
Traffic Volume (vph)	245	200	425	0	320	0	1250	0	955	195	
Future Volume (vph)	245	200	425	0	320	0	1250	0	955	195	
Satd. Flow (prot)	3467	1599	1881	0	1787	0	3539	0	2787	1599	
Flt Permitted	0.950				0.950						
Satd. Flow (perm)	3467	1599	1881	0	1787	0	3539	0	2787	1599	
Satd. Flow (RTOR)		64								212	
Lane Group Flow (vph)	266	217	462	0	348	0	1359	0	1038	212	
Turn Type	Prot	pm+ov	NA		Prot		NA		Perm	Perm	
Protected Phases	4	1	2 3		1		1 2 3				2
Permitted Phases		4							3	3	
Total Split (s)	30.0	30.0			30.0				50.0	50.0	10.0
Total Lost Time (s)	5.0	5.0			5.0				5.0	5.0	
Act Effct Green (s)	15.7	53.2	56.8		32.5		94.3		45.0	45.0	
Actuated g/C Ratio	0.13	0.44	0.47		0.27		0.79		0.38	0.38	
v/c Ratio	0.59	0.29	0.52		0.72		0.49		0.99	0.29	
Control Delay	46.2	29.9	25.3		49.7		5.5		64.0	4.4	
Queue Delay	0.9	38.3	0.0		0.0		0.0		0.0	0.0	
Total Delay	47.2	68.1	25.3		49.7		5.5		64.0	4.4	
LOS	D	E	C		D		A		E	A	
Approach Delay	56.6		25.3				14.5	53.9			
Approach LOS	E		C				B	D			
Queue Length 50th (ft)	103	122	251		238		156		450	0	
Queue Length 95th (ft)	138	202	353		#400		244		#615	49	
Internal Link Dist (ft)	85		794				911	832			
Turn Bay Length (ft)					400				300	300	
Base Capacity (vph)	722	744	890		483		2779		1045	732	
Starvation Cap Reductn	241	531	0		0		0		0	0	
Spillback Cap Reductn	0	0	0		0		0		0	0	
Storage Cap Reductn	0	0	0		0		0		0	0	
Reduced v/c Ratio	0.55	1.02	0.52		0.72		0.49		0.99	0.29	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 33.6 — Intersection LOS: C
Intersection Capacity Utilization 86.0% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

