

Traffic Evaluation

Hollywood Casino & Hotel Springfield

Springfield, Massachusetts

PREPARED FOR

Penn National Gaming, Inc
825 Berkshire Boulevard #200
Wyomissing, PA

December 2012



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TRAFFIC EVALUATION
HOLLYWOOD CASINO & HOTEL SPRINGFIELD

ACCESS ROADWAYS

The Hollywood Casino & Hotel Springfield is proposed along the west side of Main Street bounded by Main Street to the east, Emery Street to the north and Columbus Avenue to the west. Regional approach routes to the site include I-90, I-91 and I-291. The local roadways within the City of Springfield that guests will use when traveling between the site and the interstate highways are Dwight Street, Chestnut Street, Bond Street, Main Street, Emery Street and Columbus Avenue.

I-91

I-91 is a north-south interstate highway beginning in New Haven, CT to the south continuing north through the entire lengths of Connecticut, Massachusetts, and Vermont ending at the Vermont/Canada border. I-91 provides access to Hartford, CT and Waterbury, CT to the south and Northampton, MA, Greenfield, MA, and Brattleboro, VT to the north.

Approximately 4 miles north of the site is the interchange with I-90 (Massachusetts Turnpike) which will serve as the approach route for access from Pittsfield, MA and Albany, NY to the west. The local roadways that patrons will use approaching the site from the north and west will be Dwight Street, Congress Street, Main Street and Emery Street. Patrons leaving the site will return to I-91 NB via Columbus Avenue.

Patrons approaching the site via I-91 from the south will primarily use the exit ramp to Dwight Street then use Congress Street, Main Street and Emery Street to approach the site. Some of the patrons will also use Columbus Avenue as an approach route to the site. Leaving the site the majority of the patrons will use Main Street to Bond Street to access the I-91 SB entrance ramp. A small percentage of patrons will also use West Columbus Avenue southbound to access I-91.

I-291

The I-291 corridor provides direct access to and between I-90, to the east of the site and I-91 to the south. The I-91/I-291 interchange is immediately north of the site. I-291 passes through the northwestern quadrant of the City of Springfield and is served by six interchanges. The patrons approaching the site via I-90 from points east such as Worcester, MA and Boston, MA will use I-291 to access the site. Patrons approaching the site using I-291 will exit to Dwight Street and then use Congress Street, Main Street and Emery Street. Patrons leaving the site will return to I-291 via Main Street to Congress Street and use the I-291 EB Entrance Ramp from Chestnut Street.

Main Street

Main Street travels in the north-south direction beginning in Springfield's South End neighborhood traveling north through the Downtown Area and then continues north past the site through the northwest portion of Springfield and then continues into Chicopee as Center Street. Along the proposed Hollywood Casino & Hotel Springfield frontage, Main Street has two travel lanes in each direction with left turn lanes provided in both directions at Liberty Street and Congress Street. A landscaped median is provided between the northbound and southbound lanes of Main Street along the entire site frontage. To the south of the site, the development along Main Street is a mix of commercial, retail and restaurants. In the vicinity of the site the development along Main Street across from the project site is commercial.

Dwight Street

Dwight Street travels in the north-south direction beginning in the south at State Street in downtown Springfield traveling north through the central and northern parts of the city ending at Dover Street in the vicinity of the Baystate Medical Center. South of Liberty Street, Dwight Street is one-way southbound. North of Liberty Street, it is a two-way street. In the vicinity of the site, Dwight Street is general parallel to Main Street and has two lanes in each direction with an additional lane for northbound left turning vehicles onto Congress Street. In the vicinity of the project site the development along Dwight Street is commercial.

Chestnut Street

Chestnut Street travels in the north-south direction beginning to the south at State Street in downtown Springfield traveling north through the central and northern parts of the city ending at Noble Street in the vicinity of the Baystate Medical Center. South of Liberty Street, Chestnut Street is one-way northbound. North of Liberty Street, it is a two-way street. In the vicinity of the site, Chestnut Street is general parallel to Main Street and has two lanes in each direction with a median divider. An additional lane has been provided for northbound left turning vehicles onto Congress Street. In the vicinity of the project site the development along Chestnut Street is commercial.

Congress Street

Congress Street is a two lane roadway traveling in the east-west direction between Main Street and Chestnut Street. Congress Street is approximately 40 feet wide with on-street parking permitted along the south side of the street. The development along Congress Street is commercial.

(East and West) Columbus Avenue

Columbus Avenue travels parallel to I-91 beginning at Main Street in the south end of the City continuing north past the project site ending at the I-291/Route 20 ramps

immediately north of the site. West Columbus Avenue is one-way southbound and East Columbus Avenue is one-way northbound. For most of their length West Columbus Avenue travels along the west side of I-91 and East Columbus Avenue travels along the east side of I-91 with both acting as service roads for the interstate highway ramps.

Emery Street

Emery Street borders the project site on the north and is a two lane roadway traveling in the east-west direction between Columbus Avenue and Main Street. At its intersection with East Columbus Avenue all traffic must turn right and head north. At Main Street all traffic on Emery Street must turn right and head south. There is no median break along Main Street at Emery Street thus there is no access to Emery Street from northbound Main Street.

INTERSECTIONS STUDIED

Traffic counts were conducted at fifteen of the intersections in the immediate vicinity of the site. The intersections studied are listed below:

- Columbus Street at Emery Street
- Columbus at Liberty Street
- Main Street at Bond Street
- Main Street at Boylston Street
- Main Street at Emery Street
- Main Street at Congress Street
- Main Street at Liberty Street
- Bond Street at I-91 SB On Ramp
- Dwight Street at Bond Street
- Dwight Street at I-291 WB Ramps
- Dwight Street at I-91 NB Exit / I-291 EB Entrance
- Dwight Street at Congress Street
- Dwight Street at Liberty Street
- Chestnut Street at I-91 SB Exit / I-291 EB Entrance
- Chestnut Street at Congress Street

The traffic counts for these intersections and the Volumes Traffic Flow Diagram TFD-1 for the existing volumes are presented in the Supplemental Traffic Data.

IMPACT EVALUATION

Determining the traffic impact of the proposed casino has been analyzed by calculating the number of trips that are expected to be generated by the development and subsequently assigning the trips to the surrounding roadway system in order to determine the impact of the proposed development. It is assumed that the peak impact traffic of the

proposed Hollywood Casino & Hotel Springfield will occur during an afternoon rush hour, when the adjacent roadway traffic is also at its peak. The Institute of Transportation Engineers (ITE) Trip Generation, 8th Edition, 2008 contains afternoon peak hour trip generation rates for "Casino/Video Lottery Establishment" (Land Use 473). However, the data is based on only a single study and is therefore not considered reliable. Also, there is no information available as to what a casino generated over an average day. To determine an estimate for the anticipated trip generation of the proposed Hollywood Casino & Hotel Springfield, during an Afternoon Peak Period, we used trip generation rates developed by E.P. Ferris & Assoc., as presented in the Traffic Impact Study - Hollywood Casino; Columbus, OH (208.1), the trip generation rate is 0.46 trips per gaming seat. These rates are based on the number of "gaming positions" or seats (e.g., 1 seat per slot / 8 seats per gaming table). The use of gaming seat as the method for calculating the anticipated trip generation for a casino without consideration of other uses on the site is a standard methodology. This is noted on page 6 in the E.P. Ferris study:

“Most casino traffic studies use gaming position as an independent variable. Gaming position is defined as one seat, so one slot machine would be one gaming position and one seat at a poker table would be one gaming position. Facilities attached to the casino, such as hotel and food and beverage outlets, exist to support gambling operations and are included in the gaming position trip generation rate.”

The number of anticipated gaming seats for the proposed Springfield Hollywood Casino is calculated as follows:

	Seats
2,850 Slots	2,850
80 Tables @ 8/Seat	640
20 Poker @ 6/Seat	120
Total Gaming Seats	3,610

Trip generation numbers were calculated for the PM Peak Period at the full build of 3,610 gaming seats using the generation rate of 0.46 trips/seat as follows:

PM Peak Hour	1,769
Entering 53%	938
Exiting - 47%	831

The trip distribution for guests visiting the resort was calculated based the Casino Resort Market Assessment study prepared by Strategic Market Advisors for the Hollywood Casino & Hotel Springfield. This study calculated the number of patrons visiting the resort annually from the following 17 geographical areas:

- Hollywood Primary
- Central CT
- North Secondary
- South Central Mass
- Northwest CT
- Coastal CT
- Tertiary Southwest
- Tertiary West
- Saratoga
- Tertiary North
- Southern NH
- North Central Mass
- North Shore
- Inside 128
- South Shore
- Rhode Island
- Southwest CT

In order to distribute the traffic to the four regional approach routes, the percentage of total guests visiting the casino was assigned to each geographical area. Then the percentages were then assigned to each regional approach route. Using the anticipated number of patrons from each geographic area and assigning each area an approach route the anticipated regional approach traffic distribution was created. The spreadsheet with these calculations is presented in the Supplemental Traffic Data. The Regional Trip Distribution is graphically shown in the Traffic Flow Diagram TFD-2 presented in the Supplemental Traffic Data and presented in tabular form below:

I-90 / I-91 Points West and North	35%
I-90 / I-291 Points East	15%
I-91 Points South	40%
Local	<u>10%</u>
	100%

The impact of the proposed development to the affected roadway network in the vicinity of the site is determined by assigning the generated traffic volumes for the Hollywood Casino & Hotel Springfield to each roadway and intersection studied based on the calculated trip distribution. The anticipated Afternoon Peak Trip Generation numbers are shown in the Traffic Flow Diagram TFD-3 presented in the Supplemental Traffic Data.

It assumed that all buses including local and regional bus service will stop at Union Station. Patrons will then be able to walk via surface sidewalks or the pedestrian sky bridge over Main Street between Union Station and Hollywood Casino & Hotel Springfield.

Valet parking drop off / pick up will be located in the porte-cochere along Main Street at the front of the casino. Access to the porte-cochere will be from the garage entrance along Main Street opposite Congress Street. Vehicles exiting the porte-cochere area will be able to turn right on to Main Street southbound or continue to the west and exit from the site onto Columbus Avenue. It is anticipated at all taxi service will use the porte-cochere to drop off and pick up passengers.

The construction of the Hollywood Casino & Hotel Springfield will necessitate the closure of a part of two city streets. The roadway sections to be closed are Liberty Street between East Columbus Avenue and Main Street and Boylston Street between Liberty Street and Emery Street. Currently these streets only serve the Peter-Pan bus depot and The Republican Newspaper operations. Due to the closure of these streets, the traffic currently using them must be reassigned to the surrounding street. Traffic Flow Diagram TFD-5 showing the diverted traffic is presented in the Supplemental Traffic Data at the end of this section.

TRAFFIC PROJECTIONS

2018 No-Build Volumes were then calculated by expanding the Existing Traffic Volumes by 0.5% per year to 2018 to account for general background growth of traffic on the roadway network. The 2018 No-Build Volumes are shown in Traffic Flow Diagram TFD-4. These volumes were then adjusted to represent the roadway network with the proposed road closures, by applying the Diverted Trips to the 2018 No-Build volumes to create the 2018 No-Build w/Diverted Trips shown in Traffic Flow Diagram TFD-6 presented in the supplemental Traffic Data.

The 2018 Build Volumes were then calculated by adding the Site Generated Traffic to the 2018 No-Build w/ Diverted Trips volumes. The 2018 Build volumes are shown in Traffic Flow Diagram TFD-7 presented in the Supplemental Traffic Data.

RECOMMENDED IMPROVEMENTS

Evaluation of the 2018 Build Volumes by intersection capacity analysis reveals that improvements are needed at a number of the intersections studied and along various roadways, to allow for traffic to flow at a Level of Service (LOS) C or better during the afternoon peak period once the Hollywood Casino & Hotel Springfield is opened. The recommended improvements are as follows:

Chestnut Street at Congress Street

Install a traffic control signal.

Dwight Street at Bond Street

Provide a break in the Dwight Street median to allow for through vehicles traveling east along Bond Street to continue through the intersection.

Install a traffic control signal.

Dwight Street at I-91 NB Exit Ramp

Widen the exit ramp to provide two lanes - an exclusive left turn lane and an exclusive right turn lane.

Install a traffic control signal.

Congress Street between Main Street and Dwight Street

Eliminate on street parking to permit three travel lanes along Congress Street.

The Congress Street approach to Main Street will have an exclusive right turn lane and a shared through / left turn lane.

The Congress street approach to Dwight Street will have a shared through / right turn lane and an exclusive left turn lane.

Dwight Street at Congress Street

Revise the pavement markings on the eastbound Congress Street approach to provide two lanes - a shared through / right turn lane and an exclusive left turn lane.

Revise the lane use along southbound Dwight Street to provide for three lanes - an exclusive right turn lane, an exclusive through lane and an exclusive left turn lane. This will necessitate the removal of the median on this leg of Dwight Street.

Replace the traffic control signal.

Main Street at Emery Street

Provide a break in the Main Street median to allow for full access to Main Street from Emery Street.

Widen the Main Street northbound approach to provide three lanes - a through lane and two exclusive left turn lanes onto Emery Street.

Widen the eastbound Emery Street approach to provide two lanes - an exclusive right turn lane and an exclusive left turn lane.

Install a traffic control signal.

Main Street at Congress Street / Casino Valet /Garage Entrance

Revise the lane use along westbound Congress Street to provide two lanes - an exclusive right turn lane and a shared through / left turn lane.

Install a traffic control signal.

Main Street at Liberty Street

Replace the traffic control signal.

Emery Street at Hollywood Casino Garage Main Drive

Widen Emery Street westbound to provide two lanes - a shared through / left turn lane and an exclusive left turn lane.

Install a traffic control signal.

Emery Street at Columbus Avenue

Widen the median break between East Columbus Avenue and West Columbus Avenue to allow for two way traffic.

Install a traffic control signal.

Coordinated Signal System

Provide an on-street master system to provide tight coordinated operation at the following signalized intersections:

Main Street at Emery Street

Main Street at Congress Street

Main Street at Liberty Street

Dwight Street at Bond Street

Dwight Street at I-291 WB Ramps

Dwight Street at I-91 NB Exit

Dwight Street at Congress Street

Dwight Street at Liberty Street

Chestnut Street at Congress Street

Emery Street at Hollywood Casino Garage Main Drive

CAPACITY ANALYSIS

The anticipated levels of service for each of the intersections studied with the 2018 No-Build Traffic Volumes with existing conditions and the 2018 Build volumes and the recommended improvements implemented are as follows:

	2018 No-Build	2018 Build w/ Improvements
	LOS	LOS
Columbus Avenue at Emery Street	A	C
Columbus Avenue at Liberty	C	n/a
Columbus Avenue at Valet Exit	n/a	A
Main Street at Bond Street	A	A
Main Street at Boylston street	A	A
Main Street at Emery Street	A	B
Main Street at Congress Street	A	B
Main Street at Liberty Street	B	A
Main Street at Valet Exit	n/a	A

Bond Street at I-91 SB On Ramp (a)	A	A
Dwight Street at Bond Street	A	B
Dwight Street at I-291 WB Ramps	B	B
Dwight Street at I-91 NB Exit / I-291 EB Entrance	A	A
Dwight Street at Congress street	C	C
Dwight Street at Liberty Street	B	B
Chestnut Street at I-91 SB Exit / I-291 EB Entrance	A	A
Chestnut Street at Congress Street	A	B
Chestnut Street at Liberty Street	B	B
Emery Street at Main Garage Drive	n/a	B
Emery Street at Boylston Street	A	A

This table shows that all of the intersections in the vicinity of the site will operate at a Level of Service (LOS) C or better with the 2018 No-Build conditions and will continue to operate at an LOS C or better when the Hollywood Casino & Hotel Springfield is opened. In fact, the majority of the intersections will operate an LOS A or B meaning, motorists will be able to easily and safely traverse these intersections. The capacity analyses for both the 2018 No-Build and 2018 Build conditions are presented in the Supplemental Traffic Data.

RIGHT OF WAY

Based on available information there appears to be sufficient ROW available to construct the proposed improvements on City land or land controlled by the developers of the Hollywood Casino & Hotel Springfield.

PEDESTRIAN ACCESS

Pedestrian access to the Hollywood Casino & Hotel Springfield will be provided via three major points. The street level entrance will be located along Main Street at the porte-cochere. In addition to the normal street level entrance, two pedestrian sky bridges are proposed. The first will be over Main Street to the east between the casino and Union Station. The second will be to the south over the railroad tracks, providing access between the casino and the renovated Paramount Theatre.

In addition to these elevated pedestrian walkways, each of the signalized intersections listed above to be included in the coordinated signal system will be provided with pedestrian crosswalks across each leg of the intersection and fully accessible pedestrian signals. The accessible signals will be in full compliance with the 2010 MUTCD and the latest Massachusetts AAB guidelines.

MASS TRANSIT

In addition to the construction of the Hollywood Casino & Hotel Springfield, Union Station will also be undergoing a major renovation during the next 5 years. This renovation of Union Station is being undertaken by the City of Springfield will create a modern multi-modal facility incorporating local bus access, regional bus access and rail access. The developers of the Hollywood Casino & Hotel Springfield embrace the use of multi-modal access to their facility. Not only are they providing an elevated pedestrian bridge between Union Station and the new casino, they intend to encourage its use by their employees and guests through creative marketing and outreach programs.

Additionally, in cooperation with Peter Pan, Hollywood Casino & Hotel Springfield envisions packaging one-day and multi-day independent charter tours, bringing people directly to Springfield and Hollywood casino for day trips and "play and stay" or "play, stay and shop" packages. Overnight packages would not be limited to the Hollywood hotel but would offer stays at other Springfield hotels at various different price points to suit the needs attract a wide variety customers.

**Hollywood Casino & Hotel Springfield
Springfield Massachusetts
Supplemental Traffic Data**

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Traffic Engineering Terms

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Throughout this report, many terms unique to traffic engineering are used. Below are definitions of many of these terms.

Trip is a one-way movement to or from a site. One car entering and leaving site constitutes two trips.

Traffic Generation is the actual number of vehicle movements which may reasonably be expected to be attracted by a specific development. Usually traffic generation is expressed as a number of trips.

Peak Hourly Generation is traffic generation which may be anticipated during the highest volume hour for the particular development. This analysis parameter may vary as to the time of day, depending on the type of facility being proposed.

Capacity and Level of Service are terms utilized to describe the ability of a roadway to handle its traffic assignment.

Level of Service is a measure of the quality of flow and overall congestion on a particular section of road or at a specific intersection.

Levels of Service (LOS) are defined in the Highway Capacity Manual 2000 of the Transportation Research Board, National Research Council, 2000. LOS ratings are classified by letters from A to F, and are as follows:

Rating	Description	Traffic
A	Free Flow	Drivers feel no restrictions.
B	Stable Flow	Drivers feel some restrictions.
C	Stable Flow	Drivers somewhat restricted, but not objectionably so.
D	Approaching Unstable Flow	Increased restricted and congestion.
E	Capacity	Substantial restriction, serious delays.
F	Forced Flow	Stop and go conditions extreme delays.

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Trip Distribution Worksheet

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Hollywood Casino & Hotel Springfield
Springfield MA

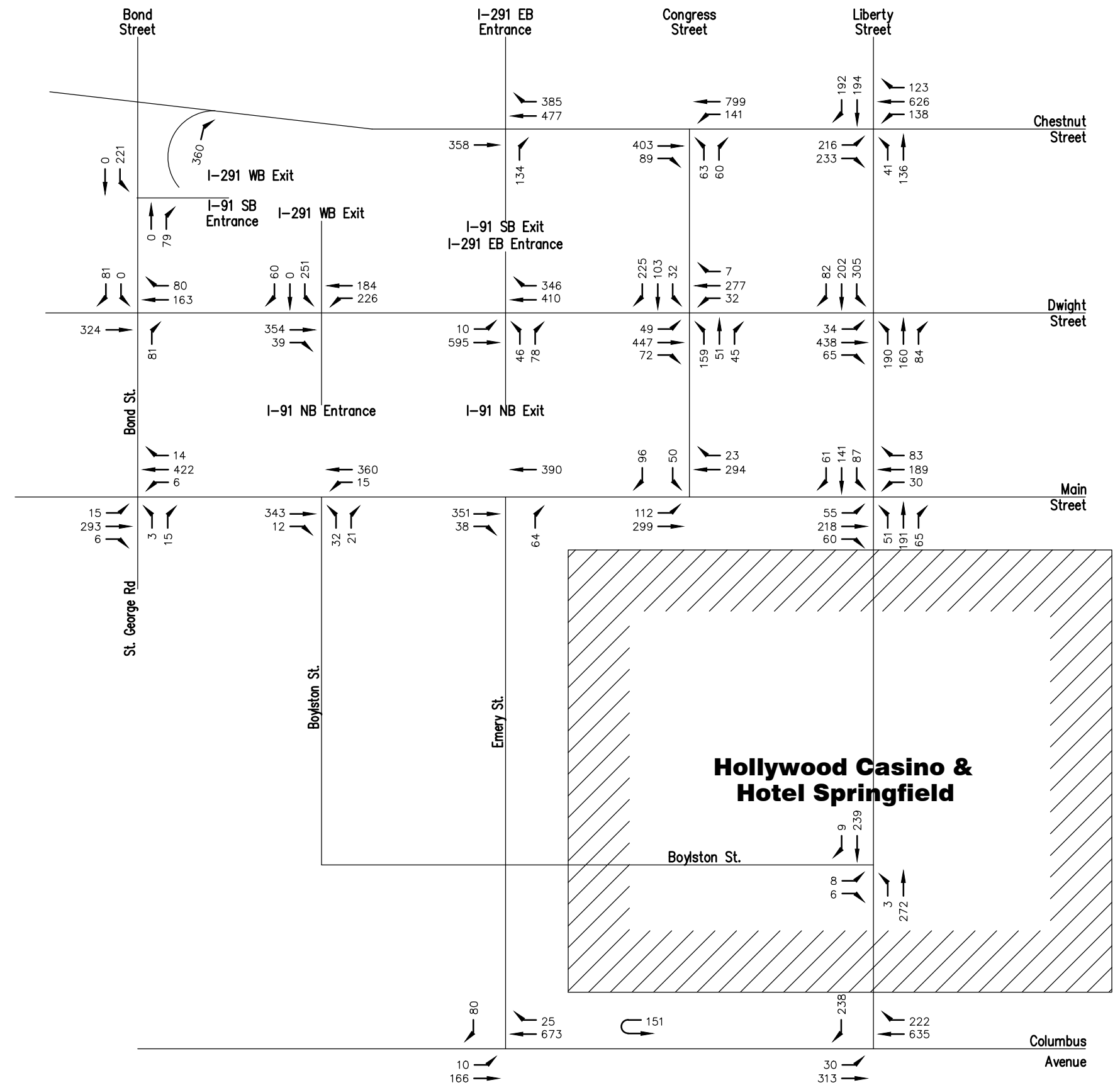
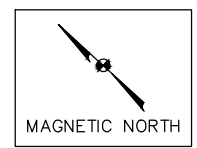
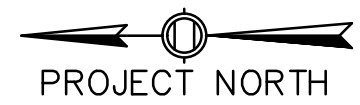
Distribution of Traffic Approaching the Site
Based on information from Economic / Market analysis

From Market Report			I-90 to west / I-91 to North		I-90 / I-291 to east		I-91 from south		Local	
Area	Visits	% Total	% of Area		% of Area		% of Area		% of Area	
Hollywood Primary	1,680,774	44.93%	40.00%	17.97%	20.00%	8.99%	20.00%	8.99%	20.00%	8.99%
Central CT	917,047	24.52%		0.00%		0.00%	100.00%	24.52%		0.00%
North Secondary	103,286	2.76%	100.00%	2.76%		0.00%		0.00%		0.00%
South Central Mass	123,567	3.30%		0.00%	100.00%	3.30%		0.00%		0.00%
Northwest CT	41,572	1.11%		0.00%	40.00%	0.44%	60.00%	0.67%		0.00%
Coastal CT	64,276	1.72%		0.00%		0.00%	100.00%	1.72%		0.00%
Tertiary Southwest	299,123	8.00%	40.00%	3.20%		0.00%	60.00%	4.80%		0.00%
Tertiary West	149,403	3.99%	100.00%	3.99%		0.00%		0.00%		0.00%
Saratoga	239,735	6.41%	100.00%	6.41%		0.00%		0.00%		0.00%
Tertiary North	43,333	1.16%	100.00%	1.16%		0.00%		0.00%		0.00%
Southern NH	13,931	0.37%		0.00%	100.00%	0.37%		0.00%		0.00%
North Central Mass	32,999	0.88%	50.00%	0.44%	50.00%	0.44%		0.00%		0.00%
North Shore	16,749	0.45%		0.00%	100.00%	0.45%		0.00%		0.00%
Inside 128	1,509	0.04%		0.00%	100.00%	0.04%		0.00%		0.00%
South Shore	4,567	0.12%		0.00%	100.00%	0.12%		0.00%		0.00%
Rhode Island	6,408	0.17%		0.00%	80.00%	0.14%	20.00%	0.03%		0.00%
Southwest CT	2,423	0.06%		0.00%		0.00%	100.00%	0.06%		0.00%
Total	3,740,702	100.00%		35.93%		14.29%		40.78%		8.99%

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Traffic Flow Diagrams

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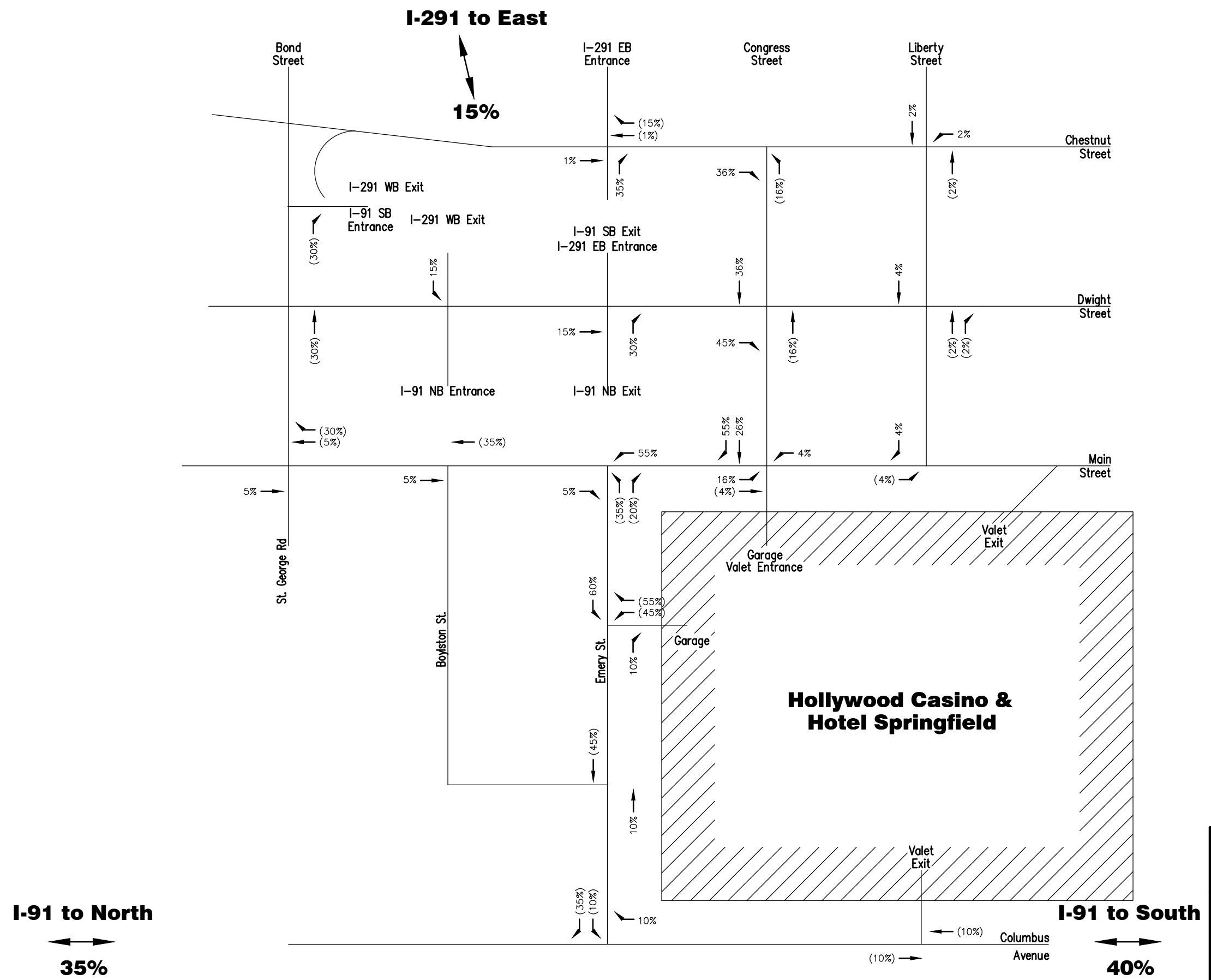
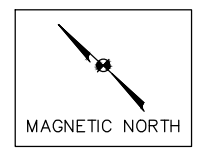
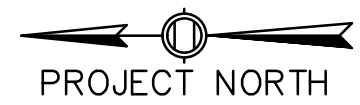


Penn National Gaming, Inc.
Hollywood Casino & Hotel Springfield
Springfield, MA

**TRAFFIC FLOW DIAGRAM
2012 Existing Conditions**

benesch Alfred Benesch & Company
engineers • scientists • planners 90 National Drive
Glastonbury, Connecticut 06033
860-633-8341

SCALE: N.T.S. | DATE: Dec. 2012 | TFD-1

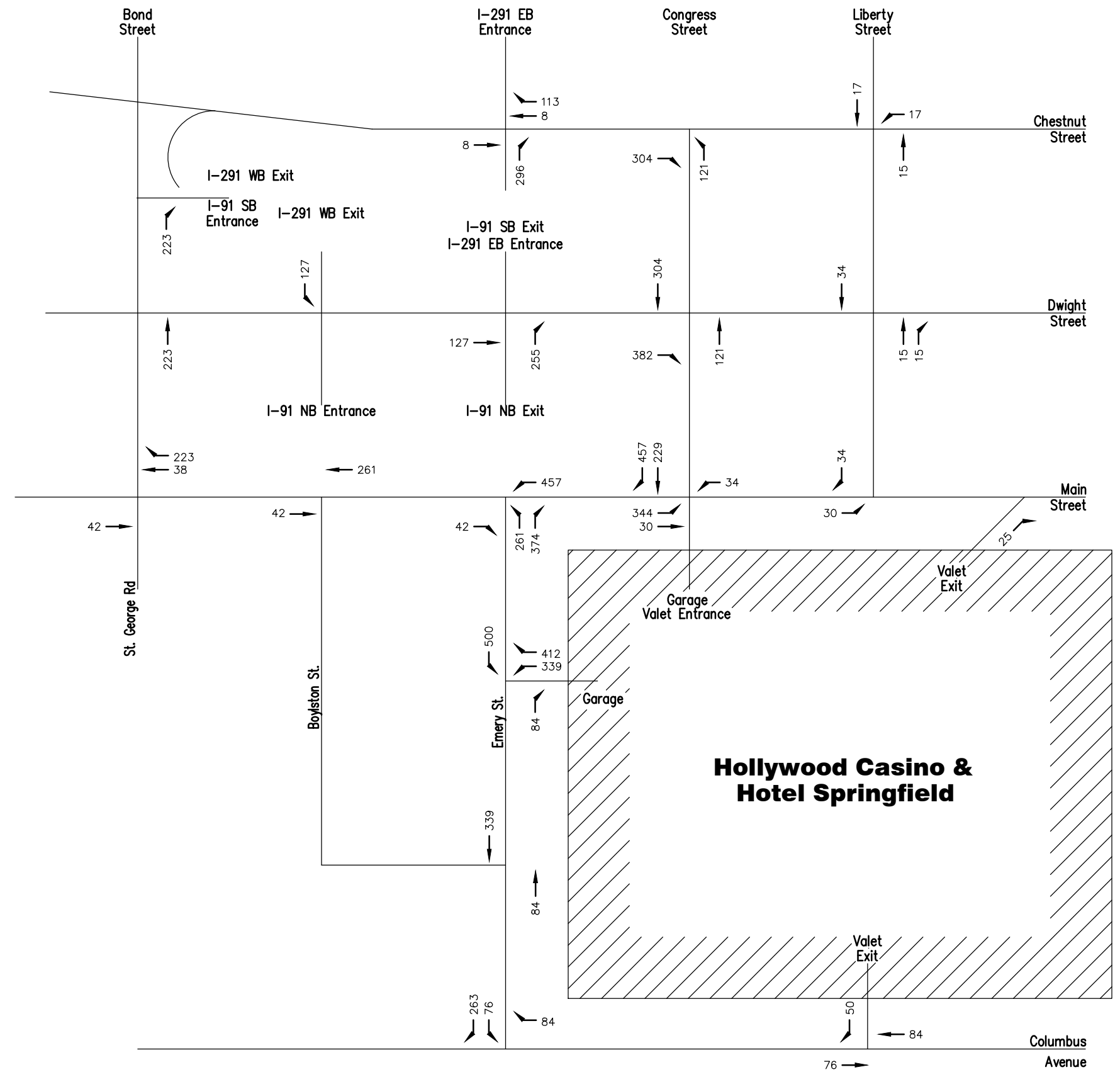
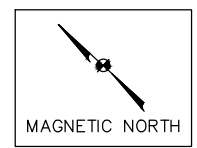
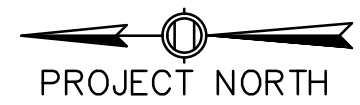


