



90 Canal Street, Suite 301  
Boston, MA 02114  
617.248.0300

[www.bryant-engrs.com](http://www.bryant-engrs.com)

Improving lives through infrastructure

June 6, 2024  
BAI#223042

Mr. Daniel Glazer, AIA, LEED AP  
Project Architect  
Drummey Rosane Anderson, Inc.  
Howard Clock Building  
260 Charles Street, Studio 300  
Waltham, MA 02453

REFERENCE: Site Plan Review Comments – Traffic Impact Analysis  
Tri-County Regional Vocational Technical School  
147 Pond Street  
Franklin, Massachusetts

Dear Mr. Glazer,

As requested, Bryant Associates, Inc. (Bryant) is providing this response to the Franklin Planning Board's request for a Traffic Impact Analysis for the Tri-County Regional Vocational Technical School (Tri-County) project, which is located at 147 Pond Street in Franklin.

Bryant has reviewed the traffic information available for the intersection of Route 140 and Old West Central Street, which includes a traffic impact and access study prepared in 2014 by Ron Muller & Associates for a nearby retail development, see attached. The study recommended that the traffic signal timings be adjusted to optimize the traffic operations and indicated that the levels of service at the intersection would be acceptable with the signal timing changes. The intersection of Route 140 and Old West Central Street is under the jurisdiction of the Massachusetts Department of Transportation (MassDOT). They recently, within the last few years, have made adjustments to the signal timings to improve operations. It is recommended that the Town request MassDOT to review the operations again to see if any additional adjustments could be made. It is noted that a review of historic traffic volumes for Route 140 indicates that the most recently available traffic volumes from 2023 are similar to the traffic volumes from 2014, when the Muller study was completed. In addition, the analysis in the previous study also included a conservative growth rate in traffic, as well as traffic from other nearby planned developments, so it is likely that the volumes used in the analysis are higher than current traffic volumes. Due to this, it is likely that any analysis prepared for the new school would produce similar results, especially since there will not be any change to the number of students attending the school and no anticipated change in traffic volumes from the school, thus there would be no impact to existing traffic operations from the new school. In addition, the analysis in the previous traffic report was for the PM peak hour, which occurred between 5 and 6 PM. The traffic volumes on Route 140 during the PM dismissal of the school, which occurs around 2 PM are lower

Mr. Daniel Glazer, AIA, LEED AP  
June 6, 2024  
Page 2 of 2

than the PM peak period, thus the analysis is likely to be conservative for that time period. It should also be noted that the impacts to the traffic operations from the school traffic only occur for a short duration during the morning arrival and afternoon dismissal.

As a point of reference, a MassDOT access permit or the submission of an associated traffic impact analysis for the school would not be required if the school was located on a state highway, which to clarify it is not, since the new school does not result in a substantial increase in or impact on traffic over the current use.

We are prepared to review this analysis with you at your convenience. If you have any questions or comments, please do not hesitate to contact me at 401.834.1063 or tbrayton@bryant-engrs.com.

Very truly yours  
BRYANT ASSOCIATES, INC.



Todd E. Brayton, P.E.  
Transportation Director

TEB:  
Enclosure – Ron Muller & Associates Traffic Impact and Access Study – Proposed Retail Building,  
Dated February 12, 2014





***Ron Müller & Associates***  
*Traffic Engineering and Consulting Services*

56 Teresa Road  
Hopkinton, MA 01748  
Tel.: (508) 395-1576  
Fax: (508) 435-2481  
[www.RonMullerAssociates.com](http://www.RonMullerAssociates.com)

## Traffic Impact and Access Study

**Proposed Retail Building  
Franklin, Massachusetts**

**Prepared for:**

**Lisciotti Development Corp.  
83 Orchard Hill Park Drive  
Leominster, MA 01453**

**February 12, 2014**

**Quality**



**Accuracy**



**Integrity**





---

## Traffic Impact and Access Study

To: Mr. Gregg Lisciotti, President  
Lisciotti Development Corporation  
83 Orchard Hill Park Drive  
Leominster, MA 01453

Reg: Proposed Restaurant/Retail/Office  
648 Old West Central Street  
Franklin, Massachusetts

From: Ron Müller, P.E., Principal

Date: February 12, 2014  
Project #: 13068

---

### INTRODUCTION

*Ron Müller & Associates* (RMA) has conducted this Traffic Assessment for the redevelopment of a site located near the corner of West Central Street (Route 140) and Old West Central Street in Franklin, Massachusetts. As proposed, the existing residential building on the site will be razed and a new 8,800 square foot building will be constructed to contain a variety of stores including a 1,900 square foot Starbucks coffee/donut shop with drive-through window, a 3,000 square foot Doctors Express clinic, a 2,500 square foot sit-down restaurant, and approximately 1,400 square feet of retail space. Access to the site is currently provided via two curb cuts on Old West Central Street. With the redevelopment of the site as proposed, these residential curb cuts will be closed, a new full-access/egress driveway will be provided on Old West Central Street at the site's eastern property line, and a new right-in/right-out only driveway will be provided on Route 140 near the site's western property line. The site location is shown on Figure 1.

This report has been prepared to assess the safety of the proposed site driveways, estimate the increase in traffic as a result of site redevelopment, evaluate the impacts of this traffic on the adjacent streets, provide recommendations on the design and location of the proposed driveways, and assess the adequacy of drive-through queuing for the proposed Starbucks. As this report shows, the development is expected to draw the majority of its business from the traffic already traveling on the adjacent streets and will result in minimal traffic increases ranging from 0.8 to 1.4 percent. The proposed drive-through lane for the Starbucks is expected to accommodate the anticipated queues without affecting on-site circulation or access. All study intersections operate at acceptable levels for peak hour conditions and the addition of site traffic is not expected to have a significant effect on traffic operations.

Ample sight distance will exist at the proposed driveway locations to allow safe operation with the re-grading of land along the Old West Central Street site frontage. It is recommended that sight lines at the new driveways be kept clear of any obstructions such as landscaping or signs. It is also recommended that the Route 140 driveway be constructed to meet state standards including a 24-foot wide driveway with 30-foot corner radii.

**Figure 1**  
**Site Location Map**



## **EXISTING CONDITIONS**

### **Study Area**

Evaluation of the traffic impacts associated with the proposed site redevelopment requires an evaluation of existing and projected traffic volumes, the volume of traffic expected to be generated by the project, and the impact that this traffic will have on the adjacent streets and nearby intersections. In preparing this study, the following intersections were analyzed and evaluated:

- Route 140 at Old West Central Street and Franklin Village Driveway (signalized)
- Route 140 at the proposed site driveway
- Old West Central Street at the proposed site driveway

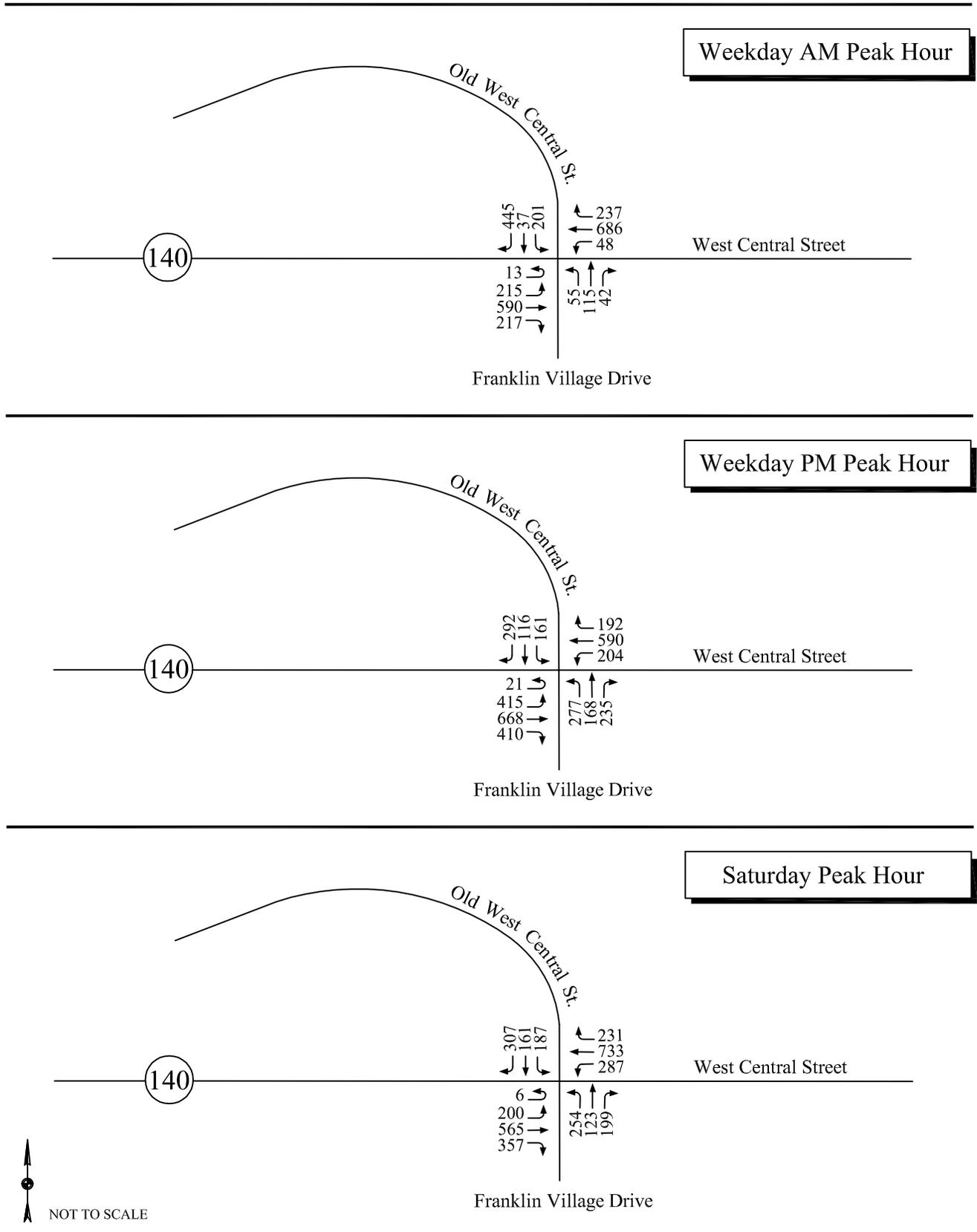
Due to the uses proposed, the development is expected to have a negligible effect on traffic operations beyond this study area.

### **Traffic Volumes**

Base traffic conditions within the study area were developed by conducting automatic traffic recorder (ATR) counts on Route 140 and on Old West Central Street adjacent to the site to collect weekday and Saturday daily traffic volume data and by conducting manual turning movement and vehicle classification counts (TMCs) at the study area intersection. All count data were conducted in November 2013 and are provided in the Appendix. The TMCs were performed during the weekday AM peak period (7:00 to 9:00 AM), the weekday PM peak period (4:00 to 6:00 PM), and the Saturday midday peak period (11:00 AM to 2:00 PM) to collect peak hour data during times when both the adjacent street volumes are highest and the development generates the greatest volume of traffic. The count data indicate that the weekday AM peak hours occurs from 7:00 to 8:00 AM, the weekday PM peak hour occurs from 5:00 to 6:00 PM, and the Saturday midday peak hour occurs from 12:00 AM to 1:00 PM.

To determine if the count data needed to be adjusted to represent annual average month conditions consistent with state guidelines for traffic impact assessment, historical traffic volume data were obtained from MassDOT. The closest permanent count station to the project site is located on I-495 in Bellingham at the Franklin town line (Station No. 6125). Based on this information, traffic during the month of November is approximately 2 percent below annual average-month conditions. Accordingly, the collected data were increased by 2 percent to represent an annual average condition. The MassDOT seasonal adjustment data are provided in the Appendix and the daily and peak hour traffic flows are summarized in Table 1. The 2013 Existing peak hour traffic flow networks are shown on Figure 2.

Figure 2  
 2013 Existing  
 Peak Hour Traffic Volumes



**Table 1**  
**Existing Traffic Volume Summary**

Location/Time Period	Daily Volume <sup>a</sup>	Peak Hour Volume <sup>b</sup>	K-Factor <sup>c</sup>	Directional Distribution <sup>d</sup>
<b>Route 140 west of Old West Central Street:</b>				
Weekday	30,300			
AM Peak Hour		2,234	7.4%	54% WB
PM Peak Hour		2,694	8.9%	56% EB
Saturday	27,380	2,428	8.9%	54% WB
<b>Old West Central St. east of Rolling Ridge Rd.:</b>				
Weekday	12,420			
AM Peak Hour		811	6.5%	66% EB
PM Peak Hour		1,131	9.1%	56% WB
Saturday	11,160	971	8.7%	53% EB

<sup>a</sup>In vehicles per day.

<sup>b</sup>In vehicles per hour.

<sup>c</sup>Percentage of daily traffic occurring during the peak hour.

<sup>d</sup>EB = eastbound, WB = westbound.

## **Accidents**

Accident data for the study intersection were obtained from MassDOT for the period between 2009 and 2011, the latest three years of available data. A summary of the MassDOT accident data is provided in Table 2. In addition to the summary, accident occurrence should also be compared to the volume of traffic through a particular intersection to determine any significance. Accordingly, an accident rate was calculated for the intersection and compared with the statewide and district-wide (District 3) averages. An intersection accident rate is a measure of the frequency of accidents compared to the volume of traffic through an intersection and is presented in accidents per million entering vehicles (acc/mev). For signalized intersections, the statewide average accident rate is 0.80 acc/mev and the district-wide accident rate is 0.89 acc/mev. A comparison of the calculated accident rate to the statewide and district-wide averages can be used to establish the significance of accident occurrence and whether or not potential safety problems exist. The crash rate worksheet is provided in the Appendix.

**Table 2**  
**Accident Summary**

Location	Number of Accidents			Severity <sup>a</sup>			Accident Type <sup>b</sup>						% During Wet/Icy Conditions
	Total	Avg./Year	Accident Rate <sup>c</sup>	PD	PI	F	CM	RE	HO	FO	Ped	Other	
Rt. 140 at Old West Central St.	34	11.3	0.75	24	10	0	14	17	0	1	1	1	21%

Source: MassDOT Traffic Operations Safety Management System – 2009 through 2011 data.

<sup>a</sup> PD = property damage only; PI = personal injury; F = fatality.

<sup>b</sup> CM = cross movement/angle; RE = rear end; HO = head on; FO = fixed object; Ped = pedestrian.

<sup>c</sup> Measured in accidents per million entering vehicles.

As shown in Table 2, the intersection of Route 140 at Old West Central Street and the Franklin Plaza driveway experienced, on average, just over 11 accidents per year over the three-year analysis period. The accident rate for the intersection is 0.75 acc/mev, which is below both the statewide and district-wide averages. The majority of the accidents (71% percent) involved property damage only and most of the accidents were split between angle-type and rear-end type collisions.

**Vehicle Speeds**

Speed measurements were conducted along Route 140 and Old West Central Street adjacent to the site by measuring the elapsed time for vehicles traveling a short, pre-measured distance between two checkpoints. The travel time was recorded using automatic traffic recorders and the speed is derived by dividing the elapsed time into the measured distance between checkpoints. The results of the speed measurements are summarized in Table 3.

As shown, average and 85<sup>th</sup> percentile speeds on Route 40 were recorded to be below the posted speed limit of 40 miles per hour (mph) in both the eastbound and westbound directions. This is likely due to the influence of the nearby traffic signals at Old West Central Street and the I-495 northbound ramps. Along Old West Central Street, average travel speeds range from 29 to 30 mph and the 85<sup>th</sup> percentile speeds were recorded between 33 to 34 mph, higher than the posted speed limit of 25 mph. These speeds were accordingly used in the calculation of minimum sight distance requirements, as described below.

**Table 3**  
**Observed Travel Speeds <sup>a</sup>**

<u>Location/Direction</u>	<u>Posted Speed Limit</u>	<u>Average Speed</u>	<u>85<sup>th</sup> Percentile Speed <sup>b</sup></u>
<b>Route 140</b>			
<b>Adjacent to the Site:</b>			
Eastbound	40	28	34
Westbound	40	32	37
<b>Old West Central St.</b>			
<b>Adjacent to the Site:</b>			
Eastbound	25	30	34
Westbound	25	29	33

<sup>a</sup> In miles per hour (mph).

<sup>b</sup> Speed at, or below which 85 percent of all observed vehicles travel.

### **Sight Distance**

To identify potential safety concerns associated with site access and egress, sight distances have been evaluated at the proposed site driveway intersections with Route 140 and with Old West Central Street to determine if the available sight distances for vehicles exiting the site meet or exceed the minimum distances required for approaching vehicles to safely stop. The available sight distances were compared with minimum requirements, as established by the American Association of State Highway and Transportation Officials (AASHTO).<sup>1</sup> AASHTO is the national standard by which vehicle sight distance is calculated, measured, and reported. The MassDOT and the Executive Office of Energy and Environmental Affairs (EEA) require the use of AASHTO sight distance standards when preparing traffic impact assessments and studies, as stated in their guidelines for traffic impact assessments.

Sight distance is the length of roadway ahead that is visible to the driver. Stopping Sight Distance (SSD) is the minimum distance required for a vehicle traveling at a certain speed to safely stop before reaching a stationary object in its path. The values are based on a driver perception and reaction time of 2.5 seconds and a braking distance calculated for wet, level pavements. When the roadway is either on an upgrade or downgrade, grade correction factors are applied. Stopping sight distance is measured from an eye height of 3.5 feet to an object height of 2 feet above street level, equivalent to the taillight height of a passenger car. The SSD is measured along the centerline of the traveled way of the major road.

<sup>1</sup>A *Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2004.

Intersection sight distance (ISD) is provided on minor street approaches to allow the drivers of stopped vehicles a sufficient view of the major roadway to decide when to enter the major roadway. By definition, ISD is the minimum distance required for a motorist exiting a minor street to turn onto the major street, without being overtaken by an approaching vehicle reducing its speed from the design speed to 70 percent of the design speed. ISD is measured from an eye height of 3.5 feet to an object height of 3.5 feet above street level. The use of an object height equal to the driver eye height makes intersection sight distances reciprocal (i.e., if one driver can see another vehicle, then the driver of that vehicle can also see the first vehicle). When the minor street is on an upgrade that exceeds 3 percent, grade correction factors are applied.

SSD is generally more important as it represents the minimum distance required for safe stopping while ISD is based only upon acceptable speed reductions to the approaching traffic stream. However, the ISD must be equal to or greater than the minimum required SSD in order to provide safe operations at the intersection. In accordance with the AASHTO manual, *“If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.”* Accordingly, ISD should be at least equal to the distance required to allow a driver approaching the minor road to safely stop.

The available intersection sight distances at the proposed driveway locations were measured and compared to minimum requirements as established by AASHTO based on the observed speeds and are shown in Table 4. Since the observed speeds on Route 140 were lower than the speed limit, the posted speed was used for the minimum sight distance requirements on Route 140.

**Table 4**  
**Sight Distance Summary**

Location/Direction	Sight Distance (feet)		
	Measured	Minimum Required (SSD) <sup>a</sup>	Desirable (ISD) <sup>b</sup>
<b>Route 140 at Proposed Site Driveway:</b>			
East of intersection	500+	305	445
<b>Old West Central St. at Proposed Site Driveway:</b>			
East of intersection	310	230	280
West of intersection	150	240	280

<sup>a</sup> Values based on AASHTO SSD requirements for posted speed of 40 mph on Route 140 and observed 85<sup>th</sup> percentile travel speeds of 34 mph eastbound on Old West Central St., and 33 mph westbound on Old West Central St.

<sup>b</sup> Values based on AASHTO ISD requirements for posted speed limit of 40 mph on Route 140 and 25 mph on Old West Central Street.

As shown in the table, ample sight distance exists at the Route 140 driveway location to allow safe operation of this new driveway. At the Old West Central Street driveway, sight lines to the west of the proposed driveway location are currently restricted by the topography of the site, overgrown vegetation, and the horizontal curvature of Old West Central Street. It is recommended that the site be re-graded to meet the minimum sight distance requirements. Based on the site plan prepared by Bohler Engineering, this can be accomplished through the construction of a retaining wall at the site’s northwest corner. A plan and profile of the available sight line after redevelopment of the site is provided in the Appendix. As shown on this plan, the minimum sight distance requirement of 240 feet based on the observed vehicle speeds can be achieved. It is further recommended that any proposed landscaping or signs in the vicinity of the site driveways be kept low (maximum 2 feet in height from street level), or set back sufficiently so as not to impede the available sight distances.

**FUTURE CONDITIONS**

**Traffic Growth**

Future traffic conditions were projected to the year 2020, representing a 7-year design horizon consistent with EEA and MassDOT requirements for traffic impact analysis. To project traffic conditions within this design horizon, two components of traffic growth were included. First, an

annual average traffic growth rate was determined to account for general population growth and smaller development projects (i.e. residential subdivisions) that may impact traffic in the site vicinity. Based on historical traffic volume information from the MassDOT permanent count station on I-495 in Bellingham (Station #6125) at the Franklin town line, traffic volumes have decreased an average of 1.2 percent per year between 2005 and 2009 (the latest years of available data). However, to provide a conservative analytical framework, a traffic growth rate of 1.0 percent per year was used in this study. The MassDOT historical traffic data are provided in the Appendix.

Second, any planned or approved specific developments in the area that would generate a significant volume of traffic on study area roadways within the next seven years were included. Based on discussions with local officials, there are three approved development projects in the area.

The first is the Wendy's restaurant site at 505 West Central Street which was approved in 2011 along with two other buildings on the site to be used as either office or retail space. Although the Wendy's restaurant has been constructed, the approved 2,600 square foot and 6,000 square foot retail/office buildings have not been constructed. Accordingly, the 9<sup>th</sup> Edition of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*<sup>2</sup> was used to estimate the volume of traffic expected to be generated by these buildings using Land Use Code 826 (Specialty Retail) for the 2,600 square foot building and Land Use Code 710 (General Office Building) for the 6,000 square foot building. The traffic was distributed on the study roadways as described in the traffic study prepared by Conley Associates for the project and is provided in the Appendix.

The second project is the Taco Bell site at 420 West Central Street which was approved in 2012 along with two other buildings (3,000 square feet each) on the site to be used as retail space. Although the Taco Bell restaurant has since been constructed, the retail buildings have not. The trip generation and distribution estimates presented in the traffic study prepared by Vanasse & Associates, Inc. for the project were accordingly used, as shown in the Appendix.

The third project is a Stop & Shop gas station which was approved in 2013 on Route 140 west of I-495. Based on the location of the site and it being a high pass-by traffic type use, the traffic expected to be generated by this project through the study area is assumed to be included in the annual background growth rate.

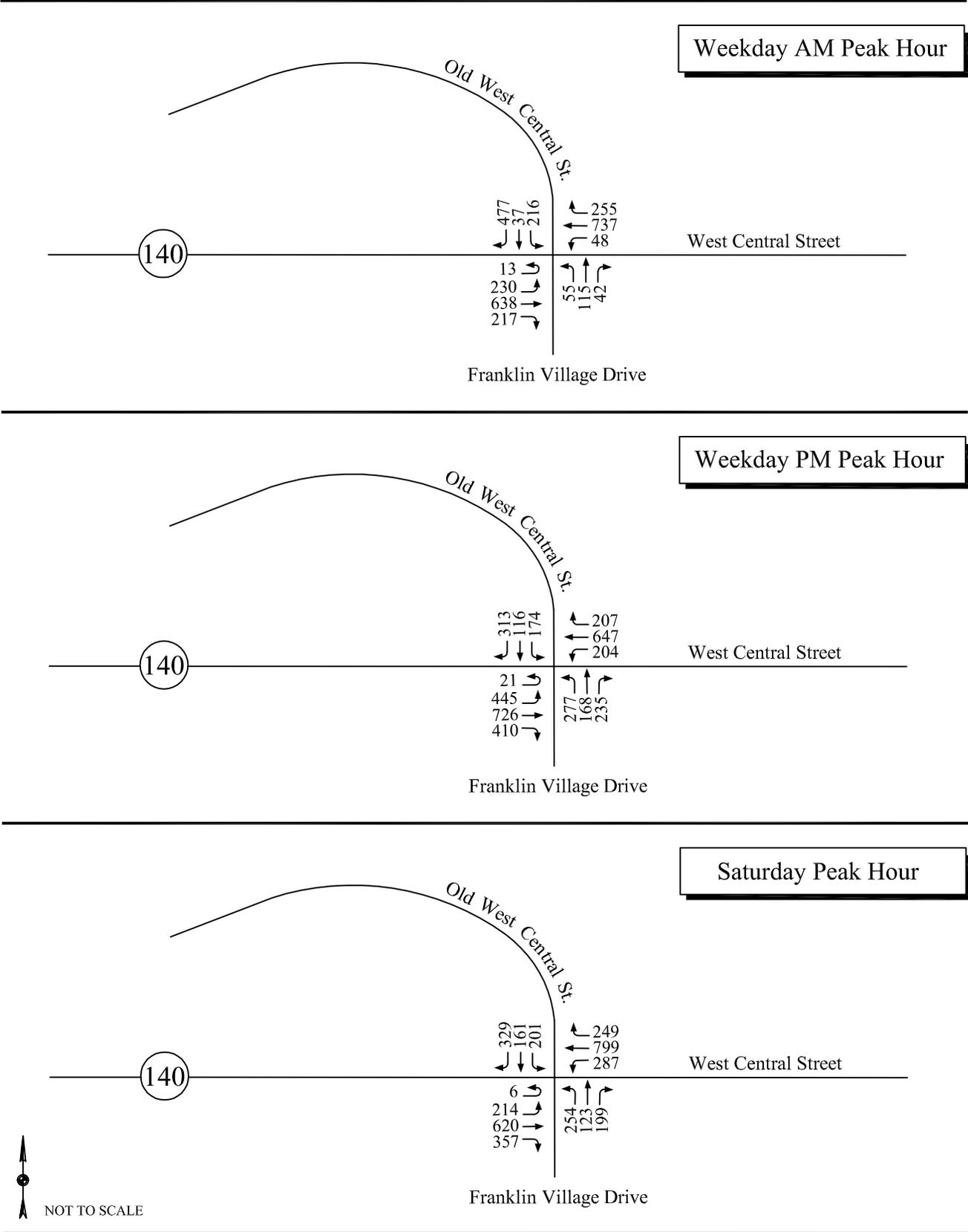
### **No-Build Conditions**

The 2020 No-Build networks were accordingly developed by applying a compounded 1.0 percent annual growth rate (7.2 percent over seven years) to the existing adjacent street volumes and by assuming completion of the above area development projects. The 2020 No-Build peak-hour traffic-flow networks are shown on Figure 3.

---

<sup>2</sup> *Trip Generation Manual, 9<sup>th</sup> Edition*; Institute of Transportation Engineers; Washington, DC; 2012.

