Sunset City

A Proposed Campground and Motocross / Offroad Park
Brookfield Road
Charlton, MA

Traffic Impact Analysis

January 13, 2015

ADDENDUM

April 15, 2015

Prepared for:

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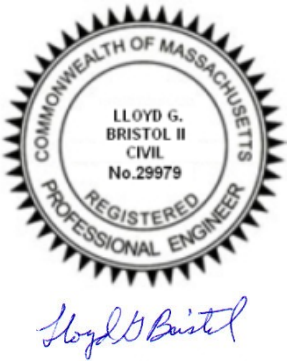

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INTRODUCTION

This report documents the findings and conclusions of an addendum to the original traffic impact analysis conducted for Sunset City, a proposed 150 ± site campground with a Motocross Track / Offroad Park submitted to the Charlton Planning Board for site plan approval.

As previously stated in the original report, a Campground and Motocross / Offroad Park compliment each other when studying traffic generated by both sites. During the busiest period of the Motocross or Offroad Park usage, many of the participants will be staying at the campground whether recreational riders or entered in a competition, thus those riders vehicles will not be arriving or leaving before or after an event or daily ride and their trips are included in the campground ITE rates. This significantly reduces the trips generated by the recreational facilities. Also both uses are typically utilized more extensively on the weekends during the peak periods when Brookfield Road traffic volumes are approximately 40%+ lower than on weekdays. The site users also tend to arrive or depart during non-commuter peak traffic hours during the weekdays as well, thus not adding to the highest travel hours on Brookfield Road.

Scope of Tasks for this Addendum.

As a result of comments received at the February 17th public hearing this addendum has three distinct tasks:

1. Conley Associates , the towns traffic peer review consultant, asked for a new 2 hour weekday evening count on Brookfield Road near the location of the previous 5 day 2-way count provided for the original report. This new count is to validate the original December count as not being unduly influenced by the holiday season.
2. Due to a lack of ITE Trip Generation Data for a Motocross facility, research into local similar facilities was requested. This data is to help validate the volume of trips estimated to and from the site in the Sunset City Traffic Report. During weekday practice sessions trip counts are rather low as most riders are local. Weekend Race Events will draw larger numbers of participants and spectators from the New England Region is the more critical estimate to validate.
3. Analyze the Rte 49 / Putnam Road intersection both with and without the site trips anticipated to arrive and depart via Rte 49 to the major highway system of the Mass Turnpike, Rte 84, Rte 9 and Rte 20 west. The site trip estimates at this intersection are found on FIG's 8 and 10 for weekday and weekend peak periods.

This addendum to the traffic report has been prepared for submission to the Town of Charlton Planning Board, the review agent for Site Plan projects. The traffic related issues addressed in this report are as follows:

- Collect new traffic count on Brookfield Road near the proposed site driveway intersection for 2 hours during a weekday between 4:00-6:00 PM for comparison to prior December 2014 counts presented in the first report.
- Adjustment of the new counts for time of year adjusting to an average month then to summer months per area wide MDOT monthly count statistics. For consistency with prior report calculations, the same data source from MDOT will be utilized and further adjustment rates will be analyzed on the summary sheet from MDOT for months any new counts are taken (see Appendix).
- Solicit and tabulate trip generation data from several New England Motocross facilities similar to the proposed facility.
- Collect counts for the Rte 49 / Putnam Road intersection for weekday and weekend peak AM & PM periods.
- Analyze the Rte 49 / Putnam Road intersection capacity to handle existing traffic volumes without the project, during the peak AM & PM periods for the year 2014 as counted for weekday and weekend. For consistency between the report and this addendum, although the new counts are from the start of 2015, they will be analyzed for be a 5 year growth period ending in 2019 for comparison purposes.
- Project future traffic ahead 5 years (2019) with and without full build-out using a local increase of 1% growth per year for the background traffic at the study intersection during AM and PM peak weekday and weekend travel periods.
- Assign the previously estimated site generated traffic volumes and their anticipated distribution onto Brookfield Road at the study intersection for future 2019 Build traffic volumes. Weekday and Weekend site trips can bee found on FIG's 8 & 10.
- Analyze 2019 traffic operations with and without this development's traffic at the Rte 49 / Putnam Road intersection (2019 Build vs. No-Build) to determine any impact on level of service.

Scope of Study

Evaluation and analysis of this project included a field review of existing conditions (i.e. lane widths, road layout and alignments), collection of a new 2 Hour Peak Weekday evening count on Brookfield Road for comparison to the FIG. 2 Peak Hour counts presented in the original report (See FIG. 2A for comparison). Data solicitation from existing regional Motocross facilities to verify that the report includes similar site trip generation for Motocross Event weekends. Collection of AM and PM peak hour weekday and weekend intersectional turning movement counts (TMC's) at the Rte 49 / Putnam Road intersection to analyze the capacity of pre- versus post-construction with and without the site traffic. This is to determine what effect the site will have on the new study intersection and the ability of the study intersection to accommodate the new site traffic during peak periods for weekdays and weekends.

Based on a discussion during the public hearing, this traffic analysis shall be concentrated on the single intersection that is thought to be potentially impacted by the proposed development, namely:

- Route 49 (Podunk Pike) at Putnam Road (MDOT State Roadway)

TASKS:

1. EXISTING December Brookfield Road Count Validation

Following is a new FIG. 2A showing a listing of both the December count for evening weekday PM peak hours from 4:00-6:00 PM and the new March 12th 4:00-6:00 PM 2=way count. As can be seen on the FIG. 2A page the Brookfield Road new March count is only 9 vehicles lower for the 2 hour span for Southbound traffic and only 5 vehicles lower for the North Bound 2 hour span. In the intersection sketch on FIG 2A compared to FIG 2, one can see the similar volumes are comparable.

Brookfield Road / Site Driveway
Existing No-Build March 2015 Weekday PM Peak Hour Turning Movement Counts
(Adjusted to Average Month and to Summer Increased Volumes)

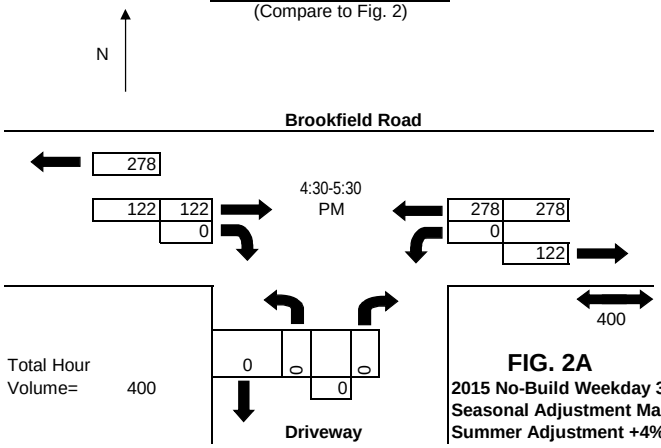
Charlton, MA - Brookfield Road @ Site Driveway

UNADJUSTED COUNT DATA COMPARISON
4:00-6:00 PM
(Both Count Dates)

	Dec 17, '14		Mar 12, '15	
Begin at:	**SB**	**NB**	**SB**	**NB**
04:00 PM	29	64	27	52
04:15 PM	39	62	25	54
04:30 PM	36	57	30	49
04:45 PM	21	66	26	75
05:00 PM	32	67	33	80
05:15 PM	22	68	26	59
05:30 PM	20	57	18	61
05:45 PM	21	50	26	56
2Hr Total	220	491	211	486

Turning Movements for One hour Starting with 4:30 PM
Count conducted by BTTC - Thursday March 12, 2015 4:00-6:00PM
Weather - Sunny 35 F.

*** NEW MARCH PM COUNT**
(Compare to Fig. 2)

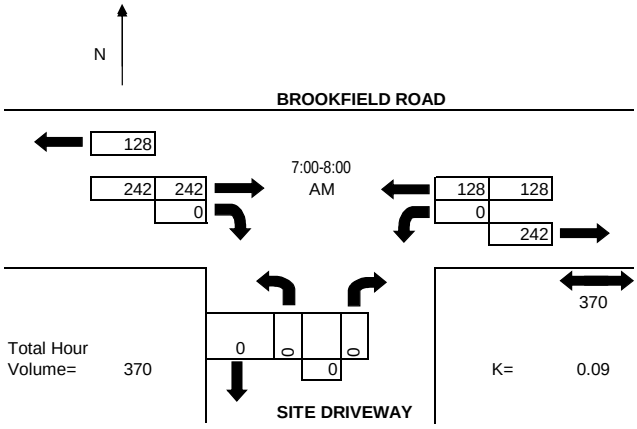


Total Hour
Volume= 400

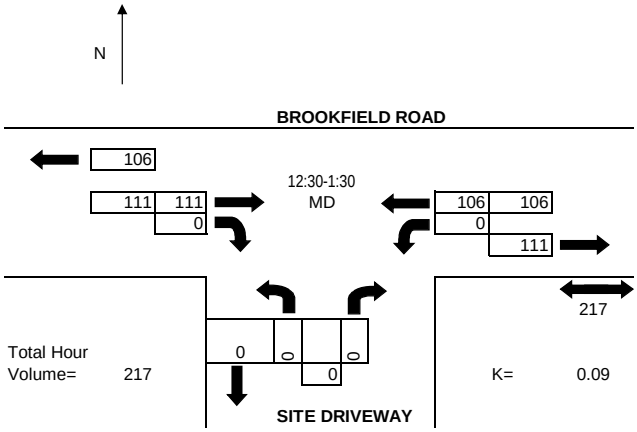
FIG. 2A
2015 No-Build Weekday 3-12-15 PM only
Seasonal Adjustment March +1.8%
Summer Adjustment +4%

Brookfield Road / Site Driveway
Existing No-Build 2014 Weekday Peak Hour Turning Movement Counts
(Adjusted to Average Month and to Summer Increased Volumes)

Charlton, MA - Brookfield Road @ Site Driveway
Turning Movements for One hour Starting with 7:00 AM
Counts conducted by Precision Data Industries - Wednesday, December 17, 2014
Weather: Light Rain



Turning Movements for One hour Starting with 12:30 PM
Counts conducted by Precision Data Industries - Wednesday, December 17, 2014
Weather: Light Rain



Turning Movements for One hour Starting with 4:15 PM
Counts conducted by Precision Data Industries - Wednesday, December 17, 2014
Weather: Light Rain

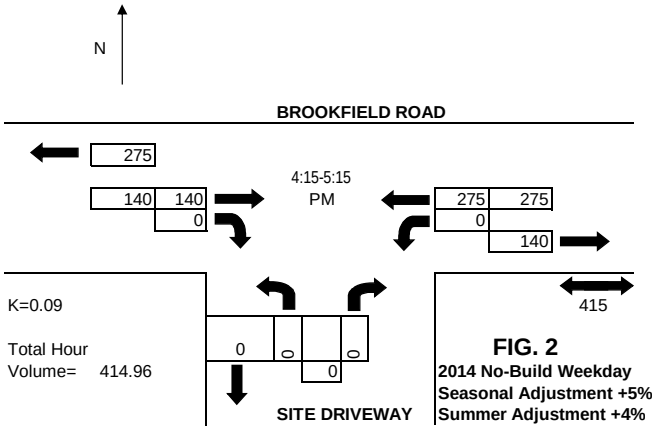


FIG. 2
2014 No-Build Weekday
Seasonal Adjustment +5%
Summer Adjustment +4%

2. Regional Motocross Trip Generation Verification

The original report included a rate of weekday trip generation for practicing on Non-Race weekdays of approximately 50 vehicles less 20 staying at the campground resulting in 60 enter/exit trips spread throughout the day. This resulting in 9 to 18 estimated in and out peak hour trips. Weekends increase somewhat for non-race days for practice that occurs by both locals and race participants, before a Sunday race. These vehicles were estimated to be in the 80-120 vehicles per Saturday spread throughout the day since no official race time is involved. However for the conservative estimate on weekends, we chose to use Race Day Event vehicle estimates in the 250 to 300 vehicles, arriving and departing between 8:00AM-7:00PM. It is assumed that at least 50 of these race participants will utilize the campground for overnight prior to the race, thus reducing the trips to and from the site on race day to approximately 250 vehicles or 500 trips entering and exiting.

This data was derived from participants at two Connecticut Motocross facilities called Connecticut River Motocross and Mototown. The later has closed this year. To collect parking demand for vehicles, thus being able to calculate the number of vehicles arriving and departing sites on the busiest days on weekends with races being held, five New England Motocross facilities have been solicited to provide vehicle count data for race day events. Each facility was called several times and an email was sent to each requesting vehicle count data anonymously. Those facilities are as follows:

Connecticut River Motocross in Rocky Hill, CT;
Wareham MX in Wareham, MA;
TheWick338 Southwick Motocross in Southwick, MA;
Crow Hill Motocross in Baldwinville (Templeton), MA; and
Winchester Speed Park in Winchester, NH.

For reasons unknown, each facility would not respond to the request for vehicle or parking counts. However the Winchester site posts past years race results, with all race entries listed by name. This data allowed us to look at one of the busiest race day occurrences for a specialty race motocross site, when they hosted the Winchester MX Series and the New England MK series on the same day in Oct. 2013. Normally only a single event occurs on any given weekend.

By analyzing the entire listing of 614 race entries and screening names for riders who enter more than a single race to get an accurate count of riders

at the site, we were able to determine on this busy dual event day that 352 individual riders participated. The Sunset City traffic report estimated up to 300 vehicles on an event day with 50 assumed to stay at the campground. The data at Winchester compares quite well with our estimated site vehicles.

Keeping in mind that many riders come from all over the New England region and drive sizable distances to get there, often multiple riders drive together with multiple bikes in a single pickup truck. Some share the drive with up to four bikes or riders within enclosed trailers, pulled by a pickup or SUV. Ages of riders varies from under 10 yrs old to 50+ years old. Younger riders have family attend and older riders often share the drive. This data confirms that an estimated 300 vehicles on a normal single event race day at Sunset City, not the dual event as was analyzed from Winchester Speed Park, is a reasonable estimate. The rider listing is found in the Appendix and on the Winchester Speed Park website.

3. State Route 49 (Podunk Pike) @ Putnam Road

Existing Intersection

The existing Route 49 consists of two 12 foot travel lanes and two 10 foot shoulders traveling north/south between Route 9 in Spencer and Route 20 in Sturbridge. The shoulder striping flares to widen the travel lanes to 22 feet on both approaches to Putnam Road, thus allowing through vehicles to pass a left turning vehicle or the right turn vehicles to maneuver to the right and allow a through vehicle to continue straight without stopping. Route 49 has a speed limit of 55 MPH.

Putnam Road consists of an east/west two lane roadway intersecting Route 49 at an angle with stop contol on both approaches. Paved islands on each approach separate Putnam Road approach lanes from the departure lanes. Approximately 75 feet from the stop lines, the approaches to Route 49 flare and provide a 20 foot wide approach with small striped shoulders on each side of the approach lanes. This width allows vehicles turning right to stop adjacent to any vehicles traveling straight or turning left at the stop lines. Putnam Road connects to Brookfield Road to the south at the Charlton Town Line where speed limits change between 30 to 35 MPH range.

Existing & Proposed Traffic Operations

Traffic Counts

In order to quantify existing traffic conditions and identify predominant traffic patterns both weekday and weekend turning movement counts were collected for the AM and PM peak periods. These counts were then adjusted using the same MDOT monthly counts at various surrounding roadways as was used in the Sunset City traffic study, with monthly adjustment factors calculated. Since this site will have the greatest use in summer months, the counts were also adjusted to the average for months June-August for the turning movement counts. Those adjustment percentages can be found in the appe4ndix with the TMC data. The adjusted results are included here for the AM and PM weekday and weekend counts for 2014 No-Build, 2019 No-Build and 2019 Build diagrams on Figures 13 to 15 and Figures 16 to 18 respectively. Also for conveniences, the site trip distribution estimates are also included from the Sunset City traffic study Figures 8 and 10 for weekday vs. weekend trips. Each of these are utilized to perform the Capacity Analysis which follows.

It should be noted that the weekend traffic both on Route 49 and headed to or from Brookfield Road and the site driveway, is significantly lower than weekday traffic volumes on these road due to a heavy commuter traffic load on weekdays. Also note that the site will generate more trips on weekends when local traffic volumes are higher and on weekends the site trips will be higher when local traffic volumes are 40% lower.

Future Year (2019) No-Build & Build Traffic Volumes

Based on the 1.0% annual growth rate assumed for the project area, existing background traffic data was projected five years into the future (5.1% increase). This traffic was added to the 2014 seasonally adjusted count data to arrive at the Future (2019) "No Build" traffic volumes. Those traffic volumes for weekday AM and PM peak hours then had the estimated site trips added to them to create the 2019 Build estimates

2014 Capacity Analysis

Using the turning movement traffic counts shown on Figures 13-18, existing No-Build conditions as well as Build conditions were analyzed for capacity using the Synchro Highway Capacity Software by Trafficware.

Capacity analysis assesses traffic operations in terms of Level of Service (LOS) that is a concept developed by transportation engineers to quantify the level of operation of intersections and roadways. A complete description of this methodology is available in the Highway Capacity Manual 2010 (HCM 2010). LOS measures are classified in grades "A" through "F" indicating a range of operation from LOS "A", signifying the least congested level of operation, to "F", the worst, which is considered failure.

Level of Service for an unsignalized intersection is defined in terms of delay, which is known as control delay. Control delay includes initial deceleration delay, queue move up time, stopped delay and final acceleration delay. The delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until that vehicle departs from the stop line. This time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free flow speed to the speed of the vehicles in the queue. Specifically in the HCM, Level of Service (LOS) criteria is stated in terms of the average control delay per vehicle for the analysis period. The average control delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. This criteria is given in Table 1.

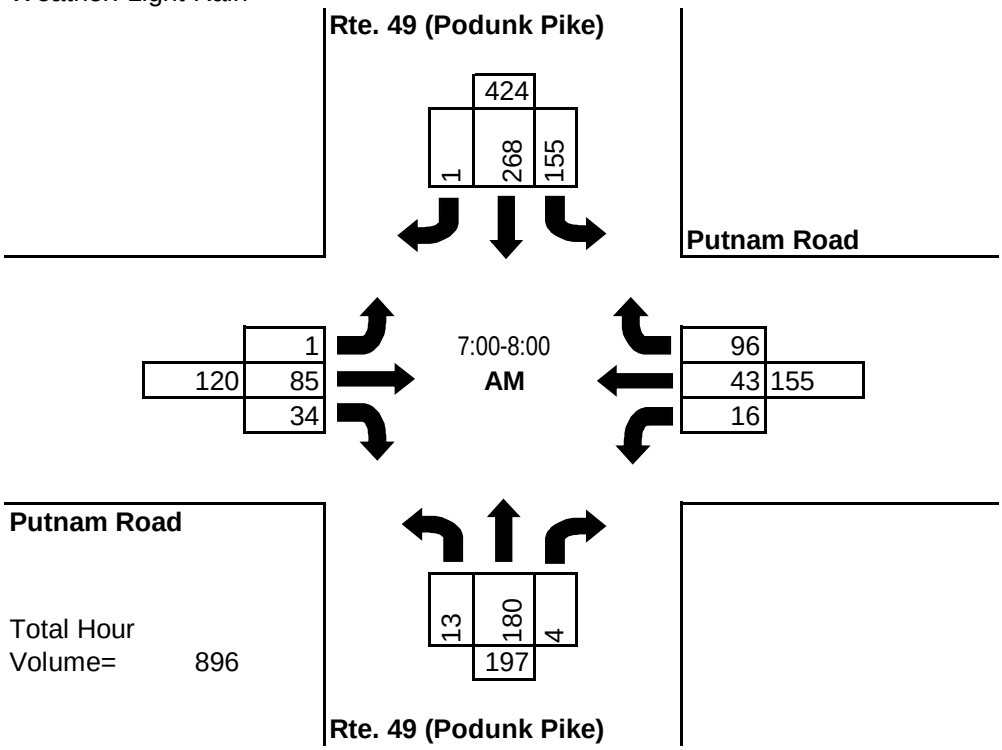
Table 1 - Level-of-Service Criteria for Unsignalized Intersections

LEVEL OF SERVICE (LOS)	CONTROL DELAY PER VEHICLE (SEC)
A	0-10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Generally, LOS "D" is considered the threshold limit of acceptable operation for intersections.