Legend
 xx = Arriving Percentage
 (xx) = Departing Percentage

Penn National Gaming, Inc.
 Hollywood Casino & Hotel Springfield
 Springfield, MA

TRAFFIC FLOW DIAGRAM
Trip Distribution

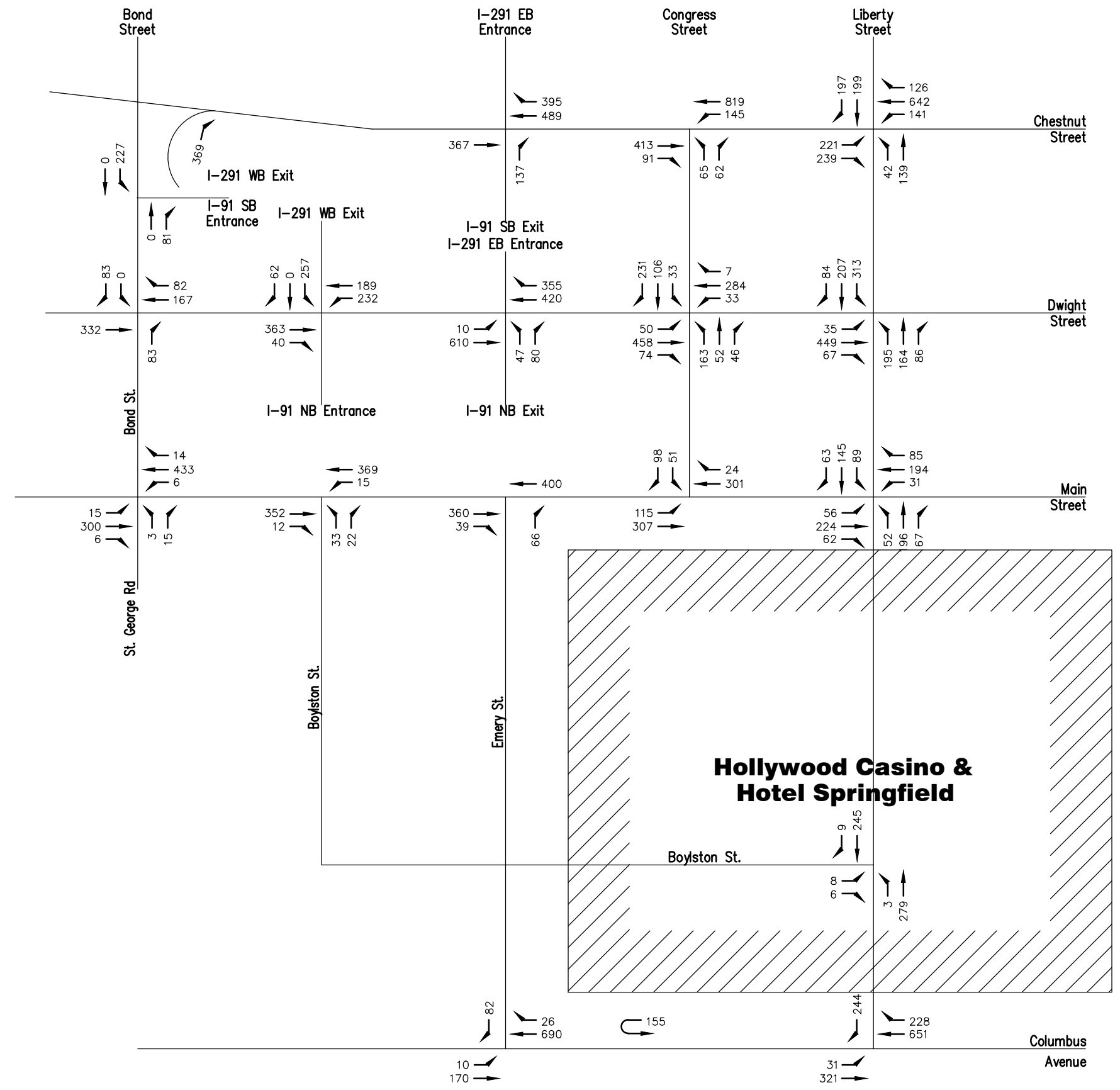
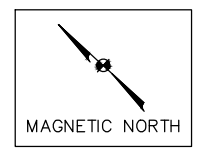
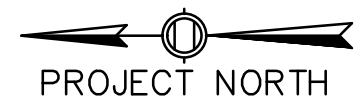




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 Hollywood Casino & Hotel Springfield
 Springfield, MA

TRAFFIC FLOW DIAGRAM
Generated Trips

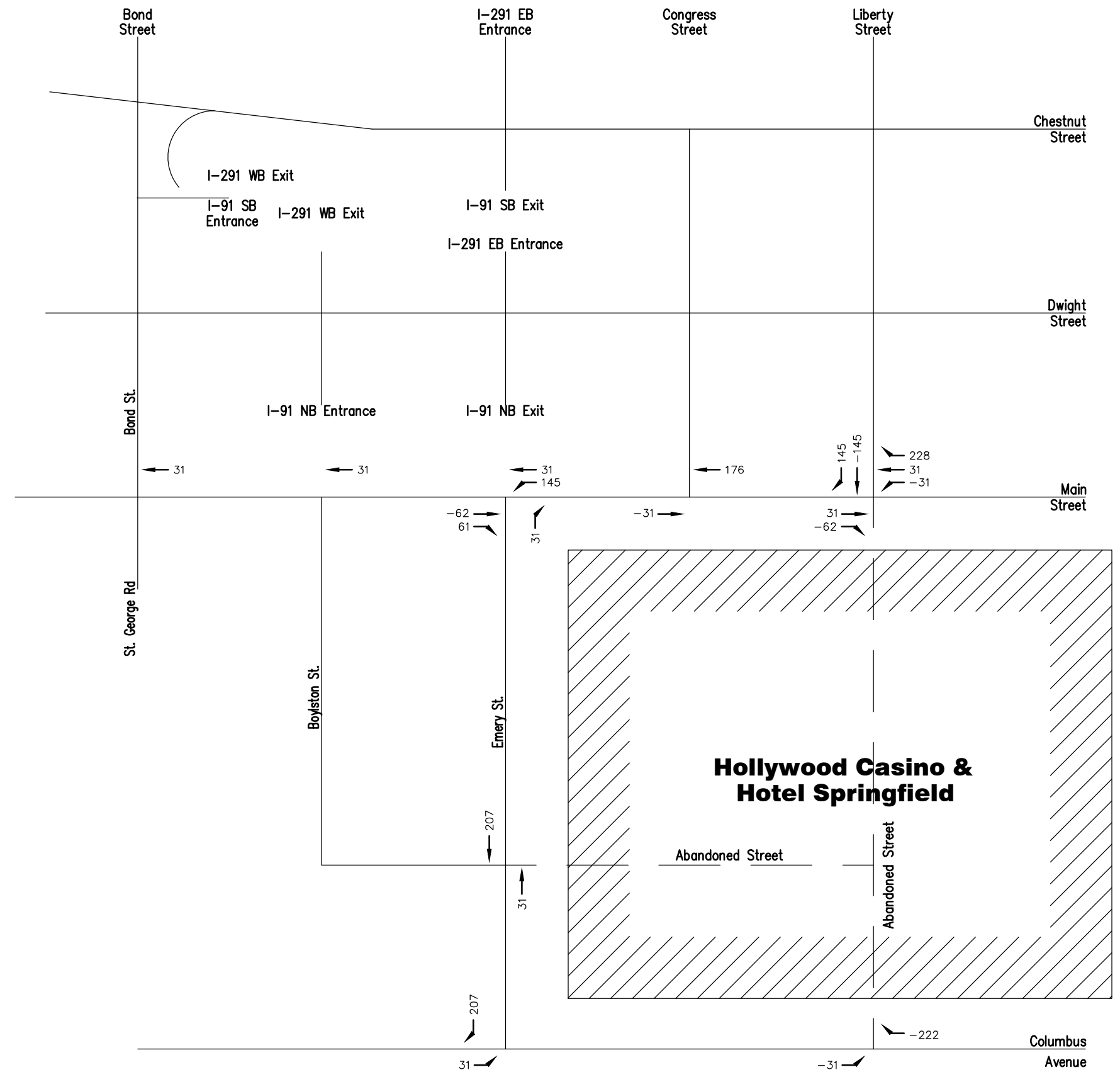
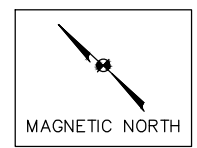
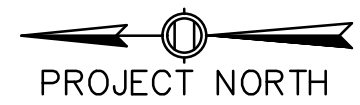




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Hollywood Casino & Hotel Springfield
Springfield, MA

TRAFFIC FLOW DIAGRAM
2018 No-Build

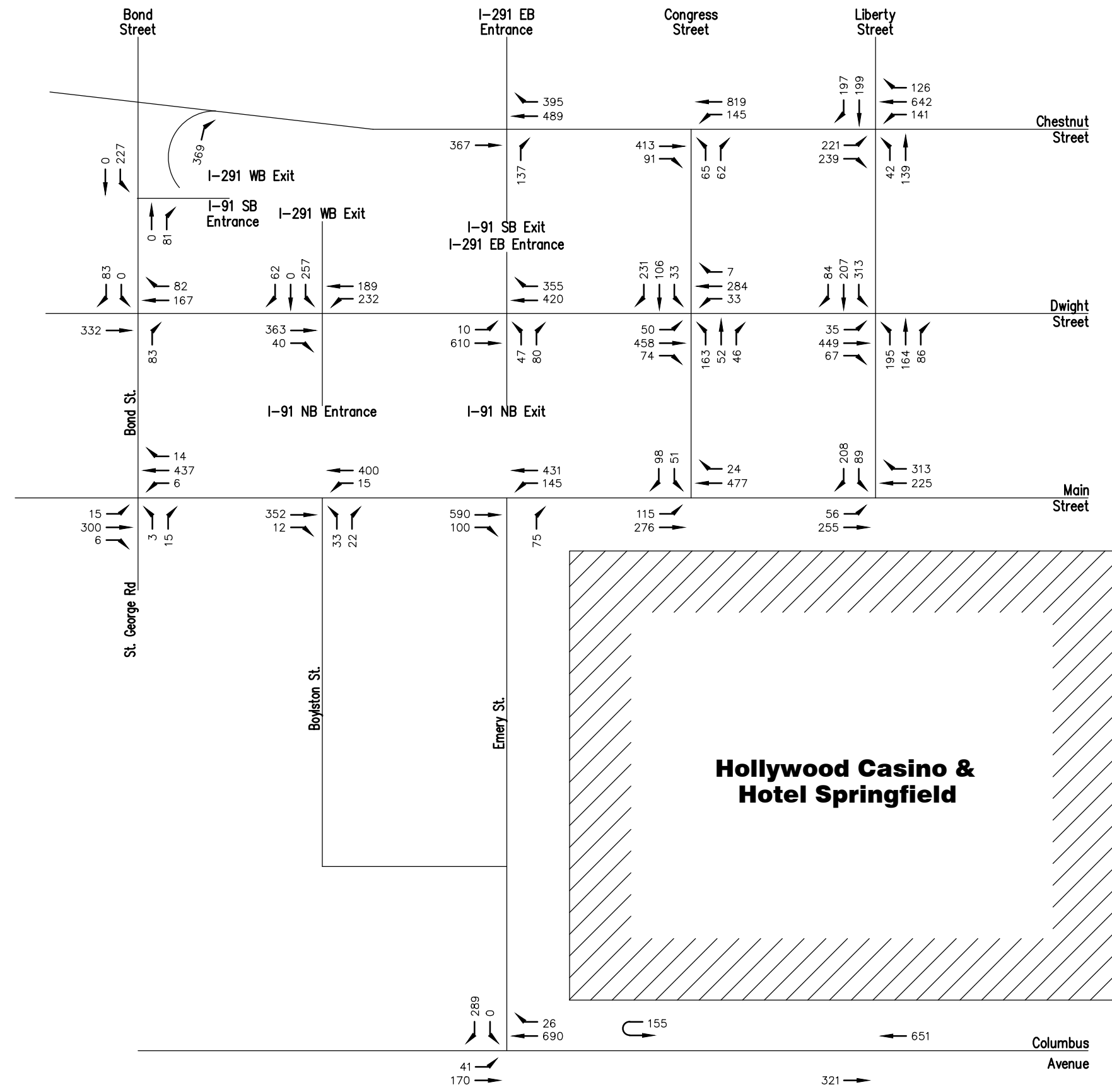
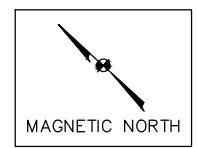
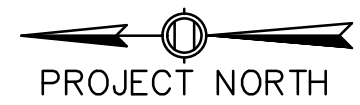
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Glastonbury, Connecticut 06033
860-633-8341



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Springfield, MA

TRAFFIC FLOW DIAGRAM
Diverted Trips

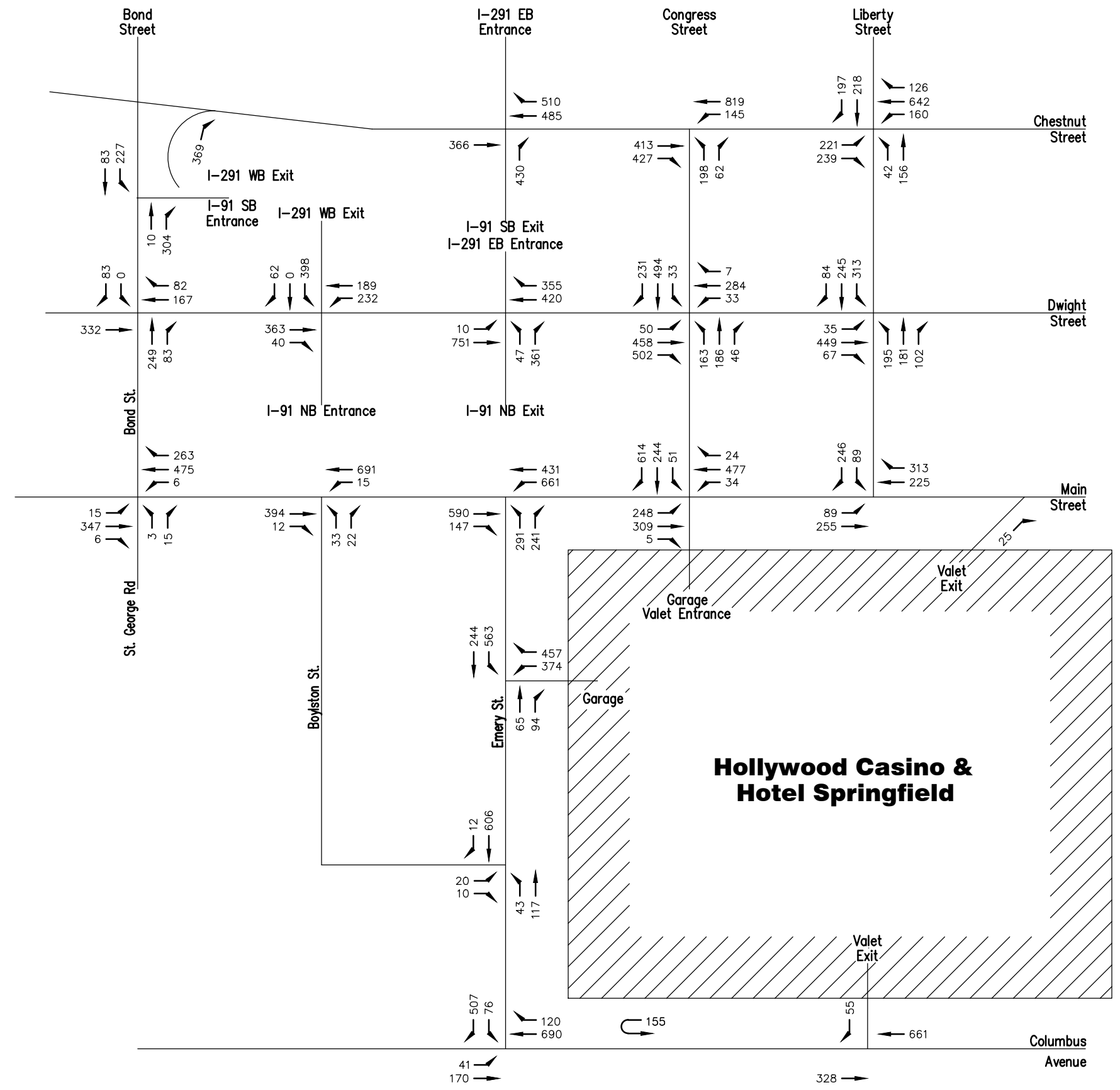
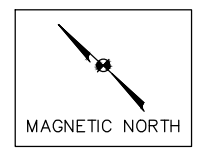
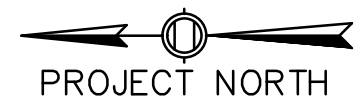
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90 National Drive
Glastonbury, Connecticut 06033
860-633-8341



Penn National Gaming, Inc.
Hollywood Casino & Hotel Springfield
Springfield, MA

TRAFFIC FLOW DIAGRAM
2018 No-Build w/Diverted Trips

 **benesch**
engineers • scientists • planners
Alfred Benesch & Company
90 National Drive
Glastonbury, Connecticut 06033
860-633-8341



Penn National Gaming, Inc.
 Hollywood Casino & Hotel Springfield
 Springfield, MA

TRAFFIC FLOW DIAGRAM
Evening Peak 2018 Build



SCALE: N.T.S. | DATE: Dec. 2012 | TFD-7

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Traffic Counts

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Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: E & W Columbus Avenue

E / W: Liberty Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Columbus @ Liberty

Site Code : 5

Start Date : 11/29/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Columbus From North					Liberty From East					Columbus From South					From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	0	3	0	3	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
04:15 PM	0	1	0	0	1	2	0	0	0	2	2	0	0	0	2	0	0	0	0	0	0
04:30 PM	0	0	2	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	1	2	0	3	1	0	0	0	1	1	2	0	0	3	0	0	0	0	0	0
Total	0	2	7	0	9	4	0	0	0	4	4	2	0	0	6	0	0	0	0	0	0
05:00 PM	0	0	1	0	1	2	0	0	0	2	2	1	0	0	3	0	0	0	0	0	0
05:15 PM	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
05:30 PM	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
05:45 PM	0	1	3	0	4	2	0	1	0	3	2	0	0	0	2	0	0	0	0	0	0
Total	0	1	6	0	7	4	0	1	0	5	6	1	0	0	7	0	0	0	0	0	0
Grand Total	0	3	13	0	16	8	0	1	0	9	10	3	0	0	13	0	0	0	0	0	0
Apprch %	0	18.8	81.2	0		88.9	0	11.1	0		76.9	23.1	0	0		0	0	0	0		
Total %	0	7.9	34.2	0	42.1	21.1	0	2.6	0	23.7	26.3	7.9	0	0	34.2	0	0	0	0	0	

Start Time	Columbus From North					Liberty From East					Columbus From South					From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	
04:15 PM	0	1	0	0	1	2	0	0	0	2	2	0	0	0	2	0	0	0	0	0	0
04:30 PM	0	0	2	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	1	2	0	3	1	0	0	0	1	1	2	0	0	3	0	0	0	0	0	0
05:00 PM	0	0	1	0	1	2	0	0	0	2	2	1	0	0	3	0	0	0	0	0	0
Total Volume	0	2	5	0	7	6	0	0	0	6	5	3	0	0	8	0	0	0	0	0	0
% App. Total	0	28.6	71.4	0		100	0	0	0		62.5	37.5	0	0		0	0	0	0		
PHF	.000	.500	.625	.000	.583	.750	.000	.000	.000	.750	.625	.375	.000	.000	.667	.000	.000	.000	.000	.000	.750

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Main Street

E / W: Bond & St. George

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Main @ Bond

Site Code : 6

Start Date : 12/6/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Main From North						Bond From East					Main From South						St. George From West					Int. Total
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	2	74	6	1	0	83	0	0	0	8	8	1	118	1	0	3	123	3	0	0	4	7	221
04:15 PM	1	70	6	1	0	78	0	0	0	10	10	6	88	0	0	0	94	3	0	0	3	6	188
04:30 PM	1	70	0	2	0	73	0	0	0	11	11	4	120	2	1	0	127	5	0	1	0	6	217
04:45 PM	2	79	3	0	0	84	0	0	0	5	5	3	96	3	0	0	102	4	0	2	5	11	202
Total	6	293	15	4	0	318	0	0	0	34	34	14	422	6	1	3	446	15	0	3	12	30	828
05:00 PM	5	59	0	3	0	67	0	0	0	8	8	3	119	2	0	1	125	13	0	3	0	16	216
05:15 PM	2	71	2	1	2	78	0	0	0	2	2	2	87	0	0	0	89	5	0	0	7	12	181
05:30 PM	0	60	1	0	0	61	0	0	0	5	5	2	80	0	0	0	82	6	0	1	2	9	157
05:45 PM	2	64	0	0	1	67	0	0	1	0	1	0	64	1	0	1	66	2	0	0	0	2	136
Total	9	254	3	4	3	273	0	0	1	15	16	7	350	3	0	2	362	26	0	4	9	39	690
Grand Total	15	547	18	8	3	591	0	0	1	49	50	21	772	9	1	5	808	41	0	7	21	69	1518
Apprch %	2.5	92.6	3	1.4	0.5		0	0	2	98		2.6	95.5	1.1	0.1	0.6		59.4	0	10.1	30.4		
Total %	1	36	1.2	0.5	0.2	38.9	0	0	0.1	3.2	3.3	1.4	50.9	0.6	0.1	0.3	53.2	2.7	0	0.5	1.4	4.5	
PCs and Peds	15	516	17	8	3	559	0	0	0	49	49	21	727	9	1	5	763	41	0	7	21	69	1440
% PCs and Peds	100	94.3	94.4	100	100	94.6	0	0	0	100	98	100	94.2	100	100	100	94.4	100	0	100	100	100	94.9
HVs / Busses	0	26	1	0	0	27	0	0	1	0	1	0	41	0	0	0	41	0	0	0	0	0	69
% HVs / Busses																							
Bicycles	0	5	0	0	0	5	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	9
% Bicycles	0	0.9	0	0	0	0.8	0	0	0	0	0	0	0.5	0	0	0	0.5	0	0	0	0	0	0.6

Start Time	Main From North						Bond From East					Main From South						St. George From West					Int. Total
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																							
Peak Hour for Entire Intersection Begins at 04:00 PM																							
04:00 PM	2	74	6	1	0	83	0	0	0	8	8	1	118	1	0	3	123	3	0	0	4	7	221
04:15 PM	1	70	6	1	0	78	0	0	0	10	10	6	88	0	0	0	94	3	0	0	3	6	188
04:30 PM	1	70	0	2	0	73	0	0	0	11	11	4	120	2	1	0	127	5	0	1	0	6	217
04:45 PM	2	79	3	0	0	84	0	0	0	5	5	3	96	3	0	0	102	4	0	2	5	11	202
Total Volume	6	293	15	4	0	318	0	0	0	34	34	14	422	6	1	3	446	15	0	3	12	30	828
% App. Total	1.9	92.1	4.7	1.3	0		0	0	0	100		3.1	94.6	1.3	0.2	0.7		50	0	10	40		
PHF	.750	.927	.625	.500	.000	.946	.000	.000	.000	.773	.773	.583	.879	.500	.250	.250	.878	.750	.000	.375	.600	.682	.937



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Main Street

E / W: Boylston Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Main @ Boylston

Site Code : 7

Start Date : 11/29/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Main From North					From East					Main From South					Boylston From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	1	85	0	0	86	0	0	0	0	0	11	76	0	0	87	3	0	12	8	23	196
04:15 PM	1	92	0	0	93	0	0	0	0	0	7	91	6	0	104	7	0	7	11	25	222
04:30 PM	7	82	0	0	89	0	0	0	0	0	5	99	6	0	110	7	0	6	5	18	217
04:45 PM	3	84	1	0	88	0	0	0	0	0	5	94	3	0	102	4	0	7	5	16	206
Total	12	343	1	0	356	0	0	0	0	0	28	360	15	0	403	21	0	32	29	82	841
05:00 PM	2	66	0	0	68	0	0	0	0	0	1	87	6	0	94	13	0	6	4	23	185
05:15 PM	0	68	0	0	68	0	0	0	0	0	3	72	5	0	80	0	0	4	6	10	158
05:30 PM	1	57	0	0	58	0	0	0	0	0	2	60	4	0	66	1	0	2	4	7	131
05:45 PM	0	60	0	1	61	0	0	0	0	0	0	43	1	0	44	0	0	1	4	5	110
Total	3	251	0	1	255	0	0	0	0	0	6	262	16	0	284	14	0	13	18	45	584
Grand Total	15	594	1	1	611	0	0	0	0	0	34	622	31	0	687	35	0	45	47	127	1425
Apprch %	2.5	97.2	0.2	0.2		0	0	0	0	0	4.9	90.5	4.5	0		27.6	0	35.4	37		
Total %	1.1	41.7	0.1	0.1	42.9	0	0	0	0	0	2.4	43.6	2.2	0	48.2	2.5	0	3.2	3.3	8.9	
PCs and Peds																					
% PCs and Peds	100	98.3	100	100	98.4	0	0	0	0	0	100	98.1	93.5	0	98	94.3	0	100	100	98.4	98.2
HVs / Busses																					
% HVs / Busses	0	0.8	0	0	0.8	0	0	0	0	0	0	1.1	6.5	0	1.3	5.7	0	0	0	1.6	1.1
Bicycles	0	5	0	0	5	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	10
% Bicycles	0	0.8	0	0	0.8	0	0	0	0	0	0	0.8	0	0	0.7	0	0	0	0	0	0.7

Start Time	Main From North					From East					Main From South					Boylston From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	1	85	0	0	86	0	0	0	0	0	11	76	0	0	87	3	0	12	8	23	196
04:15 PM	1	92	0	0	93	0	0	0	0	0	7	91	6	0	104	7	0	7	11	25	222
04:30 PM	7	82	0	0	89	0	0	0	0	0	5	99	6	0	110	7	0	6	5	18	217
04:45 PM	3	84	1	0	88	0	0	0	0	0	5	94	3	0	102	4	0	7	5	16	206
Total Volume	12	343	1	0	356	0	0	0	0	0	28	360	15	0	403	21	0	32	29	82	841
% App. Total	3.4	96.3	0.3	0		0	0	0	0	0	6.9	89.3	3.7	0		25.6	0	39	35.4		
PHF	.429	.932	.250	.000	.957	.000	.000	.000	.000	.000	.636	.909	.625	.000	.916	.750	.000	.667	.659	.820	.947



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovatedata.com or 1.413.668.5094

N / S: Main Street (Southbound)

E / W: Emery Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Main @ Emery

Site Code : 8

Start Date : 11/29/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Main From North					From East					Main From South					Emery From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
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		
Total %																					

Start Time	Main From North					From East					Main From South					Emery From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	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 Volume	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		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



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N / S: Main Street (Southbound)

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File Name : PM Peak - Main @ Emery

Site Code : 8

Start Date : 11/29/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Main From North					From East					Main From South					Emery From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	10	93	0	0	103	0	0	0	0	0	0	0	0	0	0	12	0	0	0	12	115
04:15 PM	11	86	0	1	98	0	0	0	0	0	0	0	0	0	0	16	0	0	0	16	114
04:30 PM	8	84	0	2	94	0	0	0	0	0	0	3	0	0	3	17	0	0	0	17	114
04:45 PM	9	88	0	0	97	0	0	0	0	0	0	0	0	0	0	19	0	0	0	19	116
Total	38	351	0	3	392	0	0	0	0	0	0	3	0	0	3	64	0	0	0	64	459
05:00 PM	5	77	0	0	82	0	0	0	0	0	0	0	0	0	0	22	0	0	0	22	104
05:15 PM	5	64	0	0	69	0	0	0	0	0	0	0	0	0	0	22	0	0	0	22	91
05:30 PM	4	60	0	0	64	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8	72
05:45 PM	0	59	0	0	59	1	0	0	0	1	0	0	0	0	0	14	0	0	0	14	74
Total	14	260	0	0	274	1	0	0	0	1	0	0	0	0	0	66	0	0	0	66	341
Grand Total	52	611	0	3	666	1	0	0	0	1	0	3	0	0	3	130	0	0	0	130	800
Apprch %	7.8	91.7	0	0.5		100	0	0	0		0	100	0	0		100	0	0	0		
Total %	6.5	76.4	0	0.4	83.2	0.1	0	0	0	0.1	0	0.4	0	0	0.4	16.2	0	0	0	16.2	
PCs and Peds	100	94.8	0	0	94.7	100	0	0	0	100	0	0	0	0	0	98.5	0	0	0	98.5	95
% PCs and Peds																					
HVs / Busses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HVs / Busses																					
Bicycles	0	32	0	3	35	0	0	0	0	0	0	3	0	0	3	2	0	0	0	2	40
% Bicycles	0	5.2	0	100	5.3	0	0	0	0	0	0	100	0	0	100	1.5	0	0	0	1.5	5

Start Time	Main From North					From East					Main From South					Emery From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	10	93	0	0	103	0	0	0	0	0	0	0	0	0	0	12	0	0	0	12	115
04:15 PM	11	86	0	1	98	0	0	0	0	0	0	0	0	0	0	16	0	0	0	16	114
04:30 PM	8	84	0	2	94	0	0	0	0	0	0	3	0	0	3	17	0	0	0	17	114
04:45 PM	9	88	0	0	97	0	0	0	0	0	0	0	0	0	0	19	0	0	0	19	116
Total Volume	38	351	0	3	392	0	0	0	0	0	0	3	0	0	3	64	0	0	0	64	459
% App. Total	9.7	89.5	0	0.8		0	0	0	0		0	100	0	0		100	0	0	0		
PHF	.864	.944	.000	.375	.951	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.842	.000	.000	.000	.842	.989



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N / S: Main Street

E / W: Boylston Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Main @ Boylston

Site Code : 7

Start Date : 11/29/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Main From North					From East					Main From South					Boylston From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	2	0	0	2	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	1
Total	0	5	0	0	5	0	0	0	0	0	0	1	2	0	3	1	0	0	0	0	1
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	1	0	0	0	0	1
Grand Total	0	5	0	0	5	0	0	0	0	0	0	7	2	0	9	2	0	0	0	0	2
Apprch %	0	100	0	0		0	0	0	0		0	77.8	22.2	0		100	0	0	0		
Total %	0	31.2	0	0	31.2	0	0	0	0	0	0	43.8	12.5	0	56.2	12.5	0	0	0	12.5	

