

South Kingstown, Rhode Island
The Village at South County Commons
(District 5)
June 2017

Traffic Impact Study



Prepared For:

Mr. Eric Prive, P.E.
DiPrete Engineering, Inc.
Two Stafford Court
Cranston, RI 02920



June 21, 2017

Mr. Eric Prive, P.E.
DiPrete Engineering, Inc.
Two Stafford Court
Cranston, RI 02920

Re: Proposed Commercial Development
The Village at South County Commons – District 5
Hampton Way, South Kingstown, Rhode Island

Dear Mr. Prive:

BETA Group, Inc., in accordance with our scope of services, has completed a traffic impact study for a proposed commercial development project in the Town of South Kingstown, Rhode Island. The site is located on the northwest quadrant of the intersection of Tower Hill Road (Route 1) and Hampton Way/Government Center access road. The parcel is defined by Assessor's Plat 50-4 Lot 22, which contains approximately 13.8 acres of undeveloped and wooded land. An access driveway extends from Hampton Way through the center of the parcel to the *Bradley School*.

Based upon information provided by your office, and a review of the current site plan prepared by *DiPrete Engineering*, it is our understanding that the development project will include several commercial businesses. Three separate buildings containing a hotel, a professional office, and a bank are proposed. Access and egress to the new businesses will be provided from two new driveways on the existing *Bradley School* access drive.

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

Sincerely,
BETA Group, Inc.

Paul J. Bannon
Senior Project Manager

William McGrath, P.E.
Associate

INTRODUCTION

The objective of the following study is to assess the potential traffic impacts associated with a proposed commercial development project in the Town of South Kingstown, Rhode Island. The project will include the final phase (District 5) of the large scale *Village at South County Commons* development, which has been under construction over the last fifteen plus years. This final phase, separate and to the south of the main development site, includes construction of three new buildings adjacent to the *Bradley School*.

The subject property is situated on a parcel of land on the northwest quadrant of the intersection of Route 1 with Hampton Way. Refer to the Figure 1, Project Vicinity Map, on the following page for the project location. Hampton Way which provides access to the subject property, was constructed in coordination with the *Bradley School* and the *Village at South County Commons* during the approval and construction of *Wakefield Meadows* and *Hampton Place*, a mixed-use residential and commercial development along the westerly side of Route 1. This report provides an update of the final development component that originally included approximately 50,000 square feet of office use on the subject parcel as part of the original approvals.

The current development scenario consists of a 100-room hotel, a 3,425 SF bank with a three lane drive-thru and a single, 3-story 32,500 square foot office building. Parking for the hotel (110), bank (12), and office building (93) will be provided adjacent to each building, yielding a total of 215 parking spaces for the development. Access and egress will be provided at two new driveways along the *Bradley School* access driveway off of Hampton Way which bisects the property. The existing access driveway alignment will be slightly modified at its intersection with Hampton Way to better accommodate the new uses. It should be noted that the original design of *Hampton Place* included a bank and hotel that has been modified in its final approval phase to include only 40,000 square feet of office use, resulting in less development than the infrastructure of Hampton Way and its intersection with Route 1 was designed to accommodate.

The study summarized herein focused on both traffic flow efficiency and safety along Hampton Way and Route 1 in the immediate project area. 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:

- Review of information from previous studies completed in the immediate area including available turning movement count data at the intersection of Route 1 with the Government Center/Hampton Way, and record information from the Rhode Island Department of Transportation.
- An analysis of accident records obtained from the local police department for the immediate project area.
- An inventory of the physical roadway characteristics of Hampton Way and Route 1 adjacent to the site to determine the adequacy of the existing roadway geometric features in reference to safety and capacity.
- An estimate of future traffic volumes for the proposed commercial development project was calculated using data from the “Trip Generation” Manual, an informational report published by the Institute of Transportation Engineers (ITE).
- Evaluation and analysis of the traffic safety and capacity issues for existing and future build roadway conditions.
- Development of recommendations where necessary, that would be required to maintain safe and efficient traffic conditions in the project area.

PROJECT AREA

As noted in the previous section, the subject property is situated to the west of Route 1 on Hampton Way, a private roadway that provides access to *Wakefield Meadows*, a senior residential condominium neighborhood and *Hampton Place*, a commercial office complex. The subject parcel contains approximately 13.8 acres of undeveloped and wooded land. A driveway, which provides access to the *Bradley School* runs through the center of the property.

Other properties in the immediate project area along Route 1 include; the *Village at South County Commons* which is a mixed-use development that’s in the final stages of construction. This property contains a diverse mix of land uses including offices, retail shops, a cinema,

restaurants, a hotel, apartments, condominiums, and an assisted living facility. Also to the north is the *Prout School* and low density single-family residential homes and large wooded parcels. At the signalized intersection of Route 1 with Hampton Way, access is provided to state offices including the Department of Motor Vehicles and judicial offices situated along the easterly side of Route 1. To the immediate south there are several small businesses, a small residential neighborhood, and the village of Wakefield with dozens of small to medium size commercial businesses including the *Wakefield Mall* shopping center, auto dealerships, restaurants and professional offices. Refer to Figure 2 on the following page depicting the site and surrounding properties.

Route 1 will serve as the primary access route to the new development, with Hampton Way providing immediate local access. Based upon the volume of traffic serviced along this section of road, and the proposed small scale commercial development of the property, a study impact area was defined for the project. The limits of our analysis focused on Route 1 and Hampton Way in the immediate area of the development including their intersection.

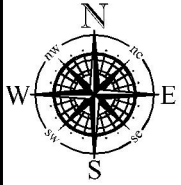
EXISTING CONDITIONS

ROADWAYS

Tower Hill Road (Route 1)

Route 1 is a major north/south arterial through South County, providing access from the interstate highway system to more densely populated areas in the southern half of Rhode Island including Washington and Newport Counties. Route 1, south of Route 4, is a divided roadway separated by median guardrail, concrete barrier or a raised grass median. Due to the divided nature and adjacent low density development, it is generally posted at 50 mph.

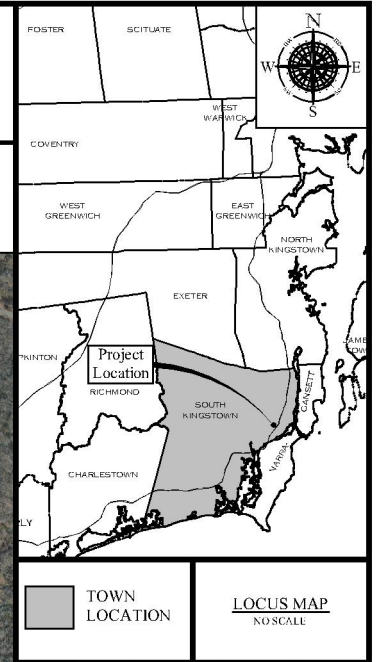
The limited access (right in/out) section of Route 1 through South Kingstown extends from south of Route 138 through Hampton Way/Oliver Stedman Government Center, where all left or U-turns are made at signalized jug-handle type intersections. South of Wakefield in the lightly populated areas and less traffic, properties are still restricted to right in/out but left turns are completed at regularly spaced median U-turn locations.



The Village at South County Commons

SOUTH KINGSTOWN, RHODE ISLAND

Figure 2 - Project Location Map



Route 1 within the defined project area is a four lane roadway with access limited to right turns in and out of adjacent properties as described above. Two 12 foot travel lanes and a 10 foot shoulder are provided in each direction. A 14-foot grassed median and a 14-foot median with concrete jersey barrier separating the northbound and southbound travel lanes exists along Route 1 to the north and south of the intersection with Hampton Way/Government Center access road, respectively, to restrict full property access along this section of highway as can be seen in the adjacent photograph. The



The roadway surface condition can be classified as in very good condition south of Hampton Way as it was recently resurfaced in the summer of 2015. North of Hampton Way, the roadway surface condition can be classified as in fair condition with visible crack sealing. No curbing or sidewalks are available along the rural roadway which is under consideration to be classified as Scenic Highway due to its rural character and abutting properties consisting of large tracts of undeveloped land, open fields, farmland, and horse farms.

Hampton Way

This local private road was constructed as part of the *Wakefield Meadows/Hampton Place* development project. The roadway construction modified the southbound Route 1 jug-handle that existed at the signalized intersection with the Government Center. The roadway extends from the intersection to the west and south linking to Kelley Way which intersects with Old Tower Hill Road heading into Wakefield.

The first 450 feet services the commercial component of the mixed use site (*Hampton Place*) and the *Bradley School*. The road is approximately 55 feet in width consisting of four lanes with a raised landscaped median. Extending to the south into Wakefield Meadows the road narrows and becomes a 24 foot two lane residential street. The road through the residential condominium

segment is signed as private in an effort to limit, or restrict cut-thru traffic between Route 1 and downtown Wakefield.

INTERSECTIONS

Tower Hill Road (Route 1) and Government Center/Hampton Way Intersection

The Government Center and Hampton Way intersect Route 1 to form a signalized, four-way junction. The Route 1 northbound and southbound approaches provide two thru lanes in each direction. The Hampton Way eastbound approach provides a left turn lane and a shared thru and right turn lane. The Government Center westbound approach provides a single multiuse lane. As discussed previously, jug-handle turn-arounds are available at this intersection with a northbound right turn exit that provides a single lane into the Government Center complex and a southbound right turn exit that provides two lanes intersecting with Hampton Way at a two-way stop condition. All left and U-turns on Route 1 must be made through the jug-handles.

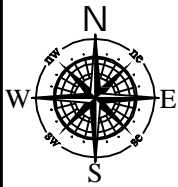
The intersection, depicted in the photograph on the previous page looking south on Route 1, was determined to operate in a fully actuated mode consisting of three phases. Route 1 movements are serviced under Phase 1. The Hampton Way eastbound and the Government Center westbound approaches are served separately (split) under the remaining two phases, respectively. In addition, pedestrian accommodations are provided at the intersection including curb ramps, pedestrian signal heads and push buttons with a crosswalk extending east/west across the northbound Route 1 approach. The pedestrian activity requiring accommodations at this location are specific to the RIPTA bus route along Route 1 and the Bus Stop available at this location for the demand created by the adjacent state offices.

TRAFFIC FLOW DATA

Existing traffic flow characteristics for this area were developed from a traffic counting program completed by BETA Group, Inc., a review of traffic data from previous studies completed in the immediate area, and from record data from the RIDOT. Route 1, which is influenced by South County Hospital, the University of Rhode Island during the school year, and recreational beach areas during the summer months, services in an average month, 35,000 vehicles per day (vpd). During the summer months, this can increase by 20% to approximately 42,000 vpd.

The manual turning movement count at the intersection of Route 1 with the Government Center/Hampton Way was collected in June, 2015 as part of a recent traffic study for a site development project by *DiPrete Engineering*. Data was collected during the peak daily periods between 7:00-9:00 AM, and 4:00-6:00 PM when the site development would have its greatest impact on the surrounding roadway system. Based upon this information it was determined that the morning peak hour occurred between 7:30 and 8:30 AM where approximately 2,755 vehicles per hour (1,300 SB/1,455 NB) were recorded on the segment of Route 1 between the Government Center and the Wakefield exit. During the afternoon peak hour between 4:30 and 5:30 PM approximately 3,015 vehicles per hour (1,595 SB/1,420 NB) were recorded in this section. Figure 3 on the following page depicts the daily peak hour turning movement volumes for these periods at the study intersection. Complete count information can be found in the Appendix.

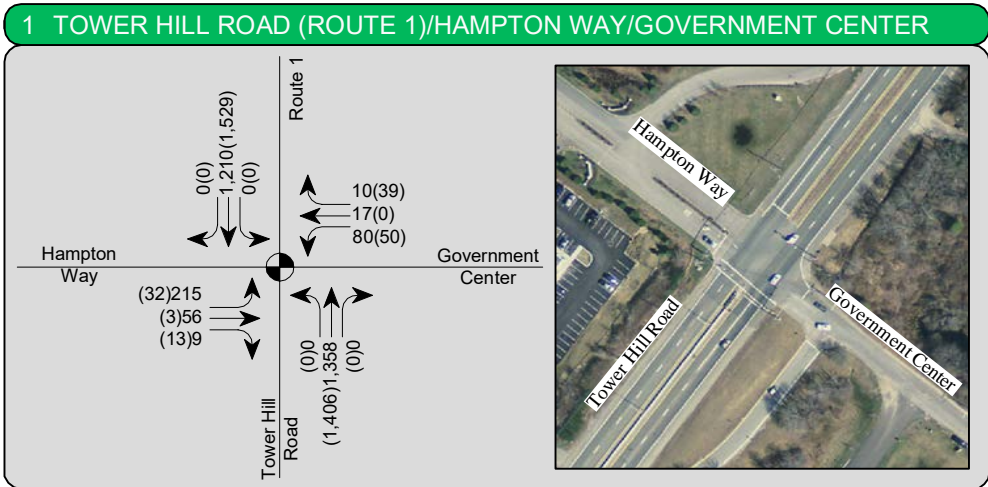
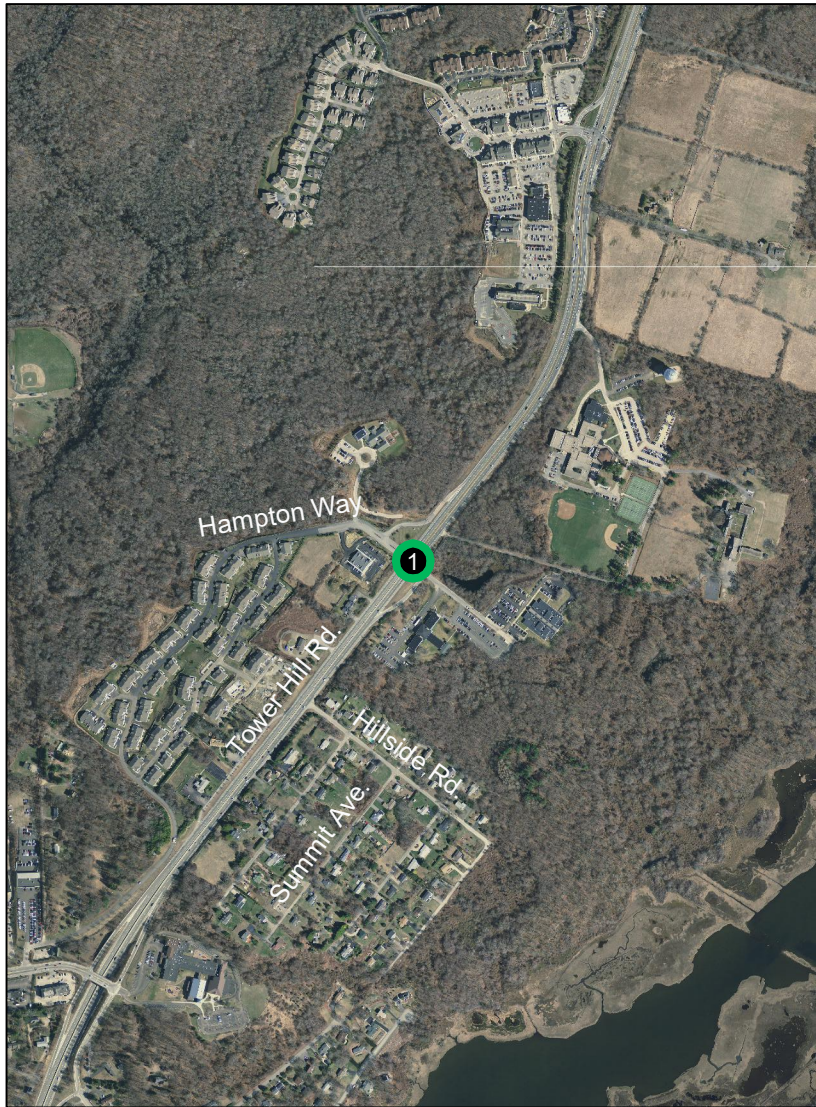
The manual turning movement count at the intersection of Route 1 with Government Center/Hampton Way from a previous site development project was compared to record counts completed for the earlier studies in 1998, 2001 and 2003 from the original report to define the growth along the corridor over the last fifteen to twenty years. Based upon count information of the Government Center intersection, it was found that during the morning peak hour between 7:30 and 8:30 AM there were approximately 2,525 vehicles per hour (1,085 SB/1,440 NB) recorded on the segment of Route 1 between the Wakefield interchange and the Government Center. During the afternoon peak hour between 4:30 and 5:30 PM approximately 2,485 vehicles per hour (1,280 SB/1,205 NB) were recorded in this section. As can be seen peak hour volumes in this area have increased overall between 250 and 550 vehicles per hour. This increase can be directly attributed to the earlier noted projects of *South County Commons*, *Bradley School* and *Wakefield Meadows/Hampton Place*. In addition, *The Prout School* has also seen a substantial growth over this same period where it has become a co-educational high school with over 500 students.



The Village at South County Commons

SOUTH KINGSTOWN, RHODE ISLAND

Figure 3 - Existing Traffic Volumes



LEGEND:

- TURN LANE
- XXX AM PEAK VOLUMES (7:30 TO 8:30)
- (XXX) PM PEAK VOLUMES (4:30 TO 5:30)
- STUDY INTERSECTION
- TRAFFIC SIGNAL

SAFETY ANALYSIS

To determine if there are any limiting factors affecting safety relating to the access to the final phase of the *Village at South County Commons*, the physical characteristics of Hampton Way in the project area, and specifically at the proposed site access road intersection were investigated. These limiting factors would potentially include horizontal or vertical alignment changes or roadside obstructions that limit sight distances for vehicles traveling along the road, or entering the road from a side street or driveway location. In this instance, the sight distance standard is necessary to permit turning vehicles to safely enter and exit the site driveway.

The vertical and horizontal alignment of Hampton Way in the project area can be described as relatively flat and generally straight with a 45-degree curve at the proposed access road intersection. Based upon the existing roadway geometry as described, the measured sight distances at the proposed modified intersection with Hampton Way are greater than 350 feet through the signalized intersection with Route 1 to the east, and in excess of 500 feet to the west. These values are greater than AASHTO's recommended minimum sight distance of 155 feet based on an assumed speed limit of 25 mph on Hampton Way and actual travel speeds due to the controlled nature of the adjacent intersections and residential area to the south.

As a result of the preliminary evaluation of the existing roadway geometry and physical features, it does not appear that any significant physical roadway safety deficiencies exist within the defined study area. Also, as part of our analysis, a review of accident statistics at the intersection of Route 1 with Hampton Way/Government Center access road was completed. Data was reviewed from information obtained from the South Kingstown Police Department to determine if any location in the project area experienced a high frequency or pattern of accidents.

A total of 3 crashes (avg. 1 per year) occurred at the intersection of Route 1 with Government Center/Hampton Way, with none involving injury. All three crashes are rear-end type collisions, which is typical of signalized junctions where the majority of the crashes are rear-end due to the numerous starting and stopping movement required for the signal change interval.

Based upon the historical accident data obtained, and a review of existing roadway geometry and operations, roadway or traffic related safety improvements are currently not warranted to improve operations or safety within the immediate project area. A summary of the accident data depicting the number, type, and severity is provided in the Appendix.