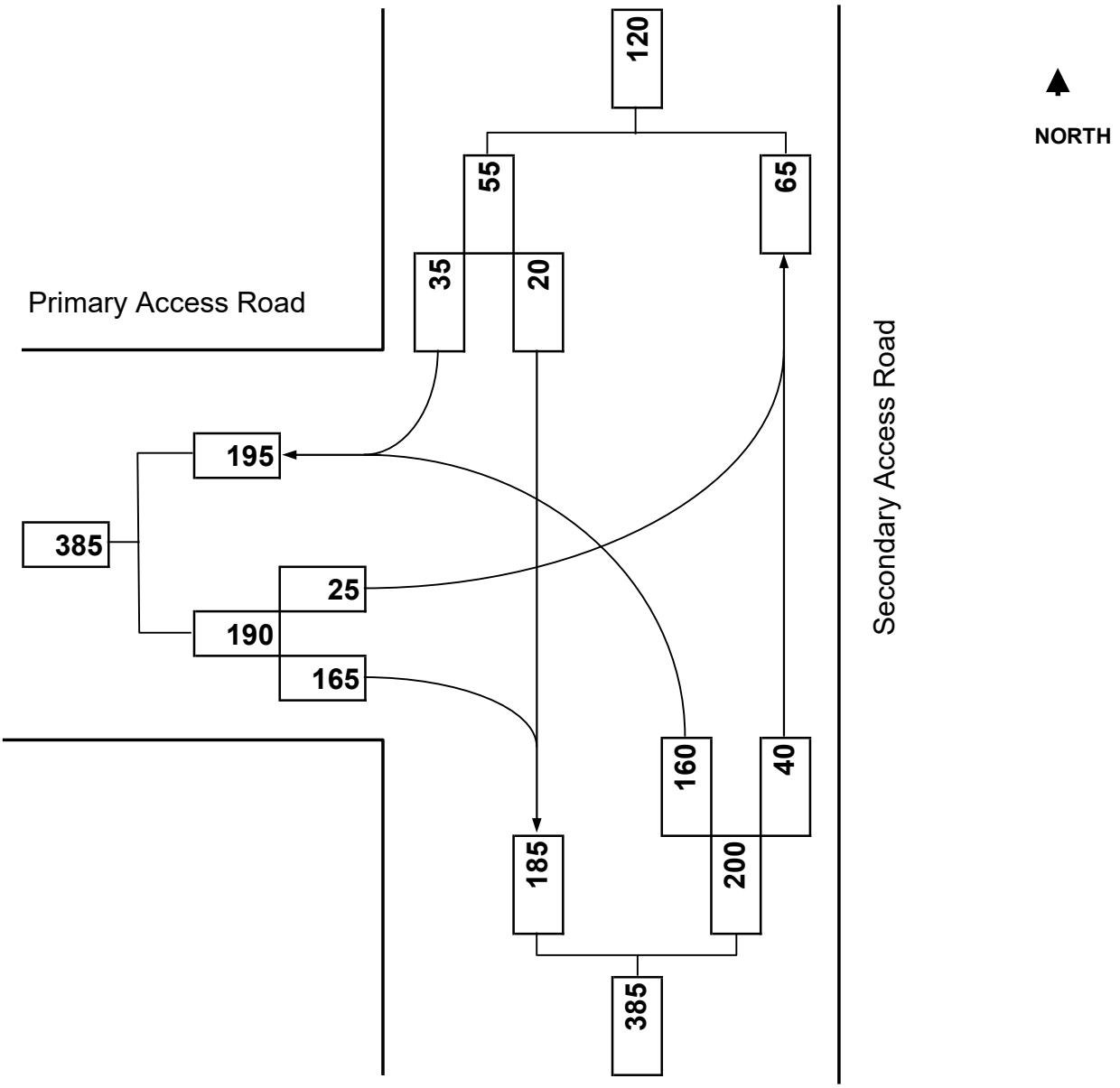
Splits and Phases: 4:

Internal Site Access Intersection

ENGINEERING SUCCESS **TOGETHER**

Turning Movement Diagram

Major Street:	Primary Access Road	**Minor Street**:	Secondary Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	AM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø2	Ø3
Lane Configurations								
Traffic Volume (vph)	25	165	160	40	20	35		
Future Volume (vph)	25	165	160	40	20	35		
Satd. Flow (prot)	1787	1599	3467	1900	1737	0		
Flt Permitted	0.950		0.718					
Satd. Flow (perm)	1787	1599	2620	1900	1737	0		
Satd. Flow (RTOR)		179			38			
Lane Group Flow (vph)	27	179	174	43	60	0		
Turn Type	Prot	Free	pm+pt	NA	NA			
Protected Phases	1		4	2 3	2 3		2	3
Permitted Phases		Free	2 3					
Total Split (s)	13.0		13.0				13.0	36.0
Total Lost Time (s)	5.0		5.0					
Act Effct Green (s)	8.0	75.0	52.0	44.0	44.0			
Actuated g/C Ratio	0.11	1.00	0.69	0.59	0.59			
v/c Ratio	0.14	0.11	0.09	0.04	0.06			
Control Delay	28.3	0.2	2.6	6.7	3.6			
Queue Delay	0.0	0.0	0.0	0.0	0.0			
Total Delay	28.3	0.2	2.6	6.7	3.6			
LOS	C	A	A	A	A			
Approach Delay	3.9			3.4	3.6			
Approach LOS	A			A	A			
Queue Length 50th (ft)	6	0	7	8	4			
Queue Length 95th (ft)	m20	1	13	20	17			
Internal Link Dist (ft)	85			627	484			
Turn Bay Length (ft)			300					
Base Capacity (vph)	190	1599	1906	1114	1034			
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	0.14	0.11	0.09	0.04	0.06			