Start Time	Main From North					From East					Main From South					Boylston From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	
04:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	2	0	0	2	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	1
Total Volume	0	5	0	0	5	0	0	0	0	0	0	1	2	0	3	1	0	0	0	0	1
% App. Total	0	100	0	0		0	0	0	0		0	33.3	66.7	0		100	0	0	0		
PHF	.000	.625	.000	.000	.625	.000	.000	.000	.000	.000	.000	.250	.500	.000	.375	.250	.000	.000	.000	.250	.563

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM



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Belchertown, Massachusetts

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N / S: Main Street

E / W: Congress / Driveway

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Main @ Congress

Site Code : 9

Start Date : 11/29/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Main From North						Congress From East					Main From South						Republican From West					Int. Total
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	76	26	1	0	103	28	0	14	8	50	7	52	0	1	1	61	0	0	0	5	5	219
04:15 PM	0	76	30	2	3	111	20	0	8	8	36	7	88	0	0	4	99	0	0	0	10	10	256
04:30 PM	0	75	28	0	1	104	30	0	16	5	51	3	78	0	0	0	81	0	0	0	5	5	241
04:45 PM	0	72	28	4	1	105	18	0	12	5	35	6	76	0	0	2	84	0	0	0	6	6	230
Total	0	299	112	7	5	423	96	0	50	26	172	23	294	0	1	7	325	0	0	0	26	26	946
05:00 PM	0	67	31	0	0	98	16	0	20	1	37	6	65	0	2	0	73	0	0	0	0	0	208
05:15 PM	0	61	17	4	0	82	20	0	10	1	31	13	53	1	0	2	69	0	0	0	7	7	189
05:30 PM	0	52	16	1	0	69	18	0	14	4	36	5	47	0	0	1	53	0	0	0	5	5	163
05:45 PM	0	49	20	0	0	69	8	0	12	1	21	9	43	0	0	1	53	0	0	0	4	4	147
Total	0	229	84	5	0	318	62	0	56	7	125	33	208	1	2	4	248	0	0	0	16	16	707
Grand Total	0	528	196	12	5	741	158	0	106	33	297	56	502	1	3	11	573	0	0	0	42	42	1653
Apprch %	0	71.3	26.5	1.6	0.7		53.2	0	35.7	11.1		9.8	87.6	0.2	0.5	1.9		0	0	0	100		
Total %	0	31.9	11.9	0.7	0.3	44.8	9.6	0	6.4	2	18	3.4	30.4	0.1	0.2	0.7	34.7	0	0	0	2.5	2.5	
PCs and Peds	0	507	193	12	5	717	151	0	105	33	289	55	457	1	3	11	527	0	0	0	42	42	1575
% PCs and Peds	0	96	98.5	100	100	96.8	95.6	0	99.1	100	97.3	98.2	91	100	100	100	92	0	0	0	100	100	95.3
HVs / Busses	0	20	2	0	0	22	7	0	1	0	8	1	38	0	0	0	39	0	0	0	0	0	69
% HVs / Busses																							
Bicycles	0	1	1	0	0	2	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	9
% Bicycles	0	0.2	0.5	0	0	0.3	0	0	0	0	0	0	1.4	0	0	0	1.2	0	0	0	0	0	0.5

Start Time	Main From North						Congress From East					Main From South						Republican From West					Int. Total
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																							
Peak Hour for Entire Intersection Begins at 04:00 PM																							
04:00 PM	0	76	26	1	0	103	28	0	14	8	50	7	52	0	1	1	61	0	0	0	5	5	219
04:15 PM	0	76	30	2	3	111	20	0	8	8	36	7	88	0	0	4	99	0	0	0	10	10	256
04:30 PM	0	75	28	0	1	104	30	0	16	5	51	3	78	0	0	0	81	0	0	0	5	5	241
04:45 PM	0	72	28	4	1	105	18	0	12	5	35	6	76	0	0	2	84	0	0	0	6	6	230
Total Volume	0	299	112	7	5	423	96	0	50	26	172	23	294	0	1	7	325	0	0	0	26	26	946
% App. Total	0	70.7	26.5	1.7	1.2		55.8	0	29.1	15.1		7.1	90.5	0	0.3	2.2		0	0	0	100		
PHF	.000	.984	.933	.438	.417	.953	.800	.000	.781	.813	.843	.821	.835	.000	.250	.438	.821	.000	.000	.000	.650	.650	.924



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Client: Alfred Benesch & Company

File Name : PM Peak - Main @ Congress

Site Code : 9

Start Date : 11/29/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Main From North						Congress From East					Main From South						Republican From West					Int. Total	
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
04:00 PM	0	4	0	0	0	4	0	0	0	0	0	1	5	0	0	0	6	0	0	0	0	0	0	10
04:15 PM	0	1	2	0	0	3	2	0	0	0	2	0	8	0	0	0	8	0	0	0	0	0	0	13
04:30 PM	0	4	0	0	0	4	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	8
04:45 PM	0	3	0	0	0	3	1	0	1	0	2	0	1	0	0	0	1	0	0	0	0	0	0	6
Total	0	12	2	0	0	14	3	0	1	0	4	1	18	0	0	0	19	0	0	0	0	0	0	37
05:00 PM	0	2	0	0	0	2	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	7
05:15 PM	0	1	0	0	0	1	1	0	0	0	1	0	6	0	0	0	6	0	0	0	0	0	0	8
05:30 PM	0	2	0	0	0	2	1	0	0	0	1	0	4	0	0	0	4	0	0	0	0	0	0	7
05:45 PM	0	3	0	0	0	3	2	0	0	0	2	0	5	0	0	0	5	0	0	0	0	0	0	10
Total	0	8	0	0	0	8	4	0	0	0	4	0	20	0	0	0	20	0	0	0	0	0	0	32
Grand Total	0	20	2	0	0	22	7	0	1	0	8	1	38	0	0	0	39	0	0	0	0	0	0	69
Apprch %	0	90.9	9.1	0	0		87.5	0	12.5	0		2.6	97.4	0	0	0		0	0	0	0	0	0	
Total %	0	29	2.9	0	0	31.9	10.1	0	1.4	0	11.6	1.4	55.1	0	0	0	56.5	0	0	0	0	0	0	

Start Time	Main From North						Congress From East					Main From South						Republican From West					Int. Total	
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																								
Peak Hour for Entire Intersection Begins at 04:00 PM																								
04:00 PM	0	4	0	0	0	4	0	0	0	0	0	1	5	0	0	0	6	0	0	0	0	0	0	10
04:15 PM	0	1	2	0	0	3	2	0	0	0	2	0	8	0	0	0	8	0	0	0	0	0	0	13
04:30 PM	0	4	0	0	0	4	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	8
04:45 PM	0	3	0	0	0	3	1	0	1	0	2	0	1	0	0	0	1	0	0	0	0	0	0	6
Total Volume	0	12	2	0	0	14	3	0	1	0	4	1	18	0	0	0	19	0	0	0	0	0	0	37
% App. Total	0	85.7	14.3	0	0		75	0	25	0		5.3	94.7	0	0	0		0	0	0	0	0	0	
PHF	.000	.750	.250	.000	.000	.875	.375	.000	.250	.000	.500	.250	.563	.000	.000	.000	.594	.000	.000	.000	.000	.000	.712	



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N / S: Main Street

E / W: Liberty Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Main @ Liberty

Site Code : 10

Start Date : 12/5/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Main From North					Liberty From East					Main From South						Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	9	59	14	9	91	11	33	14	0	58	16	43	7	2	18	86	22	48	10	8	88	323
04:15 PM	15	56	17	9	97	20	32	24	3	79	24	36	8	2	4	74	14	38	15	13	80	330
04:30 PM	15	53	12	6	86	19	44	29	2	94	22	53	7	2	9	93	19	56	9	9	93	366
04:45 PM	13	59	8	15	95	15	33	20	2	70	18	53	4	1	11	87	14	38	9	21	82	334
Total	52	227	51	39	369	65	142	87	7	301	80	185	26	7	42	340	69	180	43	51	343	1353
05:00 PM	17	50	18	4	89	7	32	14	0	53	19	47	11	3	16	96	18	59	18	4	99	337
05:15 PM	12	45	9	0	66	7	21	20	1	49	10	33	5	6	18	72	19	40	13	2	74	261
05:30 PM	11	50	10	2	73	9	14	24	6	53	8	35	4	1	6	54	13	31	12	3	59	239
05:45 PM	8	49	5	4	66	9	20	21	5	55	13	20	4	8	7	52	12	24	14	4	54	227
Total	48	194	42	10	294	32	87	79	12	210	50	135	24	18	47	274	62	154	57	13	286	1064
Grand Total	100	421	93	49	663	97	229	166	19	511	130	320	50	25	89	614	131	334	100	64	629	2417
Apprch %	15.1	63.5	14	7.4		19	44.8	32.5	3.7		21.2	52.1	8.1	4.1	14.5		20.8	53.1	15.9	10.2		
Total %	4.1	17.4	3.8	2	27.4	4	9.5	6.9	0.8	21.1	5.4	13.2	2.1	1	3.7	25.4	5.4	13.8	4.1	2.6	26	
PCs and Peds	96	401	92	48	637	93	225	151	19	488	130	310	48	25	89	602	72	313	59	64	508	2235
% PCs and Peds	96	95.2	98.9	98	96.1	95.9	98.3	91	100	95.5	100	96.9	96	100	100	98	55	93.7	59	100	80.8	92.5
HVs / Busses	3	16	1	1	21	2	3	15	0	20	0	4	1	0	0	5	54	17	41	0	112	158
% HVs / Busses	3	3.8	1.1	2	3.2	2.1	1.3	9	0	3.9	0	1.2	2	0	0	0.8	41.2	5.1	41	0	17.8	6.5
Bicycles	1	4	0	0	5	2	1	0	0	3	0	6	1	0	0	7	5	4	0	0	9	24
% Bicycles	1	1	0	0	0.8	2.1	0.4	0	0	0.6	0	1.9	2	0	0	1.1	3.8	1.2	0	0	1.4	1

Start Time	Main From North					Liberty From East					Main From South						Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM

04:15 PM	15	56	17	9	97	20	32	24	3	79	24	36	8	2	4	74	14	38	15	13	80	330
04:30 PM	15	53	12	6	86	19	44	29	2	94	22	53	7	2	9	93	19	56	9	9	93	366
04:45 PM	13	59	8	15	95	15	33	20	2	70	18	53	4	1	11	87	14	38	9	21	82	334
05:00 PM	17	50	18	4	89	7	32	14	0	53	19	47	11	3	16	96	18	59	18	4	99	337
Total Volume	60	218	55	34	367	61	141	87	7	296	83	189	30	8	40	350	65	191	51	47	354	1367
% App. Total	16.3	59.4	15	9.3		20.6	47.6	29.4	2.4		23.7	54	8.6	2.3	11.4		18.4	54	14.4	13.3		
PHF	.882	.924	.764	.567	.946	.763	.801	.750	.583	.787	.865	.892	.682	.667	.625	.911	.855	.809	.708	.560	.894	.934



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File Name : PM Peak - Main @ Liberty

Site Code : 10

Start Date : 12/5/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Main From North					Liberty From East					Main From South					Liberty From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds		App. Total
04:00 PM	0	1	0	0	1	0	1	1	0	2	0	0	0	0	0	0	8	3	5	0	16	19
04:15 PM	0	2	0	0	2	0	1	3	0	4	0	1	0	0	0	1	5	3	7	0	15	22
04:30 PM	1	2	0	0	3	1	1	2	0	4	0	2	0	0	0	2	7	2	2	0	11	20
04:45 PM	1	2	0	0	3	1	0	1	0	2	0	0	0	0	0	0	6	1	2	0	9	14
Total	2	7	0	0	9	2	3	7	0	12	0	3	0	0	0	3	26	9	16	0	51	75
05:00 PM	0	5	1	0	6	0	0	2	0	2	0	0	0	0	0	0	8	3	7	0	18	26
05:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	1	6	2	5	0	13	15
05:30 PM	1	1	0	1	3	0	0	3	0	3	0	0	0	0	0	0	8	2	3	0	13	19
05:45 PM	0	2	0	0	2	0	0	3	0	3	0	0	1	0	0	1	6	1	10	0	17	23
Total	1	9	1	1	12	0	0	8	0	8	0	1	1	0	0	2	28	8	25	0	61	83
Grand Total	3	16	1	1	21	2	3	15	0	20	0	4	1	0	0	5	54	17	41	0	112	158
Apprch %	14.3	76.2	4.8	4.8		10	15	75	0		0	80	20	0	0		48.2	15.2	36.6	0		
Total %	1.9	10.1	0.6	0.6	13.3	1.3	1.9	9.5	0	12.7	0	2.5	0.6	0	0	3.2	34.2	10.8	25.9	0	70.9	

Start Time	Main From North					Liberty From East					Main From South					Liberty From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds		App. Total
05:00 PM	0	5	1	0	6	0	0	2	0	2	0	0	0	0	0	0	8	3	7	0	18	26
05:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	1	6	2	5	0	13	15
05:30 PM	1	1	0	1	3	0	0	3	0	3	0	0	0	0	0	0	8	2	3	0	13	19
05:45 PM	0	2	0	0	2	0	0	3	0	3	0	0	1	0	0	1	6	1	10	0	17	23
Total Volume	1	9	1	1	12	0	0	8	0	8	0	1	1	0	0	2	28	8	25	0	61	83
% App. Total	8.3	75	8.3	8.3		0	0	100	0		0	50	50	0	0		45.9	13.1	41	0		
PHF	.250	.450	.250	.250	.500	.000	.000	.667	.000	.667	.000	.250	.250	.000	.000	.500	.875	.667	.625	.000	.847	.798

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM



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N / S: Boylston Street

E / W: Liberty Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Liberty @ Boylston

Site Code : 11

Start Date : 11/29/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Boylston From North					Liberty From East					From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	0	1	0	1	1	42	0	0	43	0	0	0	5	5	0	54	2	0	56	105
04:15 PM	1	0	3	0	4	1	55	0	0	56	0	0	0	3	3	0	71	0	0	71	134
04:30 PM	2	0	1	0	3	4	61	0	0	65	0	0	0	1	1	0	69	1	0	70	139
04:45 PM	1	0	1	0	2	3	54	0	0	57	0	0	0	0	0	0	45	1	0	46	105
Total	4	0	6	0	10	9	212	0	0	221	0	0	0	9	9	0	239	4	0	243	483
05:00 PM	2	0	3	0	5	1	69	0	0	70	0	0	0	0	0	0	87	1	0	88	163
05:15 PM	1	0	3	0	4	2	42	0	0	44	0	0	0	0	0	0	45	1	0	46	94
05:30 PM	2	0	1	0	3	1	34	0	0	35	0	0	0	5	5	0	52	0	0	52	95
05:45 PM	0	0	4	0	4	4	30	0	0	34	0	0	0	3	3	0	42	1	0	43	84
Total	5	0	11	0	16	8	175	0	0	183	0	0	0	8	8	0	226	3	0	229	436
Grand Total	9	0	17	0	26	17	387	0	0	404	0	0	0	17	17	0	465	7	0	472	919
Apprch %	34.6	0	65.4	0		4.2	95.8	0	0		0	0	0	100		0	98.5	1.5	0		
Total %	1	0	1.8	0	2.8	1.8	42.1	0	0	44	0	0	0	1.8	1.8	0	50.6	0.8	0	51.4	
PCs and Peds																					
% PCs and Peds	100	0	11.8	0	42.3	100	97.9	0	0	98	0	0	0	100	100	0	93.8	85.7	0	93.6	94.2
HVs / Busses																					
% HVs / Busses	0	0	88.2	0	57.7	0	2.1	0	0	2	0	0	0	0	0	0	4.9	14.3	0	5.1	5.1
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	6
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	0	0	1.3	0.7

Start Time	Boylston From North					Liberty From East					From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM

04:15 PM	1	0	3	0	4	1	55	0	0	56	0	0	0	3	3	0	71	0	0	71	134
04:30 PM	2	0	1	0	3	4	61	0	0	65	0	0	0	1	1	0	69	1	0	70	139
04:45 PM	1	0	1	0	2	3	54	0	0	57	0	0	0	0	0	0	45	1	0	46	105
05:00 PM	2	0	3	0	5	1	69	0	0	70	0	0	0	0	0	0	87	1	0	88	163
Total Volume	6	0	8	0	14	9	239	0	0	248	0	0	0	4	4	0	272	3	0	275	541
% App. Total	42.9	0	57.1	0		3.6	96.4	0	0		0	0	0	100		0	98.9	1.1	0		
PHF	.750	.000	.667	.000	.700	.563	.866	.000	.000	.886	.000	.000	.000	.333	.333	.000	.782	.750	.000	.781	.830



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Boylston Street

E / W: Liberty Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Liberty @ Boylston

Site Code : 11

Start Date : 11/29/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Boylston From North					Liberty From East					From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
04:15 PM	0	0	3	0	3	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	8
04:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	4
04:45 PM	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
Total	0	0	5	0	5	0	5	0	0	5	0	0	0	0	0	0	9	0	0	9	19
05:00 PM	0	0	2	0	2	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	6
05:15 PM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	4
05:45 PM	0	0	4	0	4	0	2	0	0	2	0	0	0	0	0	0	6	1	0	7	13
Total	0	0	10	0	10	0	3	0	0	3	0	0	0	0	0	0	14	1	0	15	28
Grand Total	0	0	15	0	15	0	8	0	0	8	0	0	0	0	0	0	23	1	0	24	47
Apprch %	0	0	100	0		0	100	0	0		0	0	0	0		0	95.8	4.2	0		
Total %	0	0	31.9	0	31.9	0	17	0	0	17	0	0	0	0	0	0	48.9	2.1	0	51.1	

Start Time	Boylston From North					Liberty From East					From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
05:00 PM	0	0	2	0	2	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	6
05:15 PM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	4
05:45 PM	0	0	4	0	4	0	2	0	0	2	0	0	0	0	0	0	6	1	0	7	13
Total Volume	0	0	10	0	10	0	3	0	0	3	0	0	0	0	0	0	14	1	0	15	28
% App. Total	0	0	100	0		0	100	0	0		0	0	0	0		0	93.3	6.7	0		
PHF	.000	.000	.625	.000	.625	.000	.375	.000	.000	.375	.000	.000	.000	.000	.000	.000	.583	.250	.000	.536	.538

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM



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PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Dwight Street

E / W: Bond Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ Bond

Site Code : 12

Start Date : 12/5/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Dwight From North					Bond From East					Dwight From South					Bond From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	90	0	4	94	0	0	0	0	0	16	35	0	1	52	19	0	0	2	21	167
04:15 PM	0	67	0	1	68	4	0	0	1	5	20	49	0	0	69	17	0	0	3	20	162
04:30 PM	0	81	0	4	85	1	0	0	1	2	28	38	0	2	68	23	0	0	3	26	181
04:45 PM	0	86	0	6	92	3	0	0	0	3	16	41	0	1	58	22	0	0	1	23	176
Total	0	324	0	15	339	8	0	0	2	10	80	163	0	4	247	81	0	0	9	90	686
05:00 PM	0	78	0	7	85	1	0	0	1	2	25	38	0	0	63	15	0	0	1	16	166
05:15 PM	0	70	0	0	70	0	0	0	0	0	17	35	0	2	54	9	0	0	0	9	133
05:30 PM	0	64	0	0	64	1	0	1	3	5	8	38	0	0	46	10	0	0	5	15	130
05:45 PM	0	57	0	0	57	1	0	0	0	1	8	27	0	0	35	8	0	0	3	11	104
Total	0	269	0	7	276	3	0	1	4	8	58	138	0	2	198	42	0	0	9	51	533
Grand Total	0	593	0	22	615	11	0	1	6	18	138	301	0	6	445	123	0	0	18	141	1219
Apprch %	0	96.4	0	3.6		61.1	0	5.6	33.3		31	67.6	0	1.3		87.2	0	0	12.8		
Total %	0	48.6	0	1.8	50.5	0.9	0	0.1	0.5	1.5	11.3	24.7	0	0.5	36.5	10.1	0	0	1.5	11.6	
PCs and Peds																					
% PCs and Peds	0	96.1	0	95.5	96.1	90.9	0	100	100	94.4	100	97	0	83.3	97.8	99.2	0	0	100	99.3	97
HVs / Busses																					
% HVs / Busses	0	3.9	0	0	3.7	0	0	0	0	0	0	3	0	0	2	0.8	0	0	0	0.7	2.7
Bicycles	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	3
% Bicycles	0	0	0	4.5	0.2	9.1	0	0	0	5.6	0	0	0	16.7	0.2	0	0	0	0	0	0.2

Start Time	Dwight From North					Bond From East					Dwight From South					Bond From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

04:00 PM	0	90	0	4	94	0	0	0	0	0	16	35	0	1	52	19	0	0	2	21	167
04:15 PM	0	67	0	1	68	4	0	0	1	5	20	49	0	0	69	17	0	0	3	20	162
04:30 PM	0	81	0	4	85	1	0	0	1	2	28	38	0	2	68	23	0	0	3	26	181
04:45 PM	0	86	0	6	92	3	0	0	0	3	16	41	0	1	58	22	0	0	1	23	176
Total Volume	0	324	0	15	339	8	0	0	2	10	80	163	0	4	247	81	0	0	9	90	686
% App. Total	0	95.6	0	4.4		80	0	0	20		32.4	66	0	1.6		90	0	0	10		
PHF	.000	.900	.000	.625	.902	.500	.000	.000	.500	.500	.714	.832	.000	.500	.895	.880	.000	.000	.750	.865	.948



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PO Box 468

Belchertown, Massachusetts

www.innovativedata.com or 1.413.668.5094

N / S: Dwight Street

E / W: Bond Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ Bond

Site Code : 12

Start Date : 12/5/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Dwight From North					Bond From East					Dwight From South					Bond From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
04:00 PM	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6
04:15 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	6
04:30 PM	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	6
04:45 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3
Total	0	14	0	0	14	0	0	0	0	0	0	6	0	0	6	1	0	0	0	1	0	21
05:00 PM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4
05:15 PM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3
05:30 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:45 PM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	9	0	0	9	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	12
Grand Total	0	23	0	0	23	0	0	0	0	0	0	9	0	0	9	1	0	0	0	1	0	33
Apprch %	0	100	0	0		0	0	0	0		0	100	0	0		100	0	0	0		0	
Total %	0	69.7	0	0	69.7	0	0	0	0	0	0	27.3	0	0	27.3	3	0	0	0	3	0	

Start Time	Dwight From North					Bond From East					Dwight From South					Bond From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total		
04:00 PM	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6
04:15 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	6
04:30 PM	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	6
04:45 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3
Total Volume	0	14	0	0	14	0	0	0	0	0	0	6	0	0	6	1	0	0	0	1	0	21
% App. Total	0	100	0	0		0	0	0	0		0	100	0	0		100	0	0	0		0	
PHF	.000	.700	.000	.000	.700	.000	.000	.000	.000	.000	.000	.750	.000	.000	.750	.250	.000	.000	.000	.250	0	.875

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Dwight Street

E / W: I-291 WB Ramps

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ I-291 EB Ramps (Turns)

Site Code : 14

Start Date : 12/5/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Dwight From North					I-291 EB On Ramp From East					Dwight From South					I-291 EB Off Ramp From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	0	1	0	1	0	0	0	0	0	70	0	0	0	70	20	0	16	2	38	109
04:15 PM	0	0	0	0	0	0	0	0	0	0	66	0	0	0	66	27	0	19	4	50	116
04:30 PM	0	0	2	0	2	0	0	0	0	0	103	0	0	0	103	19	0	9	1	29	134
04:45 PM	0	0	3	0	3	0	0	0	0	0	82	0	0	0	82	20	0	7	1	28	113
Total	0	0	6	0	6	0	0	0	0	0	321	0	0	0	321	86	0	51	8	145	472
05:00 PM	0	0	5	0	5	0	0	0	0	0	95	0	0	0	95	12	0	11	1	24	124
05:15 PM	0	0	1	0	1	0	0	0	0	0	65	0	0	0	65	24	0	6	3	33	99
05:30 PM	0	0	1	0	1	0	0	0	0	0	57	0	0	0	57	16	0	16	0	32	90
05:45 PM	0	0	1	0	1	0	0	0	0	0	40	0	0	0	40	13	0	8	0	21	62
Total	0	0	8	0	8	0	0	0	0	0	257	0	0	0	257	65	0	41	4	110	375
Grand Total	0	0	14	0	14	0	0	0	0	0	578	0	0	0	578	151	0	92	12	255	847
Apprch %	0	0	100	0		0	0	0	0		100	0	0	0		59.2	0	36.1	4.7		
Total %	0	0	1.7	0	1.7	0	0	0	0	0	68.2	0	0	0	68.2	17.8	0	10.9	1.4	30.1	
PCs and Peds																					
% PCs and Peds	0	0	100	0	100	0	0	0	0	0	99.3	0	0	0	99.3	99.3	0	100	100	99.6	99.4
HVs / Busses																					
% HVs / Busses	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0.7	0.7	0	0	0	0.4	0.6
Bicycles																					
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Time	Dwight From North					I-291 EB On Ramp From East					Dwight From South					I-291 EB Off Ramp From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	0	0	0	0	0	0	0	0	0	66	0	0	0	66	27	0	19	4	50	116
04:30 PM	0	0	2	0	2	0	0	0	0	0	103	0	0	0	103	19	0	9	1	29	134
04:45 PM	0	0	3	0	3	0	0	0	0	0	82	0	0	0	82	20	0	7	1	28	113
05:00 PM	0	0	5	0	5	0	0	0	0	0	95	0	0	0	95	12	0	11	1	24	124
Total Volume	0	0	10	0	10	0	0	0	0	0	346	0	0	0	346	78	0	46	7	131	487
% App. Total	0	0	100	0		0	0	0	0		100	0	0	0		59.5	0	35.1	5.3		
PHF	.000	.000	.500	.000	.500	.000	.000	.000	.000	.000	.840	.000	.000	.000	.840	.722	.000	.605	.438	.655	.909



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N / S: Dwight Street

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City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ I-291 EB Ramps (Turns)

Site Code : 14

Start Date : 12/5/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Dwight From North					I-291 EB On Ramp From East					Dwight From South					I-291 EB Off Ramp From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
04:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	1
04:30 PM	0	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	0
Total	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	1	0	0	0	0	1	3
05:00 PM	0	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	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	2
Grand Total	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	1	0	0	0	0	1	5
Apprch %	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	100	0	0	0	0	0	0
Total %	0	0	0	0	0	0	0	0	0	0	80	0	0	0	80	20	0	0	0	20	0	0

Start Time	Dwight From North					I-291 EB On Ramp From East					Dwight From South					I-291 EB Off Ramp From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 04:00 PM																						
04:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	2
04:30 PM	0	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	0
Total Volume	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	1	0	0	0	0	1	3
% App. Total	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	100	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.000	.000	.000	.500	.250	.000	.000	.000	.250	.375	



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Dwight Street

E / W: I-291 WB Ramps

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ I-291 WB Ramps

Site Code : 13

Start Date : 12/5/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Dwight From North					I-291 WB Off Ramp From East					Dwight From South					I-291 WB On Ramp From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	5	95	0	0	100	11	0	59	0	70	0	49	55	0	104	0	0	0	2	2	276
04:15 PM	9	62	1	0	72	17	0	48	3	68	0	43	51	0	94	0	0	0	1	1	235
04:30 PM	15	89	1	0	105	19	0	98	0	117	0	47	66	0	113	0	0	0	1	1	336
04:45 PM	10	108	0	0	118	16	0	46	0	62	0	45	54	0	99	0	0	0	1	1	280
Total	39	354	2	0	395	63	0	251	3	317	0	184	226	0	410	0	0	0	5	5	1127
05:00 PM	3	97	1	0	101	15	0	55	1	71	0	50	53	0	103	0	0	0	1	1	276
05:15 PM	4	54	0	0	58	14	1	58	1	74	0	33	47	0	80	0	0	0	1	1	213
05:30 PM	4	63	0	0	67	19	0	39	0	58	0	23	28	0	51	0	0	0	0	0	176
05:45 PM	0	72	0	0	72	14	0	33	0	47	0	22	32	0	54	0	0	0	0	0	173
Total	11	286	1	0	298	62	1	185	2	250	0	128	160	0	288	0	0	0	2	2	838
Grand Total	50	640	3	0	693	125	1	436	5	567	0	312	386	0	698	0	0	0	7	7	1965
Apprch %	7.2	92.4	0.4	0		22	0.2	76.9	0.9		0	44.7	55.3	0		0	0	0	100		
Total %	2.5	32.6	0.2	0	35.3	6.4	0.1	22.2	0.3	28.9	0	15.9	19.6	0	35.5	0	0	0	0.4	0.4	
PCs and Peds																					
% PCs and Peds	100	96.4	100	0	96.7	96	100	96.6	100	96.5	0	98.1	99.7	0	99	0	0	0	100	100	97.5
HVs / Busses																					
% HVs / Busses	0	3.6	0	0	3.3	4	0	3.4	0	3.5	0	1.9	0.3	0	1	0	0	0	0	0	2.5
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Time	Dwight From North					I-291 WB Off Ramp From East					Dwight From South					I-291 WB On Ramp From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	5	95	0	0	100	11	0	59	0	70	0	49	55	0	104	0	0	0	2	2	276
04:15 PM	9	62	1	0	72	17	0	48	3	68	0	43	51	0	94	0	0	0	1	1	235
04:30 PM	15	89	1	0	105	19	0	98	0	117	0	47	66	0	113	0	0	0	1	1	336
04:45 PM	10	108	0	0	118	16	0	46	0	62	0	45	54	0	99	0	0	0	1	1	280
Total Volume	39	354	2	0	395	63	0	251	3	317	0	184	226	0	410	0	0	0	5	5	1127
% App. Total	9.9	89.6	0.5	0		19.9	0	79.2	0.9		0	44.9	55.1	0		0	0	0	100		
PHF	.650	.819	.500	.000	.837	.829	.000	.640	.250	.677	.000	.939	.856	.000	.907	.000	.000	.000	.625	.625	.839



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Belchertown, Massachusetts

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N / S: Dwight Street

E / W: I-291 WB Ramps

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ I-291 WB Ramps

Site Code : 13

Start Date : 12/5/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Dwight From North					I-291 WB Off Ramp From East					Dwight From South					I-291 WB On Ramp From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
04:00 PM	0	4	0	0	4	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	6
04:15 PM	0	4	0	0	4	3	0	2	0	5	0	1	0	0	1	0	0	0	0	0	0	10
04:30 PM	0	4	0	0	4	1	0	4	0	5	0	1	0	0	1	0	0	0	0	0	0	10
04:45 PM	0	2	0	0	2	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	6
Total	0	14	0	0	14	4	0	11	0	15	0	3	0	0	3	0	0	0	0	0	0	32
05:00 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	5
05:15 PM	0	1	0	0	1	1	0	2	0	3	0	1	1	0	2	0	0	0	0	0	0	6
05:30 PM	0	2	0	0	2	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	4
05:45 PM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	9	0	0	9	1	0	4	0	5	0	3	1	0	4	0	0	0	0	0	0	18
Grand Total	0	23	0	0	23	5	0	15	0	20	0	6	1	0	7	0	0	0	0	0	0	50
Apprch %	0	100	0	0		25	0	75	0		0	85.7	14.3	0		0	0	0	0	0		
Total %	0	46	0	0	46	10	0	30	0	40	0	12	2	0	14	0	0	0	0	0		

Start Time	Dwight From North					I-291 WB Off Ramp From East					Dwight From South					I-291 WB On Ramp From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total		
04:00 PM	0	4	0	0	4	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	6
04:15 PM	0	4	0	0	4	3	0	2	0	5	0	1	0	0	1	0	0	0	0	0	0	10
04:30 PM	0	4	0	0	4	1	0	4	0	5	0	1	0	0	1	0	0	0	0	0	0	10
04:45 PM	0	2	0	0	2	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	6
Total Volume	0	14	0	0	14	4	0	11	0	15	0	3	0	0	3	0	0	0	0	0	0	32
% App. Total	0	100	0	0		26.7	0	73.3	0		0	100	0	0		0	0	0	0	0		
PHF	.000	.875	.000	.000	.875	.333	.000	.688	.000	.750	.000	.750	.000	.000	.750	.000	.000	.000	.000	.000	.000	.800