TRIP GENERATION

To determine the traffic impact of a proposed development, estimates of anticipated traffic to be generated by a particular land use must be calculated. As previously discussed, the development proposal includes construction of a 100-room hotel, a 3,425 SF bank with a three lane drive-thru, and a commercial building totaling 32,500 gross square feet, where three 10,000 square foot floor levels will be available for office space lease. Parking will be provided in separate lots associated with each use for a total of 215 parking spaces. Access and egress will be provided at two new driveways along the *Bradley School* access drive off of Hampton Way for immediate local access. A site plan, prepared by *DiPrete Engineering*, depicting the site layout and access can be found on Figure 4.

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

For the proposed final phase (District 5) of the *Village at South County Commons*, Land Use Code 310 - Hotel, Land Use Code 710 - General Office, and Land Use Code - 912 Drive-in Bank were reviewed for applicability in developing an estimate of site related vehicles trips. The appropriate worksheets from the manual are included in the Appendix along with the trip estimate calculations. Table 1 on the following page summarizes the estimated trip volumes calculated for this project.

TABLE 1
Trip Generation Summary

	<u>Description</u>	<u>Enter</u>	<u>Exit</u>	<u>Total</u>
<u>AM PEAK HOUR</u>				
ITE Land Use Code 310	Hotel	31	22	53
ITE Land Use Code 710	General Office Building	42	5	47
ITE Land Use Code 912	Drive-in Bank	25	18	43
	TOTAL	98	45	143
<u>PM PEAK HOUR</u>				
ITE Land Use Code 310	Hotel	31	29	60
ITE Land Use Code 710	General Office Building	8	37	45
ITE Land Use Code 912	Drive-in Bank	43	43	86
	TOTAL	82	109	191

Future Traffic Volumes

In order to properly assess the impacts of a development, future traffic conditions of area roadways should be estimated for the period when the development is constructed and fully occupied. Typically, the expansion of base traffic is calculated when a project is to be constructed over an extended period (3 to 5 years). In all instances, area growth that may affect capacity results should be considered. For this project, a conservative annual growth rate of 1.5 percent was utilized for the future background traffic growth of the servicing roadways in addition to known site specific developments that have been approved by the Town of South Kingstown. The known development project trips were added to the existing volumes that were expanded by 1.5 percent to establish a future 2020 No-Build traffic condition.

One of the known future developments, the final phase of *Hampton Place*, is proposed adjacent to the subject site on Hampton Way. The proposed commercial project was added to the No-Build traffic condition along with other projects on Route 1 to establish the future 2020 Build

traffic period. Figure 5 on the following page depicts the estimated future traffic volumes at the study intersection. Site distribution figures are also provided in the Appendix.

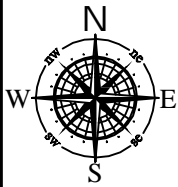
In developing the intersection volumes to be analyzed under build conditions, a directional distribution of the site traffic at the proposed development was estimated. The distribution was based on current traffic patterns in the area. It is estimated that 55% of the site traffic will arrive from and depart to the north and 45% will arrive from and depart to the south for both the AM and PM peak hours.

OPERATIONAL ANALYSIS

The key to any traffic impact analysis is the evaluation of roadway operations during peak traffic periods on the servicing roadway system. This situation would occur when the site-generated traffic, combined with the traffic volumes on the main roadway, result in the highest one-hour volume serviced along a roadway segment, or through an intersection. Analysis of the base traffic data found that the weekday AM and PM peak hours would represent this worst-case combination of site-generated traffic with the servicing roadway peak conditions.

The *2010 Highway Capacity Manual* (HCM) methodology provides the most accurate means of evaluating traffic capacity and delays for roadways and intersections. The results of this procedure are expressed in terms of Level of Service (LOS). Level of Service is a qualitative measure of traffic flow efficiency based on anticipated vehicle delays. For example, LOS “A” represents the best condition with little or no delay, while LOS “F” indicates that the roadway/intersection is at full capacity resulting in extended vehicle delays and potential queuing. Table 2 outlines the Level of Service delay criteria presented in the HCM for signalized and unsignalized intersections.

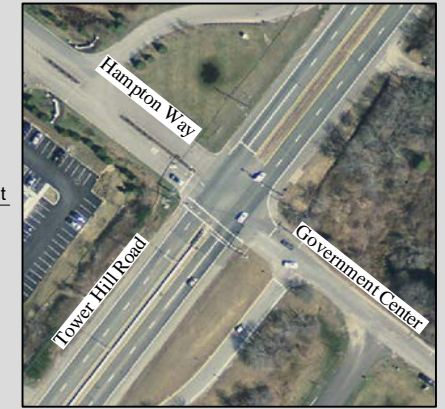
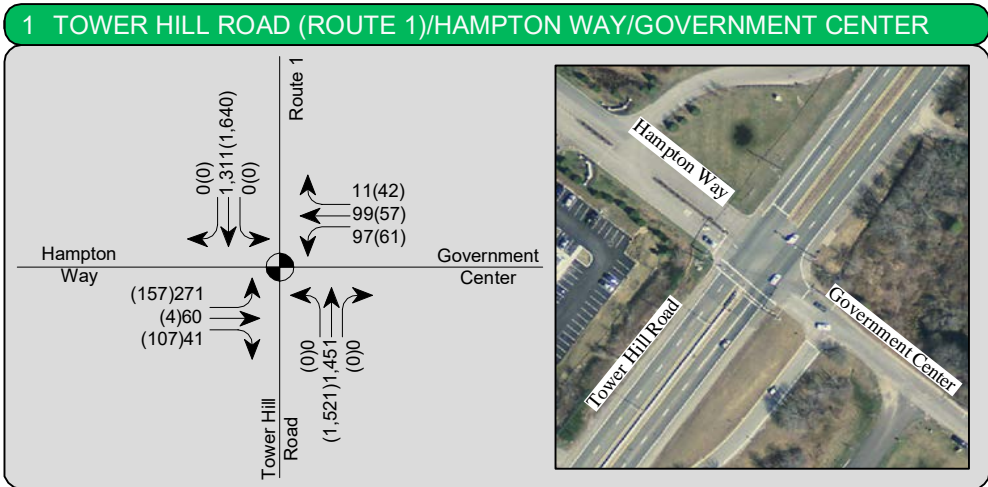
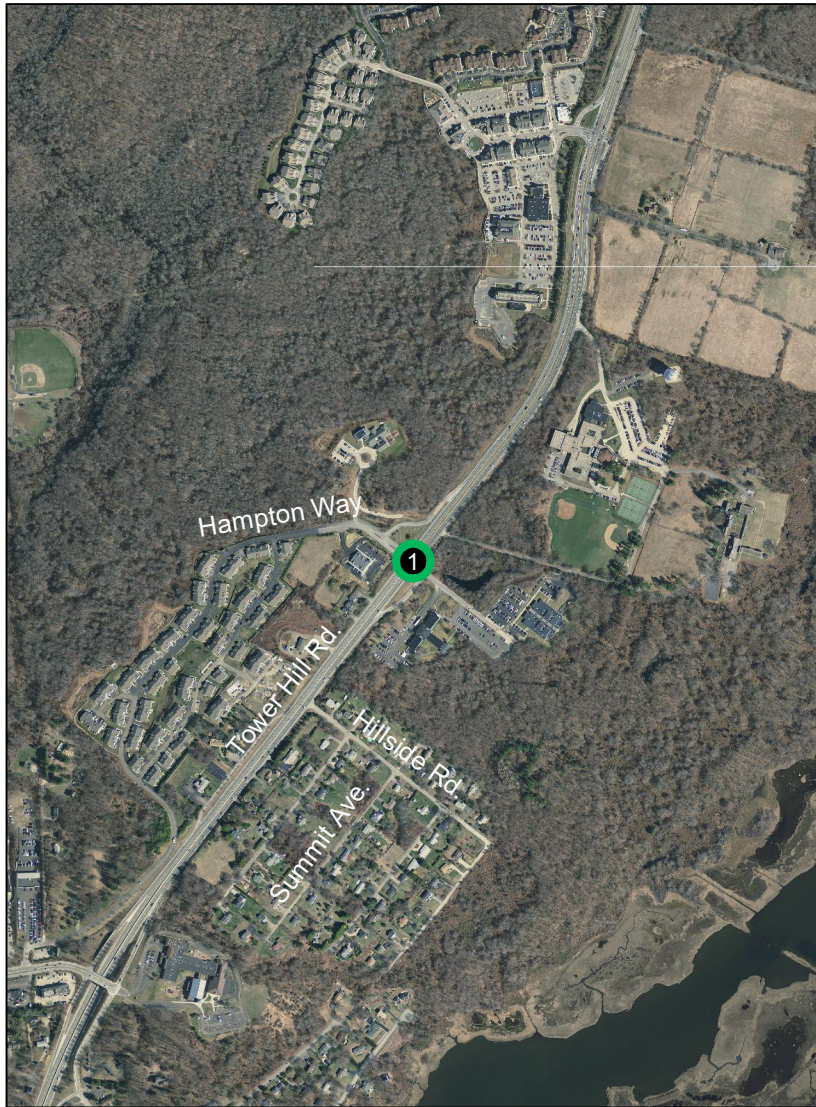
The intersection of Tower Hill Road (Route 1) with the Hampton Way/Government Center was analyzed for the weekday AM and PM peak hours, which would represent the period of greatest impact of site related traffic and heaviest traffic volume conditions during the day. The capacity analysis worksheets are included in the Appendix and Table 3a through Table 3c on the following pages summarizes the results of the analyses.



The Village at South County Commons

SOUTH KINGSTOWN, RHODE ISLAND

Figure 5 - Future Traffic Volumes



LEGEND:

- TURN LANE
- XXX AM PEAK VOLUMES (7:30 TO 8:30)
- (XXX) PM PEAK VOLUMES (4:30 TO 5:30)
- STUDY INTERSECTION
- TRAFFIC SIGNAL

TABLE 2

Highway Capacity Manual Criteria

<u>Level of Service</u>	<u>Unsignalized Delay Per Vehicle (sec)</u>	<u>Signalized Delay Per Vehicle (sec)</u>
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

Table 3a depicts the current operating conditions at the study intersection during the daily AM and PM peak hours. As can be seen in the table, the study intersection operates in an efficient manner at an overall Level of Service (LOS) C or better during the daily peak periods. In addition, all critical movements operate an acceptable LOS D or better with no excessive queueing or extended delays.

TABLE 3a

Level of Service Summary

Location / Movement	2017 EXISTING							
	AM Peak Hour				PM Peak Hour			
	LOS	Delay	95 th % Queue Length (ft.)	v/c	LOS	Delay	95 th % Queue Length (ft.)	v/c
Tower Hill Road (Route 1) at Hampton Way/Government Center								
Route 1 NB	C	21.9	#440	0.85	A	9.4	302	0.57
Route 1 SB	B	17.9	324	0.76	B	10.7	#370	0.62
Hampton Way EB Left	D	35.2	#185	0.64	C	23.5	33	0.10
Hampton Way EB Thru/Right	C	22.3	54	0.18	B	14.5	15	0.05
Government Center WB	C	28.1	85	0.38	A	6.6	28	0.24
Overall Intersection	C	21.5	-	-	B	10.1	-	-

Table 3b represents the future design period taking into consideration base traffic growth along the servicing roadways combined with known developments as previously described. The subject development is not included in this “No Build” analysis scenario. As can be seen in the table, the study intersection continues to operate overall at an acceptable LOS C or better during the morning and afternoon peak periods, with no excessive queuing or extended delays.

TABLE 3b
Level of Service Summary

Location / Movement	2020 FUTURE NO BUILD							
	AM Peak Hour				PM Peak Hour			
	LOS	Delay	95 th % Queue Length (ft.)	v/c	LOS	Delay	95 th % Queue Length (ft.)	v/c
Tower Hill Road (Route 1) at Hampton Way/Government Center								
Route 1 NB	C	30.6	#489	0.94	B	17.9	#494	0.75
Route 1 SB	C	22.8	#414	0.85	C	20.3	#554	0.81
Hampton Way EB Left	D	46.3	#223	0.79	C	27.9	77	0.33
Hampton Way EB Thru/Right	C	21.3	61	0.25	B	10.0	31	0.20
Government Center WB	C	32.8	122	0.56	C	23.9	84	0.41
Overall Intersection	C	28.5	-	-	B	19.4	-	-

Table 3c depicts the future build condition at the study intersection where the analysis found that the estimated increase in traffic during the peak periods resulting from the proposed site development project, combined with the base traffic growth along the servicing roadways and known developments as previously described, will have a minor effect on overall traffic operations along Route 1. Specifically at the main signalized intersection reviewed for this project at Hampton Way/Government Center access road, acceptable peak hour operations will continue for the future build condition.

TABLE 3c
Level of Service Summary

Location / Movement	2020 FUTURE FULL BUILD							
	AM Peak Hour				PM Peak Hour			
	LOS	Delay	95 th % Queue Length	v/c	LOS	Delay	95 th % Queue Length	v/c
Tower Hill Road (Route 1) at Hampton Way/Government Center								
Route 1 NB	C	33.2	#489	0.95	C	22.4	#490	0.86
Route 1 SB	C	23.9	#414	0.86	C	28.2	#556	0.93
Hampton Way EB Left	D	53.9	#253	0.86	C	34.8	125	0.54
Hampton Way EB Thru/Right	B	18.5	65	0.29	A	9.1	42	0.32
Government Center WB	D	37.9	#169	0.68	C	33.9	121	0.58
Overall Intersection	C	31.1	-	-	C	25.7	-	-

The study intersection will continue to operate at an overall acceptable LOS C for the future build traffic conditions during the weekday AM and PM peak periods with two minor approach movements experiencing greater delays. The additional delays on the minor approaches will have no discernable effect on the traffic flow along Route 1 through the junction, which will continue to operate efficiently in an acceptable manner.

As future traffic conditions along the Route 1 corridor warrant consideration for additional capacity, modifications to the minor approaches at this intersection can easily be implemented that would limit the amount of green time needed to service the minor approaches. The side streets can be modified with restriping within the existing paved width to accommodate an additional turn lane that can be serviced under the existing split phasing scheme. By reducing the service time for the side streets, additional green time can be reallocated to the Route 1 movements, reducing vehicle stops and intersection delays.

CONCLUSIONS AND RECOMMENDATIONS

In summary, the study has shown that the final phase of the *Village at South County Commons* (District 5), development 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 site access road intersection on Hampton Way was reviewed for geometry and sight distances. The proposed modified roadway intersection was determined to provide sufficient sight distances in accordance with AASHTO criteria for visibility and decision making of drivers attempting to enter/exit main street traffic from the minor road approach.

The results of the operational analysis determined that the estimated increase in traffic resulting from the proposed *Village at South County Commons* final phase will have a minor effect on overall traffic operations along Tower Hill Road (Route 1), particularly during the morning and afternoon peak hours when the site services its greatest daily volumes. The design of Hampton Way including its intersection with Route 1 was completed in conjunction with the *Village at South County Commons* and *Bradley School* project as part of the *Wakefield Meadows/Hampton Place* project. The final development proposal for these projects is smaller in size than originally considered and designed for, resulting in less overall traffic along these servicing roadways and the major signalized intersection providing site access.

Therefore, based upon the data collected on the servicing roadways, the analysis completed as part of this study, along with the access design proposed, it can be concluded that the final phase of the commercial development proposed as part of the *Village at South County Commons* has adequate and safe access to a public street, and will not have a detrimental effect on public safety and welfare in the study area.

Appendix

Traffic Volume Data

Traffic Crash Data

Trip Generation

Operational Analysis

Traffic Volume Data

Intersection Turning Movement Count
Tower Hill Road (Route 1) @ Government Center/Hampton Way



Project Name: Castle Farm
 Town/City: South Kingstown, RI
 Location: Rte 1 @ Hampton W./Govt. Cent
 Weather: Sunny/60's

File Name : 506703 Route 1 at Hampton Way-Govt. Center
 Site Code : 506703
 Start Date : 5/20/2015
 Page No : 1