Figure 3  
 2020 No-Build  
 Peak Hour Traffic Volumes



## **Trip Generation**

The traffic to be generated by the proposed uses was estimated using the ITE *Trip Generation Manual*. As proposed, an approximately 8,800 square foot building will be constructed of which 1,900 square feet will be occupied by a Starbucks coffee/donut shop with drive-through window. ITE Land Use Code 937 (Coffee/Donut Shop with Drive-Through Window) was used to estimate traffic generation for this use. Approximately 3,000 square feet of the building will be occupied by a Doctors Express medical office for which ITE Land Use Code 720 (Medical-Dental Office) was used to estimate the traffic generation. Approximately 2,500 square feet will be occupied by a sit-down restaurant for which ITE Land Use Code 932 (High Turnover, Sit-Down Restaurant) was used. The remainder of the space will be occupied by a retail business, expected to be a hair salon. ITE Land Use Code 826 (Specialty Retail) was applied to this remaining 1,400 square feet of space. The site is currently occupied by a residence. However, no trip generation credit was assumed for this existing use. The anticipated traffic generation as a result of site redevelopment is shown in Table 5. All trip generation calculations are provided in the Appendix.

**Table 5**  
**Trip Generation Summary**

Time Period	Retail <sup>a</sup>	Coffee/Donut Shop <sup>b</sup>	Medical Office <sup>c</sup>	Restaurant <sup>c</sup>	Total Trips	Pass-By <sup>d</sup>	New Trips
Weekday Daily	100	1,560	110	320	2,090	1,560	530
Weekday AM Peak Hour							
Enter	4	97	6	15	122	94	28
Exit	<u>2</u>	<u>94</u>	<u>1</u>	<u>12</u>	<u>109</u>	<u>90</u>	<u>19</u>
Total	6	191	7	27	231	184	47
Weekday PM Peak Hour							
Enter	11	41	3	15	70	47	23
Exit	<u>14</u>	<u>41</u>	<u>9</u>	<u>10</u>	<u>74</u>	<u>46</u>	<u>28</u>
Total	25	82	12	25	144	93	51
Saturday Daily	60	1,320	30	400	1,810	1,360	450
Saturday Peak Hour							
Enter	17	82	6	19	124	86	38
Exit	<u>15</u>	<u>82</u>	<u>5</u>	<u>16</u>	<u>118</u>	<u>84</u>	<u>34</u>
Total	32	164	11	35	242	170	72

<sup>a</sup> ITE Land Use Code 826 (Specialty Retail) for 1,400 square feet.

<sup>b</sup> ITE Land Use Code 937 (Coffee/Donut Shop with Drive-Through Window) for 1,900 square feet.

<sup>c</sup> ITE Land Use Code 720 (Medical Office) for 3,000 square feet.

<sup>d</sup> ITE Land Use Code 932 (High Turnover, Sit-Down Restaurant) for 2,500 square feet.

<sup>e</sup> ITE *Trip Generation Manual*, 9<sup>th</sup> Edition. Retail pass-by rate is 34% weekday and 26% Saturday. Coffee/Donut shop pass-by rate is 89%. Restaurant pass-by rate is 43%. No pass-by credit was assumed for the medical office use.

Not all vehicle trips generated by the project, however, represent new trips. Studies have shown that retail developments and in particular donut shops generate a majority of their business from the traffic already present on the adjacent roadway. This traffic is referred to as pass-by trips. Based on data published in the ITE *Trip Generation Manual*, an average of 89 percent of the total traffic generated by coffee/donut shops is typically pass-by traffic. For general retail establishments, the ITE average pass-by rate is 34 percent for weekday conditions and 26 percent for Saturday conditions. For sit-down restaurants, the average pass-by trip percentage is 43 percent. No pass-by traffic was assumed for the medical office use. Therefore, while the total traffic generated by the project will be realized at the site driveways, the impact of that traffic on the adjacent streets is substantially less. Table 5 also summarizes the expected volume of pass-by trips and the resulting new trips to be added to the surrounding roadways.

As shown in Table 5, during the weekday peak hours, the redevelopment project is expected to add between 47 and 51 new peak hour vehicle trips to the adjacent streets with the remaining traffic generated by the project already present in the adjacent traffic stream. During the Saturday peak hour, 72 new vehicle trips will be added to the surrounding streets.

### **Trip Distribution**

The distribution of new traffic generated by the project is based on surrounding population densities, businesses, available access routes to the site, and distribution of traffic at other area retail uses such as the Franklin Village plaza. It is accordingly expected that approximately 45 percent of the new site traffic will be oriented to/from the west on Route 140, 35 percent to/from the east on Route 140, and 20 percent to/from Old West Central Street. Pass-by trips are expected to be drawn from the adjacent streets based on the directional distribution of traffic on these streets during the respective peak hours.

### **Build Conditions**

Based on the traffic generation and distribution estimates for this project, the traffic volumes generated by the proposed project were assigned to the roadway network as shown on Figure 4 and were added to the 2020 No-Build traffic volumes to develop the 2020 Build traffic volumes. The 2020 Build traffic volume networks are graphically depicted on Figure 5.

### **Traffic Increases**

Based on the above traffic generation and distribution patterns, peak hour traffic increases ranging from 21 to 32 vehicles are expected on Route 140 west of the site. These increases average approximately one additional vehicle on Route 140 every two to three minutes during peak hours. Along Route 140 east of Old West Central Street, peak hour traffic increases ranging from 17 to 25 vehicles are expected averaging approximately one additional vehicle every two to four minutes. On Old West Central Street, peak hour traffic increases ranging from

Figure 4  
 Site Generated  
 Peak Hour Traffic Volumes

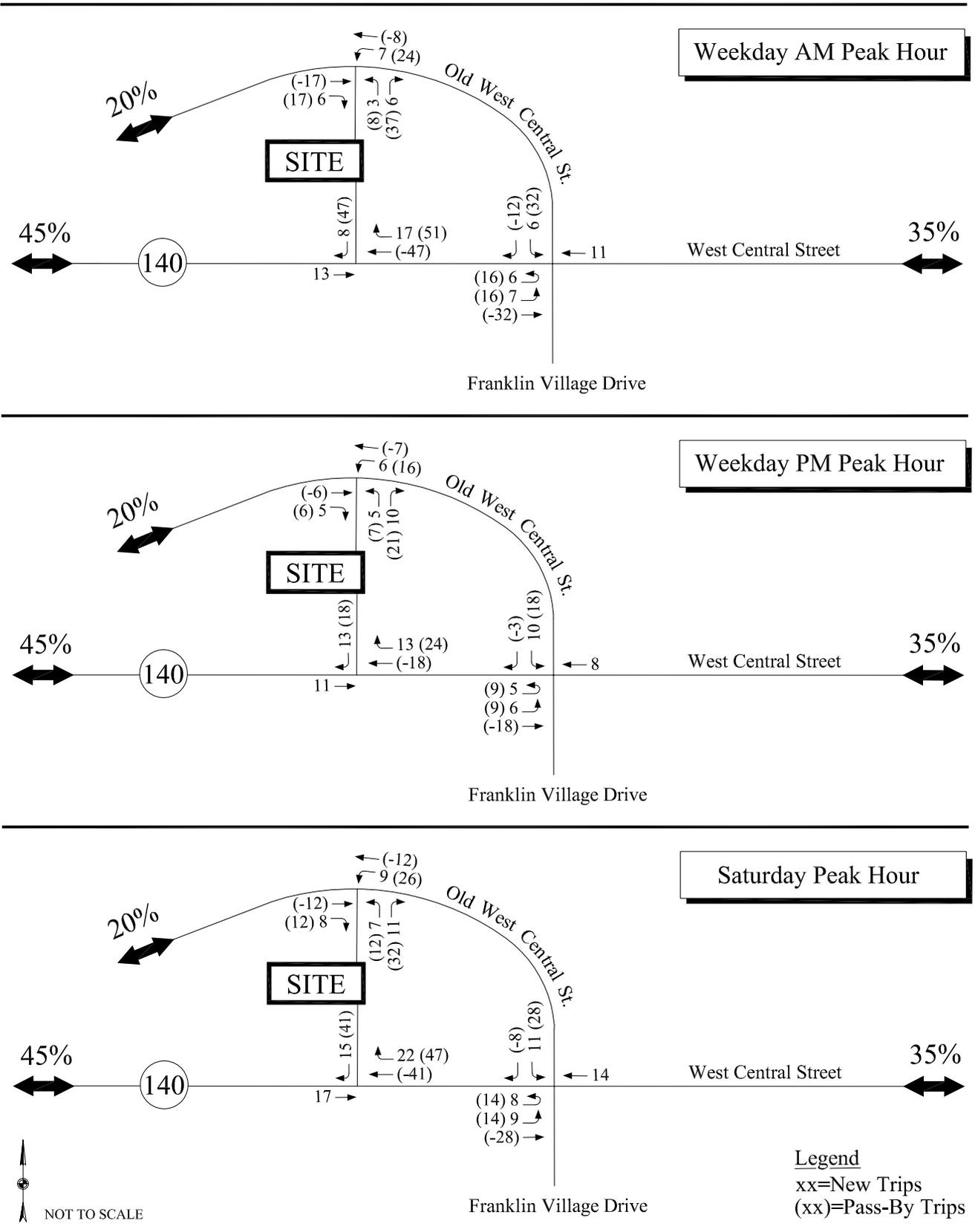
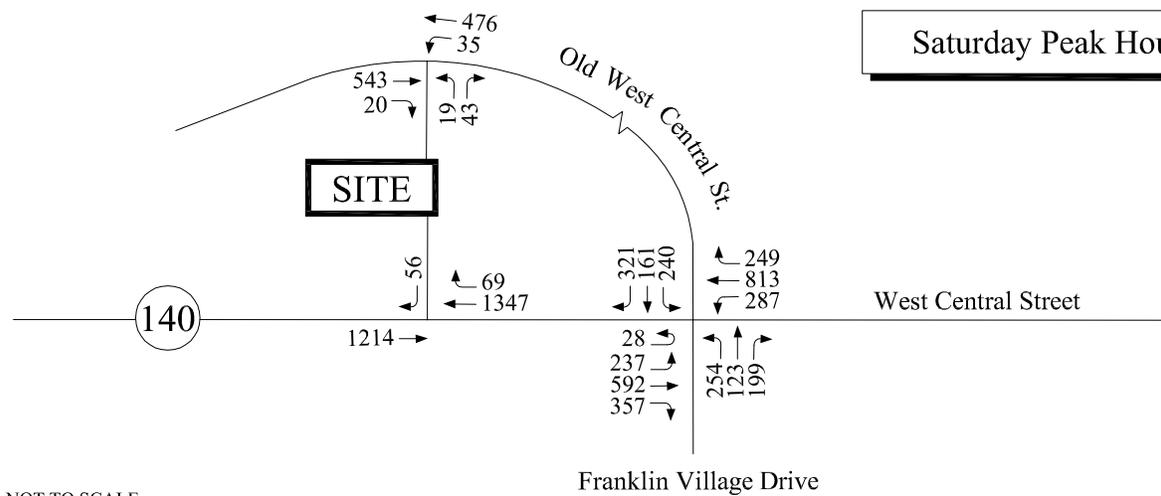
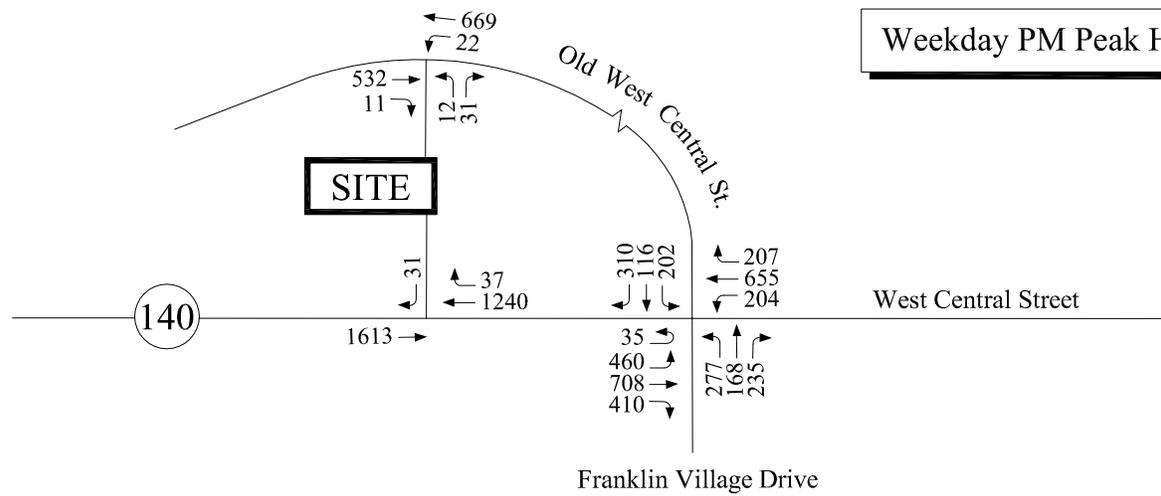
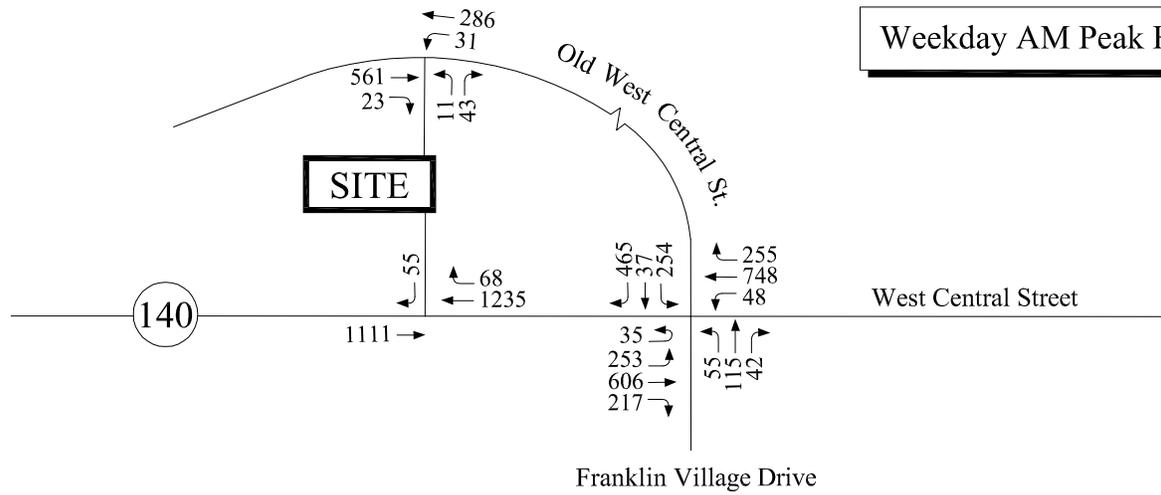


Figure 5  
 2020 Build  
 Peak Hour Traffic Volumes



↑  
 NOT TO SCALE

9 to 15 vehicles are expected averaging approximately one additional vehicle every four to seven minutes. These volume increases are minimal and represent an increase in traffic over the No-Build conditions of between 0.8 and 1.4 percent.

### **Site Access and On-Site Circulation**

The existing residential site provides two curb cuts along Old West Central Street. As part of the site redevelopment, these curb cuts will be closed and a new full access/egress driveway will be constructed on Old West Central Street at the site's eastern property line. This driveway is proposed to be 24 feet in width with 10-foot corner radii. This driveway design is adequate for access to a local street. A driveway will also be provided on Route 140 near the western site property line allowing only right-turns in and right-turns out on the westbound side of Route 140. The raised median on Route 140 will be maintained, thereby restricting left-turn movements into or out of the driveway. The driveway design includes 30-foot corner radii and a raised delta island to reinforce the right-turn-only movements allowed at this driveway.

Based on a published study<sup>3</sup> of drive-through queuing at a number of different land uses, the average maximum queue at coffee shops was found to be 11 vehicles and the 85<sup>th</sup> percentile maximum queue was 13 vehicles. The study was performed at six different coffee shops including four Starbucks and two Caribou coffee shops located in Minnesota and Kansas. In addition, a drive-through queue study<sup>4</sup> performed at 12 different Starbucks coffee shops in Kansas and presented at the 2009 ITE Annual Meeting concluded that a maximum of 13 vehicles were observed at any one coffee shop and recommended that new coffee shops be designed to accommodate 11 vehicles in queue.

To determine drive-through characteristics at a more local Starbucks coffee shop, drive-through queue observations were performed at the existing Starbucks located at the corner of Route 1 and Route 27 in Walpole, Massachusetts during the weekday AM peak period (7:00 to 9:00 AM). This study observed an average vehicle queue in the drive-through lane of 6 vehicles with a maximum observed queue of 10 vehicles. A summary of this queue study is provided in the Appendix.

Based on the site plan prepared by Bohler Engineering, the Starbucks coffee shop will provide approximately 220 feet of drive-through storage allowing for a total of 11 cars to be queued in the lane without affecting on-site circulation, access, or parking. This drive-through storage lane is consistent with the recommendations of the ITE and is adequate to accommodate the observed vehicle queues at the local Starbucks shop as described above. It is recommended that the pick-up window of the proposed Starbucks be located near the southwest corner of the building to maximize queue storage.

---

<sup>3</sup> *Drive-Through Queue Generation*; Mike Spack, PE, PTOE; CountingCars.com; February 2012.

<sup>4</sup> *Drive-Through Stacking Information for Banks and Coffee Shops*; Mark Stuecheli, PTP; ITE Annual Meeting; August 12, 2009.

## CAPACITY ANALYSIS

Level-of-service (LOS) analyses were conducted at the study area intersections under existing and projected volume conditions to determine the effects that the site generated traffic will have on traffic operations. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual*<sup>5</sup> (HCM) and is described in the Appendix. The maximum back of queue during an average signal cycle and a 95<sup>th</sup> percentile signal cycle were calculated for each lane group during the peak periods studied. The back of queue is the length of a backup of vehicles from the stop line of a signalized intersection to the last car in the queue that is required to stop, regardless of the signal indication. The length of this queue depends on a number of factors including signal timing, vehicle arrival patterns, and the saturation flow rate. For unsignalized intersections, the 95<sup>th</sup> percentile queue represents the length of queue of the critical minor-street movement that is not expected to be exceeded 95 percent of the time during the analysis period (typically one hour). In this case, the queue length is a function of the capacity of the movement and the movement's degree of saturation. The level-of-service and queue results are presented in Table 6 and are discussed below. All analysis worksheets are provided in the Appendix.

As shown in the table, the signalized intersection of Route 140 at Old West Central Street and the Franklin Village Driveway currently operates at LOS C during the analyzed peak hours with all lane groups operating under capacity. Under both the future No-Build and Build conditions, the intersection is expected to continue to operate at LOS C with all lane groups continuing to operate under capacity. Overall intersection delay is increased by 4.3 seconds or less as a result of the site redevelopment during the peak hours.

It should be noted that the Route 140 eastbound left-turn movement experiences significant queuing during both AM and PM peak hours that exceeds the available storage capacity of that lane under existing volume conditions. This condition will be exacerbated with future growth in traffic. Based on a review of the signal operation, timing changes could be implemented that would reduce these queues. These changes include extending the maximum green time allowed for this movement and potentially taking this intersection out of coordination during the AM peak hour. The intersection is currently coordinated with the signals at the I-495 ramps only during the weekday morning hours. During all other times, this intersection operates free. Allowing the intersection to also operate independently during the weekday AM peak hour would allow for a reallocation of green time to minimize vehicle queuing. The results of these changes are shown in Table 7.

The proposed site driveways on Route 140 and on Old West Central Street are both expected to operate at LOS C or better during the analyzed peak hours. Based on the expected traffic impacts of the proposed site redevelopment as described in this report as well as the intersection analysis, the study area intersections including the site driveways are expected to operate at acceptable levels.

---

<sup>5</sup> *Highway Capacity Manual 2010*; Transportation Research Board; Washington, DC; 2010.

**Table 6**  
**Level-of-Service Analysis Summary**

Location/Peak Hour Movement	2013 Existing				2020 No-Build				2020 Build			
	v/c <sup>a</sup>	Del. <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup>	v/c	Del.	LOS	Queue	v/c	Del.	LOS	Queue
<b>Rte. 140 at Old West Central St. and Plaza Driveway</b>												
<i>Weekday AM Peak</i>												
EB U-Turn/Left	0.72	49.4	D	314	0.76	52.9	D	339	0.94	77.0	E	408
EB Thru	0.35	14.5	B	193	0.38	15.3	B	211	0.38	16.0	B	198
EB Right	0.25	3.2	A	44	0.26	3.2	A	44	0.26	3.3	A	44
WB Left	0.37	45.7	D	64	0.37	45.7	D	64	0.37	45.7	D	64
WB Thru	0.57	24.5	C	237	0.64	26.1	C	258	0.67	27.4	C	263
WB Right	0.35	4.0	A	48	0.38	4.0	A	49	0.38	4.1	A	49
NB Left	0.19	25.7	C	54	0.18	25.1	C	54	0.17	24.0	C	54
NB Thru	0.29	27.5	C	96	0.28	26.7	C	96	0.26	25.4	C	96
NB Right	0.03	0.0	A	0	0.03	0.0	A	0	0.03	0.0	A	0
SB Left	0.74	45.1	D	179	0.76	46.1	D	195	0.82	49.8	D	243
SB Thru	0.09	23.8	C	39	0.09	23.3	C	39	0.08	22.4	C	39
SB Right	0.78	18.7	B	187	0.83	23.4	C	230	0.83	27.1	C	264
<b>Overall</b>	--	<b>21.8</b>	<b>C</b>	--	--	<b>23.4</b>	<b>C</b>	--	--	<b>27.7</b>	<b>C</b>	--
<i>Weekday PM Peak</i>												
EB U-Turn/Left	0.88	50.8	D	442	0.93	59.0	E	485	0.99	71.4	E	523
EB Thru	0.52	21.9	C	211	0.54	22.1	C	232	0.52	21.9	C	226
EB Right	0.49	4.2	A	58	0.48	4.1	A	58	0.48	4.1	A	58
WB Left	0.74	51.0	D	213	0.77	53.7	D	213	0.77	53.9	D	213
WB Thru	0.69	32.4	C	217	0.73	33.7	C	240	0.73	33.9	C	243
WB Right	0.36	6.1	A	49	0.38	5.9	A	51	0.38	5.9	A	51
NB Left	0.83	49.9	D	280	0.85	52.8	D	280	0.85	52.9	D	280
NB Thru	0.34	26.5	C	134	0.35	27.1	C	134	0.35	27.2	C	134
NB Right	0.15	0.2	A	0	0.15	0.2	A	0	0.15	0.2	A	0
SB Left	0.54	33.3	C	145	0.60	36.2	D	156	0.70	41.3	D	184
SB Thru	0.24	25.2	C	96	0.24	25.6	C	96	0.24	25.7	C	96
SB Right	0.46	5.7	A	59	0.49	5.8	A	60	0.49	5.8	A	60
<b>Overall</b>	--	<b>26.0</b>	<b>C</b>	--	--	<b>27.8</b>	<b>C</b>	--	--	<b>29.9</b>	<b>C</b>	--
<i>Saturday Peak Hour</i>												
EB U-Turn/Left	0.63	39.2	D	185	0.69	42.8	D	197	0.78	48.9	D	269
EB Thru	0.58	25.6	C	189	0.61	26.1	C	209	0.55	25.0	C	199
EB Right	0.51	5.4	A	59	0.50	5.2	A	59	0.49	5.0	A	59
WB Left	0.79	47.6	D	313	0.80	49.8	D	313	0.82	52.4	D	313
WB Thru	0.70	27.4	C	258	0.73	28.3	C	286	0.74	29.4	C	293
WB Right	0.37	5.0	A	50	0.38	4.9	A	51	0.38	4.9	A	51
NB Left	0.76	41.2	D	244	0.77	43.0	D	245	0.79	45.2	D	247
NB Thru	0.24	23.0	C	97	0.24	23.5	C	97	0.24	24.1	C	97
NB Right	0.13	0.2	A	0	0.13	0.2	A	0	0.13	0.2	A	0
SB Left	0.54	29.9	C	157	0.58	31.9	C	169	0.70	37.9	D	206
SB Thru	0.31	23.8	C	125	0.31	24.4	C	125	0.32	25.0	C	125
SB Right	0.47	5.4	A	57	0.49	5.5	A	59	0.49	5.5	A	59
<b>Overall</b>	--	<b>23.2</b>	<b>C</b>	--	--	<b>24.1</b>	<b>C</b>	--	--	<b>25.7</b>	<b>C</b>	--

<sup>a</sup> Volume-to-capacity ratio; <sup>b</sup> Average control delay (sec./vehicle); <sup>c</sup> Level of service; <sup>d</sup> 95th percentile queue in feet, assuming 25 feet/vehicle.

**Table 6 (Continued)**  
**Level-of-Service Analysis Summary**

Location/Peak Hour Movement	2013 Existing				2020 No-Build				2020 Build			
	v/c <sup>a</sup>	Del. <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup>	v/c	Del.	LOS	Queue	v/c	Del.	LOS	Queue
<b>Old West Central St. and Proposed Site Driveway</b>												
<i>Weekday AM Peak</i>												
NB Left/Right	--	--	--	--	--	--	--	--	0.15	15.5	C	13
WB Left	--	--	--	--	--	--	--	--	0.04	9.1	A	3
<i>Weekday PM Peak</i>												
NB Left/Right	--	--	--	--	--	--	--	--	0.13	17.4	C	13
WB Left	--	--	--	--	--	--	--	--	0.02	8.6	A	3
<i>Saturday Peak Hour</i>												
NB Left/Right	--	--	--	--	--	--	--	--	0.18	17.2	C	15
WB Left	--	--	--	--	--	--	--	--	0.04	8.8	A	3
<b>Route 140 and Proposed Site Driveway</b>												
<i>Weekday AM Peak</i>												
SB Right	--	--	--	--	--	--	--	--	0.17	16.6	C	15
<i>Weekday PM Peak</i>												
SB Right	--	--	--	--	--	--	--	--	0.08	14.7	B	8
<i>Saturday Peak Hour</i>												
SB Right	--	--	--	--	--	--	--	--	0.16	16.8	C	15

<sup>a</sup> Volume-to-capacity ratio.

<sup>b</sup> Average control delay (sec./vehicle).

<sup>c</sup> Level of service.

<sup>d</sup> 95th percentile queue in feet, assuming 25 feet/vehicle.