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM



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PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Dwight Street
 E / W: Congress Street
 City, State: Springfield, Massachusetts
 Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ Congress
 Site Code : 15
 Start Date : 12/5/2012
 Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Dwight From North						Congress From East					Dwight From South					Congress From West					Int. Total	
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
04:00 PM	23	123	13	10	1	170	58	32	9	0	99	0	43	3	0	46	18	11	27	0	56	371	
04:15 PM	23	107	14	4	3	151	47	24	7	2	80	2	60	5	0	67	14	12	31	1	58	356	
04:30 PM	20	124	16	7	0	167	80	26	6	0	112	3	73	3	0	79	10	16	46	0	72	430	
04:45 PM	18	109	10	7	3	147	48	24	8	1	81	2	67	5	0	74	8	15	37	2	62	364	
Total	84	463	53	28	7	635	233	106	30	3	372	7	243	16	0	266	50	54	141	3	248	1521	
05:00 PM	11	107	9	6	2	135	50	29	11	1	91	0	77	4	0	81	13	8	45	0	66	373	
05:15 PM	14	102	23	5	2	146	44	22	6	1	73	1	59	1	0	61	5	8	38	1	52	332	
05:30 PM	17	98	7	5	2	129	36	21	11	0	68	1	48	0	1	50	7	9	18	1	35	282	
05:45 PM	13	89	9	4	1	116	36	16	5	0	57	1	26	1	2	30	8	3	16	0	27	230	
Total	55	396	48	20	7	526	166	88	33	2	289	3	210	6	3	222	33	28	117	2	180	1217	
Grand Total	139	859	101	48	14	1161	399	194	63	5	661	10	453	22	3	488	83	82	258	5	428	2738	
Apprch %	12	74	8.7	4.1	1.2		60.4	29.3	9.5	0.8		2	92.8	4.5	0.6		19.4	19.2	60.3	1.2			
Total %	5.1	31.4	3.7	1.8	0.5	42.4	14.6	7.1	2.3	0.2	24.1	0.4	16.5	0.8	0.1	17.8	3	3	9.4	0.2	15.6		
PCs and Peds	138	842	101	48	14	1143	398	192	63	5	658	10	452	21	3	486	83	81	258	5	427	2714	
% PCs and Peds	99.3	98	100	100	100	98.4	99.7	99	100	100	99.5	100	99.8	95.5	100	99.6	100	98.8	100	100	99.8	99.1	
HVs / Busses	1	17	0	0	0	18	1	2	0	0	3	0	1	1	0	2	0	1	0	0	0	1	24
% HVs / Busses	0.7	2	0	0	0	1.6	0.3	1	0	0	0.5	0	0.2	4.5	0	0.4	0	1.2	0	0	0	0.2	0.9
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Time	Dwight From North						Congress From East					Dwight From South					Congress From West					Int. Total
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM

04:15 PM	23	107	14	4	3	151	47	24	7	2	80	2	60	5	0	67	14	12	31	1	58	356
04:30 PM	20	124	16	7	0	167	80	26	6	0	112	3	73	3	0	79	10	16	46	0	72	430
04:45 PM	18	109	10	7	3	147	48	24	8	1	81	2	67	5	0	74	8	15	37	2	62	364
05:00 PM	11	107	9	6	2	135	50	29	11	1	91	0	77	4	0	81	13	8	45	0	66	373
Total Volume	72	447	49	24	8	600	225	103	32	4	364	7	277	17	0	301	45	51	159	3	258	1523
% App. Total	12	74.5	8.2	4	1.3		61.8	28.3	8.8	1.1		2.3	92	5.6	0		17.4	19.8	61.6	1.2		
PHF	.783	.901	.766	.857	.667	.898	.703	.888	.727	.500	.813	.583	.899	.850	.000	.929	.804	.797	.864	.375	.896	.885



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovatedata.com or 1.413.668.5094

N / S: Dwight Street

E / W: Congress Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ Congress

Site Code : 15

Start Date : 12/5/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Dwight From North						Congress From East					Dwight From South					Congress From West					Int. Total	
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1
04:15 PM	0	5	0	0	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
04:30 PM	0	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0
04:45 PM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	11	0	0	0	11	0	1	0	0	1	0	1	1	0	2	0	1	0	0	1	1	15
05:00 PM	0	2	0	0	0	2	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	0	0
05:30 PM	1	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
05:45 PM	0	2	0	0	0	2	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4
Total	1	6	0	0	0	7	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	9
Grand Total	1	17	0	0	0	18	1	2	0	0	3	0	1	1	0	2	0	1	0	0	1	1	24
Apprch %	5.6	94.4	0	0	0		33.3	66.7	0	0		0	50	50	0		0	100	0	0			
Total %	4.2	70.8	0	0	0	75	4.2	8.3	0	0	12.5	0	4.2	4.2	0	8.3	0	4.2	0	0	4.2		

Start Time	Dwight From North						Congress From East					Dwight From South					Congress From West					Int. Total	
	Right	Thru	Left	U Turns	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
04:15 PM	0	5	0	0	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6
04:30 PM	0	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	4
04:45 PM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
05:00 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	13	0	0	0	13	0	1	0	0	1	0	1	0	0	1	0	1	0	0	1	1	16
% App. Total	0	100	0	0	0		0	100	0	0		0	100	0	0		0	100	0	0			
PHF	.000	.650	.000	.000	.000	.650	.000	.250	.000	.000	.250	.000	.250	.000	.000	.250	.000	.250	.000	.000	.250	.667	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM



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PO Box 468

Belchertown, Massachusetts

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N / S: Dwight Street

E / W: Liberty Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ Liberty

Site Code : 16

Start Date : 12/5/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Dwight From North					Liberty From East					Dwight From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	22	114	9	1	146	13	59	71	0	143	0	0	0	5	5	26	43	32	4	105	399
04:15 PM	19	111	10	3	143	17	64	67	1	149	0	0	0	3	3	19	41	36	3	99	394
04:30 PM	23	110	8	2	143	25	59	80	0	164	0	0	0	11	11	20	36	52	0	108	426
04:45 PM	11	109	8	1	129	20	38	79	1	138	0	0	0	3	3	22	33	48	1	104	374
Total	75	444	35	7	561	75	220	297	2	594	0	0	0	22	22	87	153	168	8	416	1593
05:00 PM	12	108	8	1	129	20	41	79	0	140	0	0	0	13	13	23	50	54	4	131	413
05:15 PM	14	104	6	4	128	18	34	74	1	127	0	0	0	4	4	14	27	36	0	77	336
05:30 PM	13	78	11	7	109	4	29	62	3	98	0	0	0	6	6	10	25	35	0	70	283
05:45 PM	14	83	7	1	105	8	41	77	0	126	0	0	0	1	1	6	22	23	2	53	285
Total	53	373	32	13	471	50	145	292	4	491	0	0	0	24	24	53	124	148	6	331	1317
Grand Total	128	817	67	20	1032	125	365	589	6	1085	0	0	0	46	46	140	277	316	14	747	2910
Apprch %	12.4	79.2	6.5	1.9		11.5	33.6	54.3	0.6		0	0	0	100		18.7	37.1	42.3	1.9		
Total %	4.4	28.1	2.3	0.7	35.5	4.3	12.5	20.2	0.2	37.3	0	0	0	1.6	1.6	4.8	9.5	10.9	0.5	25.7	
PCs and Peds																					
% PCs and Peds	89.8	98.4	97	100	97.3	99.2	96.7	98.8	100	98.2	0	0	0	100	100	97.1	95.7	99.1	100	97.5	97.7
HVs / Busses																					
% HVs / Busses	10.2	1.5	1.5	0	2.5	0.8	3	1.2	0	1.8	0	0	0	0	0	2.9	4.3	0.6	0	2.4	2.2
Bicycles	0	1	1	0	2	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	4
% Bicycles	0	0.1	1.5	0	0.2	0	0.3	0	0	0.1	0	0	0	0	0	0	0	0.3	0	0.1	0.1

Start Time	Dwight From North					Liberty From East					Dwight From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM

04:15 PM	19	111	10	3	143	17	64	67	1	149	0	0	0	3	3	19	41	36	3	99	394
04:30 PM	23	110	8	2	143	25	59	80	0	164	0	0	0	11	11	20	36	52	0	108	426
04:45 PM	11	109	8	1	129	20	38	79	1	138	0	0	0	3	3	22	33	48	1	104	374
05:00 PM	12	108	8	1	129	20	41	79	0	140	0	0	0	13	13	23	50	54	4	131	413
Total Volume	65	438	34	7	544	82	202	305	2	591	0	0	0	30	30	84	160	190	8	442	1607
% App. Total	11.9	80.5	6.2	1.3		13.9	34.2	51.6	0.3		0	0	0	100		19	36.2	43	1.8		
PHF	.707	.986	.850	.583	.951	.820	.789	.953	.500	.901	.000	.000	.000	.577	.577	.913	.800	.880	.500	.844	.943



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Dwight Street
 E / W: Liberty Street
 City, State: Springfield, Massachusetts
 Client: Alfred Benesch & Company

File Name : PM Peak - Dwight @ Liberty
 Site Code : 16
 Start Date : 12/5/2012
 Page No : 1

Groups Printed- HVs / Busses

Start Time	Dwight From North					Liberty From East					Dwight From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	1	1	0	0	2	0	3	2	0	5	0	0	0	0	0	1	3	0	0	4	11
04:15 PM	3	4	1	0	8	1	0	1	0	2	0	0	0	0	0	0	2	2	0	4	14
04:30 PM	1	3	0	0	4	0	3	1	0	4	0	0	0	0	0	1	1	0	0	2	10
04:45 PM	3	1	0	0	4	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	6
Total	8	9	1	0	18	1	6	5	0	12	0	0	0	0	0	2	7	2	0	11	41
05:00 PM	1	1	0	0	2	0	2	1	0	3	0	0	0	0	0	1	2	0	0	3	8
05:15 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	2
05:30 PM	2	2	0	0	4	0	1	0	0	1	0	0	0	0	0	1	1	0	0	2	7
05:45 PM	2	0	0	0	2	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	5
Total	5	3	0	0	8	0	5	2	0	7	0	0	0	0	0	2	5	0	0	7	22
Grand Total	13	12	1	0	26	1	11	7	0	19	0	0	0	0	0	4	12	2	0	18	63
Apprch %	50	46.2	3.8	0		5.3	57.9	36.8	0		0	0	0	0		22.2	66.7	11.1	0		
Total %	20.6	19	1.6	0	41.3	1.6	17.5	11.1	0	30.2	0	0	0	0	0	6.3	19	3.2	0	28.6	

Start Time	Dwight From North					Liberty From East					Dwight From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	
04:00 PM	1	1	0	0	2	0	3	2	0	5	0	0	0	0	0	1	3	0	0	4	11
04:15 PM	3	4	1	0	8	1	0	1	0	2	0	0	0	0	0	0	2	2	0	4	14
04:30 PM	1	3	0	0	4	0	3	1	0	4	0	0	0	0	0	1	1	0	0	2	10
04:45 PM	3	1	0	0	4	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	6
Total Volume	8	9	1	0	18	1	6	5	0	12	0	0	0	0	0	2	7	2	0	11	41
% App. Total	44.4	50	5.6	0		8.3	50	41.7	0		0	0	0	0		18.2	63.6	18.2	0		
PHF	.667	.563	.250	.000	.563	.250	.500	.625	.000	.600	.000	.000	.000	.000	.000	.500	.583	.250	.000	.688	.732

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Chestnut Street

E / W: Congress Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Chestnut @ Congress

Site Code : 17

Start Date : 12/5/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Chestnut From North					From East					Chestnut From South					Congress From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	13	99	0	24	136	0	0	0	0	0	0	224	47	1	272	10	0	19	1	30	438
04:15 PM	29	95	0	29	153	0	0	0	0	0	0	178	34	2	214	12	0	18	5	35	402
04:30 PM	15	96	0	30	141	0	0	2	0	2	0	217	32	0	249	22	0	17	3	42	434
04:45 PM	23	103	0	29	155	0	0	0	0	0	0	179	38	3	220	15	0	16	1	32	407
Total	80	393	0	112	585	0	0	2	0	2	0	798	151	6	955	59	0	70	10	139	1681
05:00 PM	22	109	0	37	168	0	0	0	1	1	2	225	37	1	265	11	0	12	5	28	462
05:15 PM	24	86	0	24	134	0	0	0	0	0	0	178	30	1	209	16	0	13	6	35	378
05:30 PM	16	76	0	15	107	0	0	0	0	0	0	135	31	4	170	8	0	7	6	21	298
05:45 PM	18	87	0	18	123	0	0	0	0	0	0	141	29	1	171	9	0	10	1	20	314
Total	80	358	0	94	532	0	0	0	1	1	2	679	127	7	815	44	0	42	18	104	1452
Grand Total	160	751	0	206	1117	0	0	2	1	3	2	1477	278	13	1770	103	0	112	28	243	3133
Apprch %	14.3	67.2	0	18.4		0	0	66.7	33.3		0.1	83.4	15.7	0.7		42.4	0	46.1	11.5		
Total %	5.1	24	0	6.6	35.7	0	0	0.1	0	0.1	0.1	47.1	8.9	0.4	56.5	3.3	0	3.6	0.9	7.8	
PCs and Peds												1436									
% PCs and Peds	97.5	97.7	0	100	98.1	0	0	100	100	100	100	97.2	98.9	100	97.5	93.2	0	98.2	100	96.3	97.6
HVs / Busses																					
% HVs / Busses	2.5	2.3	0	0	1.9	0	0	0	0	0	0	2.8	1.1	0	2.5	6.8	0	1.8	0	3.7	2.4
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Time	Chestnut From North					From East					Chestnut From South					Congress From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	29	95	0	29	153	0	0	0	0	0	0	178	34	2	214	12	0	18	5	35	402
04:30 PM	15	96	0	30	141	0	0	2	0	2	0	217	32	0	249	22	0	17	3	42	434
04:45 PM	23	103	0	29	155	0	0	0	0	0	0	179	38	3	220	15	0	16	1	32	407
05:00 PM	22	109	0	37	168	0	0	0	1	1	2	225	37	1	265	11	0	12	5	28	462
Total Volume	89	403	0	125	617	0	0	2	1	3	2	799	141	6	948	60	0	63	14	137	1705
% App. Total	14.4	65.3	0	20.3		0	0	66.7	33.3		0.2	84.3	14.9	0.6		43.8	0	46	10.2		
PHF	.767	.924	.000	.845	.918	.000	.000	.250	.250	.375	.250	.888	.928	.500	.894	.682	.000	.875	.700	.815	.923



Innovative Data, LLC

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Belchertown, Massachusetts

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N / S: Chestnut Street

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City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Chestnut @ Congress

Site Code : 17

Start Date : 12/5/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Chestnut From North					From East					Chestnut From South					Congress From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	5	0	0	5	0	0	0	0	0	0	13	1	0	14	1	0	1	0	2	21
04:15 PM	0	3	0	0	3	0	0	0	0	0	0	6	0	0	6	1	0	0	0	1	10
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	8	1	0	9	2	0	0	0	2	12
04:45 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	5
Total	0	11	0	0	11	0	0	0	0	0	0	28	2	0	30	5	0	2	0	7	48
05:00 PM	1	1	0	0	2	0	0	0	0	0	0	4	0	0	4	1	0	0	0	1	7
05:15 PM	0	2	0	0	2	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	6
05:30 PM	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	5
05:45 PM	3	2	0	0	5	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	8
Total	4	6	0	0	10	0	0	0	0	0	0	13	1	0	14	2	0	0	0	2	26
Grand Total	4	17	0	0	21	0	0	0	0	0	0	41	3	0	44	7	0	2	0	9	74
Apprch %	19	81	0	0		0	0	0	0	0	0	93.2	6.8	0		77.8	0	22.2	0		
Total %	5.4	23	0	0	28.4	0	0	0	0	0	0	55.4	4.1	0	59.5	9.5	0	2.7	0	12.2	

Start Time	Chestnut From North					From East					Chestnut From South					Congress From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	
04:00 PM	0	5	0	0	5	0	0	0	0	0	0	13	1	0	14	1	0	1	0	2	21
04:15 PM	0	3	0	0	3	0	0	0	0	0	0	6	0	0	6	1	0	0	0	1	10
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	8	1	0	9	2	0	0	0	2	12
04:45 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	5
Total Volume	0	11	0	0	11	0	0	0	0	0	0	28	2	0	30	5	0	2	0	7	48
% App. Total	0	100	0	0		0	0	0	0	0	0	93.3	6.7	0		71.4	0	28.6	0		
PHF	.000	.550	.000	.000	.550	.000	.000	.000	.000	.000	.000	.538	.500	.000	.536	.625	.000	.500	.000	.875	.571

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM



Innovative Data, LLC

PO Box 468

Belchertown, Massachusetts

www.innovativedatallc.com or 1.413.668.5094

N / S: Chestnut Street

E / W: Liberty Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Chestnut @ Liberty

Site Code : 18

Start Date : 12/5/2012

Page No : 1

Groups Printed- PCs and Peds - HVs / Busses - Bicycles

Start Time	Chestnut From North					Liberty From East					Chestnut From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	56	0	53	3	112	53	44	0	6	103	45	171	35	6	257	0	34	16	3	53	525
04:15 PM	55	0	55	12	122	45	55	0	10	110	27	149	36	1	213	0	43	8	1	52	497
04:30 PM	59	0	58	5	122	46	56	0	4	106	28	165	42	5	240	0	30	10	4	44	512
04:45 PM	63	0	50	4	117	48	39	0	4	91	23	141	25	1	190	0	29	7	0	36	434
Total	233	0	216	24	473	192	194	0	24	410	123	626	138	13	900	0	136	41	8	185	1968
05:00 PM	70	0	61	1	132	37	35	0	2	74	29	178	32	2	241	0	33	17	1	51	498
05:15 PM	61	0	55	3	119	35	41	0	3	79	20	145	23	5	193	0	25	6	4	35	426
05:30 PM	51	0	36	2	89	25	32	0	16	73	12	102	12	2	128	0	28	6	1	35	325
05:45 PM	54	0	41	4	99	32	45	0	5	82	16	90	19	0	125	0	25	6	0	31	337
Total	236	0	193	10	439	129	153	0	26	308	77	515	86	9	687	0	111	35	6	152	1586
Grand Total	469	0	409	34	912	321	347	0	50	718	200	1141	224	22	1587	0	247	76	14	337	3554
Apprch %	51.4	0	44.8	3.7		44.7	48.3	0	7		12.6	71.9	14.1	1.4		0	73.3	22.6	4.2		
Total %	13.2	0	11.5	1	25.7	9	9.8	0	1.4	20.2	5.6	32.1	6.3	0.6	44.7	0	6.9	2.1	0.4	9.5	
PCs and Peds											1121										
% PCs and Peds	97.9	0	97.3	100	97.7	97.5	96.5	0	100	97.2	99	98.2	98.2	100	98.4	0	96	93.4	100	95.5	97.7
HVs / Busses																					
% HVs / Busses	2.1	0	2.7	0	2.3	2.5	3.5	0	0	2.8	1	1.8	1.8	0	1.6	0	4	6.6	0	4.5	2.3
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Time	Chestnut From North					Liberty From East					Chestnut From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	56	0	53	3	112	53	44	0	6	103	45	171	35	6	257	0	34	16	3	53	525
04:15 PM	55	0	55	12	122	45	55	0	10	110	27	149	36	1	213	0	43	8	1	52	497
04:30 PM	59	0	58	5	122	46	56	0	4	106	28	165	42	5	240	0	30	10	4	44	512
04:45 PM	63	0	50	4	117	48	39	0	4	91	23	141	25	1	190	0	29	7	0	36	434
Total Volume	233	0	216	24	473	192	194	0	24	410	123	626	138	13	900	0	136	41	8	185	1968
% App. Total	49.3	0	45.7	5.1		46.8	47.3	0	5.9		13.7	69.6	15.3	1.4		0	73.5	22.2	4.3		
PHF	.925	.000	.931	.500	.969	.906	.866	.000	.600	.932	.683	.915	.821	.542	.875	.000	.791	.641	.500	.873	.937



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N / S: Chestnut Street

E / W: Liberty Street

City, State: Springfield, Massachusetts

Client: Alfred Benesch & Company

File Name : PM Peak - Chestnut @ Liberty

Site Code : 18

Start Date : 12/5/2012

Page No : 1

Groups Printed- HVs / Busses

Start Time	Chestnut From North					Liberty From East					Chestnut From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	1	0	3	0	4	1	4	0	0	5	0	5	1	0	6	0	1	2	0	3	18
04:15 PM	2	0	2	0	4	3	2	0	0	5	0	4	0	0	4	0	3	0	0	3	16
04:30 PM	1	0	2	0	3	1	3	0	0	4	1	7	1	0	9	0	0	1	0	1	17
04:45 PM	2	0	1	0	3	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	5
Total	6	0	8	0	14	5	10	0	0	15	1	16	2	0	19	0	5	3	0	8	56
05:00 PM	2	0	0	0	2	1	0	0	0	1	1	1	0	0	2	0	2	1	0	3	8
05:15 PM	2	0	0	0	2	0	0	0	0	0	0	1	1	0	2	0	1	0	0	1	5
05:30 PM	0	0	1	0	1	1	1	0	0	2	0	1	0	0	1	0	0	1	0	1	5
05:45 PM	0	0	2	0	2	1	1	0	0	2	0	1	1	0	2	0	2	0	0	2	8
Total	4	0	3	0	7	3	2	0	0	5	1	4	2	0	7	0	5	2	0	7	26
Grand Total	10	0	11	0	21	8	12	0	0	20	2	20	4	0	26	0	10	5	0	15	82
Apprch %	47.6	0	52.4	0		40	60	0	0		7.7	76.9	15.4	0		0	66.7	33.3	0		
Total %	12.2	0	13.4	0	25.6	9.8	14.6	0	0	24.4	2.4	24.4	4.9	0	31.7	0	12.2	6.1	0	18.3	

Start Time	Chestnut From North					Liberty From East					Chestnut From South					Liberty From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	
04:00 PM	1	0	3	0	4	1	4	0	0	5	0	5	1	0	6	0	1	2	0	3	18
04:15 PM	2	0	2	0	4	3	2	0	0	5	0	4	0	0	4	0	3	0	0	3	16
04:30 PM	1	0	2	0	3	1	3	0	0	4	1	7	1	0	9	0	0	1	0	1	17
04:45 PM	2	0	1	0	3	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	5
Total Volume	6	0	8	0	14	5	10	0	0	15	1	16	2	0	19	0	5	3	0	8	56
% App. Total	42.9	0	57.1	0		33.3	66.7	0	0		5.3	84.2	10.5	0		0	62.5	37.5	0		
PHF	.750	.000	.667	.000	.875	.417	.625	.000	.000	.750	.250	.571	.500	.000	.528	.000	.417	.375	.000	.667	.778

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM

Innovative Data, LLC

Location: East & West Columbus Avenue
 Location: North of Liberty
 Location: Springfield, Massachusetts
 Client: Alfred Benesch & Company

PO Box 468
 Belchertown, Massachusetts
 innovativedatalc.com or 1.413.668.5094

Start Time	05-Dec-12		Northbound		Southbound		Combined		06-Dec-Thu	Northbound		Southbound		Combined	
	Wed		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00			11	185	9	72	20	257		1	*	1	*	2	*
12:15			10	170	8	60	18	230		*	*	*	*	*	*
12:30			10	138	3	50	13	188		*	*	*	*	*	*
12:45			12	136	8	59	20	195		*	*	*	*	*	*
01:00			4	120	4	56	8	176		*	*	*	*	*	*
01:15			13	124	8	62	21	186		*	*	*	*	*	*
01:30			10	118	8	46	18	164		*	*	*	*	*	*
01:45			9	101	3	53	12	154		*	*	*	*	*	*
02:00			9	145	3	68	12	213		*	*	*	*	*	*
02:15			4	150	4	64	8	214		*	*	*	*	*	*
02:30			4	148	2	69	6	217		*	*	*	*	*	*
02:45			9	141	12	70	21	211		*	*	*	*	*	*
03:00			11	148	7	58	18	206		*	*	*	*	*	*
03:15			10	157	3	64	13	221		*	*	*	*	*	*
03:30			13	143	5	77	18	220		*	*	*	*	*	*
03:45			10	140	8	62	18	202		*	*	*	*	*	*
04:00			5	193	3	84	8	277		*	*	*	*	*	*
04:15			6	188	3	79	9	267		*	*	*	*	*	*
04:30			11	202	3	84	14	286		*	*	*	*	*	*
04:45			8	176	5	70	13	246		*	*	*	*	*	*
05:00			5	287	4	90	9	377		*	*	*	*	*	*
05:15			9	188	7	59	16	247		*	*	*	*	*	*
05:30			9	130	7	48	16	178		*	*	*	*	*	*
05:45			20	132	18	60	38	192		*	*	*	*	*	*
06:00			19	110	15	38	34	148		*	*	*	*	*	*
06:15			19	90	20	30	39	120		*	*	*	*	*	*
06:30			33	63	22	19	55	82		*	*	*	*	*	*
06:45			45	56	25	24	70	80		*	*	*	*	*	*
07:00			42	56	25	19	67	75		*	*	*	*	*	*
07:15			58	60	38	16	96	76		*	*	*	*	*	*
07:30			74	59	52	12	126	71		*	*	*	*	*	*
07:45			84	32	92	12	176	44		*	*	*	*	*	*
08:00			78	46	60	17	138	63		*	*	*	*	*	*
08:15			66	48	69	17	135	65		*	*	*	*	*	*
08:30			82	70	69	10	151	80		*	*	*	*	*	*
08:45			94	43	96	14	190	57		*	*	*	*	*	*
09:00			90	46	58	12	148	58		*	*	*	*	*	*
09:15			86	36	48	10	134	46		*	*	*	*	*	*
09:30			89	29	62	10	151	39		*	*	*	*	*	*
09:45			101	48	47	8	148	56		*	*	*	*	*	*
10:00			105	53	60	10	165	63		*	*	*	*	*	*
10:15			112	30	56	10	168	40		*	*	*	*	*	*
10:30			102	22	48	10	150	32		*	*	*	*	*	*
10:45			98	12	48	9	146	21		*	*	*	*	*	*
11:00			107	27	51	11	158	38		*	*	*	*	*	*
11:15			106	13	44	7	150	20		*	*	*	*	*	*
11:30			107	16	48	3	155	19		*	*	*	*	*	*
11:45			132	13	64	6	196	19		*	*	*	*	*	*
Total			2151	4838	1362	1898	3513	6736		1	0	1	0	2	0
Day Total			6989		3260		10249			1	0	1	0	2	0
% Total			21.0%	47.2%	13.3%	18.5%			50.0%	0.0%	50.0%	0.0%			
Peak			11:00	04:15	08:00	04:15	11:00	04:15							
Vol.			452	853	294	323	659	1176							
P.H.F.			0.856	0.743	0.766	0.897	0.841	0.780							
ADT			ADT 10,240		AADT 10,240										

Innovative Data, LLC

Location: Emery Street
 Location: West of Main
 Location: Springfield, Massachusetts
 Client: Alfred Benesch & Company

PO Box 468
 Belchertown, Massachusetts
 innovativedata LLC or 1.413.668.5094

Start Time	05-Dec-12		Westbound		Eastbound		Combined		06-Dec-Thu	Westbound		Eastbound		Combined	
	Wed		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00			0	10	2	16	2	26	*	*	*	*	*	*	
12:15			1	20	0	8	1	28	*	*	*	*	*	*	
12:30			0	19	0	11	0	30	*	*	*	*	*	*	
12:45			1	9	1	17	2	26	*	*	*	*	*	*	
01:00			0	18	0	15	0	33	*	*	*	*	*	*	
01:15			0	14	0	10	0	24	*	*	*	*	*	*	
01:30			1	8	1	12	2	20	*	*	*	*	*	*	
01:45			0	4	1	10	1	14	*	*	*	*	*	*	
02:00			0	10	0	13	0	23	*	*	*	*	*	*	
02:15			0	7	0	15	0	22	*	*	*	*	*	*	
02:30			0	8	0	10	0	18	*	*	*	*	*	*	
02:45			1	19	0	22	1	41	*	*	*	*	*	*	
03:00			0	12	1	18	1	30	*	*	*	*	*	*	
03:15			0	4	0	6	0	10	*	*	*	*	*	*	
03:30			0	12	1	11	1	23	*	*	*	*	*	*	
03:45			1	6	1	12	2	18	*	*	*	*	*	*	
04:00			1	4	1	14	2	18	*	*	*	*	*	*	
04:15			1	7	0	11	1	18	*	*	*	*	*	*	
04:30			6	20	2	18	8	38	*	*	*	*	*	*	
04:45			0	8	4	18	4	26	*	*	*	*	*	*	
05:00			0	20	1	16	1	36	*	*	*	*	*	*	
05:15			0	10	0	10	0	20	*	*	*	*	*	*	
05:30			4	8	2	7	6	15	*	*	*	*	*	*	
05:45			2	5	1	6	3	11	*	*	*	*	*	*	
06:00			1	16	1	11	2	27	*	*	*	*	*	*	
06:15			0	6	3	5	3	11	*	*	*	*	*	*	
06:30			0	2	3	3	3	5	*	*	*	*	*	*	
06:45			0	2	6	3	6	5	*	*	*	*	*	*	
07:00			2	2	3	7	5	9	*	*	*	*	*	*	
07:15			2	2	6	0	8	2	*	*	*	*	*	*	
07:30			1	6	4	2	5	8	*	*	*	*	*	*	
07:45			8	4	8	3	16	7	*	*	*	*	*	*	
08:00			6	4	14	0	20	4	*	*	*	*	*	*	
08:15			8	2	18	4	26	6	*	*	*	*	*	*	
08:30			5	3	13	4	18	7	*	*	*	*	*	*	
08:45			10	1	13	1	23	2	*	*	*	*	*	*	
09:00			6	2	16	2	22	4	*	*	*	*	*	*	
09:15			14	4	8	1	22	5	*	*	*	*	*	*	
09:30			6	2	11	2	17	4	*	*	*	*	*	*	
09:45			12	1	12	5	24	6	*	*	*	*	*	*	
10:00			4	6	12	1	16	7	*	*	*	*	*	*	
10:15			14	1	18	2	32	3	*	*	*	*	*	*	
10:30			6	4	10	1	16	5	*	*	*	*	*	*	
10:45			8	2	12	3	20	5	*	*	*	*	*	*	
11:00			8	4	11	0	19	4	*	*	*	*	*	*	
11:15			3	2	8	0	11	2	*	*	*	*	*	*	
11:30			8	0	17	4	25	4	*	*	*	*	*	*	
11:45			10	0	16	1	26	1	*	*	*	*	*	*	
Total			161	340	262	371	423	711		0	0	0	0	0	0
Day Total			501		633		1134			0	0	0	0	0	0
% Total			14.2%	30.0%	23.1%	32.7%				0.0%	0.0%	0.0%	0.0%		
Peak			09:00	00:15	08:15	02:15	08:15	04:30							
Vol.			38	66	60	65	89	120							
P.H.F.			0.679	0.825	0.833	0.739	0.856	0.789							
ADT			ADT 1,133		AADT 1,133										

Innovative Data, LLC

Location: Exit 2: I-91SB / 291EB
 Location: to Chestnut Street SB
 Location: Springfield, Massachusetts
 Client: Alfred Benesch & Company