Groups Printed- Vehicles

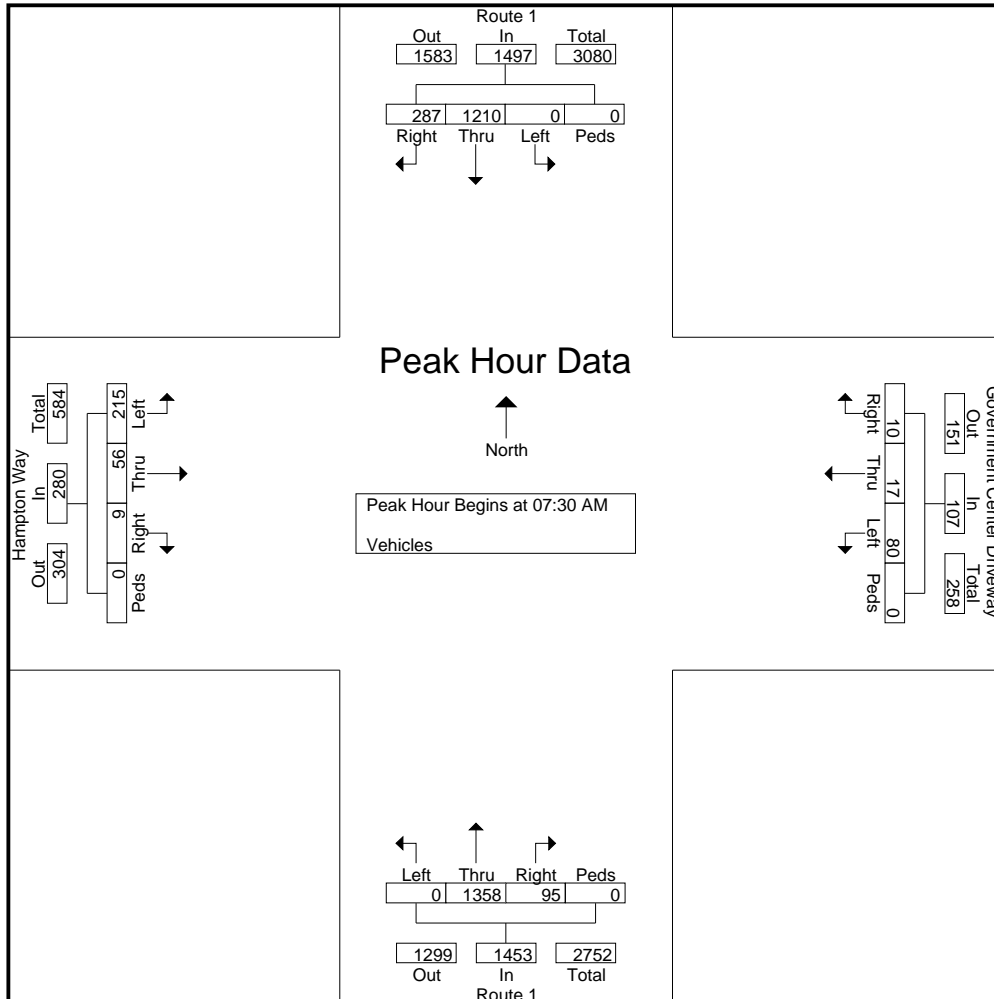
Start Time	Route 1 Southbound					Government Center Driveway Westbound					Route 1 Northbound					Hampton Way Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	0	241	11	0	252	3	0	0	0	3	0	291	2	0	293	4	2	1	0	7	555
07:15 AM	0	247	32	0	279	5	1	0	0	6	0	302	7	0	309	32	3	2	0	37	631
07:30 AM	0	276	68	0	344	18	3	1	0	22	0	338	19	0	357	56	2	1	0	59	782
07:45 AM	0	276	93	0	369	22	5	3	0	30	0	323	19	0	342	79	12	0	0	91	832
Total	0	1040	204	0	1244	48	9	4	0	61	0	1254	47	0	1301	171	19	4	0	194	2800
08:00 AM	0	330	80	0	410	26	6	3	0	35	0	338	15	0	353	67	18	7	0	92	890
08:15 AM	0	328	46	0	374	14	3	3	0	20	0	359	42	0	401	13	24	1	0	38	833
08:30 AM	0	318	36	0	354	11	1	1	0	13	0	296	37	0	333	7	31	3	0	41	741
08:45 AM	0	328	48	0	376	10	3	4	0	17	0	259	32	0	291	10	44	0	0	54	738
Total	0	1304	210	0	1514	61	13	11	0	85	0	1252	126	0	1378	97	117	11	0	225	3202
*** BREAK ***																					
04:00 PM	0	323	13	0	336	18	0	22	0	40	0	362	9	0	371	10	3	1	0	14	761
04:15 PM	0	332	16	0	348	25	0	8	0	33	0	368	5	0	373	11	4	1	0	16	770
04:30 PM	0	377	10	0	387	18	0	25	0	43	0	355	0	0	355	13	1	5	0	19	804
04:45 PM	0	359	8	0	367	11	0	8	0	19	0	365	4	0	369	6	0	4	0	10	765
Total	0	1391	47	0	1438	72	0	63	0	135	0	1450	18	0	1468	40	8	11	0	59	3100
05:00 PM	0	396	11	0	407	7	0	4	0	11	0	325	5	0	330	9	2	3	0	14	762
05:15 PM	0	397	5	0	402	14	0	2	0	16	0	361	6	0	367	4	0	1	0	5	790
05:30 PM	0	365	10	0	375	11	0	2	0	13	0	327	5	0	332	6	0	1	0	7	727
05:45 PM	0	338	7	0	345	12	0	2	0	14	0	291	6	0	297	3	4	0	0	7	663
Total	0	1496	33	0	1529	44	0	10	0	54	0	1304	22	0	1326	22	6	5	0	33	2942
Grand Total	0	5231	494	0	5725	225	22	88	0	335	0	5260	213	0	5473	330	150	31	0	511	12044
Apprch %	0	91.4	8.6	0		67.2	6.6	26.3	0		0	96.1	3.9	0		64.6	29.4	6.1	0		
Total %	0	43.4	4.1	0	47.5	1.9	0.2	0.7	0	2.8	0	43.7	1.8	0	45.4	2.7	1.2	0.3	0	4.2	



Project Name: Castle Farm
 Town/City: South Kingstown, RI
 Location: Rte 1 @ Hampton W./Govt. Cent
 Weather: Sunny/60's

File Name : 506703 Route 1 at Hampton Way-Govt. Center
 Site Code : 506703
 Start Date : 5/20/2015
 Page No : 2

Start Time	Route 1 Southbound					Government Center Driveway Westbound					Route 1 Northbound					Hampton Way Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	276	68	0	344	18	3	1	0	22	0	338	19	0	357	56	2	1	0	59	782
07:45 AM	0	276	93	0	369	22	5	3	0	30	0	323	19	0	342	79	12	0	0	91	832
08:00 AM	0	330	80	0	410	26	6	3	0	35	0	338	15	0	353	67	18	7	0	92	890
08:15 AM	0	328	46	0	374	14	3	3	0	20	0	359	42	0	401	13	24	1	0	38	833
Total Volume	0	1210	287	0	1497	80	17	10	0	107	0	1358	95	0	1453	215	56	9	0	280	3337
% App. Total	0	80.8	19.2	0		74.8	15.9	9.3	0		0	93.5	6.5	0		76.8	20	3.2	0		
PHF	.000	.917	.772	.000	.913	.769	.708	.833	.000	.764	.000	.946	.565	.000	.906	.680	.583	.321	.000	.761	.937

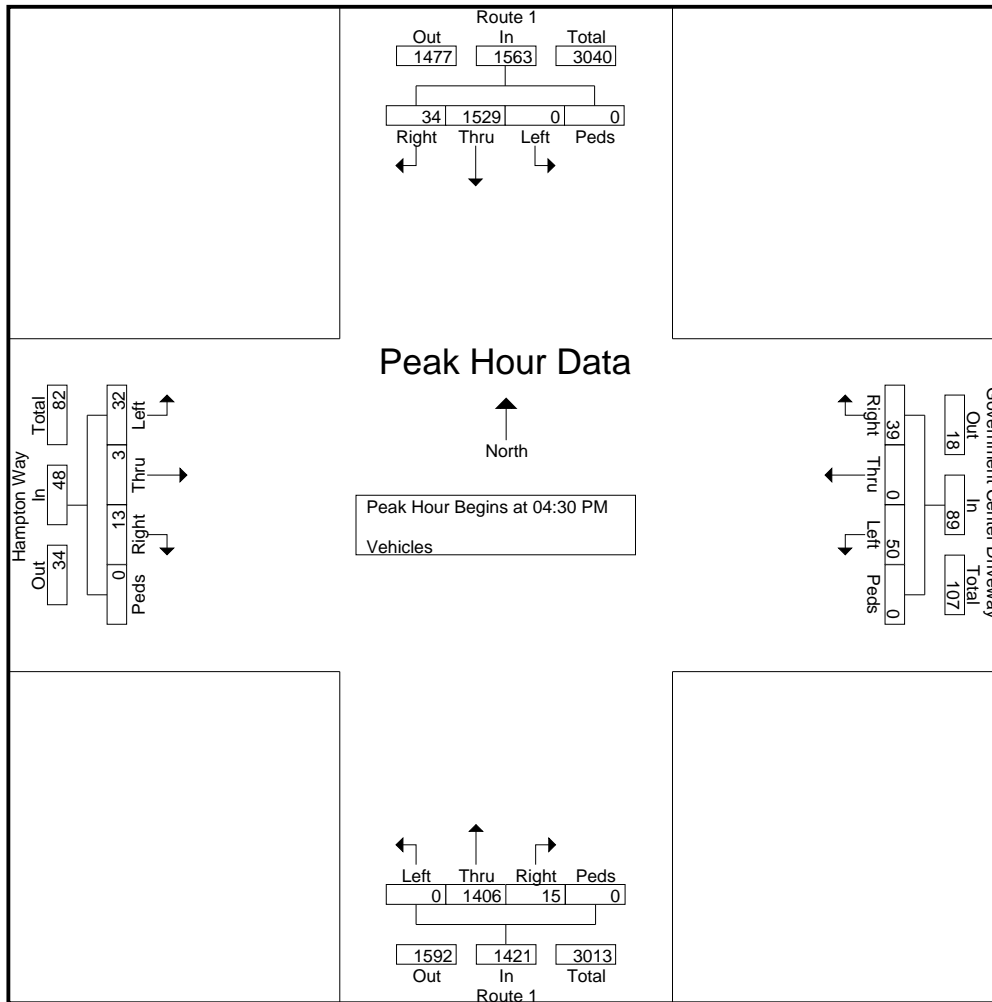




Project Name: Castle Farm
 Town/City: South Kingstown, RI
 Location: Rte 1 @ Hampton W./Govt. Cent
 Weather: Sunny/60's

File Name : 506703 Route 1 at Hampton Way-Govt. Center
 Site Code : 506703
 Start Date : 5/20/2015
 Page No : 3

Start Time	Route 1 Southbound					Government Center Driveway Westbound					Route 1 Northbound					Hampton Way Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	377	10	0	387	18	0	25	0	43	0	355	0	0	355	13	1	5	0	19	804
04:45 PM	0	359	8	0	367	11	0	8	0	19	0	365	4	0	369	6	0	4	0	10	765
05:00 PM	0	396	11	0	407	7	0	4	0	11	0	325	5	0	330	9	2	3	0	14	762
05:15 PM	0	397	5	0	402	14	0	2	0	16	0	361	6	0	367	4	0	1	0	5	790
Total Volume	0	1529	34	0	1563	50	0	39	0	89	0	1406	15	0	1421	32	3	13	0	48	3121
% App. Total	0	97.8	2.2	0		56.2	0	43.8	0		0	98.9	1.1	0		66.7	6.2	27.1	0		
PHF	.000	.963	.773	.000	.960	.694	.000	.390	.000	.517	.000	.963	.625	.000	.963	.615	.375	.650	.000	.632	.970



Traffic Crash Data

2013 through 2015

Tower Hill Road (Route 1) at Government Center/Hampton Way Intersection

Tower Hill Road (Route 1) at Hampton Way/Government Center Intersection

		2013	2014	2015	Total	Percent
Collision Type						
	Rear End		1	2	3	100%
	Angle				0	0%
	Head On				0	0%
	Single Vehicle Crash				0	0%
	Sideswipe, Same Direction				0	0%
	Sideswipe, Opposite Direction				0	0%
	Rear to Rear				0	0%
	<u>Unknown/Other</u>				0	0%
	Total	0	1	2	3	100%
Accident Severity						
	Property		1	2	3	100%
	Injury				0	0%
	Fatal				0	0%
	Not Reported				0	0%
Light Condition						
	Day		1	2	3	100%
	Night				0	0%
	Dusk/Dawn				0	0%
	Dark, Lighted Roadway				0	0%
	Dark, Roadway Not Lighted				0	0%
	Not Reported				0	0%
Road Condition						
	Dry		1	2	3	100%
	Wet				0	0%
	Snow				0	0%
	Ice				0	0%
	Not Reported				0	0%
Hour of Day						
	6:00 AM -9:00 AM			1	1	33%
	9:00 AM -3:00 PM			1	1	33%
	3:00 PM -6:00 PM		1		1	33%
	6:00 PM -6:00 AM				0	0%
	Total Accidents:	0	1	2	3	

Trip Generation

Trip Generation Summary and Distribution

ITE Land Use Code 310 - Hotel

ITE Land Use Code 710 – General Office Building

ITE Land Use Code 912 – Drive-in Bank

Trip Generation Summary

Trip Generation Summary

	<u>Description</u>	<u>Enter</u>	<u>Exit</u>	<u>Total</u>
<i><u>AM PEAK HOUR</u></i>				
ITE Land Use Code 310	Hotel	31	22	53
ITE Land Use Code 710	General Office Building	42	5	47
ITE Land Use Code 912	Drive-in Bank	<u>25</u>	<u>18</u>	<u>43</u>
	TOTAL	98	45	143

PM PEAK HOUR

ITE Land Use Code 310	Hotel	31	29	60
ITE Land Use Code 710	General Office Building	8	37	45
ITE Land Use Code 912	Drive-in Bank	<u>43</u>	<u>43</u>	<u>86</u>
	TOTAL	82	109	191

Calculations;

ITE Land Use Code 310 – Hotel (100 Rooms)

Independent Variable (X) = Rooms X = 100

<u>AM Peak</u>	<i>Directional Distribution 59% Entering, 41% Exiting</i>	
	T = 0.53 (X)	Enter: 31
	T = 0.53 (100)	<u>Exit: 22</u>
	T = 53	Total 53

<u>PM Peak</u>	<i>Directional Distribution 51% Entering, 49% Exiting</i>	
	T = 0.60 (X)	Enter: 31
	T = 0.60 (100)	<u>Exit: 29</u>
	T = 60	Total 60

ITE Land Use Code 710 – General Office (30,000 Square Feet)

Independent Variable (X) = Thousand Gross Floor Area X = 30

<u>AM Peak</u>	<i>Directional Distribution 88% Entering, 12% Exiting</i>	
	T = 1.56 (X)	Enter: 42
	T = 1.56 (30)	<u>Exit: 5</u>
	T = 47	Total 47

<u>PM Peak</u>	<i>Directional Distribution 17% Entering, 83% Exiting</i>	
	T = 1.49 (X)	Enter: 8
	T = 1.49 (30)	<u>Exit: 37</u>
	T = 45	Total 45

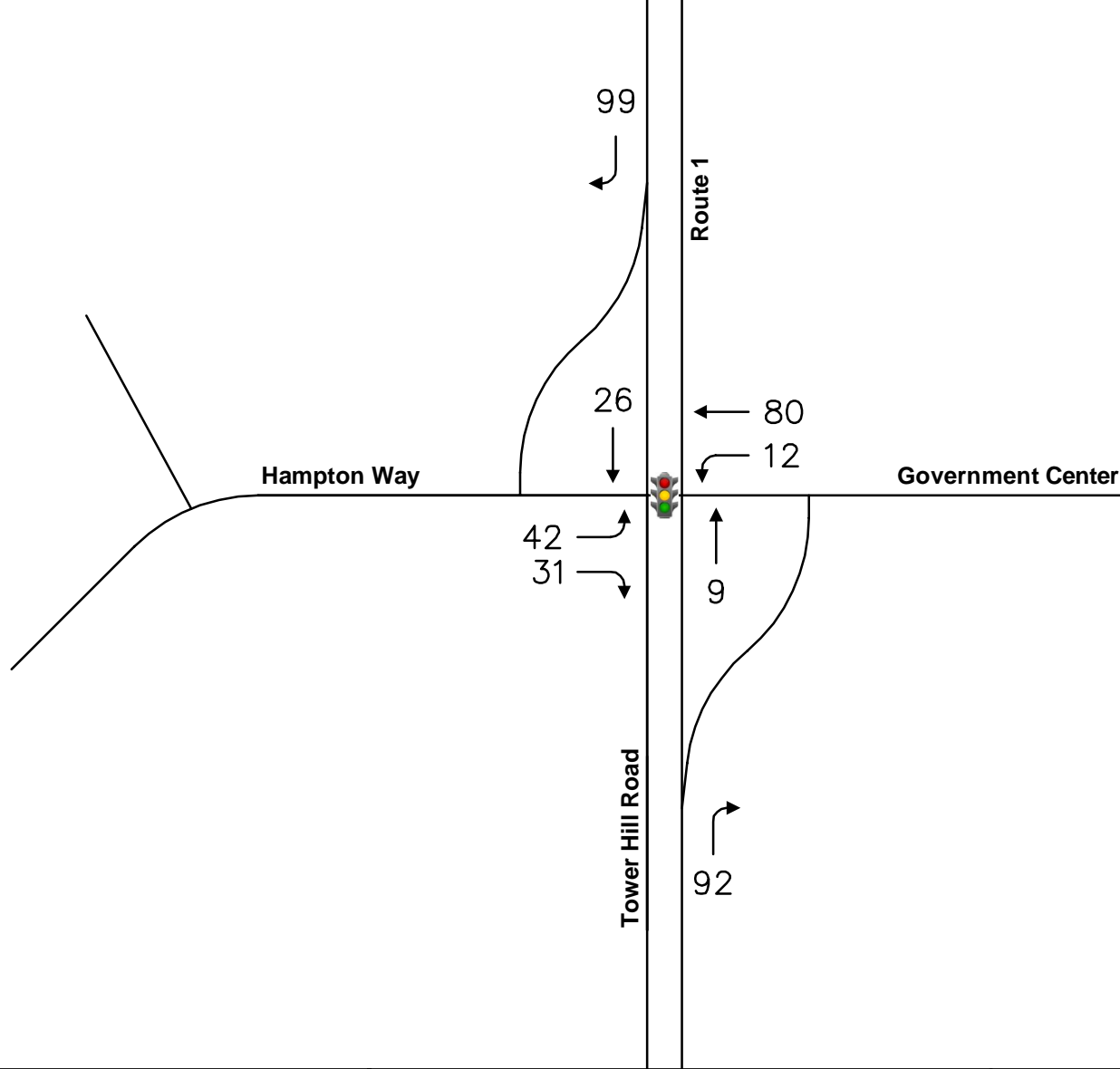
ITE Land Use Code 912 – Drive-in Bank (3,425 Square Feet)

Independent Variable (X) = Thousand Gross Floor Area X = 3.5

<u>AM Peak</u>	<i>Directional Distribution 57% Entering, 43% Exiting</i>	
	T = 12.08 (X)	Enter: 25
	T = 12.08 (3.5)	<u>Exit: 18</u>
	T = 43	Total 43

<u>PM Peak</u>	<i>Directional Distribution 50% Entering, 50% Exiting</i>	
	T = 24.30 (X)	Enter: 43
	T = 24.30 (3.5)	<u>Exit: 43</u>
	T = 86	Total 86