**Table 7**  
**Level-of-Service Analysis Summary - With Improvements**

Location/Peak Hour Movement	2020 No-Build				2020 Build				2020 Build with Improvements			
	v/c <sup>a</sup>	Del. <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup>	v/c	Del.	LOS	Queue	v/c	Del.	LOS	Queue
<b>Rte. 140 at Old West Central St. and Plaza Driveway</b>												
<i>Weekday AM Peak</i>												
EB U-Turn/Left	0.76	52.9	D	339	0.94	77.0	E	408	0.84	50.2	D	293
EB Thru	0.38	15.3	B	211	0.38	16.0	B	198	0.39	14.0	B	167
EB Right	0.26	3.2	A	44	0.26	3.3	A	44	0.27	2.9	A	38
WB Left	0.37	45.7	D	64	0.37	45.7	D	64	0.39	46.2	D	64
WB Thru	0.64	26.1	C	258	0.67	27.4	C	263	0.80	33.1	C	289
WB Right	0.38	4.0	A	49	0.38	4.1	A	49	0.43	5.3	A	55
NB Left	0.18	25.1	C	54	0.17	24.0	C	54	0.17	23.7	C	55
NB Thru	0.28	26.7	C	96	0.26	25.4	C	96	0.25	24.3	C	96
NB Right	0.03	0.0	A	0	0.03	0.0	A	0	0.03	0.0	A	0
SB Left	0.76	46.1	D	195	0.82	49.8	D	243	0.82	47.6	D	262
SB Thru	0.09	23.3	C	39	0.08	22.4	C	39	0.08	22.2	C	39
SB Right	0.83	23.4	C	230	0.83	27.1	C	264	0.68	9.4	A	120
<b>Overall</b>	--	<b>23.4</b>	<b>C</b>	--	--	<b>27.7</b>	<b>C</b>	--	--	<b>23.4</b>	<b>C</b>	--
<i>Weekday PM Peak</i>												
EB U-Turn/Left	0.93	59.0	E	485	0.99	71.4	E	523	0.87	43.8	D	423
EB Thru	0.54	22.1	C	232	0.52	21.9	C	226	0.54	24.3	C	261
EB Right	0.48	4.1	A	58	0.48	4.1	A	58	0.49	4.5	A	63
WB Left	0.77	53.7	D	213	0.77	53.9	D	213	0.71	49.5	D	200
WB Thru	0.73	33.7	C	240	0.73	33.9	C	243	0.89	51.4	D	368
WB Right	0.38	5.9	A	51	0.38	5.9	A	51	0.42	8.0	A	62
NB Left	0.85	52.8	D	280	0.85	52.9	D	280	0.82	50.7	D	293
NB Thru	0.35	27.1	C	134	0.35	27.2	C	134	0.34	28.0	C	143
NB Right	0.15	0.2	A	0	0.15	0.2	A	0	0.15	0.2	A	0
SB Left	0.60	36.2	D	156	0.70	41.3	D	184	0.68	41.2	D	197
SB Thru	0.24	25.6	C	96	0.24	25.7	C	96	0.23	26.7	C	103
SB Right	0.49	5.8	A	60	0.49	5.8	A	60	0.48	5.8	A	61
<b>Overall</b>	--	<b>27.8</b>	<b>C</b>	--	--	<b>29.9</b>	<b>C</b>	--	--	<b>29.6</b>	<b>C</b>	--

<sup>a</sup> Volume-to-capacity ratio; <sup>b</sup> Average control delay (sec./vehicle); <sup>c</sup> Level of service; <sup>d</sup> 95th percentile queue in feet, assuming 25 feet/vehicle.

As can be seen from the table above, the recommended timing changes would allow significantly reduced vehicle queuing for the eastbound left-turn movement (to better than existing conditions and LOS D operations) while not significantly affecting other movements through the intersection and maintaining overall LOS C operations. It is recommended that these modifications be considered by MassDOT as part of their regular maintenance program.

## CONCLUSIONS

Existing and future conditions at the study area intersections have been described and analyzed with respect to traffic operations and the impact of the proposed site redevelopment. Conclusions of this effort and recommendations are presented below.

- As proposed, the existing residence on the site will be razed and a new building will be constructed with approximately 8,800 square feet to contain a variety of stores including a 1,900 square foot Starbucks with drive-through window, a 3,000 square foot Doctors Express, a 2,500 square foot sit-down restaurant, and approximately 1,400 square feet of retail.
- The site is currently has two residential curb cuts along Old West Central Street. These curb cuts will be closed as part of the site redevelopment and a full-access/egress driveway will be constructed on Old West Central Street near the site's eastern property line and a right-in/right-out only driveway will be constructed on Route 140 near the site's western property line.
- The driveway on Old West Central Street is proposed to be 24 feet in width with 10-foot corner radii. This driveway design is adequate for access to a local street. The driveway onto Route 140 includes 30-foot corner radii and a raised delta island to reinforce the right-turn-only movements allowed at this driveway. This design is appropriate for access to a state highway.
- The available sight distance to the west of the proposed Old West Central Street driveway is severely restricted by the topography of the site, overgrown vegetation, and the horizontal curvature of Old West Central Street. It is recommended that the site frontage along Old West Central Street be re-graded to achieve desirable sight lines from the proposed driveway. Sight distances at the Route 140 driveway exceed the requirements and safe operation can therefore be expected. It is recommended that any proposed landscaping or signs in the vicinity of the site driveways be set back sufficiently so as not to impede sight distances for drivers exiting the site.
- The proposed development is expected to generate between 144 and 231 vehicle trips (total entering and exiting) during the peak hours. However, the retail and restaurant uses and especially the coffee shop will generate the majority of its business from the traffic already traveling on the adjacent streets. Accordingly, the new traffic that will be added to the surrounding streets ranges from 47 to 72 peak hour trips.
- The new traffic generated by the site will result in peak hour traffic increases of 21 to 32 vehicles on Route 140 west of the site and increases ranging from 17 to 25 vehicles on Route 140 to the east. On Old West Central Street, peak hour traffic increases ranging from 9 to 15 vehicles are expected, averaging approximately one additional vehicle every

four to seven minutes. These volume increases are minimal and represent an increase in traffic on the adjacent streets of 0.8 to 1.4 percent.

- The proposed drive-through lane will provide queue storage for 11 vehicles and is expected to accommodate the anticipated queues without affecting on-site circulation or access. The length of this drive-through lane is consistent with the recommendations of the ITE and is adequate to accommodate maximum queues observed at a local Starbucks in Walpole. It is recommended that the pick-up window of the proposed Starbucks be located near the southwest corner of the building to maximize queue storage.
- Analysis of the study area intersections reveals that the redevelopment project will have a negligible impact on traffic operations and will not result in a change in overall level of service. Acceptable intersection operations will be maintained (overall LOS C) at the Route 140 at Old West Central Street and the Franklin Village driveway signalized intersection.
- Signal timing changes are recommended to reduce vehicle queuing for Route 140 eastbound left turns onto Old West Central Street. These changes include extending the maximum green time allowed for this movement and potentially taking this intersection out of coordination during the AM peak hour. This would allow significantly reduced delays and queues for this movement while not significantly affecting other movements through the intersection and maintaining overall LOS C operations. It is recommended that these modifications be considered by MassDOT as part of their regular maintenance program.
- The proposed site driveways on Route 140 and on Old West Central Street are both expected to operate at LOS C or better during the analyzed peak hours.

## **APPENDIX**

---

Traffic Count Data  
Seasonal/Historical Adjustment Data & Crash Rate Worksheet  
Sight Distance Plan  
Trip Generation Worksheets & Drive-Through Queue Summary  
Capacity Analysis Methodology and Worksheets

---

## **Traffic Count Data**

---



PRECISION  
D A T A  
INDUSTRIES, LLC

P.O. Box 301, Berlin, MA 01503  
Office: 508-481-3999 Fax: 508-545-1234  
Email: datarequests@pdtilc.com

West Central Street (Route 140)  
west of Old West Central Street  
City, State: Franklin, MA  
Client: Ron Muller & Associates

133624 A VOLUME  
Site Code: TBA

Start Time	08-Nov-13		09-Nov-13		10-Nov-13		11-Nov-13		12-Nov-13		13-Nov-13		14-Nov-13		Week Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	69	66	122	114	138	98	*	*	*	*	*	*	*	*	110	93
01:00	32	36	79	76	80	72	*	*	*	*	*	*	*	*	64	61
02:00	24	24	43	45	46	32	*	*	*	*	*	*	*	*	38	34
03:00	24	44	34	26	23	21	*	*	*	*	*	*	*	*	27	30
04:00	82	89	49	26	19	16	*	*	*	*	*	*	*	*	50	44
05:00	175	261	83	98	50	40	*	*	*	*	*	*	*	*	103	133
06:00	571	610	254	223	107	130	*	*	*	*	*	*	*	*	311	321
07:00	951	979	498	428	206	238	*	*	*	*	*	*	*	*	552	548
08:00	846	1017	655	639	323	438	*	*	*	*	*	*	*	*	608	698
09:00	841	854	853	904	485	546	*	*	*	*	*	*	*	*	726	768
10:00	817	893	956	1073	693	790	*	*	*	*	*	*	*	*	822	919
11:00	935	938	959	1120	875	839	*	*	*	*	*	*	*	*	923	966
12:00 PM	1094	946	1020	1067	979	1016	*	*	*	*	*	*	*	*	1031	1010
01:00	1041	886	1005	1061	967	963	*	*	*	*	*	*	*	*	1004	970
02:00	950	1076	1020	1058	920	962	*	*	*	*	*	*	*	*	963	1032
03:00	1005	919	998	974	960	913	*	*	*	*	*	*	*	*	988	935
04:00	1116	945	961	945	909	816	*	*	*	*	*	*	*	*	995	914
05:00	1064	839	928	892	837	688	*	*	*	*	*	*	*	*	943	806
06:00	1011	928	809	829	682	613	*	*	*	*	*	*	*	*	834	790
07:00	820	771	627	584	488	425	*	*	*	*	*	*	*	*	645	593
08:00	580	538	449	476	368	301	*	*	*	*	*	*	*	*	466	438
09:00	486	415	376	310	266	269	*	*	*	*	*	*	*	*	376	331
10:00	378	334	352	343	175	132	*	*	*	*	*	*	*	*	302	270
11:00	188	194	193	177	104	119	*	*	*	*	*	*	*	*	162	163
Total	15100	14602	13323	13524	10700	10477	0	0	0	0	0	0	0	0	13043	12867
Day	29702		26847		21177		0	0	0	0	0	0	0	0	25910	
AM Peak	07:00	08:00	11:00	11:00	11:00	11:00	-	-	-	-	-	-	-	-	11:00	11:00
Vol.	951	1017	959	1120	875	839	-	-	-	-	-	-	-	-	923	966
PM Peak	16:00	14:00	12:00	12:00	12:00	12:00	-	-	-	-	-	-	-	-	12:00	14:00
Vol.	1116	1076	1020	1067	979	1016	-	-	-	-	-	-	-	-	1031	1032
Comb. Total	29702		26847		21177		0	0	0	0	0	0	0	0	25910	
ADT	ADT 25,909		ADT 25,909		ADT 25,909											

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 DATA  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Volume  
 Site Code: TBA

Start Time	EB		WB		Combin ed		08-Nov-13 Fri
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	31	295	14	204	45	499	
12:15	18	280	28	256	46	536	
12:30	9	271	15	247	24	518	
12:45	11	248	9	239	20	487	2040
01:00	13	267	12	200	25	467	
01:15	3	239	9	253	12	492	
01:30	5	263	3	232	8	495	
01:45	11	272	12	201	23	473	1927
02:00	7	234	4	217	11	451	
02:15	7	230	4	296	11	526	
02:30	3	252	6	309	9	561	
02:45	7	234	10	254	17	488	2026
03:00	3	212	14	223	17	435	
03:15	10	265	8	228	18	493	
03:30	3	262	8	245	11	507	
03:45	8	266	14	223	22	489	1924
04:00	9	265	15	240	24	505	
04:15	12	279	20	227	32	506	
04:30	21	277	19	234	40	511	
04:45	40	295	35	244	75	539	2061
05:00	29	284	38	241	67	525	
05:15	25	227	59	198	84	425	
05:30	53	290	75	222	128	512	
05:45	68	263	89	178	157	441	1903
06:00	93	281	120	209	213	490	
06:15	122	237	124	242	246	479	
06:30	150	273	174	223	324	496	
06:45	206	220	192	254	398	474	1939
07:00	226	222	220	217	446	439	
07:15	256	217	255	191	511	408	
07:30	228	207	296	198	524	405	
07:45	241	174	208	165	449	339	1591
08:00	207	175	269	161	476	336	
08:15	195	139	245	138	440	277	
08:30	213	149	259	111	472	260	
08:45	231	117	244	128	475	245	1118
09:00	213	124	216	119	429	243	
09:15	205	103	200	93	405	196	
09:30	189	149	222	113	411	262	
09:45	234	110	216	854	90	200	901
10:00	175	116	223	114	398	230	
10:15	215	97	249	89	464	186	
10:30	211	89	205	69	416	158	
10:45	216	76	216	893	62	138	712
11:00	216	64	244	72	460	136	
11:15	225	37	238	47	463	84	
11:30	236	48	229	38	465	86	
11:45	258	39	227	938	37	76	382
Total	5367	9733	5811	8791	11178	18524	
Percent	48.0%	52.5%	52.0%	47.5%			
Day Total		15100		14602		29702	
Peak Vol.	07:00	-	04:15	-	07:15	-	04:15
P.H.F.	0.929	-	0.962	-	0.875	-	0.965

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Volume  
 Site Code: TBA

Start Time	EB		WB		Combin ed		09-Nov-13 Sat					
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.						
12:00	30	261	24	290	54	551						
12:15	23	257	35	261	58	518						
12:30	43	259	31	280	74	539						
12:45	26	122 243	1020	24	114 236	1067	50 236 479 2087					
01:00	31	246	26	275	57	521						
01:15	18	236	30	241	48	477						
01:30	20	259	11	282	31	541						
01:45	10	79 264	1005	9	76 263	1061	19 155 527 2066					
02:00	13	268	18	260	31	528						
02:15	9	228	10	270	19	498						
02:30	16	250	8	249	24	499						
02:45	5	43 274	1020	9	45 279	1058	14 88 553 2078					
03:00	6	239	8	229	14	468						
03:15	9	255	4	238	13	493						
03:30	6	261	5	274	11	535						
03:45	13	34 243	998	9	26 233	974	22 60 476 1972					
04:00	3	240	11	254	14	494						
04:15	5	248	3	252	8	500						
04:30	13	224	7	255	20	479						
04:45	28	49 249	961	5	26 220	981	33 75 469 1942					
05:00	10	218	17	243	27	461						
05:15	11	243	25	215	36	458						
05:30	26	231	24	223	50	454						
05:45	36	83 236	928	32	98 211	892	68 181 447 1820					
06:00	35	226	30	229	65	455						
06:15	41	193	46	215	87	408						
06:30	64	208	53	191	117	399						
06:45	114	254 182	809	94	223 194	829	208 477 376 1638					
07:00	96	166	83	171	179	337						
07:15	114	181	91	138	205	319						
07:30	116	140	118	162	234	302						
07:45	172	498 140	627	136	428 113	584	308 926 253 1211					
08:00	181	116	137	111	318	227						
08:15	143	118	145	126	288	244						
08:30	142	108	167	115	309	223						
08:45	189	655 107	449	190	639 124	476	379 1294 231 925					
09:00	181	98	216	90	397	188						
09:15	214	85	216	74	430	159						
09:30	221	105	222	81	443	186						
09:45	237	853 88	376	250	904 65	310	487 1757 153 686					
10:00	227	110	288	109	515	219						
10:15	238	104	253	93	491	197						
10:30	242	62	240	76	482	138						
10:45	249	956 76	352	292	1073 65	343	541 2029 141 695					
11:00	240	43	264	55	504	98						
11:15	228	58	302	52	530	110						
11:30	240	45	273	37	513	82						
11:45	251	959 47	193	281	1120 33	177	532 2079 80 370					
Total	4585	8738	4772	8752	9357	17490						
Percent	49.0%	50.0%	51.0%	50.0%								
Day Total		13323		13524		26847						
Peak	10:15	-	02:45	-	10:45	-	10:45	-	01:30	-	-	-
Vol.	969	-	1029	-	1131	-	1075	-	2088	-	2094	-
P.H.F.	0.973	-	0.939	-	0.936	-	0.953	-	0.965	-	0.968	-

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 DATA  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Volume  
 Site Code: TBA

Start Time	EB		WB		Combin ed		10-Nov-13 Sun					
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.						
12:00	47	252	22	242	69	494						
12:15	41	264	26	260	67	524						
12:30	29	217	25	269	54	486						
12:45	21	246	25	245	46	491	1995					
01:00	30	255	20	296	50	551						
01:15	23	226	20	209	43	435						
01:30	16	250	19	226	35	476						
01:45	11	236	13	232	24	468	1930					
02:00	20	236	9	211	29	447						
02:15	12	221	9	251	21	472						
02:30	10	230	10	255	20	485						
02:45	4	233	4	245	8	478	1882					
03:00	4	229	8	219	12	448						
03:15	8	230	4	228	12	458						
03:30	6	276	7	213	13	489						
03:45	5	225	2	253	7	478	1873					
04:00	4	235	4	221	8	456						
04:15	6	227	6	194	12	421						
04:30	3	227	2	178	5	405						
04:45	6	220	4	223	10	443	1725					
05:00	14	197	5	181	19	378						
05:15	8	212	13	184	21	396						
05:30	9	204	11	166	20	370						
05:45	19	224	11	157	30	381	1525					
06:00	16	191	17	184	33	375						
06:15	30	171	24	150	54	321						
06:30	23	168	38	156	61	324						
06:45	38	152	51	123	61	275	1295					
07:00	39	143	50	132	89	275						
07:15	61	117	63	87	124	204						
07:30	43	120	60	102	103	222						
07:45	63	108	65	238	104	212	913					
08:00	58	88	93	97	151	185						
08:15	76	104	95	83	171	187						
08:30	90	78	114	66	204	144						
08:45	99	323	98	438	55	301	235	761	153	669		
09:00	108	74	138	80	246	154						
09:15	105	64	128	65	233	129						
09:30	136	70	141	67	277	137						
09:45	136	485	58	266	139	546	57	269	275	1031	115	535
10:00	170	52	198	39	368	91						
10:15	177	64	200	42	377	106						
10:30	175	36	197	28	372	64						
10:45	171	693	23	175	195	790	23	132	366	1483	46	307
11:00	179	20	202	31	381	51						
11:15	206	27	203	31	409	58						
11:30	225	27	211	39	436	66						
11:45	265	875	30	104	223	839	18	119	488	1714	48	223
Total	3045	7655	3260	7217	6305	14872						
Percent	48.3%	51.5%	51.7%	48.5%								
Day Total		10700		10477		21177						
Peak Vol.	11:00	-	00:15	-	11:00	-	00:15	-	-	-	-	-
P.H.F.	0.825	-	0.930	-	0.941	-	0.904	-	0.878	-	0.931	-

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Speed  
 Site Code: TBA

EB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
	14	19	24	29	34	39	44	49	54	59	64	69	9999			
11/08/13	0	2	5	8	18	19	14	3	0	0	0	0	0	69	41	34
01:00	0	0	2	4	5	16	5	0	0	0	0	0	0	32	39	35
02:00	0	0	0	3	4	8	9	0	0	0	0	0	0	24	42	37
03:00	0	0	2	4	6	6	3	2	1	0	0	0	0	24	43	35
04:00	0	1	10	11	14	27	14	5	0	0	0	0	0	82	41	34
05:00	0	0	7	28	50	60	27	3	0	0	0	0	0	175	39	34
06:00	0	4	44	99	210	152	55	7	0	0	0	0	0	571	38	33
07:00	16	45	149	271	343	106	18	3	0	0	0	0	0	951	34	28
08:00	6	16	75	195	376	146	32	0	0	0	0	0	0	846	35	30
09:00	1	14	87	232	331	136	39	1	0	0	0	0	0	841	35	30
10:00	1	10	61	255	339	142	9	0	0	0	0	0	0	817	35	30
11:00	1	32	145	356	296	94	9	1	1	0	0	0	0	935	33	28
12 PM	4	48	236	470	264	62	10	0	0	0	0	0	0	1094	32	27
13:00	17	75	243	378	264	52	11	1	0	0	0	0	0	1041	32	26
14:00	12	67	178	394	242	50	7	0	0	0	0	0	0	950	32	26
15:00	13	58	206	407	251	58	11	1	0	0	0	0	0	1005	32	27
16:00	15	78	297	450	221	53	2	0	0	0	0	0	0	1116	31	26
17:00	33	117	311	449	142	12	0	0	0	0	0	0	0	1064	29	24
18:00	6	53	244	364	271	65	7	1	0	0	0	0	0	1011	32	27
19:00	6	26	163	337	220	60	8	0	0	0	0	0	0	820	32	27
20:00	0	12	66	199	201	77	24	1	0	0	0	0	0	580	35	30
21:00	1	2	38	146	192	89	17	1	0	0	0	0	0	486	35	31
22:00	1	2	27	97	162	70	17	1	1	0	0	0	0	378	36	31
23:00	0	3	7	29	68	66	14	1	0	0	0	0	0	188	38	33
Total	133	665	2603	5186	4490	1626	362	32	3	0	0	0	0	15100		
%	0.9%	4.4%	17.2%	34.3%	29.7%	10.8%	2.4%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	07:00	07:00	11:00	08:00	06:00	06:00	06:00	03:00					07:00		
Vol.	16	45	149	356	376	152	55	7	1					951		
PM Peak	17:00	17:00	17:00	12:00	18:00	21:00	20:00	13:00	22:00					16:00		
Vol.	33	117	311	470	271	89	24	1	1					1116		

Stats

15th Percentile : 21 MPH  
 50th Percentile : 27 MPH  
 85th Percentile : 34 MPH  
 95th Percentile : 37 MPH

Mean Speed(Average) : 28 MPH  
 10 MPH Pace Speed : 24-33 MPH  
 Number in Pace : 8832  
 Percent in Pace : 58.5%  
 Number of Vehicles > 30 MPH : 5209  
 Percent of Vehicles > 30 MPH : 34.5%

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 DATA  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Speed  
 Site Code: TBA

EB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
11/09/																
13	0	2	6	18	36	43	15	1	1	0	0	0	0	122	39	34
01:00	0	1	1	7	24	37	7	2	0	0	0	0	0	79	39	35
02:00	0	1	1	7	14	13	6	1	0	0	0	0	0	43	39	34
03:00	0	3	2	3	10	11	4	1	0	0	0	0	0	34	39	32
04:00	0	0	1	4	12	19	10	2	1	0	0	0	0	49	41	36
05:00	0	0	4	10	23	31	12	3	0	0	0	0	0	83	40	35
06:00	1	1	17	47	73	81	30	3	0	1	0	0	0	254	39	33
07:00	0	4	30	125	180	114	41	4	0	0	0	0	0	498	37	32
08:00	1	7	44	167	281	122	32	1	0	0	0	0	0	655	36	31
09:00	3	25	97	314	329	82	3	0	0	0	0	0	0	853	33	29
10:00	2	33	156	406	316	41	2	0	0	0	0	0	0	956	32	28
11:00	4	30	155	389	308	72	1	0	0	0	0	0	0	959	32	28
12 PM	1	42	210	411	297	54	4	1	0	0	0	0	0	1020	32	27
13:00	12	69	235	367	259	58	5	0	0	0	0	0	0	1005	32	26
14:00	6	49	252	392	261	54	5	1	0	0	0	0	0	1020	32	27
15:00	0	28	198	421	285	58	8	0	0	0	0	0	0	998	32	28
16:00	11	87	252	363	209	36	2	1	0	0	0	0	0	961	31	25
17:00	5	45	218	378	228	45	9	0	0	0	0	0	0	928	32	27
18:00	0	32	159	310	247	49	12	0	0	0	0	0	0	809	32	28
19:00	1	16	99	240	197	61	13	0	0	0	0	0	0	627	33	29
20:00	2	4	42	121	200	66	13	1	0	0	0	0	0	449	35	30
21:00	0	3	18	88	178	74	15	0	0	0	0	0	0	376	36	32
22:00	0	5	23	77	155	72	18	2	0	0	0	0	0	352	36	32
23:00	0	0	7	44	62	61	17	1	1	0	0	0	0	193	38	33
Total	49	487	2227	4709	4184	1354	284	25	3	1	0	0	0	13323		
%	0.4%	3.7%	16.7%	35.3%	31.4%	10.2%	2.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	11:00	10:00	10:00	10:00	09:00	08:00	07:00	07:00	00:00	06:00				11:00		
Vol.	4	33	156	406	329	122	41	4	1	1				959		
PM Peak	13:00	16:00	14:00	15:00	12:00	21:00	22:00	22:00	23:00					12:00		
Vol.	12	87	252	421	297	74	18	2	1					1020		

Stats

15th Percentile : 21 MPH  
 50th Percentile : 28 MPH  
 85th Percentile : 33 MPH  
 95th Percentile : 37 MPH

Mean Speed(Average) : 28 MPH  
 10 MPH Pace Speed : 24-33 MPH  
 Number in Pace : 8120  
 Percent in Pace : 60.9%  
 Number of Vehicles > 30 MPH : 4634  
 Percent of Vehicles > 30 MPH : 34.8%

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Speed  
 Site Code: TBA

EB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
	14	19	24	29	34	39	44	49	54	59	64	69	9999			
11/10/13	0	1	3	16	52	50	13	3	0	0	0	0	0	138	38	34
01:00	0	0	3	13	25	28	7	4	0	0	0	0	0	80	39	34
02:00	0	0	1	7	12	18	5	2	1	0	0	0	0	46	40	35
03:00	2	0	2	2	8	3	6	0	0	0	0	0	0	23	40	30
04:00	0	0	0	2	5	6	4	2	0	0	0	0	0	19	43	37
05:00	0	0	3	7	17	13	6	4	0	0	0	0	0	50	41	34
06:00	0	0	1	19	31	36	14	5	1	0	0	0	0	107	40	35
07:00	0	0	8	41	78	64	13	1	1	0	0	0	0	206	37	33
08:00	0	2	20	62	132	82	24	1	0	0	0	0	0	323	37	32
09:00	1	5	39	104	193	113	22	7	1	0	0	0	0	485	37	32
10:00	1	9	71	213	279	98	21	1	0	0	0	0	0	693	35	30
11:00	1	16	119	325	306	88	20	0	0	0	0	0	0	875	34	29
12 PM	1	32	199	401	275	62	8	1	0	0	0	0	0	979	32	28
13:00	7	56	236	367	249	43	9	0	0	0	0	0	0	967	32	26
14:00	4	25	168	345	296	73	9	0	0	0	0	0	0	920	33	28
15:00	3	42	160	372	308	63	12	0	0	0	0	0	0	960	32	28
16:00	5	39	193	361	252	48	10	1	0	0	0	0	0	909	32	27
17:00	2	24	118	326	278	82	6	1	0	0	0	0	0	837	33	28
18:00	1	11	88	240	241	82	19	0	0	0	0	0	0	682	34	29
19:00	0	4	33	133	196	101	18	3	0	0	0	0	0	488	36	31
20:00	1	5	19	100	148	78	15	2	0	0	0	0	0	368	36	31
21:00	1	3	17	49	103	71	16	6	0	0	0	0	0	266	37	32
22:00	0	0	8	18	49	76	19	5	0	0	0	0	0	175	39	35
23:00	0	0	4	6	26	46	20	2	0	0	0	0	0	104	40	36
Total	30	274	1513	3529	3559	1424	316	51	4	0	0	0	0	10700		
%	0.3%	2.6%	14.1%	33.0%	33.3%	13.3%	3.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	03:00	11:00	11:00	11:00	11:00	09:00	08:00	09:00	02:00					11:00		
Vol.	2	16	119	325	306	113	24	7	1					875		
PM Peak	13:00	13:00	13:00	12:00	15:00	19:00	23:00	21:00						12:00		
Vol.	7	56	236	401	308	101	20	6						979		