PO Box 468
 Belchertown, Massachusetts
 innovativedata.com or 1.413.668.5094

Start Time	Wed 05-Dec-1		Thu 06-Dec-1		Fri 07-Dec-1		Daily Average	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	5	52	*	*	*	*	5	52
12:15	4	106	*	*	*	*	4	106
12:30	1	90	*	*	*	*	1	90
12:45	3	110	*	*	*	*	3	110
01:00	3	85	*	*	*	*	3	85
01:15	2	83	*	*	*	*	2	83
01:30	6	70	*	*	*	*	6	70
01:45	2	86	*	*	*	*	2	86
02:00	3	78	*	*	*	*	3	78
02:15	4	86	*	*	*	*	4	86
02:30	4	84	*	*	*	*	4	84
02:45	1	94	*	*	*	*	1	94
03:00	1	88	*	*	*	*	1	88
03:15	4	80	*	*	*	*	4	80
03:30	3	98	*	*	*	*	3	98
03:45	4	79	*	*	*	*	4	79
04:00	3	64	*	*	*	*	3	64
04:15	5	62	*	*	*	*	5	62
04:30	3	60	*	*	*	*	3	60
04:45	7	78	*	*	*	*	7	78
05:00	12	76	*	*	*	*	12	76
05:15	7	70	*	*	*	*	7	70
05:30	14	55	*	*	*	*	14	55
05:45	30	66	*	*	*	*	30	66
06:00	35	50	*	*	*	*	35	50
06:15	53	37	*	*	*	*	53	37
06:30	57	42	*	*	*	*	57	42
06:45	92	38	*	*	*	*	92	38
07:00	82	27	*	*	*	*	82	27
07:15	114	21	*	*	*	*	114	21
07:30	140	20	*	*	*	*	140	20
07:45	192	14	*	*	*	*	192	14
08:00	116	32	*	*	*	*	116	32
08:15	158	22	*	*	*	*	158	22
08:30	154	18	*	*	*	*	154	18
08:45	147	27	*	*	*	*	147	27
09:00	117	25	*	*	*	*	117	25
09:15	110	10	*	*	*	*	110	10
09:30	93	14	*	*	*	*	93	14
09:45	94	22	*	*	*	*	94	22
10:00	70	20	*	*	*	*	70	20
10:15	77	9	*	*	*	*	77	9
10:30	82	13	*	*	*	*	82	13
10:45	80	13	*	*	*	*	80	13
11:00	62	9	*	*	*	*	62	9
11:15	62	12	*	*	*	*	62	12
11:30	85	10	*	*	*	*	85	10
11:45	84	1	*	*	*	*	84	1
Total	2487	2406	0	0	0	0	2487	2406
Combined Total	4893		0		0		4893	
Peak	07:45	00:15					07:45	00:15
Vol.	620	391					620	391
P.H.F.	0.807	0.889					0.807	0.889
ADT	ADT 4,890		AADT 4,890					

Innovative Data, LLC

Location: I-91SB / 291 Ramp
 Location: to Chestnut Street SB
 Location: Springfield, Massachusetts
 Client: Alfred Benesch & Company

PO Box 468
 Belchertown, Massachusetts
 innovativedata.com or 1.413.668.5094

Start Time	Wed 05-Dec-1		Thu 06-Dec-1		Fri 07-Dec-1		Daily Average	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	2	28	*	*	*	*	2	28
12:15	1	33	*	*	*	*	1	33
12:30	1	24	*	*	*	*	1	24
12:45	1	14	*	*	*	*	1	14
01:00	0	31	*	*	*	*	0	31
01:15	1	25	*	*	*	*	1	25
01:30	0	19	*	*	*	*	0	19
01:45	0	24	*	*	*	*	0	24
02:00	4	21	*	*	*	*	4	21
02:15	2	21	*	*	*	*	2	21
02:30	1	34	*	*	*	*	1	34
02:45	1	37	*	*	*	*	1	37
03:00	0	22	*	*	*	*	0	22
03:15	0	26	*	*	*	*	0	26
03:30	4	37	*	*	*	*	4	37
03:45	1	35	*	*	*	*	1	35
04:00	1	33	*	*	*	*	1	33
04:15	1	29	*	*	*	*	1	29
04:30	3	21	*	*	*	*	3	21
04:45	4	35	*	*	*	*	4	35
05:00	4	28	*	*	*	*	4	28
05:15	4	15	*	*	*	*	4	15
05:30	3	16	*	*	*	*	3	16
05:45	8	24	*	*	*	*	8	24
06:00	8	16	*	*	*	*	8	16
06:15	17	11	*	*	*	*	17	11
06:30	27	19	*	*	*	*	27	19
06:45	32	7	*	*	*	*	32	7
07:00	34	9	*	*	*	*	34	9
07:15	33	10	*	*	*	*	33	10
07:30	59	4	*	*	*	*	59	4
07:45	75	3	*	*	*	*	75	3
08:00	50	2	*	*	*	*	50	2
08:15	58	3	*	*	*	*	58	3
08:30	41	4	*	*	*	*	41	4
08:45	51	3	*	*	*	*	51	3
09:00	43	5	*	*	*	*	43	5
09:15	34	6	*	*	*	*	34	6
09:30	30	5	*	*	*	*	30	5
09:45	36	0	*	*	*	*	36	0
10:00	20	2	*	*	*	*	20	2
10:15	24	4	*	*	*	*	24	4
10:30	22	2	*	*	*	*	22	2
10:45	27	1	*	*	*	*	27	1
11:00	20	2	*	*	*	*	20	2
11:15	27	3	*	*	*	*	27	3
11:30	26	1	*	*	*	*	26	1
11:45	28	1	*	*	*	*	28	1
Total	869	755	0	0	0	0	869	755
Combined Total	1624		0		0		1624	
Peak	07:30	03:30					07:30	03:30
Vol.	242	134					242	134
P.H.F.	0.807	0.905					0.807	0.905
ADT	ADT 1,623		AADT 1,623					

Innovative Data, LLC

Location: I-291 EB On Ramp
 Location: from Chestnut Street NB
 Location: Springfield, Massachusetts
 Client: Alfred Benesch & Company

PO Box 468
 Belchertown, Massachusetts
 innovativedatalc.com or 1.413.668.5094

Start Time	05-Dec-12		Ramp		Direction 2		Combined		06-Dec-Thu	Ramp		Direction 2		Combined	
	Wed		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00			5	60	0	0	5	60	*	*	*	*	*	*	
12:15			2	66	0	0	2	66	*	*	*	*	*	*	
12:30			5	50	0	0	5	50	*	*	*	*	*	*	
12:45			6	35	0	0	6	35	*	*	*	*	*	*	
01:00			2	43	0	0	2	43	*	*	*	*	*	*	
01:15			3	52	0	0	3	52	*	*	*	*	*	*	
01:30			3	44	0	0	3	44	*	*	*	*	*	*	
01:45			2	60	0	0	2	60	*	*	*	*	*	*	
02:00			6	58	0	0	6	58	*	*	*	*	*	*	
02:15			2	71	0	0	2	71	*	*	*	*	*	*	
02:30			9	67	0	0	9	67	*	*	*	*	*	*	
02:45			0	64	0	0	0	64	*	*	*	*	*	*	
03:00			1	51	0	0	1	51	*	*	*	*	*	*	
03:15			1	69	0	0	1	69	*	*	*	*	*	*	
03:30			1	72	0	0	1	72	*	*	*	*	*	*	
03:45			1	60	0	0	1	60	*	*	*	*	*	*	
04:00			2	82	0	0	2	82	*	*	*	*	*	*	
04:15			1	96	0	0	1	96	*	*	*	*	*	*	
04:30			0	107	0	0	0	107	*	*	*	*	*	*	
04:45			4	87	0	0	4	87	*	*	*	*	*	*	
05:00			4	95	0	0	4	95	*	*	*	*	*	*	
05:15			5	86	0	0	5	86	*	*	*	*	*	*	
05:30			12	55	0	0	12	55	*	*	*	*	*	*	
05:45			7	47	0	0	7	47	*	*	*	*	*	*	
06:00			12	53	0	0	12	53	*	*	*	*	*	*	
06:15			8	38	0	0	8	38	*	*	*	*	*	*	
06:30			18	27	0	0	18	27	*	*	*	*	*	*	
06:45			21	36	0	0	21	36	*	*	*	*	*	*	
07:00			17	29	0	0	17	29	*	*	*	*	*	*	
07:15			14	27	0	0	14	27	*	*	*	*	*	*	
07:30			35	14	0	0	35	14	*	*	*	*	*	*	
07:45			18	20	0	0	18	20	*	*	*	*	*	*	
08:00			30	23	0	0	30	23	*	*	*	*	*	*	
08:15			28	19	0	0	28	19	*	*	*	*	*	*	
08:30			27	36	0	0	27	36	*	*	*	*	*	*	
08:45			45	33	0	0	45	33	*	*	*	*	*	*	
09:00			32	10	0	0	32	10	*	*	*	*	*	*	
09:15			38	22	0	0	38	22	*	*	*	*	*	*	
09:30			41	11	0	0	41	11	*	*	*	*	*	*	
09:45			24	13	0	0	24	13	*	*	*	*	*	*	
10:00			33	11	0	0	33	11	*	*	*	*	*	*	
10:15			42	13	0	0	42	13	*	*	*	*	*	*	
10:30			39	12	0	0	39	12	*	*	*	*	*	*	
10:45			37	8	0	0	37	8	*	*	*	*	*	*	
11:00			52	5	0	0	52	5	*	*	*	*	*	*	
11:15			48	9	0	0	48	9	*	*	*	*	*	*	
11:30			51	6	0	0	51	6	*	*	*	*	*	*	
11:45			26	4	0	0	26	4	*	*	*	*	*	*	
Total			820	2056	0	0	820	2056	0	0	0	0	0	0	
Day Total			2876		0		2876		0		0		0		
% Total			28.5%	71.5%	0.0%	0.0%			0.0%	0.0%	0.0%	0.0%			
Peak			10:45	04:15			10:45	04:15							
Vol.			188	385			188	385							
P.H.F.			0.904	0.900			0.904	0.900							
ADT			ADT 2,874		AADT 2,874										

Innovative Data, LLC

Location: I-91SB / 291 Ramp
 Location: from Bond Street
 Location: Springfield, Massachusetts
 Client: Alfred Benesch & Company

PO Box 468
 Belchertown, Massachusetts
 innovativedatalc.com or 1.413.668.5094

Start Time	05-Dec-12		LT from Bond		RT from Bond		Combined		06-Dec-Thu	LT from Bond		RT from Bond		Combined	
	Wed		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00			5	12	1	12	6	24		*	*	*	*	*	*
12:15			1	26	1	14	2	40		*	*	*	*	*	*
12:30			1	30	2	7	3	37		*	*	*	*	*	*
12:45			1	16	0	12	1	28		*	*	*	*	*	*
01:00			2	29	1	21	3	50		*	*	*	*	*	*
01:15			0	24	0	6	0	30		*	*	*	*	*	*
01:30			0	36	0	10	0	46		*	*	*	*	*	*
01:45			1	20	1	7	2	27		*	*	*	*	*	*
02:00			0	26	3	14	3	40		*	*	*	*	*	*
02:15			2	28	1	6	3	34		*	*	*	*	*	*
02:30			1	35	0	12	1	47		*	*	*	*	*	*
02:45			0	21	0	10	0	31		*	*	*	*	*	*
03:00			2	33	2	10	4	43		*	*	*	*	*	*
03:15			0	37	1	10	1	47		*	*	*	*	*	*
03:30			0	47	4	23	4	70		*	*	*	*	*	*
03:45			0	47	4	16	4	63		*	*	*	*	*	*
04:00			2	71	0	15	2	86		*	*	*	*	*	*
04:15			3	40	1	16	4	56		*	*	*	*	*	*
04:30			6	53	0	23	6	76		*	*	*	*	*	*
04:45			3	57	0	18	3	75		*	*	*	*	*	*
05:00			3	46	0	20	3	66		*	*	*	*	*	*
05:15			6	36	1	18	7	54		*	*	*	*	*	*
05:30			4	23	4	5	8	28		*	*	*	*	*	*
05:45			9	25	1	6	10	31		*	*	*	*	*	*
06:00			9	29	3	9	12	38		*	*	*	*	*	*
06:15			14	29	1	6	15	35		*	*	*	*	*	*
06:30			20	28	7	7	27	35		*	*	*	*	*	*
06:45			17	23	3	5	20	28		*	*	*	*	*	*
07:00			20	19	4	7	24	26		*	*	*	*	*	*
07:15			15	16	2	1	17	17		*	*	*	*	*	*
07:30			20	12	2	5	22	17		*	*	*	*	*	*
07:45			17	18	5	3	22	21		*	*	*	*	*	*
08:00			17	7	2	5	19	12		*	*	*	*	*	*
08:15			14	15	4	2	18	17		*	*	*	*	*	*
08:30			17	11	4	1	21	12		*	*	*	*	*	*
08:45			20	9	2	1	22	10		*	*	*	*	*	*
09:00			27	7	6	2	33	9		*	*	*	*	*	*
09:15			20	9	7	5	27	14		*	*	*	*	*	*
09:30			13	6	9	4	22	10		*	*	*	*	*	*
09:45			25	9	5	1	30	10		*	*	*	*	*	*
10:00			24	5	5	2	29	7		*	*	*	*	*	*
10:15			28	6	6	1	34	7		*	*	*	*	*	*
10:30			17	2	3	2	20	4		*	*	*	*	*	*
10:45			19	4	12	0	31	4		*	*	*	*	*	*
11:00			26	12	9	2	35	14		*	*	*	*	*	*
11:15			16	3	5	2	21	5		*	*	*	*	*	*
11:30			34	12	10	0	44	12		*	*	*	*	*	*
11:45			23	10	5	1	28	11		*	*	*	*	*	*
Total			524	1119	149	385	673	1504		0	0	0	0	0	0
Day Total			1643		534		2177			0		0		0	
% Total			24.1%	51.4%	6.8%	17.7%				0.0%	0.0%	0.0%	0.0%		
Peak			11:00	04:00	10:45	04:30	10:45	04:00							
Vol.			99	221	36	79	131	293							
P.H.F.			0.728	0.778	0.750	0.859	0.744	0.852							
ADT			ADT 2,174		AADT 2,174										

Innovative Data, LLC

Location: Main Street
 Location: b/w Congress & Liberty
 Location: Springfield, Massachusetts
 Client: Alfred Benesch & Company

PO Box 468
 Belchertown, Massachusetts
 innovativedata.com or 1.413.668.5094

Start Time	05-Dec-12 Wed		Southbound		Northbound		Combined		06-Dec-Thu	Southbound		Northbound		Combined	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	12	111	10	92	22	203			1	*	1	*	2	*	
12:15	5	96	11	104	16	200			*	*	*	*	*	*	
12:30	5	80	7	92	12	172			*	*	*	*	*	*	
12:45	7	98	5	80	12	178			*	*	*	*	*	*	
01:00	2	82	9	96	11	178			*	*	*	*	*	*	
01:15	3	77	6	90	9	167			*	*	*	*	*	*	
01:30	11	102	10	86	21	188			*	*	*	*	*	*	
01:45	5	102	4	120	9	222			*	*	*	*	*	*	
02:00	6	117	3	78	9	195			*	*	*	*	*	*	
02:15	3	85	4	90	7	175			*	*	*	*	*	*	
02:30	3	98	5	76	8	174			*	*	*	*	*	*	
02:45	4	97	0	80	4	177			*	*	*	*	*	*	
03:00	4	76	2	82	6	158			*	*	*	*	*	*	
03:15	5	76	3	82	8	158			*	*	*	*	*	*	
03:30	1	92	6	72	7	164			*	*	*	*	*	*	
03:45	5	105	3	83	8	188			*	*	*	*	*	*	
04:00	5	82	4	63	9	145			*	*	*	*	*	*	
04:15	1	94	2	66	3	160			*	*	*	*	*	*	
04:30	10	86	2	86	12	172			*	*	*	*	*	*	
04:45	14	78	6	78	20	156			*	*	*	*	*	*	
05:00	13	90	8	70	21	160			*	*	*	*	*	*	
05:15	9	70	9	51	18	121			*	*	*	*	*	*	
05:30	15	73	20	54	35	127			*	*	*	*	*	*	
05:45	20	68	16	44	36	112			*	*	*	*	*	*	
06:00	31	54	18	58	49	112			*	*	*	*	*	*	
06:15	26	51	18	48	44	99			*	*	*	*	*	*	
06:30	21	46	24	47	45	93			*	*	*	*	*	*	
06:45	45	37	28	42	73	79			*	*	*	*	*	*	
07:00	25	34	22	42	47	76			*	*	*	*	*	*	
07:15	57	28	53	22	110	50			*	*	*	*	*	*	
07:30	61	34	58	32	119	66			*	*	*	*	*	*	
07:45	82	26	63	26	145	52			*	*	*	*	*	*	
08:00	84	36	64	27	148	63			*	*	*	*	*	*	
08:15	83	31	52	30	135	61			*	*	*	*	*	*	
08:30	92	37	67	34	159	71			*	*	*	*	*	*	
08:45	113	33	68	27	181	60			*	*	*	*	*	*	
09:00	90	35	81	30	171	65			*	*	*	*	*	*	
09:15	98	29	74	22	172	51			*	*	*	*	*	*	
09:30	96	31	72	30	168	61			*	*	*	*	*	*	
09:45	92	28	78	22	170	50			*	*	*	*	*	*	
10:00	79	27	70	24	149	51			*	*	*	*	*	*	
10:15	89	16	74	24	163	40			*	*	*	*	*	*	
10:30	103	14	84	13	187	27			*	*	*	*	*	*	
10:45	82	8	78	15	160	23			*	*	*	*	*	*	
11:00	96	14	71	15	167	29			*	*	*	*	*	*	
11:15	93	10	84	13	177	23			*	*	*	*	*	*	
11:30	123	16	96	9	219	25			*	*	*	*	*	*	
11:45	100	6	85	13	185	19			*	*	*	*	*	*	
Total	2029	2816	1637	2580	3666	5396			1	0	1	0	2	0	
Day Total	4845		4217		9062				1	0	1	0	2	0	
% Total	22.4%	31.1%	18.1%	28.5%					50.0%	0.0%	50.0%	0.0%			
Peak	11:00	01:30	11:00	01:00	11:00	01:30									
Vol.	412	406	336	392	748	780									
P.H.F.	0.837	0.868	0.875	0.817	0.854	0.878									
ADT	ADT 9,052		AADT 9,052												

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**Capacity Analyses
2018 No-Build Conditions**

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Lanes, Volumes, Timings
 10: Emery Street & East Columbus Ave.

2018 No-Build PM Peak
 12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	690	26	0	10	0	0	0	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frts					0.995							0.865
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3592	0	0	1900	0	0	0	1644
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3592	0	0	1900	0	0	0	1644
Link Speed (mph)		30			30			30				30
Link Distance (ft)		571			622			64				149
Travel Time (s)		13.0			14.1			1.5				3.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	750	28	0	11	0	0	0	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	778	0	0	11	0	0	0	89
Sign Control		Free			Free			Stop				Stop

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	37.4%
ICU Level of Service	A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 1.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	0	0	0	690	26	0	10	0	0	0	82
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	750	28	0	11	0	0	0	89
Number of Lanes	0	0	0	0	2	0	0	1	0	0	0	1

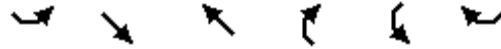
Major/Minor	Major 2			Minor 1			Minor 2		
Conflicting Flow All	0	0	0	375	778	0	769	764	388
Stage 1	-	-	-	0	0	-	764	764	-
Stage 2	-	-	-	375	778	-	5	0	-
Follow-up Headway	-	-	-	3.5	4	Error	3.5	4	3.3
Pot Capacity-1 Maneuver	-	-	-	604	330	-	342	336	616
Stage 1	-	-	-	-	-	-	426	416	-
Stage 2	-	-	-	671	410	-	-	-	-
Time blocked-Platoon, %	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	-	-	-	604	# 0	-	342	0	616
Mov Capacity-2 Maneuver	-	-	-	604	# 0	-	342	0	-
Stage 1	-	-	-	-	# 0	-	426	0	-
Stage 2	-	-	-	671	# 0	-	-	0	-

Approach	NW	NE	SW
HCM Control Delay, s	0	-	11.8
HCM LOS	-	-	B

Minor Lane / Major Mvmt	NELn1	NWL	NWT	NWR	SWLn1
Cap, veh/h	-	-	-	-	616
HCM Control Delay, s	-	0	-	-	11.8
HCM Lane V/C Ratio	-	-	-	-	0.14
HCM Lane LOS	-	A	-	-	B
HCM 95th-tile Q, veh	-	-	-	-	0.5

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↕↑				
Volume (vph)	10	166	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.997				
Satd. Flow (prot)	0	3599	0	0	0	0
Flt Permitted		0.997				
Satd. Flow (perm)	0	3599	0	0	0	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		649	621		64	
Travel Time (s)		14.8	14.1		1.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	180	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	191	0	0	0	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	39.9%			ICU Level of Service A		
Analysis Period (min)	15					

HCM research expects at least one 'Stop' controlled approach at the intersection.



Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	31	321	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1805	1900	0	0	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1805	1900	0	0	0	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		621	401		75	
Travel Time (s)		14.1	9.1		1.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	349	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	34	349	0	0	0	0
Sign Control		Free	Free		Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	72.8%
	ICU Level of Service C
Analysis Period (min)	15

HCM research expects at least one 'Stop' controlled approach at the intersection.



Lane Group	WBL	WBR	WBR2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		RB					↑				↑
Volume (vph)	0	651	228	0	0	0	31	0	0	0	244
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850									0.865
Flt Protected											
Satd. Flow (prot)	0	2842	0	0	0	0	1900	0	0	0	1644
Flt Permitted											
Satd. Flow (perm)	0	2842	0	0	0	0	1900	0	0	0	1644
Link Speed (mph)	30			30			30			30	
Link Distance (ft)	376			622			75			164	
Travel Time (s)	8.5			14.1			1.7			3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	708	248	0	0	0	34	0	0	0	265
Shared Lane Traffic (%)											
Lane Group Flow (vph)	0	956	0	0	0	0	34	0	0	0	265
Sign Control	Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	69.9%
ICU Level of Service	C
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 3.8

Movement	WBL	WBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	651	0	0	0	31	0	0	0	244
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None
Storage Length	0	0	0	0	0	0	0	0	0	0
Median Width	0		0			0			0	
Grade, %	0%		0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	708	0	0	0	34	0	0	0	265
Number of Lanes	0	2	0	0	0	1	0	0	0	1

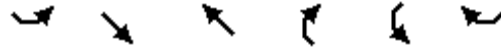
Major/Minor	Minor 1			Minor 2				
Conflicting Flow All	0	0	354	955	0	849	832	477
Stage 1	-	-	0	0	-	832	832	-
Stage 2	-	-	354	955	-	17	0	-
Follow-up Headway	-	-	3.5	4	Error	3.5	4	3.3
Pot Capacity-1 Maneuver	-	-	623	260	-	304	307	540
Stage 1	-	-	-	-	-	393	387	-
Stage 2	-	-	687	339	-	-	-	-
Time blocked-Platoon, %	0	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	-	-	623	# 0	-	304	0	540
Mov Capacity-2 Maneuver	-	-	623	# 0	-	304	0	-
Stage 1	-	-	-	# 0	-	393	0	-
Stage 2	-	-	687	# 0	-	-	0	-

Approach	WB	NE	SW
HCM Control Delay, s	0	-	17.9
HCM LOS	-	-	C

Minor Lane / Major Mvmt	NELn1	WBL	WBR	WBR2SWLn1
Cap, veh/h	-	-	-	540
HCM Control Delay, s	-	0	-	17.9
HCM Lane V/C Ratio	-	-	-	0.49
HCM Lane LOS	-	A	-	C
HCM 95th-tile Q, veh	-	-	-	2.7

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↑↑	↑↑			
Volume (vph)	15	300	433	14	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.995			
Flt Protected		0.998				
Satd. Flow (prot)	0	3603	3592	0	0	0
Flt Permitted		0.998				
Satd. Flow (perm)	0	3603	3592	0	0	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		281	75		932	
Travel Time (s)		6.4	1.7		21.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	326	471	15	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	342	486	0	0	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	22.7%		ICU Level of Service A			
Analysis Period (min)	15					

HCM research expects at least one 'Stop' controlled approach at the intersection.

Lanes, Volumes, Timings
 15: Main Street & Bolyston Street

2018 No-Build PM Peak
 12/28/2012



Lane Group	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Volume (vph)	33	22	352	12	15	369
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.946		0.995			
Flt Protected	0.971					0.998
Satd. Flow (prot)	1745	0	3592	0	0	3603
Flt Permitted	0.971					0.998
Satd. Flow (perm)	1745	0	3592	0	0	3603
Link Speed (mph)	30		30			30
Link Distance (ft)	817		765			376
Travel Time (s)	18.6		17.4			8.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	24	383	13	16	401
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	0	396	0	0	417
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	31.2%
ICU Level of Service	A
Analysis Period (min)	15
Description:	Main Street

Intersection

Intersection Delay, s/veh 1.1

Movement	EBL	EBR	SET	SER	NWL	NWT
Vol, veh/h	33	22	352	12	15	369
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	12		12			12
Grade, %	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	36	24	383	13	16	401
Number of Lanes	1	0	2	0	0	2

Major/Minor	Major 1		Major 2			
Conflicting Flow All	622	198	0	0	396	0
Stage 1	389	-	-	-	-	-
Stage 2	233	-	-	-	-	-
Follow-up Headway	3.5	3.3	-	-	2.2	-
Pot Capacity-1 Maneuver	423	816	-	-	1174	-
Stage 1	660	-	-	-	-	-
Stage 2	790	-	-	-	-	-
Time blocked-Platoon, %	0	0	-	-	0	-
Mov Capacity-1 Maneuver	415	816	-	-	1174	-
Mov Capacity-2 Maneuver	415	-	-	-	-	-
Stage 1	660	-	-	-	-	-
Stage 2	776	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	12.9	0	0.4
HCM LOS	B	-	-

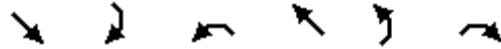
Minor Lane / Major Mvmt	NWL	NWT	EBLn1	SET	SER
Cap, veh/h	1174	-	517	-	-
HCM Control Delay, s	8.11	0.1	12.9	-	-
HCM Lane V/C Ratio	0.01	-	0.12	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th-tile Q, veh	0.0	-	0.4	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lanes, Volumes, Timings
 16: Emery Street & Main Street

2018 No-Build PM Peak
 12/28/2012



Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑			↑↑		↗
Volume (vph)	360	39	0	400	0	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t	0.985					0.865
Flt Protected						
Satd. Flow (prot)	3556	0	0	3610	0	1644
Flt Permitted						
Satd. Flow (perm)	3556	0	0	3610	0	1644
Link Speed (mph)	30			30	30	
Link Distance (ft)	376			238	365	
Travel Time (s)	8.5			5.4	8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	391	42	0	435	0	72
Shared Lane Traffic (%)						
Lane Group Flow (vph)	433	0	0	435	0	72
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	21.9%
	ICU Level of Service A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 0.8

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	360	39	0	400	0	66
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	12			12	0	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	391	42	0	435	0	72
Number of Lanes	2	0	0	2	0	1

Major/Minor	Major 1		Major 2			
Conflicting Flow All	0	0	434	0	630	217
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	217	-
Follow-up Headway	-	-	2.2	-	3.5	3.3
Pot Capacity-1 Maneuver	-	-	1136	-	418	794
Stage 1	-	-	-	-	642	-
Stage 2	-	-	-	-	804	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1136	-	418	794
Mov Capacity-2 Maneuver	-	-	-	-	418	-
Stage 1	-	-	-	-	642	-
Stage 2	-	-	-	-	804	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0	10
HCM LOS	-	-	B

Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	794	1136	-	-	-
HCM Control Delay, s	10	0	-	-	-
HCM Lane V/C Ratio	0.09	-	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th-tile Q, veh	0.3	0.0	-	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lanes, Volumes, Timings
 17: Main Street & Congress Street

2018 No-Build PM Peak
 12/28/2012



Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	115	307	301	24	51	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150			0	0	400
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.989		0.911	
Flt Protected	0.950				0.983	
Satd. Flow (prot)	1805	3610	3570	0	1701	0
Flt Permitted	0.950				0.983	
Satd. Flow (perm)	1805	3610	3570	0	1701	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		238	397		1019	
Travel Time (s)		5.4	9.0		23.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	334	327	26	55	107
Shared Lane Traffic (%)						
Lane Group Flow (vph)	125	334	353	0	162	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	34.3% ICU Level of Service A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 3.5

Movement	SEL	SET	NWT	NWR	SWL	SWR
Vol, veh/h	115	307	301	24	51	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	150			0	0	400
Median Width		12	12		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	125	334	327	26	55	107
Number of Lanes	1	2	2	0	1	0

Major/Minor	Major 1	Major 2				
Conflicting Flow All	353	0	-	0	757	177
Stage 1	-	-	-	-	340	-
Stage 2	-	-	-	-	417	-
Follow-up Headway	2.2	-	-	-	3.5	3.3
Pot Capacity-1 Maneuver	1217	-	-	-	348	842
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	639	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1217	-	-	-	312	842
Mov Capacity-2 Maneuver	-	-	-	-	312	-
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	573	-

Approach	SE	NW	SW
HCM Control Delay, s	2.3	0	14.7
HCM LOS	-	-	B
























Minor Lane / Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Cap, veh/h	-	-	1217	-	532
HCM Control Delay, s	-	-	8.296	-	14.7
HCM Lane V/C Ratio	-	-	0.10	-	0.30
HCM Lane LOS	-	-	A	-	B
HCM 95th-tile Q, veh	-	-	0.3	-	1.3

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lanes, Volumes, Timings
18: Main Street & Liberty Street

2018 No-Build PM Peak
12/28/2012

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	56	224	62	31	194	85	52	196	67	89	145	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	100		100	150		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.968				0.850			0.850		0.955	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3494	0	1805	1900	1615	1805	1900	1615	1805	1814	0
Flt Permitted	0.950			0.950			0.513			0.950		
Satd. Flow (perm)	1805	3494	0	1805	1900	1615	975	1900	1615	1805	1814	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		64				196			196		38	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		397			340			487			993	
Travel Time (s)		9.0			7.7			11.1			22.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	243	67	34	211	92	57	213	73	97	158	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	310	0	34	211	92	57	213	73	97	226	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA	Perm	Split	NA	
Protected Phases	1	6		5	2			4		8	8	
Permitted Phases						2	4		4			
Detector Phase	1	6		5	2	2	4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	8.0	10.0		8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Total Split (s)	8.0	15.0		8.0	15.0	15.0	14.0	14.0	14.0	13.0	13.0	
Total Split (%)	16.0%	30.0%		16.0%	30.0%	30.0%	28.0%	28.0%	28.0%	26.0%	26.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	4.5	19.3		4.5	17.7	17.7	9.2	9.2	9.2	8.4	8.4	
Actuated g/C Ratio	0.09	0.39		0.09	0.35	0.35	0.18	0.18	0.18	0.17	0.17	
v/c Ratio	0.38	0.22		0.21	0.31	0.13	0.32	0.61	0.16	0.32	0.67	
Control Delay	29.2	11.5		24.9	17.3	0.4	22.6	26.7	0.7	21.1	27.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.2	11.5		24.9	17.3	0.4	22.6	26.7	0.7	21.1	27.6	
LOS	C	B		C	B	A	C	C	A	C	C	
Approach Delay		14.4			13.5			20.5			25.6	
Approach LOS		B			B			C			C	
90th %ile Green (s)	4.0	11.0		4.0	11.0	11.0	10.0	10.0	10.0	9.0	9.0	
90th %ile Term Code	Max	Coord		Max	Coord	Coord	Max	Max	Max	Max	Max	
70th %ile Green (s)	4.0	11.0		4.0	11.0	11.0	10.0	10.0	10.0	9.0	9.0	

Lanes, Volumes, Timings
18: Main Street & Liberty Street

2018 No-Build PM Peak
12/28/2012

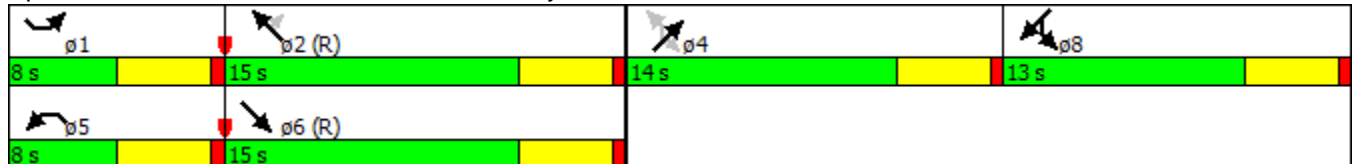


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
70th %ile Term Code	Max	Coord		Max	Coord	Coord	Max	Max	Max	Max	Max	
50th %ile Green (s)	4.0	19.0		0.0	11.0	11.0	10.0	10.0	10.0	9.0	9.0	
50th %ile Term Code	Max	Coord		Skip	Coord	Coord	Max	Max	Max	Max	Max	
30th %ile Green (s)	0.0	20.0		0.0	20.0	20.0	9.1	9.1	9.1	8.9	8.9	
30th %ile Term Code	Skip	Coord		Skip	Coord	Coord	Gap	Gap	Gap	Gap	Gap	
10th %ile Green (s)	0.0	35.7		0.0	35.7	35.7	0.0	0.0	0.0	6.3	6.3	
10th %ile Term Code	Skip	Coord		Skip	Coord	Coord	Skip	Skip	Skip	Gap	Gap	
Stops (vph)	54	163		33	153	0	47	172	0	75	151	
Fuel Used(gal)	1	2		0	2	0	1	3	0	1	4	
CO Emissions (g/hr)	56	171		29	143	16	49	193	18	104	253	
NOx Emissions (g/hr)	11	33		6	28	3	9	38	4	20	49	
VOC Emissions (g/hr)	13	40		7	33	4	11	45	4	24	59	
Dilemma Vehicles (#)	0	0		0	0	0	0	0	0	0	0	
Queue Length 50th (ft)	18	24		10	54	0	14	57	0	25	51	
Queue Length 95th (ft)	#52	60		31	107	2	41	111	0	58	#127	
Internal Link Dist (ft)		317			260			407			913	
Turn Bay Length (ft)	150			150			100		100	150		
Base Capacity (vph)	162	1390		162	674	699	195	380	479	324	357	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.38	0.22		0.21	0.31	0.13	0.29	0.56	0.15	0.30	0.63	

Intersection Summary

Area Type: Other
 Cycle Length: 50
 Actuated Cycle Length: 50
 Offset: 0 (0%), Referenced to phase 2:NWT and 6:SET, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 18.3 Intersection LOS: B
 Intersection Capacity Utilization 42.1% ICU Level of Service A
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 18: Main Street & Liberty Street





Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations			↑			↑
Volume (vph)	0	0	0	0	227	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						0.965
Satd. Flow (prot)	0	0	1900	0	0	1834
Flt Permitted						0.965
Satd. Flow (perm)	0	0	1900	0	0	1834
Link Speed (mph)	30		30			30
Link Distance (ft)	158		156			182
Travel Time (s)	3.6		3.5			4.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	247	90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	337
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	20.3%
	ICU Level of Service A
Analysis Period (min)	15

HCM research expects at least one 'Stop' controlled approach at the intersection.



Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations			↔			↑
Volume (vph)	0	0	10	81	0	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.880			
Flt Protected						
Satd. Flow (prot)	0	0	1672	0	0	1900
Flt Permitted						
Satd. Flow (perm)	0	0	1672	0	0	1900
Link Speed (mph)	30		30			30
Link Distance (ft)	224		140			156
Travel Time (s)	5.1		3.2			3.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	11	88	0	89
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	99	0	0	89
Sign Control	Stop		Free			Free

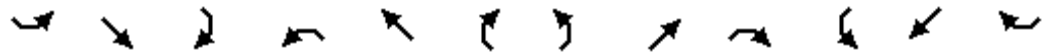
Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	8.9%
	ICU Level of Service A
Analysis Period (min)	15

HCM research expects at least one 'Stop' controlled approach at the intersection.

Lanes, Volumes, Timings
21: Bond Street & Dwight Street

2018 No-Build PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑			↑↑				↑		↑↓	
Volume (vph)	0	332	0	0	167	82	0	0	83	1	0	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t					0.951				0.865		0.866	
Fl _t Protected											0.999	
Satd. Flow (prot)	0	3610	0	0	3433	0	0	0	1644	0	1644	0
Fl _t Permitted											0.999	
Satd. Flow (perm)	0	3610	0	0	3433	0	0	0	1644	0	1644	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		294			555			932			140	
Travel Time (s)		6.7			12.6			21.2			3.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	361	0	0	182	89	0	0	90	1	0	90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	361	0	0	271	0	0	0	90	0	91	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	29.5%
ICU Level of Service	A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 2.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	332	0	0	167	82	0	0	83	1	0	83
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		6			6			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	361	0	0	182	89	0	0	90	1	0	90
Number of Lanes	0	2	0	0	2	0	0	0	1	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	271	0	0	361	0	0	452	632	180	406	587	135
Stage 1	-	-	-	-	-	-	361	361	-	226	226	-
Stage 2	-	-	-	-	-	-	91	271	-	180	361	-
Follow-up Headway	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1304	-	-	1209	-	-	496	400	838	534	425	895
Stage 1	-	-	-	-	-	-	636	629	-	762	721	-
Stage 2	-	-	-	-	-	-	912	689	-	810	629	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1304	-	-	1209	-	-	446	400	838	477	425	895
Mov Capacity-2 Maneuver	-	-	-	-	-	-	446	400	-	477	425	-
Stage 1	-	-	-	-	-	-	636	629	-	762	721	-
Stage 2	-	-	-	-	-	-	820	689	-	723	629	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0	9.8	9.5
HCM LOS	-	-	A	A

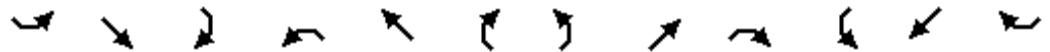
Minor Lane / Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Cap, veh/h	838	1209	-	-	1304	-	-	886
HCM Control Delay, s	9.8	0	-	-	0	-	-	9.5
HCM Lane V/C Ratio	0.11	-	-	-	-	-	-	0.10
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th-tile Q, veh	0.4	0.0	-	-	0.0	-	-	0.3

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lanes, Volumes, Timings
22: Dwight Street & I-291 WB Exit

2018 No-Build PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑			↑↑						↑	↑
Volume (vph)	0	363	40	232	189	0	0	0	0	257	2	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985										0.850
Flt Protected					0.973						0.953	
Satd. Flow (prot)	0	3556	0	0	3513	0	0	0	0	0	1811	1615
Flt Permitted					0.627						0.953	
Satd. Flow (perm)	0	3556	0	0	2263	0	0	0	0	0	1811	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22										67
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		555			435			935			487	
Travel Time (s)		12.6			9.9			21.3			11.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	395	43	252	205	0	0	0	0	279	2	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	438	0	0	457	0	0	0	0	0	281	67
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		6			2						8	
Permitted Phases				2						8		8
Detector Phase		6		2	2					8	8	8
Switch Phase												
Minimum Initial (s)		4.0		4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		10.0		10.0	10.0					10.0	10.0	10.0
Total Split (s)		41.0		41.0	41.0					34.0	34.0	34.0
Total Split (%)		54.7%		54.7%	54.7%					45.3%	45.3%	45.3%
Yellow Time (s)		3.5		3.5	3.5					3.5	3.5	3.5
All-Red Time (s)		0.5		0.5	0.5					0.5	0.5	0.5
Lost Time Adjust (s)		0.0			0.0						0.0	0.0
Total Lost Time (s)		4.0			4.0						4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max		C-Max	C-Max					None	None	None
Act Effct Green (s)		49.8			49.8						17.2	17.2
Actuated g/C Ratio		0.66			0.66						0.23	0.23
v/c Ratio		0.19			0.30						0.68	0.16
Control Delay		5.5			7.4						34.1	6.5
Queue Delay		0.0			0.0						0.0	0.0
Total Delay		5.5			7.4						34.1	6.5
LOS		A			A						C	A
Approach Delay		5.5			7.4						28.8	
Approach LOS		A			A						C	
90th %ile Green (s)		43.0		43.0	43.0					24.0	24.0	24.0
90th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap
70th %ile Green (s)		47.3		47.3	47.3					19.7	19.7	19.7
70th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap
50th %ile Green (s)		49.9		49.9	49.9					17.1	17.1	17.1
50th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap

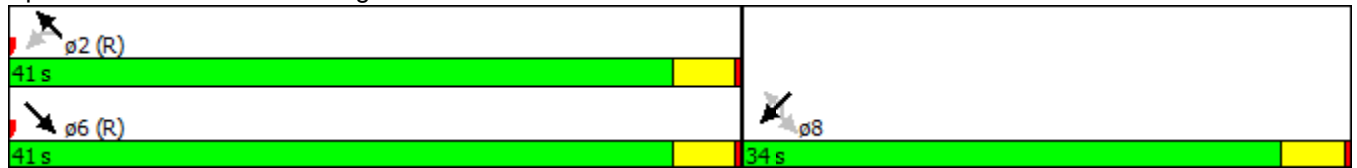


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
30th %ile Green (s)		52.5		52.5	52.5					14.5	14.5	14.5
30th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap
10th %ile Green (s)		56.2		56.2	56.2					10.8	10.8	10.8
10th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap
Stops (vph)		140			208						223	13
Fuel Used(gal)		3			3						4	0
CO Emissions (g/hr)		208			224						280	27
NOx Emissions (g/hr)		40			44						55	5
VOC Emissions (g/hr)		48			52						65	6
Dilemma Vehicles (#)		0			0						0	0
Queue Length 50th (ft)		33			50						120	0
Queue Length 95th (ft)		66			m86						174	25
Internal Link Dist (ft)		475			355			855			407	
Turn Bay Length (ft)												
Base Capacity (vph)		2367			1502						724	686
Starvation Cap Reductn		0			0						0	0
Spillback Cap Reductn		0			0						0	0
Storage Cap Reductn		0			0						0	0
Reduced v/c Ratio		0.19			0.30						0.39	0.10

Intersection Summary

Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 75
 Offset: 74 (99%), Referenced to phase 2:NWTL and 6:SET, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 12.7 Intersection LOS: B
 Intersection Capacity Utilization 48.5% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 22: Dwight Street & I-291 WB Exit





Lane Group	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations	↘		↘↘			↘↘
Volume (vph)	47	80	610	0	0	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	0.915					
Flt Protected	0.982					
Satd. Flow (prot)	1707	0	3610	0	0	3610
Flt Permitted	0.982					
Satd. Flow (perm)	1707	0	3610	0	0	3610
Link Speed (mph)	30		30			30
Link Distance (ft)	410		435			133
Travel Time (s)	9.3		9.9			3.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	87	663	0	0	457
Shared Lane Traffic (%)						
Lane Group Flow (vph)	138	0	663	0	0	457
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	31.0%
ICU Level of Service	A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 1.8

Movement	EBL	EBR	SET	SER	NWL	NWT
Vol, veh/h	47	80	610	0	0	420
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	12		6			0
Grade, %	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	51	87	663	0	0	457
Number of Lanes	1	0	2	0	0	2

Major/Minor	Major 1		Major 2			
Conflicting Flow All	891	332	0	0	663	0
Stage 1	663	-	-	-	-	-
Stage 2	228	-	-	-	-	-
Follow-up Headway	3.5	3.3	-	-	2.2	-
Pot Capacity-1 Maneuver	286	670	-	-	935	-
Stage 1	480	-	-	-	-	-
Stage 2	794	-	-	-	-	-
Time blocked-Platoon, %	0	0	-	-	0	-
Mov Capacity-1 Maneuver	286	670	-	-	935	-
Mov Capacity-2 Maneuver	286	-	-	-	-	-
Stage 1	480	-	-	-	-	-
Stage 2	794	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	16.6	0	0
HCM LOS	C	-	-

Minor Lane / Major Mvmt	NWL	NWT	EBLn1	SET	SER
Cap, veh/h	935	-	448	-	-
HCM Control Delay, s	0	-	16.6	-	-
HCM Lane V/C Ratio	-	-	0.31	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th-tile Q, veh	0.0	-	1.3	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lanes, Volumes, Timings
24: Congress Street & Dwight Street

2018 No-Build PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕↕		↕	↕↕			↕↕			↕↕	
Volume (vph)	50	458	67	33	284	7	163	52	46	33	106	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	300		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982			0.996			0.976			0.916	
Flt Protected		0.996		0.950				0.970			0.996	
Satd. Flow (prot)	0	3531	0	1805	3596	0	0	1799	0	0	1733	0
Flt Permitted		0.898		0.389				0.409			0.958	
Satd. Flow (perm)	0	3183	0	739	3596	0	0	758	0	0	1667	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			4			16			150	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		225			399			1019			567	
Travel Time (s)		5.1			9.1			23.2			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	498	73	36	309	8	177	57	50	36	115	251
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	625	0	36	317	0	0	284	0	0	402	0
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	1	6			2			4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		2	2		4	4		3	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.0	10.0		10.0	10.0		10.0	10.0		8.0	10.0	
Total Split (s)	8.0	28.0		28.0	28.0		31.0	31.0		8.0	39.0	
Total Split (%)	10.7%	37.3%		37.3%	37.3%		41.3%	41.3%		10.7%	52.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		4.0		4.0	4.0			4.0			4.0	
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	
Act Effct Green (s)		44.7		44.7	44.7			22.3			22.3	
Actuated g/C Ratio		0.60		0.60	0.60			0.30			0.30	
v/c Ratio		0.33		0.08	0.15			1.20			0.67	
Control Delay		6.7		3.9	3.1			149.3			17.1	
Queue Delay		0.0		0.0	0.0			0.0			0.0	
Total Delay		6.7		3.9	3.1			149.3			17.1	
LOS		A		A	A			F			B	
Approach Delay		6.7			3.2			149.3			17.1	
Approach LOS		A			A			F			B	
90th %ile Green (s)	0.0	36.8		36.8	36.8		30.2	30.2		0.0	30.2	
90th %ile Term Code	Skip	Coord		Coord	Coord		Gap	Gap		Skip	Hold	
70th %ile Green (s)	0.0	40.6		40.6	40.6		26.4	26.4		0.0	26.4	

Lanes, Volumes, Timings
 24: Congress Street & Dwight Street

2018 No-Build PM Peak
 12/28/2012

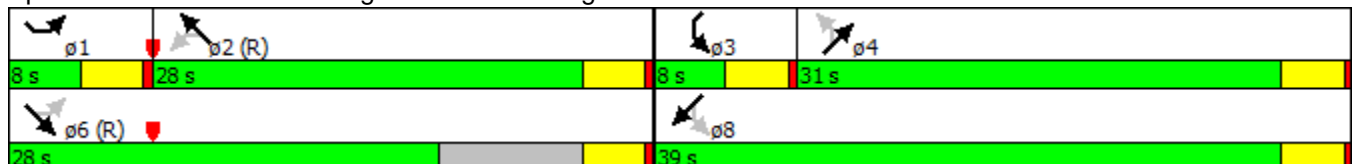


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
70th %ile Term Code	Skip	Coord		Coord	Coord		Gap	Gap		Skip	Hold	
50th %ile Green (s)	0.0	44.2		44.2	44.2		22.8	22.8		0.0	22.8	
50th %ile Term Code	Skip	Coord		Coord	Coord		Gap	Gap		Skip	Hold	
30th %ile Green (s)	0.0	48.0		48.0	48.0		19.0	19.0		0.0	19.0	
30th %ile Term Code	Skip	Coord		Coord	Coord		Gap	Gap		Skip	Hold	
10th %ile Green (s)	0.0	53.8		53.8	53.8		13.2	13.2		0.0	13.2	
10th %ile Term Code	Skip	Coord		Coord	Coord		Gap	Gap		Skip	Hold	
Stops (vph)		208		11	76			210			144	
Fuel Used(gal)		3		0	2			11			4	
CO Emissions (g/hr)		206		13	106			780			260	
NOx Emissions (g/hr)		40		3	21			152			51	
VOC Emissions (g/hr)		48		3	25			181			60	
Dilemma Vehicles (#)		0		0	0			0			0	
Queue Length 50th (ft)		48		2	9			~156			73	
Queue Length 95th (ft)		92		15	38			#265			113	
Internal Link Dist (ft)		145			319			939			487	
Turn Bay Length (ft)				150								
Base Capacity (vph)		1906		440	2143			289			857	
Starvation Cap Reductn		0		0	0			0			0	
Spillback Cap Reductn		0		0	0			0			0	
Storage Cap Reductn		0		0	0			0			0	
Reduced v/c Ratio		0.33		0.08	0.15			0.98			0.47	

Intersection Summary

Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 75
 Offset: 72 (96%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.20
 Intersection Signal Delay: 32.8 Intersection LOS: C
 Intersection Capacity Utilization 73.8% ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 24: Congress Street & Dwight Street



Lanes, Volumes, Timings
25: Liberty Street & Dwight Street

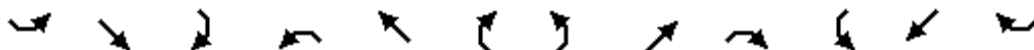
2018 No-Build PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	35	449	67	0	0	0	195	164	86	313	207	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		0	150		0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980						0.949				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	1805	3538	0	0	0	0	1805	1803	0	1805	1900	1615
Flt Permitted	0.950						0.577			0.525		
Satd. Flow (perm)	1805	3538	0	0	0	0	1096	1803	0	998	1900	1615
Right Turn on Red			Yes				Yes		Yes			Yes
Satd. Flow (RTOR)		22						65				91
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		399			420			993			547	
Travel Time (s)		9.1			9.5			22.6			12.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	488	73	0	0	0	212	178	93	340	225	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	561	0	0	0	0	212	271	0	340	225	91
Turn Type	Perm	NA					Perm	NA		Perm	NA	Perm
Protected Phases		6						4			8	
Permitted Phases	6						4	4		8	8	8
Detector Phase	6	6					4	4		8	8	8
Switch Phase												
Minimum Initial (s)	4.0	4.0					4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	10.0	10.0					10.0	10.0		10.0	10.0	10.0
Total Split (s)	25.0	25.0					50.0	50.0		50.0	50.0	50.0
Total Split (%)	33.3%	33.3%					66.7%	66.7%		66.7%	66.7%	66.7%
Yellow Time (s)	3.5	3.5					3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5					0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0					4.0	4.0		4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max					None	None		None	None	None
Act Effct Green (s)	35.0	35.0					32.0	32.0		32.0	32.0	32.0
Actuated g/C Ratio	0.47	0.47					0.43	0.43		0.43	0.43	0.43
v/c Ratio	0.05	0.34					0.45	0.34		0.80	0.28	0.12
Control Delay	13.1	13.6					16.6	10.1		26.9	9.6	2.3
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	0.0
Total Delay	13.1	13.6					16.6	10.1		26.9	9.6	2.3
LOS	B	B					B	B		C	A	A
Approach Delay		13.6						13.0			17.6	
Approach LOS		B						B			B	
90th %ile Green (s)	22.4	22.4					44.6	44.6		44.6	44.6	44.6
90th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
70th %ile Green (s)	28.8	28.8					38.2	38.2		38.2	38.2	38.2

Lanes, Volumes, Timings
25: Liberty Street & Dwight Street

2018 No-Build PM Peak
12/28/2012

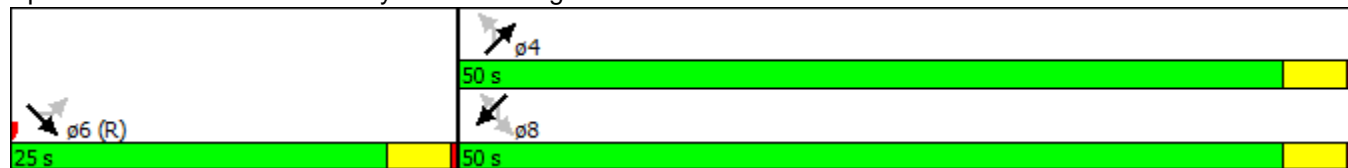


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
70th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
50th %ile Green (s)	34.5	34.5					32.5	32.5		32.5	32.5	32.5
50th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
30th %ile Green (s)	40.5	40.5					26.5	26.5		26.5	26.5	26.5
30th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
10th %ile Green (s)	49.0	49.0					18.0	18.0		18.0	18.0	18.0
10th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
Stops (vph)	26	365					121	107		228	94	8
Fuel Used(gal)	0	5					3	3		4	2	0
CO Emissions (g/hr)	24	353					198	212		301	126	31
NOx Emissions (g/hr)	5	69					39	41		59	25	6
VOC Emissions (g/hr)	6	82					46	49		70	29	7
Dilemma Vehicles (#)	0	0					0	0		0	0	0
Queue Length 50th (ft)	11	99					67	59		91	50	0
Queue Length 95th (ft)	m34	m162					84	73		124	69	16
Internal Link Dist (ft)		319			340			913			467	
Turn Bay Length (ft)	150									150		
Base Capacity (vph)	843	1664					672	1130		612	1165	1025
Starvation Cap Reductn	0	0					0	0		0	0	0
Spillback Cap Reductn	0	0					0	0		0	0	0
Storage Cap Reductn	0	0					0	0		0	0	0
Reduced v/c Ratio	0.05	0.34					0.32	0.24		0.56	0.19	0.09

Intersection Summary

Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 75
 Offset: 17 (23%), Referenced to phase 6:SETL, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 14.9 Intersection LOS: B
 Intersection Capacity Utilization 55.8% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: Liberty Street & Dwight Street



Lanes, Volumes, Timings
 26: Chestnut Street & 291 Exit Ramp & I-291 Entrance Ramp

2018 No-Build PM Peak
 12/28/2012



Lane Group	EBL	EBR	SBL	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↑				↑↑			↑↑	
Volume (vph)	0	137	0	0	0	375	0	0	489	395
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Fr _t		0.865							0.933	
Flt Protected										
Satd. Flow (prot)	0	1644	0	0	0	3610	0	0	3368	0
Flt Permitted										
Satd. Flow (perm)	0	1644	0	0	0	3610	0	0	3368	0
Link Speed (mph)	30		30			30			30	
Link Distance (ft)	398		403			693			263	
Travel Time (s)	9.0		9.2			15.8			6.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	149	0	0	0	408	0	0	532	429
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	149	0	0	0	408	0	0	961	0
Sign Control	Stop		Free			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized
 Intersection Capacity Utilization 29.5% ICU Level of Service A
 Analysis Period (min) 15

Intersection

Intersection Delay, s/veh 1

Movement	EBL	EBR	SBL	SBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	0	137	0	0	0	375	0	0	489	395
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None
Storage Length	0	0	0	0	0	0	0	0	0	0
Median Width	0		0			6			6	
Grade, %	0%		0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	149	0	0	0	408	0	0	532	429
Number of Lanes	0	1	0	0	0	2	0	0	2	0

Major/Minor	Major 1			Major 2					
Conflicting Flow All	674	204		961	0	0	408	0	0
Stage 1	408	-		-	-	-	-	-	-
Stage 2	266	-		-	-	-	-	-	-
Follow-up Headway	3.5	3.3		2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	393	809		724	-	-	1162	-	-
Stage 1	646	-		-	-	-	-	-	-
Stage 2	760	-		-	-	-	-	-	-
Time blocked-Platoon, %	0	0		0	-	-	0	-	-
Mov Capacity-1 Maneuver	393	809		724	-	-	1162	-	-
Mov Capacity-2 Maneuver	393	-		-	-	-	-	-	-
Stage 1	646	-		-	-	-	-	-	-
Stage 2	760	-		-	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	10.5	0	0
HCM LOS	B	-	-

Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	SEL	SET	SER
Cap, veh/h	1162	-	-	809	724	-	-
HCM Control Delay, s	0	-	-	10.5	0	-	-
HCM Lane V/C Ratio	-	-	-	0.18	-	-	-
HCM Lane LOS	A	-	-	B	A	-	-
HCM 95th-tile Q, veh	0.0	-	-	0.7	0.0	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑		↙	↑↑	↘	
Volume (vph)	413	91	145	819	65	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	100		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.973				0.934	
Flt Protected			0.950		0.975	
Satd. Flow (prot)	3513	0	1805	3610	1730	0
Flt Permitted			0.950		0.975	
Satd. Flow (perm)	3513	0	1805	3610	1730	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	263			455	567	
Travel Time (s)	6.0			10.3	12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	449	99	158	890	71	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	548	0	158	890	138	0
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.8%
ICU Level of Service	A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 4.1

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	413	91	145	819	65	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	100		0	0
Median Width	12			12	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	449	99	158	890	71	67
Number of Lanes	2	0	1	2	1	0

Major/Minor	Major 1	Major 2				
Conflicting Flow All	0	0	548	0	1258	274
Stage 1	-	-	-	-	498	-
Stage 2	-	-	-	-	760	-
Follow-up Headway	-	-	2.2	-	3.5	3.3
Pot Capacity-1 Maneuver	-	-	1032	-	166	730
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	428	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1032	-	141	730
Mov Capacity-2 Maneuver	-	-	-	-	141	-
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	362	-

Approach	SE	NW	NE
HCM Control Delay, s	0	1.4	40.7
HCM LOS	-	-	E





















Minor Lane / Major Mvmt	NELn1	NWL	NWT	SET	SER
Cap, veh/h	233	1032	-	-	-
HCM Control Delay, s	40.7	9.116	-	-	-
HCM Lane V/C Ratio	0.59	0.15	-	-	-
HCM Lane LOS	E	A	-	-	-
HCM 95th-tile Q, veh	3.4	0.5	-	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

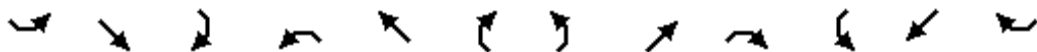
Lanes, Volumes, Timings
28: Liberty Street & Chestnut Street

2018 No-Build PM Peak
12/28/2012

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	221	0	239	141	642	126	42	139	0	0	199	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.975							0.850
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1805	0	1615	1805	3520	0	1805	1900	0	0	1900	1615
Flt Permitted	0.950			0.950			0.480					
Satd. Flow (perm)	1805	0	1615	1805	3520	0	912	1900	0	0	1900	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			260		35							91
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		455			438			547			526	
Travel Time (s)		10.3			10.0			12.4			12.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	240	0	260	153	698	137	46	151	0	0	216	214
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	0	260	153	835	0	46	151	0	0	216	214
Turn Type	Prot		Free	Split	NA		Perm	NA			NA	pm+ov
Protected Phases	1			2	2			4			8	1
Permitted Phases			Free				4	4			8	8
Minimum Split (s)	8.0			10.0	10.0		10.0	10.0			10.0	8.0
Total Split (s)	22.0			32.0	32.0		21.0	21.0			21.0	22.0
Total Split (%)	29.3%			42.7%	42.7%		28.0%	28.0%			28.0%	29.3%
Yellow Time (s)	3.5			3.5	3.5		3.5	3.5			3.5	3.5
All-Red Time (s)	0.5			0.5	0.5		0.5	0.5			0.5	0.5
Lost Time Adjust (s)	0.0			0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	4.0			4.0	4.0		4.0	4.0			4.0	4.0
Lead/Lag	Lead			Lag	Lag							Lead
Lead-Lag Optimize?	Yes			Yes	Yes							Yes
Act Effct Green (s)	18.0		75.0	28.0	28.0		17.0	17.0			17.0	39.0
Actuated g/C Ratio	0.24		1.00	0.37	0.37		0.23	0.23			0.23	0.52
v/c Ratio	0.55		0.16	0.23	0.62		0.22	0.35			0.50	0.24
Control Delay	30.7		0.2	17.3	20.9		23.5	22.8			30.1	6.4
Queue Delay	0.0		0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	30.7		0.2	17.3	20.9		23.5	22.8			30.1	6.4
LOS	C		A	B	C		C	C			C	A
Approach Delay					20.3			23.0			18.3	
Approach LOS					C			C			B	
Stops (vph)	191		0	92	578		26	82			170	60
Fuel Used(gal)	3		1	1	9		1	2			3	1
CO Emissions (g/hr)	225		60	104	635		37	118			208	98
NOx Emissions (g/hr)	44		12	20	123		7	23			40	19
VOC Emissions (g/hr)	52		14	24	147		8	27			48	23
Dilemma Vehicles (#)	0		0	0	0		0	0			0	0
Queue Length 50th (ft)	98		0	48	156		13	42			88	28
Queue Length 95th (ft)	168		0	88	215		39	91			152	62
Internal Link Dist (ft)		375			358			467			446	
Turn Bay Length (ft)												

Lanes, Volumes, Timings
 28: Liberty Street & Chestnut Street

2018 No-Build PM Peak
 12/28/2012

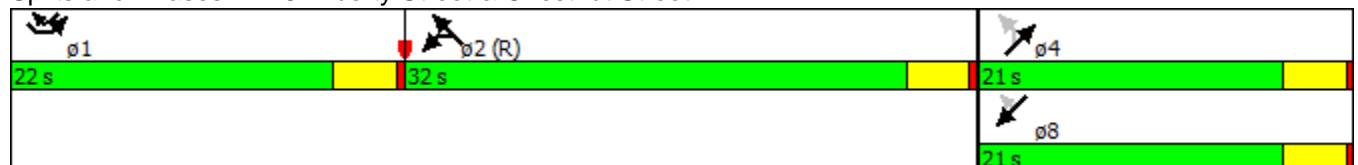


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Base Capacity (vph)	433		1615	673	1336		206	430			430	883
Starvation Cap Reductn	0		0	0	0		0	0			0	0
Spillback Cap Reductn	0		0	0	0		0	0			0	0
Storage Cap Reductn	0		0	0	0		0	0			0	0
Reduced v/c Ratio	0.55		0.16	0.23	0.63		0.22	0.35			0.50	0.24

Intersection Summary

Area Type:	Other
Cycle Length:	75
Actuated Cycle Length:	75
Offset:	12 (16%), Referenced to phase 2:NWTL, Start of Green
Natural Cycle:	40
Control Type:	Pretimed
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	18.8
Intersection LOS:	B
Intersection Capacity Utilization	61.1%
ICU Level of Service	B
Analysis Period (min)	15

Splits and Phases: 28: Liberty Street & Chestnut Street



Lanes, Volumes, Timings
30: Emery Street & Bolyston Street

2018 No-Build PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	20	10	10	10	10	10	43	107	10	10	571	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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		0.966			0.955			0.991			0.997	
Flt Protected		0.976			0.984			0.987			0.999	
Satd. Flow (prot)	0	1791	0	0	1785	0	0	1858	0	0	1892	0
Flt Permitted		0.976			0.984			0.987			0.999	
Satd. Flow (perm)	0	1791	0	0	1785	0	0	1858	0	0	1892	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		817			626			149			182	
Travel Time (s)		18.6			14.2			3.4			4.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	11	11	11	11	11	47	116	11	11	621	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	0	33	0	0	174	0	0	645	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	43.6%
ICU Level of Service	A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 2.1

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	20	10	10	10	10	10	43	107	10	10	571	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	0		0	0		0	0		0	0		0
Median Width		0			0			0			0	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	22	11	11	11	11	11	47	116	11	11	621	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Major/Minor	Minor 2		Minor 1		Major 1			Major 2				
Conflicting Flow All	875	870	627	875	870	122	634	0	0	127	0	0
Stage 1	649	649	-	215	215	-	-	-	-	-	-	-
Stage 2	226	221	-	660	655	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	272	292	487	272	292	935	959	-	-	1472	-	-
Stage 1	462	469	-	792	729	-	-	-	-	-	-	-
Stage 2	781	724	-	455	466	-	-	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	0	0	0	0	-	-	0	-	-
Mov Capacity-1 Maneuver	248	273	487	245	273	935	959	-	-	1472	-	-
Mov Capacity-2 Maneuver	248	273	-	245	273	-	-	-	-	-	-	-
Stage 1	438	463	-	750	690	-	-	-	-	-	-	-
Stage 2	719	686	-	429	460	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	19.6	16.7	2.4	0.1
HCM LOS	C	C	-	-

Minor Lane / Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Cap, veh/h	959	-	-	340	290	1472	-
HCM Control Delay, s	8.946	0	-	16.7	19.6	7.464	0
HCM Lane V/C Ratio	0.05	-	-	0.10	0.15	0.01	-
HCM Lane LOS	A	A	-	C	C	A	A
HCM 95th-tile Q, veh	0.2	-	-	0.3	0.5	0.0	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

**Capacity Analyses
2018 Build Conditions**

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Lanes, Volumes, Timings
10: Emery Street & East Columbus Ave.