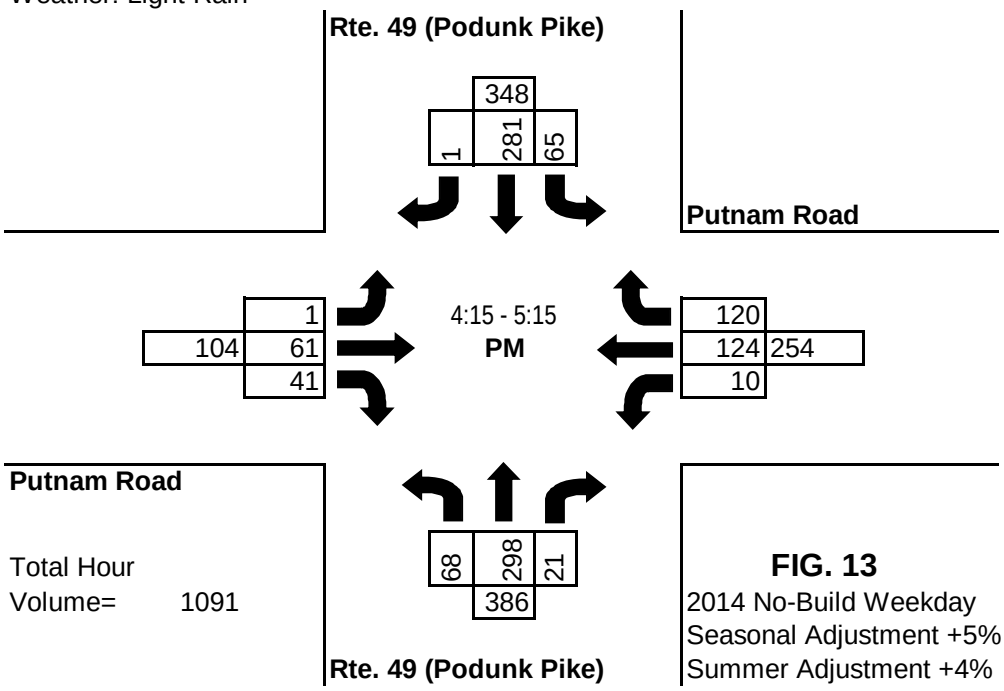
Route 49 (Podunk Pike) / Putnam Road
Existing No-Build 2014 Weekday AM + PM Peak Hour Turning Movement Counts
(Adjusted to Avg Month and to Summer Increased Volumes)

Sturbridge, MA - Route 49 (Podunk Pike) @ Putnam Road
Turning Movements in One hour Starting with 7:00 AM
Counts conducted by Precision Data Industries - Wednesday, Dec. 17, 2014
Weather: Light Rain



Total Hour
Volume= 896

Turning Movements in One hour Starting with 4:15 PM
Counts conducted by Precision Data Industries - Wednesday, Dec. 17, 2014
Weather: Light Rain

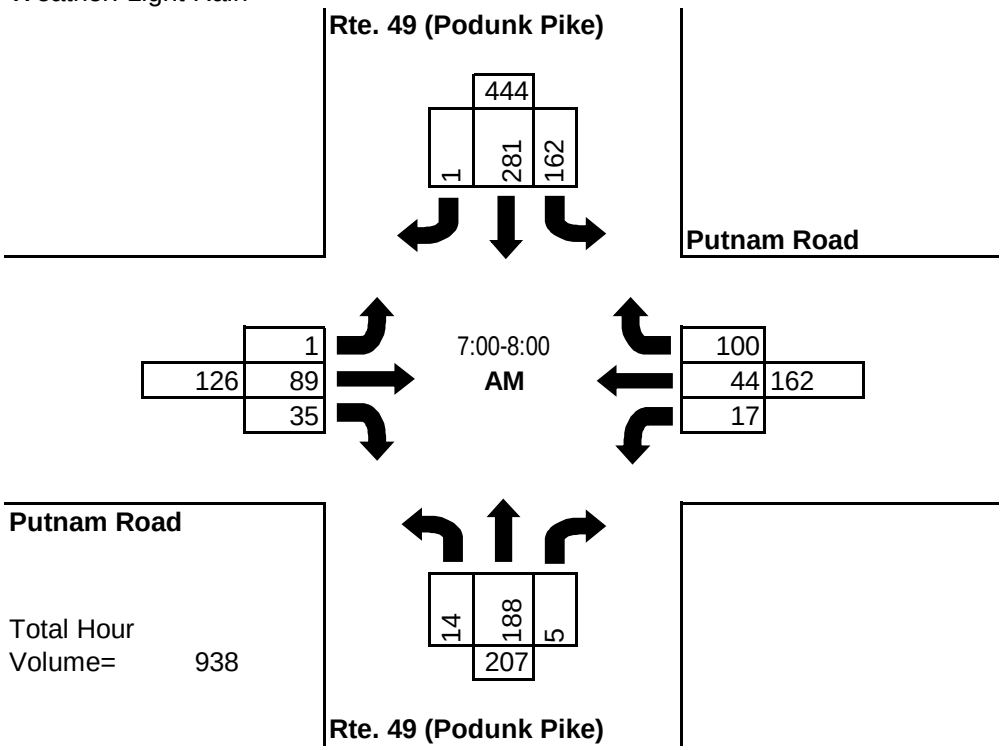


Total Hour
Volume= 1091

FIG. 13
2014 No-Build Weekday
Seasonal Adjustment +5%
Summer Adjustment +4%

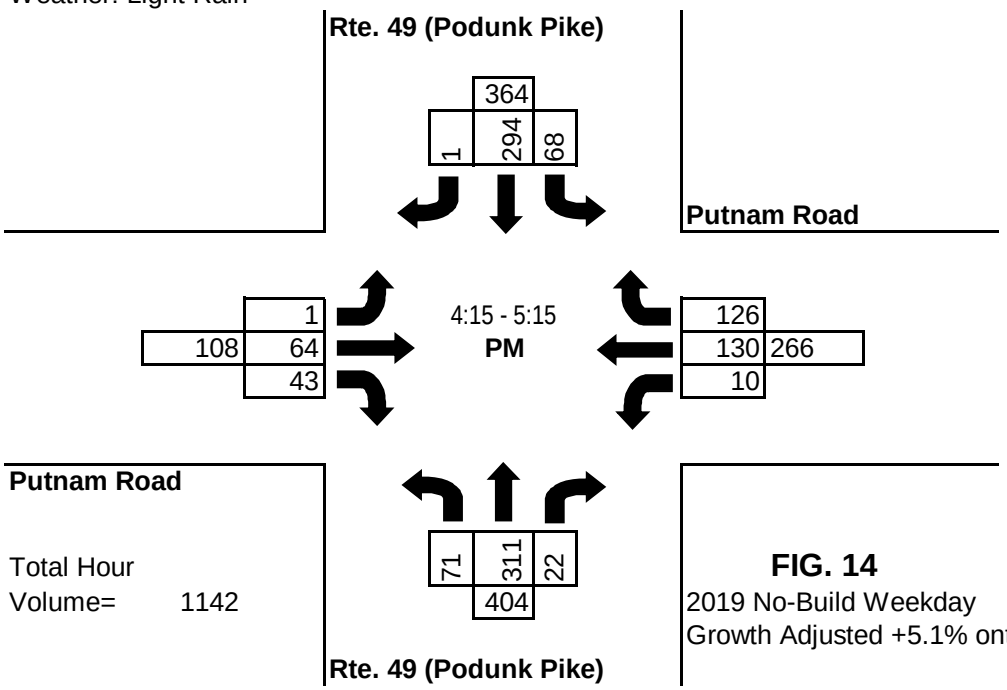
Route 49 (Podunk Pike) / Putnam Road
Future No-Build 2019 Weekday AM + PM Peak Hour Turning Movement Counts
(Adjusted to Avg Month and to Summer Increased Volumes + 5Yr Growth @ 1%/Yr)

Sturbridge, MA - Route 49 (Podunk Pike) @ Putnam Road
Turning Movements in One hour Starting with 7:00 AM
Counts conducted by Precision Data Industries - Wednesday, Dec. 17, 2014
Weather: Light Rain



Total Hour
Volume= 938

Turning Movements in One hour Starting with 4:15 PM
Counts conducted by Precision Data Industries - Wednesday, Dec. 17, 2014
Weather: Light Rain

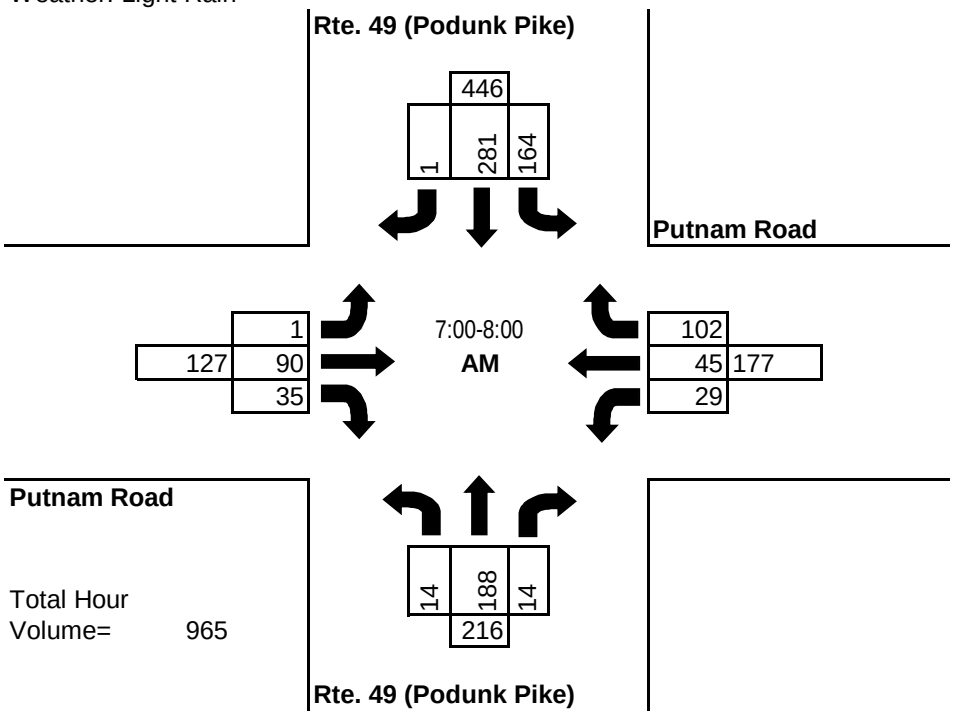


Total Hour
Volume= 1142

FIG. 14
2019 No-Build Weekday
Growth Adjusted +5.1% onto 2014 counts

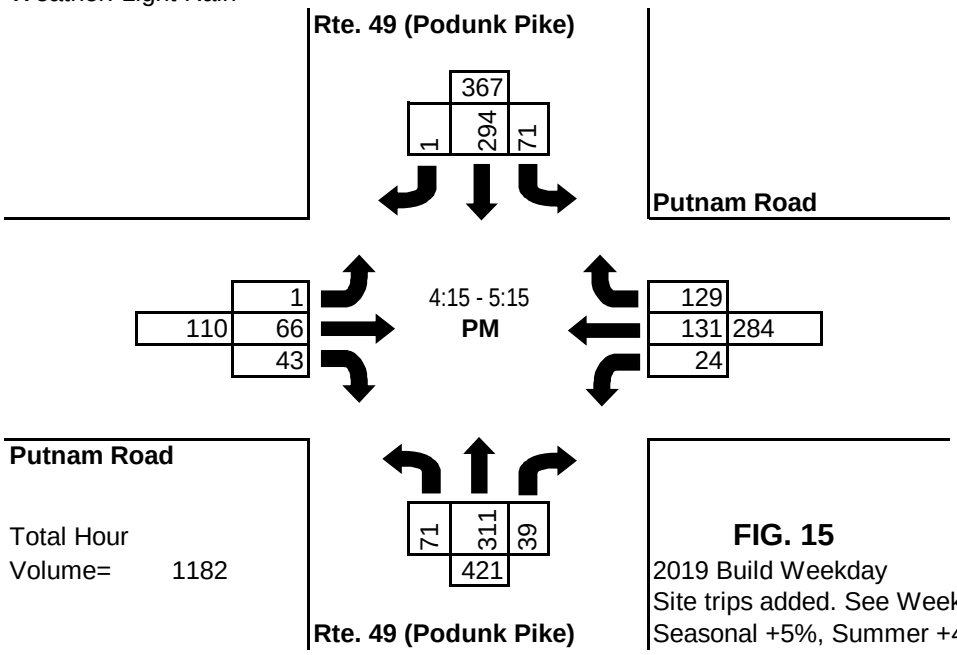
Route 49 (Podunk Pike) / Putnam Road
Future Build 2019 Weekday AM + PM Peak Hour Turning Movement Counts
(Adjusted to Avg Month + Summer Increased Volumes + 5Yr Growth. Weekday Site trips added.)
(See Fig. 8 for site trips assigned to Rte. 49)

Sturbridge, MA - Route 49 (Podunk Pike) @ Putnam Road
Turning Movements in One hour Starting with 7:00 AM
Counts conducted by Precision Data Industries - Wednesday, Dec. 17, 2014
Weather: Light Rain



Total Hour
Volume= 965

Turning Movements in One hour Starting with 4:15 PM
Counts conducted by Precision Data Industries - Wednesday, Dec. 17, 2014
Weather: Light Rain

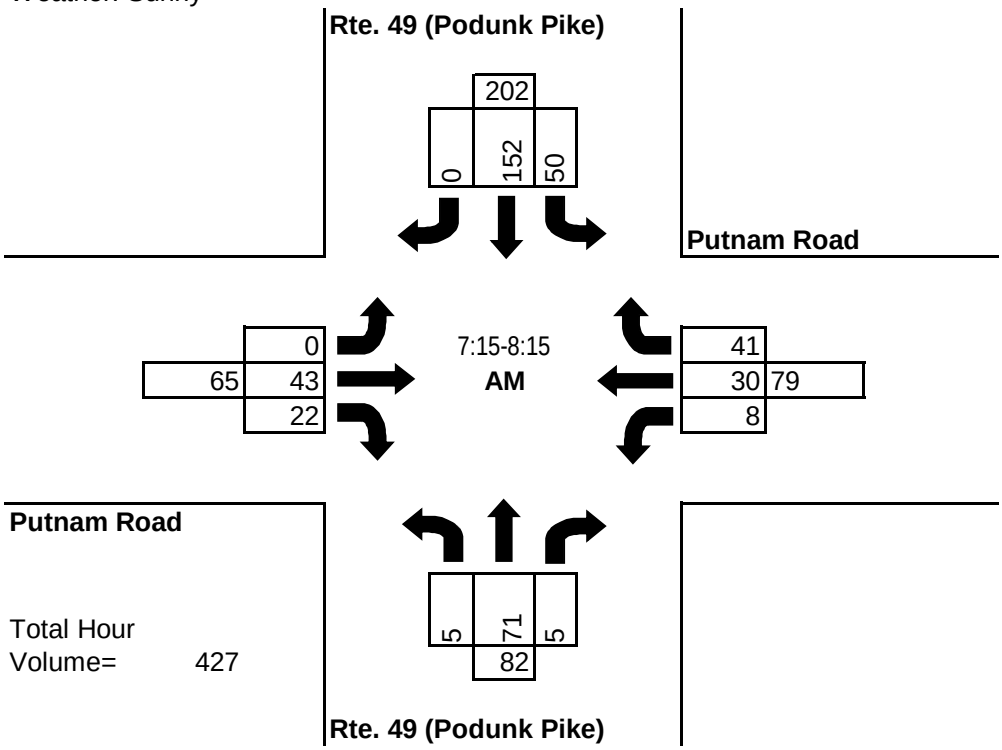


Total Hour
Volume= 1182

FIG. 15
2019 Build Weekday
Site trips added. See WeekDay Distribution FIG 8
Seasonal +5%, Summer +4%, Growth 5.1% = 14.1%

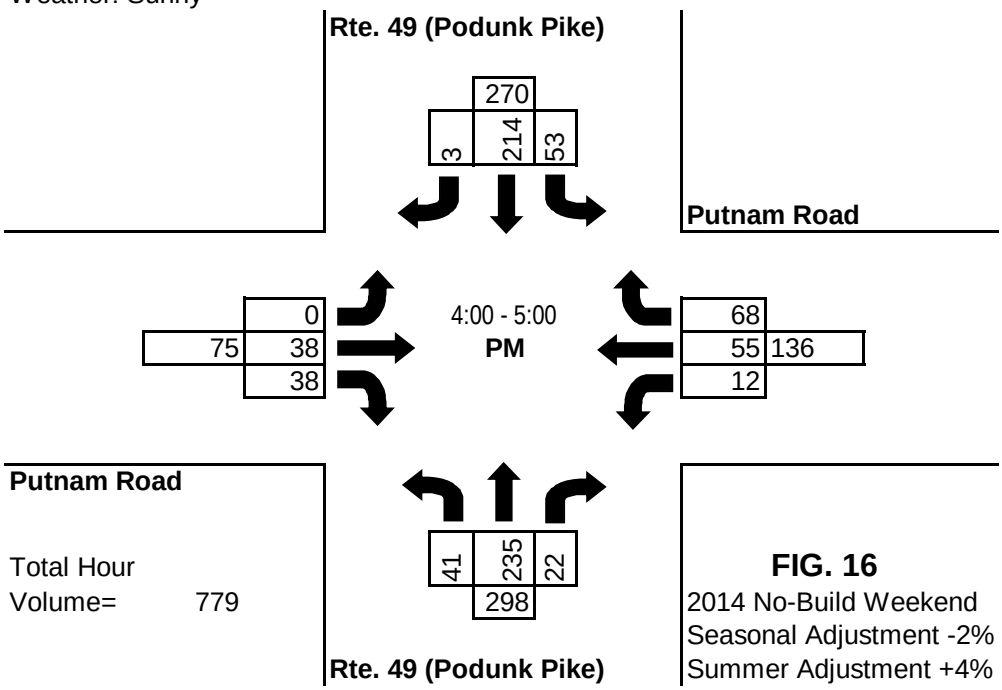
Route 49 (Podunk Pike) / Putnam Road
Existing No-Build 2014 Weekend AM + PM Peak Hour Turning Movement Counts
(Adjusted to Avg Month and to Summer Increased Volumes)

Sturbridge, MA - Route 49 (Podunk Pike) @ Putnam Road
Turning Movements in One hour Starting with 7:15 AM
Counts conducted by BTTC - Saturday, Apr. 11, 2015
Weather: Sunny



Total Hour
Volume= 427

Turning Movements in One hour Starting with 4:00 PM
Counts conducted by BTTC - Saturday, Apr. 11, 2015
Weather: Sunny

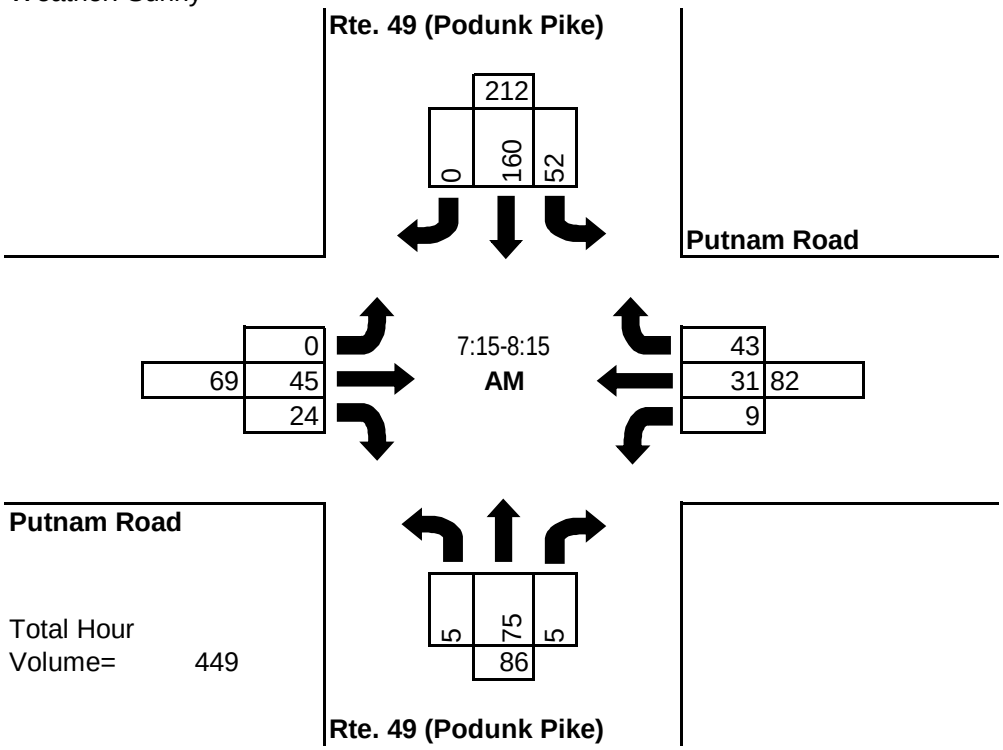


Total Hour
Volume= 779

FIG. 16
2014 No-Build Weekend
Seasonal Adjustment -2%
Summer Adjustment +4%

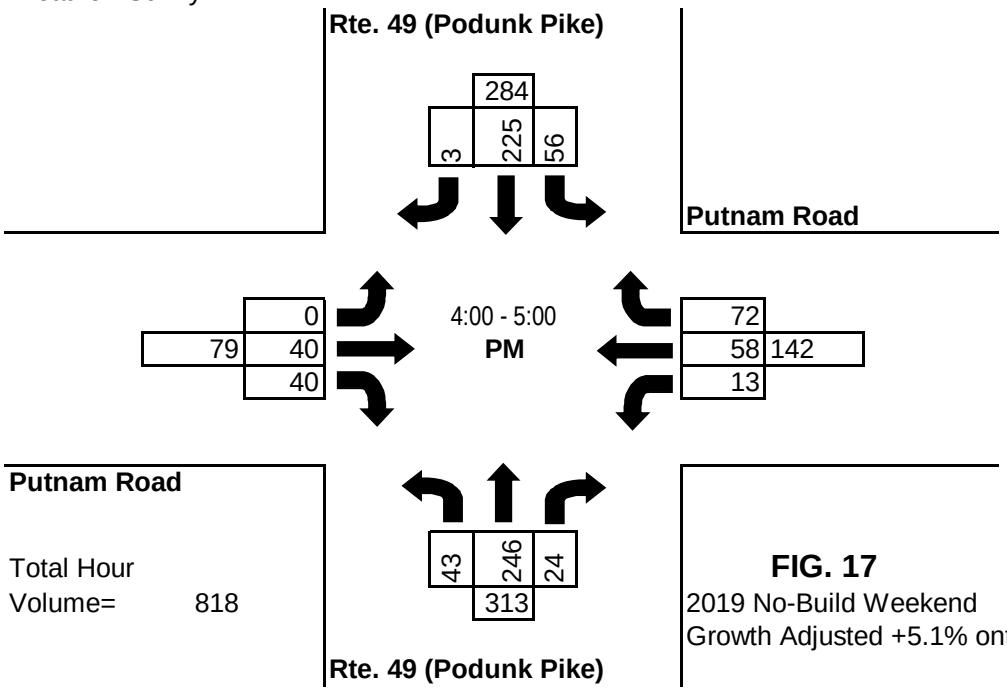
Route 49 (Podunk Pike) / Putnam Road
Future No-Build 2019 Weekend AM + PM Peak Hour Turning Movement Counts
(Adjusted to Avg Month and to Summer Increased Volumes + 5Yr Growth @ 1%/Yr)