Trip Distribution

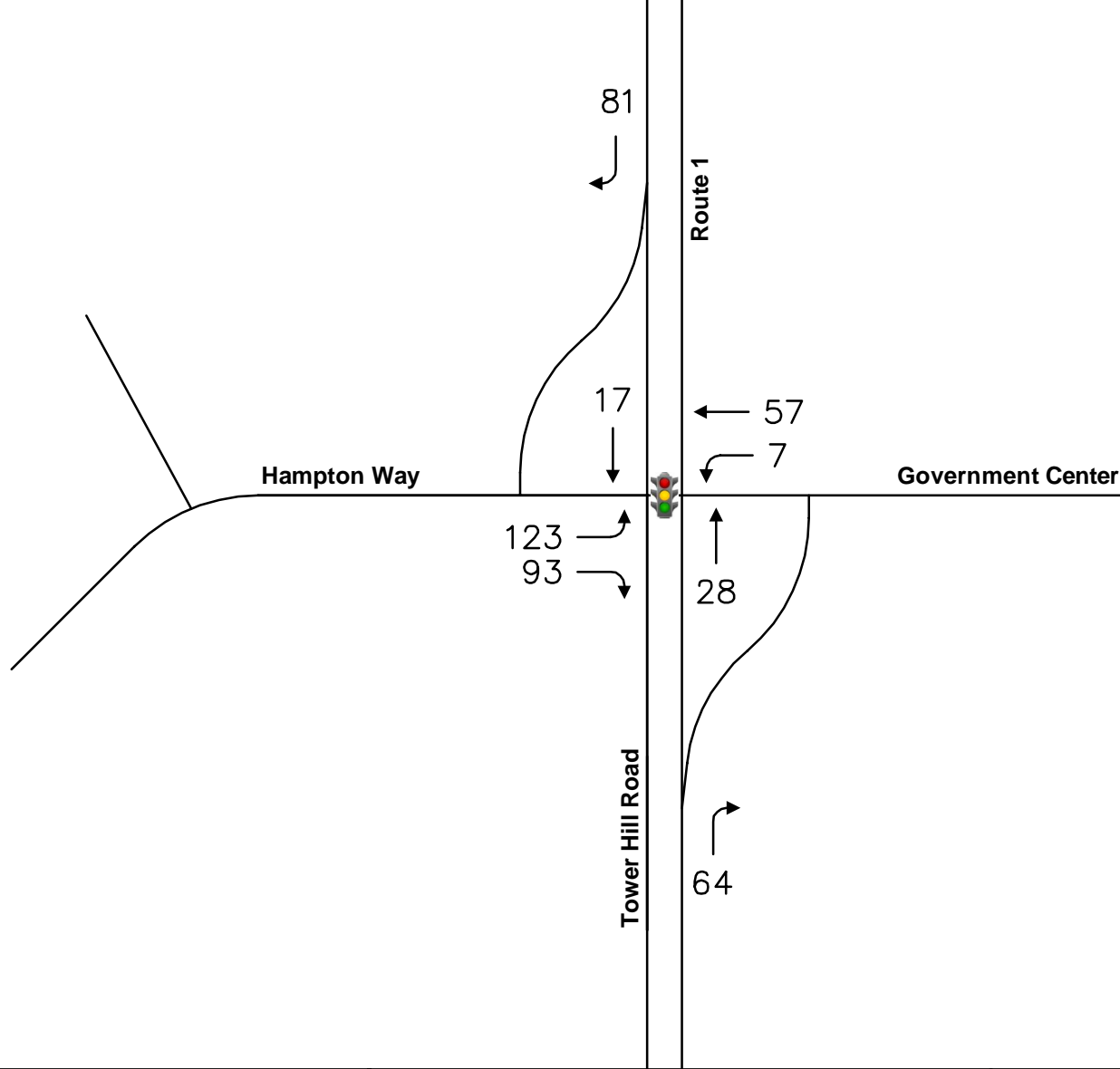


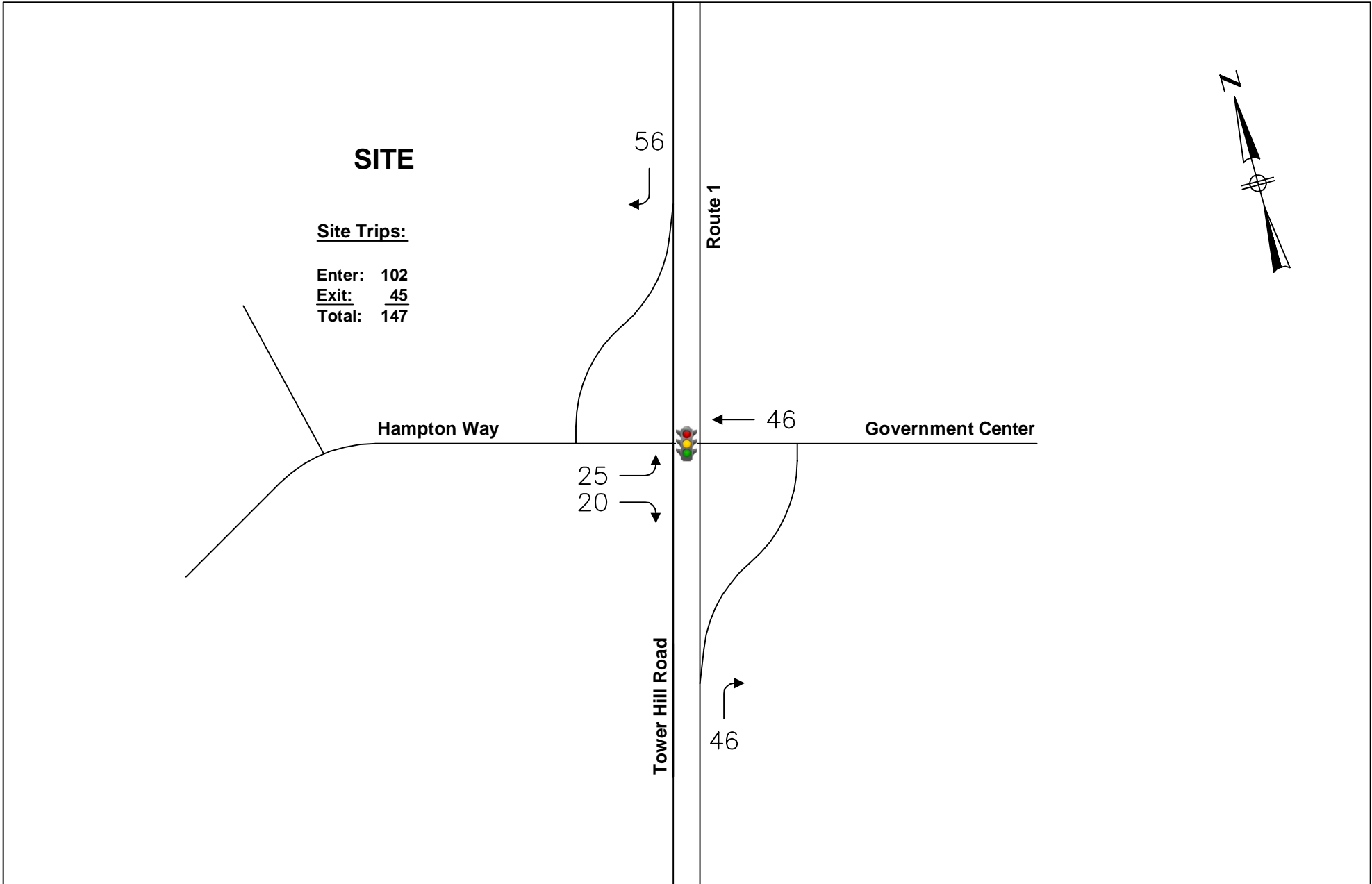
www.BETA-inc.com

2020 WEEKDAY TRAFFIC DISTRIBUTION
AM PEAK HOUR FULL BUILD

THE VILLAGE AT SOUTH COUNTY COMMONS
SOUTH KINGSTOWN, RHODE ISLAND

FIGURE

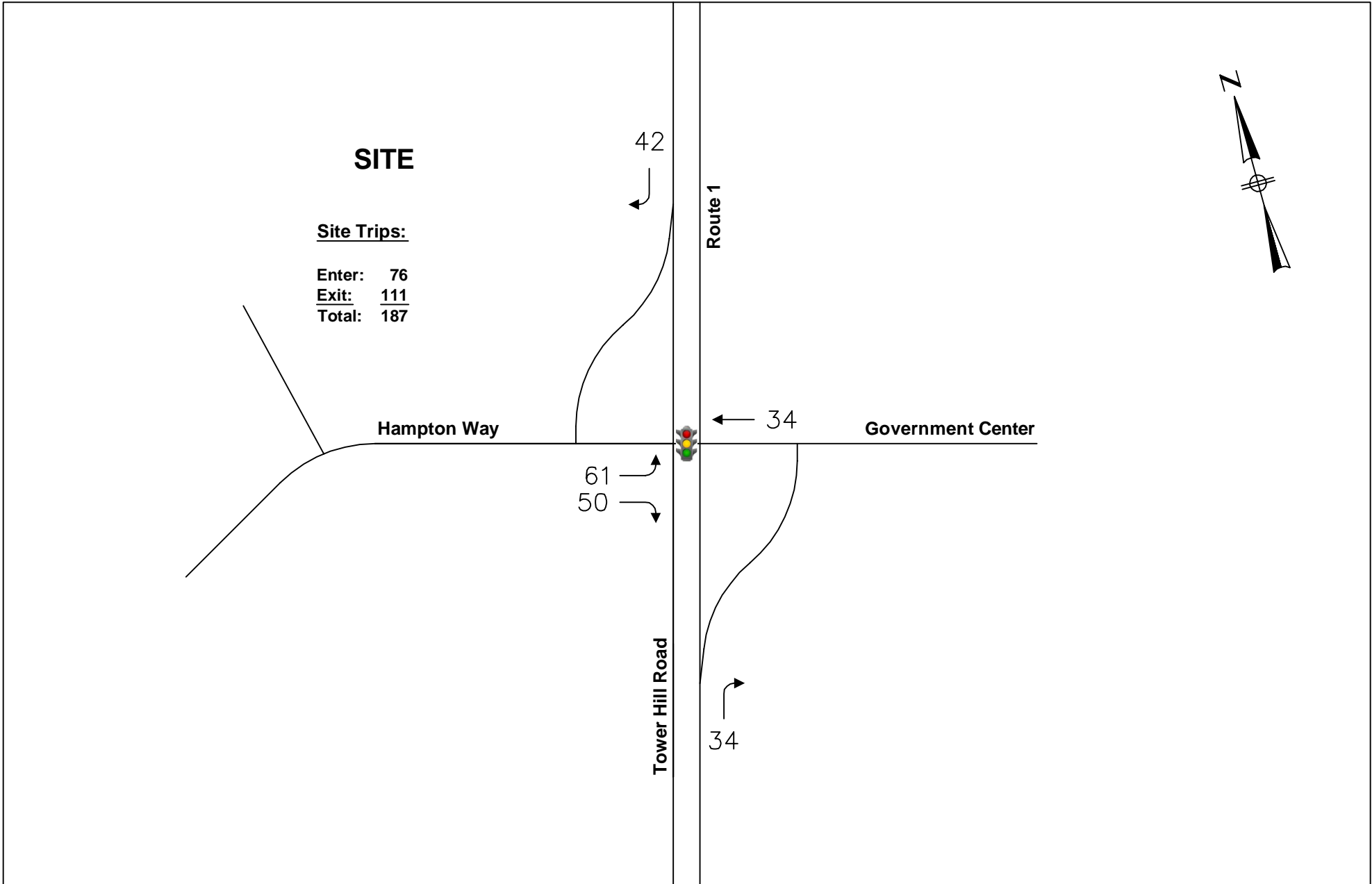




2020 WEEKDAY TRAFFIC DISTRIBUTION
AM PEAK HOUR BUILD

THE VILLAGE AT SOUTH COUNTY COMMONS
SOUTH KINGSTOWN, RHODE ISLAND

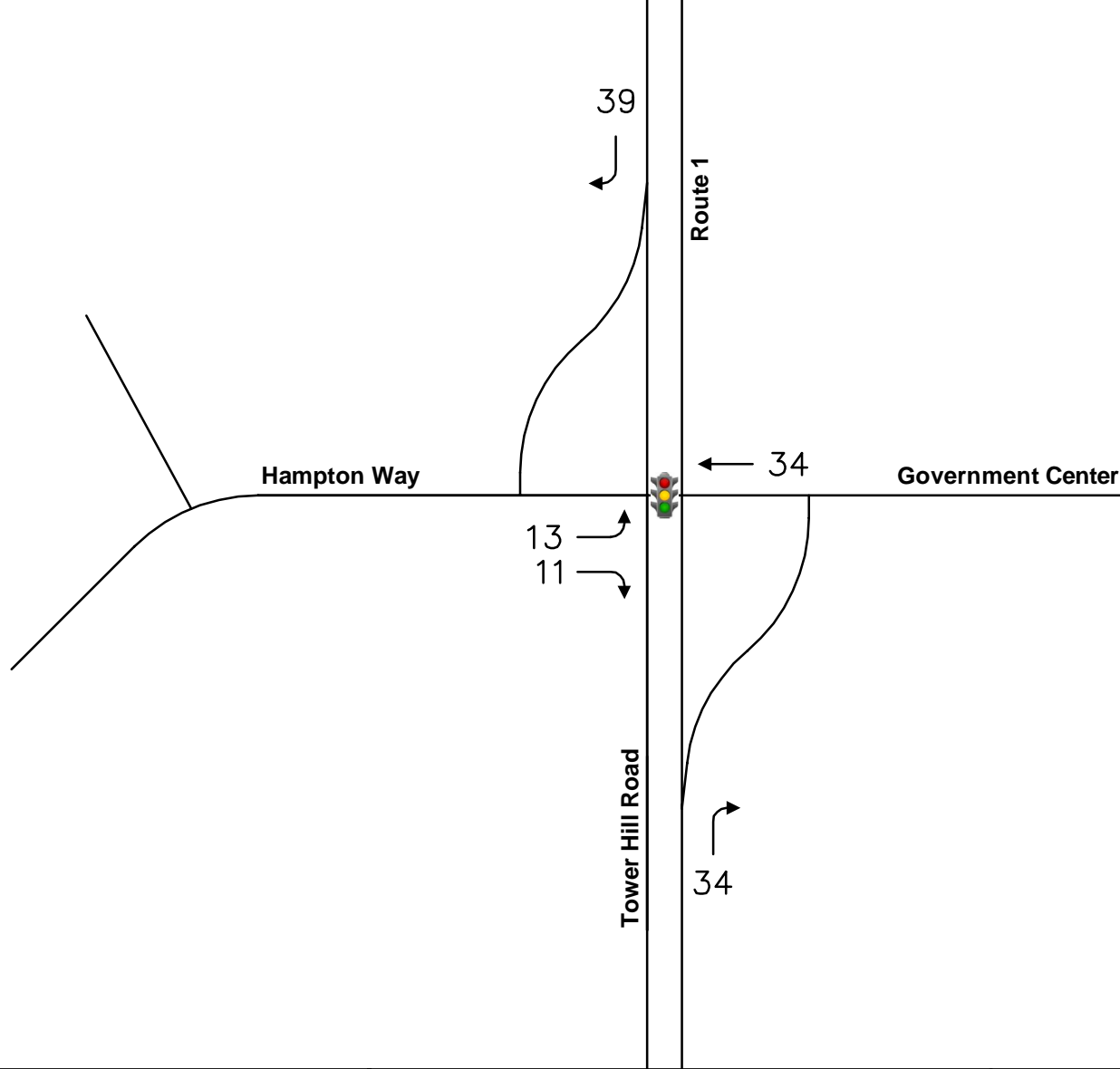
FIGURE

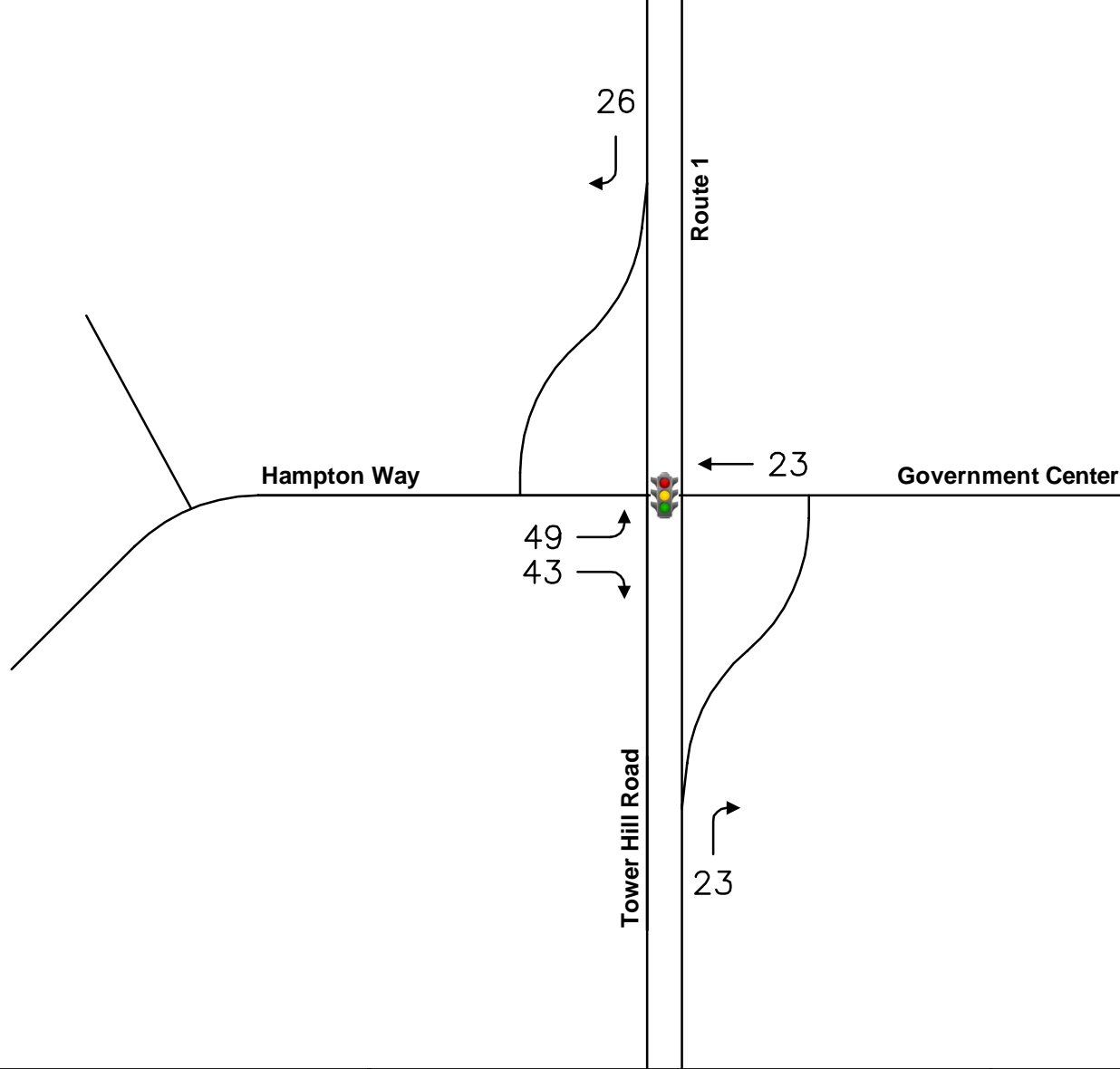


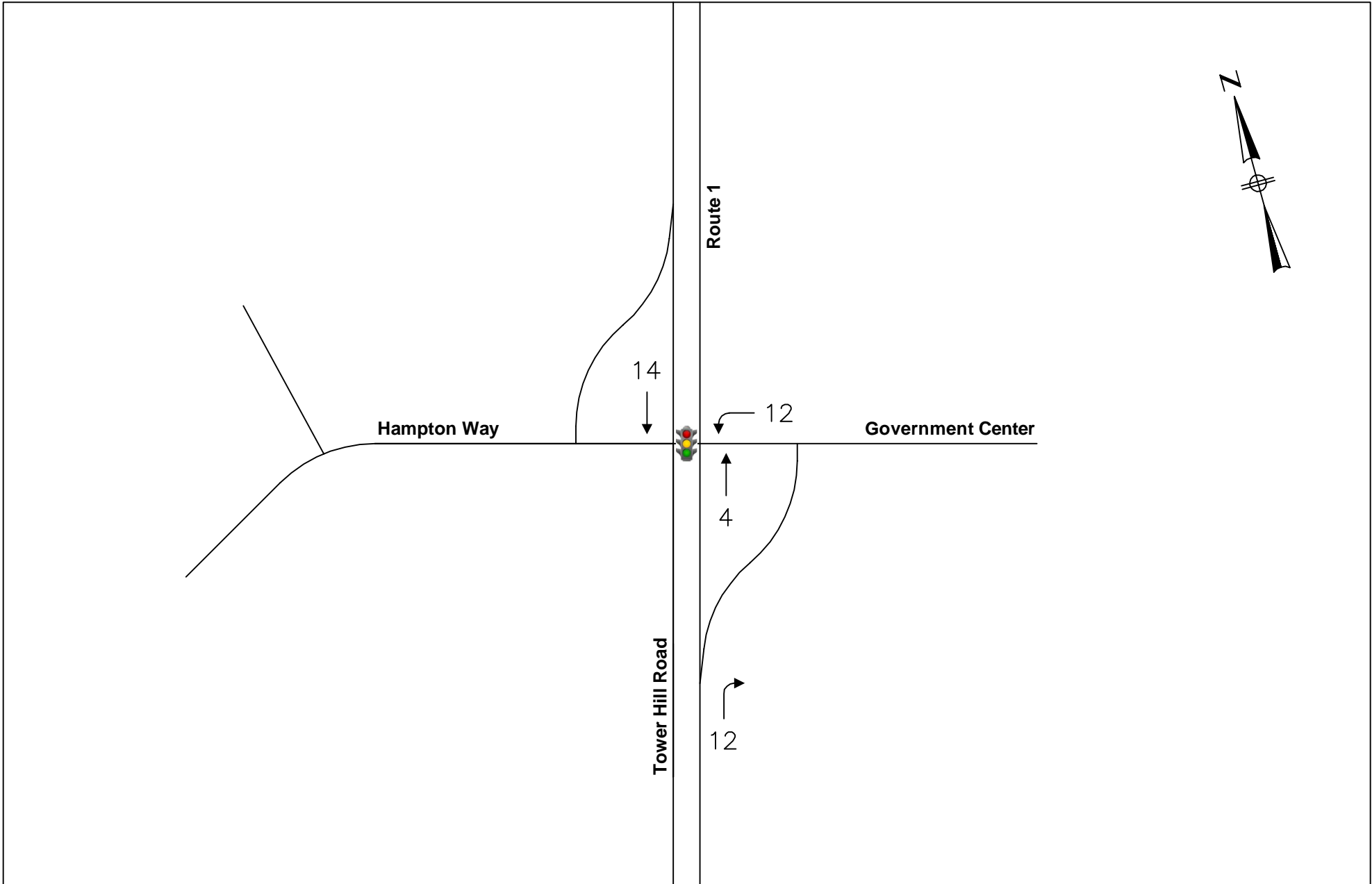
2020 WEEKDAY TRAFFIC DISTRIBUTION
PM PEAK HOUR BUILD

THE VILLAGE AT SOUTH COUNTY COMMONS
SOUTH KINGSTOWN, RHODE ISLAND

FIGURE



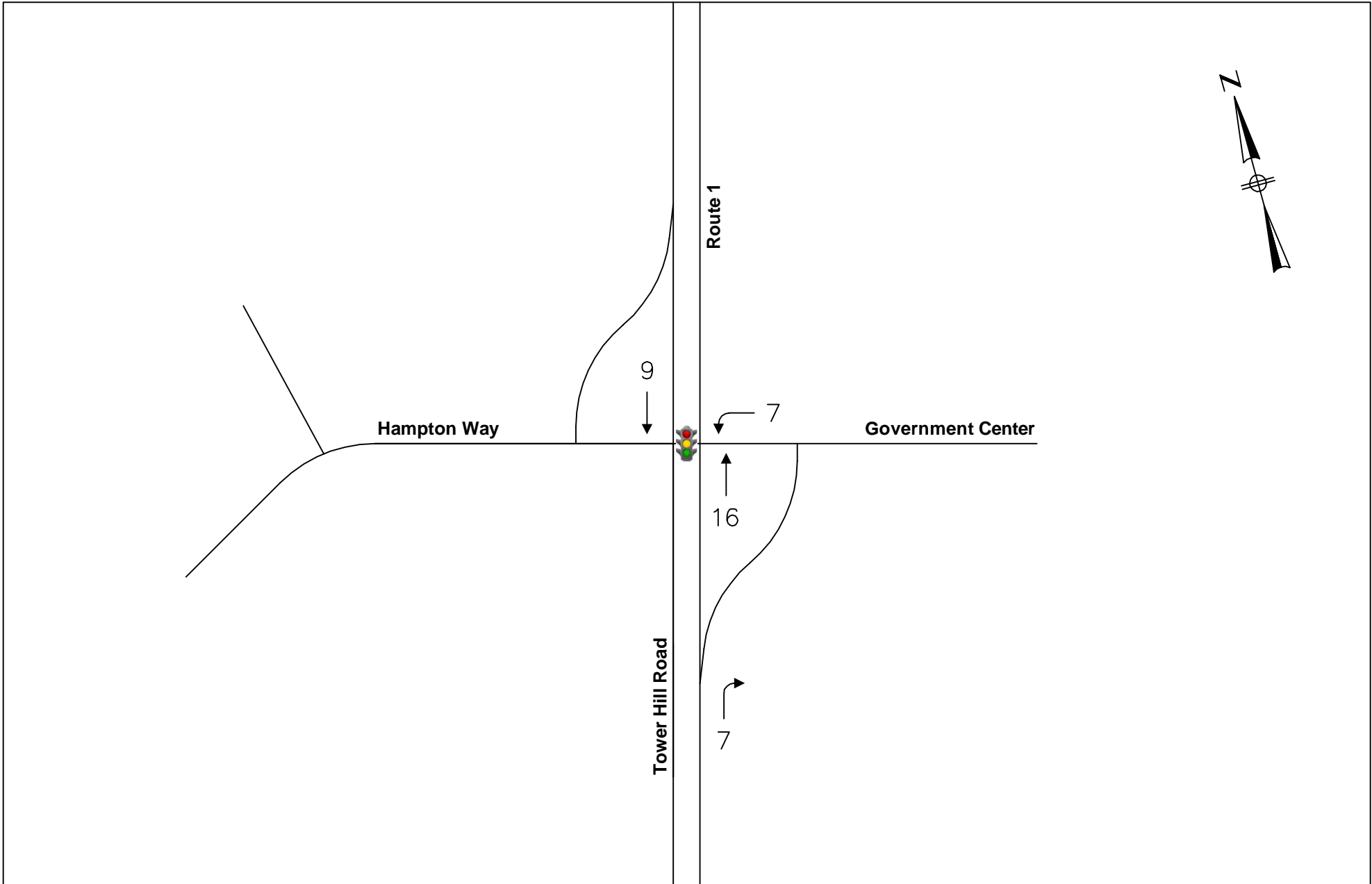




2020 WEEKDAY TRAFFIC DISTRIBUTION
AM PEAK HOUR

FUTURE DEVELOPMENT
WESTERLY CREDIT UNION

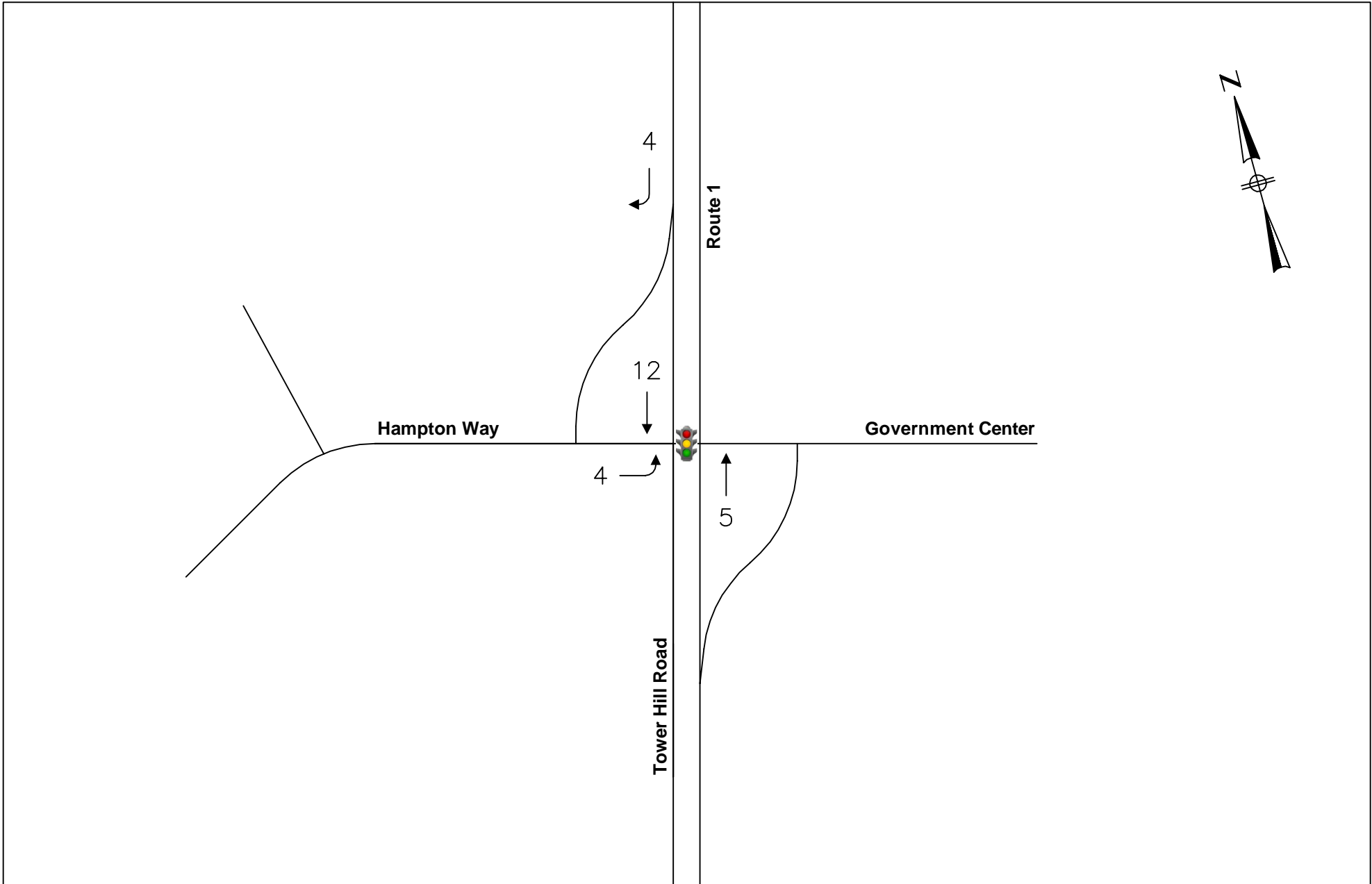
FIGURE

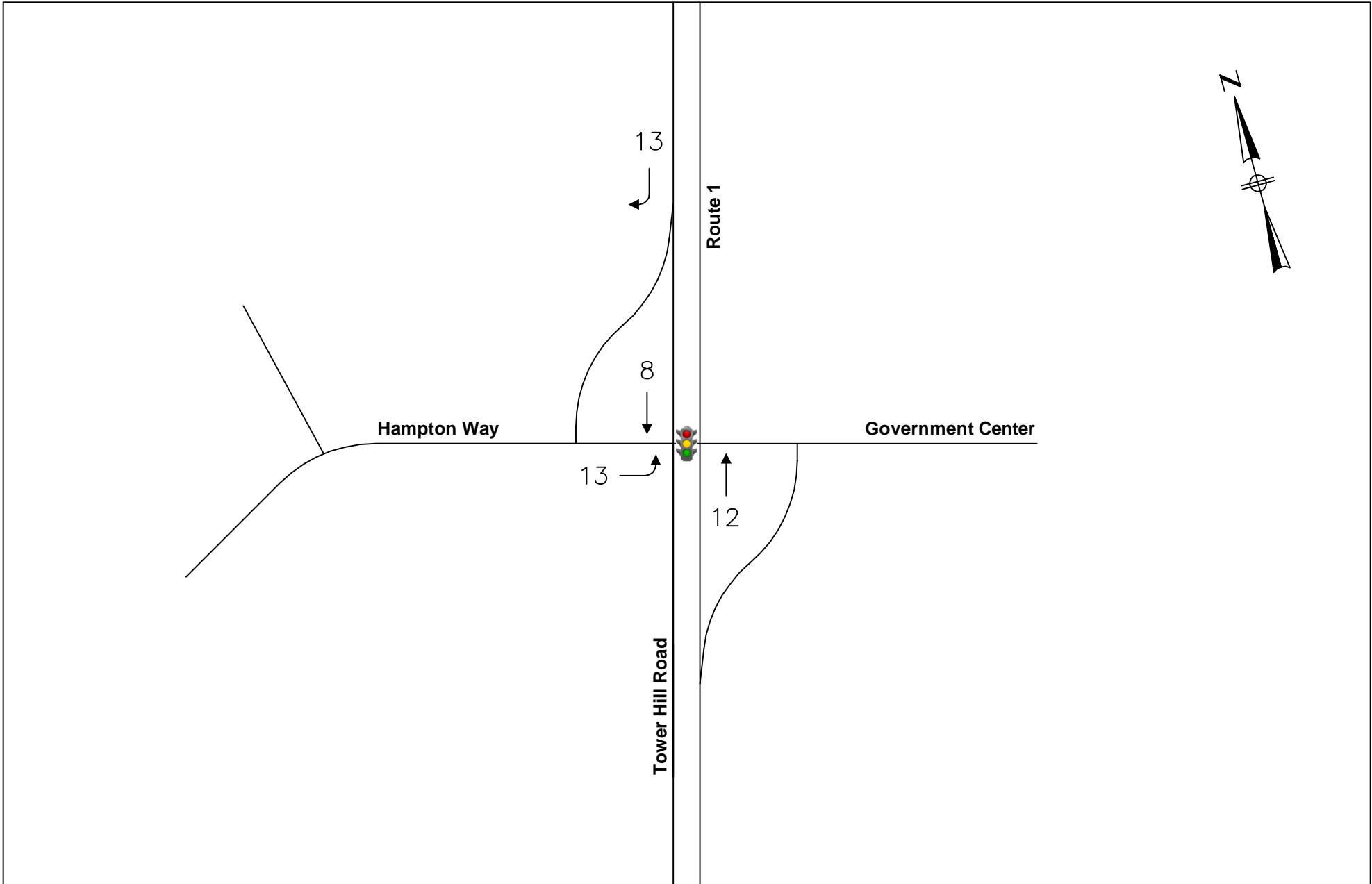


2020 WEEKDAY TRAFFIC DISTRIBUTION
PM PEAK HOUR

FUTURE DEVELOPMENT
WESTERLY CREDIT UNION

FIGURE





ITE Land Use Code 310 – Hotel

Land Use: 310

Hotel

Description

Hotels are places of lodging that provide sleeping accommodations and supporting facilities such as restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, limited recreational facilities (pool, fitness room), and/or other retail and service shops. Some of the sites included in this land use category are actually large motels providing the hotel facilities noted above. All suites hotel (Land Use 311), business hotel (Land Use 312), motel (Land Use 320) and resort hotel (Land Use 330) are related uses.

Additional Data

Studies of hotel employment density indicate that, on the average, a hotel will employ 0.9 employees per room.¹

Thirty studies provided information on occupancy rates at the time the studies were conducted. The average occupancy rate for these studies was approximately 83 percent.

The hotels surveyed were primarily located outside central business districts in suburban areas.