Stats  
 15th Percentile : 22 MPH  
 50th Percentile : 28 MPH  
 85th Percentile : 34 MPH  
 95th Percentile : 38 MPH

Mean Speed(Average) : 29 MPH  
 10 MPH Pace Speed : 25-34 MPH  
 Number in Pace : 6494  
 Percent in Pace : 60.7%  
 Number of Vehicles > 30 MPH : 4347  
 Percent of Vehicles > 30 MPH : 40.6%

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Speed  
 Site Code: TBA

WB

Start Time	14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/08/13	0	0	2	4	21	27	10	2	0	0	0	0	0	66	40	35
01:00	0	0	0	3	11	18	3	1	0	0	0	0	0	36	39	35
02:00	1	0	0	1	1	7	9	3	2	0	0	0	0	24	46	39
03:00	0	0	2	2	8	22	6	4	0	0	0	0	0	44	41	37
04:00	0	0	2	8	15	32	23	8	1	0	0	0	0	89	43	37
05:00	0	0	0	8	62	105	57	26	2	1	0	0	0	261	43	38
06:00	0	1	1	40	222	259	73	13	1	0	0	0	0	610	39	35
07:00	0	2	14	119	410	349	78	7	0	0	0	0	0	979	38	34
08:00	0	0	7	107	446	377	69	9	2	0	0	0	0	1017	38	34
09:00	0	0	6	72	357	322	87	10	0	0	0	0	0	854	38	35
10:00	0	0	8	146	420	279	38	2	0	0	0	0	0	893	37	33
11:00	0	0	17	170	464	259	26	2	0	0	0	0	0	938	36	33
12 PM	0	0	12	180	493	229	31	1	0	0	0	0	0	946	36	32
13:00	2	5	36	175	439	211	17	1	0	0	0	0	0	886	36	32
14:00	4	6	97	345	432	182	10	0	0	0	0	0	0	1076	35	30
15:00	0	6	56	242	450	145	20	0	0	0	0	0	0	919	35	31
16:00	0	12	58	280	432	141	20	2	0	0	0	0	0	945	35	31
17:00	0	0	38	190	425	162	24	0	0	0	0	0	0	839	35	32
18:00	0	3	21	187	454	224	36	3	0	0	0	0	0	928	36	32
19:00	0	0	11	91	399	235	33	2	0	0	0	0	0	771	37	33
20:00	0	0	8	58	258	179	29	4	1	1	0	0	0	538	37	34
21:00	0	0	1	48	172	149	39	6	0	0	0	0	0	415	38	34
22:00	0	0	7	40	139	122	23	3	0	0	0	0	0	334	38	34
23:00	0	0	0	11	60	82	33	8	0	0	0	0	0	194	40	36
Total	7	35	404	2527	6590	4117	794	117	9	2	0	0	0	14602		
%	0.0%	0.2%	2.8%	17.3%	45.1%	28.2%	5.4%	0.8%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak	02:00	07:00	11:00	11:00	11:00	08:00	09:00	05:00	02:00	05:00				08:00		
Vol.	1	2	17	170	464	377	87	26	2	1				1017		
PM Peak	14:00	16:00	14:00	14:00	12:00	19:00	21:00	23:00	20:00	20:00				14:00		
Vol.	4	12	97	345	493	235	39	8	1	1				1076		

Stats

15th Percentile : 27 MPH  
 50th Percentile : 32 MPH  
 85th Percentile : 37 MPH  
 95th Percentile : 40 MPH

Mean Speed(Average) : 33 MPH  
 10 MPH Pace Speed : 29-38 MPH  
 Number in Pace : 10078  
 Percent in Pace : 69.0%  
 Number of Vehicles > 30 MPH : 9844  
 Percent of Vehicles > 30 MPH : 67.4%

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Speed  
 Site Code: TBA

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/09/ 13	0	0	1	3	37	37	31	4	1	0	0	0	0	114	42	37
01:00	0	0	2	6	17	27	17	6	0	0	1	0	0	76	42	37
02:00	0	0	1	1	12	15	8	7	1	0	0	0	0	45	44	38
03:00	0	0	3	3	5	7	6	2	0	0	0	0	0	26	42	35
04:00	0	0	2	0	6	10	6	2	0	0	0	0	0	26	42	37
05:00	0	0	0	1	25	34	27	9	2	0	0	0	0	98	43	38
06:00	0	0	0	14	63	91	43	11	0	1	0	0	0	223	41	37
07:00	0	0	1	32	139	175	72	8	1	0	0	0	0	428	40	36
08:00	0	0	1	53	261	240	68	15	0	0	1	0	0	639	39	35
09:00	0	0	9	133	471	250	39	2	0	0	0	0	0	904	37	33
10:00	0	1	24	207	569	247	23	2	0	0	0	0	0	1073	36	32
11:00	0	0	10	201	594	278	34	2	1	0	0	0	0	1120	36	33
12 PM	0	1	13	214	581	234	22	2	0	0	0	0	0	1067	36	32
13:00	0	0	22	206	569	236	28	0	0	0	0	0	0	1061	36	32
14:00	2	5	42	227	523	233	24	2	0	0	0	0	0	1058	36	32
15:00	0	2	23	186	477	249	36	1	0	0	0	0	0	974	36	32
16:00	4	21	86	237	440	175	15	3	0	0	0	0	0	981	35	30
17:00	0	0	8	159	492	205	24	4	0	0	0	0	0	892	36	33
18:00	0	0	9	132	404	242	36	4	2	0	0	0	0	829	37	33
19:00	0	1	11	65	294	182	28	3	0	0	0	0	0	584	37	33
20:00	0	0	2	40	199	191	38	6	0	0	0	0	0	476	38	35
21:00	0	0	0	21	129	126	32	1	1	0	0	0	0	310	38	35
22:00	0	0	1	22	153	128	31	6	1	0	1	0	0	343	38	35
23:00	0	0	0	9	45	76	36	9	2	0	0	0	0	177	41	37
Total	6	31	271	2172	6505	3688	724	111	12	1	3	0	0	13524		
%	0.0%	0.2%	2.0%	16.1%	48.1%	27.3%	5.4%	0.8%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak		10:00	10:00	10:00	11:00	11:00	07:00	08:00	05:00	06:00	01:00			11:00		
Vol.		1	24	207	594	278	72	15	2	1	1			1120		
PM Peak	16:00	16:00	16:00	16:00	12:00	15:00	20:00	23:00	18:00		22:00			12:00		
Vol.	4	21	86	237	581	249	38	9	2		1			1067		

Stats

15th Percentile : 27 MPH  
 50th Percentile : 32 MPH  
 85th Percentile : 37 MPH  
 95th Percentile : 40 MPH

Mean Speed(Average) : 33 MPH  
 10 MPH Pace Speed : 29-38 MPH  
 Number in Pace : 9584  
 Percent in Pace : 70.9%  
 Number of Vehicles > 30 MPH : 9225  
 Percent of Vehicles > 30 MPH : 68.2%

West Central Street (Route 140)  
 west of Old West Central Street  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 A Speed  
 Site Code: TBA

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/10/ 13	0	0	0	7	31	36	18	6	0	0	0	0	0	98	41	36
01:00	0	0	0	3	13	23	21	9	3	0	0	0	0	72	44	39
02:00	0	0	0	1	5	13	9	3	1	0	0	0	0	32	43	39
03:00	0	0	2	2	3	9	5	0	0	0	0	0	0	21	40	35
04:00	0	0	0	1	6	5	4	0	0	0	0	0	0	16	41	36
05:00	0	0	0	2	7	17	11	2	1	0	0	0	0	40	42	38
06:00	0	0	0	7	35	59	23	6	0	0	0	0	0	130	41	36
07:00	0	0	0	13	69	107	39	8	2	0	0	0	0	238	40	36
08:00	0	0	0	15	166	197	48	11	1	0	0	0	0	438	39	36
09:00	0	0	4	27	254	212	41	8	0	0	0	0	0	546	38	35
10:00	0	0	6	90	381	259	48	5	1	0	0	0	0	790	37	34
11:00	0	0	6	83	405	300	44	1	0	0	0	0	0	839	37	34
12 PM	0	0	16	160	519	284	35	1	1	0	0	0	0	1016	36	33
13:00	0	0	16	155	524	238	25	4	1	0	0	0	0	963	36	33
14:00	0	1	21	197	520	205	16	2	0	0	0	0	0	962	35	32
15:00	0	1	10	177	516	199	9	1	0	0	0	0	0	913	35	32
16:00	0	0	7	168	430	193	18	0	0	0	0	0	0	816	36	32
17:00	0	0	6	85	352	218	27	0	0	0	0	0	0	688	37	33
18:00	0	1	4	71	314	187	33	3	0	0	0	0	0	613	37	33
19:00	0	0	2	32	190	166	32	3	0	0	0	0	0	425	38	34
20:00	0	0	0	35	144	99	20	3	0	0	0	0	0	301	38	34
21:00	0	0	2	24	95	102	38	8	0	0	0	0	0	269	40	35
22:00	0	0	1	4	43	54	26	3	0	1	0	0	0	132	40	36
23:00	0	0	0	7	32	40	34	6	0	0	0	0	0	119	42	37
Total	0	3	103	1366	5054	3222	624	93	11	1	0	0	0	10477		
%	0.0%	0.0%	1.0%	13.0%	48.2%	30.8%	6.0%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak			10:00	10:00	11:00	11:00	08:00	08:00	01:00					11:00		
Vol.			6	90	405	300	48	11	3					839		
PM Peak		14:00	14:00	14:00	13:00	12:00	21:00	21:00	12:00	22:00				12:00		
Vol.		1	21	197	524	284	38	8	1	1				1016		

Stats  
 15th Percentile : 28 MPH  
 50th Percentile : 32 MPH  
 85th Percentile : 37 MPH  
 95th Percentile : 40 MPH

Mean Speed(Average) : 34 MPH  
 10 MPH Pace Speed : 29-38 MPH  
 Number in Pace : 7652  
 Percent in Pace : 73.0%  
 Number of Vehicles > 30 MPH : 7626  
 Percent of Vehicles > 30 MPH : 72.8%



PRECISION  
D A T A  
INDUSTRIES, LLC

P.O. Box 301, Berlin, MA 01503  
Office: 508-481-3999 Fax: 508-545-1234  
Email: datarequests@pdilic.com

Old West Central Street  
east of Rolling Ridge Road  
City, State: Franklin, MA  
Client: Ron Muller & Associates

133624 B VOLUME  
Site Code: TBA

Start Time	08-Nov-13		09-Nov-13		10-Nov-13		11-Nov-13		12-Nov-13		13-Nov-13		14-Nov-13		Week Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	12	20	39	47	26	69	*	*	*	*	*	*	*	*	26	45
01:00	9	9	14	42	14	29	*	*	*	*	*	*	*	*	12	27
02:00	4	3	12	16	11	17	*	*	*	*	*	*	*	*	9	12
03:00	15	3	7	7	3	8	*	*	*	*	*	*	*	*	8	6
04:00	30	9	8	9	8	4	*	*	*	*	*	*	*	*	15	7
05:00	113	23	37	17	12	5	*	*	*	*	*	*	*	*	54	15
06:00	294	136	111	37	53	24	*	*	*	*	*	*	*	*	153	66
07:00	527	268	201	113	125	57	*	*	*	*	*	*	*	*	284	146
08:00	488	254	326	228	229	126	*	*	*	*	*	*	*	*	348	203
09:00	352	266	286	286	301	194	*	*	*	*	*	*	*	*	373	249
10:00	320	263	486	381	392	293	*	*	*	*	*	*	*	*	399	312
11:00	329	297	446	390	394	362	*	*	*	*	*	*	*	*	390	350
12:00 PM	319	381	507	445	433	399	*	*	*	*	*	*	*	*	420	408
01:00	330	376	443	477	416	386	*	*	*	*	*	*	*	*	396	413
02:00	451	446	409	433	421	412	*	*	*	*	*	*	*	*	427	430
03:00	438	457	352	426	368	405	*	*	*	*	*	*	*	*	386	429
04:00	439	553	384	463	315	406	*	*	*	*	*	*	*	*	379	474
05:00	491	618	370	373	256	364	*	*	*	*	*	*	*	*	372	452
06:00	438	535	323	334	221	328	*	*	*	*	*	*	*	*	327	399
07:00	275	398	205	296	180	237	*	*	*	*	*	*	*	*	220	310
08:00	153	269	129	208	114	182	*	*	*	*	*	*	*	*	132	220
09:00	133	230	93	170	89	97	*	*	*	*	*	*	*	*	105	166
10:00	115	147	103	136	50	81	*	*	*	*	*	*	*	*	89	121
11:00	41	98	56	82	21	40	*	*	*	*	*	*	*	*	39	73
Total	6116	6059	5528	5416	4452	4525	0	0	0	0	0	0	0	0	5363	5333
Day	12175		10944		8977		0	0	0	0	0	0	0	0	10696	
AM Peak Vol.	07:00 527	11:00 297	10:00 486	11:00 390	11:00 394	11:00 362	-	-	-	-	-	-	-	-	10:00 399	11:00 350
PM Peak Vol.	17:00 491	17:00 618	12:00 507	13:00 477	12:00 433	14:00 412	-	-	-	-	-	-	-	-	14:00 427	16:00 474
Comb. Total	12175		10944		8977		0	0	0	0	0	0	0	0	10696	
ADT	ADT 10,699		AADT 10,699													

Old West Central Street  
east of Rolling Ridge Road  
City, State: Franklin, MA  
Client: Ron Muller & Associates



PRECISION  
D A T A  
INDUSTRIES, LLC  
P.O. Box 301 Berlin, MA 01503  
Office: 508.481.3999 Fax: 508.545.1234  
Email: datarequests@pdillc.com

133624 B VOLUME  
Site Code: TBA

Start Time	EB		WB		Combin ed		08-Nov- 13 Fri
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	6	76	8	84	14	160	
12:15	6	91	6	85	12	176	
12:30	0	81	2	107	2	188	
12:45	0	12 71	319	4 20 105	381	4 32 176	700
01:00	1	77	2	100	3	177	
01:15	3	66	0	92	3	158	
01:30	2	84	2	89	4	173	
01:45	3	9 103	330	5 9 95	376	8 18 198	706
02:00	2	98	2	101	4	199	
02:15	1	131	1	113	2	244	
02:30	1	107	0	111	1	218	
02:45	0	4 115	451	0 3 121	446	0 7 236	897
03:00	5	105	1	108	6	213	
03:15	6	113	1	108	7	221	
03:30	2	102	1	121	3	223	
03:45	2	15 118	438	0 3 120	457	2 18 238	895
04:00	6	93	0	120	6	213	
04:15	5	105	2	147	7	252	
04:30	4	118	4	134	8	252	
04:45	15	30 123	439	3 9 152	553	18 39 275	992
05:00	20	107	5	138	25	245	
05:15	30	145	1	162	31	307	
05:30	27	128	6	171	33	299	
05:45	36	113 111	491	11 23 147	618	47 136 258	1109
06:00	46	108	24	149	70	257	
06:15	60	109	27	129	87	238	
06:30	89	101	32	143	121	244	
06:45	99	294 120	438	53 136 114	535	152 430 234	973
07:00	122	90	63	101	185	191	
07:15	128	79	60	100	188	179	
07:30	156	47	60	97	216	144	
07:45	121	527 59	275	85 268 100	398	206 795 159	673
08:00	131	51	66	67	197	118	
08:15	134	31	76	76	210	107	
08:30	119	38	66	57	185	95	
08:45	104	488 33	153	46 254 69	269	150 742 102	422
09:00	100	35	67	59	167	94	
09:15	78	31	68	49	146	80	
09:30	87	33	55	64	142	97	
09:45	87	352 34	133	76 266 58	230	163 618 92	363
10:00	89	40	72	50	161	90	
10:15	78	37	62	31	140	68	
10:30	67	18	65	37	132	55	
10:45	86	320 20	115	64 263 29	147	150 583 49	262
11:00	75	20	71	25	146	45	
11:15	86	6	80	17	166	23	
11:30	85	5	69	30	154	35	
11:45	83	329 10	41	77 297 26	98	160 626 36	139
Total	2493	3623	1551	4508	4044	8131	
Percent	61.6%	44.6%	38.4%	55.4%			
Day Total		6116		6059		12175	
Peak	07:30	- 04:45	- 11:00	- 05:15	- 07:30	- 04:45	- - -
Vol.	542	- 503	- 297	- 629	- 829	- 1126	- - -
P.H.F.	0.869	0.867	0.928	0.920	0.959	0.917	

Old West Central Street  
 east of Rolling Ridge Road  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 B VOLUME  
 Site Code: TBA

Start Time	EB		WB		Combin ed		09-Nov-13 Sat							
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.								
12:00	12	126	7	99	19	225								
12:15	8	156	11	115	19	271								
12:30	11	126	15	133	26	259								
12:45	8	39	99	507	14	47	86	197	952					
01:00	4	116	23	113	27	229								
01:15	4	91	9	116	13	207								
01:30	4	114	7	133	11	247								
01:45	2	14	122	443	3	42	115	477	5	56	237	920		
02:00	6	96	6	100	12	196								
02:15	1	126	7	104	8	230								
02:30	5	89	3	108	8	197								
02:45	0	12	98	409	0	16	121	433	0	28	219	842		
03:00	1	98	2	121	3	219								
03:15	4	89	3	107	7	196								
03:30	1	81	2	107	3	188								
03:45	1	7	84	352	0	7	91	426	1	14	175	778		
04:00	2	109	1	110	3	219								
04:15	0	87	3	106	3	193								
04:30	3	100	0	120	3	220								
04:45	3	8	88	384	5	9	127	463	8	17	215	847		
05:00	3	91	1	96	4	187								
05:15	13	99	1	110	14	209								
05:30	11	96	8	92	19	188								
05:45	10	37	84	370	7	17	75	373	17	54	159	743		
06:00	17	84	7	91	24	175								
06:15	18	90	2	83	20	173								
06:30	30	85	14	77	44	162								
06:45	46	111	64	323	14	37	83	334	60	148	147	657		
07:00	43	75	14	82	57	157								
07:15	44	51	34	86	78	137								
07:30	46	44	34	65	80	109								
07:45	68	201	35	205	31	113	63	296	99	314	98	501		
08:00	60	33	64	64	124	97								
08:15	75	39	44	45	119	84								
08:30	91	38	52	57	143	95								
08:45	100	326	19	129	68	228	42	208	168	554	61	337		
09:00	103	14	74	51	177	65								
09:15	100	25	67	42	167	67								
09:30	118	32	68	38	186	70								
09:45	146	467	22	93	77	286	39	170	223	753	61	263		
10:00	128	31	81	48	209	79								
10:15	116	32	106	23	222	55								
10:30	106	24	94	33	200	57								
10:45	136	486	16	103	100	381	32	136	236	867	48	239		
11:00	117	13	115	19	232	32								
11:15	103	15	110	21	213	36								
11:30	100	12	73	22	173	34								
11:45	126	446	16	56	92	390	20	82	218	836	36	138		
Total	2154	3374	1573	3843	3727	7217								
Percent	57.8%	46.8%	42.2%	53.2%										
Day Total		5528		5416		10944								
Peak Vol.	09:30	-	12:00	-	10:30	-	01:00	-	10:15	-	00:15	-	-	-
P.H.F.	0.870	-	0.813	-	0.911	-	0.897	-	0.943	-	0.882	-	-	-

Old West Central Street  
east of Rolling Ridge Road  
City, State: Franklin, MA  
Client: Ron Muller & Associates



PRECISION  
D A T A  
INDUSTRIES, LLC  
P.O. Box 301 Berlin, MA 01503  
Office: 508.481.3999 Fax: 508.545.1234  
Email: datarequests@pdillc.com

133624 B VOLUME  
Site Code: TBA

Start Time	EB		WB		Combin ed		10-Nov-13 Sun	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		
12:00	7	101	21	107	28	208		
12:15	7	112	13	118	20	230		
12:30	3	107	19	78	22	185		
12:45	9	26 113	433	16 69	96	399	25 95	209 832
01:00	1	109	15	96	16	205		
01:15	3	100	6	84	9	184		
01:30	5	98	3	102	8	200		
01:45	5	14 109	416	5 29	104	386	10 43	213 802
02:00	4	95	7	108	11	203		
02:15	3	115	2	92	5	207		
02:30	1	118	6	107	7	225		
02:45	3	11 93	421	2 17	105	412	5 28	198 833
03:00	0	95	2	92	2	187		
03:15	1	106	3	104	4	210		
03:30	1	83	1	104	2	187		
03:45	1	3 84	368	2 8	105	405	3 11	189 773
04:00	3	82	2	107	5	189		
04:15	2	86	1	113	3	199		
04:30	1	66	0	86	1	152		
04:45	2	8 81	315	1 4	100	406	3 12	181 721
05:00	3	69	2	99	5	168		
05:15	1	67	1	86	2	153		
05:30	4	69	1	92	5	161		
05:45	4	12 51	256	1 5	87	364	5 17	138 620
06:00	3	62	3	111	6	173		
06:15	12	67	4	79	16	146		
06:30	18	51	8	67	26	118		
06:45	20	53 41	221	9 24	71	328	29 77	112 549
07:00	22	51	6	59	28	110		
07:15	23	42	11	60	34	102		
07:30	35	46	17	61	52	107		
07:45	45	125 41	180	23 57	57	237	68 182	98 417
08:00	49	32	27	62	76	94		
08:15	50	24	40	38	90	62		
08:30	53	35	25	47	78	82		
08:45	77	229 23	114	34 126	35	182	111 355	58 296
09:00	78	20	49	30	127	50		
09:15	71	24	42	22	113	46		
09:30	76	23	43	17	119	40		
09:45	76	301 22	89	60 194	28	97	136 495	50 186
10:00	98	13	69	24	167	37		
10:15	95	13	85	22	180	35		
10:30	91	15	73	19	164	34		
10:45	108	392 9	50	66 293	16	81	174 685	25 131
11:00	89	8	84	7	173	15		
11:15	84	2	81	13	165	15		
11:30	101	6	88	8	189	14		
11:45	120	394 5	21	109 362	12	40	229 756	17 61
Total	1568	2884	1188	3337	2756	6221		
Percent	56.9%	46.4%	43.1%	53.6%				
Day Total		4452		4525		8977		
Peak	11:00	- 00:15	- 11:00	- 03:30	- 11:00	- 01:45	- - -	
Vol.	394	- 441	- 362	- 429	- 756	- 848	- - -	
P.H.F.	0.821	0.976	0.830	0.949	0.825	0.922		

Old West Central Street  
 east of Rolling Ridge Road  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 B SPEED  
 Site Code: TBA

EB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
11/08/13	0	0	0	3	8	1	0	0	0	0	0	0	0	12	34	31
01:00	0	0	0	0	6	3	0	0	0	0	0	0	0	9	36	34
02:00	0	0	0	0	3	0	1	0	0	0	0	0	0	4	41	34
03:00	0	0	0	2	10	3	0	0	0	0	0	0	0	15	35	32
04:00	0	0	2	4	14	10	0	0	0	0	0	0	0	30	36	32
05:00	0	0	2	28	64	17	2	0	0	0	0	0	0	113	35	32
06:00	0	0	4	52	192	44	2	0	0	0	0	0	0	294	34	32
07:00	0	0	10	<b>147</b>	<b>298</b>	<b>70</b>	2	0	0	0	0	0	0	<b>527</b>	34	31
08:00	0	<b>4</b>	16	147	265	55	1	0	0	0	0	0	0	488	34	31
09:00	0	0	15	66	207	63	1	0	0	0	0	0	0	352	35	32
10:00	0	0	6	86	190	35	<b>3</b>	0	0	0	0	0	0	320	34	31
11:00	0	1	<b>20</b>	83	195	29	1	0	0	0	0	0	0	329	34	31
12 PM	0	0	8	117	164	30	0	0	0	0	0	0	0	319	33	30
13:00	0	0	8	99	179	43	1	0	0	0	0	0	0	330	34	31
14:00	<b>2</b>	<b>4</b>	<b>31</b>	165	208	39	<b>2</b>	0	0	0	0	0	0	451	33	30
15:00	0	4	25	151	<b>214</b>	<b>44</b>	0	0	0	0	0	0	0	438	33	30
16:00	0	3	29	211	170	26	0	0	0	0	0	0	0	439	32	29
17:00	1	2	18	<b>244</b>	199	27	0	0	0	0	0	0	0	<b>491</b>	32	29
18:00	0	2	21	221	180	14	0	0	0	0	0	0	0	438	32	29
19:00	0	0	11	122	128	13	1	0	0	0	0	0	0	275	33	30
20:00	0	1	6	58	77	11	0	0	0	0	0	0	0	153	33	30
21:00	0	0	2	49	65	16	1	0	0	0	0	0	0	133	34	31
22:00	0	0	4	42	53	15	1	0	0	0	0	0	0	115	34	31
23:00	0	0	2	14	20	5	0	0	0	0	0	0	0	41	34	30
Total	3	21	240	2111	3109	613	19	0	0	0	0	0	0	6116		
%	0.0%	0.3%	3.9%	34.5%	50.8%	10.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak		08:00	11:00	07:00	07:00	07:00	10:00								07:00	
Vol.		4	20	147	298	70	3							527		
PM Peak	14:00	14:00	14:00	17:00	15:00	15:00	14:00								17:00	
Vol.	2	4	31	244	214	44	2							491		

Stats

15th Percentile : 25 MPH  
 50th Percentile : 30 MPH  
 85th Percentile : 34 MPH  
 95th Percentile : 36 MPH

Mean Speed(Average) : 30 MPH  
 10 MPH Pace Speed : 26-35 MPH  
 Number in Pace : 4736  
 Percent in Pace : 77.4%  
 Number of Vehicles > 30 MPH : 2775  
 Percent of Vehicles > 30 MPH : 45.4%

Old West Central Street  
 east of Rolling Ridge Road  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 B SPEED  
 Site Code: TBA