Sturbridge, MA - Route 49 (Podunk Pike) @ Putnam Road
Turning Movements in One hour Starting with 7:15 AM
Counts conducted by BTTC - Saturday, Apr.11, 2015
Weather: Sunny



Total Hour
Volume= 449

Turning Movements in One hour Starting with 4:00 PM
Counts conducted by BTTC - Saturday, Apr.11, 2015
Weather: Sunny

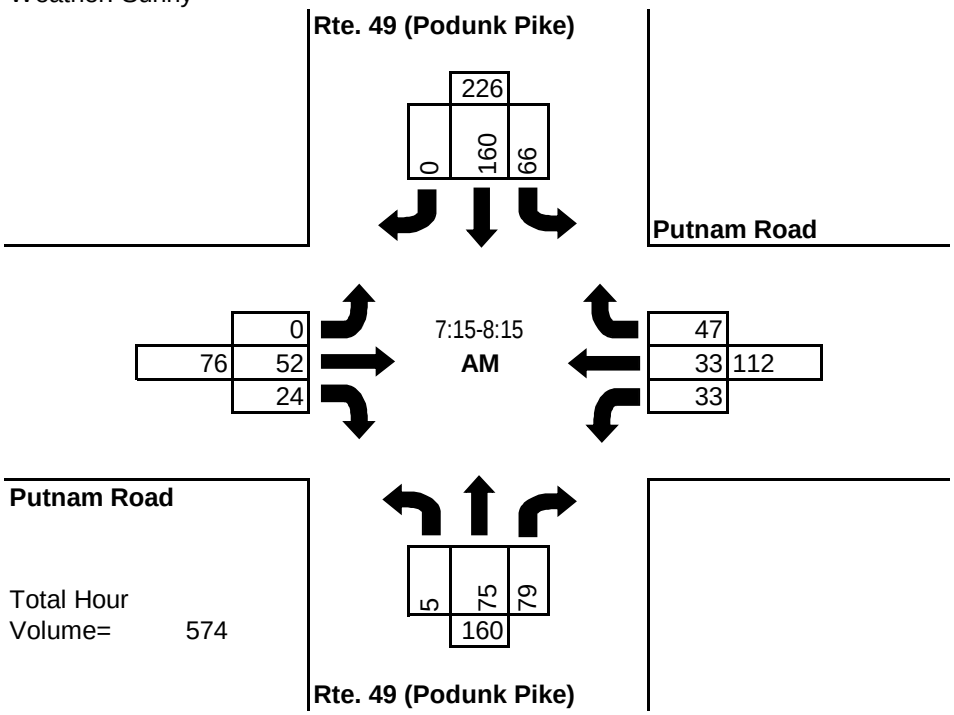


Total Hour
Volume= 818

FIG. 17
2019 No-Build Weekend
Growth Adjusted +5.1% onto 2014 counts

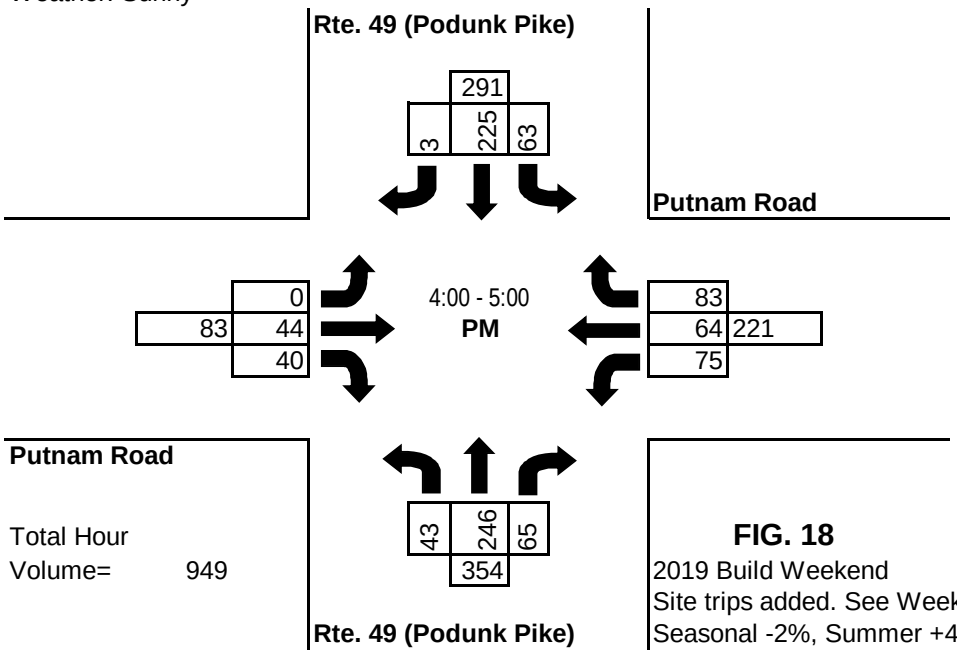
Route 49 (Podunk Pike) / Putnam Road
Future Build 2019 Weekend AM + PM Peak Hour Turning Movement Counts
(Adjusted to Avg Month + Summer Increased Volumes + 5Yr Growth. Weekend EVENT trips added.)
(See Fig.10 for site trips assigned to Rte. 49)

Sturbridge, MA - Route 49 (Podunk Pike) @ Putnam Road
Turning Movements in One hour Starting with 7:15 AM
Counts conducted by BTTC - Saturday, Apr. 11, 2015
Weather: Sunny



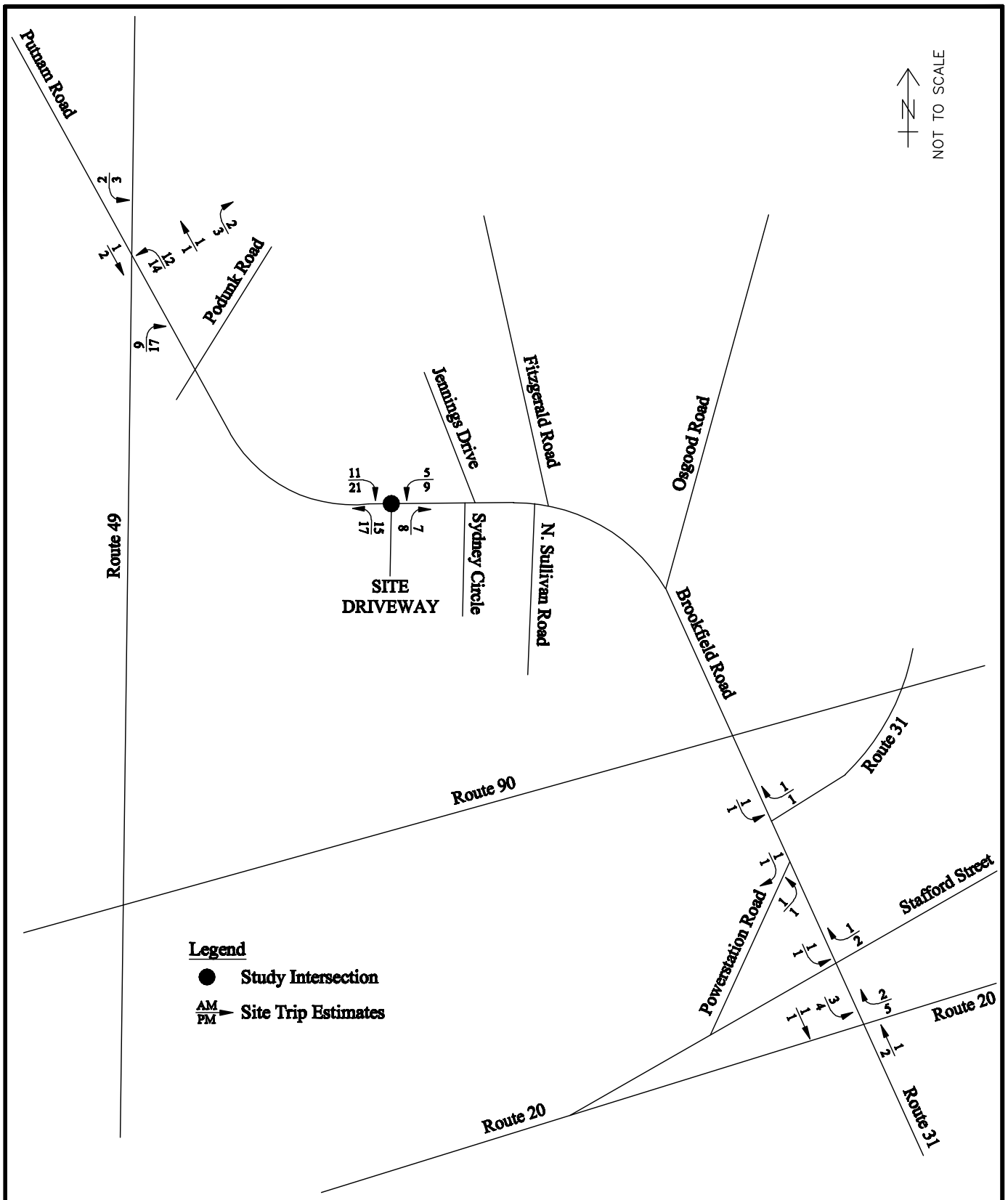
Total Hour
Volume= 574

Turning Movements in One hour Starting with 4:00 PM
Counts conducted by BTTC - Saturday, Apr. 11, 2015
Weather: Sunny



Total Hour
Volume= 949

FIG. 18
2019 Build Weekend
Site trips added. See Weekend Event Distr. FIG 10
Seasonal -2%, Summer +4%, Growth 5.1% = 7.1%



BTTC

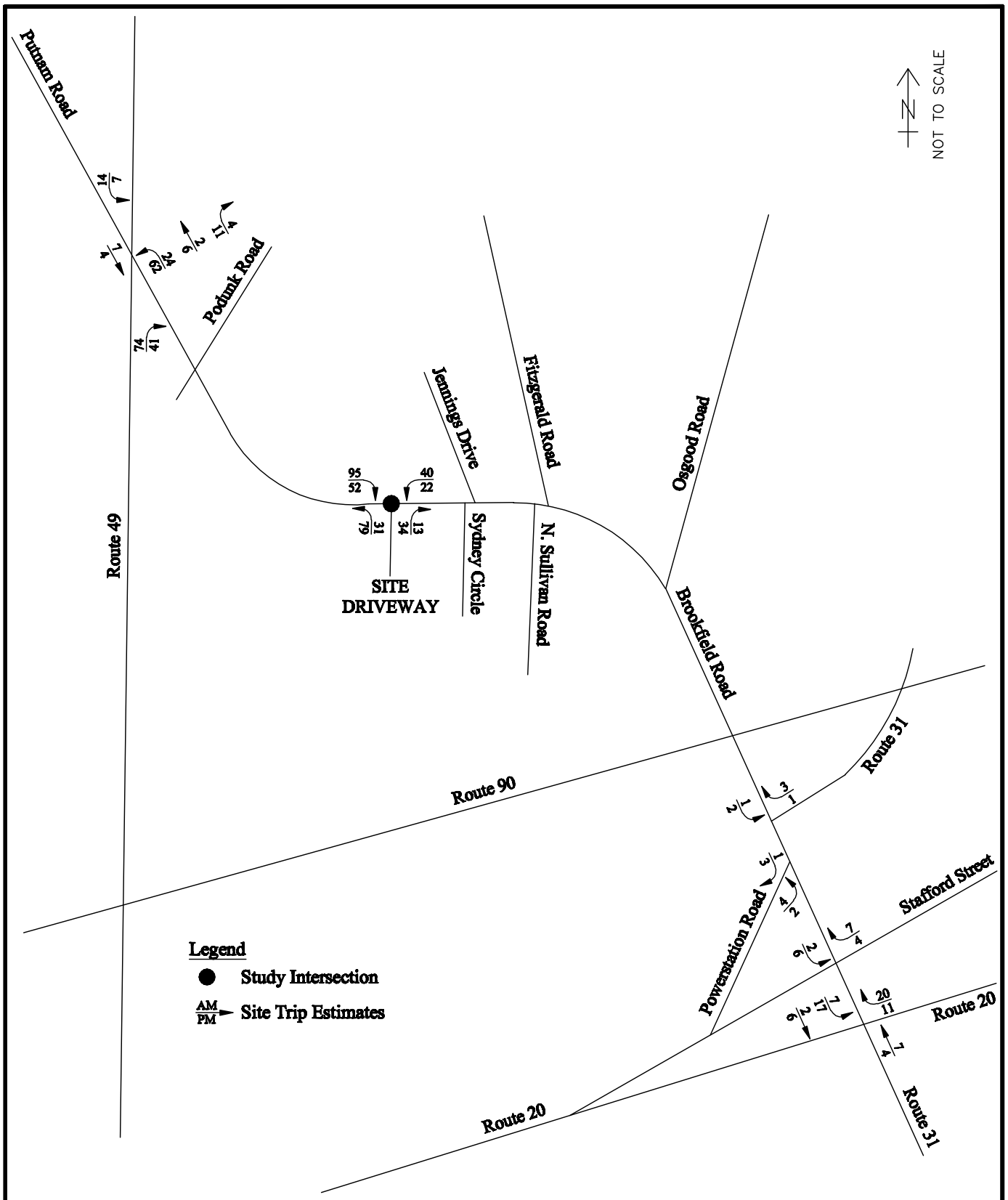
SUNSET CITY TRAFFIC ESTIMATES

CHARLTON, MASSACHUSETTS

BRISTOL TRAFFIC & TRANSPORTATION CONSULTING, LLC N. BROOKFIELD, MA

FIGURE 8

Site Trip Estimates
Weekday Peak Hours
AM & PM



BTTC

SUNSET CITY TRAFFIC ESTIMATES

CHARLTON, MASSACHUSETTS

BRISTOL TRAFFIC & TRANSPORTATION CONSULTING, LLC N. BROOKFIELD, MA

FIGURE 10

Site Trip Estimates
Event Weekend Peak Hours
AM & PM

The 2014 and 2019 No-Build and Build LOS calculations (found in the Appendix) for the study intersection has been evaluated for the previously defined weekday and weekend AM and PM peak hours. The findings of the existing conditions capacity analyses are summarized in Tables 13-19 below.

Table 13
Existing Conditions No-Build (2014) Capacity Analyses

	Weekday AM Peak			Weekday PM Peak		
Intersection / Critical Movement	**V/C[a]**	**Delay[b]**	**LOS[c]**	**V/C[a]**	**Delay[b]**	**LOS[c]**
Rte 49 / Putnam Rd:						
NB Approach	0.02	0.9	A	0.07	2.1	A
SB Approach	0.12	3.6	A	0.08	2.4	A
EB Approach	0.46	24.3	C	0.51	31.0	D
WB Approach	0.36	18.1	C	1.09	117.1	F
Overall Intersection		9.1	A		32.6	D

[a] HCM Volume to capacity ratio.
[b] HCM Average Control Delay in seconds per vehicle.
[c] HCM Level of Service.

Based on the information provided in Table 13 above, we can see that all Route 49 movements experience excellent levels of service at the highest LOS possible, "A" since they do not have to stop. Volumes on Route 49 during weekday peaks in the morning are fine however during evening commuter hours, volumes under the No-Build analysis without any future site traffic indicate westbound traffic experiences lengthy delays partially due to the north / south volumes and a speed limit of 55 MPH on Route 49.

Table 14
Existing Conditions No-Build (2014) Capacity Analyses

	Weekend AM Peak			Weekend PM Peak		
Intersection / Critical Movement	**V/C[a]**	**Delay[b]**	**LOS[c]**	**V/C[a]**	**Delay[b]**	**LOS[c]**
Rte 49 / Putnam Rd:						
NB Approach	0.01	0.7	A	0.04	1.5	A
SB Approach	0.04	2.3	A	0.05	2.1	A
EB Approach	0.11	11.5	B	0.55	14.1	B
WB Approach	0.11	10.8	B	0.30	16.1	C
Overall Intersection		5.4	A		5.8	A

[a] HCM Volume to capacity ratio.
[b] HCM Average Control Delay in seconds per vehicle.
[c] HCM Level of Service.

Based on the information provided in Table 14 above, due to fewer vehicles with no commuter peak periods as in the Weekday counts, all movements on both roadways show very good LOS readings with plenty of reserve capacity to handle additional traffic.

Accident Data

Accident data for the years 2010 through 2012 was retrieved from the Massachusetts Highway Department's Accident Record System for the study intersection in Sturbridge. Those accidents are highlighted in grey on the printout found in the Appendix. Utilizing the peak weekday PM count the average accident rate for the intersection was computed based on the MDOT Highway Division Crash Rate Worksheet Standard Procedures (Calculation worksheets of this accident rate and the accident data can be found in the Appendix).

Accidents were included based on their listed intersection. When reviewing accident statistics for a given intersection, one must not only look at the total number of accidents, but also the volume of vehicles passing through the intersection. Generally speaking, the higher the traffic volumes the more accidents one can expect to see, since there are more vehicles interacting, resulting in more opportunities for inattentive drivers to collide. Thus the Crash Rate Worksheet calculates a "rate" based on Millions of Vehicles entering the intersection during a year. This calculation allows one to compare the study intersection to the average rate for District wide intersections.

The results of the accident analysis are shown below in Table 15. Since the new driveway does not yet exist, we looked for any accidents close to the proposed driveway location and found none.

Table 15
Accident Analysis

Intersection	2010-2012 Average # of Accidents / Year	Crash Rate (Accidents / Million Entering Vehicles (MEV)
Route 49 / Putnam Rd	3.67	0.83

From review of Table 15, the crash rate for the study intersection is slightly above the MDOT Highway Division District 3 average rate of 0.66 accidents per Million Entering Vehicles for unsignalized intersections.

Because the calculated intersection rates are slightly higher than the District average, the District will be informed of the results found in this study.

2.4.4 Existing Sight Distance

Existing sight distances at intersecting roadways or driveways are an important factor in the safety of both an exiting vehicle and an approaching vehicle. Since Putnam Road is stop sign controlled only the sight lines along Route 49 to and from Putnam Road are to be of concern. As a point of fact, Route 49 was originally to be a 4 lane divided highway spanning from Route 20 to Route 2 and was designed to Interstate Highway System standards for vertical and horizontal alignment. Today it still carries a No-Access limitation along it's partially completed length. Sight distances along it's entire length surpass all Stopping Sight Distance safety requirements.

3.3.2 Future Year (2019) Capacity Analyses

The future year traffic volumes were used to perform capacity analyses for both the Future Year "No-Build"and"Build". The results of these analyses are shown in Tables 16 - 19 for Weekday and Weekend peak periods in a side by side manner to show the minor changes under the 2019 Build traffic. The capacity analyses printouts can be found in the Appendix .