Some properties contained in this land use provide guest transportation services such as airport shuttles, limousine service, or golf course shuttle service, which may have an impact on the overall trip generation rates.

The sites were surveyed between the late 1960s and the 2000s throughout the United States.

For all lodging uses, it is important to collect data on occupied rooms as well as total rooms in order to accurately predict trip generation characteristics for the site.

Trip generation at a hotel may be related to the presence of supporting facilities such as convention facilities, restaurants, meeting/banquet space and retail facilities. Future data submissions should specify the presence of these amenities. Reporting the level of activity at the supporting facilities such as full, empty, partially active, number of people attending a meeting/banquet during observation may also be useful in further analysis of this land use.

Source Numbers

4, 5, 12, 13, 18, 55, 72, 170, 187, 254, 260, 262, 277, 280, 301, 306, 357, 422, 436, 507, 577, 728

¹ Buttke, Carl H. Unpublished studies of building employment densities, Portland, Oregon.

Hotel (310)

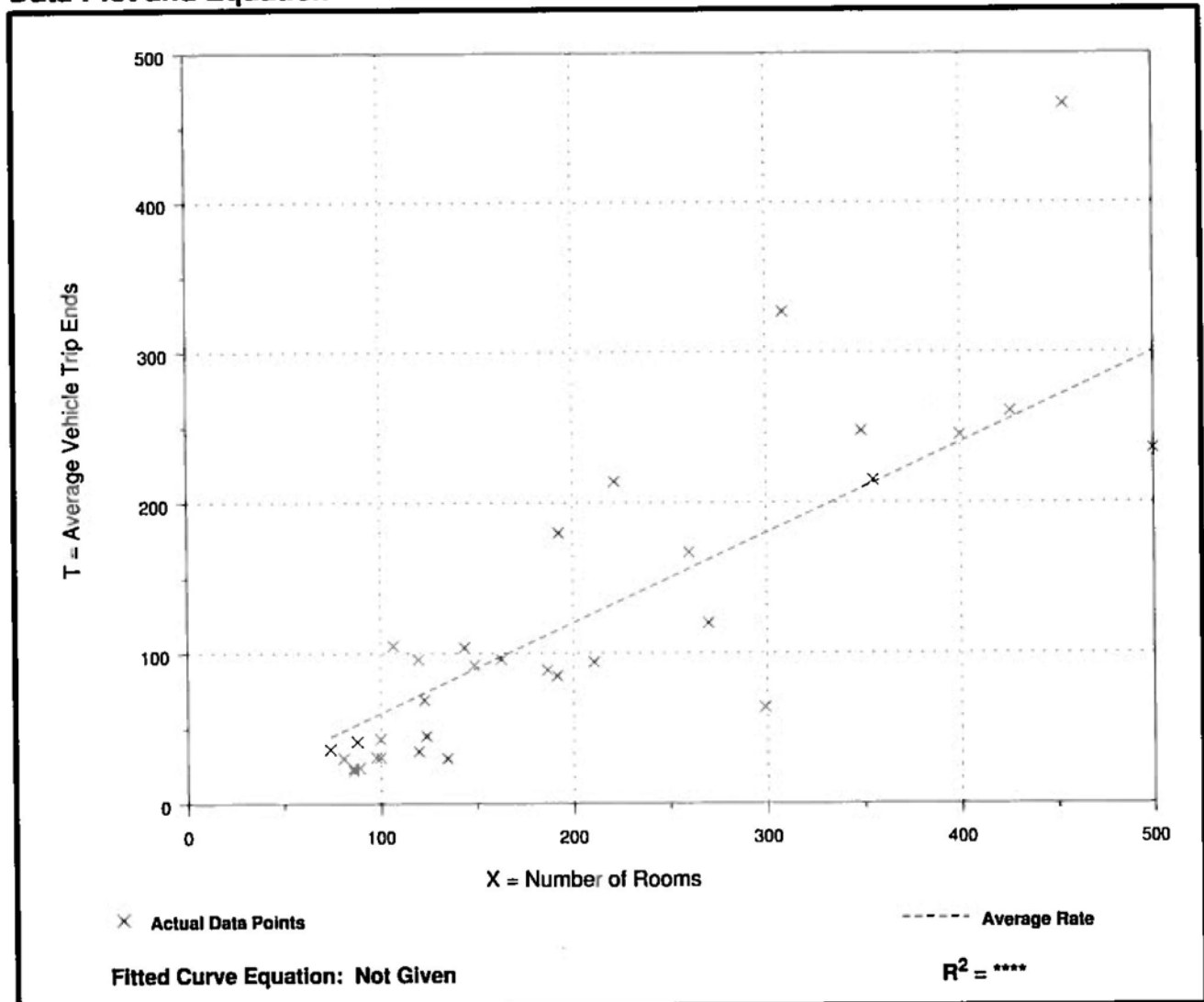
Average Vehicle Trip Ends vs: Rooms
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 33
 Average Number of Rooms: 200
 Directional Distribution: 51% entering, 49% exiting

Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.60	0.21 - 1.06	0.81

Data Plot and Equation



ITE Land Use Code 710 – General Office Building

Land Use: 710

General Office Building

Description

A general office building houses multiple tenants; it is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building or buildings may contain a mixture of tenants including professional services, insurance companies, investment brokers and tenant services, such as a bank or savings and loan institution, a restaurant or cafeteria and service retail facilities. Corporate headquarters building (Land Use 714), single tenant office building (Land Use 715), office park (Land Use 750), research and development center (Land Use 760) and business park (Land Use 770) are related uses.

If information is known about individual buildings, it is suggested that the general office building category be used rather than office parks when estimating trip generation for one or more office buildings in a single development. The office park category is more general and should be used when a breakdown of individual or different uses is not known. If the general office building category is used and if additional buildings, such as banks, restaurants, or retail stores, are included in the development, the development should be treated as a multiuse project. On the other hand, if the office park category is used, internal trips are already reflected in the data and do not need to be considered.

When the buildings are interrelated (defined by shared parking facilities or the ability to easily walk between buildings) or house one tenant, it is suggested that the total area or employment of all the buildings be used for calculating the trip generation. When the individual buildings are isolated and not related to one another, it is suggested that trip generation be calculated for each building separately and then summed.

Additional Data

Average weekday transit trip ends—

Transit service was either nonexistent or negligible at the majority of the sites surveyed in this land use. Users may wish to modify trip generation rates presented in this land use to reflect the presence of public transit, carpools and other transportation demand management (TDM) strategies. Information has not been analyzed to document the impacts of TDM measures on the total trip generation of a site. See the ITE *Trip Generation Handbook*, Second Edition for additional information on this topic.

The average building occupancy varied considerably within the studies for which occupancy data were provided. For buildings with occupancy rates reported, the average occupied gross leasable area was 88 percent.

Some of the regression curves plotted for this land use may produce illogical trip-end estimates for small office buildings. When the proposed site size is significantly smaller than the average-sized facility published in this report, caution should be used when applying these statistics. For more information, please refer to Chapter 3, "Guidelines for Estimating Trip Generation," of the ITE *Trip Generation Handbook*, Second Edition.

In some regions, peaking may occur earlier or later and may last somewhat longer than the traditional 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. peak period time frames.

The sites were surveyed between the 1960s and the 2000s throughout the United States.

Trip Characteristics

The trip generation for the A.M. and P.M. peak hours of the generator typically coincided with the peak hours of the adjacent street traffic; therefore, only one A.M. peak hour and one P.M. peak hour, which represent both the peak hour of the generator and the peak hour of the adjacent street traffic, are shown for general office buildings.

Source Numbers

2, 5, 20, 21, 51, 53, 54, 72, 88, 89, 92, 95, 98, 100, 159, 161, 172, 175, 178, 183, 184, 185, 189, 193, 207, 212, 217, 247, 253, 257, 260, 262, 279, 295, 297, 298, 300, 301, 302, 303, 304, 321, 322, 323, 324, 327, 404, 407, 408, 418, 419, 423, 562, 734

General Office Building (710)

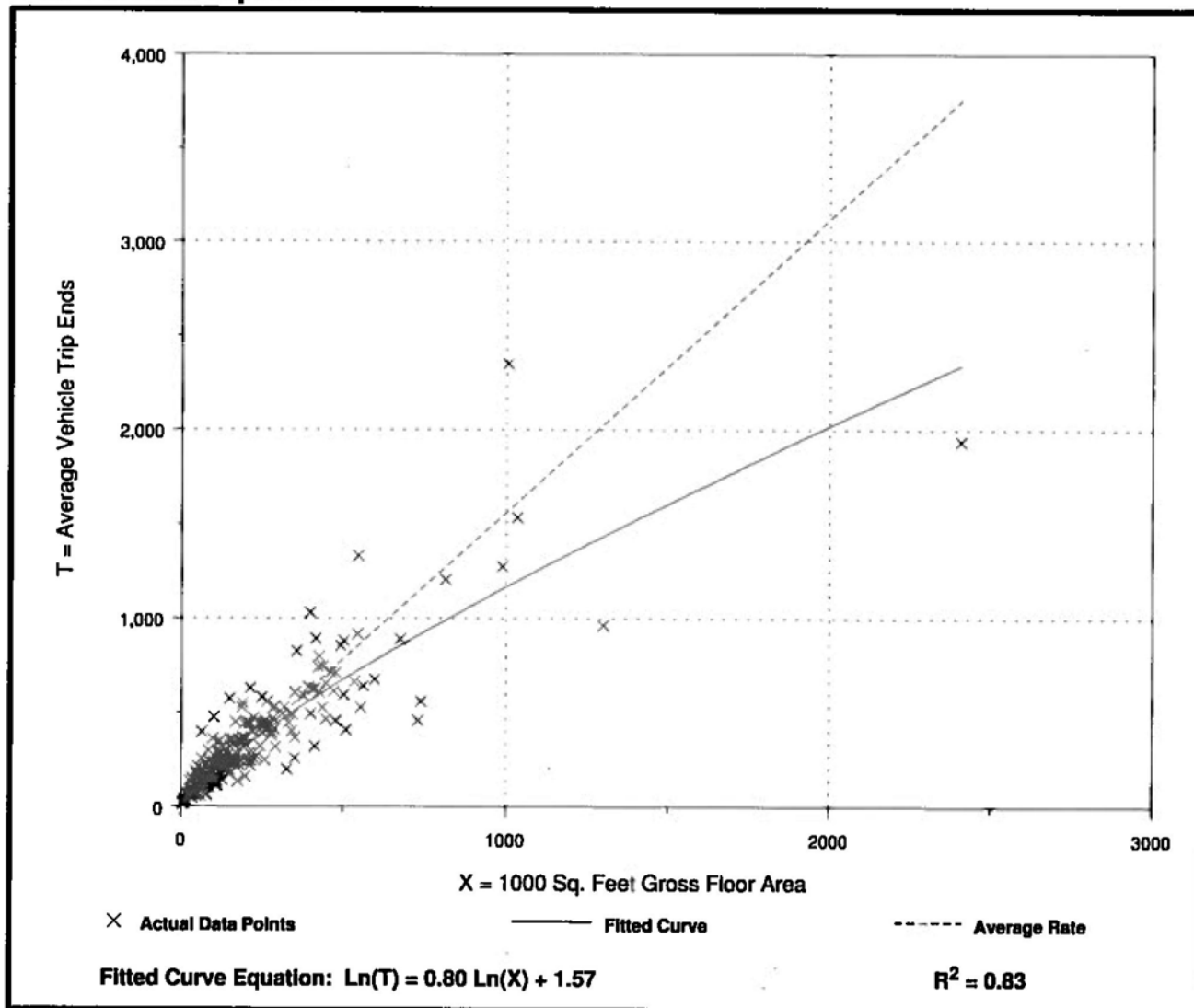
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
A.M. Peak Hour

Number of Studies: 218
 Average 1000 Sq. Feet GFA: 222
 Directional Distribution: 88% entering, 12% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.56	0.60 - 5.98	1.40

Data Plot and Equation



General Office Building (710)

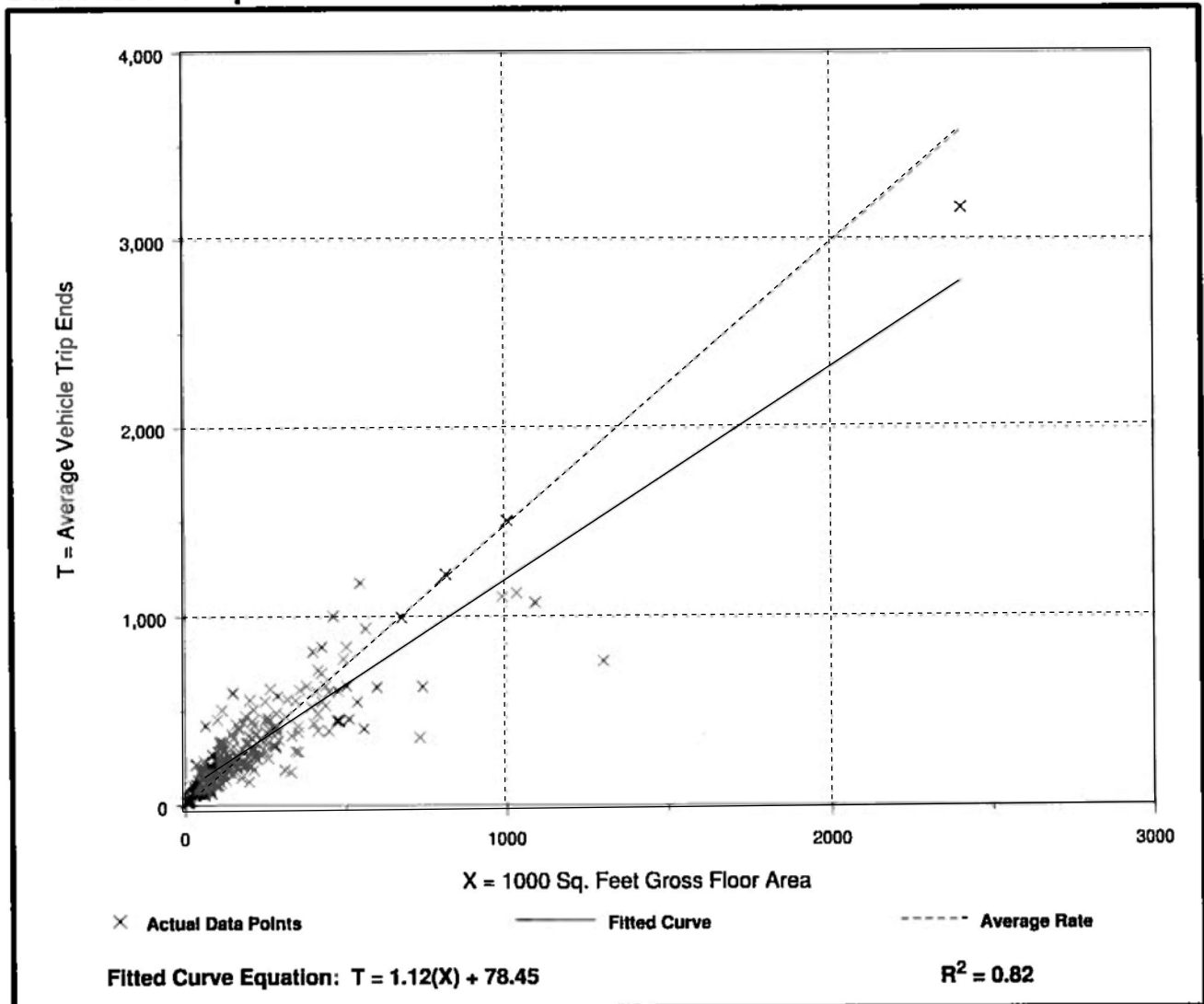
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
P.M. Peak Hour

Number of Studies: 236
 Average 1000 Sq. Feet GFA: 215
 Directional Distribution: 17% entering, 83% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.49	0.49 - 6.39	1.37

Data Plot and Equation



General Office Building (710)

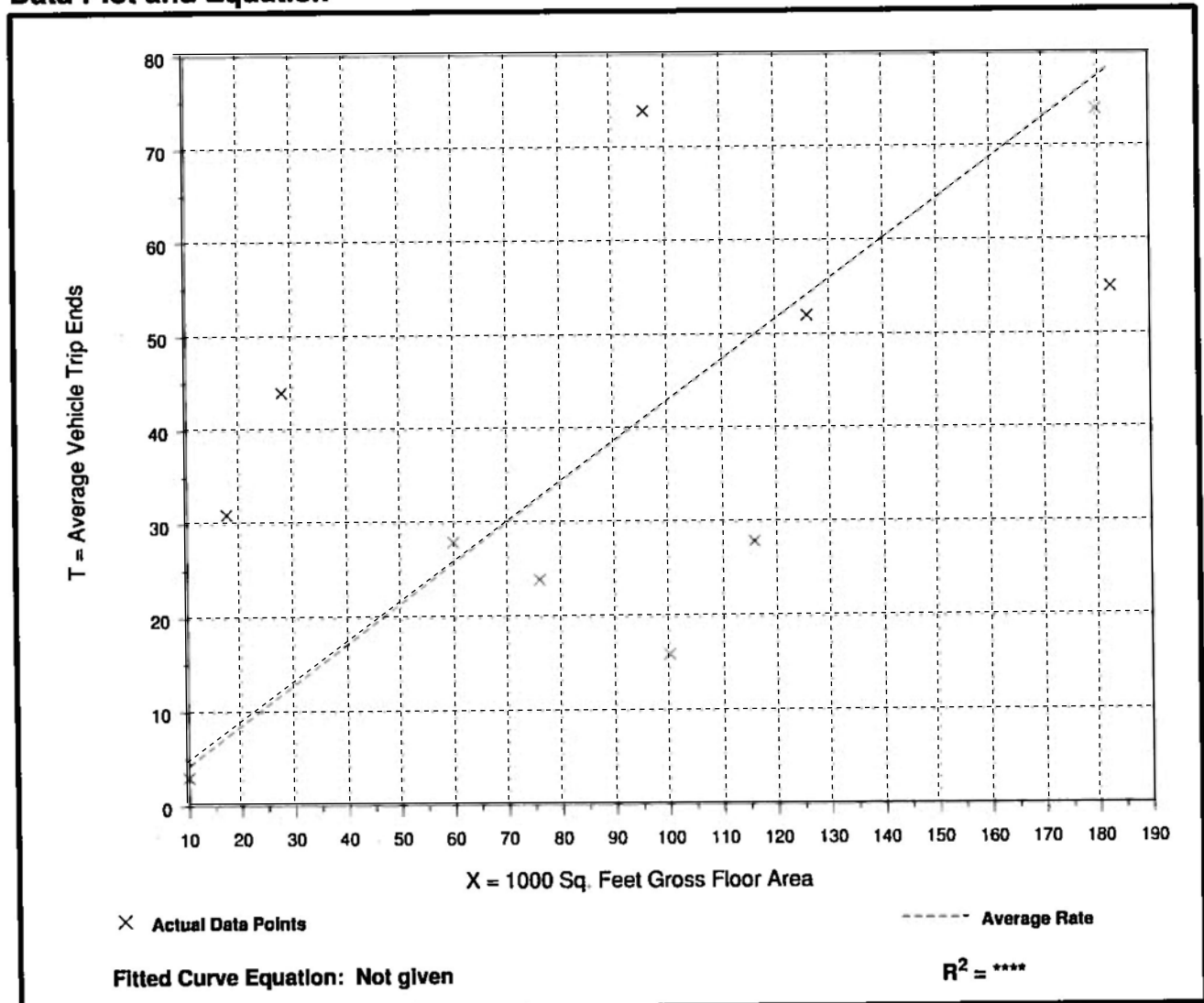
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Saturday,
Peak Hour of Generator

Number of Studies: 11
 Average 1000 Sq. Feet GFA: 90
 Directional Distribution: 54% entering, 46% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
0.43	0.16 - 1.77	0.72

Data Plot and Equation



ITE Land Use Code 912– Drive-in Bank

Land Use: 912

Drive-in Bank

Description

Drive-in banks provide 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

To reflect changes in travel patterns resulting from recent technological advances in the banking industry, data from years prior to the year 2000 have been removed from this land use. The elimination of these data resulted in substantially lower trip generation rates for most time periods presented.

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

Peak hours of the generator—

The weekday A.M. peak hour varied between 8:00 a.m. and 12:00 p.m. The weekday P.M. peak hour varied between 12:00 p.m. and 6:00 p.m. The weekend peak hour varied between 9:00 a.m. and 1:30 p.m.

The sites were surveyed in the 2000s throughout the United States.

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.

Specialized Land Use Data

One study provided data on a drive-in bank with an office on the second floor. The size and scale of this site differs considerably from those contained in this land use. Therefore, the information collected for this facility is presented in the following table and was excluded from the data plots.

<u>Independent Variable</u>	<u>Trip Generation Rate</u>	<u>Size of Independent Variable</u>	<u>Number of Studies</u>	<u>Directional Distribution</u>
-----------------------------	-----------------------------	-------------------------------------	--------------------------	---------------------------------

1,000 Square Feet Gross Floor Area

Weekday A.M. Peak Hour of Adjacent Street Traffic	3.55	15,200	1	69% entering, 31% exiting
Weekday P.M. Peak Hour of Adjacent Street Traffic	5.57	15,200	1	44% entering, 56% exiting
Weekday A.M. Peak Hour of Generator	3.55	15,200	1	69% entering, 31% exiting
Weekday P.M. Peak Hour of Generator	5.57	15,200	1	44% entering, 56% exiting

Source: 656

Source Numbers

553, 555, 573, 577, 600, 624, 626, 629, 630, 637, 656, 657, 710, 724, 728

Drive-in Bank (912)

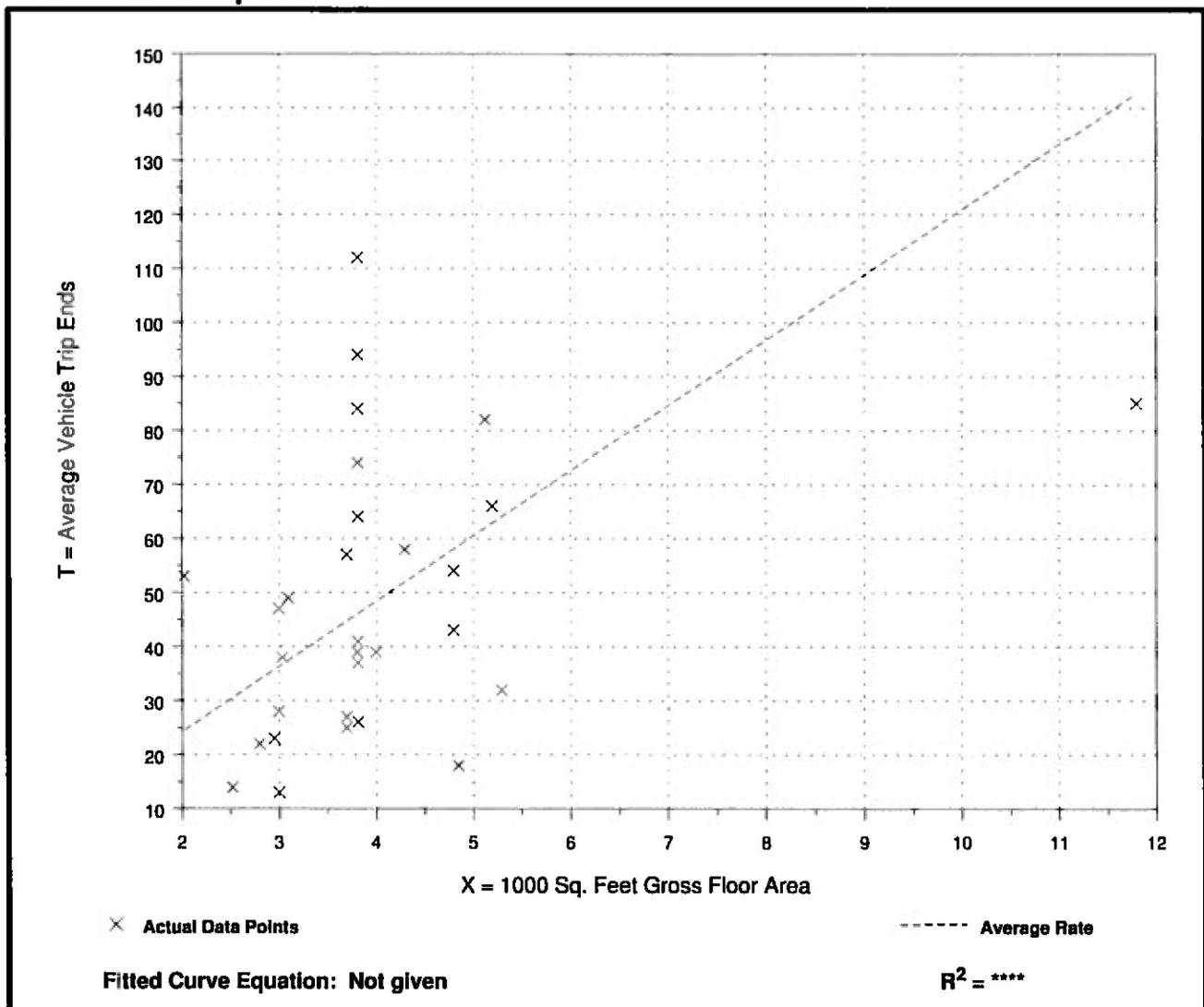
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 31
 Average 1000 Sq. Feet GFA: 4
 Directional Distribution: 57% entering, 43% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
12.08	3.71 - 29.40	6.88

Data Plot and Equation



Drive-in Bank (912)

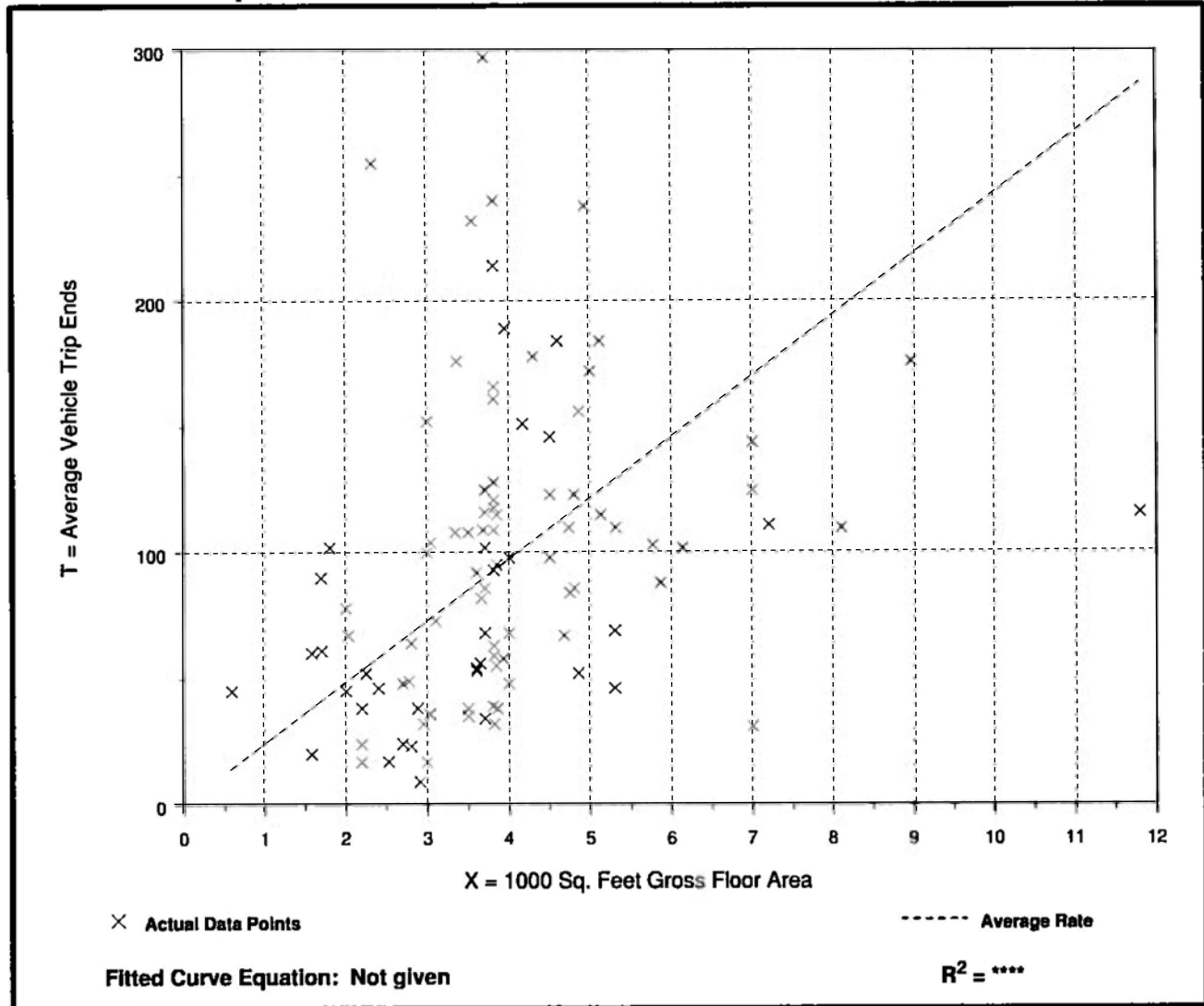
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 102
 Average 1000 Sq. Feet GFA: 4
 Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
24.30	3.09 - 109.68	16.24

Data Plot and Equation



Operational Analysis

Existing, Future No Build, Future Build Conditions

Tower Hill Road (Route 1) @ Government Center/Hampton Way

Existing Weekday AM/PM Peak Hour

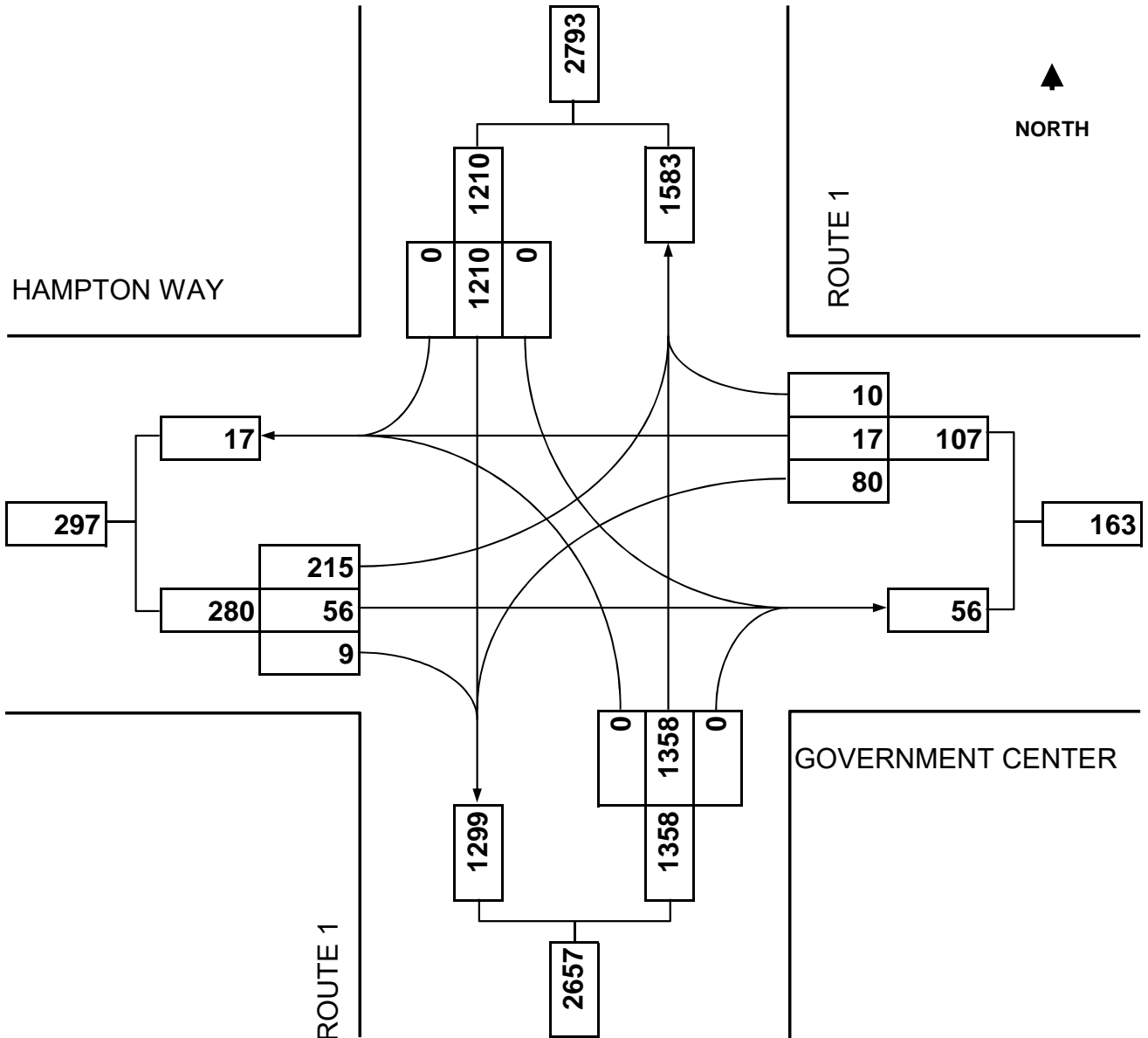


ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street: Route 1
City/Town: South Kingstown, RI
Reference No.: 5558
Existing: AM Peak

Minor Street: Hampton Way/Gov't Center
Day of Week: Weekday
Peak Period: 7:30 AM - 8:30 AM
Future: n/a



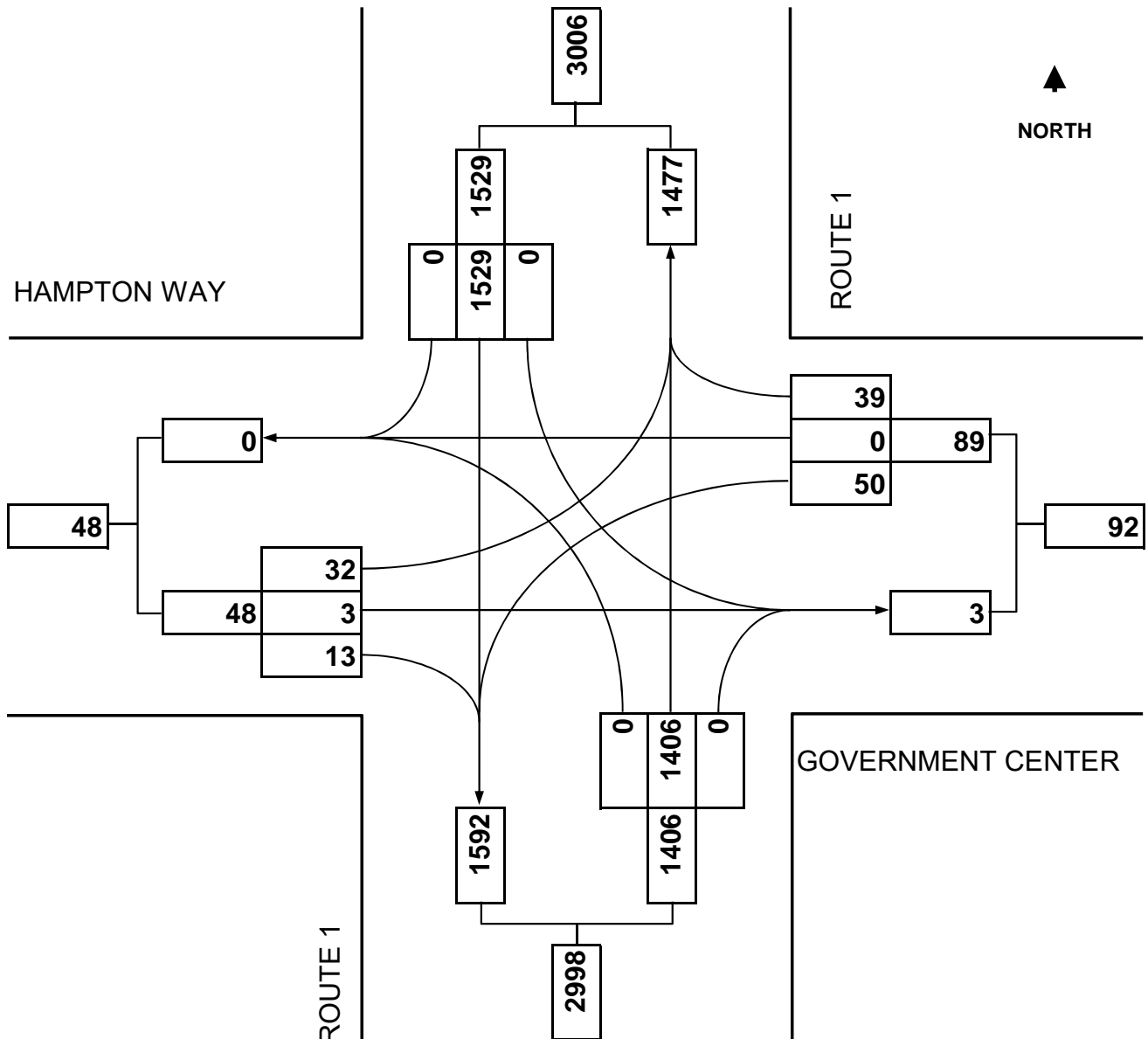


ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street: Route 1
City/Town: South Kingstown, RI
Reference No.: 5558
Existing: PM Peak

Minor Street: Hampton Way/Gov't Center
Day of Week: Weekday
Peak Period: 4:30 PM - 5:30 PM
Future: n/a



Future No Build Weekday AM/PM Peak Hour

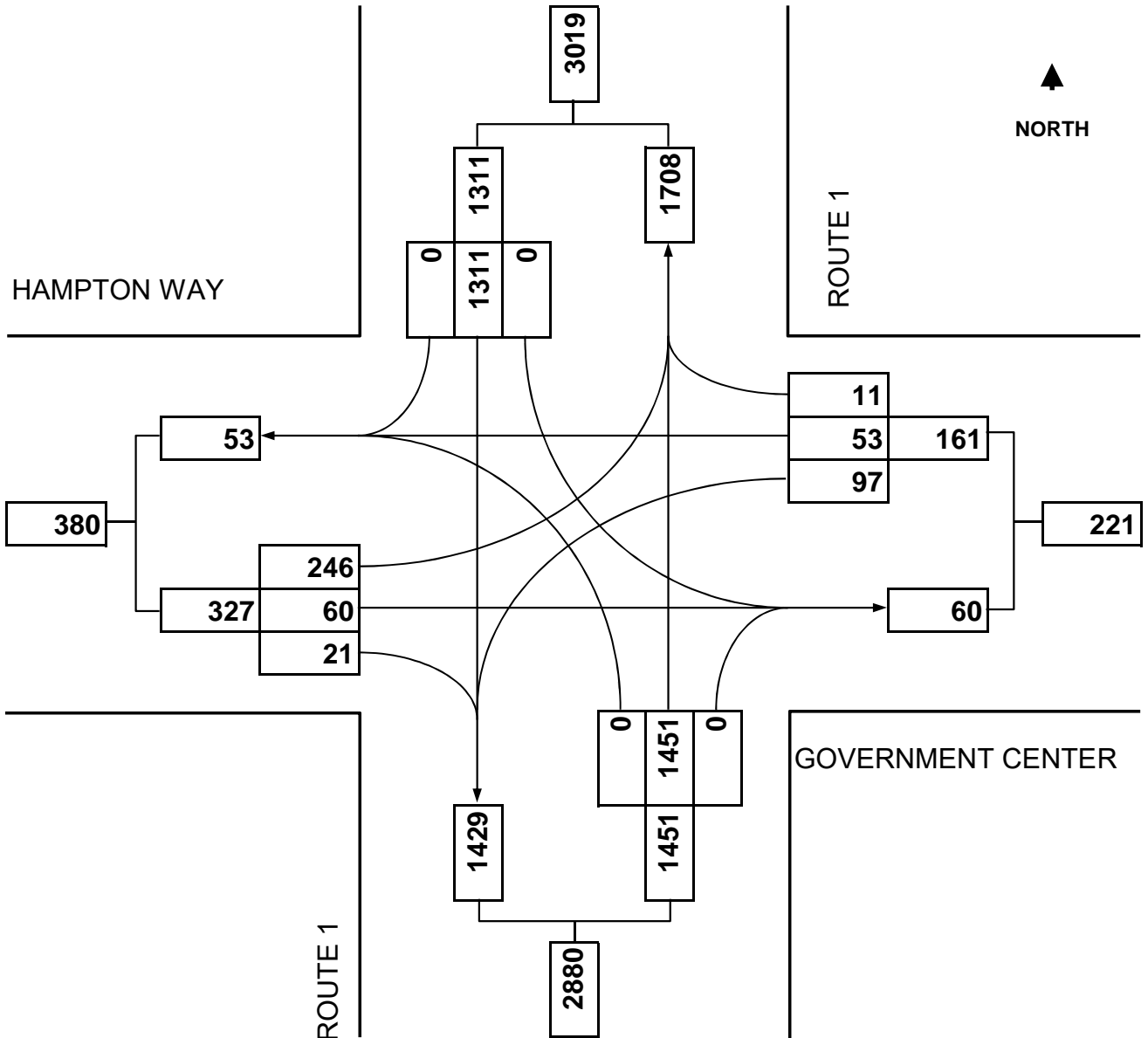


ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street: Route 1
City/Town: South Kingstown, RI
Reference No.: 5558
Existing: n/a

Minor Street: Hampton Way/Gov't Center
Day of Week: Weekday
Peak Period: AM Peak
Future: 2020 No Build



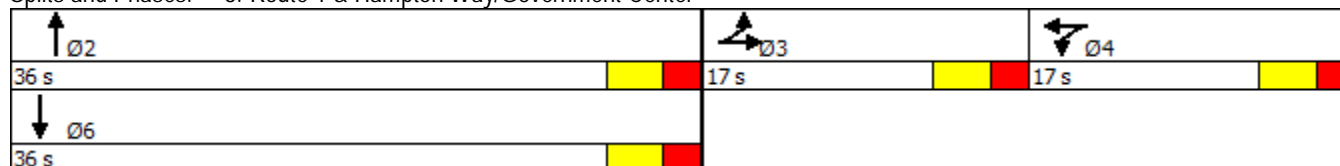


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	246	60	21	97	53	11	0	1451	0	0	1311	0
Future Volume (vph)	246	60	21	97	53	11	0	1451	0	0	1311	0
Satd. Flow (prot)	1805	1826	0	0	1828	0	0	3539	0	0	3539	0
Flt Permitted	0.950				0.971							
Satd. Flow (perm)	1805	1826	0	0	1828	0	0	3539	0	0	3539	0
Satd. Flow (RTOR)		22			5							
Lane Group Flow (vph)	265	88	0	0	173	0	0	1560	0	0	1410	0
Turn Type	Split	NA		Split	NA			NA			NA	
Protected Phases	3	3		4	4			2			6	
Permitted Phases												
Total Split (s)	17.0	17.0		17.0	17.0			36.0			36.0	
Total Lost Time (s)	4.0	4.0			4.0			4.0			4.0	
Act Effct Green (s)	12.6	12.6			11.4			32.1			32.1	
Actuated g/C Ratio	0.19	0.19			0.17			0.47			0.47	
v/c Ratio	0.79	0.25			0.56			0.94			0.85	
Control Delay	46.3	21.3			32.8			30.6			22.8	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	46.3	21.3			32.8			30.6			22.8	
LOS	D	C			C			C			C	
Approach Delay		40.1			32.8			30.6			22.8	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	109	24			66			322			271	
Queue Length 95th (ft)	#223	61			122			#489			#414	
Internal Link Dist (ft)		388			723			755			685	
Turn Bay Length (ft)												
Base Capacity (vph)	345	367			353			1665			1665	
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	0.77	0.24			0.49			0.94			0.85	

Intersection Summary

Cycle Length: 70
 Actuated Cycle Length: 68.1
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 28.5
 Intersection LOS: C
 Intersection Capacity Utilization 67.1%
 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: 3: Route 1 & Hampton Way/Government Center



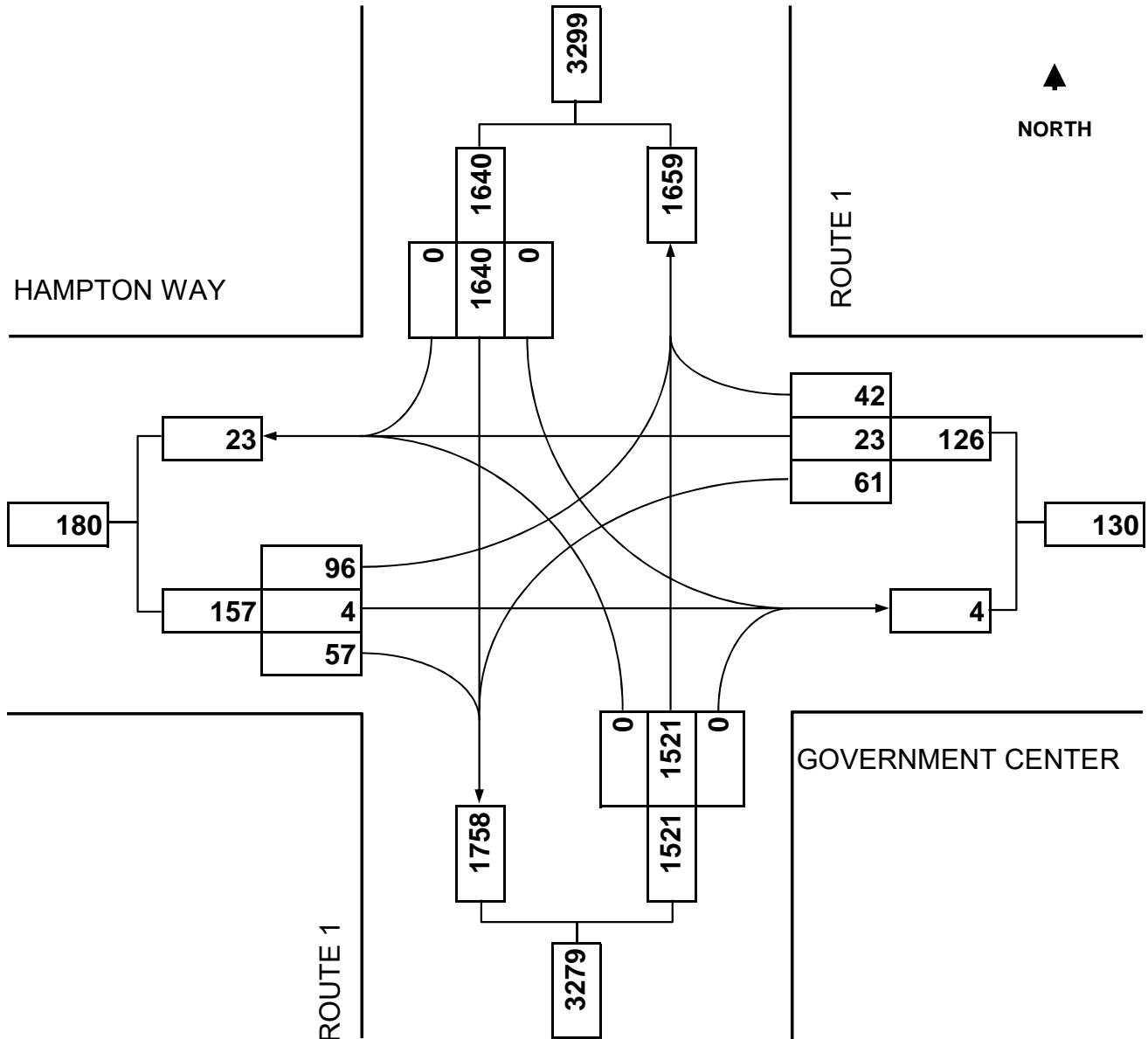


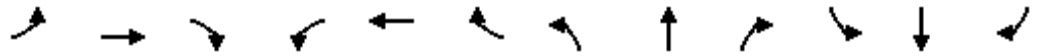
ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street: Route 1
City/Town: South Kingstown, RI
Reference No.: 5558
Existing: n/a

Minor Street: Hampton Way/Gov't Center
Day of Week: Weekday
Peak Period: PM Peak
Future: 2020 No Build



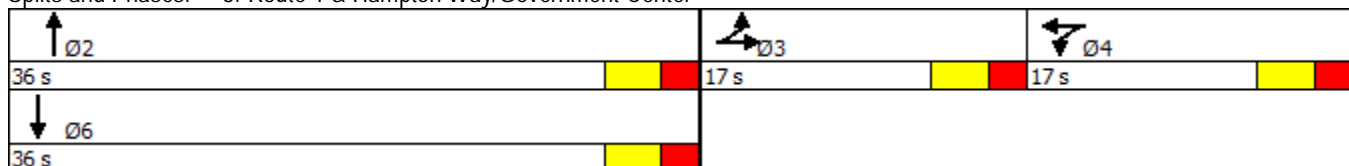


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	4	57	61	23	42	0	1521	0	0	1640	0
Future Volume (vph)	96	4	57	61	23	42	0	1521	0	0	1640	0
Satd. Flow (prot)	1805	1634	0	0	1771	0	0	3539	0	0	3539	0
Flt Permitted	0.950				0.976							
Satd. Flow (perm)	1805	1634	0	0	1771	0	0	3539	0	0	3539	0
Satd. Flow (RTOR)		59			31							
Lane Group Flow (vph)	99	63	0	0	130	0	0	1568	0	0	1691	0
Turn Type	Split	NA		Split	NA			NA			NA	
Protected Phases	3	3		4	4			2			6	
Permitted Phases												
Total Split (s)	17.0	17.0		17.0	17.0			36.0			36.0	
Total Lost Time (s)	4.0	4.0			4.0			4.0			4.0	
Act Effct Green (s)	9.9	9.9			9.9			35.3			35.3	
Actuated g/C Ratio	0.17	0.17			0.17			0.59			0.59	
v/c Ratio	0.33	0.20			0.41			0.75			0.81	
Control Delay	27.9	10.0			23.9			17.9			20.3	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	27.9	10.0			23.9			17.9			20.3	
LOS	C	B			C			B			C	
Approach Delay		21.0			23.9			17.9			20.3	
Approach LOS		C			C			B			C	
Queue Length 50th (ft)	35	1			35			265			305	
Queue Length 95th (ft)	77	31			84			#494			#554	
Internal Link Dist (ft)		388			723			755			685	
Turn Bay Length (ft)												
Base Capacity (vph)	418	424			434			2098			2098	
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	0.24	0.15			0.30			0.75			0.81	

Intersection Summary

Cycle Length: 70
 Actuated Cycle Length: 59.5
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 19.4
 Intersection LOS: B
 Intersection Capacity Utilization 65.8%
 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: 3: Route 1 & Hampton Way/Government Center



Future Build AM/PM Peak Hour

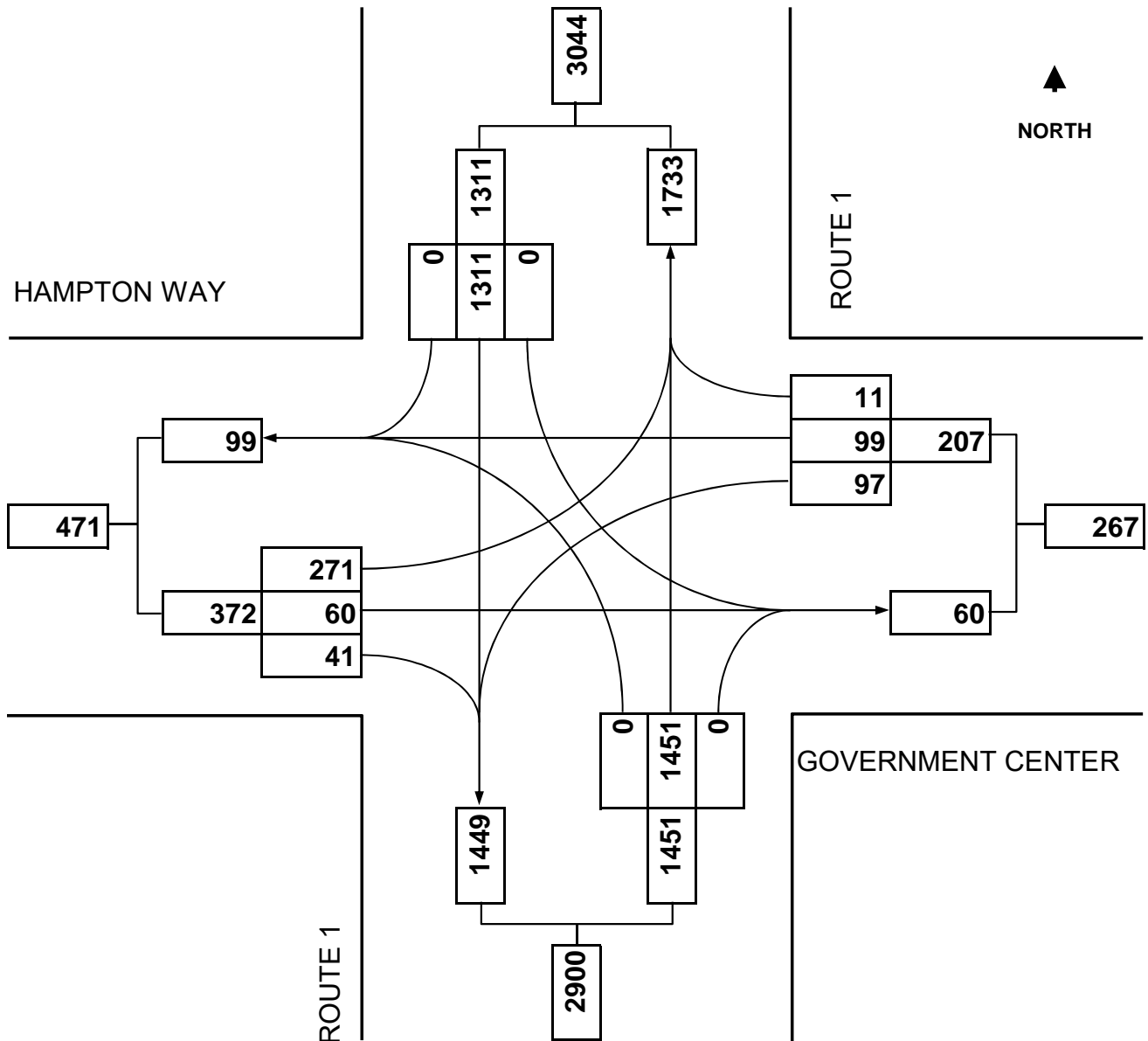


ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street: Route 1
City/Town: South Kingstown, RI
Reference No.: 5558
Existing: n/a

Minor Street: Hampton Way/Gov't Center
Day of Week: Weekday
Peak Period: AM Peak
Future: 2020 Full Build



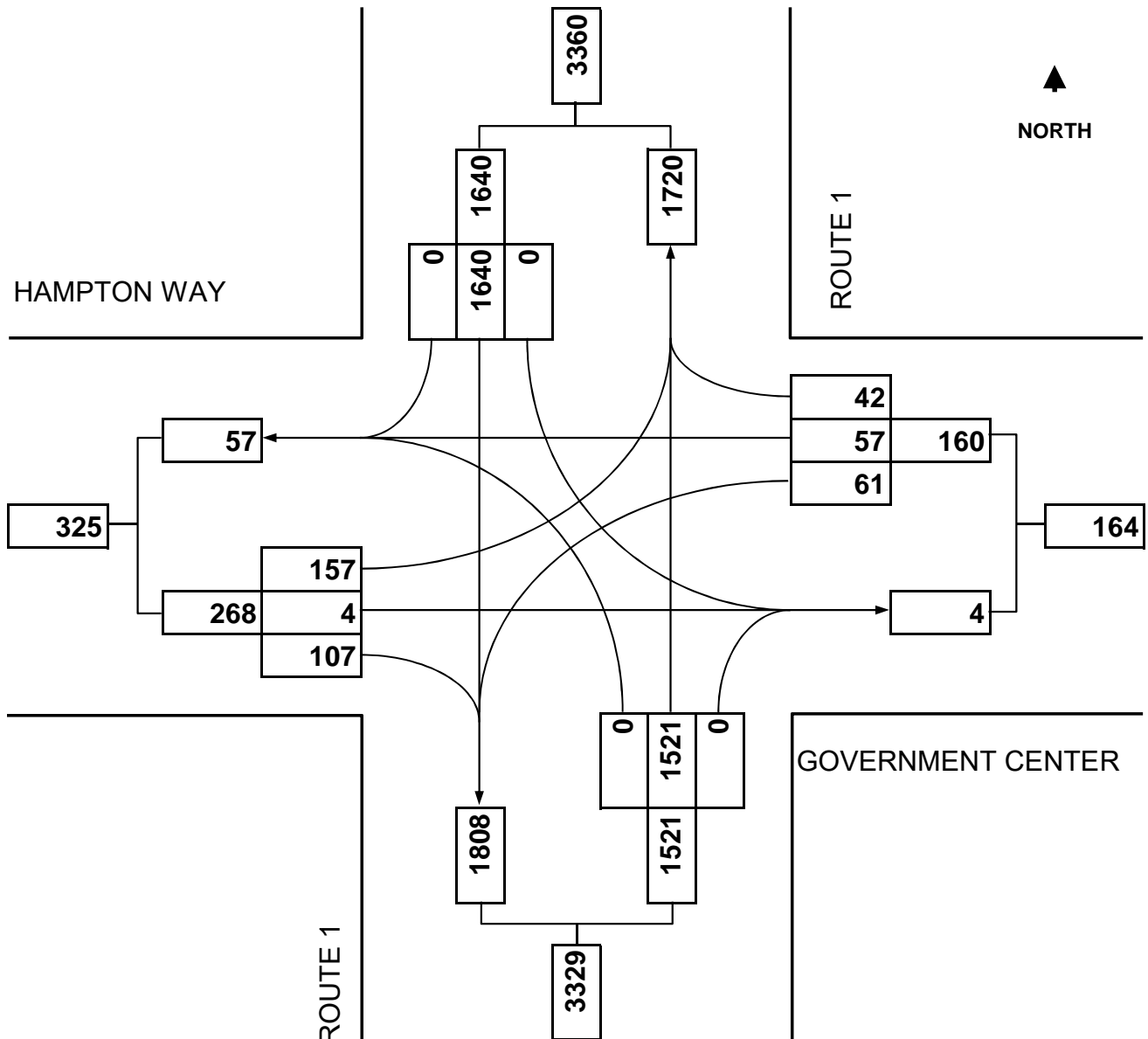


ENGINEERING SUCCESS TOGETHER

Turning Movement Diagram

Major Street: Route 1
City/Town: South Kingstown, RI
Reference No.: 5558
Existing: n/a

Minor Street: Hampton Way/Gov't Center
Day of Week: Weekday
Peak Period: PM Peak
Future: 2020 Full Build





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	157	4	107	61	57	42	0	1521	0	0	1640	0
Satd. Flow (prot)	1805	1624	0	0	1799	0	0	3539	0	0	3539	0
Flt Permitted	0.950				0.981							
Satd. Flow (perm)	1805	1624	0	0	1799	0	0	3539	0	0	3539	0
Satd. Flow (RTOR)		110			20							
Lane Group Flow (vph)	162	114	0	0	165	0	0	1568	0	0	1691	0
Turn Type	Split	NA		Split	NA			NA			NA	
Protected Phases	3	3		4	4			2			6	
Permitted Phases												
Total Split (s)	18.0	18.0		16.0	16.0			41.0			41.0	
Total Lost Time (s)	4.0	4.0			4.0			4.0			4.0	
Act Effct Green (s)	11.8	11.8			10.6			36.6			36.6	
Actuated g/C Ratio	0.17	0.17			0.15			0.51			0.51	
v/c Ratio	0.54	0.32			0.58			0.86			0.93	
Control Delay	34.8	9.1			33.9			22.4			28.2	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	34.8	9.1			33.9			22.4			28.2	
LOS	C	A			C			C			C	
Approach Delay		24.2			33.9			22.4			28.2	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	68	2			61			317			364	
Queue Length 95th (ft)	125	42			121			#490			#556	
Internal Link Dist (ft)		388			723			755			685	
Turn Bay Length (ft)												
Base Capacity (vph)	357	409			321			1851			1851	
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	0.45	0.28			0.51			0.85			0.91	

Intersection Summary

Cycle Length: 75
 Actuated Cycle Length: 71.1
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 25.7
 Intersection LOS: C
 Intersection Capacity Utilization 67.6%
 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: 3: Route 1 & Hampton Way/Government Center