2018 Build with Improvements PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations					↕↕			↑			↗	
Volume (vph)	0	0	0	0	690	120	0	41	0	0	76	535
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.978						0.882	
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3531	0	0	1900	0	0	1676	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3531	0	0	1900	0	0	1676	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					31						58	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		571			622			64			149	
Travel Time (s)		13.0			14.1			1.5			3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	750	130	0	45	0	0	83	582
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	880	0	0	45	0	0	665	0
Turn Type				Perm	NA			NA			NA	
Protected Phases					2			4			8	
Permitted Phases				2								
Detector Phase				2	2			4			8	
Switch Phase												
Minimum Initial (s)				4.0	4.0			4.0			4.0	
Minimum Split (s)				10.0	10.0			10.0			10.0	
Total Split (s)				28.0	28.0			42.0			42.0	
Total Split (%)				40.0%	40.0%			60.0%			60.0%	
Yellow Time (s)				3.5	3.5			3.5			3.5	
All-Red Time (s)				0.5	0.5			0.5			0.5	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				C-Max	C-Max			None			None	
Act Effct Green (s)					29.8			32.2			32.2	
Actuated g/C Ratio					0.43			0.46			0.46	
v/c Ratio					0.58			0.05			0.83	
Control Delay					18.0			9.3			17.5	
Queue Delay					0.0			0.0			7.4	
Total Delay					18.0			9.3			24.8	
LOS					B			A			C	
Approach Delay					18.0			9.3			24.8	
Approach LOS					B			A			C	
90th %ile Green (s)				24.0	24.0			38.0			38.0	
90th %ile Term Code				Coord	Coord			Hold			Max	
70th %ile Green (s)				24.9	24.9			37.1			37.1	
70th %ile Term Code				Coord	Coord			Hold			Gap	
50th %ile Green (s)				28.0	28.0			34.0			34.0	
50th %ile Term Code				Coord	Coord			Hold			Gap	

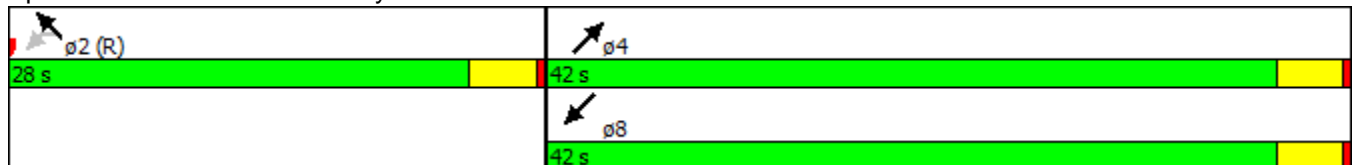


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
30th %ile Green (s)				32.4	32.4			29.6			29.6	
30th %ile Term Code				Coord	Coord			Hold			Gap	
10th %ile Green (s)				39.7	39.7			22.3			22.3	
10th %ile Term Code				Coord	Coord			Hold			Gap	
Stops (vph)					589			21			272	
Fuel Used(gal)					13			0			4	
CO Emissions (g/hr)					876			15			307	
NOx Emissions (g/hr)					170			3			60	
VOC Emissions (g/hr)					203			3			71	
Dilemma Vehicles (#)					0			0			0	
Queue Length 50th (ft)					147			10			119	
Queue Length 95th (ft)					228			22			157	
Internal Link Dist (ft)		491			542			1			69	
Turn Bay Length (ft)												
Base Capacity (vph)					1521			1031			936	
Starvation Cap Reductn					0			0			25	
Spillback Cap Reductn					0			0			227	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.58			0.04			0.94	

Intersection Summary

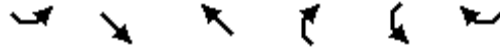
Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	10 (14%), Referenced to phase 2:NWTL, Start of Green
Natural Cycle:	45
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.83
Intersection Signal Delay:	20.6
Intersection LOS:	C
Intersection Capacity Utilization	73.2%
ICU Level of Service	D
Analysis Period (min)	15

Splits and Phases: 10: Emery Street & East Columbus Ave.





Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↑↑			↓	
Volume (vph)	40	166	0	0	83	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						
Flt Protected		0.990			0.950	
Satd. Flow (prot)	0	3574	0	0	1805	0
Flt Permitted		0.990			0.950	
Satd. Flow (perm)	0	3574	0	0	1805	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						
Link Speed (mph)		30	30		30	
Link Distance (ft)		649	650		64	
Travel Time (s)		14.8	14.8		1.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	180	0	0	90	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	223	0	0	90	0
Turn Type	Perm	NA			NA	
Protected Phases		6			8	
Permitted Phases	6					
Detector Phase	6	6			8	
Switch Phase						
Minimum Initial (s)	4.0	4.0			4.0	
Minimum Split (s)	10.0	10.0			10.0	
Total Split (s)	35.0	35.0			35.0	
Total Split (%)	50.0%	50.0%			50.0%	
Yellow Time (s)	3.5	3.5			3.5	
All-Red Time (s)	0.5	0.5			0.5	
Lost Time Adjust (s)		0.0			0.0	
Total Lost Time (s)		4.0			4.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max			None	
Act Effct Green (s)		55.8			8.9	
Actuated g/C Ratio		0.80			0.13	
v/c Ratio		0.08			0.39	
Control Delay		2.4			20.2	
Queue Delay		0.0			0.0	
Total Delay		2.4			20.2	
LOS		A			C	
Approach Delay		2.4			20.2	
Approach LOS		A			C	
90th %ile Green (s)	49.8	49.8			12.2	
90th %ile Term Code	Coord	Coord			Gap	
70th %ile Green (s)	51.8	51.8			10.2	
70th %ile Term Code	Coord	Coord			Gap	
50th %ile Green (s)	53.1	53.1			8.9	
50th %ile Term Code	Coord	Coord			Gap	

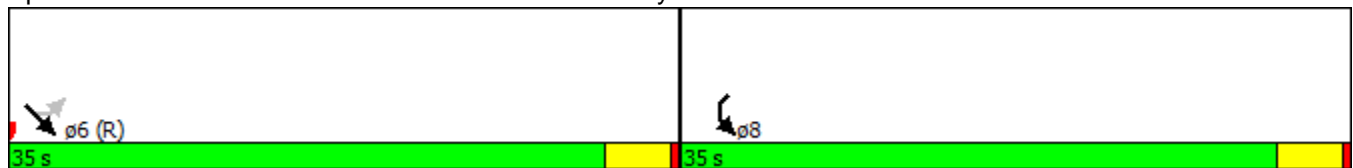


Lane Group	SEL	SET	NWT	NWR	SWL	SWR
30th %ile Green (s)	54.5	54.5			7.5	
30th %ile Term Code	Coord	Coord			Gap	
10th %ile Green (s)	66.0	66.0			0.0	
10th %ile Term Code	Coord	Coord			Skip	
Stops (vph)		45			58	
Fuel Used(gal)		2			1	
CO Emissions (g/hr)		145			49	
NOx Emissions (g/hr)		28			10	
VOC Emissions (g/hr)		34			11	
Dilemma Vehicles (#)		0			0	
Queue Length 50th (ft)		9			24	
Queue Length 95th (ft)		21			m39	
Internal Link Dist (ft)		569	570		1	
Turn Bay Length (ft)						
Base Capacity (vph)		2851			799	
Starvation Cap Reductn		0			0	
Spillback Cap Reductn		5			0	
Storage Cap Reductn		0			0	
Reduced v/c Ratio		0.08			0.11	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 21 (30%), Referenced to phase 6:SETL, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.39
 Intersection Signal Delay: 7.6
 Intersection LOS: A
 Intersection Capacity Utilization 75.7%
 ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: West Columbus Ave. & Emery Street





Lane Group	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations		↑	↑↑			↑↑
Volume (vph)	0	25	344	0	0	538
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt		0.865				
Flt Protected						
Satd. Flow (prot)	0	1644	3610	0	0	3610
Flt Permitted						
Satd. Flow (perm)	0	1644	3610	0	0	3610
Link Speed (mph)	30		30			30
Link Distance (ft)	115		340			124
Travel Time (s)	2.6		7.7			2.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	27	374	0	0	585
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	27	374	0	0	585
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.5% ICU Level of Service A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 0.3

Movement	EBL	EBR	SET	SER	NWL	NWT
Vol, veh/h	0	25	344	0	0	538
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	0		0			0
Grade, %	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	27	374	0	0	585
Number of Lanes	0	1	2	0	0	2

Major/Minor	Major 1		Major 2			
Conflicting Flow All	666	187	0	0	374	0
Stage 1	374	-	-	-	-	-
Stage 2	292	-	-	-	-	-
Follow-up Headway	3.5	3.3	-	-	2.2	-
Pot Capacity-1 Maneuver	397	830	-	-	1196	-
Stage 1	672	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Time blocked-Platoon, %	0	0	-	-	0	-
Mov Capacity-1 Maneuver	397	830	-	-	1196	-
Mov Capacity-2 Maneuver	397	-	-	-	-	-
Stage 1	672	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	9.5	0	0
HCM LOS	A	-	-

Minor Lane / Major Mvmt	NWL	NWT	EBLn1	SET	SER
Cap, veh/h	1196	-	830	-	-
HCM Control Delay, s	0	-	9.5	-	-
HCM Lane V/C Ratio	-	-	0.03	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th-tile Q, veh	0.0	-	0.1	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	EBL	EBT	WBT	WBR	SEL	SER	SWL	SWR	SWR2
Lane Configurations		↑		↑					↑
Volume (vph)	0	328	0	661	0	0	0	0	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.865					0.865
Flt Protected									
Satd. Flow (prot)	0	1900	0	1644	0	0	0	0	1644
Flt Permitted									
Satd. Flow (perm)	0	1900	0	1644	0	0	0	0	1644
Link Speed (mph)		30	30		30		30		
Link Distance (ft)		359	93		376		32		
Travel Time (s)		8.2	2.1		8.5		0.7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	357	0	718	0	0	0	0	60
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	357	0	718	0	0	0	0	60
Sign Control		Free	Free		Free		Stop		
Intersection Summary									
Area Type:	Other								
Control Type:	Unsignalized								
Intersection Capacity Utilization	51.0%			ICU Level of Service A					
Analysis Period (min)	15								

Intersection

Intersection Delay, s/veh 0.8

Movement	EBL	EBT	WBT	WBR	SEL	SER	SWL	SWR
Vol, veh/h	0	328	0	661	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None
Storage Length	0			0	0	0	0	0
Median Width		0	0		0		0	
Grade, %		0%	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0
Mvmt Flow	0	357	0	718	0	0	0	0
Number of Lanes	0	1	0	1	0	0	0	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	718	0	0	0	718	718
Stage 1	-	-	-	-	718	-
Stage 2	-	-	-	-	0	-
Follow-up Headway	2.2	-	-	-	3.5	3.3
Pot Capacity-1 Maneuver	892	-	-	-	399	432
Stage 1	-	-	-	-	487	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	892	-	-	-	399	432
Mov Capacity-2 Maneuver	-	-	-	-	399	-
Stage 1	-	-	-	-	487	-
Stage 2	-	-	-	-	-	-

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

Minor Lane / Major Mvmt	EBL2	EBL	EBT	WBT	WBR	WBR2	SWLn1
Cap, veh/h	892	-	-	-	-	-	432
HCM Control Delay, s	0	-	-	0	-	-	14.7
HCM Lane V/C Ratio	-	-	-	-	-	-	0.14
HCM Lane LOS	A	-	-	A	-	-	B
HCM 95th-tile Q, veh	0.0	-	-	-	-	-	0.5

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined



Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↑↑	↑↑			
Volume (vph)	15	347	475	263	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.947			
Flt Protected		0.998				
Satd. Flow (prot)	0	3603	3419	0	0	0
Flt Permitted		0.998				
Satd. Flow (perm)	0	3603	3419	0	0	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		281	75		932	
Travel Time (s)		6.4	1.7		21.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	377	516	286	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	393	802	0	0	0
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	24.9%		ICU Level of Service A			
Analysis Period (min)	15					

HCM research expects at least one 'Stop' controlled approach at the intersection.



Lane Group	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Volume (vph)	33	22	399	12	15	691
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.946		0.996			
Flt Protected	0.971					0.999
Satd. Flow (prot)	1745	0	3596	0	0	3606
Flt Permitted	0.971					0.999
Satd. Flow (perm)	1745	0	3596	0	0	3606
Link Speed (mph)	30		30			30
Link Distance (ft)	817		765			376
Travel Time (s)	18.6		17.4			8.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	24	434	13	16	751
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	0	447	0	0	767
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.8%
ICU Level of Service	A
Analysis Period (min)	15
Description:	Main Street

Intersection

Intersection Delay, s/veh 0.9

Movement	EBL	EBR	SET	SER	NWL	NWT
Vol, veh/h	33	22	399	12	15	691
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	12		12			12
Grade, %	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	36	24	434	13	16	751
Number of Lanes	1	0	2	0	0	2

Major/Minor	Major 1		Major 2			
Conflicting Flow All	848	223	0	0	447	0
Stage 1	440	-	-	-	-	-
Stage 2	408	-	-	-	-	-
Follow-up Headway	3.5	3.3	-	-	2.2	-
Pot Capacity-1 Maneuver	304	787	-	-	1124	-
Stage 1	622	-	-	-	-	-
Stage 2	646	-	-	-	-	-
Time blocked-Platoon, %	0	0	-	-	0	-
Mov Capacity-1 Maneuver	297	787	-	-	1124	-
Mov Capacity-2 Maneuver	297	-	-	-	-	-
Stage 1	622	-	-	-	-	-
Stage 2	630	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	15.7	0	0.3
HCM LOS	C	-	-







Minor Lane / Major Mvmt	NWL	NWT	EBLn1	SET	SER
Cap, veh/h	1124	-	395	-	-
HCM Control Delay, s	8.25	0.1	15.7	-	-
HCM Lane V/C Ratio	0.01	-	0.15	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th-tile Q, veh	0.0	-	0.5	-	-

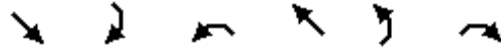
Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lanes, Volumes, Timings
16: Emery Street & Main Street

2018 Build with Improvements PM Peak
12/28/2012

						
Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑	↑	↑↑	↑	↑	↑
Volume (vph)	390	147	661	431	291	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Fr _t		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	3502	1900	1805	1615
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	3502	1900	1805	1615
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		160				171
Link Speed (mph)	30			30	30	
Link Distance (ft)	376			238	365	
Travel Time (s)	8.5			5.4	8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	160	718	468	316	262
Shared Lane Traffic (%)						
Lane Group Flow (vph)	424	160	718	468	316	262
Turn Type	NA	Perm	Prot	NA	NA	pm+ov
Protected Phases	6		5	2	4	5
Permitted Phases		6				4
Detector Phase	6	6	5	2	4	5
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	10.0	8.0	10.0	10.0	8.0
Total Split (s)	25.0	25.0	24.0	49.0	21.0	24.0
Total Split (%)	35.7%	35.7%	34.3%	70.0%	30.0%	34.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes			Yes
Recall Mode	Max	Max	C-Max	C-Max	None	C-Max
Act Effct Green (s)	21.0	21.0	21.5	46.5	15.5	41.0
Actuated g/C Ratio	0.30	0.30	0.31	0.66	0.22	0.59
v/c Ratio	0.74	0.27	0.67	0.37	0.79	0.26
Control Delay	31.9	4.9	22.6	5.6	36.1	2.4
Queue Delay	0.0	0.0	1.4	1.2	0.0	0.0
Total Delay	31.9	4.9	24.1	6.8	36.1	2.4
LOS	C	A	C	A	D	A
Approach Delay	24.5			17.2	20.8	
Approach LOS	C			B	C	
90th %ile Green (s)	21.0	21.0	20.0	45.0	17.0	20.0
90th %ile Term Code	MaxR	MaxR	Coord	Coord	Max	Coord
70th %ile Green (s)	21.0	21.0	20.0	45.0	17.0	20.0
70th %ile Term Code	MaxR	MaxR	Coord	Coord	Max	Coord
50th %ile Green (s)	21.0	21.0	20.0	45.0	17.0	20.0
50th %ile Term Code	MaxR	MaxR	Coord	Coord	Max	Coord



Lane Group	SET	SER	NWL	NWT	NEL	NER
30th %ile Green (s)	21.0	21.0	21.9	46.9	15.1	21.9
30th %ile Term Code	MaxR	MaxR	Coord	Coord	Gap	Coord
10th %ile Green (s)	21.0	21.0	25.4	50.4	11.6	25.4
10th %ile Term Code	MaxR	MaxR	Coord	Coord	Gap	Coord
Stops (vph)	333	22	561	164	254	36
Fuel Used(gal)	6	1	7	2	4	1
CO Emissions (g/hr)	385	49	515	154	306	70
NOx Emissions (g/hr)	75	9	100	30	59	14
VOC Emissions (g/hr)	89	11	119	36	71	16
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (ft)	163	0	164	73	127	21
Queue Length 95th (ft)	#289	38	145	86	#229	26
Internal Link Dist (ft)	296			158	285	
Turn Bay Length (ft)						
Base Capacity (vph)	570	596	1073	1261	438	1016
Starvation Cap Reductn	0	0	182	545	0	0
Spillback Cap Reductn	0	0	0	0	0	10
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.27	0.81	0.65	0.72	0.26

Intersection Summary

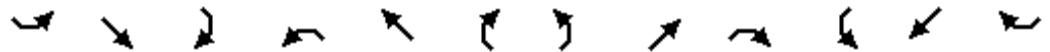
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 68 (97%), Referenced to phase 2:NWT and 5:NWL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 19.9
 Intersection LOS: B
 Intersection Capacity Utilization 65.5%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 16: Emery Street & Main Street



Lanes, Volumes, Timings
17: Garage/Congress Street & Main Street

2018 Build with Improvements PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	248	309	5	38	477	24	0	0	0	51	244	614
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		0	0		300
Storage Lanes	1		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.993							0.850
Flt Protected	0.950			0.950							0.991	
Satd. Flow (prot)	1805	3603	0	1805	3585	0	0	0	0	0	1883	1615
Flt Permitted	0.314			0.547							0.991	
Satd. Flow (perm)	597	3603	0	1039	3585	0	0	0	0	0	1883	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			7							42
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		238			397			60			1019	
Travel Time (s)		5.4			9.0			1.4			23.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	270	336	5	41	518	26	0	0	0	55	265	667
Shared Lane Traffic (%)												
Lane Group Flow (vph)	270	341	0	41	544	0	0	0	0	0	320	667
Turn Type	pm+pt	NA		pm+pt	NA					Perm	NA	pm+ov
Protected Phases	1	6		5	2						8	1
Permitted Phases	6			2						8		8
Detector Phase	1	6		5	2					8	8	1
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0					4.0	4.0	4.0
Minimum Split (s)	8.0	10.0		8.0	10.0					10.0	10.0	8.0
Total Split (s)	26.0	37.0		8.0	19.0					25.0	25.0	26.0
Total Split (%)	37.1%	52.9%		11.4%	27.1%					35.7%	35.7%	37.1%
Yellow Time (s)	3.5	3.5		3.5	3.5					3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5					0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0						0.0	0.0
Total Lost Time (s)	4.0	4.0		4.0	4.0						4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							Yes
Recall Mode	None	Max		None	Max					C-Max	C-Max	None
Act Effct Green (s)	41.0	36.2		27.0	23.0						21.0	39.0
Actuated g/C Ratio	0.59	0.52		0.39	0.33						0.30	0.56
v/c Ratio	0.46	0.18		0.09	0.46						0.57	0.73
Control Delay	11.9	13.3		9.0	19.1						27.4	10.7
Queue Delay	0.5	0.0		0.0	0.4						0.0	0.0
Total Delay	12.4	13.3		9.0	19.4						27.4	10.7
LOS	B	B		A	B						C	B
Approach Delay		12.9			18.7						16.1	
Approach LOS		B			B						B	
90th %ile Green (s)	22.0	33.0		4.0	15.0					21.0	21.0	22.0
90th %ile Term Code	Max	MaxR		Max	MaxR					Coord	Coord	Max
70th %ile Green (s)	18.3	33.0		4.0	18.7					21.0	21.0	18.3

Lanes, Volumes, Timings
 17: Garage/Congress Street & Main Street

2018 Build with Improvements PM Peak
 12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
70th %ile Term Code	Gap	MaxR		Max	MaxR					Coord	Coord	Gap
50th %ile Green (s)	11.8	33.0		4.0	25.2					21.0	21.0	11.8
50th %ile Term Code	Gap	MaxR		Max	MaxR					Coord	Coord	Gap
30th %ile Green (s)	10.2	41.0		0.0	26.8					21.0	21.0	10.2
30th %ile Term Code	Gap	MaxR		Skip	MaxR					Coord	Coord	Gap
10th %ile Green (s)	7.5	41.0		0.0	29.5					21.0	21.0	7.5
10th %ile Term Code	Gap	MaxR		Skip	MaxR					Coord	Coord	Gap
Stops (vph)	185	246		24	372						234	257
Fuel Used(gal)	2	3		0	6						5	8
CO Emissions (g/hr)	146	195		22	387						368	533
NOx Emissions (g/hr)	28	38		4	75						72	104
VOC Emissions (g/hr)	34	45		5	90						85	124
Dilemma Vehicles (#)	0	0		0	0						0	0
Queue Length 50th (ft)	94	65		6	77						122	141
Queue Length 95th (ft)	m132	m87		15	168						m158	m139
Internal Link Dist (ft)		158			317			1			939	
Turn Bay Length (ft)	150											300
Base Capacity (vph)	729	1864		445	1184						564	1098
Starvation Cap Reductn	169	0		0	0						0	0
Spillback Cap Reductn	0	0		0	234						0	2
Storage Cap Reductn	0	0		0	0						0	0
Reduced v/c Ratio	0.48	0.18		0.09	0.57						0.57	0.61

Intersection Summary

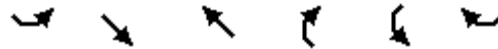
Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 19 (27%), Referenced to phase 8:SWTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 15.9 Intersection LOS: B
 Intersection Capacity Utilization 58.6% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 17: Garage/Congress Street & Main Street



Lanes, Volumes, Timings
18: Main Street & Liberty Street

2018 Build with Improvements PM Peak
12/28/2012



Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (vph)	89	255	225	313	89	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Fr _t				0.850		0.850
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1805	3610	1900	1615	1805	1615
Fl _t Permitted	0.607				0.950	
Satd. Flow (perm)	1153	3610	1900	1615	1805	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				340		267
Link Speed (mph)		30	30		30	
Link Distance (ft)		397	340		993	
Travel Time (s)		9.0	7.7		22.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	277	245	340	97	267
Shared Lane Traffic (%)						
Lane Group Flow (vph)	97	277	245	340	97	267
Turn Type	Perm	NA	NA	Perm	NA	Prot
Protected Phases		6	2		8	8
Permitted Phases	6			2		
Detector Phase	6	6	2	2	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	39.0	39.0	39.0	39.0	31.0	31.0
Total Split (%)	55.7%	55.7%	55.7%	55.7%	44.3%	44.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	52.8	52.8	52.8	52.8	9.2	9.2
Actuated g/C Ratio	0.75	0.75	0.75	0.75	0.13	0.13
v/c Ratio	0.11	0.10	0.17	0.26	0.41	0.60
Control Delay	1.0	0.7	3.1	1.0	32.3	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.0	0.7	3.1	1.0	32.3	11.8
LOS	A	A	A	A	C	B
Approach Delay		0.8	1.9		17.2	
Approach LOS		A	A		B	
90th %ile Green (s)	48.9	48.9	48.9	48.9	13.1	13.1
90th %ile Term Code	Coord	Coord	Coord	Coord	Gap	Gap
70th %ile Green (s)	51.5	51.5	51.5	51.5	10.5	10.5
70th %ile Term Code	Coord	Coord	Coord	Coord	Gap	Gap
50th %ile Green (s)	52.9	52.9	52.9	52.9	9.1	9.1
50th %ile Term Code	Coord	Coord	Coord	Coord	Gap	Gap

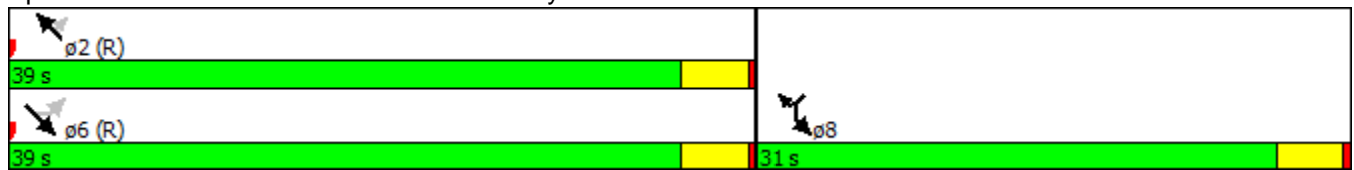


Lane Group	SEL	SET	NWT	NWR	SWL	SWR
30th %ile Green (s)	54.3	54.3	54.3	54.3	7.7	7.7
30th %ile Term Code	Coord	Coord	Coord	Coord	Gap	Gap
10th %ile Green (s)	56.3	56.3	56.3	56.3	5.7	5.7
10th %ile Term Code	Coord	Coord	Coord	Coord	Gap	Gap
Stops (vph)	5	12	58	13	78	114
Fuel Used(gal)	0	1	1	1	2	3
CO Emissions (g/hr)	22	62	74	67	119	218
NOx Emissions (g/hr)	4	12	14	13	23	42
VOC Emissions (g/hr)	5	14	17	16	28	51
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (ft)	1	2	22	0	30	6
Queue Length 95th (ft)	m6	6	51	19	75	35
Internal Link Dist (ft)		317	260		913	
Turn Bay Length (ft)						
Base Capacity (vph)	869	2721	1432	1301	696	786
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.10	0.17	0.26	0.14	0.34

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 3 (4%), Referenced to phase 2:NWT and 6:SETL, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 5.8
 Intersection LOS: A
 Intersection Capacity Utilization 33.7%
 ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 18: Main Street & Liberty Street





Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations			↑			↑
Volume (vph)	0	0	0	0	227	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						0.965
Satd. Flow (prot)	0	0	1900	0	0	1834
Flt Permitted						0.965
Satd. Flow (perm)	0	0	1900	0	0	1834
Link Speed (mph)	30		30			30
Link Distance (ft)	158		156			182
Travel Time (s)	3.6		3.5			4.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	247	90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	337
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	20.3%		ICU Level of Service A			
Analysis Period (min)	15					

HCM research expects at least one 'Stop' controlled approach at the intersection.



Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations			↑			↑
Volume (vph)	0	0	20	330	0	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.873			
Flt Protected						
Satd. Flow (prot)	0	0	1659	0	0	1900
Flt Permitted						
Satd. Flow (perm)	0	0	1659	0	0	1900
Link Speed (mph)	30		30			30
Link Distance (ft)	224		140			156
Travel Time (s)	5.1		3.2			3.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	22	359	0	90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	381	0	0	90
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	24.8%
ICU Level of Service	A
Analysis Period (min)	15

HCM research expects at least one 'Stop' controlled approach at the intersection.

Lanes, Volumes, Timings
21: Bond Street & Dwight Street

2018 Build with Improvements PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑			↑↑			↑				↑↓
Volume (vph)	0	332	0	0	167	82	0	249	83	1	0	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.951			0.966				0.866
Flt Protected												0.999
Satd. Flow (prot)	0	3610	0	0	3433	0	0	1835	0	0	1644	0
Flt Permitted												0.997
Satd. Flow (perm)	0	3610	0	0	3433	0	0	1835	0	0	1640	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					89			37				90
Link Speed (mph)		30			30			30				30
Link Distance (ft)		294			555			932				140
Travel Time (s)		6.7			12.6			21.2				3.2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	361	0	0	182	89	0	271	90	1	0	90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	361	0	0	271	0	0	361	0	0	91	0
Turn Type		NA			NA			NA		Perm		NA
Protected Phases		6			2			4				8
Permitted Phases										8		
Detector Phase		6			2			4		8		8
Switch Phase												
Minimum Initial (s)		4.0			4.0			4.0		4.0		4.0
Minimum Split (s)		10.0			10.0			10.0		10.0		10.0
Total Split (s)		28.0			28.0			42.0		42.0		42.0
Total Split (%)		40.0%			40.0%			60.0%		60.0%		60.0%
Yellow Time (s)		3.5			3.5			3.5		3.5		3.5
All-Red Time (s)		0.5			0.5			0.5		0.5		0.5
Lost Time Adjust (s)		0.0			0.0			0.0		0.0		0.0
Total Lost Time (s)		4.0			4.0			4.0		4.0		4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max			C-Max			None		None		None
Act Effct Green (s)		43.3			43.3			18.7				18.7
Actuated g/C Ratio		0.62			0.62			0.27				0.27
v/c Ratio		0.16			0.13			0.70				0.18
Control Delay		6.9			4.3			24.1				5.0
Queue Delay		0.0			0.0			0.0				0.0
Total Delay		6.9			4.3			24.1				5.0
LOS		A			A			C				A
Approach Delay		6.9			4.3			24.1				5.0
Approach LOS		A			A			C				A
90th %ile Green (s)		35.3			35.3			26.7		26.7		26.7
90th %ile Term Code		Coord			Coord			Gap		Hold		Hold
70th %ile Green (s)		40.4			40.4			21.6		21.6		21.6
70th %ile Term Code		Coord			Coord			Gap		Hold		Hold
50th %ile Green (s)		43.5			43.5			18.5		18.5		18.5
50th %ile Term Code		Coord			Coord			Gap		Hold		Hold

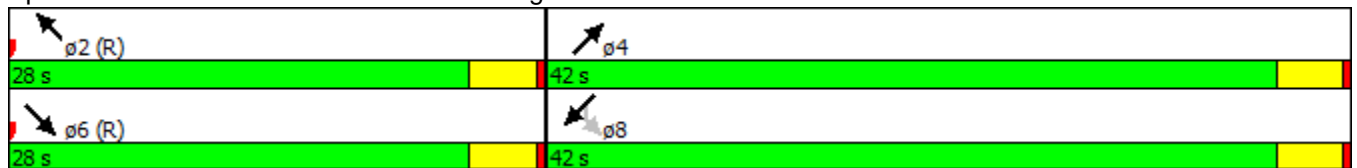


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
30th %ile Green (s)		46.5			46.5			15.5		15.5	15.5	
30th %ile Term Code		Coord			Coord			Gap		Hold	Hold	
10th %ile Green (s)		50.8			50.8			11.2		11.2	11.2	
10th %ile Term Code		Coord			Coord			Gap		Hold	Hold	
Stops (vph)		137			64			271				15
Fuel Used(gal)		2			2			6				0
CO Emissions (g/hr)		139			115			387				18
NOx Emissions (g/hr)		27			22			75				4
VOC Emissions (g/hr)		32			27			90				4
Dilemma Vehicles (#)		0			0			0				0
Queue Length 50th (ft)		30			8			125				0
Queue Length 95th (ft)		64			29			m179				26
Internal Link Dist (ft)		214			475			852				60
Turn Bay Length (ft)												
Base Capacity (vph)		2233			2157			1013				931
Starvation Cap Reductn		0			0			0				0
Spillback Cap Reductn		0			0			0				0
Storage Cap Reductn		0			0			0				0
Reduced v/c Ratio		0.16			0.13			0.36				0.10

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 20 (29%), Referenced to phase 2:NWT and 6:SET, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 11.8 Intersection LOS: B
 Intersection Capacity Utilization 34.0% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 21: Bond Street & Dwight Street