Table 16
Weekday Morning AM Peak Hour Capacity Analysis

	2019 No-Build			2019 Build		
Intersection / Critical Movement	**V/C[a]**	**Delay[b]**	**LOS[c]**	**V/C[a]**	**Delay[b]**	**LOS[c]**
Rte 49 / Putnam Rd:						
NB Approach	0.02	1.0	A	0.02	0.9	A
SB Approach	0.13	3.7	A	0.13	3.7	A
EB Approach	0.52	27.4	D	0.54	29.1	D
WB Approach	0.41	19.8	C	0.56	26.3	D
Overall Intersection		9.9	A		11.5	B

[a] HCM Volume to capacity ratio.
[b] HCM Average Control Delay in seconds per vehicle.
[c] HCM Level of Service.

Table 17
Weekday Evening PM Peak Hour Capacity Analysis

	2019 No-Build			2019 Build		
Intersection / Critical Movement	**V/C[a]**	**Delay[b]**	**LOS[c]**	**V/C[a]**	**Delay[b]**	**LOS[c]**
Rte 49 / Putnam Rd:						
NB Approach	0.07	2.2	A	0.07	2.1	A
SB Approach	0.08	2.5	A	0.09	2.6	A
EB Approach	0.57	36.2	E	0.76	63.0	F
WB Approach	1.25	177.5	F	1.58	321.6	F
Overall Intersection		47.5	E		86.5	F

[a] HCM Volume to capacity ratio.
[b]HCM Average Control Delay in seconds per vehicle.
[c]HCM Level of Service.

From review of Table 17 it can be seen that during the weekday PM peak periods, under future No-Build conditions the Putnam Road LOS experiences LOS F due in part to the heavy commuter traffic flow along Putnam Road westbound approaching Route 49 from Brookfield Road and along with the high speed Route 49, which carries a moderately higher volume on weekdays. During the Build conditions, there are some increases in LOS since the analysis indicates Westbound is already having significant delays without the site trips. We note that during the weekday periods the estimated site trips shown on Figure 8 are relatively minor and the few site trips have an overly significant change in delay since the westbound is already somewhat overloaded. Only minor changes in westbound traffic have an unproportional impact on the operation due to existing No-Build issues.

Table 18
Weekend Morning AM Peak Hour Capacity Analysis

	2019 No-Build			2019 Build		
Intersection / Critical Movement	**V/C[a]**	**Delay[b]**	**LOS[c]**	**V/C[a]**	**Delay[b]**	**LOS[c]**
Rte 49 / Putnam Rd:						
NB Approach	0.01	0.6	A	0.01	0.30	A
SB Approach	0.04	2.3	A	0.06	0.29	A
EB Approach	0.12	11.7	B	0.17	13.6	B
WB Approach	0.12	10.9	B	0.25	13.7	B
Overall Intersection		5.5	A		6.1	A

[a] HCM Volume to capacity ratio.
[b]HCM Average Control Delay in seconds per vehicle.
[c]HCM Level of Service.

Table 19
Weekend Evening PM Peak Hour Capacity Analysis

	2019 No-Build			2019 Build		
Intersection / Critical Movement	**V/C[a]**	**Delay[b]**	**LOS[c]**	**V/C[a]**	**Delay[b]**	**LOS[c]**
Rte 49 / Putnam Rd:						
NB Approach	0.04	1.5	A	0.04	1.4	A
SB Approach	0.06	2.1	A	0.07	2.4	A
EB Approach	0.17	14.7	B	0.21	16.3	C
WB Approach	0.33	17.3	C	0.90	64.2	F
Overall Intersection		6.1	A		19.0	C

[a] HCM Volume to capacity ratio.
[b]HCM Average Control Delay in seconds per vehicle.
[c]HCM Level of Service.

From review of Table 18 it can be seen that during the weekday AM peak periods, under future No-Build and Build conditions with site trips added there are good LOS results. From Table 19 one can see that the No-Build results are acceptable and the PM analysis indicates that the site trips may increase the Westbound delay somewhat over the delay limit for LOS F. This result would occur when PM trips are larger due to the annual 10 or so race events held at the site are ending and participants are heading back to the major highway system if traveling from a distance. This would be a short time period after only approximately 10 weekend events end.

4. STUDY CONCLUSIONS

The analysis indicates that the Route 49 / Putnam Road intersection can handle weekend traffic more easily that weekday traffic when commuter trips are significant. Sufficient capacity to handle the AM estimated weekend traffic from this proposed Campground and Motocross / Offroad Park project with little to no increased delay. The Weekday volumes traveling through the study intersection indicate a commuter pattern of morning peak traffic heading south and a return peak flow during the evening commuter hours heading north. Due to this commuter traffic the 24 hour weekday volume exceeds weekend volumes by approximately 700 vehicles heading to Brookfield Road. Weekend traffic does not peak during morning or evening period as shown by the graphs found in Appendix A of the original traffic report. Weekend traffic volumes gradually increase from morning until midday then decrease slowly toward evening hours. The peak hour traffic on weekends when site generated trips are the highest, only if a race event is scheduled that day, is significantly lower than weekday peaks.

This proposed project has low traffic generation rates for weekdays, especially during the peak commuter hours, yet the busiest times for site traffic are the weekend periods when the study intersection on Route 49 and Brookfield Road traffic has the lowest volumes. Another traffic mitigation for the site traffic is that it is a seasonal use, with summer camping and good weather Motocross and Offroad Park usage during the summer months most prevalently and much reduced potential use during colder weather in fall and winter.

This report documents that the proposed intersection of Route 49 and Putnam Road can accommodate the proposed site traffic with little noticeable change in operational efficiency and safety during weekends periods and that existing traffic on weekdays already causes significant day, at a time when the site generates it's' lowest volume of trips.

REFERENCES

1. *Highway Capacity Manual, HCM2010*, Updated 2010, Transportation Research Board of the National Academies.

2. *Trip Generation Manual, Ninth Edition*, 2012, Institute of Transportation Engineers.

3. *Manual on Uniform Traffic Control Devices*, 2009, Federal Highway Administration.

4. *A Policy on The Geometric Design of Highways and Streets, 6th Edition*, 2011, American Association of State Highway and Transportation Officials.

APPENDIX A

TRAFFIC COUNTS

Seasonal and Summer Adjustment MDOT Data Spreadsheet

Weekday Turning Movement Counts Rte 49/Putnam Rd.
Weekend (Saturday) Turning Movement Counts Rte 49 / Putnam Rd.

STATION 5 - STERLING - RTE.12 - NORTH OF RTE.I-190

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
05	7,333	8,200	8,308	8,194	9,300	9,439	8,516	8,669	8,559	8,500	8,300	8,100	8,452
	6%	-4%	3%	4%	-6%	-4%	-4%	-1%	-1%	-2%	-3%	-3%	-1%
06	7,800	7,909	8,517	8,504	8,752	9,024	8,197	8,580	8,507	8,291	8,019	7,838	8,328
	-2%	-3%	-5%	-2%	3%	0%	6%	2%	2%	6%	2%	-1%	1%
07	7,615	7,693	8,091	8,322	8,987	8,988	*8,700*	8,742	8,658	8,754	8,169	7,767	8,374
	8%	4%	3%	10%	1%	0%	-1%	-4%	-2%	-4%	-4%	-1%	1%
08	8,243	7,993	8,296	9,168	9,115	8,992	8,578	8,425	8,482	8,400	7,839	7,700	8,436
	-7%	0%	-1%	-4%	-3%	0%	1%	1%	0%	0%	2%	2%	-1%
09	7,685	8,011	8,189	8,776	8,819	8,997	8,654	8,533	8,519	8,434	7,969	7,858	8,370
	MAR=	**-1.3%**	**41,401**	**42,964**		**45,440**	**42,645**	**42,949**		**DEC=**	**-6.4%**	**39,263**	**41,960**

STATION 211 - DEERFIELD - RTES.5 AND 10 - NORTH OF THE WHATELY T.L.

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
05	7,142	7,800	7,860	8,529	8,907	9,070	8,969	10,099	10,152	9,137	8,880	8,880	8,785
07	8,004	8,318	8,158	*9,300*	9,452	9,195	*9,250*	9,098	*8,700*	*8,248*	7,636	7,636	8,583
	-4%	-9%	-5%	-9%	-7%	-10%	-11%	-9%	3%	12%	2%	0%	-4%
08	7,671	7,610	7,733	8,505	8,800	8,288	*8,200*	8,314	8,932	*9,228*	7,823	7,633	8,228
	-6%	6%	-1%	-1%	-3%	2%	3%	-2%	1%	-6%	9%	8%	1%
09	7,208	8,037	7,663	8,441	8,555	8,432	*8,422*	8,145	8,978	*8,700*	8,500	8,215	8,275
	MAR=	**-7.3%**	**31414**	**34775**		**34985**	**34841**	**35656**		**DEC=**	**-4.4%**	**32364**	**33871**

STATION 307 - WESTBOROUGH - RTE.9 - EAST OF NORTHBOROUGH T.L.

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
05	45,180	49,366	50,060	52,971	53,408	55,189	52,365	50,468	50,556	50,848	47,901	*48,515*	50,569
	-2%	-9%	1%	-3%	-3%	-5%	-8%	0%	1%	-1%	4%	3%	-2%
06	44,301	44,854	50,326	51,170	51,729	52,438	48,052	50,270	50,998	50,194	50,043	*50,032*	49,534
	7%	5%	-2%	-4%	-3%	-1%	10%	4%	-4%	1%	-1%	-6%	0%
07	47,505	47,283	49,268	49,136	*50,000*	*52,000*	*53,000*	52,322	49,031	50,571	49,662	47,007	49,732
	-4%	-2%	-3%	1%	1%	-4%	-8%	-7%	-1%	-3%	-4%	-1%	-3%
08	45,614	46,112	47,829	49,816	*50,518*	*49,936*	*48,629*	48,759	48,531	49,009	47,490	46,696	48,245
	-3%	1%	-3%	-2%	-2%	0%	-2%	-3%	-2%	-1%	0%	2%	-1%
09	44,103	46,434	46,455	49,049	*49,474*	*49,934*	*47,638*	47,056	47,762	48,663	47,379	47,564	47,626
	MAR=	**-0.7%**	**243,938**	**252,142**		**259,497**	**249,684**	**248,875**		**DEC=**	**-2.4%**	**239,814**	**245,706**

STATION 310 - SUTTON - RTE.146 - SOUTH OF PURGATORY ROAD

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
05	29,600	29,800	30,000	30,091	30,571	32,009	31,477	32,505	30,362	30,000	29,000	27,000	30,201
	-6%	-4%	0%	2%	3%	1%	2%	1%	6%	2%	7%	6%	2%
06	27,942	28,570	29,913	30,757	31,353	32,274	32,010	32,876	32,157	30,715	30,961	28,654	30,682
	-3%	-2%	3%	4%	6%	5%	5%	8%	-3%	-11%	3%	3%	2%
07	*26,982*	27,863	30,788	31,934	33,297	33,965	33,481	35,503	31,235	27,268	31,910	29,582	31,151
	11%	8%	1%	1%	-2%	-4%	-2%	-4%	4%	22%	0%	-6%	2%
08	*30,000*	30,102	31,021	32,235	32,718	32,715	32,707	34,088	32,529	33,273	31,779	27,892	31,755
	MAR=	**-1.7%**	**121,722**	**125,017**		**130,963**	**129,675**	**134,972**		**DEC=**	**-8.6%**	**113,128**	**123,789**

STATION 2265 - DEERFIELD - RTE. 116 - SOUTH OF SOUTH MILL RIVER ROAD

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
05	3,162	3,200	3,427	3,717	3,924	3,870	3,599	3,555	3,728	3,721	3,533	3,367	3,567
	4%	2%	2%	-3%	-3%	-4%	2%	-1%	-1%	2%	5%	-2%	0%
06	3,277	3,271	3,510	3,621	3,790	3,700	3,658	3,523	3,700	3,779	3,700	3,313	3,570
	-5%	-6%	-10%	-9%	0%	3%	-2%	1%	-5%	-10%	-9%	8%	-4%
07	3,113	3,091	3,168	3,298	3,781	3,797	3,584	3,569	*3,500*	*3,400*	3,367	3,592	3,438
	2%	-4%	1%	2%	-4%	-6%	-6%	-7%	0%	10%	-3%	-31%	-4%
08	3,173	2,972	3,200	3,350	3,647	3,574	3,373	3,328	*3,505*	*3,743*	3,252	2,484	3,300
	-10%	3%	-3%	2%	-1%	3%	4%	2%	2%	-4%	-1%	29%	2%
09	2,853	3,050	3,111	3,431	3,616	3,676	3,506	3,402	*3,562*	*3,610*	3,220	3,200	3,353
	MAR=	**-4.7%**	**16,416**	**17,417**		**18,617**	**17,720**	**17,377**		**DEC=**	**-7.4%**	**15,956**	**17,229**

STATION 3329 - BRIMFIELD - RTE.20 - EAST OF HOLLAND RD.

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
06	6,714	6,783	7,300	7,947	9,184	8,249	8,773	8,291	8,822	8,090	7,637	7,947	7,978
	10%	-1%	14%	7%	3%	1%	2%	-1%	9%	1%	1%	-11%	3%
07	7,385	6,741	8,315	*8,516*	9,428	8,338	8,963	8,175	9,656	8,187	7,705	7,036	8,204
	-6%	1%	-10%	-11%	-3%	-12%	-2%	3%	-9%	30%	-5%	1%	-2%
08	6,916	6,795	7,500	*7,612*	9,150	7,331	8,797	8,428	8,776	10,663	7,288	7,080	8,028
	MAR=	**-4.5%**	**23,115**	**24,075**		**23,918**	**26,533**	**24,894**		**DEC=**	**-8.9%**	**22,063**	**24,210**

		MAR.TOTALS=	**478,006**	**496,390**	**=APR. TOTAL**						**TOTALS=**	**462,588**	**486,764**
		MAR. AVG.=	**-1.8%**	**+2%**	**=APR. AVG.**								
					SUMMER TOTALS:	**513,420**	**501,098**	**504,723**			**DEC. AVG.=**	**-5.0%**	
						+5.5%	+2.9%	+3.7%					
						Summer Avg.	**506,413**	**= +4.0%**					

For MARCH TMC's & ATR's Increase 1.8% to Avg.Mo.,+4% for Summer.

For APRIL TMC's & ATR's Decrease 2% to Avg.Mo.,+4% for Summer.

For DEC. TMC's & ATR's Increase 5% for Avg.Mo.,+4% for Summer

ITALICS = ESTIMATED DATA

MADT

TURNING MOVEMENT COUNT WORKSHEET

BTTC

MUNICIPALITY: Sturbridge

DATE: 4/11/2015

LOCATION: Route 49 / Putnam Road

DAY OF WEEK: Saturday AM+PM

WEATHER: AM: Sunny 40 PM: Sunny 50

TECHNICIAN: LB

Time Period	Rte 49 From North				Putnam Road From East				Rte 49 From South				Putnam Road From West				Total	Peak
	Rt	Thru	Lt	HV	Rt	Thru	Lt	HV	Rt	Thru	Lt	HV	Rt	Thru	Lt	HV		
6:45 - 7:00	0	26	4	0	2	6	1	0	1	11	1	3	1	12	0	0	65	
7:00 - 7:15	0	22	5	1	5	5	0	0	3	16	1	4	1	7	0	0	65	
7:15 - 7:30	0	37	8	5	5	5	1	0	1	20	0	2	5	7	0	0	89	
7:30 - 7:45	0	32	11	1	17	5	2	0	1	17	1	1	4	14	0	0	104	323
7:45 - 8:00	0	43	14	1	9	9	2	0	2	14	2	2	9	11	0	0	115	373
8:00 - 8:15	0	37	16	1	9	10	3	0	1	19	2	1	4	10	0	0	111	419
TOTAL	0	197	58	9	47	40	9	0	9	97	7	13	24	61	0	0	549	
		SBPct	47.3			**WBPct**	18.4			**NBPct**	19.1			**EBPct**	15.3			
Peak Sums:	**0**	**149**	**49**	**8**	**40**	**29**	**8**	**0**	**5**	**70**	**5**	**6**	**22**	**42**	**0**	**0**	**419**	
Appr. PHF		0.87				0.80				0.91				0.80				
Peak Trucks	14					**TrkPct**	3.34		**Inters. PHF=**		0.91							
Mvmnt PHF	1.00	0.87	0.77		0.59	0.73	0.67		0.63	0.88	0.63		0.61	0.75	1.00			

Time Period	Rte 49 From North				Putnam Road From East				Rte 49 From South				Putnam Road From West				Total	Peak
	Rt	Thru	Lt	HV	Rt	Thru	Lt	HV	Rt	Thru	Lt	HV	Rt	Thru	Lt	HV		
4:00 - 4:15	0	55	16	1	13	17	3	0	4	53	13	0	11	11	0	0	196	
4:15 - 4:30	1	59	11	1	24	10	4	1	6	67	10	1	8	8	0	0	208	
4:30 - 4:45	1	54	15	0	13	14	1	0	4	46	10	1	13	8	0	0	179	
4:45 - 5:00	1	42	10	0	17	13	4	0	8	64	7	2	5	10	0	1	181	764
5:00 - 5:15	0	47	9	1	13	13	6	1	4	55	4	0	14	6	0	0	171	739
5:15 - 5:30	0	52	10	1	15	11	3	0	3	53	8	0	8	7	0	0	170	701
TOTAL	3	309	71	4	95	78	21	2	29	338	52	4	59	50	0	1	1105	
		SBPct	34.7			**WBPct**	17.4			**NBPct**	38.2			**EBPct**	9.7			
Peak Sums:	**3**	**210**	**52**	**2**	**67**	**54**	**12**	**1**	**22**	**230**	**40**	**4**	**37**	**37**	**0**	**1**	**764**	
Appr. PHF		0.93				0.88				0.88				0.84				
Peak Trucks	8					**TrkPct**	1.05		**Inters. PHF=**		0.92							
Mvmnt PHF	0.75	0.89	0.81		0.70	0.79	0.75		0.69	0.86	0.77		0.71	0.84	1.00			

N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
Client: BTTC/ L. Bristol

PRECISION DATA INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
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File Name : 144239 A
Site Code : 21400121
Start Date : 12/17/2014
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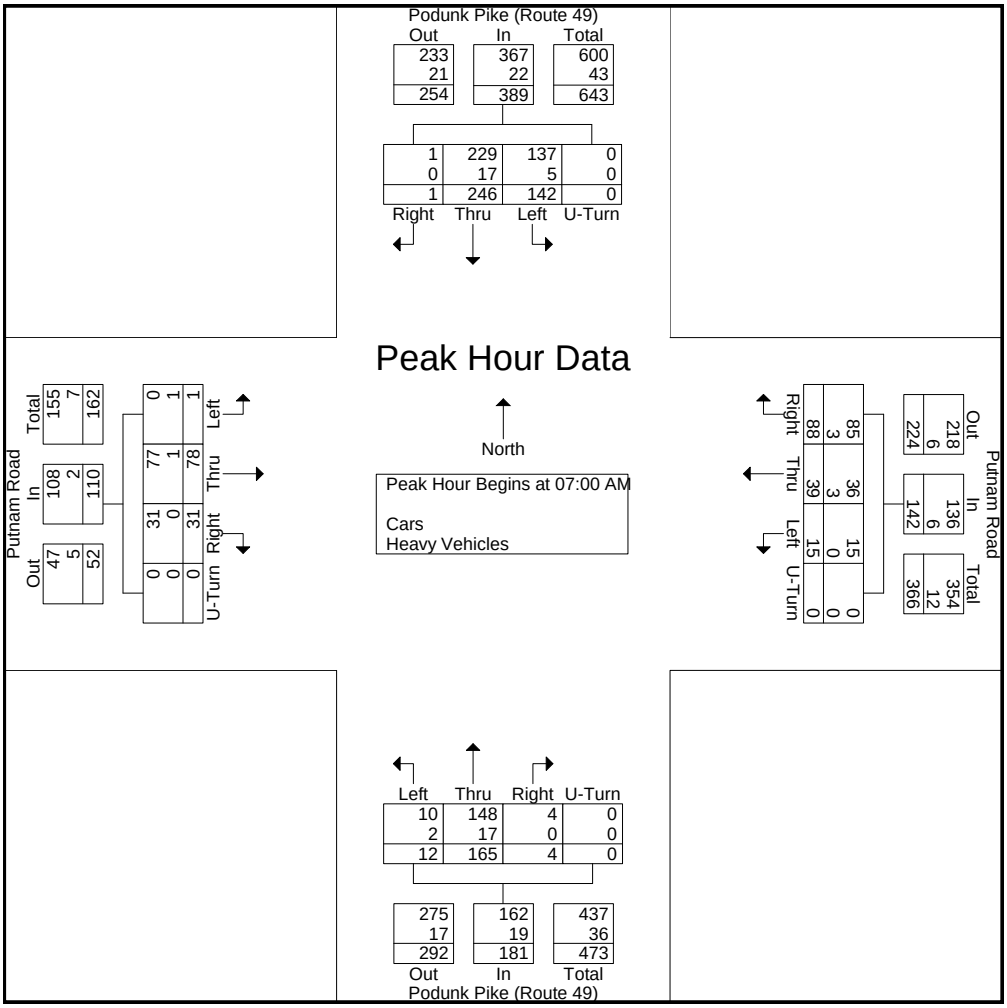
	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	57	36	0	93	15	12	5	0	32	2	42	5	0	49	8	17	0	0	25	199
07:15 AM	0	62	38	0	100	14	8	5	0	27	1	40	2	0	43	6	23	0	0	29	199
07:30 AM	0	56	30	0	86	29	8	2	0	39	1	37	4	0	42	15	24	0	0	39	206
07:45 AM	1	71	38	0	110	30	11	3	0	44	0	46	1	0	47	2	14	1	0	17	218
Total Volume	1	246	142	0	389	88	39	15	0	142	4	165	12	0	181	31	78	1	0	110	822
% App. Total	0.3	63.2	36.5	0		62	27.5	10.6	0		2.2	91.2	6.6	0		28.2	70.9	0.9	0		
PHF	.250	.866	.934	.000	.884	.733	.813	.750	.000	.807	.500	.897	.600	.000	.923	.517	.813	.250	.000	.705	.943
Cars	1	229	137	0	367	85	36	15	0	136	4	148	10	0	162	31	77	0	0	108	773
% Cars	100	93.1	96.5	0	94.3	96.6	92.3	100	0	95.8	100	89.7	83.3	0	89.5	100	98.7	0	0	98.2	94.0
Heavy Vehicles	0	17	5	0	22	3	3	0	0	6	0	17	2	0	19	0	1	1	0	2	49
% Heavy Vehicles	0	6.9	3.5	0	5.7	3.4	7.7	0	0	4.2	0	10.3	16.7	0	10.5	0	1.3	100	0	1.8	6.0