EB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/09/ 13	0	0	1	7	23	8	0	0	0	0	0	0	0	39	35	32
01:00	0	0	1	3	5	5	0	0	0	0	0	0	0	14	36	32
02:00	0	0	1	2	5	4	0	0	0	0	0	0	0	12	36	32
03:00	0	0	0	2	4	1	0	0	0	0	0	0	0	7	34	31
04:00	0	0	1	3	3	1	0	0	0	0	0	0	0	8	34	30
05:00	0	0	2	5	18	10	2	0	0	0	0	0	0	37	37	33
06:00	0	0	2	21	56	30	2	0	0	0	0	0	0	111	36	32
07:00	0	2	6	28	117	44	4	0	0	0	0	0	0	201	36	32
08:00	0	1	9	54	194	65	3	0	0	0	0	0	0	326	35	32
09:00	0	0	6	109	284	68	0	0	0	0	0	0	0	467	34	31
10:00	0	0	16	145	263	59	3	0	0	0	0	0	0	486	34	31
11:00	0	0	14	129	251	52	0	0	0	0	0	0	0	446	34	31
12 PM	0	2	24	209	242	30	0	0	0	0	0	0	0	507	33	30
13:00	0	1	9	137	270	26	0	0	0	0	0	0	0	443	33	30
14:00	0	0	13	145	206	42	3	0	0	0	0	0	0	409	34	30
15:00	0	2	17	97	187	49	0	0	0	0	0	0	0	352	34	31
16:00	0	0	5	154	216	9	0	0	0	0	0	0	0	384	33	30
17:00	0	3	14	127	203	22	1	0	0	0	0	0	0	370	33	30
18:00	0	0	20	124	159	19	1	0	0	0	0	0	0	323	33	30
19:00	0	0	3	68	122	12	0	0	0	0	0	0	0	205	33	30
20:00	0	0	4	51	62	11	1	0	0	0	0	0	0	129	33	30
21:00	0	0	2	33	46	11	1	0	0	0	0	0	0	93	34	31
22:00	0	0	4	30	58	11	0	0	0	0	0	0	0	103	34	31
23:00	0	0	2	17	29	8	0	0	0	0	0	0	0	56	34	31
Total	0	11	176	1700	3023	597	21	0	0	0	0	0	0	5528		
%	0.0%	0.2%	3.2%	30.8%	54.7%	10.8%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak		07:00	10:00	10:00	09:00	09:00	07:00							10:00		
Vol.		2	16	145	284	68	4							486		
PM Peak		17:00	12:00	12:00	13:00	15:00	14:00							12:00		
Vol.		3	24	209	270	49	3							507		

Stats  
 15th Percentile : 25 MPH  
 50th Percentile : 30 MPH  
 85th Percentile : 34 MPH  
 95th Percentile : 36 MPH

Mean Speed(Average) : 31 MPH  
 10 MPH Pace Speed : 26-35 MPH  
 Number in Pace : 4340  
 Percent in Pace : 78.5%  
 Number of Vehicles > 30 MPH : 2690  
 Percent of Vehicles > 30 MPH : 48.7%

Old West Central Street  
 east of Rolling Ridge Road  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 B SPEED  
 Site Code: TBA

EB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
	14	19	24	29	34	39	44	49	54	59	64	69	9999			
11/10/13	0	0	1	7	15	3	0	0	0	0	0	0	0	26	34	31
01:00	0	0	1	3	8	2	0	0	0	0	0	0	0	14	34	31
02:00	0	0	0	2	7	2	0	0	0	0	0	0	0	11	35	32
03:00	0	0	1	0	2	0	0	0	0	0	0	0	0	3	33	29
04:00	0	0	1	3	3	0	1	0	0	0	0	0	0	8	34	30
05:00	0	0	0	4	6	2	0	0	0	0	0	0	0	12	34	31
06:00	0	0	0	15	23	15	0	0	0	0	0	0	0	53	36	32
07:00	0	0	1	29	77	18	0	0	0	0	0	0	0	125	34	31
08:00	0	0	3	55	139	30	2	0	0	0	0	0	0	229	34	31
09:00	0	0	5	68	189	38	1	0	0	0	0	0	0	301	34	31
10:00	0	1	9	90	242	49	1	0	0	0	0	0	0	392	34	31
11:00	0	0	7	128	217	40	2	0	0	0	0	0	0	394	34	31
12 PM	0	3	25	132	230	42	1	0	0	0	0	0	0	433	34	30
13:00	0	2	19	138	220	36	1	0	0	0	0	0	0	416	33	30
14:00	0	0	8	156	224	33	0	0	0	0	0	0	0	421	33	30
15:00	0	0	24	134	199	10	1	0	0	0	0	0	0	368	33	30
16:00	0	0	4	117	169	23	2	0	0	0	0	0	0	315	33	30
17:00	0	0	19	102	120	14	1	0	0	0	0	0	0	256	33	30
18:00	0	2	18	80	102	19	0	0	0	0	0	0	0	221	33	30
19:00	0	1	4	57	98	19	1	0	0	0	0	0	0	180	34	31
20:00	0	0	3	33	58	20	0	0	0	0	0	0	0	114	35	31
21:00	0	0	5	31	42	9	1	1	0	0	0	0	0	89	34	30
22:00	0	0	1	13	27	9	0	0	0	0	0	0	0	50	35	31
23:00	0	0	0	6	12	3	0	0	0	0	0	0	0	21	34	31
Total	0	9	159	1403	2429	436	15	1	0	0	0	0	0	4452		
%	0.0%	0.2%	3.6%	31.5%	54.6%	9.8%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak		10:00	10:00	11:00	10:00	10:00	08:00							11:00		
Vol.		1	9	128	242	49	2							394		
PM Peak		12:00	12:00	14:00	12:00	12:00	16:00	21:00						12:00		
Vol.		3	25	156	230	42	2	1						433		

Stats  
 15th Percentile : 25 MPH  
 50th Percentile : 30 MPH  
 85th Percentile : 34 MPH  
 95th Percentile : 36 MPH

Mean Speed(Average) : 31 MPH  
 10 MPH Pace Speed : 26-35 MPH  
 Number in Pace : 3506  
 Percent in Pace : 78.8%  
 Number of Vehicles > 30 MPH : 2113  
 Percent of Vehicles > 30 MPH : 47.5%

Old West Central Street  
 east of Rolling Ridge Road  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC

P.O.Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 B SPEED  
 Site Code: TBA

WB

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
	14	19	24	29	34	39	44	49	54	59	64	69	9999			
11/08/																
13	0	0	1	7	10	2	0	0	0	0	0	0	0	20	33	30
01:00	0	0	0	1	5	3	0	0	0	0	0	0	0	9	36	33
02:00	0	0	0	0	2	1	0	0	0	0	0	0	0	3	36	34
03:00	0	0	0	1	2	0	0	0	0	0	0	0	0	3	33	30
04:00	0	0	0	5	3	1	0	0	0	0	0	0	0	9	33	30
05:00	0	0	1	3	17	2	0	0	0	0	0	0	0	23	34	31
06:00	0	1	5	27	89	14	0	0	0	0	0	0	0	136	34	31
07:00	0	0	6	71	155	31	5	0	0	0	0	0	0	268	34	31
08:00	0	0	5	73	158	17	1	0	0	0	0	0	0	254	33	31
09:00	0	0	2	72	160	32	0	0	0	0	0	0	0	266	34	31
10:00	0	0	3	99	145	16	0	0	0	0	0	0	0	263	33	30
11:00	0	0	2	110	160	25	0	0	0	0	0	0	0	297	33	31
12 PM	1	0	20	126	219	14	1	0	0	0	0	0	0	381	33	30
13:00	0	1	2	162	193	18	0	0	0	0	0	0	0	376	33	30
14:00	0	0	17	161	249	19	0	0	0	0	0	0	0	446	33	30
15:00	0	0	7	226	202	21	1	0	0	0	0	0	0	457	33	30
16:00	0	0	18	311	211	12	1	0	0	0	0	0	0	553	32	29
17:00	0	0	45	349	217	7	0	0	0	0	0	0	0	618	32	29
18:00	0	0	26	290	205	13	1	0	0	0	0	0	0	535	32	29
19:00	0	0	23	198	164	12	1	0	0	0	0	0	0	398	32	29
20:00	0	1	20	133	103	11	1	0	0	0	0	0	0	269	32	29
21:00	0	0	9	106	105	9	0	1	0	0	0	0	0	230	33	30
22:00	0	0	3	66	72	6	0	0	0	0	0	0	0	147	33	30
23:00	0	0	1	32	55	7	3	0	0	0	0	0	0	98	34	31
Total	1	3	216	2629	2901	293	15	1	0	0	0	0	0	6059		
%	0.0%	0.0%	3.6%	43.4%	47.9%	4.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak		06:00	07:00	11:00	09:00	09:00	07:00							11:00		
Vol.		1	6	110	160	32	5							297		
PM Peak	12:00	13:00	17:00	17:00	14:00	15:00	23:00	21:00						17:00		
Vol.	1	1	45	349	249	21	3	1						618		

Stats  
 15th Percentile : 25 MPH  
 50th Percentile : 29 MPH  
 85th Percentile : 33 MPH  
 95th Percentile : 35 MPH

Mean Speed(Average) : 30 MPH  
 10 MPH Pace Speed : 25-34 MPH  
 Number in Pace : 4926  
 Percent in Pace : 81.3%  
 Number of Vehicles > 30 MPH : 2305  
 Percent of Vehicles > 30 MPH : 38.0%

Old West Central Street  
 east of Rolling Ridge Road  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 B SPEED  
 Site Code: TBA

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/09/ 13	0	0	1	15	23	8	0	0	0	0	0	0	0	47	34	31
01:00	0	0	2	10	24	6	0	0	0	0	0	0	0	42	34	31
02:00	0	0	1	3	9	3	0	0	0	0	0	0	0	16	35	31
03:00	0	0	1	2	3	1	0	0	0	0	0	0	0	7	34	30
04:00	0	0	0	5	4	0	0	0	0	0	0	0	0	9	32	29
05:00	0	1	2	5	8	1	0	0	0	0	0	0	0	17	33	28
06:00	0	0	4	11	18	4	0	0	0	0	0	0	0	37	34	30
07:00	0	0	2	30	66	14	1	0	0	0	0	0	0	113	34	31
08:00	0	0	5	69	134	19	1	0	0	0	0	0	0	228	33	31
09:00	0	0	14	91	163	18	0	0	0	0	0	0	0	286	33	30
10:00	0	1	12	131	213	23	1	0	0	0	0	0	0	381	33	30
11:00	2	1	12	200	168	7	0	0	0	0	0	0	0	390	32	29
12 PM	1	3	16	198	218	9	0	0	0	0	0	0	0	445	32	29
13:00	0	1	13	214	239	10	0	0	0	0	0	0	0	477	32	30
14:00	3	1	7	189	214	19	0	0	0	0	0	0	0	433	33	30
15:00	0	0	18	200	193	15	0	0	0	0	0	0	0	426	32	29
16:00	0	0	20	193	230	18	2	0	0	0	0	0	0	463	33	30
17:00	0	1	19	196	152	5	0	0	0	0	0	0	0	373	32	29
18:00	0	0	13	181	133	6	1	0	0	0	0	0	0	334	32	29
19:00	0	0	10	136	128	20	2	0	0	0	0	0	0	296	33	30
20:00	0	0	7	75	107	18	0	0	1	0	0	0	0	208	33	30
21:00	0	0	5	68	88	7	2	0	0	0	0	0	0	170	33	30
22:00	0	0	4	47	76	9	0	0	0	0	0	0	0	136	33	30
23:00	0	0	2	32	38	9	1	0	0	0	0	0	0	82	34	30
Total	6	9	190	2301	2649	249	11	0	1	0	0	0	0	5416		
%	0.1%	0.2%	3.5%	42.5%	48.9%	4.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	11:00	05:00	09:00	11:00	10:00	10:00	07:00							11:00		
Vol.	2	1	14	200	213	23	1							390		
PM Peak	14:00	12:00	16:00	13:00	13:00	19:00	16:00		20:00					13:00		
Vol.	3	3	20	214	239	20	2		1					477		

Stats  
 15th Percentile : 25 MPH  
 50th Percentile : 29 MPH  
 85th Percentile : 33 MPH  
 95th Percentile : 35 MPH

Mean Speed(Average) : 30 MPH  
 10 MPH Pace Speed : 25-34 MPH  
 Number in Pace : 4402  
 Percent in Pace : 81.3%  
 Number of Vehicles > 30 MPH : 2075  
 Percent of Vehicles > 30 MPH : 38.3%

Old West Central Street  
 east of Rolling Ridge Road  
 City, State: Franklin, MA  
 Client: Ron Muller & Associates



PRECISION  
 D A T A  
 INDUSTRIES, LLC  
 P.O. Box 301 Berlin, MA 01503  
 Office: 508.481.3999 Fax: 508.545.1234  
 Email: datarequests@pdillc.com

133624 B SPEED  
 Site Code: TBA

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
11/10/13	0	0	0	20	41	7	1	0	0	0	0	0	0	69	34	31
01:00	0	0	1	12	14	1	0	1	0	0	0	0	0	29	33	30
02:00	0	0	0	3	8	5	1	0	0	0	0	0	0	17	37	33
03:00	0	0	2	2	3	1	0	0	0	0	0	0	0	8	34	29
04:00	0	0	0	1	3	0	0	0	0	0	0	0	0	4	33	31
05:00	0	0	2	0	3	0	0	0	0	0	0	0	0	5	32	28
06:00	0	0	0	9	12	3	0	0	0	0	0	0	0	24	34	31
07:00	0	0	1	21	31	4	0	0	0	0	0	0	0	57	33	30
08:00	0	0	8	42	66	10	0	0	0	0	0	0	0	126	33	30
09:00	0	0	4	67	103	20	0	0	0	0	0	0	0	194	34	31
10:00	0	0	4	100	170	17	2	0	0	0	0	0	0	293	33	31
11:00	0	0	5	127	206	24	0	0	0	0	0	0	0	362	33	30
12 PM	0	0	12	167	205	15	0	0	0	0	0	0	0	399	33	30
13:00	0	0	11	172	188	15	0	0	0	0	0	0	0	386	33	30
14:00	0	5	6	178	205	17	0	1	0	0	0	0	0	412	33	30
15:00	0	0	13	157	217	16	2	0	0	0	0	0	0	405	33	30
16:00	0	8	23	204	165	6	0	0	0	0	0	0	0	406	32	29
17:00	0	1	18	199	134	12	0	0	0	0	0	0	0	364	32	29
18:00	0	0	14	154	150	9	1	0	0	0	0	0	0	328	32	29
19:00	0	0	8	117	98	12	2	0	0	0	0	0	0	237	33	30
20:00	0	0	3	75	94	10	0	0	0	0	0	0	0	182	33	30
21:00	0	1	0	51	41	4	0	0	0	0	0	0	0	97	32	29
22:00	0	0	3	36	34	7	1	0	0	0	0	0	0	81	33	30
23:00	0	0	2	9	26	3	0	0	0	0	0	0	0	40	33	31
Total	0	15	140	1923	2217	218	10	2	0	0	0	0	0	4525		
%	0.0%	0.3%	3.1%	42.5%	49.0%	4.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak			08:00	11:00	11:00	11:00	10:00	01:00						11:00		
Vol.			8	127	206	24	2	1						362		
PM Peak		16:00	16:00	16:00	15:00	14:00	15:00	14:00						14:00		
Vol.		8	23	204	217	17	2	1						412		

Stats  
 15th Percentile : 25 MPH  
 50th Percentile : 29 MPH  
 85th Percentile : 33 MPH  
 95th Percentile : 35 MPH

Mean Speed(Average) : 30 MPH  
 10 MPH Pace Speed : 25-34 MPH  
 Number in Pace : 3680  
 Percent in Pace : 81.3%  
 Number of Vehicles > 30 MPH : 1749  
 Percent of Vehicles > 30 MPH : 38.7%

# Ron Müller & Associates

Traffic Engineering and Consulting Services

File Name : 13068 Rte 140- Old West Central AM

Site Code : 13068

Start Date : 11/7/2013

Page No : 1

E-W Street: West Central Street/Rte 140

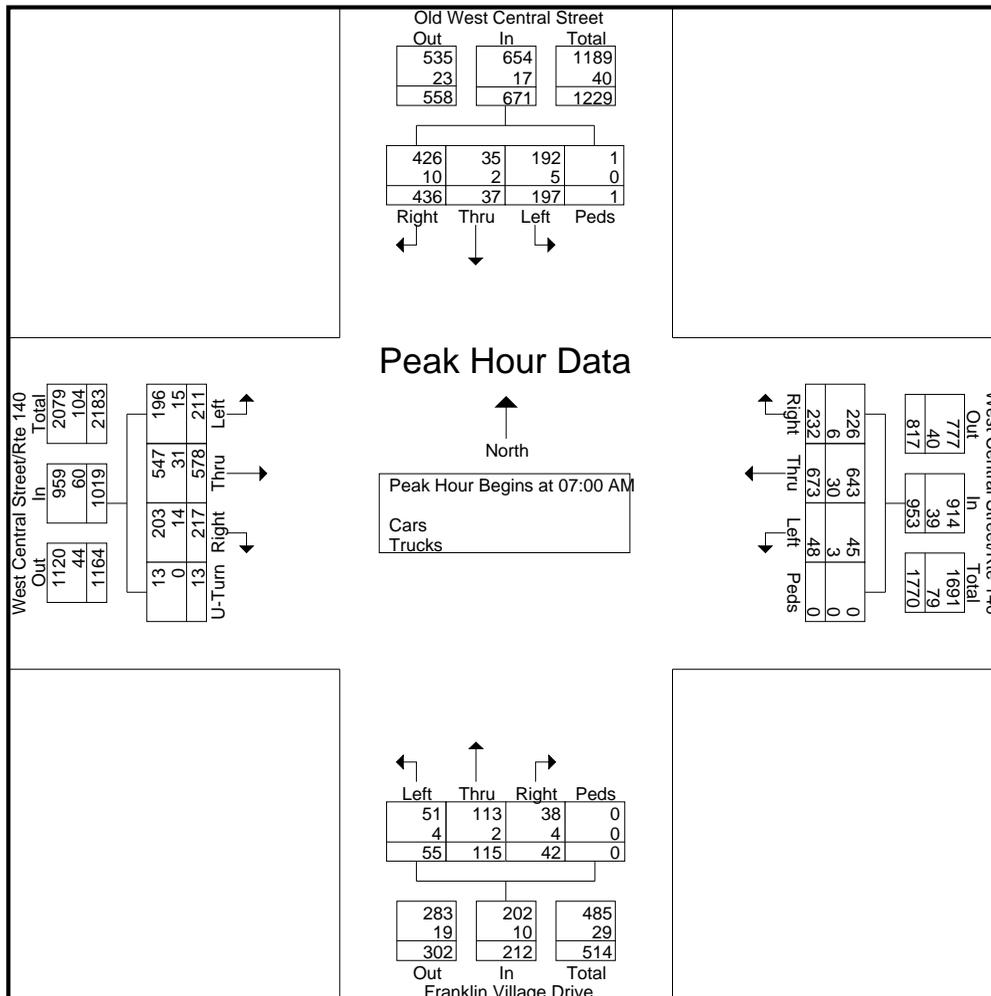
N-S Street: Old W Central/Franklin V. Dr

Groups Printed- Cars - Trucks

Start Time	Old West Central Street From North					West Central Street/Rte 140 From East					Franklin Village Drive From South					West Central Street/Rte 140 From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	U-Turn	App. Total	
07:00 AM	47	6	95	0	148	10	148	47	0	205	3	8	11	0	22	47	149	32	2	230	605
07:15 AM	49	10	99	0	158	13	174	65	0	252	19	47	15	0	81	49	142	77	3	271	762
07:30 AM	50	9	122	1	182	17	173	91	0	281	22	51	12	0	85	57	124	59	4	244	792
07:45 AM	51	12	120	0	183	8	178	29	0	215	11	9	4	0	24	58	163	49	4	274	696
Total	197	37	436	1	671	48	673	232	0	953	55	115	42	0	212	211	578	217	13	1019	2855
08:00 AM	37	12	96	0	145	18	141	32	0	191	6	5	9	0	20	51	146	37	7	241	597
08:15 AM	37	12	93	0	142	23	184	45	0	252	13	7	14	0	34	38	115	47	5	205	633
08:30 AM	37	6	67	0	110	30	178	35	0	243	27	5	14	0	46	30	106	39	6	181	580
08:45 AM	32	16	67	0	115	20	143	34	1	198	37	9	13	0	59	48	130	48	4	230	602
Total	143	46	323	0	512	91	646	146	1	884	83	26	50	0	159	167	497	171	22	857	2412
Grand Total	340	83	759	1	1183	139	1319	378	1	1837	138	141	92	0	371	378	1075	388	35	1876	5267
Apprch %	28.7	7	64.2	0.1		7.6	71.8	20.6	0.1		37.2	38	24.8	0		20.1	57.3	20.7	1.9		
Total %	6.5	1.6	14.4	0	22.5	2.6	25	7.2	0	34.9	2.6	2.7	1.7	0	7	7.2	20.4	7.4	0.7	35.6	
Cars	332	79	743	1	1155	133	1266	369	1	1769	130	138	86	0	354	354	1012	370	35	1771	5049
% Cars	97.6	95.2	97.9	100	97.6	95.7	96	97.6	100	96.3	94.2	97.9	93.5	0	95.4	93.7	94.1	95.4	100	94.4	95.9
Trucks	8	4	16	0	28	6	53	9	0	68	8	3	6	0	17	24	63	18	0	105	218
% Trucks	2.4	4.8	2.1	0	2.4	4.3	4	2.4	0	3.7	5.8	2.1	6.5	0	4.6	6.3	5.9	4.6	0	5.6	4.1

E-W Street: West Central Street/Rte 140  
 N-S Street: Old W Central/Franklin V. Dr

Start Time	Old West Central Street From North					West Central Street/Rte 140 From East					Franklin Village Drive From South					West Central Street/Rte 140 From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	47	6	95	0	148	10	148	47	0	205	3	8	11	0	22	47	149	32	2	230	605
07:15 AM	49	10	99	0	158	13	174	65	0	252	19	47	15	0	81	49	142	77	3	271	762
07:30 AM	50	9	122	1	182	17	173	91	0	281	22	51	12	0	85	57	124	59	4	244	792
07:45 AM	51	12	120	0	183	8	178	29	0	215	11	9	4	0	24	58	163	49	4	274	696
Total Volume	197	37	436	1	671	48	673	232	0	953	55	115	42	0	212	211	578	217	13	1019	2855
% App. Total	29.4	5.5	65	0.1		5	70.6	24.3	0		25.9	54.2	19.8	0		20.7	56.7	21.3	1.3		
PHF	.966	.771	.893	.250	.917	.706	.945	.637	.000	.848	.625	.564	.700	.000	.624	.909	.887	.705	.813	.930	.901
Cars	192	35	426	1	654	45	643	226	0	914	51	113	38	0	202	196	547	203	13	959	2729
% Cars	97.5	94.6	97.7	100	97.5	93.8	95.5	97.4	0	95.9	92.7	98.3	90.5	0	95.3	92.9	94.6	93.5	100	94.1	95.6
Trucks	5	2	10	0	17	3	30	6	0	39	4	2	4	0	10	15	31	14	0	60	126
% Trucks	2.5	5.4	2.3	0	2.5	6.3	4.5	2.6	0	4.1	7.3	1.7	9.5	0	4.7	7.1	5.4	6.5	0	5.9	4.4



# Ron Müller & Associates

Traffic Engineering and Consulting Services

File Name : 13068 Rte 140- Old West Central PM

Site Code : 13068

Start Date : 11/7/2013

Page No : 1

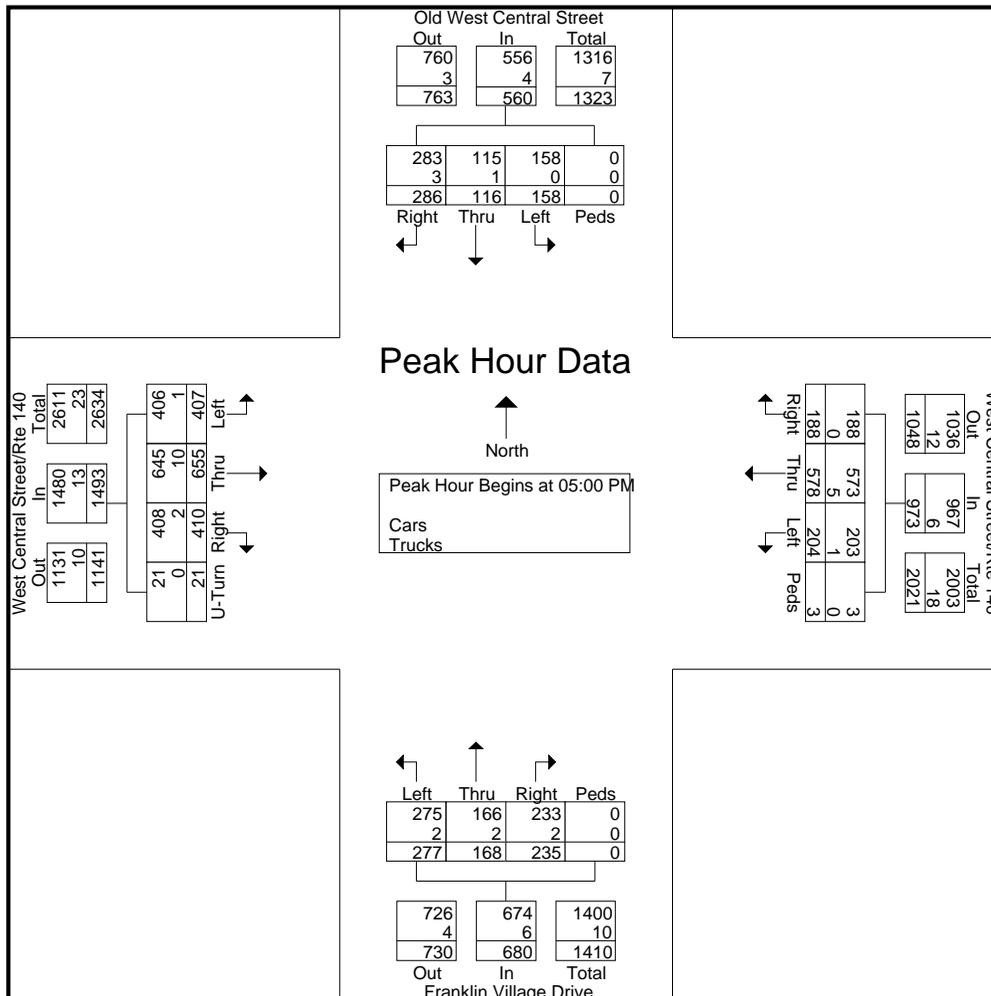
E-W Street: West Central St./Rte 140  
N-S Street: Old W Central/Franklin V. Dr

Groups Printed- Cars - Trucks

Start Time	Old West Central Street From North					West Central Street/Rte 140 From East					Franklin Village Drive From South					West Central Street/Rte 140 From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	U-Turn	App. Total	
04:00 PM	36	37	64	0	137	42	195	31	1	269	75	25	40	0	140	83	129	67	6	285	831
04:15 PM	29	20	81	0	130	43	165	40	1	249	58	31	31	0	120	102	144	47	2	295	794
04:30 PM	39	21	64	0	124	55	142	41	6	244	72	34	55	0	161	95	131	80	6	312	841
04:45 PM	43	34	78	0	155	53	127	42	1	223	66	36	54	0	156	97	148	86	5	336	870
Total	147	112	287	0	546	193	629	154	9	985	271	126	180	0	577	377	552	280	19	1228	3336
05:00 PM	29	40	87	0	156	39	131	62	2	234	74	54	61	0	189	96	129	80	10	315	894
05:15 PM	52	26	77	0	155	59	154	44	0	257	80	38	47	0	165	107	174	103	3	387	964
05:30 PM	49	23	65	0	137	55	150	44	0	249	66	39	60	0	165	99	178	114	4	395	946
05:45 PM	28	27	57	0	112	51	143	38	1	233	57	37	67	0	161	105	174	113	4	396	902
Total	158	116	286	0	560	204	578	188	3	973	277	168	235	0	680	407	655	410	21	1493	3706
Grand Total	305	228	573	0	1106	397	1207	342	12	1958	548	294	415	0	1257	784	1207	690	40	2721	7042
Apprch %	27.6	20.6	51.8	0		20.3	61.6	17.5	0.6		43.6	23.4	33	0		28.8	44.4	25.4	1.5		
Total %	4.3	3.2	8.1	0	15.7	5.6	17.1	4.9	0.2	27.8	7.8	4.2	5.9	0	17.9	11.1	17.1	9.8	0.6	38.6	
Cars	304	227	569	0	1100	395	1192	342	12	1941	545	291	410	0	1246	779	1191	684	40	2694	6981
% Cars	99.7	99.6	99.3	0	99.5	99.5	98.8	100	100	99.1	99.5	99	98.8	0	99.1	99.4	98.7	99.1	100	99	99.1
Trucks	1	1	4	0	6	2	15	0	0	17	3	3	5	0	11	5	16	6	0	27	61
% Trucks	0.3	0.4	0.7	0	0.5	0.5	1.2	0	0	0.9	0.5	1	1.2	0	0.9	0.6	1.3	0.9	0	1	0.9

E-W Street: West Central St./Rte 140  
 N-S Street: Old W Central/Franklin V. Dr

Start Time	Old West Central Street From North					West Central Street/Rte 140 From East					Franklin Village Drive From South					West Central Street/Rte 140 From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	29	40	87	0	156	39	131	62	2	234	74	54	61	0	189	96	129	80	10	315	894
05:15 PM	52	26	77	0	155	59	154	44	0	257	80	38	47	0	165	107	174	103	3	387	964
05:30 PM	49	23	65	0	137	55	150	44	0	249	66	39	60	0	165	99	178	114	4	395	946
05:45 PM	28	27	57	0	112	51	143	38	1	233	57	37	67	0	161	105	174	113	4	396	902
Total Volume	158	116	286	0	560	204	578	188	3	973	277	168	235	0	680	407	655	410	21	1493	3706
% App. Total	28.2	20.7	51.1	0		21	59.4	19.3	0.3		40.7	24.7	34.6	0		27.3	43.9	27.5	1.4		
PHF	.760	.725	.822	.000	.897	.864	.938	.758	.375	.946	.866	.778	.877	.000	.899	.951	.920	.899	.525	.943	.961
Cars	158	115	283	0	556	203	573	188	3	967	275	166	233	0	674	406	645	408	21	1480	3677
% Cars	100	99.1	99.0	0	99.3	99.5	99.1	100	100	99.4	99.3	98.8	99.1	0	99.1	99.8	98.5	99.5	100	99.1	99.2
Trucks	0	1	3	0	4	1	5	0	0	6	2	2	2	0	6	1	10	2	0	13	29
% Trucks	0	0.9	1.0	0	0.7	0.5	0.9	0	0	0.6	0.7	1.2	0.9	0	0.9	0.2	1.5	0.5	0	0.9	0.8



# Ron Müller & Associates

Traffic Engineering and Consulting Services

File Name : 13068 Rte 140- Old West Central Sat

Site Code : 13068

E-W Street: West Central Street/Rte 140

Start Date : 11/9/2013

N-S Street: Old W Central/Franklin V Dr.