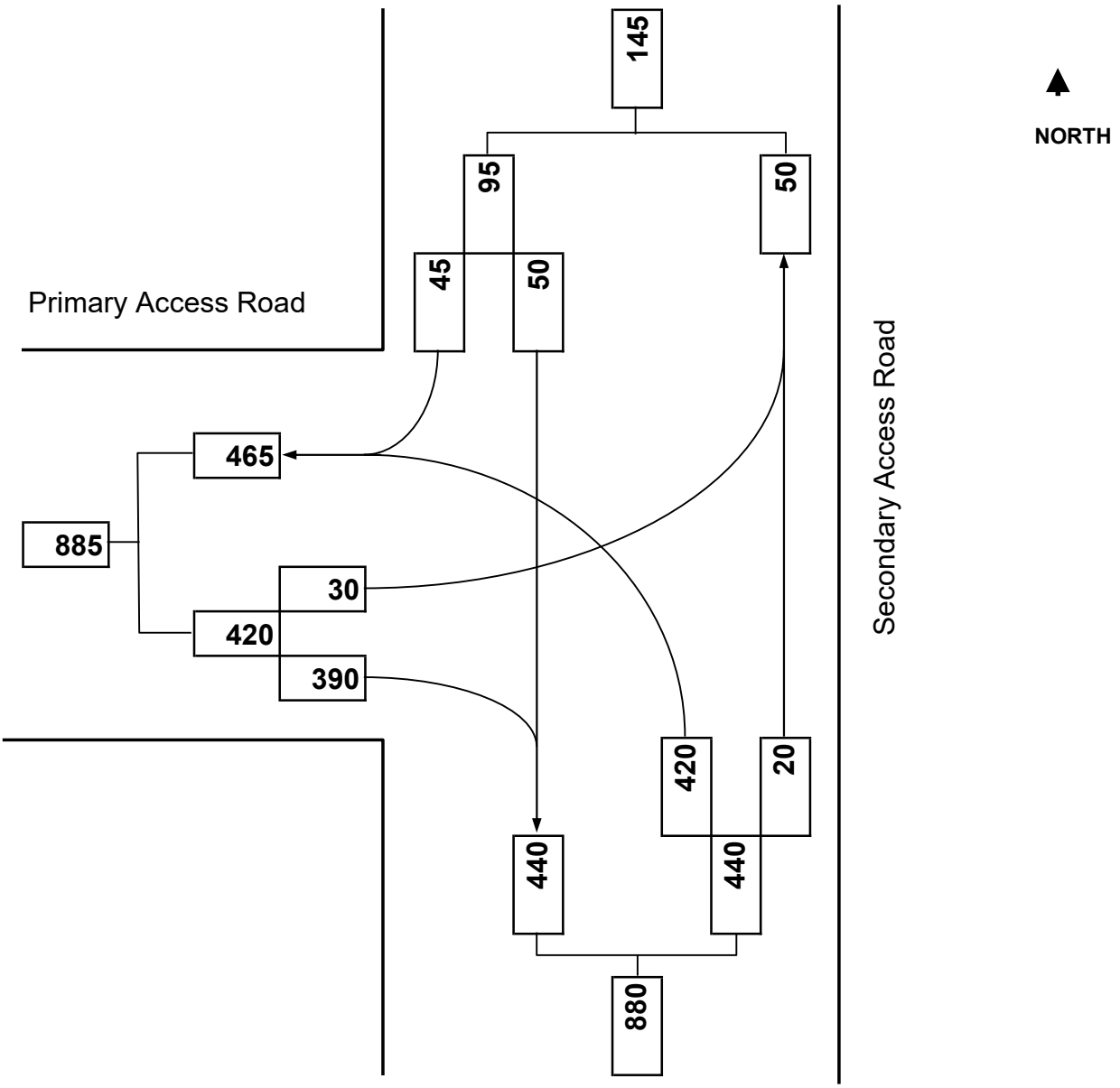
Intersection Summary			
Cycle Length: 75			
Actuated Cycle Length: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 3.7		Intersection LOS: A	
Intersection Capacity Utilization 26.2%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 12:

ENGINEERING SUCCESS **TOGETHER**

Turning Movement Diagram

Major Street:	Primary Access Road	**Minor Street**:	Secondary Access Road
City/Town:	Cranston, RI	**Day of Week**:	Weekday
Reference No.:	6695	**Peak Period**:	PM Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø2	Ø3
Lane Configurations								
Traffic Volume (vph)	30	390	420	20	50	45		
Future Volume (vph)	30	390	420	20	50	45		
Satd. Flow (prot)	1787	1599	3467	1900	1778	0		
Flt Permitted	0.950		0.690					
Satd. Flow (perm)	1787	1599	2518	1900	1778	0		
Satd. Flow (RTOR)		424			49			
Lane Group Flow (vph)	33	424	457	22	103	0		
Turn Type	Prot	Free	pm+pt	NA	NA			
Protected Phases	1		4	2 3	2 3		2	3
Permitted Phases		Free	2 3					
Total Split (s)	23.0		20.0				8.0	39.0
Total Lost Time (s)	5.0		5.0					
Act Effct Green (s)	18.0	89.9	56.9	41.9	41.9			
Actuated g/C Ratio	0.20	1.00	0.63	0.47	0.47			
v/c Ratio	0.09	0.27	0.26	0.02	0.12			
Control Delay	20.1	1.1	5.9	13.2	8.2			
Queue Delay	1.0	0.0	0.0	0.0	0.0			
Total Delay	21.1	1.1	6.0	13.2	8.2			
LOS	C	A	A	B	A			
Approach Delay	2.6			6.3	8.2			
Approach LOS	A			A	A			
Queue Length 50th (ft)	7	14	41	7	16			
Queue Length 95th (ft)	m17	m24	58	19	44			
Internal Link Dist (ft)	85			731	550			
Turn Bay Length (ft)			300					
Base Capacity (vph)	357	1599	1751	887	856			
Starvation Cap Reductn	216	0	0	0	0			
Spillback Cap Reductn	0	0	220	0	156			
Storage Cap Reductn	0	0	0	0	0			
Reduced v/c Ratio	0.23	0.27	0.30	0.02	0.15			

Intersection Summary

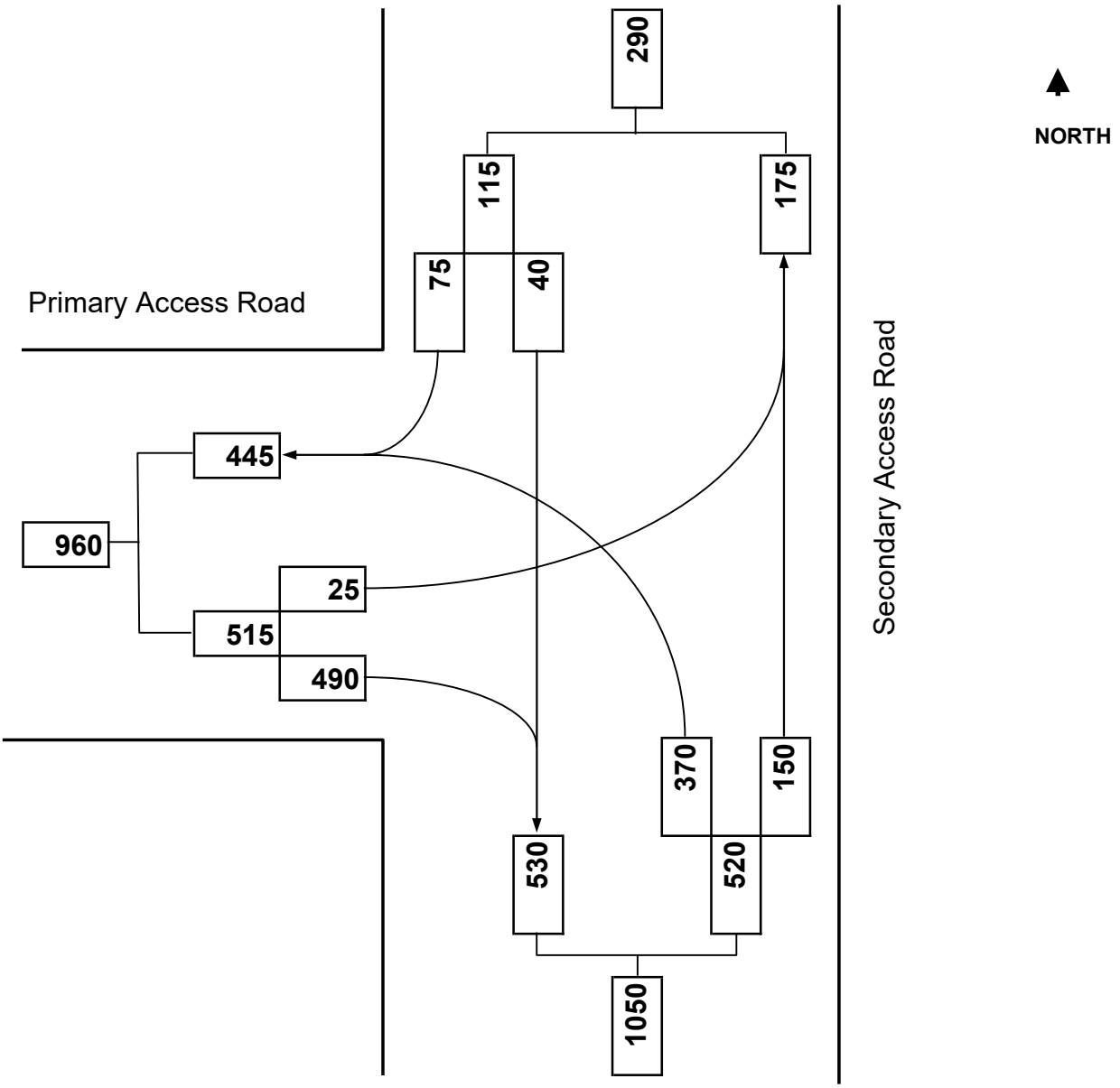
Cycle Length: 90
Actuated Cycle Length: 89.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 4.9 — Intersection LOS: A
Intersection Capacity Utilization 33.6% — ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12:

ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street:	Primary Access Road	**Minor Street**:	Secondary Access Road
City/Town:	Cranston, RI	**Day of Week**:	Saturday
Reference No.:	6695	**Peak Period**:	MD Peak Hour
Existing:	n/a	**Future**:	2025 Build



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø2	Ø3
Lane Configurations								
Traffic Volume (vph)	25	490	370	150	40	75		
Future Volume (vph)	25	490	370	150	40	75		
Satd. Flow (prot)	1787	1599	3467	1900	1731	0		
Flt Permitted	0.950		0.677					
Satd. Flow (perm)	1787	1599	2471	1900	1731	0		
Satd. Flow (RTOR)		533			82			
Lane Group Flow (vph)	27	533	402	163	125	0		
Turn Type	Prot	Free	pm+pt	NA	NA			
Protected Phases	1		4	2 3	2 3		2	3
Permitted Phases		Free	2 3					
Total Split (s)	30.0		30.0				10.0	50.0
Total Lost Time (s)	5.0		5.0					
Act Effct Green (s)	32.5	120.0	72.5	56.8	56.8			
Actuated g/C Ratio	0.27	1.00	0.60	0.47	0.47			
v/c Ratio	0.06	0.33	0.25	0.18	0.15			
Control Delay	19.2	2.0	9.5	19.5	7.8			
Queue Delay	1.5	0.0	0.1	0.0	0.2			
Total Delay	20.8	2.0	9.5	19.5	8.0			
LOS	C	A	A	B	A			
Approach Delay	2.9			12.4	8.0			
Approach LOS	A			B	A			
Queue Length 50th (ft)	6	39	62	73	18			
Queue Length 95th (ft)	m15	53	73	118	53			
Internal Link Dist (ft)	85			668	477			
Turn Bay Length (ft)			300					
Base Capacity (vph)	483	1599	1891	899	862			
Starvation Cap Reductn	373	0	0	0	0			
Spillback Cap Reductn	0	0	450	0	317			
Storage Cap Reductn	0	0	0	0	0			
Reduced v/c Ratio	0.25	0.33	0.28	0.18	0.23			

Intersection Summary

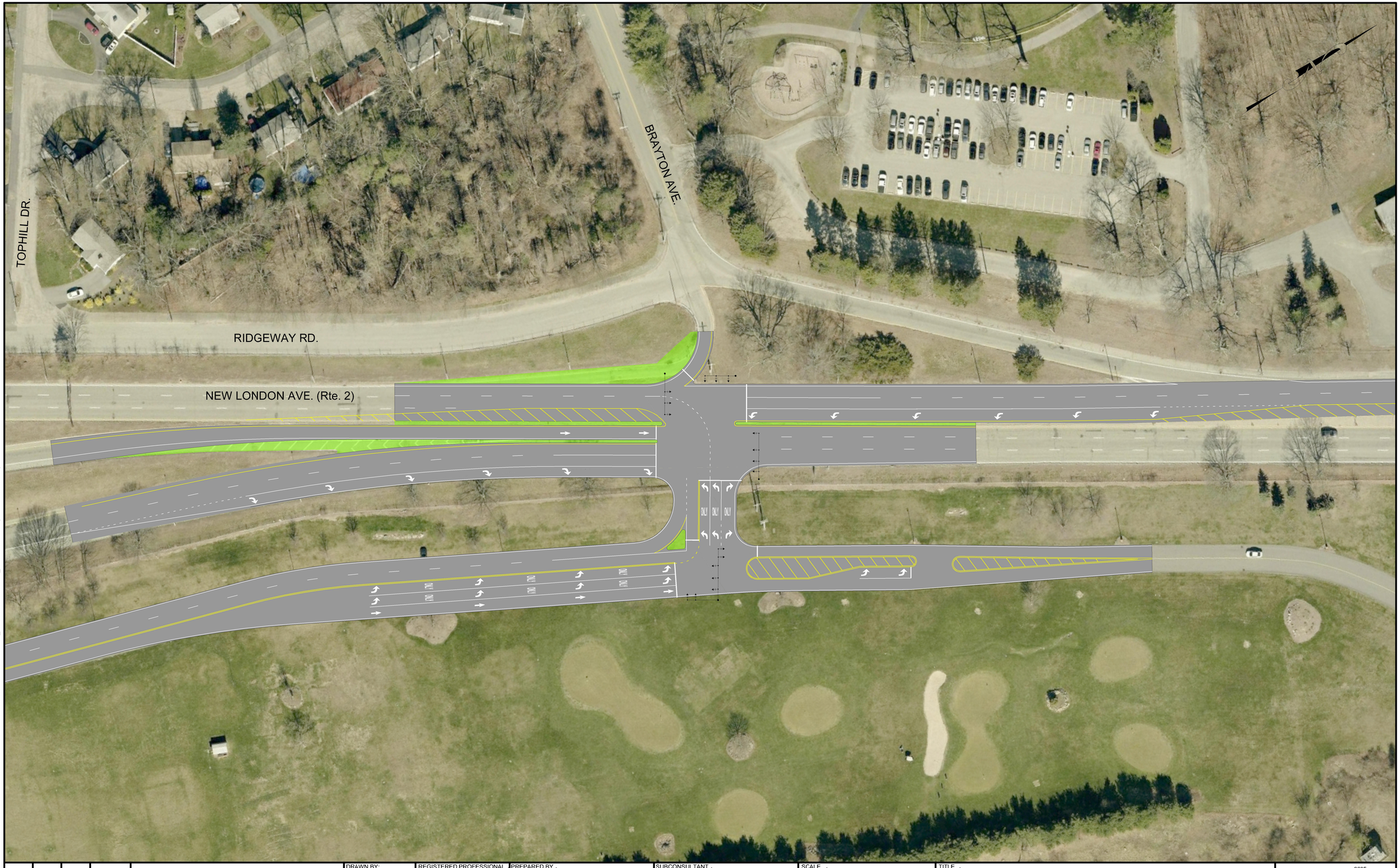
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 7.7 — Intersection LOS: A
Intersection Capacity Utilization 32.2% — ICU Level of Service A
Analysis Period (min) 15

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

Splits and Phases: 12:

APPENDIX F – Conceptual Figures

New London Avenue (Route 2) at Site Access Road



NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY:

DESIGNED BY:

CHECKED BY:

REGISTERED PROFESSIONAL

Not for Construction

PREPARED BY

BETA

www.BETA-Inc.com

SUBCONSULTANT

SCALE

40 0 40 80

SCALE IN FEET: 1"=40'

TITLE

Proposed Mixed-Use Development
Concept Plan
Cranston, RI

BETA JOB NO. 6695

ISSUE DATE 10/14/2020 10:54 AM

SHEET NO.