N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
Client: BTTC/ L. Bristol

PRECISION DATA INDUSTRIES, LLC
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File Name : 144239 A
Site Code : 21400121
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Groups Printed- Cars

	Podunk Pike (Route 49) From North				Putnam Road From East				Podunk Pike (Route 49) From South				Putnam Road From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
06:00 AM	0	44	22	0	7	4	2	0	1	14	0	0	4	14	0	0	112
06:15 AM	0	47	30	0	2	10	0	0	1	18	0	1	7	32	0	0	148
06:30 AM	0	51	32	0	13	6	1	0	0	32	3	0	5	20	0	0	163
06:45 AM	0	61	38	0	12	9	0	0	0	13	1	0	6	19	1	0	160
Total	0	203	122	0	34	29	3	0	2	77	4	1	22	85	1	0	583
07:00 AM	0	52	35	0	14	12	5	0	2	37	4	0	8	16	0	0	185
07:15 AM	0	57	36	0	14	7	5	0	1	37	2	0	6	23	0	0	188
07:30 AM	0	53	28	0	27	7	2	0	1	32	3	0	15	24	0	0	192
07:45 AM	1	67	38	0	30	10	3	0	0	42	1	0	2	14	0	0	208
Total	1	229	137	0	85	36	15	0	4	148	10	0	31	77	0	0	773
08:00 AM	0	50	24	0	11	13	8	0	0	30	2	0	2	9	0	0	149
08:15 AM	0	47	20	0	12	9	5	0	1	21	3	0	9	18	1	0	146
Grand Total	1	529	303	0	142	87	31	0	7	276	19	1	64	189	2	0	1651
Apprch %	0.1	63.5	36.4	0	54.6	33.5	11.9	0	2.3	91.1	6.3	0.3	25.1	74.1	0.8	0	
Total %	0.1	32	18.4	0	8.6	5.3	1.9	0	0.4	16.7	1.2	0.1	3.9	11.4	0.1	0	

	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	52	35	0	87	14	12	5	0	31	2	37	4	0	43	8	16	0	0	24	185
07:15 AM	0	57	36	0	93	14	7	5	0	26	1	37	2	0	40	6	23	0	0	29	188
07:30 AM	0	53	28	0	81	27	7	2	0	36	1	32	3	0	36	15	24	0	0	39	192
07:45 AM	1	67	38	0	106	30	10	3	0	43	0	42	1	0	43	2	14	0	0	16	208
Total Volume	1	229	137	0	367	85	36	15	0	136	4	148	10	0	162	31	77	0	0	108	773
% App. Total	0.3	62.4	37.3	0		62.5	26.5	11	0		2.5	91.4	6.2	0		28.7	71.3	0	0		
PHF	.250	.854	.901	.000	.866	.708	.750	.750	.000	.791	.500	.881	.625	.000	.942	.517	.802	.000	.000	.692	.929

N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
Client: BTTC/ L. Bristol

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File Name : 144239 A
Site Code : 21400121
Start Date : 12/17/2014
Page No : 1

Groups Printed- Cars

	Podunk Pike (Route 49) From North				Putnam Road From East				Podunk Pike (Route 49) From South				Putnam Road From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
06:00 AM	0	44	22	0	7	4	2	0	1	14	0	0	4	14	0	0	112
06:15 AM	0	47	30	0	2	10	0	0	1	18	0	1	7	32	0	0	148
06:30 AM	0	51	32	0	13	6	1	0	0	32	3	0	5	20	0	0	163
06:45 AM	0	61	38	0	12	9	0	0	0	13	1	0	6	19	1	0	160
Total	0	203	122	0	34	29	3	0	2	77	4	1	22	85	1	0	583
07:00 AM	0	52	35	0	14	12	5	0	2	37	4	0	8	16	0	0	185
07:15 AM	0	57	36	0	14	7	5	0	1	37	2	0	6	23	0	0	188
07:30 AM	0	53	28	0	27	7	2	0	1	32	3	0	15	24	0	0	192
07:45 AM	1	67	38	0	30	10	3	0	0	42	1	0	2	14	0	0	208
Total	1	229	137	0	85	36	15	0	4	148	10	0	31	77	0	0	773
08:00 AM	0	50	24	0	11	13	8	0	0	30	2	0	2	9	0	0	149
08:15 AM	0	47	20	0	12	9	5	0	1	21	3	0	9	18	1	0	146
Grand Total	1	529	303	0	142	87	31	0	7	276	19	1	64	189	2	0	1651
Apprch %	0.1	63.5	36.4	0	54.6	33.5	11.9	0	2.3	91.1	6.3	0.3	25.1	74.1	0.8	0	
Total %	0.1	32	18.4	0	8.6	5.3	1.9	0	0.4	16.7	1.2	0.1	3.9	11.4	0.1	0	

	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	52	35	0	87	14	**12**	**5**	0	31	**2**	**37**	**4**	**0**	**43**	8	16	0	0	24	185
07:15 AM	0	57	36	0	93	14	7	5	0	26	1	37	2	0	40	6	23	0	0	29	188
07:30 AM	0	53	28	0	81	27	7	2	0	36	1	32	3	0	36	**15**	**24**			**39**	
07:45 AM	**1**	**67**	**38**	**0**	**106**	**30**	10	3	0	**43**	**0**	**42**	1	0	43	2	14	0	0	16	**208**
Total Volume	1	229	137	0	367	85	36	15	0	136	4	148	10	0	162	31	77	0	0	108	773
% App. Total	0.3	62.4	37.3	0		62.5	26.5	11	0		2.5	91.4	6.2	0		28.7	71.3	0	0		
PHF	.250	.854	.901	.000	.866	.708	.750	.750	.000	.791	.500	.881	.625	.000	.942	.517	.802	.000	.000	.692	.929

N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
Client: BTTC/ L. Bristol

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File Name : 144239 A
Site Code : 21400121
Start Date : 12/17/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Podunk Pike (Route 49) From North				Putnam Road From East				Podunk Pike (Route 49) From South				Putnam Road From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
06:00 AM	0	7	0	0	1	0	0	0	0	4	0	0	1	1	0	0	14
06:15 AM	0	3	1	0	0	0	0	0	0	1	0	0	0	0	0	0	5
06:30 AM	0	5	0	0	0	0	0	0	0	9	0	0	0	0	0	0	14
06:45 AM	0	5	1	0	1	0	0	0	0	4	1	0	1	2	0	0	15
Total	0	20	2	0	2	0	0	0	0	18	1	0	2	3	0	0	48
07:00 AM	0	5	1	0	1	0	0	0	0	5	1	0	0	1	0	0	14
07:15 AM	0	5	2	0	0	1	0	0	0	3	0	0	0	0	0	0	11
07:30 AM	0	3	2	0	2	1	0	0	0	5	1	0	0	0	0	0	14
07:45 AM	0	4	0	0	0	1	0	0	0	4	0	0	0	0	1	0	10
Total	0	17	5	0	3	3	0	0	0	17	2	0	0	1	1	0	49
08:00 AM	0	3	0	0	1	0	0	0	0	4	0	0	0	0	1	0	9
08:15 AM	0	9	1	0	2	0	0	0	1	1	0	0	0	0	0	0	14
Grand Total	0	49	8	0	8	3	0	0	1	40	3	0	2	4	2	0	120
Apprch %	0	86	14	0	72.7	27.3	0	0	2.3	90.9	6.8	0	25	50	25	0	
Total %	0	40.8	6.7	0	6.7	2.5	0	0	0.8	33.3	2.5	0	1.7	3.3	1.7	0	

	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:30 AM																					
06:30 AM	0	5	0	0	5	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	14
06:45 AM	0	5	1	0	6	1	0	0	0	1	0	4	1	0	5	1	2	0	0	3	15
07:00 AM	0	5	1	0	6	1	0	0	0	1	0	5	1	0	6	0	1	0	0	1	14
07:15 AM	0	5	2	0	7	0	1	0	0	1	0	3	0	0	3	0	0	0	0	0	11
Total Volume	0	20	4	0	24	2	1	0	0	3	0	21	2	0	23	1	3	0	0	4	54
% App. Total	0	83.3	16.7	0		66.7	33.3	0	0		0	91.3	8.7	0		25	75	0	0		
PHF	.000	1.00	.500	.000	.857	.500	.250	.000	.000	.750	.000	.583	.500	.000	.639	.250	.375	.000	.000	.333	.900

N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
Client: BTTC/ L. Bristol

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Site Code : 21400121
Start Date : 12/17/2014
Page No : 1

Groups Printed- Peds and Bikes

	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	Peds NB	Peds SB	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Int. Total
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %																					

	Podunk Pike (Route 49) From North						Putnam Road From East						Podunk Pike (Route 49) From South						Putnam Road From West						
Start Time	Right	Thru	Left	Peds NB	Peds SB	App. Total	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 06:00 AM																									
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S: Podunk Pike (Route 49)
E/W: Putnam Road
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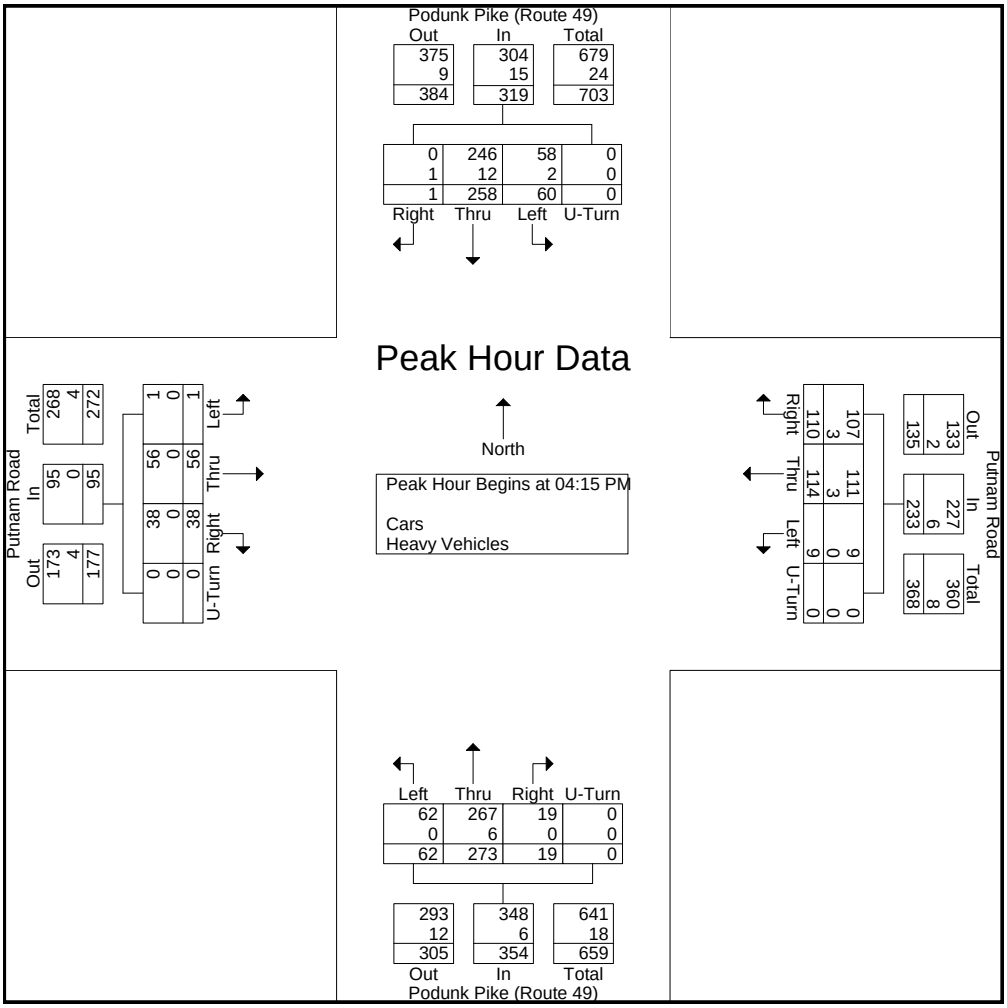
	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	75	17	0	92	28	38	3	0	69	7	61	12	0	80	8	17	1	0	26	267
04:30 PM	0	58	21	0	79	32	21	1	0	54	3	60	17	0	80	11	11	0	0	22	235
04:45 PM	0	52	13	0	65	29	29	2	0	60	8	75	20	0	103	7	7	0	0	14	242
05:00 PM	1	73	9	0	83	21	26	3	0	50	1	77	13	0	91	12	21	0	0	33	257
Total Volume	1	258	60	0	319	110	114	9	0	233	19	273	62	0	354	38	56	1	0	95	1001
% App. Total	0.3	80.9	18.8	0		47.2	48.9	3.9	0		5.4	77.1	17.5	0		40	58.9	1.1	0		
PHF	.250	.860	.714	.000	.867	.859	.750	.750	.000	.844	.594	.886	.775	.000	.859	.792	.667	.250	.000	.720	.937
Cars	0	246	58	0	304	107	111	9	0	227	19	267	62	0	348	38	56	1	0	95	974
% Cars	0	95.3	96.7	0	95.3	97.3	97.4	100	0	97.4	100	97.8	100	0	98.3	100	100	100	0	100	97.3
Heavy Vehicles	1	12	2	0	15	3	3	0	0	6	0	6	0	0	6	0	0	0	0	0	27
% Heavy Vehicles	100	4.7	3.3	0	4.7	2.7	2.6	0	0	2.6	0	2.2	0	0	1.7	0	0	0	0	0	2.7



N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
Client: BTTC/ L. Bristol

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Groups Printed- Cars - Heavy Vehicles

	Podunk Pike (Route 49) From North				Putnam Road From East				Podunk Pike (Route 49) From South				Putnam Road From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	0	49	17	0	29	25	3	0	3	76	9	0	4	10	0	12	237
03:45 PM	1	57	18	0	27	16	2	0	1	73	9	0	7	8	0	0	219
Total	1	106	35	0	56	41	5	0	4	149	18	0	11	18	0	12	456
04:00 PM	0	58	16	0	34	29	3	0	4	73	9	0	11	12	1	0	250
04:15 PM	0	75	17	0	28	38	3	0	7	61	12	0	8	17	1	0	267
04:30 PM	0	58	21	0	32	21	1	0	3	60	17	0	11	11	0	0	235
04:45 PM	0	52	13	0	29	29	2	0	8	75	20	0	7	7	0	0	242
Total	0	243	67	0	123	117	9	0	22	269	58	0	37	47	2	0	994
05:00 PM	1	73	9	0	21	26	3	0	1	77	13	0	12	21	0	0	257
05:15 PM	0	43	7	0	13	13	8	0	2	53	15	0	5	5	0	0	164
05:30 PM	1	73	17	0	25	32	3	0	6	55	9	0	6	2	0	0	229
05:45 PM	2	41	8	0	22	27	5	0	4	53	9	0	9	7	1	0	188
Total	4	230	41	0	81	98	19	0	13	238	46	0	32	35	1	0	838
Grand Total	5	579	143	0	260	256	33	0	39	656	122	0	80	100	3	12	2288
Apprch %	0.7	79.6	19.7	0	47.4	46.6	6	0	4.8	80.3	14.9	0	41	51.3	1.5	6.2	
Total %	0.2	25.3	6.2	0	11.4	11.2	1.4	0	1.7	28.7	5.3	0	3.5	4.4	0.1	0.5	
Cars	4	545	135	0	253	250	33	0	39	639	121	0	80	99	3	12	2213
% Cars	80	94.1	94.4	0	97.3	97.7	100	0	100	97.4	99.2	0	100	99	100	100	96.7
Heavy Vehicles	1	34	8	0	7	6	0	0	0	17	1	0	0	1	0	0	75
% Heavy Vehicles	20	5.9	5.6	0	2.7	2.3	0	0	0	2.6	0.8	0	0	1	0	0	3.3

	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	75	17	0	92	28	38	3	0	69	7	61	12	0	80	8	17	1	0	26	267
04:30 PM	0	58	21	0	79	32	21	1	0	54	3	60	17	0	80	11	11	0	0	22	235
04:45 PM	0	52	13	0	65	29	29	2	0	60	8	75	20	0	103	7	7	0	0	14	242
05:00 PM	1	73	9	0	83	21	26	3	0	50	1	77	13	0	91	12	21	0	0	33	257
Total Volume	1	258	60	0	319	110	114	9	0	233	19	273	62	0	354	38	56	1	0	95	1001
% App. Total	0.3	80.9	18.8	0		47.2	48.9	3.9	0		5.4	77.1	17.5	0		40	58.9	1.1	0		
PHF	.250	.860	.714	.000	.867	.859	.750	.750	.000	.844	.594	.886	.775	.000	.859	.792	.667	.250	.000	.720	.937
Cars	0	246	58	0	304	107	111	9	0	227	19	267	62	0	348	38	56	1	0	95	974
% Cars	0	95.3	96.7	0	95.3	97.3	97.4	100	0	97.4	100	97.8	100	0	98.3	100	100	100	0	100	97.3
Heavy Vehicles	1	12	2	0	15	3	3	0	0	6	0	6	0	0	6	0	0	0	0	0	27
% Heavy Vehicles	100	4.7	3.3	0	4.7	2.7	2.6	0	0	2.6	0	2.2	0	0	1.7	0	0	0	0	0	2.7

N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
Client: BTTC/ L. Bristol

PRECISION DATA INDUSTRIES, LLC
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File Name : 144239 AA
Site Code : 21400121
Start Date : 12/17/2014
Page No : 1

Groups Printed- Cars

	Podunk Pike (Route 49) From North				Putnam Road From East				Podunk Pike (Route 49) From South				Putnam Road From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	0	46	17	0	26	23	3	0	3	74	9	0	4	10	0	12	227
03:45 PM	1	51	17	0	27	16	2	0	1	71	9	0	7	7	0	0	209
Total	1	97	34	0	53	39	5	0	4	145	18	0	11	17	0	12	436
04:00 PM	0	56	14	0	34	29	3	0	4	72	8	0	11	12	1	0	244
04:15 PM	0	69	15	0	26	37	3	0	7	60	12	0	8	17	1	0	255
04:30 PM	0	56	21	0	31	21	1	0	3	56	17	0	11	11	0	0	228
04:45 PM	0	50	13	0	29	28	2	0	8	75	20	0	7	7	0	0	239
Total	0	231	63	0	120	115	9	0	22	263	57	0	37	47	2	0	966
05:00 PM	0	71	9	0	21	25	3	0	1	76	13	0	12	21	0	0	252
05:15 PM	0	37	7	0	13	12	8	0	2	51	15	0	5	5	0	0	155
05:30 PM	1	69	16	0	24	32	3	0	6	52	9	0	6	2	0	0	220
05:45 PM	2	40	6	0	22	27	5	0	4	52	9	0	9	7	1	0	184
Total	3	217	38	0	80	96	19	0	13	231	46	0	32	35	1	0	811
Grand Total	4	545	135	0	253	250	33	0	39	639	121	0	80	99	3	12	2213
Apprch %	0.6	79.7	19.7	0	47.2	46.6	6.2	0	4.9	80	15.1	0	41.2	51	1.5	6.2	
Total %	0.2	24.6	6.1	0	11.4	11.3	1.5	0	1.8	28.9	5.5	0	3.6	4.5	0.1	0.5	

	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	69	15	0	84	26	37	3	0	66	7	60	12	0	79	8	17	1	0	26	255
04:30 PM	0	56	21	0	77	31	21	1	0	53	3	56	17	0	76	11	11	0	0	22	228
04:45 PM	0	50	13	0	63	29	28	2	0	59	8	75	20	0	103	7	7	0	0	14	239
05:00 PM	0	71	9	0	80	21	25	3	0	49	1	76	13	0	90	12	21	0	0	33	252
Total Volume	0	246	58	0	304	107	111	9	0	227	19	267	62	0	348	38	56	1	0	95	974
% App. Total	0	80.9	19.1	0		47.1	48.9	4	0		5.5	76.7	17.8	0		40	58.9	1.1	0		
PHF	.000	.866	.690	.000	.905	.863	.750	.750	.000	.860	.594	.878	.775	.000	.845	.792	.667	.250	.000	.720	.955

N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
Client: BTTC/ L. Bristol

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File Name : 144239 AA
Site Code : 21400121
Start Date : 12/17/2014
Page No : 1

Groups Printed- Heavy Vehicles

	Podunk Pike (Route 49) From North				Putnam Road From East				Podunk Pike (Route 49) From South				Putnam Road From West				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Int. Total
03:30 PM	0	3	0	0	3	2	0	0	0	2	0	0	0	0	0	0	10
03:45 PM	0	6	1	0	0	0	0	0	0	2	0	0	0	1	0	0	10
Total	0	9	1	0	3	2	0	0	0	4	0	0	0	1	0	0	20
04:00 PM	0	2	2	0	0	0	0	0	0	1	1	0	0	0	0	0	6
04:15 PM	0	6	2	0	2	1	0	0	0	1	0	0	0	0	0	0	12
04:30 PM	0	2	0	0	1	0	0	0	0	4	0	0	0	0	0	0	7
04:45 PM	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
Total	0	12	4	0	3	2	0	0	0	6	1	0	0	0	0	0	28
05:00 PM	1	2	0	0	0	1	0	0	0	1	0	0	0	0	0	0	5
05:15 PM	0	6	0	0	0	1	0	0	0	2	0	0	0	0	0	0	9
05:30 PM	0	4	1	0	1	0	0	0	0	3	0	0	0	0	0	0	9
05:45 PM	0	1	2	0	0	0	0	0	0	1	0	0	0	0	0	0	4
Total	1	13	3	0	1	2	0	0	0	7	0	0	0	0	0	0	27
Grand Total	1	34	8	0	7	6	0	0	0	17	1	0	0	1	0	0	75
Apprch %	2.3	79.1	18.6	0	53.8	46.2	0	0	0	94.4	5.6	0	0	100	0	0	
Total %	1.3	45.3	10.7	0	9.3	8	0	0	0	22.7	1.3	0	0	1.3	0	0	

	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	3	0	0	3	3	2	0	0	5	0	2	0	0	2	0	0	0	0	0	10
03:45 PM	0	6	1	0	7	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	10
04:00 PM	0	2	2	0	4	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	6
04:15 PM	0	6	2	0	8	2	1	0	0	3	0	1	0	0	1	0	0	0	0	0	12
Total Volume	0	17	5	0	22	5	3	0	0	8	0	6	1	0	7	0	1	0	0	1	38
% App. Total	0	77.3	22.7	0		62.5	37.5	0	0		0	85.7	14.3	0		0	100	0	0		
PHF	.000	.708	.625	.000	.688	.417	.375	.000	.000	.400	.000	.750	.250	.000	.875	.000	.250	.000	.000	.250	.792

N/S: Podunk Pike (Route 49)
E/W: Putnam Road
City, State: Sturbridge, MA
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Groups Printed- Peds and Bikes

	Podunk Pike (Route 49) From North					Putnam Road From East					Podunk Pike (Route 49) From South					Putnam Road From West					
Start Time	Right	Thru	Left	Peds NB	Peds SB	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Int. Total
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %																					

	Podunk Pike (Route 49) From North						Putnam Road From East						Podunk Pike (Route 49) From South						Putnam Road From West						
Start Time	Right	Thru	Left	Peds NB	Peds SB	App. Total	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 03:30 PM																									
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

APPENDIX B

HIGHWAY CAPACITY ANALYSIS

Capacity Analyses
Current Year (2014) Existing Condition
<u>Weekday</u> AM, PM
Route 49/Putnam Road

Lanes and Geometrics
10: Putnam Road & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	85	34	16	43	96	13	180	4	155	268	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.995			0.999	
Flt Protected		0.998			0.986			0.995			0.983	
Satd. Flow (prot)	0	1683	1500	0	1662	1471	0	1903	0	0	2027	0
Flt Permitted		0.998			0.986			0.995			0.983	
Satd. Flow (perm)	0	1683	1500	0	1662	1471	0	1903	0	0	2027	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		561			440			447			470	
Travel Time (s)		12.8			8.6			5.5			5.8	
Peak Hour Factor	0.25	0.81	0.52	0.75	0.81	0.73	0.60	0.90	0.50	0.93	0.87	0.25
Heavy Vehicles (%)	100%	1%	0%	0%	8%	3%	17%	10%	0%	4%	7%	0%
Adj. Flow (vph)	4	105	65	21	53	132	22	200	8	167	308	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	109	65	0	74	132	0	230	0	0	479	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 53.0%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	85	34	16	43	96	13	180	4	155	268	1
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	0.25	0.81	0.52	0.75	0.81	0.73	0.60	0.90	0.50	0.93	0.87	0.25
Hourly flow rate (vph)	4	105	65	21	53	132	22	200	8	167	308	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	983	895	310	976	893	204	312			208		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	983	895	310	976	893	204	312			208		
tC, single (s)	8.1	6.5	6.2	7.1	6.6	6.2	4.3			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	3.3	3.5	4.1	3.3	2.4			2.2		
p0 queue free %	96	57	91	83	78	84	98			88		
cM capacity (veh/h)	96	242	735	126	236	834	1168			1351		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	174	206	230	479
Volume Left	4	21	22	167
Volume Right	65	132	8	4
cSH	379	567	1168	1351
Volume to Capacity	0.46	0.36	0.02	0.12
Queue Length 95th (ft)	59	41	1	11
Control Delay (s)	24.3	18.1	0.9	3.6
Lane LOS	C	C	A	A
Approach Delay (s)	24.3	18.1	0.9	3.6
Approach LOS	C	C		

Intersection Summary			
Average Delay	9.1		
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes and Geometrics
12: Putnam Road & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	61	41	10	124	120	68	298	21	65	281	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.989			0.999	
Flt Protected		0.998			0.996			0.991			0.989	
Satd. Flow (prot)	0	1761	1500	0	1727	1471	0	2049	0	0	2048	0
Flt Permitted		0.998			0.996			0.991			0.989	
Satd. Flow (perm)	0	1761	1500	0	1727	1471	0	2049	0	0	2048	0
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		373			500			341			375	
Travel Time (s)		7.3			9.7			4.2			4.6	
Peak Hour Factor	0.25	0.67	0.79	0.75	0.75	0.86	0.78	0.89	0.59	0.71	0.86	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	3%	3%	0%	2%	0%	3%	5%	100%
Adj. Flow (vph)	4	91	52	13	165	140	87	335	36	92	327	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	95	52	0	178	140	0	458	0	0	423	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.6%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	61	41	10	124	120	68	298	21	65	281	1
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	0.25	0.67	0.79	0.75	0.75	0.86	0.78	0.89	0.59	0.71	0.86	0.25
Hourly flow rate (vph)	4	91	52	13	165	140	87	335	36	92	327	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1191	1057	329	1110	1041	353	331			370		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1191	1057	329	1110	1041	353	331			370		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	89	53	93	87	16	80	93			92		
cM capacity (veh/h)	35	195	717	100	197	689	1240			1183		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	147	318	458	422
Volume Left	4	13	87	92
Volume Right	52	140	36	4
cSH	290	293	1240	1183
Volume to Capacity	0.51	1.09	0.07	0.08
Queue Length 95th (ft)	67	316	6	6
Control Delay (s)	31.0	117.1	2.1	2.4
Lane LOS	D	F	A	A
Approach Delay (s)	31.0	117.1	2.1	2.4
Approach LOS	D	F		

Intersection Summary			
Average Delay	32.6		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

Capacity Analyses
Current Year (2014) Existing Condition
<u>Weekend</u> AM, PM

Lanes and Geometrics
10: Putnam Road & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	43	22	8	30	41	5	71	5	50	152	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.989				
Flt Protected					0.989			0.996			0.987	
Satd. Flow (prot)	0	1764	1500	0	1763	1515	0	2072	0	0	2142	0
Flt Permitted					0.989			0.996			0.987	
Satd. Flow (perm)	0	1764	1500	0	1763	1515	0	2072	0	0	2142	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		561			440			447			470	
Travel Time (s)		12.8			8.6			5.5			5.8	
Peak Hour Factor	1.00	0.75	0.61	0.67	0.73	0.59	0.63	0.88	0.63	0.77	0.87	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	0	57	36	12	41	69	8	81	8	65	175	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	57	36	0	53	69	0	97	0	0	240	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 32.6%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	43	22	8	30	41	5	71	5	50	152	0
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	1.00	0.75	0.61	0.67	0.73	0.59	0.63	0.88	0.63	0.77	0.87	1.00
Hourly flow rate (vph)	0	57	36	12	41	69	8	81	8	65	175	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	460	409	175	452	405	85	175			89		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	460	409	175	452	405	85	175			89		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	89	96	97	92	93	99			96		
cM capacity (veh/h)	432	509	874	440	512	980	1414			1520		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	93	123	97	240
Volume Left	0	12	8	65
Volume Right	36	69	8	0
cSH	830	1146	1414	1520
Volume to Capacity	0.11	0.11	0.01	0.04
Queue Length 95th (ft)	9	9	0	3
Control Delay (s)	11.5	10.8	0.7	2.3
Lane LOS	B	B	A	A
Approach Delay (s)	11.5	10.8	0.7	2.3
Approach LOS	B	B		

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes and Geometrics
12: Putnam Road & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	38	38	12	55	68	41	235	22	53	214	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.988			0.998	
Flt Protected					0.991			0.993			0.990	
Satd. Flow (prot)	0	1764	1500	0	1766	1515	0	2065	0	0	2143	0
Flt Permitted					0.991			0.993			0.990	
Satd. Flow (perm)	0	1764	1500	0	1766	1515	0	2065	0	0	2143	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		373			500			341			375	
Travel Time (s)		8.5			9.7			4.2			4.6	
Peak Hour Factor	1.00	0.84	0.71	0.75	0.79	0.70	0.77	0.86	0.69	0.81	0.89	0.75
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	0	45	54	16	70	97	53	273	32	65	240	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	54	0	86	97	0	358	0	0	309	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 38.7%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	38	38	12	55	68	41	235	22	53	214	3
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	1.00	0.84	0.71	0.75	0.79	0.70	0.77	0.86	0.69	0.81	0.89	0.75
Hourly flow rate (vph)	0	45	54	16	70	97	53	273	32	65	240	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	852	785	242	818	771	289	244			305		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	852	785	242	818	771	289	244			305		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	85	93	93	77	87	96			95		
cM capacity (veh/h)	189	298	801	229	303	755	1334			1267		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	183	358	310
Volume Left	0	16	53	65
Volume Right	54	97	32	4
cSH	650	618	1334	1267
Volume to Capacity	0.15	0.30	0.04	0.05
Queue Length 95th (ft)	13	31	3	4
Control Delay (s)	14.1	16.1	1.5	2.1
Lane LOS	B	C	A	A
Approach Delay (s)	14.1	16.1	1.5	2.1
Approach LOS	B	C		

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Capacity Analyses
Future Year (2019) No-Build Condition
<u>Weekday</u> AM, PM

Lanes and Geometrics
1: Putnam Rd & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	89	35	17	44	100	14	188	5	162	281	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.994			0.999	
Flt Protected		0.998			0.985			0.995			0.983	
Satd. Flow (prot)	0	1686	1500	0	1662	1471	0	1903	0	0	2027	0
Flt Permitted		0.998			0.985			0.995			0.983	
Satd. Flow (perm)	0	1686	1500	0	1662	1471	0	1903	0	0	2027	0
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		392			767			394			424	
Travel Time (s)		8.9			17.4			4.9			5.3	
Peak Hour Factor	0.25	0.81	0.52	0.75	0.81	0.73	0.60	0.90	0.50	0.93	0.87	0.25
Heavy Vehicles (%)	100%	1%	0%	0%	8%	3%	17%	10%	0%	4%	7%	0%
Adj. Flow (vph)	4	110	67	23	54	137	23	209	10	174	323	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	114	67	0	77	137	0	242	0	0	501	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	89	35	17	44	100	14	188	5	162	281	1
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	0.25	0.81	0.52	0.75	0.81	0.73	0.60	0.90	0.50	0.93	0.87	0.25
Hourly flow rate (vph)	4	110	67	23	54	137	23	209	10	174	323	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1030	939	325	1023	936	214	327			219		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1030	939	325	1023	936	214	327			219		
tC, single (s)	8.1	6.5	6.2	7.1	6.6	6.2	4.3			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	3.3	3.5	4.1	3.3	2.4			2.2		
p0 queue free %	95	51	91	79	75	83	98			87		
cM capacity (veh/h)	85	226	721	109	221	824	1153			1339		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	181	214	242	501
Volume Left	4	23	23	174
Volume Right	67	137	10	4
cSH	351	522	1153	1339
Volume to Capacity	0.52	0.41	0.02	0.13
Queue Length 95th (ft)	70	50	2	11
Control Delay (s)	27.4	19.8	1.0	3.7
Lane LOS	D	C	A	A
Approach Delay (s)	27.4	19.8	1.0	3.7
Approach LOS	D	C		

Intersection Summary			
Average Delay	9.9		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes and Geometrics
12: Putnam Road & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	64	43	10	130	126	71	311	22	68	294	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.990			0.999	
Flt Protected		0.998			0.997			0.991			0.989	
Satd. Flow (prot)	0	1761	1500	0	1729	1471	0	2051	0	0	2048	0
Flt Permitted		0.998			0.997			0.991			0.989	
Satd. Flow (perm)	0	1761	1500	0	1729	1471	0	2051	0	0	2048	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		395			534			309			333	
Travel Time (s)		9.0			10.4			3.8			4.1	
Peak Hour Factor	0.25	0.67	0.79	0.75	0.75	0.86	0.78	0.89	0.59	0.71	0.86	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	3%	3%	0%	2%	0%	3%	5%	100%
Adj. Flow (vph)	4	96	54	13	173	147	91	349	37	96	342	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	100	54	0	186	147	0	477	0	0	442	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.1%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	64	43	10	130	126	71	311	22	68	294	1
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	0.25	0.67	0.79	0.75	0.75	0.86	0.78	0.89	0.59	0.71	0.86	0.25
Hourly flow rate (vph)	4	96	54	13	173	147	91	349	37	96	342	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1245	1104	344	1161	1088	368	346			387		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1245	1104	344	1161	1088	368	346			387		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	47	92	84	5	78	93			92		
cM capacity (veh/h)	17	181	703	84	183	675	1224			1166		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	154	333	478	442
Volume Left	4	13	91	96
Volume Right	54	147	37	4
cSH	269	267	1224	1166
Volume to Capacity	0.57	1.25	0.07	0.08
Queue Length 95th (ft)	82	401	6	7
Control Delay (s)	36.2	177.5	2.2	2.5
Lane LOS	E	F	A	A
Approach Delay (s)	36.2	177.5	2.2	2.5
Approach LOS	E	F		

Intersection Summary			
Average Delay	47.5		
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

Capacity Analyses
Future Year (2019) No-Build Condition
<u>Weekend</u> AM, PM

Lanes and Geometrics
1: Putnam Rd & Route 49

4/14/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	45	24	9	31	43	5	75	5	52	160	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.989				
Flt Protected					0.988			0.996			0.987	
Satd. Flow (prot)	0	1764	1500	0	1761	1515	0	2038	0	0	2111	0
Flt Permitted					0.988			0.996			0.987	
Satd. Flow (perm)	0	1764	1500	0	1761	1515	0	2038	0	0	2111	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		392			767			394			424	
Travel Time (s)		8.9			14.9			4.9			5.3	
Peak Hour Factor	1.00	0.75	0.61	0.67	0.73	0.59	0.63	0.88	0.63	0.77	0.87	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	3%	0%
Adj. Flow (vph)	0	60	39	13	42	73	8	85	8	68	184	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	39	0	55	73	0	101	0	0	252	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 33.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	45	24	9	31	43	5	75	5	52	160	0
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	1.00	0.75	0.61	0.67	0.73	0.59	0.63	0.88	0.63	0.77	0.87	1.00
Hourly flow rate (vph)	0	60	39	13	42	73	8	85	8	68	184	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	482	428	184	474	424	89	184			93		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	482	428	184	474	424	89	184			93		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	88	95	97	91	93	99			96		
cM capacity (veh/h)	415	496	864	420	499	974	1403			1514		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	129	101	251
Volume Left	0	13	8	68
Volume Right	39	73	8	0
cSH	821	1106	1403	1514
Volume to Capacity	0.12	0.12	0.01	0.04
Queue Length 95th (ft)	10	10	0	3
Control Delay (s)	11.7	10.9	0.6	2.3
Lane LOS	B	B	A	A
Approach Delay (s)	11.7	10.9	0.6	2.3
Approach LOS	B	B		

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes and Geometrics
12: Putnam Road & Route 49

4/14/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	40	40	13	58	72	43	246	24	56	225	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.987			0.998	
Flt Protected					0.991			0.993			0.990	
Satd. Flow (prot)	0	1764	1500	0	1766	1515	0	2063	0	0	2143	0
Flt Permitted					0.991			0.993			0.990	
Satd. Flow (perm)	0	1764	1500	0	1766	1515	0	2063	0	0	2143	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		395			534			309			333	
Travel Time (s)		9.0			10.4			3.8			4.1	
Peak Hour Factor	1.00	0.84	0.71	0.75	0.79	0.70	0.77	0.86	0.69	0.81	0.89	0.75
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	0	48	56	17	73	103	56	286	35	69	253	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	56	0	90	103	0	377	0	0	326	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 40.1%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	40	40	13	58	72	43	246	24	56	225	3
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	1.00	0.84	0.71	0.75	0.79	0.70	0.77	0.86	0.69	0.81	0.89	0.75
Hourly flow rate (vph)	0	48	56	17	73	103	56	286	35	69	253	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	896	826	255	860	810	303	257			321		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	896	826	255	860	810	303	257			321		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	83	93	92	74	86	96			94		
cM capacity (veh/h)	169	280	789	209	286	741	1320			1250		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	104	194	377	326
Volume Left	0	17	56	69
Volume Right	56	103	35	4
cSH	611	579	1320	1250
Volume to Capacity	0.17	0.33	0.04	0.06
Queue Length 95th (ft)	15	37	3	4
Control Delay (s)	14.7	17.3	1.5	2.1
Lane LOS	B	C	A	A
Approach Delay (s)	14.7	17.3	1.5	2.1
Approach LOS	B	C		

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Capacity Analyses
Future Year (2019) Build Condition
<u>Weekday</u> AM, PM

Lanes and Geometrics
12: Putnam Rd & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	90	35	29	45	102	14	188	14	164	281	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	10	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.985			0.999	
Flt Protected		0.998			0.980			0.996			0.983	
Satd. Flow (prot)	0	1686	1500	0	1668	1471	0	1900	0	0	2027	0
Flt Permitted		0.998			0.980			0.996			0.983	
Satd. Flow (perm)	0	1686	1500	0	1668	1471	0	1900	0	0	2027	0
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		219			530			262			286	
Travel Time (s)		4.3			10.3			3.2			3.5	
Peak Hour Factor	0.25	0.81	0.52	0.75	0.81	0.73	0.60	0.90	0.50	0.93	0.87	0.25
Heavy Vehicles (%)	100%	1%	0%	0%	8%	3%	17%	10%	0%	4%	7%	0%
Adj. Flow (vph)	4	111	67	39	56	140	23	209	28	176	323	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	115	67	0	95	140	0	260	0	0	503	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.1%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	90	35	29	45	102	14	188	14	164	281	1
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	0.25	0.81	0.52	0.75	0.81	0.73	0.60	0.90	0.50	0.93	0.87	0.25
Hourly flow rate (vph)	4	111	67	39	56	140	23	209	28	176	323	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1045	961	325	1036	949	223	327			237		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1045	961	325	1036	949	223	327			237		
tC, single (s)	8.1	6.5	6.2	7.1	6.6	6.2	4.3			4.1		
tC, 2 stage (s)												
tF (s)	4.4	4.0	3.3	3.5	4.1	3.3	2.4			2.2		
p0 queue free %	95	49	91	62	74	83	98			87		
cM capacity (veh/h)	81	218	721	103	216	814	1153			1318		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	182	234	260	503
Volume Left	4	39	23	176
Volume Right	67	140	28	4
cSH	338	421	1153	1318
Volume to Capacity	0.54	0.56	0.02	0.13
Queue Length 95th (ft)	76	82	2	12
Control Delay (s)	29.1	26.3	0.9	3.7
Lane LOS	D	D	A	A
Approach Delay (s)	29.1	26.3	0.9	3.7
Approach LOS	D	D		

Intersection Summary			
Average Delay	11.5		
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes and Geometrics
12: Putnam Road & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	66	43	24	131	129	71	311	39	71	294	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.982			0.999	
Flt Protected		0.998			0.992			0.991			0.989	
Satd. Flow (prot)	0	1761	1500	0	1724	1471	0	2036	0	0	2049	0
Flt Permitted		0.998			0.992			0.991			0.989	
Satd. Flow (perm)	0	1761	1500	0	1724	1471	0	2036	0	0	2049	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		493			646			322			306	
Travel Time (s)		11.2			12.6			4.0			3.8	
Peak Hour Factor	0.25	0.67	0.79	0.75	0.75	0.86	0.78	0.89	0.59	0.71	0.86	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	3%	3%	0%	2%	0%	3%	5%	100%
Adj. Flow (vph)	4	99	54	32	175	150	91	349	66	100	342	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	103	54	0	207	150	0	506	0	0	446	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	66	43	24	131	129	71	311	39	71	294	1
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	0.25	0.67	0.79	0.75	0.75	0.86	0.78	0.89	0.59	0.71	0.86	0.25
Hourly flow rate (vph)	4	99	54	32	175	150	91	349	66	100	342	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1271	1141	344	1185	1110	382	346			416		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1271	1141	344	1185	1110	382	346			416		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	29	42	92	57	1	77	93			91		
cM capacity (veh/h)	6	171	703	75	176	663	1224			1138		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	157	357	507	446
Volume Left	4	32	91	100
Volume Right	54	150	66	4
cSH	206	225	1224	1138
Volume to Capacity	0.76	1.58	0.07	0.09
Queue Length 95th (ft)	130	560	6	7
Control Delay (s)	63.0	321.6	2.1	2.6
Lane LOS	F	F	A	A
Approach Delay (s)	63.0	321.6	2.1	2.6
Approach LOS	F	F		

Intersection Summary			
Average Delay	86.5		
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

Capacity Analyses
Future Year (2019) Build Condition
<u>Weekend</u> AM, PM

Lanes and Geometrics
12: Putnam Rd & Route 49

4/13/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	52	24	33	33	47	5	75	79	66	160	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	10	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.923				
Flt Protected					0.975			0.998			0.984	
Satd. Flow (prot)	0	1764	1500	0	1738	1515	0	1931	0	0	2108	0
Flt Permitted					0.975			0.998			0.984	
Satd. Flow (perm)	0	1764	1500	0	1738	1515	0	1931	0	0	2108	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		219			530			262			286	
Travel Time (s)		5.0			10.3			3.2			3.5	
Peak Hour Factor	1.00	0.75	0.61	0.67	0.73	0.59	0.63	0.88	0.63	0.77	0.87	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	3%	0%
Adj. Flow (vph)	0	69	39	49	45	80	8	85	125	86	184	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	69	39	0	94	80	0	218	0	0	270	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 41.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	52	24	33	33	47	5	75	79	66	160	0
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	1.00	0.75	0.61	0.67	0.73	0.59	0.63	0.88	0.63	0.77	0.87	1.00
Hourly flow rate (vph)	0	69	39	49	45	80	8	85	125	86	184	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	582	582	184	573	519	148	184			211		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	582	582	184	573	519	148	184			211		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	83	95	86	90	91	99			94		
cM capacity (veh/h)	340	398	864	340	433	904	1403			1372		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	109	174	219	270
Volume Left	0	49	8	86
Volume Right	39	80	125	0
cSH	624	709	1403	1372
Volume to Capacity	0.17	0.25	0.01	0.06
Queue Length 95th (ft)	16	24	0	5
Control Delay (s)	13.6	13.7	0.3	2.9
Lane LOS	B	B	A	A
Approach Delay (s)	13.6	13.7	0.3	2.9
Approach LOS	B	B		

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes and Geometrics
12: Putnam Road & Route 49

4/14/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	44	40	75	64	83	43	246	65	63	225	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	16	12	12	16	12
Grade (%)		1%			-1%			3%			-3%	
Storage Length (ft)	0		50	0		50	0		0	0		0
Storage Lanes	0		1	0		1	0		0	0		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.971			0.998	
Flt Protected					0.973			0.994			0.988	
Satd. Flow (prot)	0	1764	1500	0	1734	1515	0	2034	0	0	2139	0
Flt Permitted					0.973			0.994			0.988	
Satd. Flow (perm)	0	1764	1500	0	1734	1515	0	2034	0	0	2139	0
Link Speed (mph)		30			35			55			55	
Link Distance (ft)		493			646			322			306	
Travel Time (s)		11.2			12.6			4.0			3.8	
Peak Hour Factor	1.00	0.84	0.71	0.75	0.79	0.70	0.77	0.86	0.69	0.81	0.89	0.75
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	0	52	56	100	81	119	56	286	94	78	253	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	52	56	0	181	119	0	436	0	0	335	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 46.7%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	40	75	64	83	43	246	65	63	225	3
Sign Control		Stop			Stop			Free			Free	
Grade		1%			-1%			3%			-3%	
Peak Hour Factor	1.00	0.84	0.71	0.75	0.79	0.70	0.77	0.86	0.69	0.81	0.89	0.75
Hourly flow rate (vph)	0	52	56	100	81	119	56	286	94	78	253	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			2			2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	955	902	255	910	857	333	257			380		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	955	902	255	910	857	333	257			380		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	79	93	46	70	83	96			93		
cM capacity (veh/h)	141	250	789	185	266	713	1320			1189		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	109	300	436	335
Volume Left	0	100	56	78
Volume Right	56	119	94	4
cSH	519	331	1320	1189
Volume to Capacity	0.21	0.90	0.04	0.07
Queue Length 95th (ft)	20	220	3	5
Control Delay (s)	16.3	64.2	1.4	2.4
Lane LOS	C	F	A	A
Approach Delay (s)	16.3	64.2	1.4	2.4
Approach LOS	C	F		

Intersection Summary			
Average Delay	19.0		
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX C

CRASH RATE WORKSHEETS
AND
ACCIDENT DATA

MassHighway

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Sturbridge COUNT DATE : Dec-14

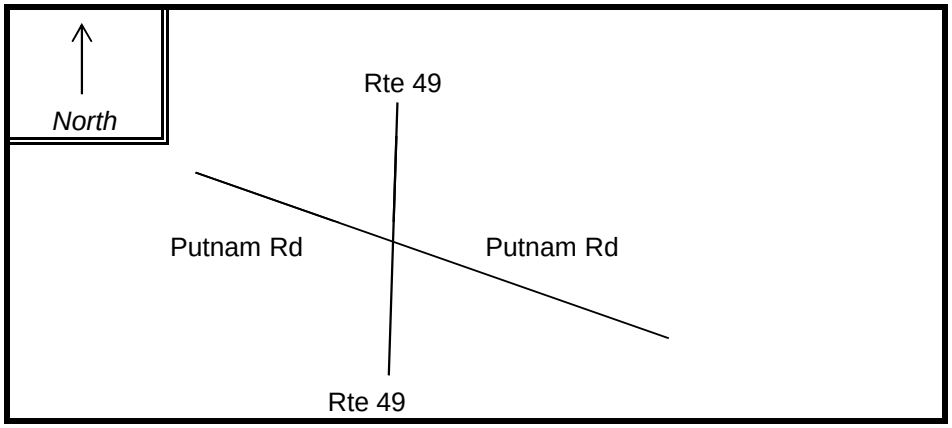
DISTRICT : 3 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Route 49 (Podunk Pike)

MINOR STREET(S) : Putnam Road

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	386	348	104	254		**1,092**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **12,133**

TOTAL # OF CRASHES : 11 # OF YEARS : 3 AVERAGE # OF CRASHES PER YEAR (**A**) : **3.67**

CRASH RATE CALCULATION : 0.83

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date: Sunset City Motocross and Campground, Charlton, MA

MassDOT Crash Report for STURBRIDGE for the year 2010

Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance from Nearest Roadway Intersection	Distance from Nearest Milemarker	Distance from Nearest Exit	Distance from Nearest Landmark	Non Motorist Type
2564969	STURBRIDGE	20-Jan-2010	8:04 AM	Property damage only (none injured)	2	0	0	Sideswipe, same direction	V1: Slowing or stopped in traffic / V2:Parked	V1:Westbound / V2:Westbound	V1: Collision with parked motor vehicle / V2: Collision with motor vehicle in traffic	V1: Bus (seats for 7-15 people, including driver) / V2:Passenger car	Ice	Daylight	Cloudy		ROUTE 49 Rte 49 / PUTNAM ROAD				
2900744	STURBRIDGE	28-Jan-2010	11:43 AM	Non-fatal injury	1	1	0	Single vehicle crash	V1: Travelling straight ahead	V1:Westbound	V1: Collision with tree	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Ice	Daylight	Snow		PUTNAM ROAD / Rte 49				
2609122	STURBRIDGE	30-May-2010	12:57 PM	Non-fatal injury	2	1	0	Angle	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Eastbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Dry	Daylight	Clear	ROUTE 49 / PUTNAM ROAD		1	0	Angle	V1: Travelling straight ahead / V2:Travelling straight ahead
2629214	STURBRIDGE	07-Aug-2010	1:31 PM	Non-fatal injury	2	2	0	Head-on	V1: Travelling straight ahead / V2:Entering traffic lane	V1:Southbound / V2:Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Daylight	Clear	Rte 49 S / PUTNAM ROAD					
2670282	STURBRIDGE	09-Nov-2010	11:28 PM	Property damage only (none injured)	1	0	0	Angle	V1: Travelling straight ahead	V1:Northbound	V1: Collision with animal - deer	V1: Not reported	Wet	Dark - roadway not lighted	Clear		PUTNAM ROAD Rte 49 / Rte 49				
2676332	STURBRIDGE	14-Dec-2010	7:46 AM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Westbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Light truck(van, mini-van, panel, pickup, sport utility) with only four tires / V2:Light truck(van, mini-van, panel, pickup, sport utility) with only four tires	Ice	Daylight	Cloudy/Snow		PUTNAM ROAD / Rte 49				

MassDOT Crash Report for STURBRIDGE for the year 2011

Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance from Nearest Roadway Intersection	Distance from Nearest Milemarker	Distance from Nearest Exit	Distance from Nearest Landmark	Non Motorist Type
2700226	STURBRIDGE	24-Jan-2011	3:46 PM	Non-fatal injury	2	1	0	Rear-end	V1: Turning right / V2:Travelling straight ahead	V1:Northbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Daylight	Clear	PUTNAM ROAD / ROUTE 49 Rte 49 S					
2768759	STURBRIDGE	16-Sep-2011	1:53 PM	Property damage only (none injured)	2	0	0	Rear-end	V1: Entering traffic lane / V2:Travelling straight ahead	V1:Eastbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Daylight	Clear	PUTNAM ROAD / Rte 49					

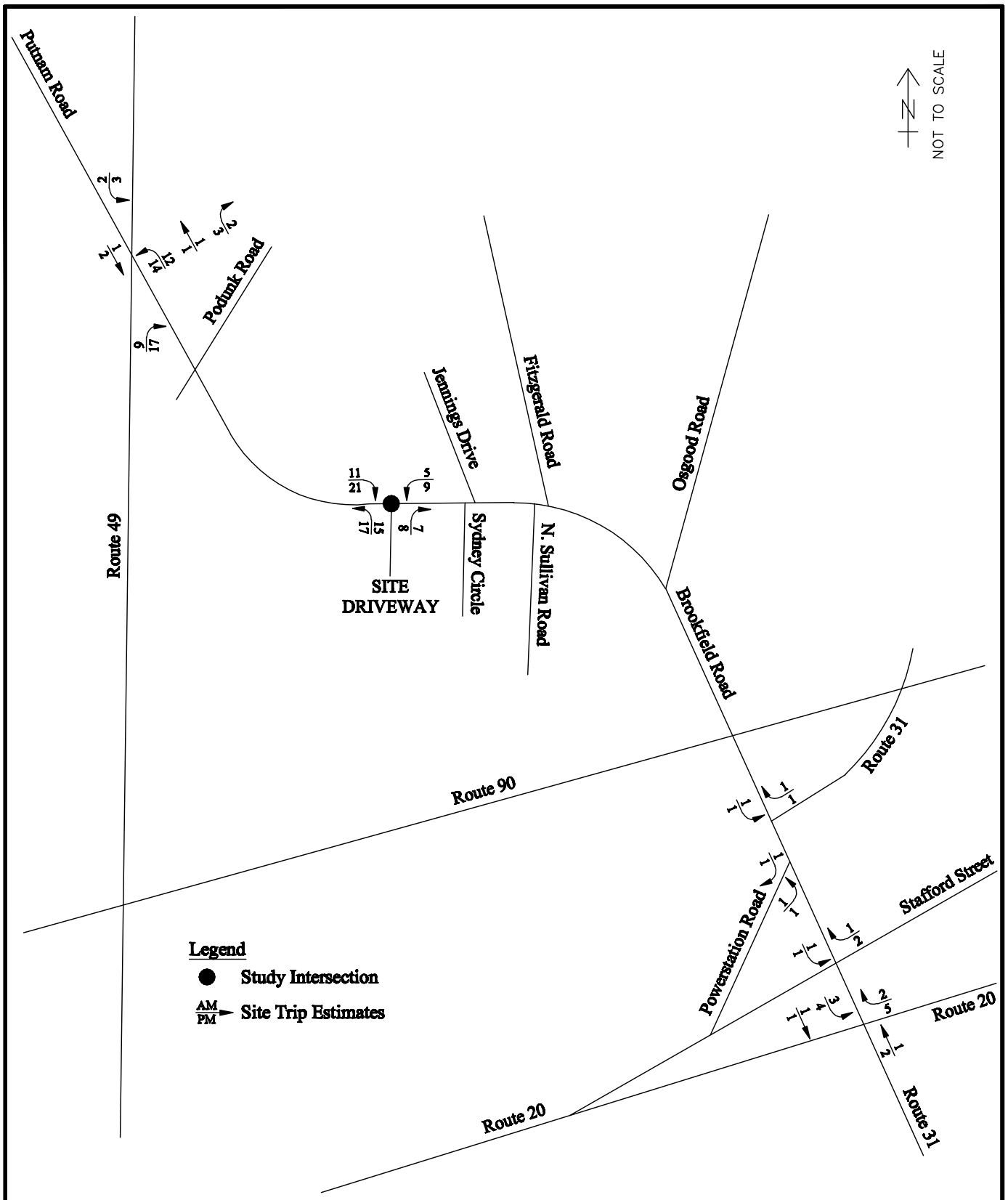
MassDOT Crash Report for STURBRIDGE for the year 2012

Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance from Nearest Roadway Intersection	Distance from Nearest Milemarker	Distance from Nearest Exit	Distance from Nearest Landmark	Non Motorist Type
3245462	STURBRIDGE	23-Jun-2012	5:47 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Southbound / V2:Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Wet	Daylight	Cloudy		PUTNAM ROAD				
3265864	STURBRIDGE	04-Aug-2012	1:50 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Eastbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Daylight	Clear	PODUNK PIKE Rte 49 S / PUTNAM ROAD					
3267234	STURBRIDGE	23-Aug-2012	8:58 AM	Non-fatal injury	2	3	0	Angle	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Westbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2:Passenger car	Dry	Daylight	Clear		PUTNAM ROAD Rte 49 / Rte 49				

APPENDIX D

TRIP GENERATION CALCULATIONS

See Figures 8 & 10



BTTC

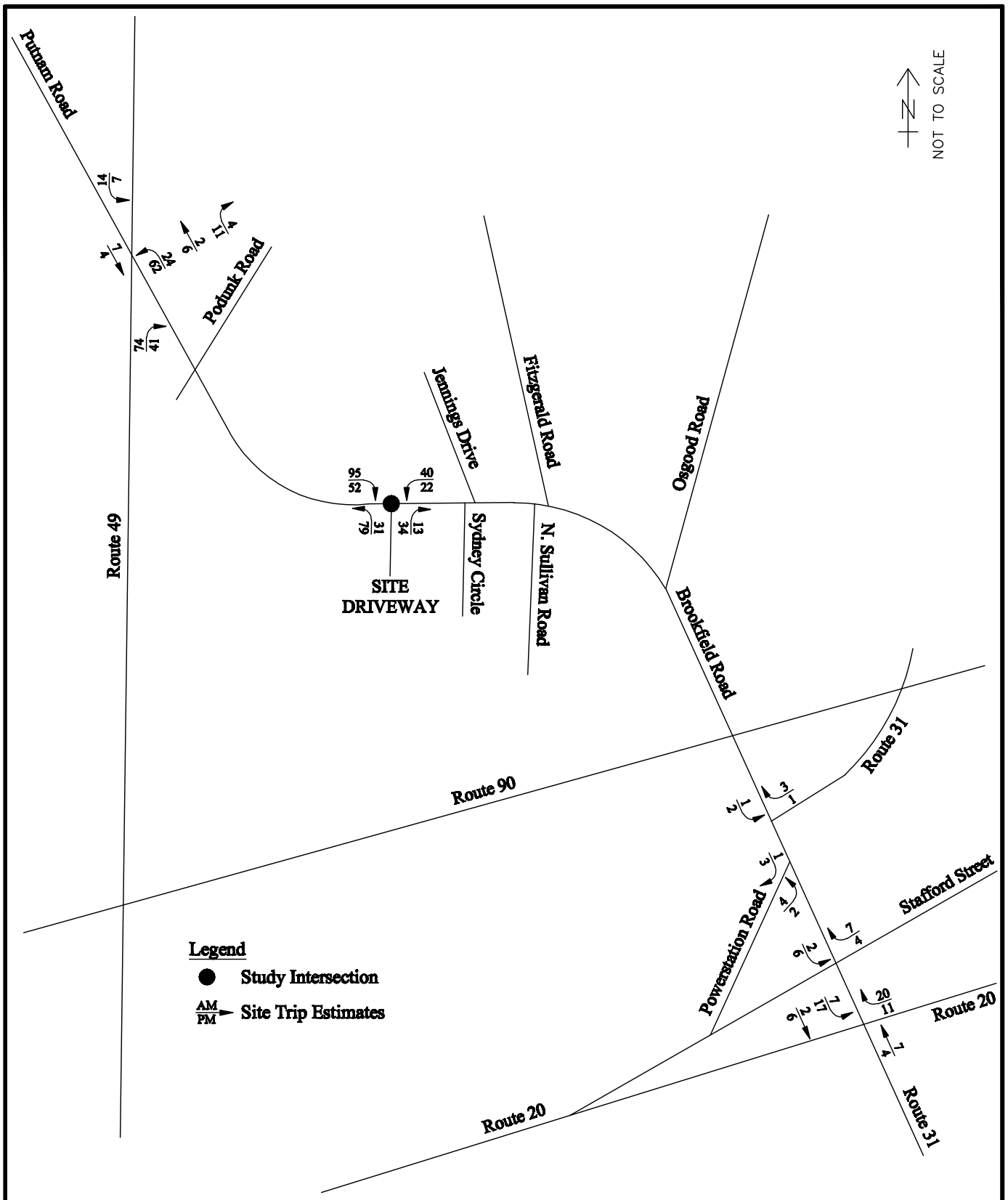
SUNSET CITY TRAFFIC ESTIMATES

CHARLTON, MASSACHUSETTS

BRISTOL TRAFFIC & TRANSPORTATION CONSULTING, LLC N. BROOKFIELD, MA

FIGURE 8

Site Trip Estimates
Weekday Peak Hours
AM & PM



BTTC

SUNSET CITY TRAFFIC ESTIMATES

CHARLTON, MASSACHUSETTS

BRISTOL TRAFFIC & TRANSPORTATION CONSULTING, LLC N. BROOKFIELD, MA

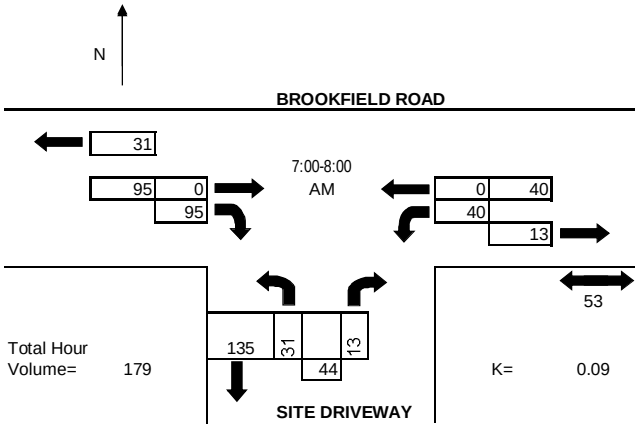
FIGURE 10

Site Trip Estimates
Event Weekend Peak Hours
AM & PM

Brookfield Road / Site Driveway
Estimated Event Weekend Site Trip Distribution Peak Hour Turning Movement Counts

Charlton, MA - Brookfield Road @ Site Driveway
Turning Movements for One hour Starting with 7:00 AM

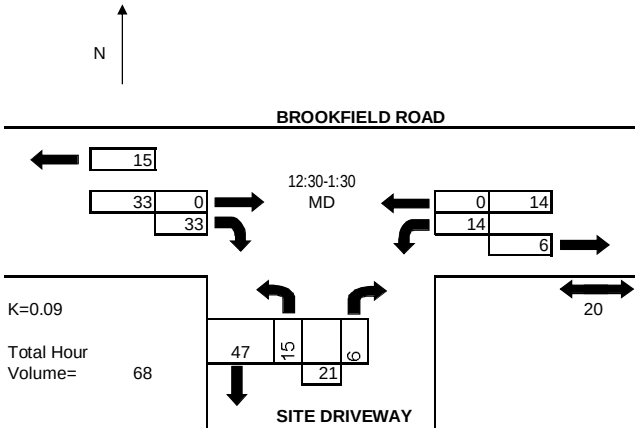
Weather: Light Rain



Total Hour Volume= 179

K= 0.09

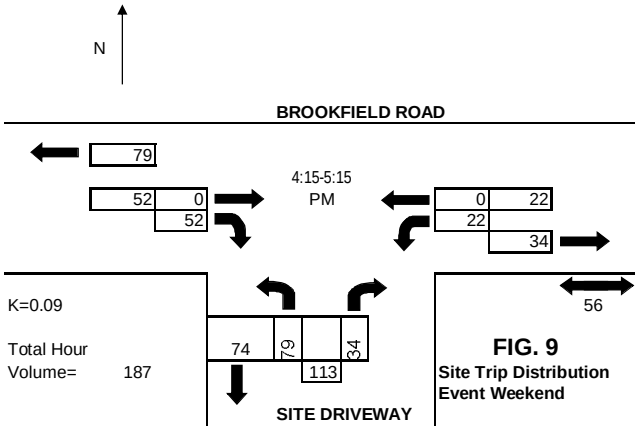
Turning Movements for One hour Starting with 12:30 PM
0
Weather: Light Rain



K=0.09

Total Hour Volume= 68

Turning Movements for One hour Starting with 4:15 PM
0
Weather: Light Rain



K=0.09

Total Hour Volume= 187

FIG. 9
Site Trip Distribution
Event Weekend

APPENDIX E

WINCHESTER SPEED PARK DUAL EVENT RIDER COUNT DATA

Winchester Speed Park Dual Event WSP Motocross+NEMA

	Bib #	Name of Rider Oct 2013
1	#50x	AARON BURDICK - KAW
2	#47	ADAM KINSLEY - YAM
3	#395	ADAM SADOWSKI - KTM
4	#800	ADIN OUELLETTE - YAM
5	#101	AIDAN CLINGAN - KTM
6	#734	AIDAN CLINGAN - YAM
7	#35x	AIDEN LAFLAM - KTM
8	#125x	ALEX COLLINS - YAM
9	#18	ALEXANDER PHANEUF - KAW
10	#402x	ALEXIS BURNS - KTM
11	#23	ALYSSA CAPUTO - KTM
12	#527x	ALYSSA CURTIS - KAW
13	#147	ANDREW DALY - SUZ
14	#713x	ANDREW ROBERTS - KAW
15	#127x	ANDREW SMITH - HON
16	#842x	ANDREW VEIT - KTM
17	#631	ANDY BROWSKY - YAM
18	#198	ANGELO FOLINO - KTM
19	#32x	ANTONIO PIZZONIA - KAW
20	#991	ARNALDO LOPEZ - HON
21	#144	AUSTIN KAPOUKRANIDIS - KTM
22	#901	AUSTIN OBER - KTM
23	#869	AUSTIN QUINN - KAW
24	#604	AUSTIN STOLINAS - HON
25	#444	BEN PURVINS - KTM
26	#64x	BENNETT PERRY - KAW
27	#7x	BOBBY MACCAULEY - YAM
28	#120	BONNIE THOMPSON - HON
29	#67	BRADEN MARTIN - KTM
30	#180	BRADY HILL - SUZ
31	#27	BRANDEN FOSTER - HON
32	#267x	BRANDON FOURNIER - KTM
33	#4x	BRANDON GERMAIN - KTM
34	#913	BRANDON GREGOIRE - KAW
35	#329x	BRIAN GILBERT - KTM
36	#11x	BRIAN HERWERTH - KTM
37	#413	BRIAN LLEWELYN - YAM
38	#173	BRIANNA KOBEL - YAM
39	#14	BRITTANI MAJCHER - HON
40	#353x	BROOKE COLUCCI - HON
41	#20	BRYAN CAPUTO - KTM
42	#101	BRYAR RUSSELL - KTM
43	#660	CAMDEN MUND - HON
44	#41	CAMERON DUFAULT - SUZ
45	#195x	CAMERON DURHAM - KAW

46	#112	CAMERON JACOBS - KAW
47	#43x	CAMERON THURSTON - YAM
48	#67x	CAREY BAKER - KAW
49	#809	CASEY MCNAMARA - KTM
50	#129	CASEY PROVONCHA - HON
51	#221	CASEY STEWART - KTM
52	#94	CASEY WARGER - KTM
53	#127x	CHAD CICCARELLI - SUZ
54	#736x	CHISTIEN DUCHARME - HON
55	#11	CHRIS CHADWICK - HON
56	#267	CHRIS DORAY - KAW
57	#615x	CHRIS HUTCHISON - KTM
58	#187x	CHRIS PENNIMAN - HON
59	#29	CHRISTOPHER CAIADO - HON
60	#18	CIARA BERNARD - SUZ
61	#87x	CJ ROUSSEAU - KAW
62	#884	CLIFF WHITE - HON
63	#141x	CLINTON ANGWIN - KTM
64	#257x	CODEY STAPLES - KAW
65	#2	CODY BECKWITH - KTM
66	#813x	CODY SHEEDY - KAW
67	#115x	COLBY GULLAKSON - YAM
68	#319	COLBY W FORTINI - KAW
69	#410x	COLE HALL - KTM
70	#615	COLE NETTLETON - KTM
71	#800	COLIN POUNCH - KTM
72	#8	COLTON MARTEL - SUZ
73	#48	CONNOR WEIDLER - KTM
74	#111x	CORA RUPPEL - KAW
75	#72x	CORBIN DILLANE - YAM
76	#30	COREY LEMELIN - YAM
77	#128x	COREY PROVONCHA - KTM
78	#496x	CORY BEETY - YAM
79	#128	CORY COVILLE - KAW
80	#53	CRAIG MOAT - KAW
81	#630x	CREW KIRST - HON
82	#99x	CYNTHIA MCKEOWN - KAW
83	#24	DAKOTA WALLINGFORD - KAW
84	#473	DALE MALANSON - HON
85	#51x	DAMIAN NADEAU - HON
86	#77	DANIEL ADAMITSKIY - KAW
87	#879x	DANIEL BLACK - HON
88	#999	DANIEL CHOQUETTE - KAW
89	#007	DANNY HARROLD - HON
90	#156	DARIN WITT - HON
91	#62x	DAVE ROTHWELL - HON
92	#61	DAVID ROTHWELL - HON

93	#166	DEAN TOOLEY - HON
94	#999	DEONNA MORAN - HON
95	#56	DESIREE WYATT - HON
96	#814	DEVEN SORENSEN - HON
97	#27x	DEVIN ROY - SUZ
98	#48	DEVIN WEIDLER - YAM
99	#367	DEWITT DAVIS - KAW
100	#36	DONALD DEMERS - YAM
101	#5	DOUG JACOBS - YAM
102	#521x	DOUGLAS TRAVIS - HON
103	#284x	DYLAN CAVACIUTI - KAW
104	#636	DYLAN FRAZIER - HON
105	#28	EAMON SMITH - KTM
106	#629x	EDWANA FOWLER - HON
107	#14	ELIJAH JOHNSON - KAW
108	#72	ELIJAH JOHNSON - SUZ
109	#43	ERIC FRANKLIN - KAW
110	#47	ERIC KINSLEY - SUZ
111	#801	ERIC STAGER - YAM
112	#322x	ERIK ANTOS - KAW
113	#519	ERIK SMITH - YAM
114	#28x	ETHAN C WILLIAMS - KAW
115	#151	ETHAN DELGROSSO - KTM
116	#279x	ETHAN STEWART - HON
117	#306x	ETHAN WORM - HON
118	#122	ETHAN ZUROWSKI - KTM
119	#544	EVAN GAGLIARDI - HON
120	#39x	EVAN MILLER - KTM
121	#792	EVAN SOTIROPOULOS - KAW
122	#847x	EVAN VEIT - KTM
123	#151x	EZRA MILES - YAM
124	#377x	FLOYD SAVILLE - KAW
125	#381	FRAN MCNAMARA - KTM
126	#97	FRANK BORON - HON
127	#49	GABE GUTIERRES - KTM
128	#168	GAGE SHERMAN - KAW
129	#255x	GARY BARKER - SUZ
130	#136	GARY PELLETIER - HON
131	#72x	GAVIN BETTS - COB
132	#16	GAVIN LAROSE - KTM
133	#715	GAVIN PHILBROOK - KTM
134	#22	GINGER OSGOOD - KTM
135	#185x	GRANTLY CARTER - KTM
136	#111x	GREG ALIX - UNK
137	#549	GREGORY J LEHTO - YAM
138	#308x	HAGEN LILLEY - KAW
139	#313	HANNAH KING - KTM

140	#313	HANNAH KING - KTM
141	#52	HARRY WALLINGFORD - KAW
142	#88x	HAYLEY JOYCE - HON
143	#365	HEATH FRAZIER - KAW
144	#517	HUNTER CALLE - KAW
145	#5	IBBY CARRINGTON - KTM
146	#51	IBBY CARRINGTON - KTM
147	#59x	IVAN BEATTIE - KTM
148	#804x	J.J KENT JR - HON
149	#803x	J.J KENT JR - HON
150	#705	JACK COURTNEY - KAW
151	#136x	JACK NERONHA - COB
152	#55	JACK STRAUT - KTM
153	#718	JACK ZARSE - KTM
154	#626	JACOB BISHOP - KAW
155	#351x	JACOB CORTIGIANO - KTM
156	#843x	JACOB MUDGE - KAW
157	#773	JACOB SHARR - KAW
158	#843	JACOB SIMMONS - KAW
159	#660	JACOB WALKER - HON
160	#5	JACOB WATKINS - KAW
161	#10	JACOB WEAVER - KTM
162	#519	JAKE LACHAPELLE - KTM
163	#981	JAMES CHOQUETTE - KAW
164	#579	JAMES CIRRONE - KTM
165	#91	JAMIE GREENE - YAM
166	#345	JAMIE PRIOR - KTM
167	#4	JASON BORON - KAW
168	#91	JASON GREENE - YAM
169	#726	JASON ROSE - UNK
170	#884	JASON WHITE - KAW
171	#426	JAY NAZARIAN - HON
172	#227x	JEFF IRELAND - HON
173	#511x	JEFFREY JACOBS - KTM
174	#66x	JEREMIAH KILBURN - HON
175	#148	JEREMY BISSON - KTM
176	#38	JESSA FAHEY - KAW
177	#589x	JESSE ASADOW - KAW
178	#148x	JESSICA INGERSOLL - SUZ
179	#417	JEWELIANNA WALKER - COB
180	#29	JILLIAN WEAVER - KAW
181	#61	JIM FOWLER - KTM
182	#47	JIM KINSLEY - YAM
183	#369x	JIM NERONHA - YAM
184	#189x	JIM O'MARA - KAW
185	#706x	JOE GUERRERA - HON
186	#712x	JOE MARFEO - KTM

187	#533	JOE STEWART - SUZ
188	#789x	JOEY PIZZONIA - KTM
189	#803	JOHN KENT SR - HON
190	#14	JOHN MAJCHER - HON
191	#409x	JOHN MAY - HON
192	#67	JOHN WATKINS - HON
193	#333x	JOHNATHON GONZALES - KAW
194	#976x	JONAS ROTHMAN - HON
195	#229x	JONATHAN MUMBLOW - KAW
196	#73	JOSEPH CORTIGIANO - KTM
197	#511	JOSH BOY - KAW
198	#23	JOSH CLARK - HON
199	#101	JOSH JAMAITUS - YAM
200	#34	JOSH PRIOR - YAM
201	#11	JOSHUA CORTIGIANO - YAM
202	#730	JOSHUA PEASE - KAW
203	#21	JOSHUA SEGAL - KAW
204	#65x	JR NADEAU - YAM
205	#26x	JUSTIN ALLEN - COB
206	#55x	JUSTIN ARMSTRONG - KTM
207	#111x	JUSTIN DICKIE - HON
208	#383	JUSTIN DWYER - KTM
209	#333	JUSTIN GONZALES - SUZ
210	#613	JUSTIN ST JOHN - YAM
211	#151	KALEB W TROMBLEY - KTM
212	#13	KATIE HANISCH - KTM
213	#29x	KATRINA CAIADO - SUZ
214	#708	KEITH JOHNSON - KTM
215	#605	KENDALL CHASE - SUZ
216	#6	KENDYL GAETANI - KTM
217	#110x	KENNETH JOYCE - YAM
218	#18x	KENNY BERNARD - KAW
219	#124x	KENNY GERMAIN - KAW
220	#64	KEVIN BERQUIST - SUZ
221	#248	KEVIN COWAN - YAM
222	#205	KEVIN HILL - YAM
223	#724	KEVIN RIZZO - KAW
224	#9	KIMBERLEY BACON - HON
225	#301	KRISTEN MAKSYMIW - KTM
226	#210x	KYLE AHLBERG - SUZ
227	#305	KYLE BILODEAU - HON
228	#238	KYLE BUSHEE - KTM
229	#385x	KYLE FLAHERTY - KTM
230	#2	KYLE GAETANI - KAW
231	#108x	KYLE GULLAKSON - YAM
232	#524	KYLE HEATH - YAM
233	#14	KYLE KELSEA - HON

234	#361	KYLE MATTESON - HON
235	#56x	KYLE MURDOCH - YAM
236	#577x	LANDON BOUCHER - KTM
237	#919	LIAM CORMAN - KTM
238	#55	LOGAN QUINN - KAW
239	#9	LOGAN TRISTANY - KTM
240	#31	LUCAS DEVLIN - YAM
241	#701	MADISON PLANTE - YAM
242	#23	MARK CAPUTO - KTM
243	#43	MARK SHEPARD - YAM
244	#696	MASON HAMEL - KTM
245	#928	MASON NETTLETON - KTM
246	#27	MATT HANISCH - HON
247	#83	MATT PARKER - YAM
248	#924x	MATTHEW GALLAGHER - KAW
249	#167	MATTHEW MAILHOT - KAW
250	#42x	MAX CARBONE - HON
251	#25x	MICHAEL BABOWICZ - YAM
252	#351x	MICHAEL CORTIGIANO - KTM
253	#124	MICHAEL GERMAIN - HON
254	#395x	MICHAEL TOMKUNAS - SUZ
255	#867	MIKE BURLINGAME - YAM
256	#10	MIKE DOUCETTE - YAM
257	#159x	NATHAN BRINDAMOUR - HON
258	#80	NATHAN GARRITY - KAW
259	#8	NATHAN MARTEL - KAW
260	#40	NATHAN SLADER - KAW
261	#5	NATHAN STRAUT - KAW
262	#831x	NICHOLAS COSTANZO - COB
263	#606	NICHOLAS COYNE - YAM
264	#110x	NICHOLAS EDWARDS - KTM
265	#365	NICHOLAS FRAZIER - KTM
266	#88	NICHOLAS HANSON - SUZ
267	#94	NICHOLAS HARDY - HON
268	#53	NICHOLAS HOULE - HON
269	#588x	NICHOLAS JAMAITUS - UNK
270	#638	NICK DOBROWOLSKI - KTM
271	#57	NICK LAROCHE - HON
272	#33	NOAH HORTON - KAW
273	#844	NOAH LAMBERT - KAW
274	#123x	NOLAN LILLEY - KAW
275	#629	PAYTON HURST - KTM
276	#24	PETE COLLINS - YAM
277	#75x	PYPER DILLANE - YAM
278	#798	RICH SMITH - KAW
279	#14	RICHARD KELSEA - KTM
280	#517x	RICHARD MOSHETTI - SUZ

281	#633x	RICKEY DEPREY, III - KTM
282	#227	RILEY BURNSIDE - KAW
283	#63	RILEY MAYNARD - KAW
284	#309x	ROBERT BAROLLI - SUZ
285	#222	ROBERT CHIODO - HON
286	#734	ROBERT CLINGAN - YAM
287	#348	RON HANISCH - HON
288	#396	RONALD ROUNDS - SUZ
289	#120	RYAN COVILLE - KAW
290	#622	RYAN HOLLIS - SUZ
291	#34x	RYAN LAFLAM - KTM
292	#47	RYAN MCLEOD - KAW
293	#127	SAMUEL ST LAURENT - KTM
294	#151	SANDRA K DELGROSSO - YAM
295	#32	SAVANNAH PETERS - HON
296	#512	SCOTT BUXTON - YAM
297	#7	SCOTT DAVIS - KAW
298	#131	SCOTT PODWIN - KAW
299	#71x	SEAMUS SULLIVAN - HON
300	#385	SEAN FLAHERTY - KTM
301	#199	SETH NICOLO - YAM
302	#18x	SHANE ANDREWS - KTM
303	#151	SHANE M DELGROSSO - YAM
304	#111x	SHANE YOUNG - HON
305	#12	SHANNON COURTNEY - KTM
306	#8x	SHANNON FLEMING - SUZ
307	#407	SHAWN BRESNAHAN - HON
308	#325	SHAWN MACDONALD - HON
309	#166	SIMON TOOLEY - HON
310	#647	STEPHANIE BANAS - KAW
311	#170	STEPHEN BRADY - HON
312	#114	STEVE STEFANIK - YAM
313	#806	STEVEN MISS - HON
314	#321x	STEVEN SAARI - YAM
315	#33x	SUE HEATH - HON
316	#38x	TAYLOR BARNETT - KAW
317	#526	TAYLOR BECKWITH - KTM
318	#127x	TAYLOR DETLEFSEN - HON
319	#528	TAYLOR FORTINI - HSK
320	#166y	TAYLOR TOOLEY - YAM
321	#300x	TEEJAY WHITTY - UNK
322	#160x	THOMAS HEATH - HON
323	#833	TIM MCGRAW - YAM
324	#33x	TIMOTHY GALLANT - HON
325	#143	TJ DONAHUE - KAW
326	#121x	TONY WILLIS - HON
327	#621x	TRAVIS BROWN - SUZ

328	#431	TRAVIS MARSH - KTM
329	#754x	TREVOR GANCARZ - HON
330	#136x	TROY MILLER - KAW
331	#844y	TUCKER LAMBERT - KAW
332	#666	TY MULLEN - KAW
333	#25	TYLER BABOWICZ - KTM
334	#277	TYLER BURNSIDE - KAW
335	#598	TYLER CARTIINI - HON
336	#969	TYLER HAMEL - KTM
337	#174	TYLER HEATH - YAM
338	#13x	TYLER HEBERT - KAW
339	#58	TYLER LAZARZ - HON
340	#814x	TYLER SORENSEN - HON
341	#105	TYLER SOUMIS - KAW
342	#7	VINCENT ARDIZZONI - KTM
343	#455x	WALTER MILLER III - YAM
344	#127	WILL AGNEW - KTM
345	#44	WILLIAM BEZEMEK - HON
346	#711x	WILLIAM GAVIN - HON
347	#111	WILLIAM REISS - YAM
348	#921x	WYATT JORDAN - HON
349	#405	ZACH BILODEAU - HON
350	#137	ZACH HERWERTH - KTM
351	#114	ZACKERY POOR - KAW
352	#123	ZAIN HARRINGTON - KAW