Page No : 1

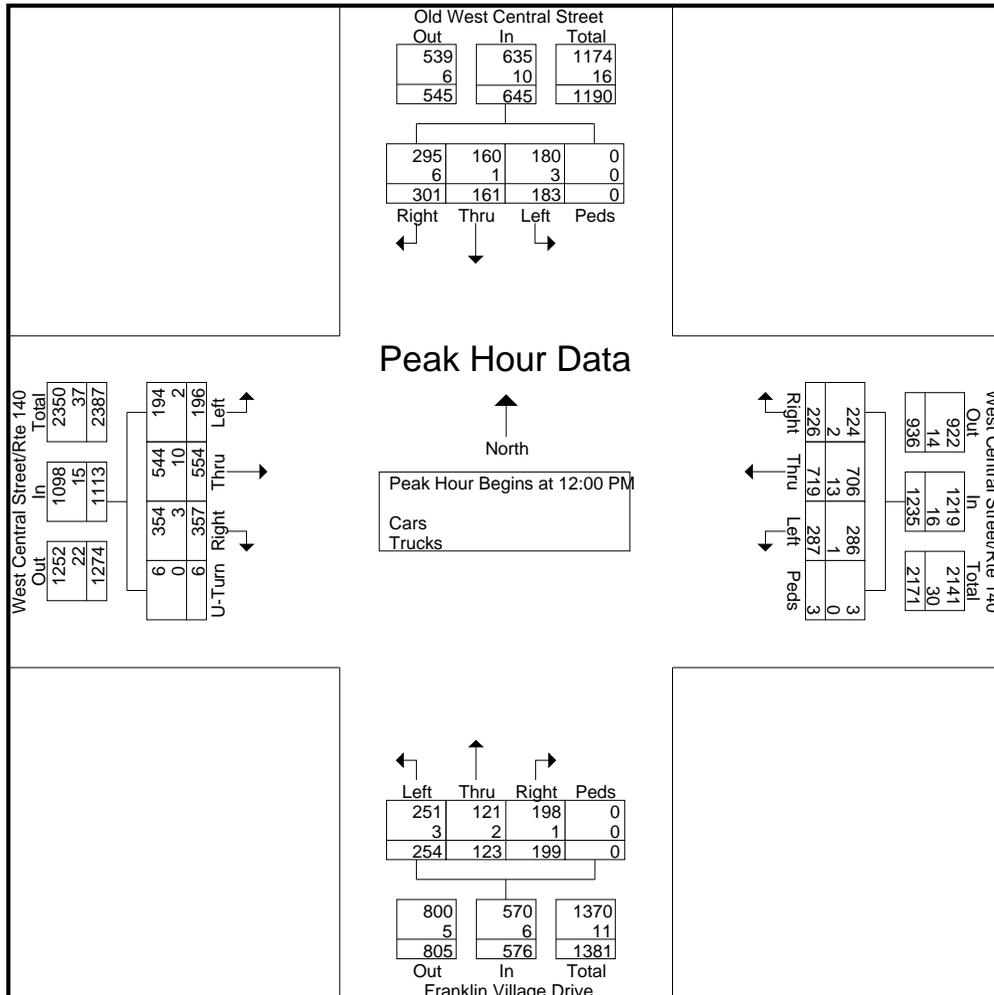
## Groups Printed- Cars - Trucks

Start Time	Old West Central Street From North					West Central Street/Rte 140 From East					Franklin Village Drive From South					West Central Street/Rte 140 From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	U-Turn	App. Total	
11:00 AM	50	41	67	0	158	60	200	65	0	325	56	19	73	0	148	51	142	80	0	273	904
11:15 AM	46	25	76	0	147	73	182	47	0	302	61	29	60	0	150	47	124	58	2	231	830
11:30 AM	49	22	72	0	143	61	183	49	0	293	68	25	55	0	148	41	157	67	1	266	850
11:45 AM	47	38	71	0	156	58	181	47	0	286	67	27	54	0	148	47	137	69	2	255	845
Total	192	126	286	0	604	252	746	208	0	1206	252	100	242	0	594	186	560	274	5	1025	3429
12:00 PM	48	44	78	0	170	79	187	62	1	329	59	25	54	0	138	50	128	91	2	271	908
12:15 PM	54	39	88	0	181	74	166	56	0	296	61	27	43	0	131	52	149	75	1	277	885
12:30 PM	47	34	79	0	160	77	190	62	0	329	66	40	44	0	150	52	135	101	1	289	928
12:45 PM	34	44	56	0	134	57	176	46	2	281	68	31	58	0	157	42	142	90	2	276	848
Total	183	161	301	0	645	287	719	226	3	1235	254	123	199	0	576	196	554	357	6	1113	3569
01:00 PM	44	49	64	0	157	56	180	56	1	293	63	36	52	0	151	53	130	80	3	266	867
01:15 PM	44	26	59	0	129	60	191	42	2	295	81	33	61	0	175	57	140	75	3	275	874
01:30 PM	32	44	97	0	173	60	153	61	0	274	83	31	39	0	153	55	144	68	4	271	871
01:45 PM	59	32	68	0	159	65	151	40	0	256	69	28	47	0	144	60	131	89	2	282	841
Total	179	151	288	0	618	241	675	199	3	1118	296	128	199	0	623	225	545	312	12	1094	3453
Grand Total	554	438	875	0	1867	780	2140	633	6	3559	802	351	640	0	1793	607	1659	943	23	3232	10451
Apprch %	29.7	23.5	46.9	0		21.9	60.1	17.8	0.2		44.7	19.6	35.7	0		18.8	51.3	29.2	0.7		
Total %	5.3	4.2	8.4	0	17.9	7.5	20.5	6.1	0.1	34.1	7.7	3.4	6.1	0	17.2	5.8	15.9	9	0.2	30.9	
Cars	547	437	866	0	1850	778	2114	628	6	3526	798	347	636	0	1781	603	1632	934	23	3192	10349
% Cars	98.7	99.8	99	0	99.1	99.7	98.8	99.2	100	99.1	99.5	98.9	99.4	0	99.3	99.3	98.4	99	100	98.8	99
Trucks	7	1	9	0	17	2	26	5	0	33	4	4	4	0	12	4	27	9	0	40	102
% Trucks	1.3	0.2	1	0	0.9	0.3	1.2	0.8	0	0.9	0.5	1.1	0.6	0	0.7	0.7	1.6	1	0	1.2	1

File Name : 13068 Rte 140- Old West Central Sat  
 Site Code : 13068  
 Start Date : 11/9/2013  
 Page No : 2

E-W Street: West Central Street/Rte 140  
 N-S Street: Old W Central/Franklin V Dr.

Start Time	Old West Central Street From North					West Central Street/Rte 140 From East					Franklin Village Drive From South					West Central Street/Rte 140 From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	U-Turn	App. Total	
Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	48	44	78	0	170	79	187	62	1	329	59	25	54	0	138	50	128	91	2	271	908
12:15 PM	54	39	88	0	181	74	166	56	0	296	61	27	43	0	131	52	149	75	1	277	885
12:30 PM	47	34	79	0	160	77	190	62	0	329	66	40	44	0	150	52	135	101	1	289	928
12:45 PM	34	44	56	0	134	57	176	46	2	281	68	31	58	0	157	42	142	90	2	276	848
Total Volume	183	161	301	0	645	287	719	226	3	1235	254	123	199	0	576	196	554	357	6	1113	3569
% App. Total	28.4	25	46.7	0		23.2	58.2	18.3	0.2		44.1	21.4	34.5	0		17.6	49.8	32.1	0.5		
PHF	.847	.915	.855	.000	.891	.908	.946	.911	.375	.938	.934	.769	.858	.000	.917	.942	.930	.884	.750	.963	.961
Cars	180	160	295	0	635	286	706	224	3	1219	251	121	198	0	570	194	544	354	6	1098	3522
% Cars	98.4	99.4	98.0	0	98.4	99.7	98.2	99.1	100	98.7	98.8	98.4	99.5	0	99.0	99.0	98.2	99.2	100	98.7	98.7
Trucks	3	1	6	0	10	1	13	2	0	16	3	2	1	0	6	2	10	3	0	15	47
% Trucks	1.6	0.6	2.0	0	1.6	0.3	1.8	0.9	0	1.3	1.2	1.6	0.5	0	1.0	1.0	1.8	0.8	0	1.3	1.3



**Seasonal/Historical Adjustment Data & Crash Rate Worksheet**

---

**STATION 6125 - BELLINGHAM - RTE.I-495 - AT FRANKLIN T.I.**

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
2005	68,859	75,000	76,114	81,056	84,692	92,299	90,531	93,731	85,564	81,684	78,522	76,419	82,039
2006	74,825	72,901	78,382	80,386	82,080	86,982	86,481	90,748	84,958	81,767	80,901	77,982	81,533
2007	72,153	71,826	75,186	78,376	84,242	88,793	87,242	91,996	85,043	83,370	79,615	72,604	80,871
2008	71,744	70,760	73,000	77,938	81,066	83,867	84,721	88,163	80,551	81,608	75,924	71,971	78,443
2009	67,317	71,174	71,926	74,852	75,774	84,000	89,606	89,969	85,237	81,173	76,814	74,493	78,528
<b>Average:</b>	70,980	72,332	74,922	78,522	81,571	87,188	87,716	90,921	84,271	81,920	78,355	74,694	80,283

**Factor to**

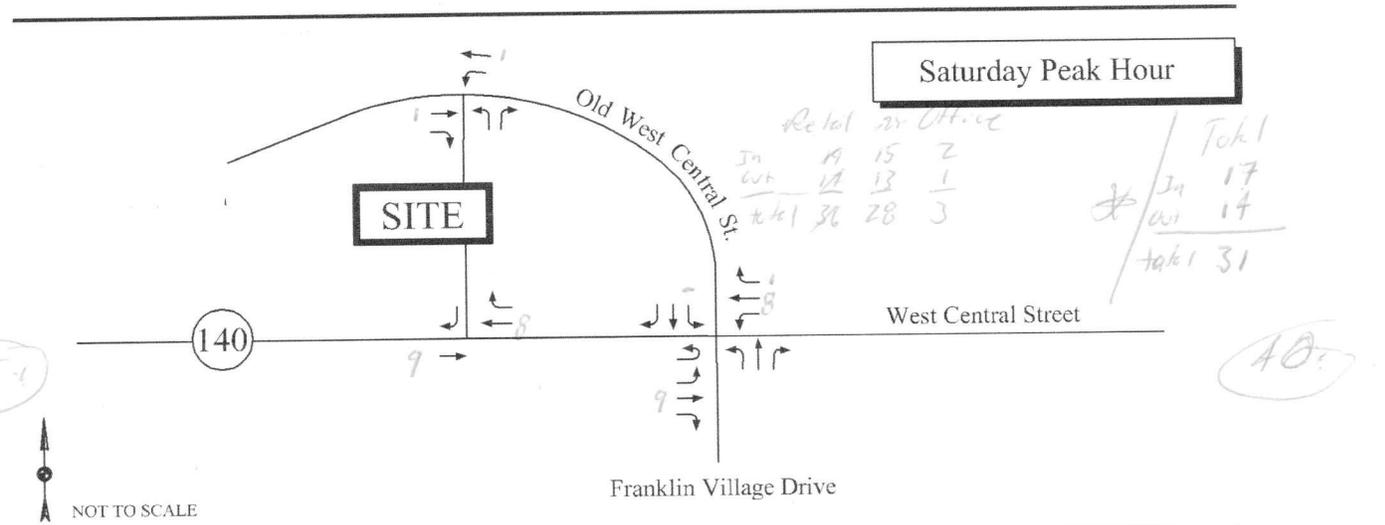
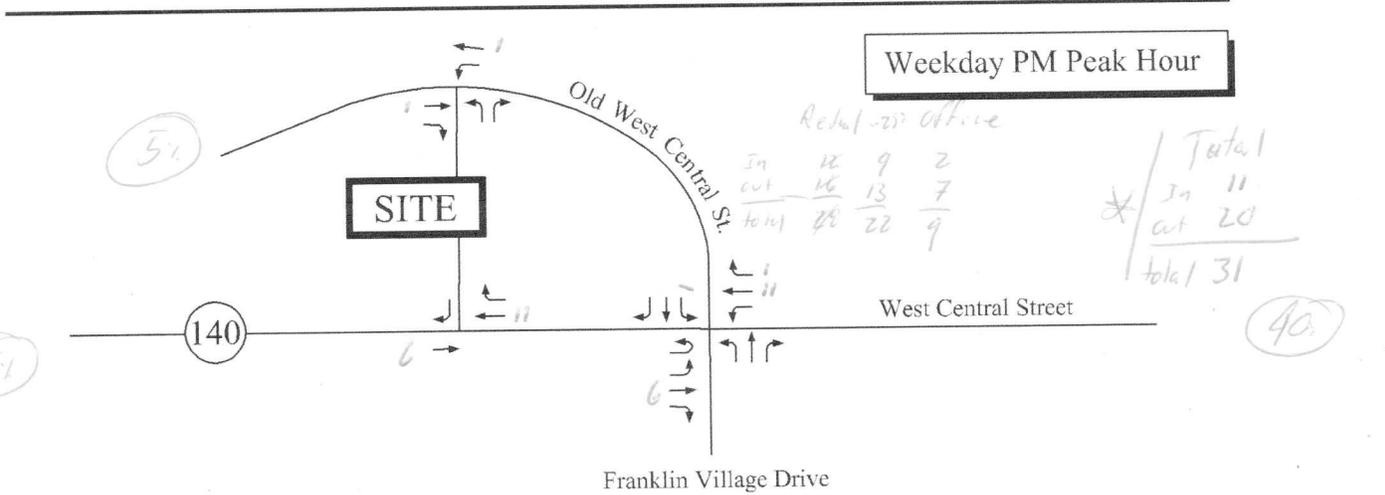
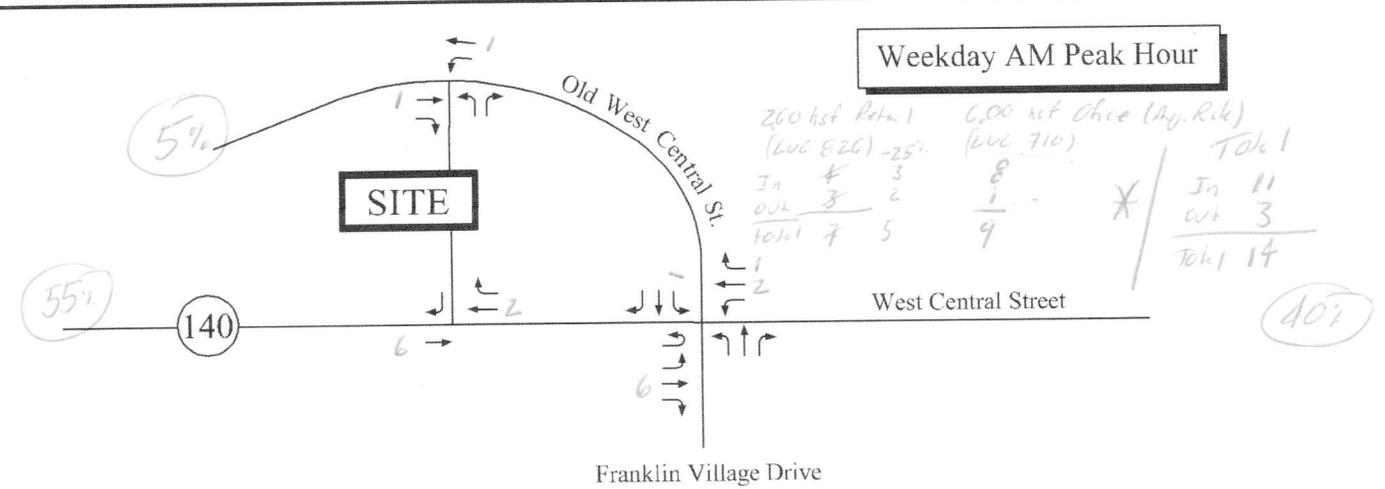
<b>Annual Avg.:</b>	1.13	1.11	1.07	1.02	0.98	0.92	0.92	0.88	0.95	0.98	1.02	1.07
---------------------	------	------	------	------	------	------	------	------	------	------	------	------

**Annual Growth:**

2005-2006	-0.62%
2005-2007	-0.71%
2005-2008	-1.46%
2005-2009	-1.07%
2006-2007	-0.81%
2006-2008	-1.89%
2006-2009	-1.23%
2007-2008	-3.00%
2007-2009	-1.45%
2008-2009	0.11%
<b>Avg. Growth:</b>	<b>-1.21%</b>

Wendys + Retail/Office

Peak Hour Traffic Volumes

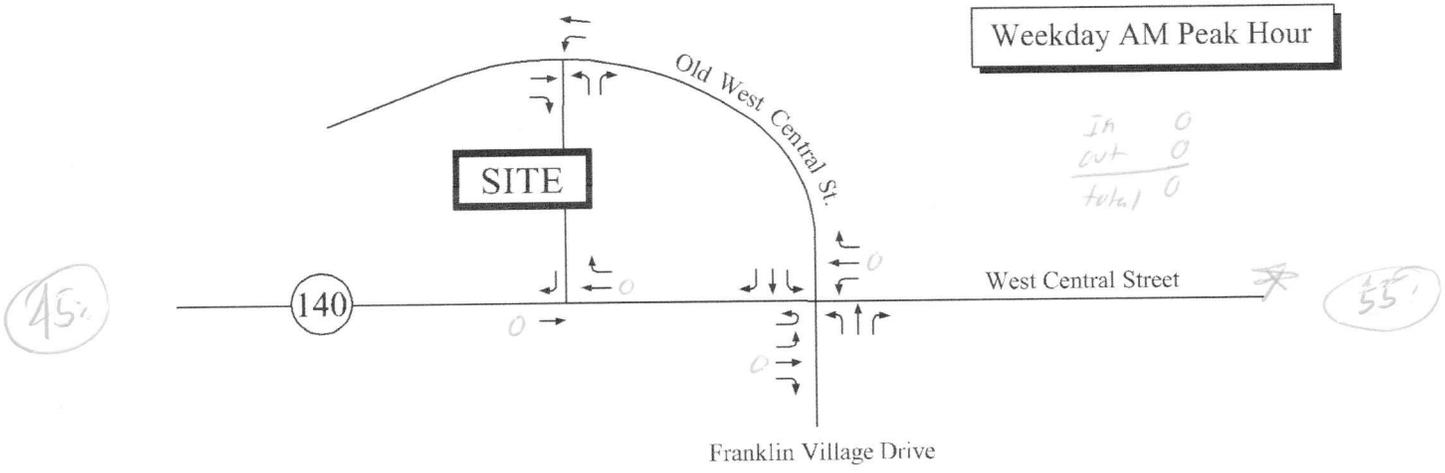


↑  
NOT TO SCALE

Taco Bell + Retail  
2 x 3000 sq ft

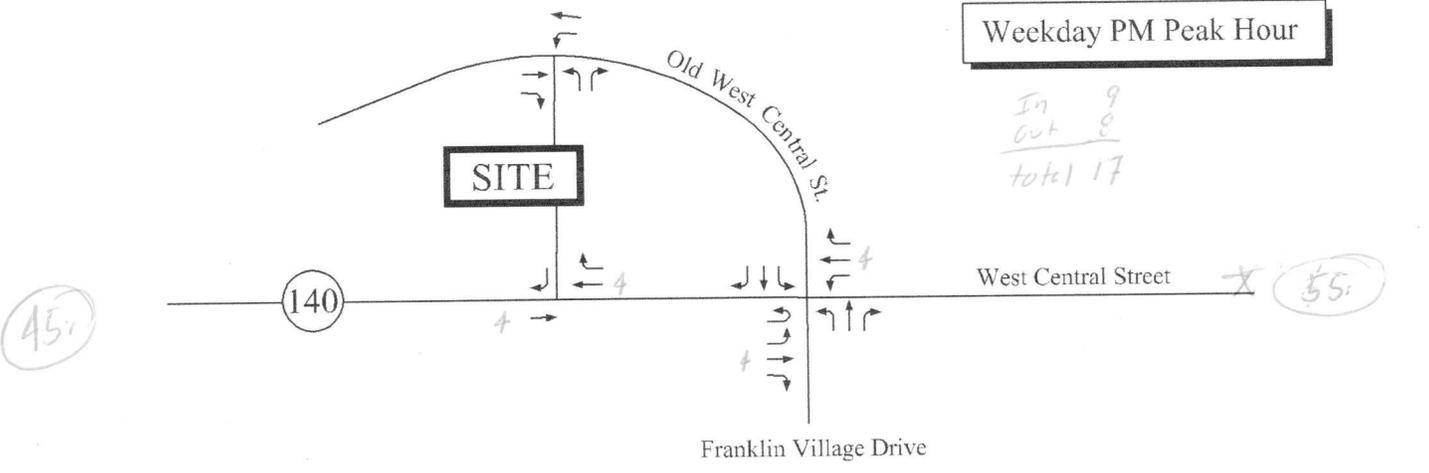
Peak Hour Traffic Volumes

Weekday AM Peak Hour



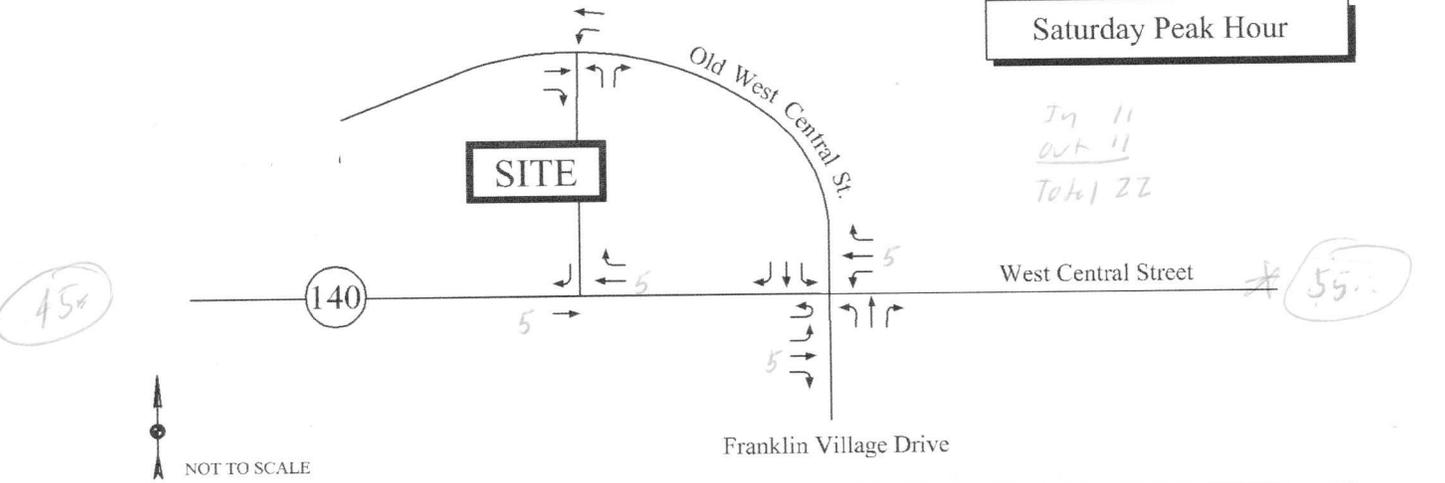
In 0  
out 0  
total 0

Weekday PM Peak Hour



In 9  
out 8  
total 17

Saturday Peak Hour

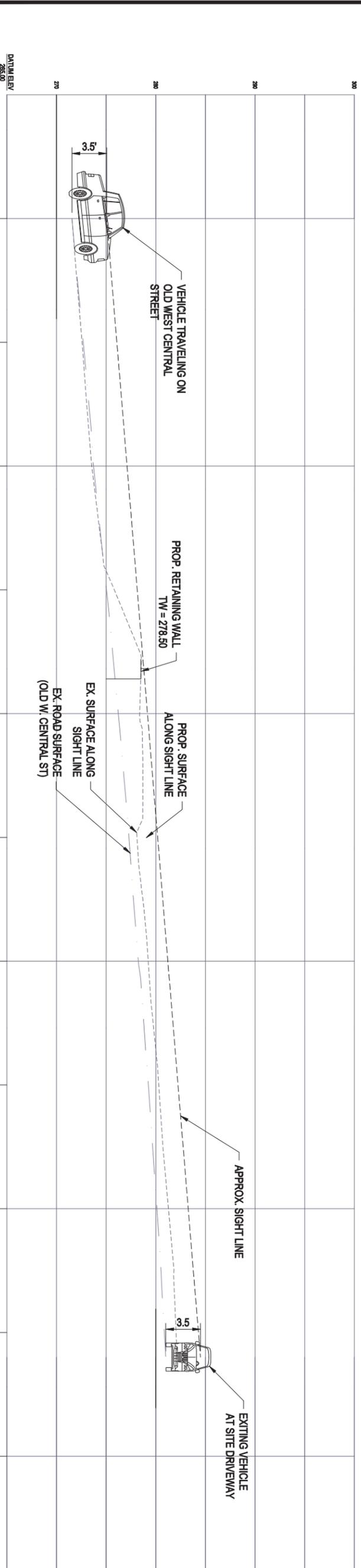
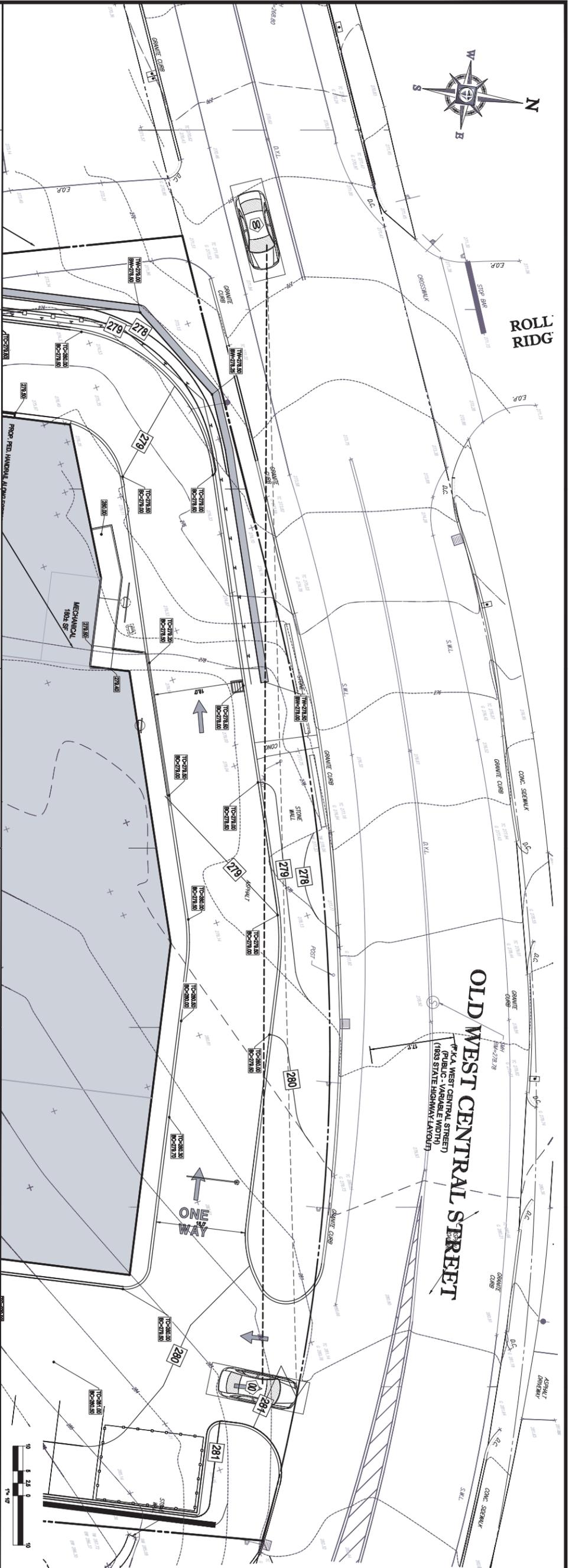


In 11  
out 11  
Total 22



## **Sight Distance Plan**

---



Sightline - Looking West - (2)

SCALE: 1" = 40' HORIZONTAL  
1" = 4' VERTICAL

**BOHLER ENGINEERING**

CIVIL & CONSULTING ENGINEERS

SURVEYORS

PROJECT MANAGERS

ENVIRONMENTAL CONSULTANTS

LANDSCAPE ARCHITECTS

CORPORATE OFFICE:  
WARREN, NJ

OFFICES:

- SOUTHBOROUGH, MA
- ROSELAND, NJ
- TOWSON, MD
- ALBANY, NY
- ROCKY HILL, CT
- CHALFONT, PA
- PHILADELPHIA, PA
- STERLING, VA
- WARRINGTON, VA
- FORT LAUDERDALE, FL
- TAMPA, FL

THE INFORMATION SHOWN AND COVERED BY THIS PLAN IS REPRESENTED AS BEING TRUE AND CORRECT FOR ANY PURPOSE WITHOUT FROM THE AUTHOR. THE INFORMATION SHOWN AND COVERED BY THIS PLAN IS NOT TO BE USED FOR ANY OTHER PURPOSES. © BOHLER ENGINEERING

REV	DATE	COMMENT	BY
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

**PRELIMINARY**

PROJECT No.: W13108  
DRAWN BY: MDS  
CHECKED BY: MDS  
DATE: 4/23/2010  
SCALE: AS NOTED  
CADD NO.: W13108B50

**SITE DEVELOPMENT PLANS FOR**

**LOCATION OF SITE**  
648 OLD WEST CENTRAL STREET  
FRANKLIN, MA  
NORFOLK COUNTY  
ASSESSOR'S LOT 30, 31, 32 MAP 271

**BOHLER ENGINEERING**

382 TURNPIKE ROAD  
SOUTHBOROUGH, MA 01772  
Tel: (508) 480-2000  
Fax: (508) 480-2000  
www.BohlerEngineering.com

**SIGHT DISTANCE EXHIBIT**

SHEET NUMBER: **X** OF 1

REV: 0 - 12/22/03

**Trip Generation Worksheets & Drive-Through Queue Summary**

---

***Institute of Transportation Engineers (ITE); 9th Edition***  
**Land Use Code (LUC) 937 - Coffee/Donut Shop with Drive-Through Window**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Floor Area  
 Independent Variable (X): 1.900

**AVERAGE WEEKDAY DAILY**

$$T = 818.58 * (X)$$

$$T = 1,555.30$$

$$T = 1,555 \text{ vehicle trips}$$

$$\text{with } 50\% ( 778 \text{ vpd) entering and } 50\% ( 778 \text{ vpd) exiting.}$$

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 100.58 * (X)$$

$$T = 191.10$$

$$T = 191 \text{ vehicle trips}$$

$$\text{with } 51\% ( 97 \text{ vph) entering and } 49\% ( 94 \text{ vph) exiting.}$$

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 42.80 * (X)$$

$$T = 81.32$$

$$T = 81 \text{ vehicle trips}$$

$$\text{with } 50\% ( 41 \text{ vph) entering and } 50\% ( 41 \text{ vph) exiting.}$$

**SATURDAY DAILY**

$$\frac{\text{Weekday Morning Peak Hour Trip Rate}}{\text{Saturday Peak Hour Trip Rate}} = \frac{\text{Weekday Daily Trip Rate}}{\text{Saturday Daily Trip Rate}}$$

$$\frac{100.58}{85.54} = \frac{818.58}{(Y)} \quad Y = 696.14$$

$$T = 696.14 * (X)$$

$$T = 1322.67$$

$$T = 1,323 \text{ vehicle trips}$$

$$\text{with } 50\% ( 661 \text{ vph) entering and } 50\% ( 662 \text{ vph) exiting.}$$

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$$\text{Ln } T = 0.64 \text{ Ln } (X) + 4.68$$

$$\text{Ln } T = 5.09$$

$$T = 162.52$$

$$T = 163 \text{ vehicle trips}$$

$$\text{with } 50\% ( 82 \text{ vph) entering and } 50\% ( 82 \text{ vph) exiting.}$$

**Institute of Transportation Engineers (ITE); 9th Edition**  
**Land Use Code (LUC) 720 - Medical-Dental Office Building**

Average Vehicle Trips Ends vs: 1000 Sq. Feet Gross Floor Area  
Independent Variable (X): 3.000

**AVERAGE WEEKDAY DAILY**

$T = 40.89 * (X) - 214.97$   
 $T = -92.30$   
 $T = -92$  vehicle trips  
with 50% ( -46 vph) entering and 50% ( -46 vph) exiting.

**WEEKDAY DAILY AVG. RATE**

$T = 36.13 * (X)$   
 $T = 108.39$   
 $T = 108$   
with 54 entering and 54 exiting

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 2.39 * (X)$   
 $T = 7.17$   
 $T = 7$  vehicle trips  
with 79% ( 6 vph) entering and 21% ( 1 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$\ln(T) = 0.90 * \ln(X) + 1.53$   
 $\ln(T) = 2.519$   
 $T = 12.41$   
 $T = 12$  vehicle trips  
with 28% ( 3 vph) entering and 72% ( 9 vph) exiting.

**WEEKDAY PM PEAK AVG. RATE**

$T = 3.57 * (X)$   
 $T = 10.71$   
 $T = 11$   
with 3 entering and 8 exiting

**SATURDAY DAILY**

$T = 8.96 * (X)$   
 $T = 26.88$   
 $T = 27$  vehicle trips  
with 50% ( 14 vph) entering and 50% ( 13 vph) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$T = 3.63 * (X)$   
 $T = 10.89$   
 $T = 11$  vehicle trips  
with 57% ( 6 vph) entering and 43% ( 5 vph) exiting.

**Institute of Transportation Engineers (ITE); 9th Edition**  
**Land Use Code (LUC) 826 - Specialty Retail Center**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Leasable Area  
 Independent Variable (X): 1.400

**AVERAGE WEEKDAY DAILY**

$$T = 42.78 * (X) + 37.66$$

$$T = 97.55$$

T = 98 vehicle trips  
 with 50% ( 49 vpd) entering and 50% ( 49 vpd) exiting.

**WEEKDAY AM PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$\frac{\text{ITE LUC 820 Weekday Morning Trip Rate}}{\text{ITE LUC 820 Weekday Evening Trip Rate}} = \frac{\text{ITE LUC 826 Weekday Morning Trip Rate}}{\text{ITE LUC 826 Weekday Evening Trip Rate}}$$

$$\frac{0.96}{3.71} = \frac{(Y)}{17.86} \quad Y = 4.62$$

$$T = 4.62 * (X)$$

$$T = 6.469$$

T = 6 vehicle trips  
 with 62% ( 4 vph) entering and 38% ( 2 vph) exiting.

*(same distribution split as ITE LUC 820 during the weekday morning peak hour of adjacent street traffic)*

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 2.40 * (X) + 21.48$$

$$T = 24.84$$

T = 25 vehicle trips  
 with 44% ( 11 vph) entering and 56% ( 14 vph) exiting.

**SATURDAY DAILY**

$$T = 42.04 * (X)$$

$$T = 58.86$$

T = 58 vehicle trips  
 with 50% ( 29 vpd) entering and 50% ( 29 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR**

$$\frac{\text{ITE LUC 820 Saturday Midday Trip Rate}}{\text{ITE LUC 820 Weekday Evening Trip Rate}} = \frac{\text{ITE LUC 826 Saturday Midday Trip Rate}}{\text{ITE LUC 826 Weekday Evening Trip Rate}}$$

$$\frac{4.82}{3.71} = \frac{(Y)}{17.86} \quad Y = 23.20$$

$$T = 23.20 * (X)$$

$$T = 32.48$$

T = 32 vehicle trips  
 with 52% ( 17 vph) entering and 48% ( 15 vph) exiting.

*(same distribution split as ITE LUC 820 during the Saturday midday peak hour of generator)*

***Institute of Transportation Engineers (ITE); 9th Edition***  
**Land Use Code (LUC) 932 - High-Turnover (Sit-Down) Restaurant**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Floor Area  
Independent Variable (X): 2.500

**AVERAGE WEEKDAY DAILY**

$$T = 127.15 * (X)$$

$$T = 317.88$$

T = 318 vehicle trips  
with 50% ( 159 vpd) entering and 50% ( 159 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 10.81 * (X)$$

$$T = 27.03$$

T = 27 vehicle trips  
with 55% ( 15 vph) entering and 45% ( 12 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 9.85 * (X)$$

$$T = 24.63$$

T = 25 vehicle trips  
with 60% ( 15 vph) entering and 40% ( 10 vph) exiting.

**SATURDAY DAILY**

$$T = 158.37 * (X)$$

$$T = 395.93$$

T = 396 vehicle trips  
with 50% ( 198 vpd) entering and 50% ( 198 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$$T = 14.07 * (X)$$

$$T = 35.18$$

T = 35 vehicle trips  
with 53% ( 19 vph) entering and 47% ( 16 vph) exiting.

**SUNDAY DAILY**

$$T = 131.84 * (X)$$

$$T = 329.60$$

T = 330 vehicle trips  
with 50% ( 165 vpd) entering and 50% ( 165 vpd) exiting.

**SUNDAY MIDDAY PEAK HOUR OF GENERATOR**

$$T = 18.46 * (X)$$

$$T = 46.15$$

T = 46 vehicle trips  
with 55% ( 25 vph) entering and 45% ( 21 vph) exiting.

**Ron Müller & Associates**  
*Traffic Engineering and Consulting Services*

Vehicle Queue Study - 7:00-9:00 AM  
Starbucks, Route 1, Walpole, MA

File Name : 13068 Starbucks Walpole AM  
Site Code : 13068  
Start Date : 11/21/2013  
Page No : 1

**Summary Information:**

7:02:00 AM - 9:00:00 AM	Drive-Trough
Total Vehicle Count:	110
Delayed Vehicle Count:	110
Through Vehicle Count:	0
Average Stopped Time:	385.47
Maximum Stopped Time:	685
Min. Secs. for Delay:	0
Average Queue:	6.01
Queue Density:	6.01
Maximum Queue:	10
Delay in Vehicle Hour:	6.01
Total Delay:	42402

## **Capacity Analysis Methodology and Worksheets**

---

## **General**

A primary result of capacity analysis is the assignment of levels of service to traffic facilities under various traffic flow conditions. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM); Transportation Research Board; Washington, D.C.; 2010. The concept of level of service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level of service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst. Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year. A description of the operating condition under each level of service is provided below:

- LOS A describes conditions with little to no delay to motorists.
- LOS B represents a desirable level with relatively low delay to motorists.
- LOS C describes conditions with average delays to motorists.
- LOS D describes operations where the influence of congestion becomes more noticeable. Delays are still within an acceptable range.
- LOS E represents operating conditions with high delay values. This level is considered by many agencies to be the limit of acceptable delay.
- LOS F is considered to be unacceptable to most drivers with high delay values that often occur, when arrival flow rates exceed the capacity of the intersection.

## **Unsignalized Intersections**

Levels of service for unsignalized intersections are calculated using the operational analysis methodology of the HCM. The procedure accounts for lane configuration on both the minor and major street approaches, conflicting traffic stream volumes, and the type of intersection control (STOP, YIELD, or all-way STOP control). The definition of level of service for unsignalized intersections is a function of average *control* delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The level-of-service criteria for unsignalized intersections are shown in Table A-1.

**Signalized Intersections**

Levels of service for signalized intersections are also calculated using the operational analysis methodology of the HCM. The methodology for signalized intersections assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometries on average *control* delay. Control delay includes queue move-up time and stopped delay. Table A-1 summarizes the relationship between level of service and average control delay.

**Table A-1**  
**Level-of-Service Criteria for Intersections**

<u>Level of Service</u>	<u>Unsignalized Criteria Average Control Delay In Seconds Per Vehicle</u>	<u>Signalized Criteria Average Control Delay In Seconds Per Vehicle</u>
A	≤ 10	≤ 10
B	10.1 to 15.0	10.1 to 20.0
C	15.1 to 25.0	20.1 to 35.0
D	25.1 to 35.0	35.1 to 55.0
E	35.1 to 50.0	55.1 to 80.0
F	>50	>80

For signalized intersections, this delay criterion may be applied in assigning level of service designations to individual lane groups, to individual intersection approaches, or to the entire intersection. For unsignalized intersections, this delay criterion may be applied in assigning level of service designations to individual lane groups or to individual intersection approaches.

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

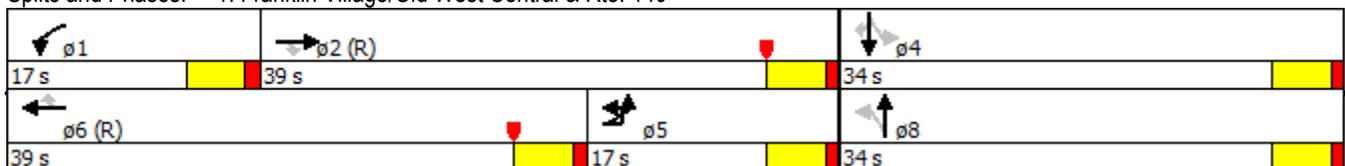
2013 Existing AM  
1/14/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	13	215	590	217	48	686	237	55	115	42	201	37
Satd. Flow (prot)	0	1703	3406	1524	1736	3471	1553	1719	1810	1538	1752	1845
Flt Permitted		0.950			0.950			0.730			0.669	
Satd. Flow (perm)	0	1703	3406	1524	1736	3471	1553	1321	1810	1538	1234	1845
Satd. Flow (RTOR)				241			263			206		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	6%	6%	4%	4%	4%	5%	5%	5%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	253	656	241	53	762	263	61	128	47	223	41
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	17.0	17.0	39.0	39.0	17.0	39.0	39.0	34.0	34.0		34.0	34.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		18.5	49.8	49.8	7.5	34.4	34.4	22.1	22.1	90.0	22.1	22.1
Actuated g/C Ratio		0.21	0.55	0.55	0.08	0.38	0.38	0.25	0.25	1.00	0.25	0.25
v/c Ratio		0.72	0.35	0.25	0.37	0.57	0.35	0.19	0.29	0.03	0.74	0.09
Control Delay		49.4	14.5	3.2	45.7	24.5	4.0	25.7	27.5	0.0	45.1	23.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		49.4	14.5	3.2	45.7	24.5	4.0	25.7	27.5	0.0	45.1	23.8
LOS		D	B	A	D	C	A	C	C	A	D	C
Approach Delay			19.8			20.5			21.5			26.7
Approach LOS			B			C			C			C
Queue Length 50th (ft)		132	116	0	29	185	0	27	58	0	115	18
Queue Length 95th (ft)		#314	193	44	64	237	48	54	96	0	179	39
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		350	1884	950	231	1357	767	425	583	1538	397	594
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.72	0.35	0.25	0.23	0.56	0.34	0.14	0.22	0.03	0.56	0.07

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 21.8  
 Intersection LOS: C  
 Intersection Capacity Utilization 80.8%  
 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: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	
Volume (vph)	445
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Satd. Flow (RTOR)	332
Peak Hour Factor	0.90
Heavy Vehicles (%)	3%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	494
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	34.0
Total Lost Time (s)	5.0
Act Effct Green (s)	22.1
Actuated g/C Ratio	0.25
v/c Ratio	0.78
Control Delay	18.7
Queue Delay	0.0
Total Delay	18.7
LOS	B
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	80
Queue Length 95th (ft)	187
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	730
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.68
Intersection Summary	

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

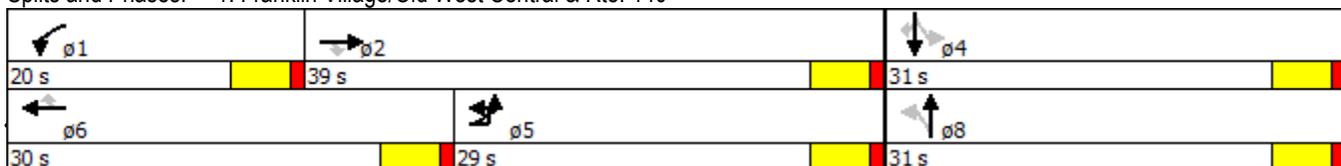
2013 Existing PM  
1/14/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	21	415	668	410	204	590	192	277	168	235	161	116
Satd. Flow (prot)	0	1787	3574	1599	1787	3574	1599	1787	1881	1599	1787	1881
Flt Permitted		0.950			0.950			0.679			0.609	
Satd. Flow (perm)	0	1787	3574	1599	1787	3574	1599	1277	1881	1599	1146	1881
Satd. Flow (RTOR)				427			200			245		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	454	696	427	212	615	200	289	175	245	168	121
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	29.0	29.0	39.0	39.0	20.0	30.0	30.0	31.0	31.0		31.0	31.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		23.1	30.3	30.3	12.9	20.0	20.0	22.0	22.0	80.5	22.0	22.0
Actuated g/C Ratio		0.29	0.38	0.38	0.16	0.25	0.25	0.27	0.27	1.00	0.27	0.27
v/c Ratio		0.88	0.52	0.49	0.74	0.69	0.36	0.83	0.34	0.15	0.54	0.24
Control Delay		50.8	21.9	4.2	51.0	32.4	6.1	49.9	26.5	0.2	33.3	25.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		50.8	21.9	4.2	51.0	32.4	6.1	49.9	26.5	0.2	33.3	25.2
LOS		D	C	A	D	C	A	D	C	A	C	C
Approach Delay			25.5			31.1			27.0			17.5
Approach LOS			C			C			C			B
Queue Length 50th (ft)		236	155	0	108	157	0	141	73	0	75	49
Queue Length 95th (ft)		#442	211	58	#213	217	49	#280	134	0	145	96
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		545	1545	933	340	1136	644	422	621	1599	378	621
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.83	0.45	0.46	0.62	0.54	0.31	0.68	0.28	0.15	0.44	0.19

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 80.5  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 26.0  
 Intersection LOS: C  
 Intersection Capacity Utilization 90.6%  
 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: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	
Volume (vph)	292
Satd. Flow (prot)	1599
Flt Permitted	
Satd. Flow (perm)	1599
Satd. Flow (RTOR)	304
Peak Hour Factor	0.96
Heavy Vehicles (%)	1%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	304
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	31.0
Total Lost Time (s)	5.0
Act Effct Green (s)	22.0
Actuated g/C Ratio	0.27
v/c Ratio	0.46
Control Delay	5.7
Queue Delay	0.0
Total Delay	5.7
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	59
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	732
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.42
Intersection Summary	

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

2013 Existing Sat  
1/14/2014

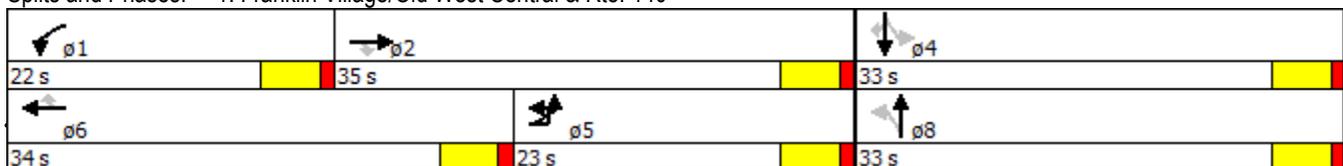
Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	6	200	565	357	287	733	231	254	123	199	187	161
Satd. Flow (prot)	0	1787	3574	1599	1787	3574	1599	1787	1881	1599	1770	1863
Flt Permitted		0.950			0.950			0.640			0.675	
Satd. Flow (perm)	0	1787	3574	1599	1787	3574	1599	1204	1881	1599	1257	1863
Satd. Flow (RTOR)				372			241			207		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	214	589	372	299	764	241	265	128	207	195	168
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	23.0	23.0	35.0	35.0	22.0	34.0	34.0	33.0	33.0		33.0	33.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		14.2	21.2	21.2	15.8	22.8	22.8	21.5	21.5	74.2	21.5	21.5
Actuated g/C Ratio		0.19	0.29	0.29	0.21	0.31	0.31	0.29	0.29	1.00	0.29	0.29
v/c Ratio		0.63	0.58	0.51	0.79	0.70	0.37	0.76	0.24	0.13	0.54	0.31
Control Delay		39.2	25.6	5.4	47.6	27.4	5.0	41.2	23.0	0.2	29.9	23.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		39.2	25.6	5.4	47.6	27.4	5.0	41.2	23.0	0.2	29.9	23.8
LOS		D	C	A	D	C	A	D	C	A	C	C
Approach Delay			21.7			27.9			23.1			16.9
Approach LOS			C			C			C			B
Queue Length 50th (ft)		96	127	0	133	164	0	111	45	0	75	60
Queue Length 95th (ft)		185	189	59	#313	258	50	#244	97	0	157	125
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		454	1514	892	429	1463	797	475	744	1599	497	736
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.47	0.39	0.42	0.70	0.52	0.30	0.56	0.17	0.13	0.39	0.23

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 74.2  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.79  
 Intersection Signal Delay: 23.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 81.4%  
 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: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	
Volume (vph)	307
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	320
Peak Hour Factor	0.96
Heavy Vehicles (%)	2%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	320
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	33.0
Total Lost Time (s)	5.0
Act Effct Green (s)	21.5
Actuated g/C Ratio	0.29
v/c Ratio	0.47
Control Delay	5.4
Queue Delay	0.0
Total Delay	5.4
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	57
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	819
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.39
Intersection Summary	

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

2020 No-Build AM  
1/14/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	13	230	638	217	48	737	255	55	115	42	216	37
Satd. Flow (prot)	0	1703	3406	1524	1736	3471	1553	1719	1810	1538	1752	1845
Flt Permitted		0.950			0.950			0.730			0.671	
Satd. Flow (perm)	0	1703	3406	1524	1736	3471	1553	1321	1810	1538	1238	1845
Satd. Flow (RTOR)				241			283			206		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	6%	6%	4%	4%	4%	5%	5%	5%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	270	709	241	53	819	283	61	128	47	240	41
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	17.0	17.0	39.0	39.0	17.0	39.0	39.0	34.0	34.0		34.0	34.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		18.7	48.9	48.9	7.5	33.3	33.3	22.9	22.9	90.0	22.9	22.9
Actuated g/C Ratio		0.21	0.54	0.54	0.08	0.37	0.37	0.25	0.25	1.00	0.25	0.25
v/c Ratio		0.76	0.38	0.26	0.37	0.64	0.38	0.18	0.28	0.03	0.76	0.09
Control Delay		52.9	15.3	3.2	45.7	26.1	4.0	25.1	26.7	0.0	46.1	23.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		52.9	15.3	3.2	45.7	26.1	4.0	25.1	26.7	0.0	46.1	23.3
LOS		D	B	A	D	C	A	C	C	A	D	C
Approach Delay			21.2			21.6			21.0			30.1
Approach LOS			C			C			C			C
Queue Length 50th (ft)		146	131	0	29	202	0	27	57	0	124	17
Queue Length 95th (ft)		#339	211	44	64	258	49	54	96	0	195	39
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		354	1852	938	231	1312	763	425	583	1538	398	594
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.76	0.38	0.26	0.23	0.62	0.37	0.14	0.22	0.03	0.60	0.07

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 23.4

Intersection LOS: C

Intersection Capacity Utilization 85.0%

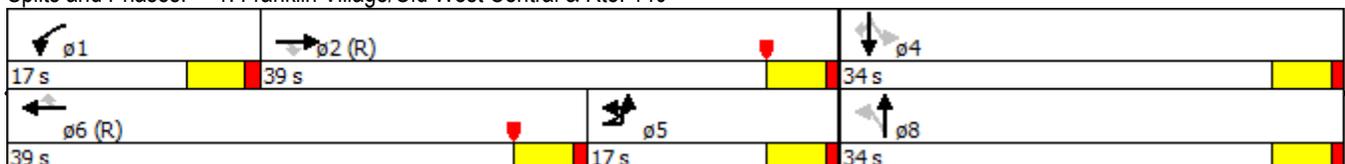
ICU Level of Service E

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	7
Volume (vph)	477
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Satd. Flow (RTOR)	322
Peak Hour Factor	0.90
Heavy Vehicles (%)	3%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	530
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	34.0
Total Lost Time (s)	5.0
Act Effct Green (s)	22.9
Actuated g/C Ratio	0.25
v/c Ratio	0.83
Control Delay	23.4
Queue Delay	0.0
Total Delay	23.4
LOS	C
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	111
Queue Length 95th (ft)	230
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	723
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.73
Intersection Summary	

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

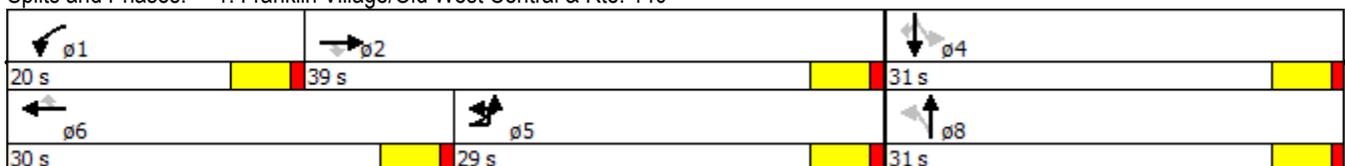
2020 No-Build PM  
1/14/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	21	445	726	410	204	647	207	277	168	235	174	116
Satd. Flow (prot)	0	1787	3574	1599	1787	3574	1599	1787	1881	1599	1787	1881
Flt Permitted		0.950			0.950			0.679			0.602	
Satd. Flow (perm)	0	1787	3574	1599	1787	3574	1599	1277	1881	1599	1132	1881
Satd. Flow (RTOR)				427			216			245		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	486	756	427	212	674	216	289	175	245	181	121
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	29.0	29.0	39.0	39.0	20.0	30.0	30.0	31.0	31.0		31.0	31.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		24.3	32.9	32.9	13.0	21.6	21.6	22.3	22.3	83.4	22.3	22.3
Actuated g/C Ratio		0.29	0.39	0.39	0.16	0.26	0.26	0.27	0.27	1.00	0.27	0.27
v/c Ratio		0.93	0.54	0.48	0.77	0.73	0.38	0.85	0.35	0.15	0.60	0.24
Control Delay		59.0	22.1	4.1	53.7	33.7	5.9	52.8	27.1	0.2	36.2	25.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		59.0	22.1	4.1	53.7	33.7	5.9	52.8	27.1	0.2	36.2	25.6
LOS		E	C	A	D	C	A	D	C	A	D	C
Approach Delay			28.3			32.1			28.3			18.4
Approach LOS			C			C			C			B
Queue Length 50th (ft)		~278	175	0	114	179	0	148	77	0	86	51
Queue Length 95th (ft)		#485	232	58	#213	240	51	#280	134	0	156	96
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		520	1473	910	324	1083	635	402	593	1599	357	593
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.93	0.51	0.47	0.65	0.62	0.34	0.72	0.30	0.15	0.51	0.20

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 83.4  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 27.8  
 Intersection LOS: C  
 Intersection Capacity Utilization 95.1%  
 ICU Level of Service F  
 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: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	
Volume (vph)	313
Satd. Flow (prot)	1599
Flt Permitted	
Satd. Flow (perm)	1599
Satd. Flow (RTOR)	326
Peak Hour Factor	0.96
Heavy Vehicles (%)	1%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	326
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	31.0
Total Lost Time (s)	5.0
Act Effct Green (s)	22.3
Actuated g/C Ratio	0.27
v/c Ratio	0.49
Control Delay	5.8
Queue Delay	0.0
Total Delay	5.8
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	60
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	727
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.45
Intersection Summary	

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

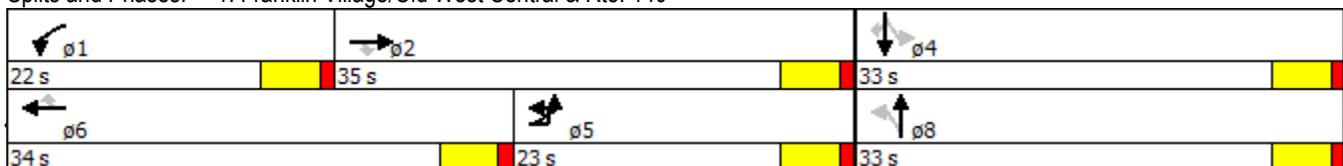
2020 No-Build Sat  
1/14/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	6	214	620	357	287	799	249	254	123	199	201	161
Satd. Flow (prot)	0	1787	3574	1599	1787	3574	1599	1787	1881	1599	1770	1863
Flt Permitted		0.950			0.950			0.635			0.675	
Satd. Flow (perm)	0	1787	3574	1599	1787	3574	1599	1195	1881	1599	1257	1863
Satd. Flow (RTOR)				372			259			207		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	229	646	372	299	832	259	265	128	207	209	168
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	23.0	23.0	35.0	35.0	22.0	34.0	34.0	33.0	33.0		33.0	33.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		14.2	22.6	22.6	15.9	24.4	24.4	21.9	21.9	76.1	21.9	21.9
Actuated g/C Ratio		0.19	0.30	0.30	0.21	0.32	0.32	0.29	0.29	1.00	0.29	0.29
v/c Ratio		0.69	0.61	0.50	0.80	0.73	0.38	0.77	0.24	0.13	0.58	0.31
Control Delay		42.8	26.1	5.2	49.8	28.3	4.9	43.0	23.5	0.2	31.9	24.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		42.8	26.1	5.2	49.8	28.3	4.9	43.0	23.5	0.2	31.9	24.4
LOS		D	C	A	D	C	A	D	C	A	C	C
Approach Delay			22.9			28.6			24.1			17.6
Approach LOS			C			C			C			B
Queue Length 50th (ft)		110	145	0	146	192	0	121	49	0	89	66
Queue Length 95th (ft)		197	209	59	#313	286	51	#245	97	0	169	125
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		442	1473	878	417	1424	793	459	723	1599	483	716
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.52	0.44	0.42	0.72	0.58	0.33	0.58	0.18	0.13	0.43	0.23

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 76.1  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 24.1  
 Intersection LOS: C  
 Intersection Capacity Utilization 85.4%  
 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: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	
Volume (vph)	329
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	343
Peak Hour Factor	0.96
Heavy Vehicles (%)	2%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	343
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	33.0
Total Lost Time (s)	5.0
Act Effct Green (s)	21.9
Actuated g/C Ratio	0.29
v/c Ratio	0.49
Control Delay	5.5
Queue Delay	0.0
Total Delay	5.5
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	59
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	819
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.42
Intersection Summary	

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

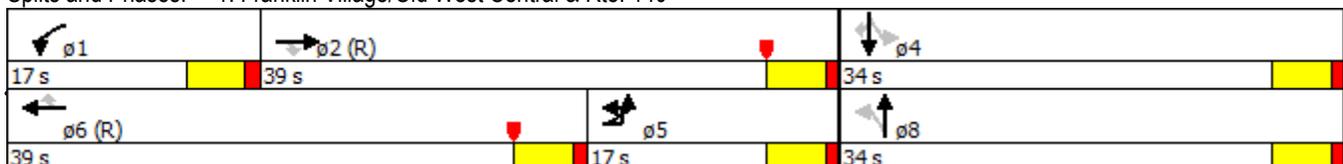
2020 Build AM  
2/5/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	35	253	606	217	48	748	255	55	115	42	254	37
Satd. Flow (prot)	0	1703	3406	1524	1736	3471	1553	1719	1810	1538	1752	1845
Flt Permitted		0.950			0.950			0.730			0.675	
Satd. Flow (perm)	0	1703	3406	1524	1736	3471	1553	1321	1810	1538	1245	1845
Satd. Flow (RTOR)				241			283			206		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	6%	6%	4%	4%	4%	5%	5%	5%	3%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	320	673	241	53	831	283	61	128	47	282	41
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	17.0	17.0	39.0	39.0	17.0	39.0	39.0	34.0	34.0		34.0	34.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		17.9	47.1	47.1	7.5	32.2	32.2	24.8	24.8	90.0	24.8	24.8
Actuated g/C Ratio		0.20	0.52	0.52	0.08	0.36	0.36	0.28	0.28	1.00	0.28	0.28
v/c Ratio		0.94	0.38	0.26	0.37	0.67	0.38	0.17	0.26	0.03	0.82	0.08
Control Delay		77.0	16.0	3.3	45.7	27.4	4.1	24.0	25.4	0.0	49.8	22.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		77.0	16.0	3.3	45.7	27.4	4.1	24.0	25.4	0.0	49.8	22.4
LOS		E	B	A	D	C	A	C	C	A	D	C
Approach Delay			29.3			22.6			20.0			34.5
Approach LOS			C			C			B			C
Queue Length 50th (ft)		183	132	0	29	212	0	25	54	0	144	17
Queue Length 95th (ft)		#408	198	44	64	263	49	54	96	0	#243	39
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		339	1780	911	231	1311	762	425	583	1538	401	594
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.94	0.38	0.26	0.23	0.63	0.37	0.14	0.22	0.03	0.70	0.07

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.94  
 Intersection Signal Delay: 27.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 87.1%  
 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: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	
Volume (vph)	465
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Satd. Flow (RTOR)	260
Peak Hour Factor	0.90
Heavy Vehicles (%)	3%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	517
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	34.0
Total Lost Time (s)	5.0
Act Effct Green (s)	24.8
Actuated g/C Ratio	0.28
v/c Ratio	0.83
Control Delay	27.1
Queue Delay	0.0
Total Delay	27.1
LOS	C
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	135
Queue Length 95th (ft)	264
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	681
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.76
Intersection Summary	

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	561	23	31	286	11	43
Satd. Flow (prot)	1835	0	0	1800	1661	0
Flt Permitted				0.995	0.990	
Satd. Flow (perm)	1835	0	0	1800	1661	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	3%	3%	5%	5%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	649	0	0	352	60	0
Sign Control	Free			Free	Stop	

Intersection Summary

Control Type: Unsignalized	
Intersection Capacity Utilization 50.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection

Int Delay, s/veh 1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	561	23	31	286	11	43
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, %	3	3	5	5	1	1
Mvmt Flow	623	26	34	318	12	48

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	649	1023
Stage 1	-	-	636
Stage 2	-	-	387
Critical Hdwy	-	4.15	6.41
Critical Hdwy Stg 1	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41
Follow-up Hdwy	-	2.245	3.509
Pot Cap-1 Maneuver	-	923	262
Stage 1	-	-	529
Stage 2	-	-	688
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	923	250
Mov Cap-2 Maneuver	-	-	250
Stage 1	-	-	529
Stage 2	-	-	657

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	15.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	404	-	-	923	-
HCM Lane V/C Ratio	0.149	-	-	0.037	-
HCM Control Delay (s)	15.5	-	-	9.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Lanes, Volumes, Timings  
8: Rte. 140 & Site Drive

2020 Build AM  
2/5/2014

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	1111	1235	68	0	55
Satd. Flow (prot)	0	3406	3443	0	0	1465
Flt Permitted						
Satd. Flow (perm)	0	3406	3443	0	0	1465
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	4%	4%	1%	1%
Parking (#/hr)						0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1234	1448	0	0	61
Sign Control		Free	Free		Stop	

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 46.4% ICU Level of Service A

Analysis Period (min) 15

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	1111	1235	68	0	55
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, %	6	6	4	4	1	1
Mvmt Flow	0	1234	1372	76	0	61

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1448	0	724
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.22	-	6.92
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.26	-	3.31
Pot Cap-1 Maneuver	444	-	370
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	444	-	370
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	16.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	444	-	-	-	370
HCM Lane V/C Ratio	-	-	-	-	0.165
HCM Control Delay (s)	0	-	-	-	16.6
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

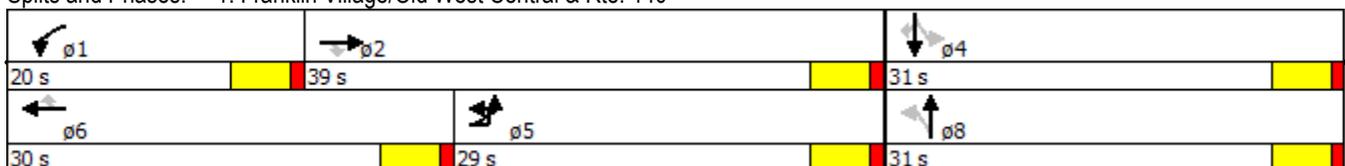
2020 Build PM  
2/5/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	35	460	708	410	204	655	207	277	168	235	202	116
Satd. Flow (prot)	0	1787	3574	1599	1787	3574	1599	1787	1881	1599	1787	1881
Flt Permitted		0.950			0.950			0.679			0.601	
Satd. Flow (perm)	0	1787	3574	1599	1787	3574	1599	1277	1881	1599	1131	1881
Satd. Flow (RTOR)				427			216			245		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	515	738	427	212	682	216	289	175	245	210	121
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	29.0	29.0	39.0	39.0	20.0	30.0	30.0	31.0	31.0		31.0	31.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		24.3	33.0	33.0	13.0	21.7	21.7	22.3	22.3	83.5	22.3	22.3
Actuated g/C Ratio		0.29	0.40	0.40	0.16	0.26	0.26	0.27	0.27	1.00	0.27	0.27
v/c Ratio		0.99	0.52	0.48	0.77	0.73	0.38	0.85	0.35	0.15	0.70	0.24
Control Delay		71.4	21.9	4.1	53.9	33.9	5.9	52.9	27.2	0.2	41.3	25.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		71.4	21.9	4.1	53.9	33.9	5.9	52.9	27.2	0.2	41.3	25.7
LOS		E	C	A	D	C	A	D	C	A	D	C
Approach Delay			32.6			32.2			28.4			20.9
Approach LOS			C			C			C			C
Queue Length 50th (ft)		~327	170	0	114	182	0	149	77	0	103	52
Queue Length 95th (ft)		#523	226	58	#213	243	51	#280	134	0	184	96
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		519	1471	909	324	1082	634	401	592	1599	355	592
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.99	0.50	0.47	0.65	0.63	0.34	0.72	0.30	0.15	0.59	0.20

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 83.5  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.99  
 Intersection Signal Delay: 29.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 96.7%  
 ICU Level of Service F  
 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: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	7
Volume (vph)	310
Satd. Flow (prot)	1599
Flt Permitted	
Satd. Flow (perm)	1599
Satd. Flow (RTOR)	323
Peak Hour Factor	0.96
Heavy Vehicles (%)	1%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	323
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	31.0
Total Lost Time (s)	5.0
Act Effct Green (s)	22.3
Actuated g/C Ratio	0.27
v/c Ratio	0.49
Control Delay	5.8
Queue Delay	0.0
Total Delay	5.8
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	60
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	724
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.45
Intersection Summary	

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	532	11	22	669	12	31
Satd. Flow (prot)	1876	0	0	1877	1675	0
Flt Permitted				0.998	0.987	
Satd. Flow (perm)	1876	0	0	1877	1675	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	565	0	0	720	44	0
Sign Control	Free			Free	Stop	

Intersection Summary

Control Type: Unsignalized	
Intersection Capacity Utilization 63.0%	ICU Level of Service B
Analysis Period (min) 15	

Intersection

Int Delay, s/veh 0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	532	11	22	669	12	31
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	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	554	11	23	697	12	32

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	566
Stage 1	-	-	560
Stage 2	-	-	743
Critical Hdwy	-	-	4.11
Critical Hdwy Stg 1	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41
Follow-up Hdwy	-	-	2.209
Pot Cap-1 Maneuver	-	-	1011
Stage 1	-	-	574
Stage 2	-	-	472
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1011
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	574
Stage 2	-	-	455

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	17.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	334	-	-	1011	-
HCM Lane V/C Ratio	0.134	-	-	0.023	-
HCM Control Delay (s)	17.4	-	-	8.6	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	1613	1240	37	0	31
Satd. Flow (prot)	0	3574	3560	0	0	1627
Flt Permitted						
Satd. Flow (perm)	0	3574	3560	0	0	1627
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1680	1331	0	0	32
Sign Control		Free	Free		Stop	

Intersection Summary

Control Type: Unsignalized	
Intersection Capacity Utilization 47.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	1613	1240	37	0	31
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	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	0	1680	1292	39	0	32

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1330	0	665
Stage 1	-	-	1311
Stage 2	-	-	840
Critical Hdwy	4.12	-	6.92
Critical Hdwy Stg 1	-	-	5.82
Critical Hdwy Stg 2	-	-	5.82
Follow-up Hdwy	2.21	-	3.31
Pot Cap-1 Maneuver	520	-	405
Stage 1	-	-	218
Stage 2	-	-	386
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	520	-	405
Mov Cap-2 Maneuver	-	-	42
Stage 1	-	-	218
Stage 2	-	-	386

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	520	-	-	-	405
HCM Lane V/C Ratio	-	-	-	-	0.08
HCM Control Delay (s)	0	-	-	-	14.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

2020 Build Sat  
2/5/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	28	237	592	357	287	813	249	254	123	199	240	161
Satd. Flow (prot)	0	1787	3574	1599	1787	3574	1599	1787	1881	1599	1770	1863
Flt Permitted		0.950			0.950			0.630			0.675	
Satd. Flow (perm)	0	1787	3574	1599	1787	3574	1599	1185	1881	1599	1257	1863
Satd. Flow (RTOR)				372			259			207		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	276	617	372	299	847	259	265	128	207	250	168
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	23.0	23.0	35.0	35.0	22.0	34.0	34.0	33.0	33.0		33.0	33.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		15.5	24.4	24.4	16.0	25.0	25.0	22.2	22.2	78.3	22.2	22.2
Actuated g/C Ratio		0.20	0.31	0.31	0.20	0.32	0.32	0.28	0.28	1.00	0.28	0.28
v/c Ratio		0.78	0.55	0.49	0.82	0.74	0.38	0.79	0.24	0.13	0.70	0.32
Control Delay		48.9	25.0	5.0	52.4	29.4	4.9	45.2	24.1	0.2	37.9	25.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		48.9	25.0	5.0	52.4	29.4	4.9	45.2	24.1	0.2	37.9	25.0
LOS		D	C	A	D	C	A	D	C	A	D	C
Approach Delay			24.4			29.8			25.2			20.6
Approach LOS			C			C			C			C
Queue Length 50th (ft)		142	140	0	159	212	0	131	53	0	120	71
Queue Length 95th (ft)		#269	199	59	#313	293	51	#247	97	0	206	125
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		427	1425	861	403	1377	775	440	700	1599	468	693
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.65	0.43	0.43	0.74	0.62	0.33	0.60	0.18	0.13	0.53	0.24

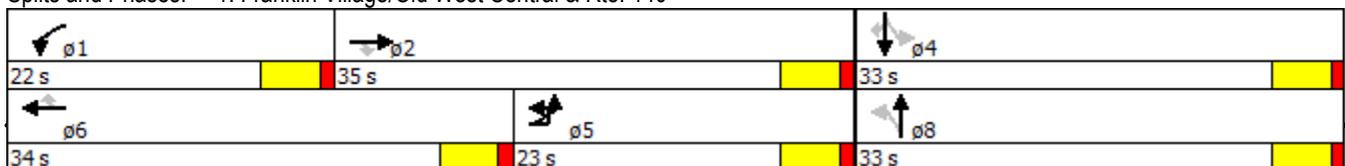
Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 78.3  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.82  
 Intersection Signal Delay: 25.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 87.8%  
 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: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	
Volume (vph)	321
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Satd. Flow (RTOR)	334
Peak Hour Factor	0.96
Heavy Vehicles (%)	2%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	334
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	33.0
Total Lost Time (s)	5.0
Act Effct Green (s)	22.2
Actuated g/C Ratio	0.28
v/c Ratio	0.49
Control Delay	5.5
Queue Delay	0.0
Total Delay	5.5
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	59
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	798
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.42
Intersection Summary	

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	543	20	35	476	19	43
Satd. Flow (prot)	1853	0	0	1857	1681	0
Flt Permitted				0.997	0.985	
Satd. Flow (perm)	1853	0	0	1857	1681	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	587	0	0	532	65	0
Sign Control	Free			Free	Stop	

Intersection Summary

Control Type: Unsignalized	
Intersection Capacity Utilization 64.2%	ICU Level of Service C
Analysis Period (min) 15	

Intersection

Int Delay, s/veh 1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	543	20	35	476	19	43
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	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	1	1
Mvmt Flow	566	21	36	496	20	45

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	576
Stage 1	-	-	576
Stage 2	-	-	569
Critical Hdwy	-	4.12	6.41
Critical Hdwy Stg 1	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41
Follow-up Hdwy	-	2.218	3.509
Pot Cap-1 Maneuver	-	989	519
Stage 1	-	-	564
Stage 2	-	-	568
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	989	519
Mov Cap-2 Maneuver	-	-	211
Stage 1	-	-	564
Stage 2	-	-	540

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	17.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	359	-	-	989	-
HCM Lane V/C Ratio	0.18	-	-	0.037	-
HCM Control Delay (s)	17.2	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.1	-

Lanes, Volumes, Timings  
8: Rte. 140 & Site Drive

2020 Build Sat  
2/5/2014

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	0	1214	1347	69	0	56
Satd. Flow (prot)	0	3539	3514	0	0	1627
Flt Permitted						
Satd. Flow (perm)	0	3539	3514	0	0	1627
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1265	1475	0	0	58
Sign Control		Free	Free		Stop	

Intersection Summary

Control Type: Unsignalized	
Intersection Capacity Utilization 49.6%	ICU Level of Service A
Analysis Period (min) 15	

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	1214	1347	69	0	56
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	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	1	1
Mvmt Flow	0	1265	1403	72	0	58

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1475	0	738
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	6.92
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	3.31
Pot Cap-1 Maneuver	453	-	363
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	453	-	363
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	16.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	453	-	-	-	363
HCM Lane V/C Ratio	-	-	-	-	0.161
HCM Control Delay (s)	0	-	-	-	16.8
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.6



Lane Group	SBR
Lane Configurations	
Volume (vph)	465
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Satd. Flow (RTOR)	454
Peak Hour Factor	0.90
Heavy Vehicles (%)	3%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	517
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	30.0
Total Lost Time (s)	5.0
Act Effct Green (s)	21.5
Actuated g/C Ratio	0.28
v/c Ratio	0.68
Control Delay	9.4
Queue Delay	0.0
Total Delay	9.4
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	25
Queue Length 95th (ft)	120
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	821
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.63
Intersection Summary	

Lanes, Volumes, Timings  
1: Franklin Village/Old West Central & Rte. 140

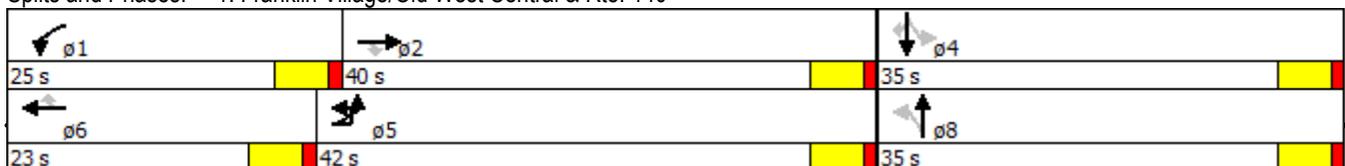
2020 Build PM  
2/5/2014

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	35	460	708	410	204	655	207	277	168	235	202	116
Satd. Flow (prot)	0	1787	3574	1599	1787	3574	1599	1787	1881	1599	1787	1881
Flt Permitted		0.950			0.950			0.679			0.600	
Satd. Flow (perm)	0	1787	3574	1599	1787	3574	1599	1277	1881	1599	1129	1881
Satd. Flow (RTOR)				427			216			245		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	515	738	427	212	682	216	289	175	245	210	121
Turn Type	Prot	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA
Protected Phases	5	5	2		1	6			8			4
Permitted Phases				2			6	8		Free		4
Total Split (s)	42.0	42.0	40.0	40.0	25.0	23.0	23.0	35.0	35.0		35.0	35.0
Total Lost Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)		28.7	32.8	32.8	14.4	18.5	18.5	23.7	23.7	86.3	23.7	23.7
Actuated g/C Ratio		0.33	0.38	0.38	0.17	0.21	0.21	0.27	0.27	1.00	0.27	0.27
v/c Ratio		0.87	0.54	0.49	0.71	0.89	0.42	0.82	0.34	0.15	0.68	0.23
Control Delay		43.8	24.3	4.5	49.5	51.4	8.0	50.7	28.0	0.2	41.2	26.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		43.8	24.3	4.5	49.5	51.4	8.0	50.7	28.0	0.2	41.2	26.7
LOS		D	C	A	D	D	A	D	C	A	D	C
Approach Delay			25.2			42.6			27.7			21.0
Approach LOS			C			D			C			C
Queue Length 50th (ft)		267	171	0	115	202	0	150	77	0	103	52
Queue Length 95th (ft)		#423	261	63	200	#368	62	#293	143	0	197	103
Internal Link Dist (ft)			176			696			172			374
Turn Bay Length (ft)		150		150	215		200				275	
Base Capacity (vph)		787	1499	918	425	766	512	456	672	1599	403	672
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.65	0.49	0.47	0.50	0.89	0.42	0.63	0.26	0.15	0.52	0.18

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 86.3  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 29.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 96.7%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Franklin Village/Old West Central & Rte. 140



Lane Group	SBR
Lane Configurations	7
Volume (vph)	310
Satd. Flow (prot)	1599
Flt Permitted	
Satd. Flow (perm)	1599
Satd. Flow (RTOR)	323
Peak Hour Factor	0.96
Heavy Vehicles (%)	1%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	323
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Total Split (s)	35.0
Total Lost Time (s)	5.0
Act Effct Green (s)	23.7
Actuated g/C Ratio	0.27
v/c Ratio	0.48
Control Delay	5.8
Queue Delay	0.0
Total Delay	5.8
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	61
Internal Link Dist (ft)	
Turn Bay Length (ft)	275
Base Capacity (vph)	778
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.42
Intersection Summary	