Lanes, Volumes, Timings
22: Dwight Street & I-291 WB Exit

2018 Build with Improvements PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑			↑↑						↑	↑
Volume (vph)	0	363	40	232	189	0	0	0	0	398	2	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.985										0.850
Flt Protected					0.973						0.953	
Satd. Flow (prot)	0	3556	0	0	3513	0	0	0	0	0	1811	1615
Flt Permitted					0.627						0.953	
Satd. Flow (perm)	0	3556	0	0	2263	0	0	0	0	0	1811	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21										67
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		555			435			935			487	
Travel Time (s)		12.6			9.9			21.3			11.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	395	43	252	205	0	0	0	0	433	2	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	438	0	0	457	0	0	0	0	0	435	67
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		6			2						8	
Permitted Phases				2						8		8
Detector Phase		6		2	2					8	8	8
Switch Phase												
Minimum Initial (s)		4.0		4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		10.0		10.0	10.0					10.0	10.0	10.0
Total Split (s)		35.0		35.0	35.0					35.0	35.0	35.0
Total Split (%)		50.0%		50.0%	50.0%					50.0%	50.0%	50.0%
Yellow Time (s)		3.5		3.5	3.5					3.5	3.5	3.5
All-Red Time (s)		0.5		0.5	0.5					0.5	0.5	0.5
Lost Time Adjust (s)		0.0			0.0						0.0	0.0
Total Lost Time (s)		4.0			4.0						4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max		C-Max	C-Max					None	None	None
Act Effct Green (s)		39.2			39.2						22.8	22.8
Actuated g/C Ratio		0.56			0.56						0.33	0.33
v/c Ratio		0.22			0.36						0.74	0.12
Control Delay		5.3			7.7						28.3	4.3
Queue Delay		0.0			0.0						0.0	0.0
Total Delay		5.3			7.7						28.3	4.3
LOS		A			A						C	A
Approach Delay		5.3			7.7						25.1	
Approach LOS		A			A						C	
90th %ile Green (s)		31.7		31.7	31.7					30.3	30.3	30.3
90th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap
70th %ile Green (s)		35.9		35.9	35.9					26.1	26.1	26.1
70th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap
50th %ile Green (s)		38.8		38.8	38.8					23.2	23.2	23.2
50th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap

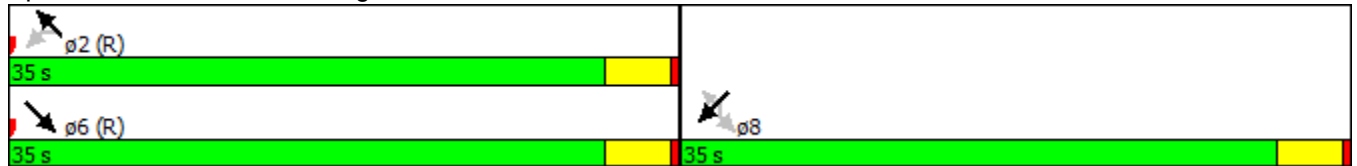


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
30th %ile Green (s)		42.6		42.6	42.6					19.4	19.4	19.4
30th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap
10th %ile Green (s)		47.2		47.2	47.2					14.8	14.8	14.8
10th %ile Term Code		Coord		Coord	Coord					Gap	Gap	Gap
Stops (vph)		126			239						332	11
Fuel Used(gal)		3			3						6	0
CO Emissions (g/hr)		201			238						395	24
NOx Emissions (g/hr)		39			46						77	5
VOC Emissions (g/hr)		47			55						92	6
Dilemma Vehicles (#)		0			0						0	0
Queue Length 50th (ft)		28			62						162	0
Queue Length 95th (ft)		41			105						217	20
Internal Link Dist (ft)		475			355			855			407	
Turn Bay Length (ft)												
Base Capacity (vph)		2002			1268						802	752
Starvation Cap Reductn		0			0						0	0
Spillback Cap Reductn		0			0						0	0
Storage Cap Reductn		0			0						0	0
Reduced v/c Ratio		0.22			0.36						0.54	0.09

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 18 (26%), Referenced to phase 2:NWTL and 6:SET, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 13.2 Intersection LOS: B
 Intersection Capacity Utilization 56.3% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 22: Dwight Street & I-291 WB Exit





Lane Group	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations	↘	↗	↕			↕
Volume (vph)	47	361	747	751	0	420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Fr _t		0.850	0.925			
Fl _t Protected	0.950					
Satd. Flow (prot)	1805	1615	3339	0	0	3610
Fl _t Permitted	0.950					
Satd. Flow (perm)	1805	1615	3339	0	0	3610
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		161	585			
Link Speed (mph)	30		30			30
Link Distance (ft)	410		435			133
Travel Time (s)	9.3		9.9			3.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	392	812	816	0	457
Shared Lane Traffic (%)						
Lane Group Flow (vph)	51	392	1628	0	0	457
Turn Type	NA	Perm	NA			NA
Protected Phases	4		6			2
Permitted Phases		4				
Detector Phase	4	4	6			2
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0			4.0
Minimum Split (s)	10.0	10.0	10.0			10.0
Total Split (s)	27.0	27.0	43.0			43.0
Total Split (%)	38.6%	38.6%	61.4%			61.4%
Yellow Time (s)	3.5	3.5	3.5			3.5
All-Red Time (s)	0.5	0.5	0.5			0.5
Lost Time Adjust (s)	0.0	0.0	0.0			0.0
Total Lost Time (s)	4.0	4.0	4.0			4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max			C-Max
Act Effct Green (s)	15.9	15.9	46.1			46.1
Actuated g/C Ratio	0.23	0.23	0.66			0.66
v/c Ratio	0.12	0.80	0.68			0.19
Control Delay	19.5	26.6	4.8			5.9
Queue Delay	0.0	0.5	0.2			0.0
Total Delay	19.5	27.1	5.0			5.9
LOS	B	C	A			A
Approach Delay	26.2		5.0			5.9
Approach LOS	C		A			A
90th %ile Green (s)	23.0	23.0	39.0			39.0
90th %ile Term Code	Max	Max	Coord			Coord
70th %ile Green (s)	19.8	19.8	42.2			42.2
70th %ile Term Code	Gap	Gap	Coord			Coord
50th %ile Green (s)	16.3	16.3	45.7			45.7
50th %ile Term Code	Gap	Gap	Coord			Coord

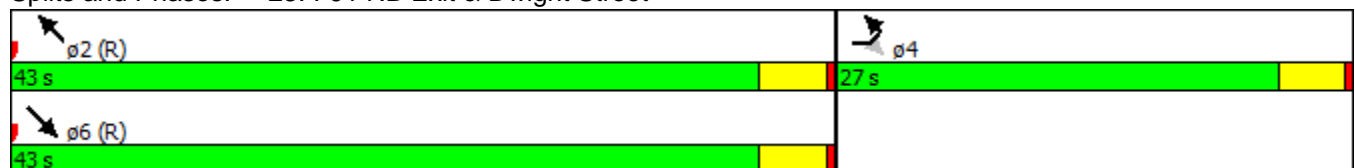


Lane Group	EBL	EBR	SET	SER	NWL	NWT
30th %ile Green (s)	12.8	12.8	49.2			49.2
30th %ile Term Code	Gap	Gap	Coord			Coord
10th %ile Green (s)	7.7	7.7	54.3			54.3
10th %ile Term Code	Gap	Gap	Coord			Coord
Stops (vph)	36	202	464			190
Fuel Used(gal)	1	6	9			2
CO Emissions (g/hr)	51	396	636			139
NOx Emissions (g/hr)	10	77	124			27
VOC Emissions (g/hr)	12	92	147			32
Dilemma Vehicles (#)	0	0	0			0
Queue Length 50th (ft)	17	92	41			45
Queue Length 95th (ft)	37	165	187			m70
Internal Link Dist (ft)	330		355			53
Turn Bay Length (ft)						
Base Capacity (vph)	593	638	2397			2376
Starvation Cap Reductn	0	0	202			0
Spillback Cap Reductn	0	49	17			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.09	0.67	0.74			0.19

Intersection Summary





















Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 2:NWT and 6:SET, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 8.9 Intersection LOS: A
 Intersection Capacity Utilization 73.8% ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 23: I-91 NB Exit & Dwight Street



Lanes, Volumes, Timings
24: Congress Street & Dwight Street

2018 Build with Improvements PM Peak
12/28/2012

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	50	458	502	33	284	7	163	186	46	33	444	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	500		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.997			0.970				0.956
Flt Protected	0.950			0.950			0.950					0.998
Satd. Flow (prot)	1805	1900	1615	1805	3599	0	1805	1843	0	0	1813	0
Flt Permitted	0.526			0.203			0.185					0.977
Satd. Flow (perm)	999	1900	1615	386	3599	0	352	1843	0	0	1775	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			362		3			24				41
Link Speed (mph)		30			30			30				30
Link Distance (ft)		225			399			1019				567
Travel Time (s)		5.1			9.1			23.2				12.9
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	482	528	35	299	7	172	196	48	35	467	243
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	482	528	35	306	0	172	244	0	0	745	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	1	6		5	2		7	4				8
Permitted Phases	6		6	2			4			8		
Detector Phase	1	6	6	5	2		7	4		8		8
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0		4.0
Minimum Split (s)	8.0	10.0	10.0	8.0	10.0		8.0	10.0		10.0		10.0
Total Split (s)	8.0	24.0	24.0	8.0	24.0		7.0	38.0		31.0		31.0
Total Split (%)	11.4%	34.3%	34.3%	11.4%	34.3%		10.0%	54.3%		44.3%		44.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5		3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5		0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0				4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag		Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes		Yes
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None		None
Act Effct Green (s)	26.4	24.8	24.8	25.6	23.2		34.0	34.0				27.0
Actuated g/C Ratio	0.38	0.35	0.35	0.37	0.33		0.49	0.49				0.39
v/c Ratio	0.13	0.72	0.66	0.16	0.26		0.74	0.27				1.05
Control Delay	14.1	28.8	11.5	10.1	15.8		29.6	5.1				64.0
Queue Delay	0.0	1.8	0.3	0.0	0.0		0.0	0.0				0.0
Total Delay	14.1	30.6	11.7	10.1	15.8		29.6	5.1				64.0
LOS	B	C	B	B	B		C	A				E
Approach Delay		20.4			15.2			15.2				64.0
Approach LOS		C			B			B				E
90th %ile Green (s)	4.0	20.0	20.0	4.0	20.0		3.0	34.0		27.0		27.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord		Max	Hold		Max		Max
70th %ile Green (s)	4.0	20.0	20.0	4.0	20.0		3.0	34.0		27.0		27.0

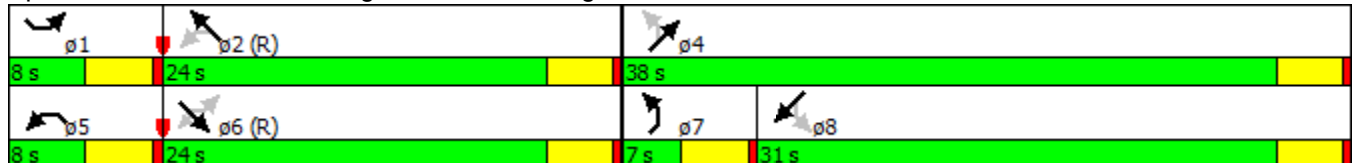


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
70th %ile Term Code	Max	Coord	Coord	Max	Coord		Max	Hold		Max	Max	
50th %ile Green (s)	4.0	28.0	28.0	0.0	20.0		3.0	34.0		27.0	27.0	
50th %ile Term Code	Max	Coord	Coord	Skip	Coord		Max	Hold		Max	Max	
30th %ile Green (s)	0.0	28.0	28.0	0.0	28.0		3.0	34.0		27.0	27.0	
30th %ile Term Code	Skip	Coord	Coord	Skip	Coord		Max	Hold		Max	Max	
10th %ile Green (s)	0.0	28.0	28.0	0.0	28.0		3.0	34.0		27.0	27.0	
10th %ile Term Code	Skip	Coord	Coord	Skip	Coord		Max	Hold		Max	Max	
Stops (vph)	33	353	161	24	244		81	118			470	
Fuel Used(gal)	0	5	3	0	3		3	3			15	
CO Emissions (g/hr)	29	380	206	21	223		190	191			1045	
NOx Emissions (g/hr)	6	74	40	4	43		37	37			203	
VOC Emissions (g/hr)	7	88	48	5	52		44	44			242	
Dilemma Vehicles (#)	0	0	0	0	0		0	0			0	
Queue Length 50th (ft)	15	161	40	11	66		12	11			~348	
Queue Length 95th (ft)	m21	#364	95	22	91		#86	32			#526	
Internal Link Dist (ft)		145			319			939			487	
Turn Bay Length (ft)	150			150			500					
Base Capacity (vph)	422	673	806	222	1194		233	907			709	
Starvation Cap Reductn	0	81	38	0	0		0	0			0	
Spillback Cap Reductn	0	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.13	0.81	0.69	0.16	0.26		0.74	0.27			1.05	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 48 (69%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 31.6 Intersection LOS: C
 Intersection Capacity Utilization 92.6% ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: Congress Street & Dwight Street



Lanes, Volumes, Timings
25: Liberty Street & Dwight Street

2018 Build with Improvements PM Peak
12/28/2012



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	35	449	67	0	0	0	195	181	102	313	245	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		0	150		0
Storage Lanes	1		0	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980						0.946				0.850
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	1805	3538	0	0	0	0	1805	1797	0	1805	1900	1615
Flt Permitted	0.950						0.541			0.497		
Satd. Flow (perm)	1805	3538	0	0	0	0	1028	1797	0	944	1900	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24						72				91
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		399			420			993			547	
Travel Time (s)		9.1			9.5			22.6			12.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	488	73	0	0	0	212	197	111	340	266	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	561	0	0	0	0	212	308	0	340	266	91
Turn Type	Perm	NA					Perm	NA		Perm	NA	Perm
Protected Phases		6						4			8	
Permitted Phases	6						4	4		8	8	8
Detector Phase	6	6					4	4		8	8	8
Switch Phase												
Minimum Initial (s)	4.0	4.0					4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	10.0	10.0					10.0	10.0		10.0	10.0	10.0
Total Split (s)	24.0	24.0					46.0	46.0		46.0	46.0	46.0
Total Split (%)	34.3%	34.3%					65.7%	65.7%		65.7%	65.7%	65.7%
Yellow Time (s)	3.5	3.5					3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5					0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0					0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0					4.0	4.0		4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max					None	None		None	None	None
Act Effct Green (s)	31.2	31.2					30.8	30.8		30.8	30.8	30.8
Actuated g/C Ratio	0.45	0.45					0.44	0.44		0.44	0.44	0.44
v/c Ratio	0.05	0.35					0.47	0.37		0.82	0.32	0.12
Control Delay	5.5	5.2					14.6	8.4		27.1	8.8	1.8
Queue Delay	0.0	0.0					0.0	0.0		0.0	0.0	0.0
Total Delay	5.5	5.2					14.6	8.4		27.1	8.8	1.8
LOS	A	A					B	A		C	A	A
Approach Delay		5.2						10.9			16.8	
Approach LOS		A						B			B	
90th %ile Green (s)	20.0	20.0					42.0	42.0		42.0	42.0	42.0
90th %ile Term Code	Coord	Coord					Hold	Hold		Max	Max	Max
70th %ile Green (s)	24.9	24.9					37.1	37.1		37.1	37.1	37.1



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
70th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
50th %ile Green (s)	30.2	30.2					31.8	31.8		31.8	31.8	31.8
50th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
30th %ile Green (s)	36.1	36.1					25.9	25.9		25.9	25.9	25.9
30th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
10th %ile Green (s)	44.7	44.7					17.3	17.3		17.3	17.3	17.3
10th %ile Term Code	Coord	Coord					Hold	Hold		Gap	Gap	Gap
Stops (vph)	0	132					130	130		214	108	7
Fuel Used(gal)	0	3					3	3		4	2	0
CO Emissions (g/hr)	10	202					196	237		297	145	30
NOx Emissions (g/hr)	2	39					38	46		58	28	6
VOC Emissions (g/hr)	2	47					45	55		69	34	7
Dilemma Vehicles (#)	0	0					0	0		0	0	0
Queue Length 50th (ft)	0	20					62	49		75	52	0
Queue Length 95th (ft)	m0	m33					94	52		104	74	m6
Internal Link Dist (ft)		319			340			913			467	
Turn Bay Length (ft)	150									150		
Base Capacity (vph)	803	1589					616	1107		566	1140	1005
Starvation Cap Reductn	0	0					0	0		0	0	0
Spillback Cap Reductn	0	0					0	0		0	0	0
Storage Cap Reductn	0	0					0	0		0	0	0
Reduced v/c Ratio	0.05	0.35					0.34	0.28		0.60	0.23	0.09

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 61 (87%), Referenced to phase 6:SETL, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 11.3 Intersection LOS: B
 Intersection Capacity Utilization 57.6% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 25: Liberty Street & Dwight Street





Lane Group	EBL	EBR	SBL	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↑				↑↑			↑↑	
Volume (vph)	0	462	0	0	0	375	0	0	497	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Fr _t		0.865							0.924	
Flt Protected										
Satd. Flow (prot)	0	1644	0	0	0	3610	0	0	3336	0
Flt Permitted										
Satd. Flow (perm)	0	1644	0	0	0	3610	0	0	3336	0
Link Speed (mph)	30		30			30			30	
Link Distance (ft)	398		403			693			263	
Travel Time (s)	9.0		9.2			15.8			6.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	502	0	0	0	408	0	0	540	554
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	502	0	0	0	408	0	0	1094	0
Sign Control	Stop		Free			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	45.6%
ICU Level of Service	A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 4.1

Movement	EBL	EBR	SBL	SBR	SEL	SET	SER	NWL	NWT	NWR
Vol, veh/h	0	462	0	0	0	375	0	0	497	510
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None	None	None	None	None
Storage Length	0	0	0	0	0	0	0	0	0	0
Median Width	0		0			6			6	
Grade, %	0%		0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	502	0	0	0	408	0	0	540	554
Number of Lanes	0	1	0	0	0	2	0	0	2	0

Major/Minor	Major 1			Major 2					
Conflicting Flow All	678	204		1095	0	0	408	0	0
Stage 1	408	-		-	-	-	-	-	-
Stage 2	270	-		-	-	-	-	-	-
Follow-up Headway	3.5	3.3		2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	390	809		645	-	-	1162	-	-
Stage 1	646	-		-	-	-	-	-	-
Stage 2	757	-		-	-	-	-	-	-
Time blocked-Platoon, %	0	0		0	-	-	0	-	-
Mov Capacity-1 Maneuver	390	809		645	-	-	1162	-	-
Mov Capacity-2 Maneuver	390	-		-	-	-	-	-	-
Stage 1	646	-		-	-	-	-	-	-
Stage 2	757	-		-	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	16.4	0	0
HCM LOS	C	-	-

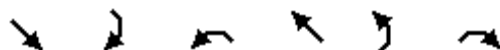
Minor Lane / Major Mvmt	NWL	NWT	NWR	EBLn1	SEL	SET	SER
Cap, veh/h	1162	-	-	809	645	-	-
HCM Control Delay, s	0	-	-	16.4	0	-	-
HCM Lane V/C Ratio	-	-	-	0.62	-	-	-
HCM Lane LOS	A	-	-	C	A	-	-
HCM 95th-tile Q, veh	0.0	-	-	4.4	0.0	-	-

Notes

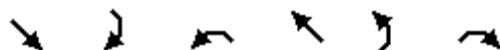
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lanes, Volumes, Timings
27: Congress Street & Chestnut Street

2018 Build with Improvements PM Peak
12/28/2012



Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑		↙	↑↑	↘	
Volume (vph)	413	427	145	819	186	198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	100		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Fr _t	0.924				0.930	
Fl _t Protected			0.950		0.976	
Satd. Flow (prot)	3336	0	1805	3610	1725	0
Fl _t Permitted			0.188		0.976	
Satd. Flow (perm)	3336	0	357	3610	1725	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	417				83	
Link Speed (mph)	30			30	30	
Link Distance (ft)	263			455	567	
Travel Time (s)	6.0			10.3	12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	449	464	158	890	202	215
Shared Lane Traffic (%)						
Lane Group Flow (vph)	913	0	158	890	417	0
Turn Type	NA		pm+pt	NA	NA	
Protected Phases	6		5	2	4	
Permitted Phases	6		2	2		
Detector Phase	6		5	2	4	
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	10.0		8.0	10.0	10.0	
Total Split (s)	29.0		13.0	42.0	28.0	
Total Split (%)	41.4%		18.6%	60.0%	40.0%	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	4.0		4.0	4.0	4.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	C-Max		None	C-Max	None	
Act Effct Green (s)	31.4		43.3	43.3	18.7	
Actuated g/C Ratio	0.45		0.62	0.62	0.27	
v/c Ratio	0.53		0.41	0.40	0.80	
Control Delay	9.4		10.4	3.6	29.4	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	9.4		10.4	3.6	29.4	
LOS	A		B	A	C	
Approach Delay	9.4			4.6	29.4	
Approach LOS	A			A	C	
90th %ile Green (s)	25.0		9.0	38.0	24.0	
90th %ile Term Code	Coord		Max	Coord	Max	
70th %ile Green (s)	26.3		9.3	39.6	22.4	

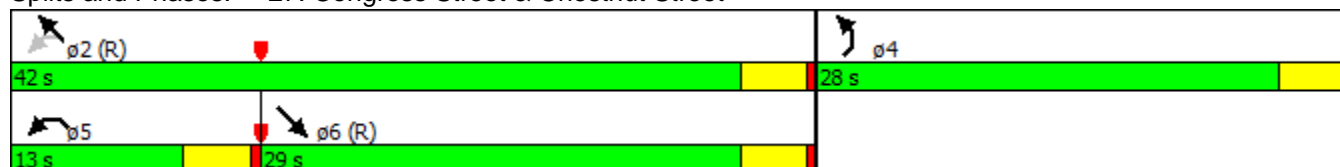


Lane Group	SET	SER	NWL	NWT	NEL	NER
70th %ile Term Code	Coord		Gap	Coord	Gap	
50th %ile Green (s)	30.5		8.1	42.6	19.4	
50th %ile Term Code	Coord		Gap	Coord	Gap	
30th %ile Green (s)	34.8		7.0	45.8	16.2	
30th %ile Term Code	Coord		Gap	Coord	Gap	
10th %ile Green (s)	40.6		5.9	50.5	11.5	
10th %ile Term Code	Coord		Gap	Coord	Gap	
Stops (vph)	337		53	139	283	
Fuel Used(gal)	5		1	4	6	
CO Emissions (g/hr)	363		78	299	389	
NOx Emissions (g/hr)	71		15	58	76	
VOC Emissions (g/hr)	84		18	69	90	
Dilemma Vehicles (#)	0		0	0	0	
Queue Length 50th (ft)	71		10	31	134	
Queue Length 95th (ft)	143		m37	60	213	
Internal Link Dist (ft)	183			375	487	
Turn Bay Length (ft)			100			
Base Capacity (vph)	1728		408	2232	645	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.53		0.39	0.40	0.65	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 6 (9%), Referenced to phase 2:NWTL and 6:SET, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 10.8
 Intersection LOS: B
 Intersection Capacity Utilization 65.6%
 ICU Level of Service C
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: Congress Street & Chestnut Street



Lanes, Volumes, Timings
28: Liberty Street & Chestnut Street

2018 Build with Improvements PM Peak
12/28/2012

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	221	0	239	160	642	126	42	156	0	0	218	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.975							0.850
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1805	0	1615	1805	3520	0	1805	1900	0	0	1900	1615
Flt Permitted	0.950			0.950			0.451					
Satd. Flow (perm)	1805	0	1615	1805	3520	0	857	1900	0	0	1900	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			260		36							81
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		455			438			547			526	
Travel Time (s)		10.3			10.0			12.4			12.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	240	0	260	174	698	137	46	170	0	0	237	214
Shared Lane Traffic (%)												
Lane Group Flow (vph)	240	0	260	174	835	0	46	170	0	0	237	214
Turn Type	Prot		Free	Split	NA		Perm	NA			NA	pm+ov
Protected Phases	1			2	2			4			8	1
Permitted Phases			Free				4	4			8	8
Minimum Split (s)	8.0			10.0	10.0		10.0	10.0			10.0	8.0
Total Split (s)	21.0			29.0	29.0		20.0	20.0			20.0	21.0
Total Split (%)	30.0%			41.4%	41.4%		28.6%	28.6%			28.6%	30.0%
Yellow Time (s)	3.5			3.5	3.5		3.5	3.5			3.5	3.5
All-Red Time (s)	0.5			0.5	0.5		0.5	0.5			0.5	0.5
Lost Time Adjust (s)	0.0			0.0	0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	4.0			4.0	4.0		4.0	4.0			4.0	4.0
Lead/Lag	Lead			Lag	Lag							Lead
Lead-Lag Optimize?	Yes			Yes	Yes							Yes
Act Effct Green (s)	17.0		70.0	25.0	25.0		16.0	16.0			16.0	37.0
Actuated g/C Ratio	0.24		1.00	0.36	0.36		0.23	0.23			0.23	0.53
v/c Ratio	0.55		0.16	0.27	0.65		0.24	0.39			0.55	0.24
Control Delay	25.6		0.2	17.4	20.9		22.6	21.8			29.3	6.2
Queue Delay	0.0		0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	25.6		0.2	17.4	20.9		22.6	21.8			29.3	6.2
LOS	C		A	B	C		C	C			C	A
Approach Delay					20.3			22.0			18.3	
Approach LOS					C			C			B	
Stops (vph)	176		0	109	590		28	92			188	62
Fuel Used(gal)	3		1	2	9		1	2			3	1
CO Emissions (g/hr)	203		60	120	640		37	130			226	98
NOx Emissions (g/hr)	40		12	23	124		7	25			44	19
VOC Emissions (g/hr)	47		14	28	148		9	30			52	23
Dilemma Vehicles (#)	0		0	0	0		0	0			0	0
Queue Length 50th (ft)	84		0	52	148		11	41			90	27
Queue Length 95th (ft)	m154		m0	96	207		37	97			157	60
Internal Link Dist (ft)		375			358			467			446	
Turn Bay Length (ft)												

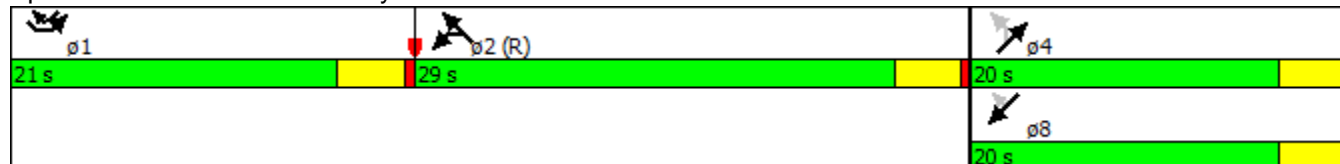


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Base Capacity (vph)	438		1615	644	1280		195	434			434	891
Starvation Cap Reductn	0		0	0	0		0	0			0	0
Spillback Cap Reductn	0		0	0	0		0	0			0	0
Storage Cap Reductn	0		0	0	0		0	0			0	0
Reduced v/c Ratio	0.55		0.16	0.27	0.65		0.24	0.39			0.55	0.24

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	59 (84%), Referenced to phase 2:NWTL, Start of Green
Natural Cycle:	40
Control Type:	Pretimed
Maximum v/c Ratio:	0.65
Intersection Signal Delay:	18.2
Intersection LOS:	B
Intersection Capacity Utilization	62.1%
ICU Level of Service	B
Analysis Period (min)	15
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 28: Liberty Street & Chestnut Street





Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	374	457	65	94	563	244
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850	0.920			
Flt Protected	0.950				0.950	0.980
Satd. Flow (prot)	1805	1615	1748	0	1715	1769
Flt Permitted	0.950				0.950	0.980
Satd. Flow (perm)	1805	1615	1748	0	1715	1769
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		497	83			
Link Speed (mph)	30		30			30
Link Distance (ft)	57		182			365
Travel Time (s)	1.3		4.1			8.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	407	497	71	102	612	265
Shared Lane Traffic (%)					29%	
Lane Group Flow (vph)	407	497	173	0	435	442
Turn Type	NA	Perm	NA		Split	NA
Protected Phases	2		4		3	3
Permitted Phases		2				
Detector Phase	2	2	4		3	3
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	10.0	10.0	10.0		8.0	8.0
Total Split (s)	27.0	27.0	12.0		31.0	31.0
Total Split (%)	38.6%	38.6%	17.1%		44.3%	44.3%
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	Max	Max	None		C-Max	C-Max
Act Effct Green (s)	23.6	23.6	7.4		27.0	27.0
Actuated g/C Ratio	0.34	0.34	0.11		0.39	0.39
v/c Ratio	0.67	0.57	0.67		0.66	0.65
Control Delay	26.6	4.9	24.2		8.5	7.9
Queue Delay	0.0	0.0	0.0		0.2	0.2
Total Delay	26.6	4.9	24.2		8.6	8.0
LOS	C	A	C		A	A
Approach Delay	14.6		24.2			8.3
Approach LOS	B		C			A
90th %ile Green (s)	23.0	23.0	8.0		27.0	27.0
90th %ile Term Code	MaxR	MaxR	Max		Coord	Coord
70th %ile Green (s)	23.0	23.0	8.0		27.0	27.0
70th %ile Term Code	MaxR	MaxR	Max		Coord	Coord
50th %ile Green (s)	23.0	23.0	8.0		27.0	27.0
50th %ile Term Code	MaxR	MaxR	Max		Coord	Coord

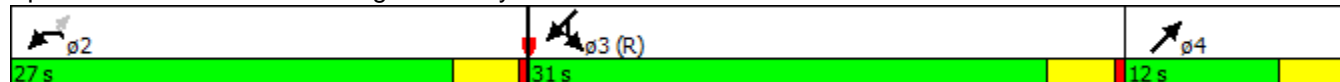


Lane Group	NWL	NWR	NET	NER	SWL	SWT
30th %ile Green (s)	23.7	23.7	7.3		27.0	27.0
30th %ile Term Code	MaxR	MaxR	Gap		Coord	Coord
10th %ile Green (s)	25.3	25.3	5.7		27.0	27.0
10th %ile Term Code	MaxR	MaxR	Gap		Coord	Coord
Stops (vph)	314	48	106		77	72
Fuel Used(gal)	4	1	2		2	2
CO Emissions (g/hr)	274	64	111		157	154
NOx Emissions (g/hr)	53	13	22		31	30
VOC Emissions (g/hr)	64	15	26		36	36
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (ft)	150	0	40		22	23
Queue Length 95th (ft)	244	60	#102		50	46
Internal Link Dist (ft)	1		102			285
Turn Bay Length (ft)						
Base Capacity (vph)	608	874	273		661	682
Starvation Cap Reductn	0	0	0		17	18
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.67	0.57	0.63		0.68	0.67

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 70
 Offset: 0 (0%), Referenced to phase 3:SWTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 12.6
 Intersection LOS: B
 Intersection Capacity Utilization 61.9%
 ICU Level of Service B
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 29: Garage & Emery Street





Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Volume (vph)	20	10	43	117	606	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.955				0.997	
Flt Protected	0.968			0.987		
Satd. Flow (prot)	1756	0	0	1875	1894	0
Flt Permitted	0.968			0.987		
Satd. Flow (perm)	1756	0	0	1875	1894	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	817			149	182	
Travel Time (s)	18.6			3.4	4.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	11	47	127	659	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	33	0	0	174	672	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	53.8%
	ICU Level of Service A
Analysis Period (min)	15

Intersection

Intersection Delay, s/veh 1.1

Movement	SEL	SER	NEL	NET	SWT	SWR
Vol, veh/h	20	10	43	117	606	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0	0			0
Median Width	12			0	0	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	22	11	47	127	659	13
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2	
Conflicting Flow All	886	665	672	0	- 0
Stage 1	665	-	-	-	- -
Stage 2	221	-	-	-	- -
Follow-up Headway	3.5	3.3	2.2	-	- -
Pot Capacity-1 Maneuver	318	464	928	-	- -
Stage 1	515	-	-	-	- -
Stage 2	821	-	-	-	- -
Time blocked-Platoon, %	0	0	0	-	- -
Mov Capacity-1 Maneuver	301	464	928	-	- -
Mov Capacity-2 Maneuver	301	-	-	-	- -
Stage 1	515	-	-	-	- -
Stage 2	777	-	-	-	- -

Approach	SE	NE	SW
HCM Control Delay, s	16.7	2.4	0
HCM LOS	C	-	-

Minor Lane / Major Mvmt	NEL	NET	SELn1	SWT	SWR
Cap, veh/h	928	-	341	-	-
HCM Control Delay, s	9.085	0	16.7	-	-
HCM Lane V/C Ratio	0.05	-	0.10	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th-tile Q, veh	0.2	-	0.3	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined