Traffic Impact Study

Proposed New City of Gardner Elementary School

Gardner, MA

April 19, 2019

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1 Summary Sheet

As an aid to reviewers, this Summary Sheet has been included to outline the various study parameters utilized in this report. Although a full explanation of the study methodologies is included in the text of the report, this summary can serve as a useful reference for reviewers.

Applicant:
City of Gardner

Site Acreage:
19 acres

Development Size/Type:
145,750 sqft New Elementary School to accommodate a total of 950 students.

Parking:
230 Spaces

Applications:
City of Gardner Planning Board

Build Year:
2022 is the projected opening year. 2026 is the future year used for the build condition in this study to satisfy the 7-year settle-in period outlined in MassDOT's Traffic Impact Assessment Guidelines.

Background Traffic Growth Factor:
2.0% annual growth

Traffic Counts:
Collected by Innovative Data - 3/19/2019 (Turning Movement Counts)
Collected by Innovative Data - 3/19/2019 (Automatic Traffic Recorders)

Peak Hours Analyzed:
AM Peak Hour – 8:00-9:00am
PM Peak Hour – 3:30-4:30pm

Expected Trip Generation:
AM Peak Hour – 618 trips. 54% entering, 46% exiting.
PM Peak Hour – 323 trips. 45% entering, 55% exiting.

Capacity Analysis:
Technique – Highway Capacity Manual 6th Edition
Execution – Synchro Professional Software, Version 10.0

2 Introduction

The following report summarizes the site traffic impact assessment for a proposed new City of Gardner elementary school with a main access road intersecting Pearl Street (Route 101). The proposed elementary school site will have a second access road connecting the elementary school parking area to Middle School Road/Catherine Street at the site of Gardner High School and Middle School. The proposed elementary school will be occupied by an estimated 950 students with approximately 230 new parking spaces. This report presents the results of field investigation, traffic counts, traffic generation estimation, crash history analysis, sight distance analysis, intersection capacity analysis, and queuing analysis.

3 Existing Condition

3.1 Site of Development

The development site is located on Pearl Street (Route 101) in Gardner, MA. The proposed primary access road to the site intersects Pearl Street on the north side between Ridgewood Ln and Smith St. The proposed site entrance is located across Pearl Street from the entrance to Dunn State Park, which has an address of 289 Pearl Street.

A locus map of the site location and the surrounding area is provided in Appendix B, Figure 1. The footprint of the proposed site utilizes three land parcels as described below.

- Parcel W27-11-1 is a 17.34 acre undeveloped parcel abutting Pearl Street currently zoned residential code 1300. This parcel is privately owned and would need to be acquired by the City of Gardner for the proposed development.
- Parcel W27-1-11 is a 1.92 acre vacant developable parcel zoned as land use code 3900 and owned by Massachusetts Electric Company. Easement rights to use this parcel would need to be acquired by the City of Gardner for the proposed development.
- Parcel R27-5-3 is a City of Gardner owned parcel at 297 Catherine Street. This parcel has an approximate area of 32 acres and is zoned 9314 for municipal education improved. This parcel is mostly wooded but includes a portion of the Gardner High School track and field facility. Middle School Rd, also known as Catherine Street, crosses the parcel connecting Gardner High School and Gardner Middle School.

The three site parcels total approximately 51 acres. The footprint of the proposed elementary school buildings, parking lots, and access roads make up roughly one third of the total parcel area.

Existing land use zoning for properties abutting the study area include: single-family residential, condominium residential, municipal education, undevelopable land, and vacant developable residential land.

3.2 Adjacent Road Network

The study area of influence includes portions of: Pearl Street, Smith Street, Betty Spring Road, and Catherine Street. This section provides a description of roads in the study area. Section 3.3 provides a description of the intersections in the study area. All streets are located within the City of Gardner.

PEARL STREET (STATE ROUTE 101)

- Location: Connects the center of the City of Gardner with State Route 140 to the east. The segment of Pearl Street immediately impacted by the proposed development is between the intersections with Smith Street and Catherine St.
- Traffic Volume: Automatic Traffic Recorder (ATR) data collected for this study in March of 2019 on Pearl Street between Ridgewood Ln and Smith Street gave a seasonally adjusted Average Annual Daily Traffic (AADT) of 5,681 vehicles.
- Speed limit: 30mph
- Lane geometry: Pearl Street is a two-lane road with 12ft lane width. Shoulder with varies from 8ft to 2ft.
- NHS: No, Pearl Street is not part of the National Highway System (NHS).
- Jurisdiction: Pearl Street is under the administrative jurisdiction of the City of Gardner.
- Functional classification: Pearl Street is functionally classified as an urban minor arterial and is federal-aid eligible.
- Adjacent land use: Single-family residential, residential condominium, municipal education, park land (Dunn State Park), undeveloped land.
- Sidewalks: There is a continuous 5ft wide sidewalk along the north side of Pearl St.
- Bike lanes: No.
- Transit: Montachusett Regional Transit Authority operates two bus routes on Pearl St, Gardner #1 and Gardner #2. Both bus routes stop and turn around at Smith Street near Dunn State Park before returning to the city center. Each route has a weekday frequency of 1 hour, the routes are staggered so that a city bus arrives on Pearl Street approximately every half hour.
- Parking: There is no parking on Pearl St.

CATHERINE STREET

- Location: Catherine Street intersects Pearl Street and continues north as the primary access road to Gardner High School and Gardner Middle School.
- Traffic volume: MassDOT's Road Inventory online GIS database cites an undated AADT of approximately 1,000. Daily traffic is likely higher when school is in session.
- Speed limit: 20mph.
- Lane geometry: Catherine Street is a two-lane road with 12ft lane and shoulders that vary from 2ft to 8ft.
- NHS: No, Catherine Street is not part of the NHS.
- Jurisdiction: Catherine Street is under the administrative jurisdiction of the City of Gardner.
- Functional classification: Catherine Street is a local road and is not federal-aid eligible.
- Adjacent land use: Single-family residential and municipal education.
- Sidewalks: There is a 6ft continuous sidewalk on the west side of Catherine St.

- Bike lanes: No.
- Transit: Montachusett Regional Transit Authority operates one bus route on Catherine St, Gardner #1. The bus arrives at Gardner High School on weekdays when school is in session only between 3pm and 5pm.
- Parking: On-street parking on both shoulders is permitted in front of the single family residential parcels along Catherine Street between Gardner High School and Pearl St.

SMITH STREET

- Location: Smith Street is located between Pearl Street and Chapel St.
- Traffic volume: MassDOT's Road Inventory online GIS database cites an undated AADT of approximately 1,000.
- Speed limit: 30mph
- Lane geometry: Smith Street is a two-lane road with 10ft lanes and 2ft shoulder width. There are no lane markings on Smith St.
- NHS: No, Smith Street is not part of the NHS.
- Jurisdiction: Smith Street is under the administrative jurisdiction of the City of Gardner.
- Functional classification: Smith Street is a local road and is not federal-aid eligible.
- Adjacent land use: Single-family residential, park land (Dunn State Park), and undeveloped land.
- Sidewalks: No.
- Bike lanes: No.
- Transit: No.
- Parking: There is no parking on Smith St.

BETTY SPRING ROAD

- Location: Betty Spring Rd is located between Pearl Street and State Route 140.
- Traffic volume: According to the MassDOT Road Inventory online GIS database, Betty Spring Rd had an AADT of 4,484 vehicles in 2016.
- Speed limit: 25mph
- Lane geometry: Betty Spring is a two-lane road with lane width of 11ft and varying shoulder width from 1ft to 2ft.
- NHS: No, Betty Spring Rd is not part of the NHS.
- Jurisdiction: Betty Spring Rd is under the administrative jurisdiction of the City of Gardner.
- Functional classification: Betty Spring Rd is an urban minor arterial and is federal-aid eligible.
- Adjacent land use: Single-family residential, park land (Dunn State Park), undeveloped land, Division of Fisheries and Wildlife land, developed land, warehouses for manufactured products, and motel.
- Sidewalks: No.
- Bike lanes: No.
- Transit: No.
- Parking: There is no parking on Betty Spring Rd.

RIDGEWOOD LANE

- Location: Ridgewood Ln intersects Pearl Street and continues to a dead end north of Pearl St.
- Traffic volume: There were no AADT counts available for Ridgewood Ln.

- Speed limit: 20mph
- Lane geometry: Ridgewood Ln is a two-lane road with lane width of 11ft and a shoulder width from of 2ft.
- NHS: No, Ridgewood Ln is not part of the NHS.
- Jurisdiction: Ridgewood Ln is a private road.
- Functional classification: Ridgewood Ln is a local road and is not federal aid eligible.
- Adjacent land use: Ridgewood Ln the only entrance and exit of a residential condominium community.
- Sidewalks: No.
- Bike lanes: No.
- Transit: No.
- Parking: There is no parking on Ridgewood Ln.

3.3 Study Area Intersections

The study area includes nearby intersections to the proposed site consisting of: Catherine Street at Pearl St, Betty Spring Rd at Pearl St, Ridgewood Ln at Pearl St, and Smith Street at Pearl St. The intersections are described in more detail below.

CATHERINE STREET at PEARL STREET
Geometry: A three-leg 'T' intersection. Catherine Street is aligned north/south terminating at Pearl St. The southbound Catherine Street approach has two turn-only lanes: one left-turn only lane and one right-turn only lane. The Catherine Street right-turn-only lane has a storage bay of 160ft long. Pearl is Street aligned east/west. The westbound Pearl Street approach is a single lane approach. The eastbound Pearl Street approach has two lanes: a through lane and a left-turn only lane for turns onto Catherine St. The left-turn only lane on Pearl Street extends 205ft from Catherine Street to the upstream intersection at Elizabeth Street.

Control: Pearl Street is uncontrolled. There is however a single flashing yellow beacon that flashes yellow to each approach on Pearl St. The beacon post is located on the south side of Pearl St. This same post also supports a single flashing red beacon for the Catherine Street approachfor emphasis and advanced warningof the stop-sign control.

Crosswalks:
There is one crosswalk crossing Catherine Street at the intersection with Pearl St. The crosswalk connects the sidewalk that is located along the north side of Pearl St.

BETTY SPRING ROAD at PEARL STREET
Geometry: A three-leg 'T' intersection. Betty Spring Rd is aligned north/south terminating at Pearl St. The northbound Betty Spring Rd approach has two turn-only lanes: one left-turn only lane and one right-turn only lane. The Betty Spring Rd right-turn only lane has a storage bay of 150ft long. Pearl Street is aligned east/west. The westbound Pearl Street approach is a single lane approach. The eastbound Pearl Street approach has two lanes: a through lane and a right-turn only lane for turns onto Betty Spring Rd. The right-turn-only lane on Pearl Street extends 100ft upstream.

Control: Pearl Street is uncontrolled at both approaches. Betty Spring Rd is stop-sign controlled.

Crosswalks: There are no crosswalks at this intersection.

RIDGEWOOD LANE at PEARL STREET
Geometry: A three-leg 'T' intersection. Ridgewood Ln is aligned northwest/southeast terminating at Pearl St. The Ridgewood Ln approach is a single lane approach. Pearl Street is aligned northeast/southwest. The Pearl Street approaches are single lane approaches.

Control: Pearl Street is uncontrolled at both approaches. Ridgewood Ln is stop sign controlled.

Crosswalks: There is one crosswalk across Ridgewood Ln at the intersection with Pearl St. The crosswalk connects the sidewalk along the north side of Pearl St.

SMITH STREET at PEARL STREET
Geometry: A three-leg 'T' intersection. Smith Street is aligned east/west terminating at Pearl St. The westbound Smith Street approach is a single lane approach with a channelized right turn onto Pearl Street. A grass island surrounded by granite curbing delineates the channelized right turn from Smith Street. Pearl Street is aligned northeast/southwest. Both Pearl Street approaches are single lane approaches.

Control: Pearl Street is uncontrolled at both approaches. Smith Street is stop-sign controlled.

Crosswalks: There are no crosswalks at this intersection.

3.4 Traffic Volumes, Speeds and Counts

TMC and PEAK HOUR DETERMINATION
In order to determine the traffic impact of the proposed elementary school, weekday morning and afternoon peak period manual turning movement counts (TMCs) were conducted on March 19, 2019 at the four identified intersections described in Section 3.3. The morning counts were conducted between 7:00am-9:00am and the afternoon counts were conducted between 2:00pm- 5:00pm. The AM peak hour of the study area intersections was observed as 7:00am-8:00am and the PM peak hour was 3:30pm-4:30pm. The raw data from the observed TMCs are shown in Appendix C.

The proposed elementary school development has very distinct weekday peak hours of trip generation. These hours coincide with the start and end of the school day. The two existing Gardner elementary schools, Elm Street School and Waterford Street School, currently have scheduled student drop-off times of 8:45am and 9:00am respectively for school start times of 9:00am and 9:15am respectively. The end of the school day is currently 3:15pm for Elm Street School and 3:30pm for Waterford Street School.

Based on the currently scheduled Gardner elementary school start and end times, the AM peak hour of trip generation for the proposed site is projected as 8:00am-9:00am, and the PM peak hour of trip generation for the site is projected as 3:30pm-4:30pm.

The greatest potential for traffic impact on the adjacent road network by the proposed elementary school will occur during the AM and PM peak hours of generation from the proposed site. The PM peak hour of generation for the proposed elementary school coincides with the existing observed peak hour of the adjacent study area intersections, 3:30pm-4:30pm. In the morning however, there is a one hour difference between the peak hour of the existing observed intersections, 7:00am-8:00am, and the peak hour of the proposed elementary school, 8:00am-9:00am. The peak hour of the proposed elementary school generation is selected in this study as the AM peak hour, because the proposed elementary school will generate a negligible number of trips between 7:00am-8:00am.

ATR COUNTS

Continuous 24-hour Automatic Traffic Recorder (ATR) traffic counts were conducted on Pearl Street between Ridgewood Ln and Smith Street in the vicinity of the proposed elementary school site. The ATR counts were conducted Tuesday-Wednesday March 19th-20th, 2019. The Average Daily Traffic (ADT) recorded over the 48-hour period was approximately 5,681 vehicles per day on Pearl St. The daily percentage of observed heavy vehicles, including trucks with six tires or more and buses made up 8.7% of observed vehicles. The weekday afternoon peak hour traffic was greater than the weekday morning peak hour traffic. The afternoon peak hour between 3:30pm-4:30pm had 561 vehicles while the morning peak hour between 7:00am-8:00am had 426 vehicles. Between 8:00-9:00am there were 329.

SPEED STUDY on PEARL STREET

Speed on Pearl Street was observed on Tuesday-Wednesday March 19th-20th, 2019. The posted speed limit on Pearl Street is 30 mph. Observed vehicle speeds in the southbound direction on Pearl Street were between 32 mph and 45 mph. The 85th percentile speed was 43 mph and the mean speed was 37 mph.

Operating speeds in the eastbound direction on Pearl Street were between 35 mph and 50 mph. The 85th percentile speed was 46 mph and the mean speed was 41 mph. The observed 85th percentile speeds, also known as the design speeds, indicate that operating speeds on Pearl Street exceed the posted speed limit of 30 mph. Copies of the ATR traffic data and observed speed data have been included in Appendix D of this report.

4 Background Traffic Conditions

4.1 Growth Rate

The proposed elementary school is projected to be opened by 2022. In order to satisfy MassDOT's Traffic Impact Assessment Guidelines, a seven-year build condition scenario was analyzed for the year 2026. The seven-year future scenario allows for full occupancy and operation at the proposed development. Future traffic conditions were estimated by applying an annual growth factor to all

existing peak hour turning movement traffic volumes to account for background regional growth characteristics such as other developments not yet programed, increasing population, or other travel behavior changes that may result in increased traffic volume.

To determine a growth rate for the background traffic volumes for the study area an inquiry was made to the transportation planning department at the regional Municipal Planning Organization, Montachusett Regional Planning Commission (MRPC). This request was made due to the absence of a permanent count traffic station on a comparable facility to Pearl Street in the vicinity of the City of Gardner. MRPC recommended a 2.0% annual growth rate for traffic volume on a minor arterial in the Montachusett region based on past precedent.

4.2 Background Developments

There are no other programmed developments anticipated to be completed during the 7-year analysis period that would impact traffic in the study area as of the time of this publication. Two projects currently in conceptual phases of planning were considered: 1) The development of an industrial warehouse site near the interchange of State Route 140 and Pearl Street near Old Matthews Rd, and 2) An expansion of multi-family residential housing at Meadowbrook Lane and Pearl Street. However, neither of these conceptual projects were found to be far enough along in the planning and approval process to be considered as imminent development for this study and no traffic data associated with these projects is available.

4.3 Planned Transportation Improvement Projects

There are no currently planned and programmed transportation improvement projects in the study area that will permanently impact the travel patterns in the study area.

4.4 Estimated Volumes

The raw peak hour count data from the TMC locations were graphically applied to the study area network. The volumes were not factored by the MassDOT seasonal weekday adjustment factor for the month of March, which is 0.97 for urban minor arterials. The factor was not applied because the counts were collected while school was in session, which is a relevant condition for this analysis. The resulting volumes are used as the Base Condition scenario. The weekday AM and PM 2019 Base Condition turning movement traffic volumes are given in Appendix B, Fig 2 and Fig 3.

To estimate the traffic volumes when the project is expected to be fully operational and occupied, the Base 2019 volumes were increased by a 2.0% annual growth rate for seven years. This volume projection

results in the 2026 No-Build Condition scenario. The weekday AM and PM 2026 No-Build Condition traffic volume estimates are given in Appendix B, Fig 4 and Fig 5.

5 Proposed Conditions

5.1 Development and Site Access

The project remains in a conceptual design phase; the description below describes the development concept at the time of this report publication. A conceptual plan view of the site development is included in Appendix E.

LAND USE

The proposed development consists of a new elementary school with associated parking and circulation areas, pupil pick up and drop off zones, and outdoor recreation spaces.

BUILDINGS

The proposed elementary school consists of three one-story structures connected by two enclosed corridors. The cumulative floor area of the proposed new elementary school buildings is approximately 145,750 sqft. The buildings are planned to accommodate 950 students in total. The parking area adjacent to the elementary school buildings is designed for 230 spaces.

SITE ACCESS

The road network layout on the site includes a primary access road connecting the parking area to Pearl St. The primary access road is a two-lane and two-way road. The road circulation pattern around the parking area is designed to provide separated access to the curbside frontage of the school for parent vehicle drop-offs and school buses.

The bus drop-off area has curb length of approx. 300ft to accommodate a maximum of 7 buses simultaneously unloading. The parent drop-off area is also approx. 300ft in length, enough room to accommodate approximately 15 vehicle drop-offs simultaneously. There is ample storage for queuing of parent drop-off vehicles. Measuring from the upstream end of curb in the parent drop-off area back to Pearl St, there is approximately 1,300 ft of storage for queuing, which is enough length to store approximately 65 passenger vehicles.

There is a secondary access connection road between the elementary school parking area and Middle School Rd/Catherine St. This connection road would connect the proposed elementary school to the campus of Gardner Middle School and Gardner High School. Because of the staggered drop-off and pick up times of Gardner High, Middle, and Elementary schools the connection road will not see significant traffic demand during pick-up and drop-off times at the proposed elementary school. The connection road does not provide an advantageous cut-through for vehicle drop-off and pick up maneuvers at the elementary school when compared with using the main access road entrance on Pearl Street.

The connection road does however potentially provide the school department with enhanced emergency access, safety, recreational opportunities, and convenience of services by allowing easy access between the proposed elementary school and the facilities of the other schools.

5.2 Pedestrian Access

The primary site access road is proposed to include an accessibility compliant pedestrian sidewalk along the eastern side. The school access road sidewalk will connect to the existing sidewalk that runs along the north side of Pearl St. The sidewalk continues from the access road through the proposed parking area and along the curb frontage of the school buildings, creating a continuous pedestrian path from Pearl Street to the proposed elementary school entrance.

It is recommended that the existing crosswalk crossing Pearl Street at the entrance to Dunn State Park be moved to the east side of the proposed new intersection. The moved crosswalk is recommended to connect to an accessible curb ramp on both sides of Pearl St. A new sidewalk on the south side of Pearl Street is also recommended between the relocated crosswalk and the bus stop at Smith Street, a distance of approximately 250ft.

5.3 Trip Generation

The expected site generated traffic volume was calculated using existing empirical data from the Institute of Transportation Engineers (ITE) publication Trip Generation, 10th Edition, 2017. This publication is an industry-accepted resource for determining trip generation.

"New" vehicle trips are trips by vehicles whose sole reason to be on the road is to travel to and from the project or have traveled out of their way to visit the site. New trips will increase the traffic volume on the adjacent streets. The proposed development site will attract 100 percent new trips. There will be no pass-by trips, which are trips to the site that already exist on the adjacent road and were unplanned upon departure from the trip origin.

Trip generation estimated for the proposed development was estimated based on the total number of students as the independent variable. The ITE land use code and number of students for this development are listed below.

- 950 students
- Land Use Code 520: Elementary School

Based on ITE rates, the proposed development is estimated to produce 1,796 vehicle trips over a typical 24-hour period on weekdays, 50 percent of trips entering and 50 percent exiting. During the weekday morning peak hour of site generation, 8:00-9:00am, the proposed school is estimated to generate 618 vehicle trips, 54 percent entering, and 46 percent exiting. During the afternoon peak hour, 3:30pm-4:30pm, the proposed school is estimated to generate 323 trips, 45 percent entering and 55 percent

exiting. The trip generation estimates from ITE show that the PM peak hour departures from school are more spread out during the afternoon when compared to morning arrivals.

Table 5.3-1 presents the daily and peak hour weekday trip estimates.

TABLE 5.3.1
Land Use Code 520 Elementary School
Proposed Gardner Elementary
Peak Hour Trip Generation Estimates

		Build Total Vehicle Trips	Existing Site Vehicle Trips	Net New Vehicle Trips
Weekday (24 Hour)				
	Entering:	898	0	898
	Exiting:	898	0	898
	Total:	1796	0	1796
Weekday AM Peak Hour of Site Generation 8:00-9:00am				
	Entering:	334	0	334
	Exiting:	284	0	284
	Total:	618	0	618
Weekday PM Peak Hour of Site Generation 3:30-4:30pm				
	Entering:	145	0	145
	Exiting:	178	0	178
	Total:	323	0	323

5.4 Trip Distribution

The distribution of traffic entering and exiting the proposed site was applied to the road network based on the proportions of observed Base Condition traffic. The estimated trips were routed to and from the proposed site via the primary access road intersection with Pearl Street only.

The proposed connection road between the parking area and Middle School Rd/Catherine Street was not assigned peak hour entrance and exit traffic to the elementary school for two reasons: 1) the distance from the proposed elementary school to the nearest arterial, Pearl Street, is significantly shorter using the main access road; and 2) the staggered start and end times of the high, middle, and elementary schools do not lend themselves easily to pick-up and drop-off trips chained in sequence among the different schools. The high and middle schools start and end one hour or more before the elementary school. There may be a small number of exceptions to this assumption, nevertheless the peak hour traffic volume on the proposed connection road appears to be negligible. This assumption presents the most conservative analysis of demand conditions at the proposed site driveway intersection.

Diagrams showing the percentages of distributed peak hour site generated trips in isolation are included in Appendix B, Fig. 6 and Fig. 7 for the AM and PM peak hours respectively.

Diagrams showing the values of distributed peak hour site generated trips are included in Appendix B, Fig. 8 and Fig. 9 for the AM and PM peak hours respectively.

5.5 Combined Volumes

The 2026 Combined Build Condition traffic volumes were calculated by adding the distributed new site traffic to the projected 2026 No-Build Condition traffic volumes. The 2026 Combined Build Condition traffic volumes are given diagrammatically in Appendix B, Fig 10 and Fig 11.

6 Analyses

6.1 Crash Data Review

In the study area, an analysis to determine crash experience at each intersection was prepared. Accident data was obtained from MassDOT for each of the study area intersections described in Section 3.3. The records were gathered for the most recent 3 years of available data, 2014 through 2016. The crash rates, expressed as "crashes per Million Entering Vehicles" (MEV), were determined using the turning movement counts and the average number of crashes during the three-year period. A summary of the accident data and resulting crash rates is provided in Appendix A, Table A1. MassDOT intersection crash calculation worksheets for the four existing study area intersections are included in Appendix H. The crash rates for each of the unsignalized intersections in the study area were determined to be well below the relevant MassDOT District 3 average of 0.61 crashes per MEV during the last 3 years.

6.2 Intersection Visibility Review

Intersection sight distance (ISD) and stopping sight distance (SSD) were measured and evaluated at the proposed site entrance locations in accordance with criteria set forth by the American Association of State Highway and Transportation Officials (AASHTO).

ISD accounts for the perception and reaction times needed to identify an appropriate gap in oncoming traffic thereby allowing the vehicle to safely turn onto a road and accelerate without causing severe speed reduction to conflicting vehicles. ISD is measured using a line of sight across the corners of an intersection from a point on the proposed intersecting access road set a minimum of 14.5 ft from the edge of the major road, the approximate point of view of a driver stopped and waiting to turn onto the major road.

SSD ensures that vehicles on the major road will have sufficient visibility to safely stop for another stopped vehicle in the road at an intersection. SSD is measured using a line of sight along the major roadway centerline. Stopping sight distance is considered the absolute minimum visibility criteria, while ISD is recommended where feasible and readily achievable to reduce the occurrence of severe braking on the major road.

Existing ISD and SSD were measured in the field at both the proposed primary site access road intersection on Pearl Street and the proposed secondary connection road intersection on Middle School Rd/Catherine St. The results are described below for each location. The sight distance calculation sheets are included in Appendix I.

PRIMARY SITE ACCESS ROAD at PEARL STREET

Required SSD is 385 ft based on the eastbound Pearl Street 85th percentile speed of 46 mph. The measured stopping sight distance was 1,075 ft for eastbound vehicles on Pearl St, exceeding the required SSD.

Required SSD is 355 ft based on the westbound Pearl Street 85th percentile speed of 43 mph. The measured stopping sight distance was 400 ft for southbound vehicles on Pearl St, exceeding the required SSD.

Given the observed 85th percentile speeds on Pearl St, the recommended ISD at the proposed access road intersection with Pearl Street is 645 ft in both directions. The existing ISD at the proposed site access road intersection is 280 ft for eastbound traffic on Pearl Street and 300 ft for westbound traffic. The proposed site access road intersection location does not meet the recommended ISD given existing conditions. The following steps are recommended to improve the ISD at the proposed site access road intersection with Pearl St:

1. Establish a 20mph School Zone on Pearl St: The proposed site access road intersection on Pearl Street meets the criteria for the establishment of a School Zone as described in MassDOT's Procedures for Speed Zoning on State Highways and Municipal Roads[1], since the elementary school property abuts the street and there is a school crossing within the site frontage.. At a speed of 20mph on Pearl St, the ISD for the proposed access road becomes 280 ft, which is attainable at the site.

It is recommended that the school zone include new signage and pavement markings in accordance with the Massachusetts Amendments to the Manual on Uniform Traffic Control Devices (MUTCD)[2], including flashing yellow beacons and posted time limits corresponding to the weekday AM and PM peak hours of school activity. MassDOT guidelines specify a School Zone length of 500 ft in both travel directions from the school entrance.

2. Enforcement of the posted speed limit on Pearl St: The observed 85th percentile speeds on Pearl Street were 46 mph in the eastbound direction and 43 mph in the westbound direction. Enforcement of the posted speed limit would enhance safety at the proposed elementary school access road, particularly for the safety of turning movements onto Pearl Street outside of the hours when the school speed zone is in effect.

3. Removal of trees from the intersection line of sight: For vehicles traveling on Pearl Street in the eastbound direction, the ISD would be enhanced by the removal of a linear stand of trees along the

1 MassDOT. Procedures for Speed Zoning on State Highways and Municipal Roads: Standards and Practices to Promote Safe and Efficient Travel in Massachusetts. Februrary 2017. pg. 21.
2 MassDOT. The Massachusetts Amendments to the 2009 MUTCD and the Standard Municipal Traffic Code. pgs.66-72.

north side of Pearl St. The stand of trees exists between Stump Pond and the proposed site access road intersection along the north shoulder of Pearl St. The trees appear to be a mix of mature pine and oak trees totaling approximately 15 number.

4. Relocation of utility poles: For vehicles traveling on Pearl Street in the southbound direction, the ISD would be enhanced by the relocation of three utility poles from the north side of Pearl St. The utility poles are numbered #36, #38, and #39. The current location of the poles interfere with ISD because of their current location at the edge of sidewalk and the horizontal curvature of Pearl St.

5. Tree trimming and brush control: For vehicles traveling on Pearl Street in the westbound direction, the ISD would be enhanced by annual tree trimming and brush growth control on the north side of Pearl St. There are trees and brush located on residential private property on the north side of Pearl Street that reduce ISD visibility when in full bloom. The trees and brush interfere with ISD because of the horizontal curvature of Pearl St.

Table 6.2-1 summarizes the sight distance results for the proposed intersection of Pearl Street and the proposed primary access road the elementary school.

TABLE 6.2.1
SIGHT DISTANCE MEASUREMENTS
Proposed New Elementary School- Gardner, MA

Location	Direction of Travel	Speed	Stopping Sight Distance		Intersection Sight Distance	
			Required[1]	Existing	Recommended[1]	Existing
Pearl St at Proposed Site Access Road						
	North/Eastbound	46 mph (observed 85th pctl)	385 ft	1,075 ft	645 ft	280ft[a]/925ft[b]
	South/Westbound	43 mph (observed 85th pctl)	355 ft	400 ft	645 ft	300ft[c]/380ft[d]
	North/Eastbound	30mph (posted)	205 ft	1,075 ft	420 ft	280ft[a]/925ft[b]
	South/Westbound	30mph (posted)	205 ft	400 ft	420 ft	300ft[c]/380ft[d]
	North/Eastbound	20mph (School Zone)	115 ft	1,075 ft	280 ft	280ft[a]/925ft[b]
	South/Westbound	20mph (School Zone)	120 ft	400 ft	280 ft	300ft[c]/380ft[d]

Notes:

[a] Existing sight distance at proposed access road intersection.

[b] Sight distance at proposed access road intersection after the removal of approx. 15 trees on the north side of Pearl St between Stump Pond and the proposed intersection.

[c] Existing sight distance at proposed access road intersection.

[d] Sight distance at proposed access road intersection after the relocation of utility poles #36, #38, and #39 out of the intersecton line of sight.

[1] Source: American Association of State Highway and Transportation Officials (AASHTO). 2018. A Policy on Geometric Design of Highways and Streets. Section 3.2.2.3 and Section 9.5.3.2.1

CONNECTION ROAD to MIDDLE SCHOOL ROAD/CATHERINE STEET

A speed study was not performed at Middle School Rd/Catherine Street located on the campus of Gardner High School and Middle School. The road is exclusively used by vehicles making trips to and from the school campus. The posted speed limit on the existing school campus is 20mph, which was used to calculate SSD and ISD.

The required SSD is 115 ft for both the northbound and southbound traffic on Middle School Rd/Catherine St. The measured stopping sight distance for a vehicle on Middle School Rd/Catherine to see an object at the location of the proposed connection road intersection was 370 ft for northbound traffic and 395 ft for southbound traffic. In both travel directions the existing centerline sight distance exceeded the required SSD.

Recommended ISD for the proposed connection road is 280 ft at the posted speed limit. The existing northbound ISD was 400 ft and the existing southbound ISD was 395ft, exceeding the recommended ISD for the proposed intersection location.

To ensure that sight distance requirements and recommendations are met, it is important that school campus speeds remain at the posted speed limit of 20 mph through enforcement, signage, and traffic calming measures if necessary.

Table 6.2-2 summarizes the sight distance results for the proposed intersection of Middle School Rd/Catherine Street and the proposed connection road to the elementary school.

TABLE 6.2.2
SIGHT DISTANCE MEASUREMENTS
Proposed New Elementary School- Gardner, MA

Location	Direction of Travel	Observed Speed	Stopping Sight Distance		Intersection Sight Distance	
			Required[1]	Existing	Recommended[1]	Existing
Proposed Connection Road at Middle School Road/Catherine St						
	Northbound	20 mph	115 ft	370ft	280 ft	400ft
	Southbound	20 mph	115 ft	395 ft	280 ft	395ft

Notes:

[1] Source: American Association of State Highway and Transportation Officials (AASHTO). 2018. A Policy on Geometric Design of Highways and Streets. Section 3.2.2.2 and Section 9.5.3.2.1

6.3 Intersection Capacity Analysis

Capacity analyses for the unsignalized intersections in the study area were conducted using Synchro Professional Software, version 10.0. Capacity analyses results are discussed using the measure of effectiveness (MOE), level of service (LOS).

LOS is a measure of traffic control delay time experienced by drivers while stopped at unsignalized intersections. The LOS ratings are intended to represent the driver's perception of operating conditions, which includes driver discomfort, frustration, fuel consumption, and lost travel time. Therefore, intersections with longer delay times are less acceptable to most drivers. LOS is rated on a scale from A to F, with A describing a condition of very low delay (less than 10 seconds per vehicle), and F describing a condition where delays will exceed 50 seconds per vehicle for unsignalized intersections. LOS F is assigned to any movement when the v/c ratio is greater than 1.0, regardless of the calculated delay.

The forgoing definitions for LOS, as well as the methodology for conducting unsignalized intersection capacity analyses, are taken from the "Highway Capacity Manual 6th Edition" published by the Transportation Research Board.

The capacity at intersections of an uncontrolled major street and a stop controlled minor street is determined by evaluating the presence of acceptable gaps for vehicles yielding right-of-way to enter the conflicting traffic stream. Priority is given to mainline left turns onto the minor street, followed by the minor street through and right-turn moves, and, finally, the minor street left-turns. The available capacity of an approach is reduced by the traffic volumes of the higher priority moves. LOS provides a description of the delay and operational characteristics of the turning vehicles at the intersection. Therefore, through vehicles on the mainline approaches are not LOS rated.

Using the above referenced methodologies, AM and PM peak hour capacity analyses were conducted at the following unsignalized intersections:

- Pearl Street and Catherine St
- Pearl Street and Betty Spring Rd
- Pearl Street and Ridgewood Ln
- Pearl Street and Smith St
- Pearl Street and Proposed Elementary Access Road

The stop controlled intersection at Middle School Rd/Catherine Street and the proposed connection road from the elementary school were not analyzed for AM and PM level of service. This road is expected to carry negligible traffic during the peak student pickup and drop-off hours due to the offset in school operation hours. The connection road may have high value to the City as a connection for emergency services or other service and recreational uses between the proposed elementary school and high/middle school campuses, but analysis does not support significant enough traffic demand during the peak commuting hours to necessitate a capacity analysis.

Preliminary capacity analysis results revealed the need for a right-turn only lane at the exit of the proposed site access road intersection with Pearl St. The right-turn only lane decreases delay for vehicles exiting the proposed site. The length of the right-turn only lane was simulated at 80 ft. This length of storage allows up to two school buses to wait for a left turn in the left-turn exit lane without impeding right-turning passenger vehicles.

- The following results assume that the proposed new access road from the site includes an 80ft right turn-only lane in addition to a left-turn exit lane at the intersection with Pearl St.

Table 6.3-1and Table 6.3-2 below present a summary of the levels of service at the unsignalized intersections, for both Background and Combined Build Conditions. Copies of the Synchro capacity analysis report sheets can be found in Appendices F and G for the AM and PM peak hours respectively.

TABLE 6.3.1 WEEKDAY MORNING PEAK HOUR 8:00-9:00am INTERSECTION CAPACITY ANALYSIS: LEVEL OF SERVICE SUMMARY							
		2019 Existing		2026 Background		2026 Combined	
Intersection	Movement	Delay	LOS	Delay	LOS	Delay	LOS
Pearl St and Catherine St							
Pearl St	NEB L	8.1	A	8.3	A	9.2	A
Catherine St	SB L	15.3	C	17.2	C	30.2	D
	SB R	10.6	B	11.1	B	13.6	B
Pearl St and Betty Spring Rd							
Pearl St	SWB L/T	7.7	A	7.8	A	8.4	A
Betty Spring Rd	NB R	9.3	A	9.4	A	10.9	B
	NB L	12.2	B	13.1	B	21.8	C
Pearl St and Rigewood Ln							
Pearl St	NEB L	7.7	A	7.8	A	8.4	A
Ridgewood Ln	SB L	9.7	A	10.0	B	12.1	B
Pearl St and Prop. Site Access Rd							
Pearl St	NEB L	N/A	N/A	N/A	N/A	9.1	A
Prop. Site Access Rd	SB L	N/A	N/A	N/A	N/A	42.5	E
	SB R	N/A	N/A	N/A	N/A	12.9	B
Pearl St and Smith St							
Pearl St	SWB L	0.0	A	0.0	A	0.0	A
Smith St	SWB L	11.2	B	11.2	B	13.5	B
	NEB R	9.1	A	9.1	A	9.7	A

*Delay is average stop time in seconds per vehide

The determination of the traffic impact from the proposed development is made through a comparison of the Background Conditions LOS (without the proposed development) versus the Combined Conditions LOS (with the proposed development).

During the AM peak hour, there are three existing unsignalized intersection movements that experience a change in LOS in the Combined Condition:

- Catherine Street at Pearl Street southbound left turn changes from LOS C to LOS D,
- Betty Spring Rd at Pearl Street northbound right turn changes from LOS A to LOS B, and
- Betty Spring Rd at Pearl Street northbound left turn changes from LOS B to LOS C.

While these changes in LOS show there will be an increase in delay to some existing turn movements onto Pearl Street as a result of the proposed elementary school, it should be noted that LOS D is generally considered acceptable in urban areas. The AM peak hour of the proposed elementary school, 8:00-9:00 AM, occurs after the AM peak hour of traffic on Pearl St. The start times of the High School and Middle School are 7:15am and 7:45am respectively. Therefore changes in turning movement LOS resulting from the proposed elementary school will not adversely affect the peak hours of commuting to the High School and Middle School.

At the proposed site access road intersection with Pearl Street in the AM period, the left-turn LOS from Pearl Street to the proposed site has a LOS of A. The stop controlled right turn from the proposed site access road onto Pearl Street has a LOS of B. The stop controlled left turn from the proposed site access road onto Pearl Street has a LOS of E. While LOS E represents a higher amount of delay than is desirable, it is generally considered the limit of permissible delay. The reduced speed in the recommended Pearl Street school zone will ensure that the left turn from the site access road onto Pearl Street can still be made safely. It should also be noted that the left turn from the proposed site access road is not the dominant turn movement exiting the site.

TABLE 6.3.2
WEEKDAY AFTERNOON PEAK HOUR 3:30-4:30pm
INTERSECTION CAPACITY ANALYSIS: LEVEL OF SERVICE SUMMARY

		2019 Existing		2026 Background		2026Combined	
Intersection	Movement	Delay	LOS	Delay	LOS	Delay	LOS
Pearl St and Catherine St							
Pearl St	NEB L	8.5	A	8.8	A	9.4	A
Catherine St	SB L	22.9	C	29.8	D	45.2	E
	SB R	12.0	B	13.1	B	15.3	C
Pearl St and Betty Spring Rd							
Pearl St	SWB L/T	8.2	A	8.4	A	8.7	A
Betty Spring Rd	NB R	10.2	B	10.5	B	11.4	B
	NB L	16.5	C	19.6	C	29.4	D
Pearl St and Rigewood Ln							
Pearl St	NEB L	8.0	A	8.2	A	8.6	A
Ridgewood Ln	SB L	11.0	B	11.7	B	13.8	B
Pearl St and Prop. Site Access Rd							
Pearl St	NEB L	N/A	N/A	N/A	N/A	8.5	A
Prop. Site Access Rd	SB L	N/A	N/A	N/A	N/A	22.4	C
	SB R	N/A	N/A	N/A	N/A	11.7	B
Pearl St and Smith St							
Pearl St	SWB L	7.8	A	7.9	A	7.8	A
Smith St	SWB L	12.7	B	13.7	B	12.7	B
	NEB R	9.6	A	9.8	A	9.6	A

*Delay is average stop time in seconds per vehide

During the PM peak hour, there are three existing unsignalized intersection movements that experience a change in LOS in the Combined Condition:

- Catherine Street at Pearl Street southbound left turn changes from LOS D to LOS E,
- Catherine Street at Pearl Street southbound right turn changes from LOS B to LOS C,
- Betty Spring Rd at Pearl Street at northbound left turn changes from LOS C to LOS D.

As described the AM peak, these changes in LOS show there will be an increase in delay to some existing turn movements onto Pearl Street as a result of the proposed elementary school. As stated previously, LOS D is generally considered acceptable in urban areas and LOS E is the limit of permissible delay.

The PM peak hour on Pearl St, 3:30-4:30 PM, which is also the PM peak hour for travel from the proposed elementary school, occurs after the dismissal times of the High School and Middle School, which let out at 2:00pm and 2:30pm respectively. The changes in turning movement LOS resulting from the proposed elementary school will not adversely affect the peak hours of commuting from the High School and Middle School.

At the proposed site access road intersection with Pearl Street in the PM period, the left-turn LOS from Pearl Street to the proposed site has a LOS of A. The stop controlled right turn from the proposed site access road onto Pearl Street has a LOS of B. The stop controlled left turn from the proposed site access road onto Pearl Street has a LOS of C. These results show that the PM peak traffic delay at the proposed intersection is well within an acceptable range.

6.4 Queue Analysis

Background and Combined Condition 95th percentile (design) queue lengths were reviewed at each intersection in the study area. The 95th percentile (design) vehicle queue lengths represent the practical maximum queue lengths that can be expected at each of the critical approach lanes of the study area intersections. The queue lengths are provided in the Synchro capacity analysis report sheets, which are located in Appendices F and G for the AM and PM peak hours respectively.

Table 6.4-1and Table 6.4-2 provide a summary of the queue lengths for turning movements of the study area intersections for the AM and PM peak hours respectively.

TABLE 6.4.1
WEEKDAY MORNING PEAK HOUR 8:00-9:00am
INTERSECTION QUEUING ANALYSIS

Intersection	Movement	2019 Existing 95th pctl Queue veh	2026 Background 95th pctl Queue veh	2026 Combined 95th pctl Queue veh
Pearl St and Catherine St				
Pearl St	NEB L	0.1	0.2	0.2
Catherine St	SB L	0.1	0.1	0.2
	SB R	0.1	0.2	0.3
Pearl St and Betty Spring Rd				
Pearl St	SWB L/T	0.0	0.0	0.1
Betty Spring Rd	NB R	0.0	0.0	0.1
	NB L	0.4	0.5	0.9
Pearl St and Rigewood Ln				
Pearl St	NEB L	0.1	0.1	0.1
Ridgewood Ln	SB L	0.2	0.4	0.4
Pearl St and Prop. Site Access Rd				
Pearl St	NEB L	N/A	N/A	0.8
Prop. Site Access Rd	SB L	N/A	N/A	2.8
	SB R	N/A	N/A	1.5
Pearl St and Smith St				
Pearl St	SWB L	0.0	0.0	0.0
Smith St	SWB L	0.1	0.2	0.2
	NEB R	0.0	0.0	0.0

In the Combined Build Condition AM peak hour none of the existing intersections had a 95th percentile queue length that increased by more than one vehicle length. None of the Combined Build Condition queue lengths, when compared to the No Build Condition, exceeded the available storage bays. No upstream driveways or intersections were blocked. The longest observed 95th percentile queue in the Combined Build Condition was for the left-turn movement exiting the proposed site access road, which had a 95th percentile queue length of 2.8 vehicles. The recommended right-turn bay of 80ft, approximately 4 passenger vehicle lengths, at the proposed access road exit will allow the left-turn movement to be stored in the left-turn lane without blocking right-turn movements.

TABLE 6.4.2 WEEKDAY AFTERNOON PEAK HOUR 3:30-4:30am INTERSECTION QUEUING ANALYSIS				
		2019 Existing	2026 Background	2026 Combined
Intersection	Movement	95th pctl Queue veh	95th pctl Queue veh	95th pctl Queue veh
Pearl St and Catherine St				
Pearl St	NEB L	0.3	0.4	0.5
Catherine St	SB L	0.6	0.9	1.4
	SB R	0.7	0.9	1.1
Pearl St and Betty Spring Rd				
Pearl St	SWB L/T	0.0	0.1	0.1
Betty Spring Rd	NB R	0.1	0.1	0.2
	NB L	1.0	1.4	2.2
Pearl St and Rigewood Ln				
Pearl St	NEB L	0.2	0.2	0.2
Ridgewood Ln	SB L	0.2	0.3	0.4
Pearl St and Prop. Site Access Rd				
Pearl St	NEB L	N/A	N/A	0.3
Prop. Site Access Rd	SB L	N/A	N/A	1.0
	SB R	N/A	N/A	0.7
Pearl St and Smith St				
Pearl St	SWB L	0.0	0.0	0.0
Smith St	SWB L	0.1	0.2	0.2
	NEB R	0.0	0.0	0.0

In the Combined Build Condition PM peak hour none of the existing intersections had a 95th percentile queue length that increased by more than one vehicle length from the No Build Condition. None of the Combined Build Condition queue lengths exceeded the available storage bays. No upstream driveways or intersections were blocked. The longest observed 95th percentile queue in the Combined Build Condition was for the left-turn movement of vehicles traveling northbound on Betty Spring Rd, which had a queue length of 2.2 vehicles. The existing left-turn storage bay for this movement is approximately 150ft, or 7.5 vehicle lengths.

The proposed development results in increased 95th percentile queue lengths that are well within the storage capacity of the study area intersections.

7 Auxiliary Lane Analysis

7.1 Left-Turn Lane Warrant Analysis

Because left turns on a two-lane road can contribute to rear-end crashes, left-lanes may be advisable even when the left-turn movement LOS and queue length are well within acceptable limits. Left-turns influence rear-end crashes on two-lane roads because of the interaction of the decelerating or stopped turning vehicles and through moving vehicles approaching behind them.

According to AASHTO's most recent recommendations on four-way intersection left-turn auxiliary lane warrants[3], a left-turn lane is recommended when a major road approach volume exceeds 50 veh/hr with a left-turn volume of 5 percent. The intersection of the proposed site driveway and Pearl Street is considered a four-way intersection due to the curb-cut entrance at Dunn State Park on the south side of Pearl St.

The AM and PM peak hour left-turn movements on Pearl Street at the proposed site driveway intersection surpass the recommended threshold for a left-turn auxiliary lane. In the Build Condition AM peak hour, there is an eastbound Pearl Street volume of 356 veh/hr and 54 percent left turns. The Build Condition PM peak hour eastbound volume on Pearl Street is 367 veh/hr with 24 percent left turns.

It is recommended that a left-turn lane be added to Pearl Street at the east bound approach to the proposed intersection with the site driveway. MassDOT's design guide[4] currently recommends a left-turn lane length of 220 ft for deceleration and storage when the design speed is 30mph. Additionally a taper length of 100 ft is recommended for the auxiliary left-turn lane. The left-turn lane is recommended to have a minimum width of 10 ft. The current width of pavement at the proposed site driveway intersection, which is approximately 48ft, appears to allow for the addition of an eastbound auxiliary left-turn lane through pavement marking modifications rather than road widening.

[3] American Association of State Highway and Transportation Officials (AASHTO). 2018. A Policy on Geometric Design of Highways and Streets. Section 9.7.3.1

[4] Massachusetts Highway Department. 2006. Project Development & Design Guide. Exhibit 6-21.

8 Conclusions & Recommendations

8.1 Conclusions

This report has described expected traffic conditions associated with the proposed new elementary school site development in Gardner, MA. The school is projected to accommodate 950 students with a start time of 8:45-9:00am and a dismissal time of 3:15-3:30pm. The proposed school site has a primary access road intersection on Pearl Street between the existing intersections of Ridgewood Ln and Smith St. A secondary connection road is proposed to intersect Middle School Rd/Catherine Street on the campus of Gardner High School and Middle School.

The study area consisted of 4 existing intersections along Pearl Street (SR 101) in Gardner. The intersecting roads were Catherine St, Betty Spring Rd, Ridgewood Ln, and Smith St. Existing conditions data collection included Automatic Traffic Recorder (ATR) counts on Pearl St, Turning Movement Counts (TMC) at the study area intersections, 48-hour speed observations on Pearl St, and field measurement of sight distance.

The most critical findings from the existing conditions data collection were:

- The prevailing operating speeds on Pearl Street are too high. The posted speed limit is 30mph. The northbound 85th%ile speed was 46 mph and the southbound speed was 43 mph.

- While the proposed site access road intersection location meets minimum requirements for sight stopping distance (SSD), the location does not meet recommended requirements for intersection sight distance (ISD) at the prevailing observed speed.

The following recommendations were made to enhance safety and visibility at the proposed elementary school access road intersection with Pearl St.

1). Establish a 20mph School Zone on Pearl St.
2). Enforcement of the posted speed limit on Pearl St.
3). Removal of trees from the intersection line of sight.
4). Relocation of utility poles.
5). Tree trimming and brush control along the north side of Pearl Street east of the site.

A crash rate analysis was performed using 2014-2016 crash data at the study area intersections. The results found that all of the existing study area intersections had crash rates well below the MassDOT District 3 average for unsignalized intersections. This demonstrated that none of the existing intersections in the study area have a history of safety concerns.

The Peak Hours for this study were based on the peak hour of the proposed site trip generation because the proposed school generates significantly fewer trips outside of the peak arrival and departure hours, particularly in the AM. The peak hours analyzed for this study were 8:00-9:00am and 3:30-4:30pm.

The year 2026 was chosen as the future analysis year. The background growth rate for traffic on the study area network was estimated as 2.0 percent annually based on the opinion of the regional MPO. There were no other programmed and approved development projects assumed to be open by the future analysis year 2026. There were no future programmed transportation improvements that were determined to have an effect on the study area.

The proposed elementary school is estimated to generate 1,796 vehicle trips per day; 50 percent entering and 50 percent exiting. The AM peak period is estimated to generate 618 vehicle trips per day; 54 percent entering and 46 percent exiting. The PM peak period is estimated to generate 323 vehicle trips; 45 percent entering and 55 percent exiting.

The newly generated trips in the Combined Build Condition were distributed using the proportional existing intersection volumes at the study area intersections. The proposed main entrance/exit on Pearl Street was assigned all the peak hour trips.

An intersection capacity analysis was performed using Synchro traffic analysis software that compared the No Build 2026 condition with the Combined Build 2026 condition. The results showed that in the AM peak period, three existing unsignalized turning movements will have a change in LOS due to the newly generated trips from the proposed development:

- Catherine Street at Pearl Street southbound left turn changes from LOS C to LOS D,
- Betty Spring Rd at Pearl Street northbound right turn changes from LOS A to LOS B, and
- Betty Spring Rd at Pearl Street northbound left turn changes from LOS B to LOS C.

Additionally in the PM peak period, three existing unsignalized turning movements will have a change in LOS due to the newly generated trips from the proposed development:

- Catherine Street at Pearl Street southbound left turn changes from LOS D to LOS E,
- Catherine Street Pearl Street southbound right turn changes from LOS B to LOS C, and
- Betty Spring Rd at Pearl Street northbound left turn changes from LOS C to LOS D.

These changes in levels of service and delay at the study area intersections are not insignificant, but the Combined Build Condition delay and levels of service remain within what is acceptable in an urban area, at or below LOS E.

The proposed elementary school access road intersection on Pearl Street between Ridgewood Ln and Smith Street showed acceptable levels of service for all turning movements. The left turn from Pearl Street to the site access road was found to have a LOS A for both AM and PM peak periods.

- It is necessary that the proposed elementary school exit at Pearl Street include a right-turn only bay of 80ft in length to improve delay and LOS of vehicles exiting the proposed site.

The left-turn movement from the proposed site access road onto Pearl Street had a LOS E in the AM peak period and a LOS C in the PM peak period. The AM delay and LOS is at the permissible limit for this movement.

A queue analysis was also performed on the study area intersections. Like the capacity analysis, the relevant comparison of peak hour queues was made between the No Build Condition and the Combined Build Condition. None of the queue lengths at existing study area intersections were increased by more than one vehicle. All Combined Build Condition queues were found to have adequate storage at their respective intersections.

The queuing at the proposed site access road exit was found to fit within the recommended storage capacity of 80 ft, the length of the recommended right-turn only exit lane and adjacent left-turn only exit lane.

A left-turn auxiliary lane warrant analysis showed that:

- The eastbound Pearl St approach to the proposed site driveway intersection is recommended to include a left-turn lane of 10ft in width and 220ft in length with a 100ft taper. The existing width of pavement appears to support the creation of a left-turn auxiliary lane through pavement marking modification while maintaining shoulders on either side.

Pedestrian access to the site will be by provided by an accessibility compliant sidewalk running along the east side of the proposed school access road. The sidewalk along the proposed school access road will connect to an existing sidewalk along the north side of Pearl St.

Recommended improvements for pedestrian access at the proposed new intersection on Pearl Street include:

- Move the existing crosswalk at the entrance to Dunn State Park to the east side of the proposed new intersection.
- Provide accessible sidewalk ramps on both ends of the relocated crosswalk traversing Pearl St.
- Extend the new sidewalk on the south side of Pearl Street to the nearby city bus stop at Smith Street and Pearl St, a distance of approx. 250ft.

The report concludes that the proposed new elementary school in Gardner will not degrade traffic conditions along Pearl Street when compared to the future No Build scenario beyond a permissible level. With the recommended improvements made to reduce speeds at the main entrance of the school and improve sight distance, the proposed new intersection at Pearl Street will operate safely. The recommended pedestrian improvements at the proposed new intersection will make the site accessible to pedestrians.

Appendix A

Tables

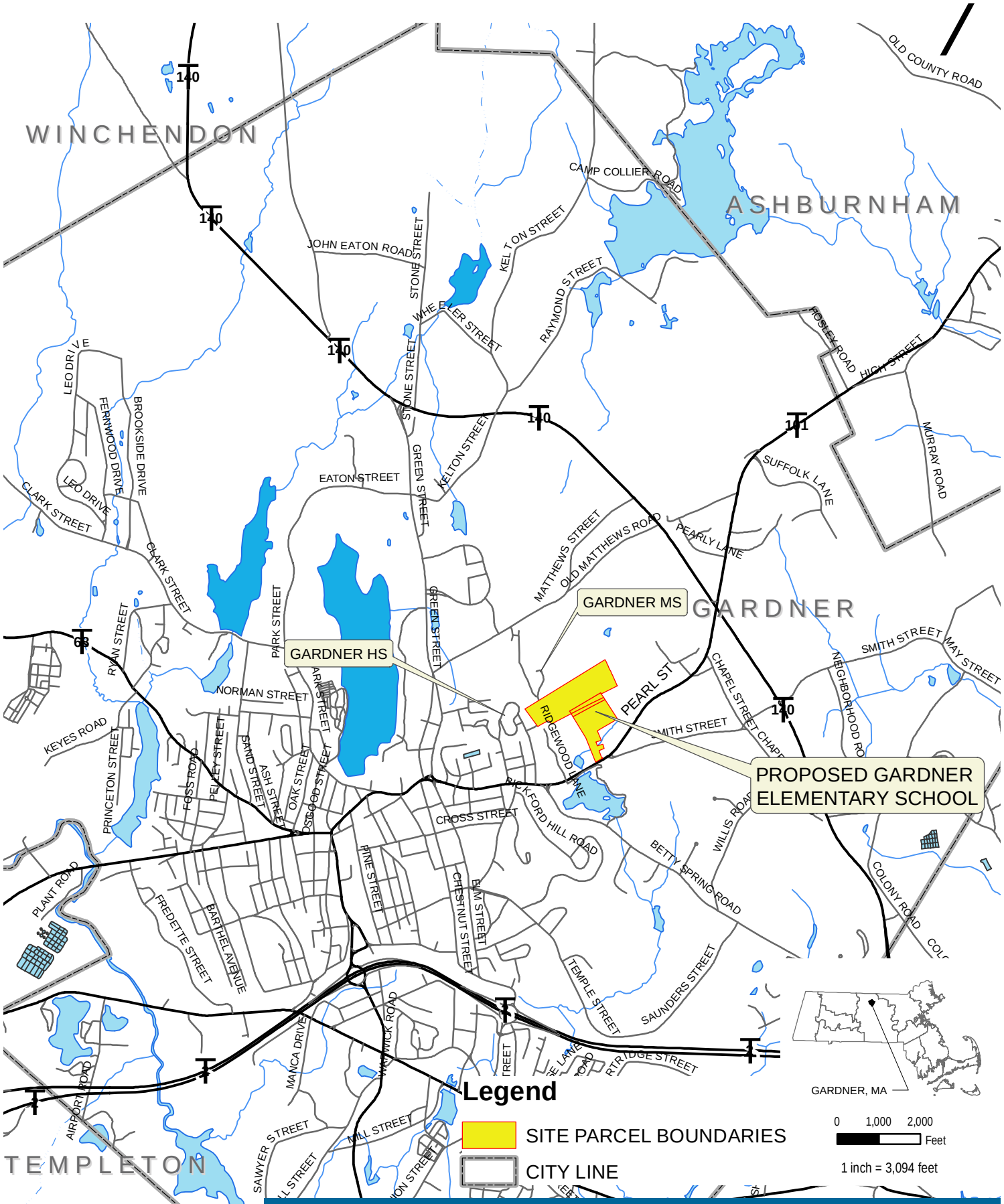
TABLE A1
CRASH DATA SUMMARY - 2014 to 2016
STUDY AREA INTERSECTIONS

Criteria	Pearl St at Catherine St	Pearl St at Betty Spring Rd	Pearl St at Ridgewood Ln	Pearl St at Smith St
YEAR				
2014	0	0	2	0
2015	0	1	0	0
2016	1	0	0	0
Total	1	1	2	0
Average No. of Crashes	0.33	0.33	0.67	0.00
Crash Rate	0.09	0.11	0.28	0.00
TYPE				
Angle	0	0	1	0
Rear-End	1	0	1	0
Head-On	0	0	0	0
Sideswipe	0	0	0	0
Pedestrian/Bicycle	0	0	0	0
Collision w/ Parked Car	0	0	0	0
Unknown/Other	0	1	0	0
Total	1	1	2	0
SEVERITY				
Property Damage Only	1	1	1	0
Non-fatal Injury	0	0	1	0
Fatality	0	0	0	0
Unknown/Other	0	0	0	0
Total	1	1	2	0
WEATHER				
Clear	0	1	2	0
Wet	0	0	0	0
Snow/Ice	1	0	0	0
Clouds	0	0	0	0
Fog	0	0	0	0
Unknown/Other	0	0	0	0
Total	1	1	2	0
TIME				
Weekday 7:30 AM - 9:30 AM	0	0	0	0
Weekday 3:30 PM - 5:30 PM	0	0	0	0
Other	1	1	2	0
Total	1	1	2	0

District #3 Average Crash Rates: 0.89 Signalized Intersections
0.61 Unsignalized Intersections

Appendix B

Figures



File Path: F:\P2018\0363\T10\Traffic Work\Traffic Figures\Figure 1 Location.mxd Plotted: Thursday, April 4, 2019

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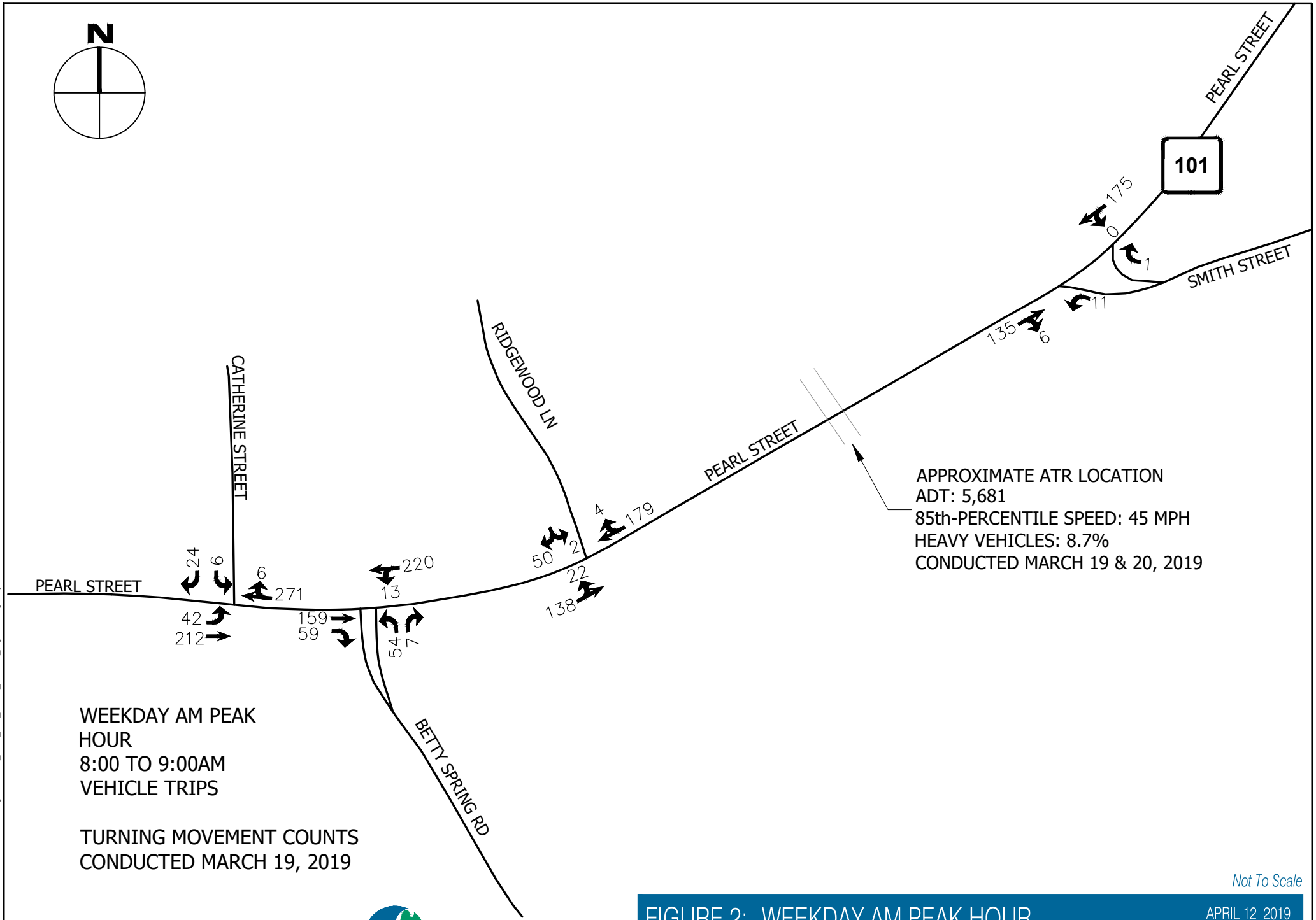
FIGURE 1: LOCUS MAP

PROJ. NO: 20180363.T10
PROP. NEW GARDNER ELEMENTARY
GARDNER, MA
April, 2019



Not To Scale

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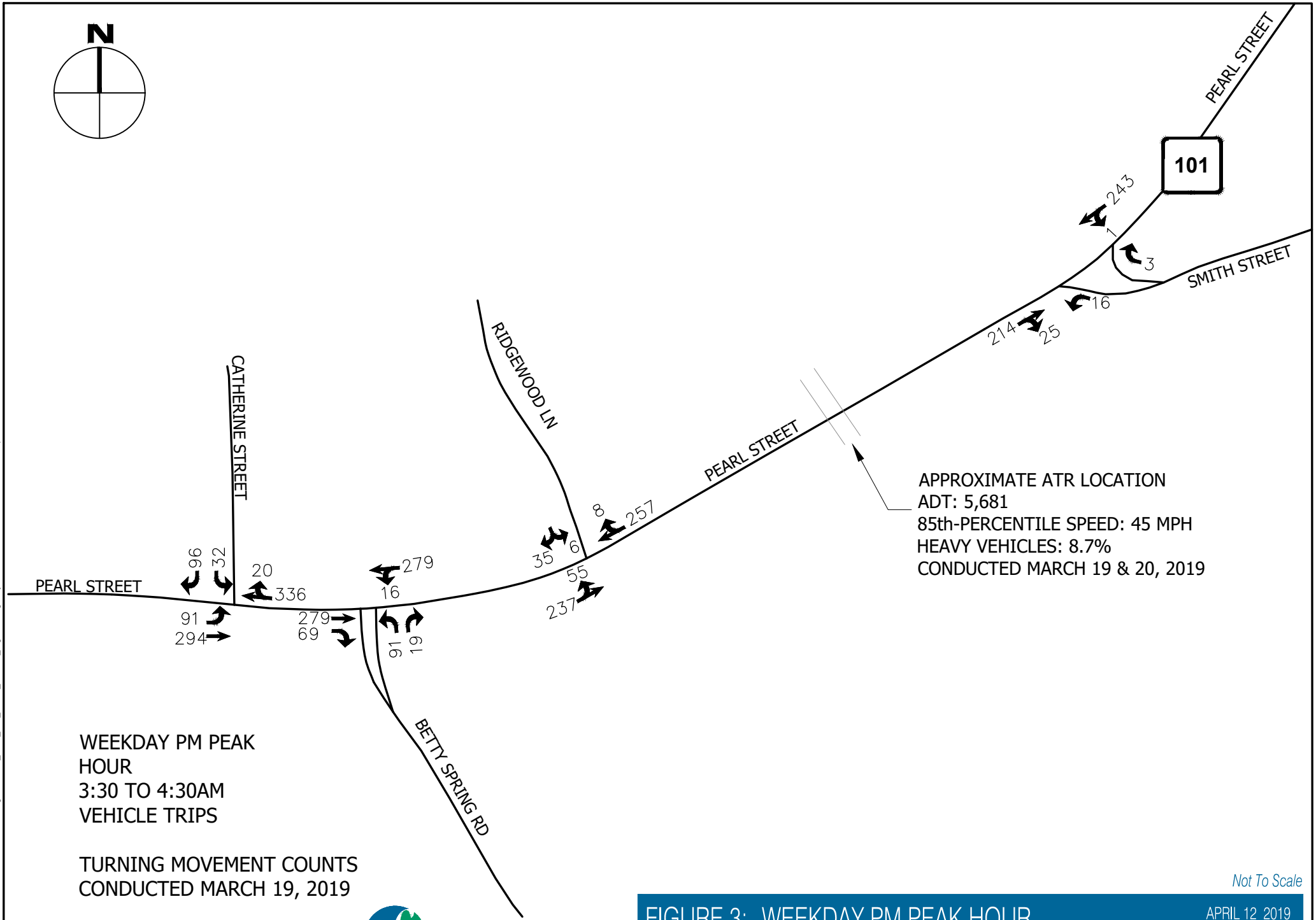
FIGURE 2: WEEKDAY AM PEAK HOUR 2019 EXISTING TRAFFIC CONDITIONS

APRIL 12 2019

PROJ. NO: 20180363.T10 | Proposed New City of Gardner Elementary School | GARDNER, MA



Not To Scale

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FIGURE 3: WEEKDAY PM PEAK HOUR 2019 EXISTING TRAFFIC CONDITIONS

APRIL 12 2019

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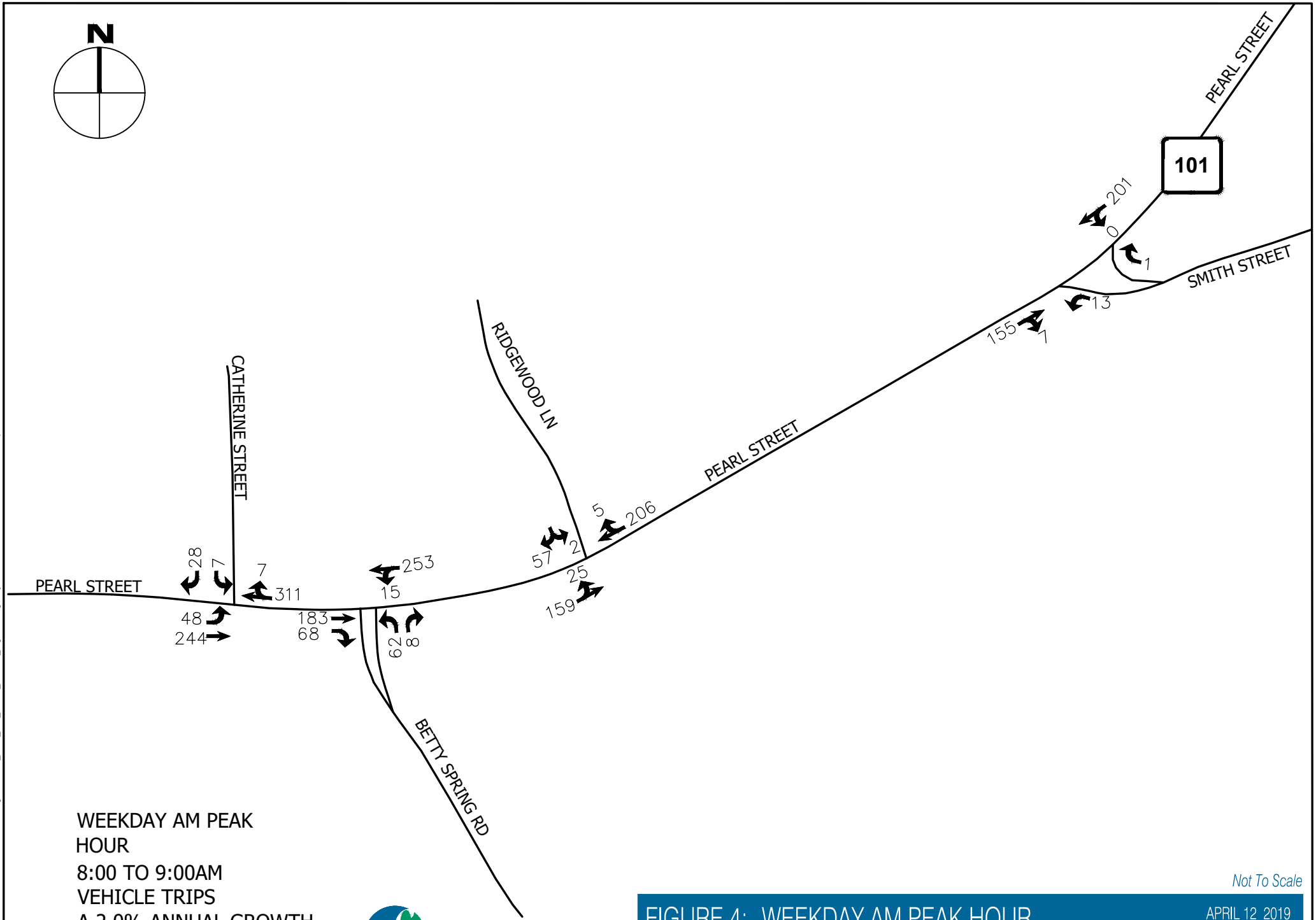

WEEKDAY AM PEAK HOUR
8:00 TO 9:00AM
VEHICLE TRIPS
A 2.0% ANNUAL GROWTH RATE WAS ASSUMED FROM 2019

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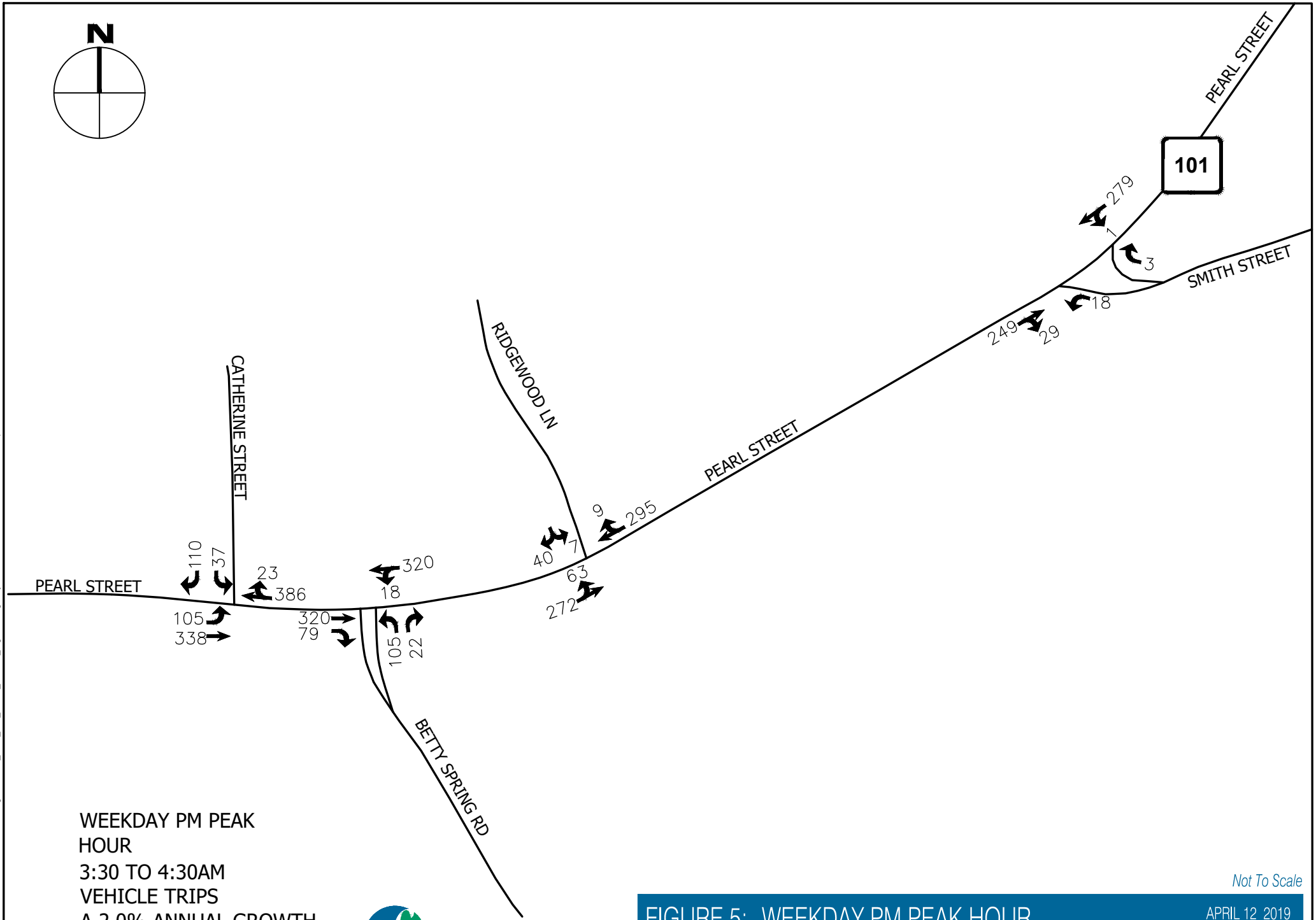
FIGURE 4: WEEKDAY AM PEAK HOUR 2026 BACKGROUND TRAFFIC CONDITIONS

APRIL 12 2019

PROJ. NO: 20180363.T10 | Proposed New City of Gardner Elementary School | GARDNER, MA



WEEKDAY PM PEAK HOUR
3:30 TO 4:30AM
VEHICLE TRIPS
A 2.0% ANNUAL GROWTH RATE WAS ASSUMED FROM 2019

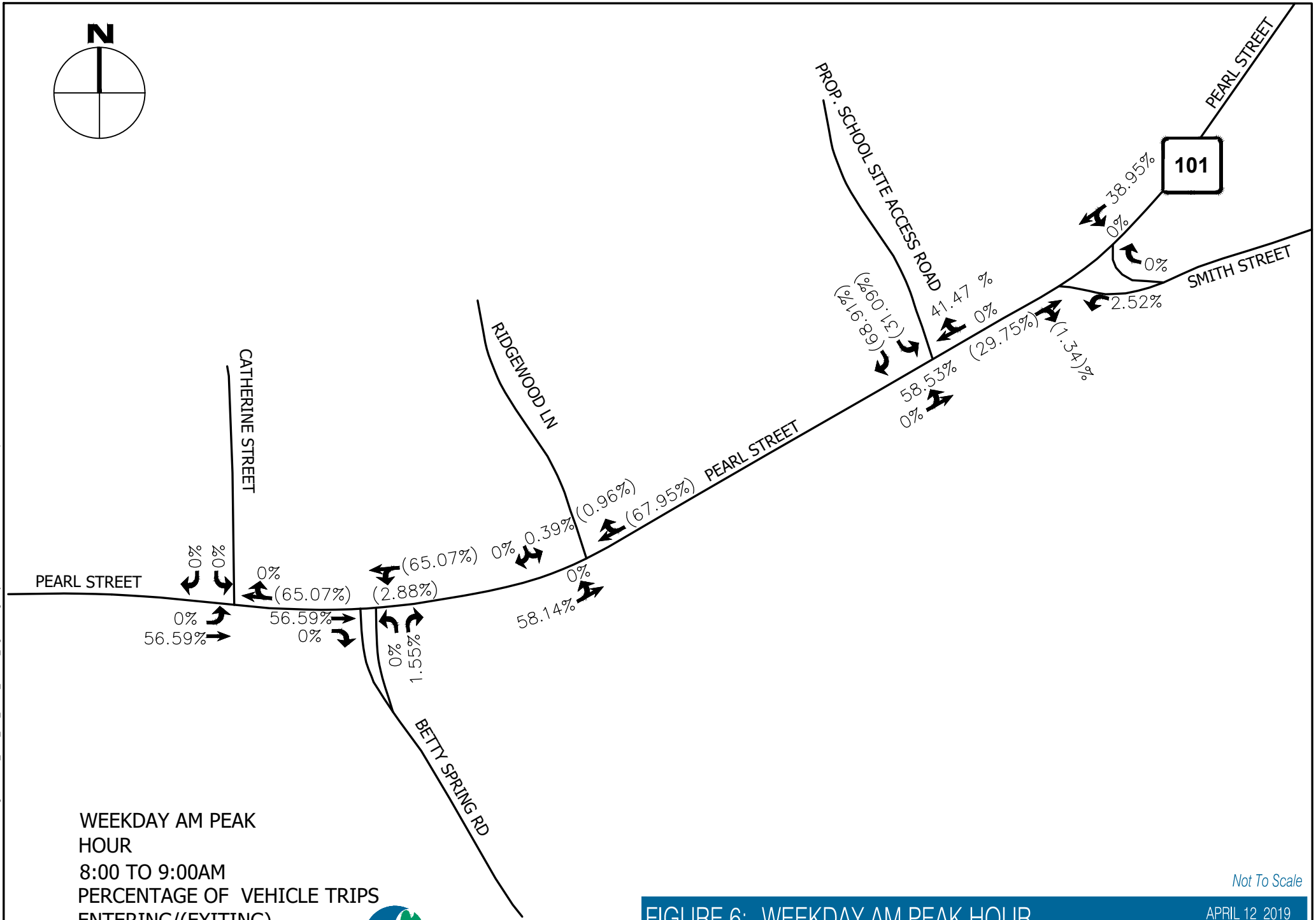
FUSS & O'NEILL
1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
www.fando.com

Not To Scale

FIGURE 5: WEEKDAY PM PEAK HOUR 2026 BACKGROUND TRAFFIC CONDITIONS

APRIL 12 2019

PROJ. NO: 20180363.T10 | Proposed New City of Gardner Elementary School | GARDNER, MA



WEEKDAY AM PEAK
HOUR
8:00 TO 9:00AM
PERCENTAGE OF VEHICLE TRIPS
ENTERING/(EXITING)

Not To Scale

FUSS & O'NEILL
1550 MAIN STREET, SUITE 400
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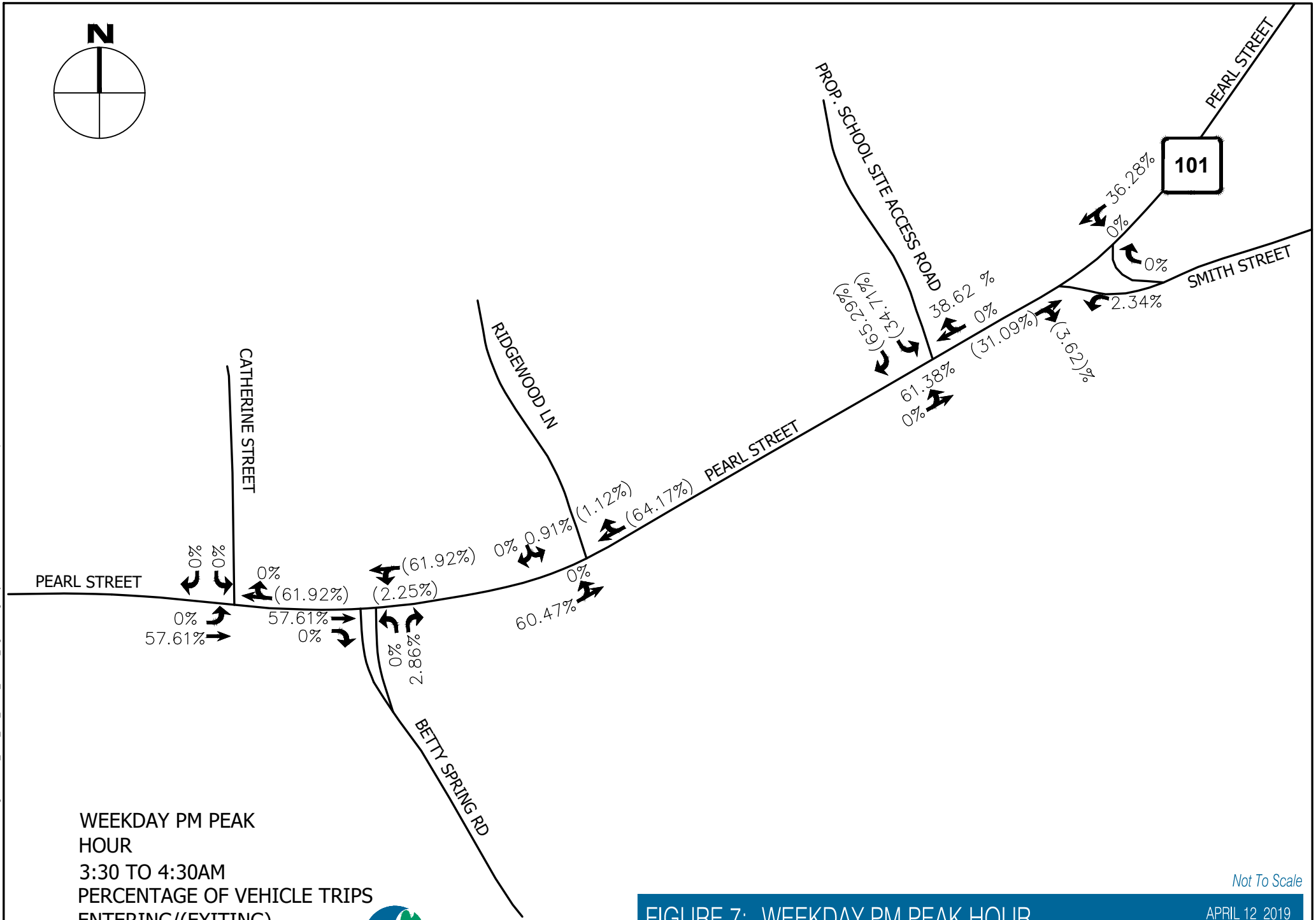
FIGURE 6: WEEKDAY AM PEAK HOUR
SITE GENERATED TRAFFIC DISTRIBUTION

APRIL 12 2019

PROJ. NO: 20180363.T10 Proposed New City of Gardner Elementary School GARDNER, MA

File Path: F:\P2018\0363\T10\Traffic Work\Traffic Figures\2018_0363_T10_Traffic_Volume_Figures.dwg Layout: FIG 6. AM DIST Plotted: Tue, April 16, 2019 - 9:43 AM User: AARON KEEGAN



WEEKDAY PM PEAK
HOUR
3:30 TO 4:30AM
PERCENTAGE OF VEHICLE TRIPS
ENTERING/(EXITING)

Not To Scale

FUSS & O'NEILL
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FIGURE 7: WEEKDAY PM PEAK HOUR SITE GENERATED TRAFFIC DISTRIBUTION

APRIL 12 2019

PROJ. NO: 20180363.T10 | Proposed New City of Gardner Elementary School | GARDNER, MA

WEEKDAY AM PEAK HOUR
8:00 TO 9:00AM
VEHICLE TRIPS ENTERING/(EXITING)

Not To Scale

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FIGURE 8: WEEKDAY AM PEAK HOUR SITE GENERATED TRAFFIC VOLUMES

APRIL 12 2019

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WEEKDAY PM PEAK HOUR
3:30 TO 4:30AM
VEHICLE TRIPS
ENTERING/(EXITING)

Not To Scale

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FIGURE 9: WEEKDAY PM PEAK HOUR SITE GENERATED TRAFFIC VOLUMES

APRIL 12 2019

PROJ. NO: 20180363.T10 | Proposed New City of Gardner Elementary School | GARDNER, MA

WEEKDAY AM PEAK HOUR
8:00 TO 9:00AM
VEHICLE TRIPS

Not To Scale

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FIGURE 10: WEEKDAY AM PEAK HOUR 2026 COMBINED BUILD CONDITION

APRIL 12 2019

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FIGURE 11: WEEKDAY PM PEAK HOUR
2026 PM COMBINED BUILD CONDITION

APRIL 12 2019

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Appendix C

Traffic Turning Movement Counts (TMCs)

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
Innovativedatallc.com or 1.413.668.5094

N / S: Catherine Street
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : AM Peak - Pearl @ Catherine
Site Code : 1
Start Date : 3/19/2019
Page No : 1

Groups Printed- PCs and Peds - Heavy Vehicles - Bicycles

	Catherine From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	60	0	12	0	72	46	53	0	0	99	0	0	0	0	0	0	68	154	0	222	393
07:15 AM	48	0	20	0	68	23	56	0	0	79	0	0	0	0	0	0	65	59	0	124	271
07:30 AM	59	0	23	0	82	22	52	0	0	74	0	0	0	0	0	0	60	92	0	152	308
07:45 AM	46	0	5	0	51	8	68	0	0	76	0	0	0	0	0	0	57	22	0	79	206
Total	213	0	60	0	273	99	229	0	0	328	0	0	0	0	0	0	250	327	0	577	1178
08:00 AM	6	0	4	0	10	3	68	0	0	71	0	0	0	0	0	0	58	9	0	67	148
08:15 AM	6	0	0	0	6	1	50	0	0	51	0	0	0	0	0	0	52	9	0	61	118
08:30 AM	8	0	0	0	8	2	78	0	0	80	0	0	0	0	0	0	38	12	0	50	138
08:45 AM	4	0	2	0	6	0	75	0	0	75	0	0	0	0	0	0	64	12	0	76	157
Total	24	0	6	0	30	6	271	0	0	277	0	0	0	0	0	0	212	42	0	254	561
Grand Total	237	0	66	0	303	105	500	0	0	605	0	0	0	0	0	0	462	369	0	831	1739
Apprch %	78.2	0	21.8	0		17.4	82.6	0	0		0	0	0	0		0	55.6	44.4	0		
Total %	13.6	0	3.8	0	17.4	6	28.8	0	0	34.8	0	0	0	0	0	0	26.6	21.2	0	47.8	
PCs and Peds	220	0	63	0	283	101	488	0	0	589	0	0	0	0	0	0	445	361	0	806	1678
% PCs and Peds	92.8	0	95.5	0	93.4	96.2	97.6	0	0	97.4	0	0	0	0	0	0	96.3	97.8	0	97	96.5
Heavy Vehicles	17	0	3	0	20	4	11	0	0	15	0	0	0	0	0	0	17	8	0	25	60
% Heavy Vehicles	7.2	0	4.5	0	6.6	3.8	2.2	0	0	2.5	0	0	0	0	0	0	3.7	2.2	0	3	3.5
Bicycles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0.1

	Catherine From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**60**	0	12	0	72	**46**	53	0	0	**99**	0	0	0	0	0	0	**68**	**154**	0	**222**	**393**
07:15 AM	48	0	20	0	68	23	56	0	0	79	0	0	0	0	0	0	65	59	0	124	271
07:30 AM	59	0	**23**	0	**82**	22	52	0	0	74	0	0	0	0	0	0	60	92	0	152	308
07:45 AM	46	0	5	0	51	8	**68**	0	0	76	0	0	0	0	0	0	57	22	0	79	206
Total Volume	213	0	60	0	273	99	229	0	0	328	0	0	0	0	0	0	250	327	0	577	1178
% App. Total	78	0	22	0		30.2	69.8	0	0		0	0	0	0		0	43.3	56.7	0		
PHF	.888	.000	.652	.000	.832	.538	.842	.000	.000	.828	.000	.000	.000	.000	.000	.000	.919	.531	.000	.650	.749
PCs and Peds																					
% PCs and Peds	92.5	0	95.0	0	93.0	96.0	96.9	0	0	96.6	0	0	0	0	0	0	96.0	97.6	0	96.9	95.9
Heavy Vehicles	16	0	3	0	19	4	6	0	0	10	0	0	0	0	0	0	10	8	0	18	47
% Heavy Vehicles	7.5	0	5.0	0	7.0	4.0	2.6	0	0	3.0	0	0	0	0	0	0	4.0	2.4	0	3.1	4.0
Bicycles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	0	0	0	0	0	0	0.4	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0.1

Innovative Data, LLC

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N / S: Catherine Street
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : AM Peak - Pearl @ Catherine
Site Code : 1
Start Date : 3/19/2019
Page No : 1

Groups Printed- Heavy Vehicles

	Catherine From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	8	0	1	0	9	0	2	0	0	2	0	0	0	0	0	0	2	1	0	3	14
07:15 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2	2	0	4	5
07:30 AM	4	0	2	0	6	3	3	0	0	6	0	0	0	0	0	0	4	5	0	9	21
07:45 AM	4	0	0	0	4	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	7
Total	16	0	3	0	19	4	6	0	0	10	0	0	0	0	0	0	10	8	0	18	47
08:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
08:15 AM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
08:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
08:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
Total	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	0	7	0	0	7	13
Grand Total	17	0	3	0	20	4	11	0	0	15	0	0	0	0	0	0	17	8	0	25	60
Apprch %	85	0	15	0		26.7	73.3	0	0		0	0	0	0		0	68	32	0		
Total %	28.3	0	5	0	33.3	6.7	18.3	0	0	25	0	0	0	0	0	0	28.3	13.3	0	41.7	

	Catherine From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**8**	0	1	0	**9**	0	2	0	0	2	0	0	0	0	0	0	2	1	0	3	14
07:15 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	2	2	0	4	5
07:30 AM	4	0	**2**	0	6	**3**	**3**	0	0	**6**	0	0	0	0	0	0	**4**	**5**	0	**9**	**21**
07:45 AM	4	0	0	0	4	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	7
Total Volume	16	0	3	0	19	4	6	0	0	10	0	0	0	0	0	0	10	8	0	18	47
% App. Total	84.2	0	15.8	0		40	60	0	0		0	0	0	0		0	55.6	44.4	0		
PHF	.500	.000	.375	.000	.528	.333	.500	.000	.000	.417	.000	.000	.000	.000	.000	.000	.625	.400	.000	.500	.560

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N / S: Betty Spring Road
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : AM Peak - Pearl @ Betty Spring
Site Code : 2
Start Date : 3/19/2019
Page No : 1

Groups Printed- PCs and Peds - Heavy Vehicles - Bicycles

	From North					Pearl From East					Betty Spring From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	65	4	0	69	2	0	32	0	34	24	62	0	0	86	189
07:15 AM	0	0	0	0	0	0	64	9	0	73	4	0	19	0	23	31	57	0	0	88	184
07:30 AM	0	0	0	0	0	0	61	5	0	66	2	0	17	0	19	33	54	0	0	87	172
07:45 AM	0	0	0	0	0	0	61	8	0	69	1	0	13	0	14	17	43	0	0	60	143
Total	0	0	0	0	0	0	251	26	0	277	9	0	81	0	90	105	216	0	0	321	688
08:00 AM	0	0	0	0	0	0	55	1	0	56	4	0	16	0	20	20	42	0	0	62	138
08:15 AM	0	0	0	0	0	0	40	5	0	45	1	0	10	0	11	10	41	0	0	51	107
08:30 AM	0	0	0	0	0	0	67	4	0	71	1	0	15	0	16	12	27	0	0	39	126
08:45 AM	0	0	0	0	0	0	58	3	0	61	1	0	13	0	14	17	49	0	0	66	141
Total	0	0	0	0	0	0	220	13	0	233	7	0	54	0	61	59	159	0	0	218	512
Grand Total	0	0	0	0	0	0	471	39	0	510	16	0	135	0	151	164	375	0	0	539	1200
Apprch %	0	0	0	0		0	92.4	7.6	0		10.6	0	89.4	0		30.4	69.6	0	0		
Total %	0	0	0	0	0	0	39.2	3.2	0	42.5	1.3	0	11.2	0	12.6	13.7	31.2	0	0	44.9	
PCs and Peds	0	0	0	0	0	0	455	38	0	493	14	0	133	0	147	157	360	0	0	517	1157
% PCs and Peds	0	0	0	0	0	0	96.6	97.4	0	96.7	87.5	0	98.5	0	97.4	95.7	96	0	0	95.9	96.4
Heavy Vehicles	0	0	0	0	0	0	15	1	0	16	2	0	2	0	4	7	15	0	0	22	42
% Heavy Vehicles	0	0	0	0	0	0	3.2	2.6	0	3.1	12.5	0	1.5	0	2.6	4.3	4	0	0	4.1	3.5
Bicycles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0.1

	From North					Pearl From East					Betty Spring From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	**65**	4	0	69	2	0	**32**	0	**34**	24	**62**	0	0	86	**189**
07:15 AM	0	0	0	0	0	0	64	**9**	0	**73**	**4**	0	19	0	23	31	57	0	0	**88**	184
07:30 AM	0	0	0	0	0	0	61	5	0	66	2	0	17	0	19	**33**	54	0	0	87	172
07:45 AM	0	0	0	0	0	0	61	8	0	69	1	0	13	0	14	17	43	0	0	60	143
Total Volume	0	0	0	0	0	0	251	26	0	277	9	0	81	0	90	105	216	0	0	321	688
% App. Total	0	0	0	0		0	90.6	9.4	0		10	0	90	0		32.7	67.3	0	0		
PHF	.000	.000	.000	.000	.000	.000	.965	.722	.000	.949	.563	.000	.633	.000	.662	.795	.871	.000	.000	.912	.910
PCs and Peds																					
% PCs and Peds	0	0	0	0	0	0	96.4	100	0	96.8	88.9	0	97.5	0	96.7	97.1	94.9	0	0	95.6	96.2
Heavy Vehicles	0	0	0	0	0	0	8	0	0	8	1	0	2	0	3	3	11	0	0	14	25
% Heavy Vehicles	0	0	0	0	0	0	3.2	0	0	2.9	11.1	0	2.5	0	3.3	2.9	5.1	0	0	4.4	3.6
Bicycles	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	0	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0	0	0	0	0	0	0	0.1

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N / S: Betty Spring Road
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : AM Peak - Pearl @ Betty Spring
Site Code : 2
Start Date : 3/19/2019
Page No : 1

Groups Printed- Heavy Vehicles

	From North					Pearl From East					Betty Spring From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
07:15 AM	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	3	0	0	3	5
07:30 AM	0	0	0	0	0	0	5	0	0	5	0	0	1	0	1	3	3	0	0	6	12
07:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	2	0	0	2	4
Total	0	0	0	0	0	0	8	0	0	8	1	0	2	0	3	3	11	0	0	14	25
08:00 AM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	2	0	0	2	5
08:15 AM	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	2
08:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	1	0	0	2	4
08:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3	1	0	0	4	6
Total	0	0	0	0	0	0	7	1	0	8	1	0	0	0	1	4	4	0	0	8	17
Grand Total	0	0	0	0	0	0	15	1	0	16	2	0	2	0	4	7	15	0	0	22	42
Apprch %	0	0	0	0		0	93.8	6.2	0		50	0	50	0		31.8	68.2	0	0		
Total %	0	0	0	0	0	0	35.7	2.4	0	38.1	4.8	0	4.8	0	9.5	16.7	35.7	0	0	52.4	

	From North					Pearl From East					Betty Spring From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	1	0	0	1	**1**	0	0	0	**1**	0	**3**	0	0	3	5
07:30 AM	0	0	0	0	0	0	**5**	0	0	**5**	0	0	**1**	0	1	**3**	3	0	0	**6**	**12**
07:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	2	0	0	2	4
08:00 AM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	2	0	0	2	5
Total Volume	0	0	0	0	0	0	9	0	0	9	2	0	2	0	4	3	10	0	0	13	26
% App. Total	0	0	0	0		0	100	0	0		50	0	50	0		23.1	76.9	0	0		
PHF	.000	.000	.000	.000	.000	.000	.450	.000	.000	.450	.500	.000	.500	.000	1.00	.250	.833	.000	.000	.542	.542

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N / S: Ridgewood Lane
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : AM Peak - Pearl @ Ridgewood
Site Code : 3
Start Date : 3/19/2019
Page No : 1

Groups Printed- PCs and Peds - Heavy Vehicles - Bicycles

	Ridgewood From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	10	0	4	0	14	0	59	0	0	59	0	0	0	0	0	0	68	0	0	68	141
07:15 AM	17	0	1	0	18	1	55	0	0	56	0	0	0	0	0	0	53	7	0	60	134
07:30 AM	10	0	0	0	10	1	49	0	0	50	0	0	0	0	0	0	52	5	0	57	117
07:45 AM	12	0	0	0	12	1	56	0	0	57	0	0	0	0	0	0	40	3	0	43	112
Total	49	0	5	0	54	3	219	0	0	222	0	0	0	0	0	0	213	15	0	228	504
08:00 AM	13	0	0	0	13	1	46	0	0	47	0	0	0	0	0	0	40	5	0	45	105
08:15 AM	11	0	1	0	12	1	35	0	0	36	0	0	0	0	0	0	40	5	0	45	93
08:30 AM	13	0	1	0	14	1	53	0	0	54	0	0	0	0	0	0	19	6	0	25	93
08:45 AM	13	0	0	1	14	1	45	0	2	48	0	0	0	0	0	0	39	6	0	45	107
Total	50	0	2	1	53	4	179	0	2	185	0	0	0	0	0	0	138	22	0	160	398
Grand Total	99	0	7	1	107	7	398	0	2	407	0	0	0	0	0	0	351	37	0	388	902
Apprch %	92.5	0	6.5	0.9		1.7	97.8	0	0.5		0	0	0	0		0	90.5	9.5	0		
Total %	11	0	0.8	0.1	11.9	0.8	44.1	0	0.2	45.1	0	0	0	0	0	0	38.9	4.1	0	43	
PCs and Peds	95	0	7	1	103	7	376	0	2	385	0	0	0	0	0	0	328	34	0	362	850
% PCs and Peds	96	0	100	100	96.3	100	94.5	0	100	94.6	0	0	0	0	0	0	93.4	91.9	0	93.3	94.2
Heavy Vehicles	3	0	0	0	3	0	22	0	0	22	0	0	0	0	0	0	23	3	0	26	51
% Heavy Vehicles	3	0	0	0	2.8	0	5.5	0	0	5.4	0	0	0	0	0	0	6.6	8.1	0	6.7	5.7
Bicycles	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	1	0	0	0	0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1

	Ridgewood From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	10	0	**4**	0	14	0	**59**	0	0	**59**	0	0	0	0	0	0	**68**	0	0	**68**	**141**
07:15 AM	**17**	0	1	0	**18**	**1**	55	0	0	56	0	0	0	0	0	0	53	**7**	0	60	134
07:30 AM	10	0	0	0	10	1	49	0	0	50	0	0	0	0	0	0	52	5	0	57	117
07:45 AM	12	0	0	0	12	1	56	0	0	57	0	0	0	0	0	0	40	3	0	43	112
Total Volume	49	0	5	0	54	3	219	0	0	222	0	0	0	0	0	0	213	15	0	228	504
% App. Total	90.7	0	9.3	0		1.4	98.6	0	0		0	0	0	0		0	93.4	6.6	0		
PHF	.721	.000	.313	.000	.750	.750	.928	.000	.000	.941	.000	.000	.000	.000	.000	.000	.783	.536	.000	.838	.894
PCs and Peds																					
% PCs and Peds	93.9	0	100	0	94.4	100	95.9	0	0	95.9	0	0	0	0	0	0	93.4	86.7	0	93.0	94.4
Heavy Vehicles	2	0	0	0	2	0	9	0	0	9	0	0	0	0	0	0	14	2	0	16	27
% Heavy Vehicles	4.1	0	0	0	3.7	0	4.1	0	0	4.1	0	0	0	0	0	0	6.6	13.3	0	7.0	5.4
Bicycles	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	2.0	0	0	0	1.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2

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N / S: Ridgewood Lane
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : AM Peak - Pearl @ Ridgewood
Site Code : 3
Start Date : 3/19/2019
Page No : 1

Groups Printed- Heavy Vehicles

	Ridgewood From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
07:15 AM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	5	1	0	6	8
07:30 AM	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	3	1	0	4	9
07:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
Total	2	0	0	0	2	0	9	0	0	9	0	0	0	0	0	0	14	2	0	16	27
08:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	1	0	4	7
08:15 AM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	4
08:30 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	7
08:45 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	6
Total	1	0	0	0	1	0	13	0	0	13	0	0	0	0	0	0	9	1	0	10	24
Grand Total	3	0	0	0	3	0	22	0	0	22	0	0	0	0	0	0	23	3	0	26	51
Apprch %	100	0	0	0		0	100	0	0		0	0	0	0		0	88.5	11.5	0		
Total %	5.9	0	0	0	5.9	0	43.1	0	0	43.1	0	0	0	0	0	0	45.1	5.9	0	51	

	Ridgewood From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**1**	0	0	0	**1**	0	1	0	0	1	0	0	0	0	0	0	**5**	**1**	0	**6**	8
07:30 AM	1	0	0	0	1	0	**4**	0	0	**4**	0	0	0	0	0	0	3	1	0	4	**9**
07:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
08:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3	1	0	4	7
Total Volume	2	0	0	0	2	0	10	0	0	10	0	0	0	0	0	0	13	3	0	16	28
% App. Total	100	0	0	0		0	100	0	0		0	0	0	0		0	81.2	18.8	0		
PHF	.500	.000	.000	.000	.500	.000	.625	.000	.000	.625	.000	.000	.000	.000	.000	.000	.650	.750	.000	.667	.778

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N / S: Smith Street
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : AM Peak - Pearl @ Smith
Site Code : 4
Start Date : 3/19/2019
Page No : 1

Groups Printed- PCs and Peds - Heavy Vehicles - Bicycles

	From North					Pearl From East					Smith From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	55	0	0	55	2	0	5	0	7	5	66	0	0	71	133
07:15 AM	0	0	0	0	0	0	50	0	0	50	0	0	2	0	2	1	50	0	0	51	103
07:30 AM	0	0	0	0	0	0	47	0	0	47	1	0	6	0	7	5	47	0	0	52	106
07:45 AM	0	0	0	0	0	0	49	0	0	49	0	0	5	0	5	2	37	0	0	39	93
Total	0	0	0	0	0	0	201	0	0	201	3	0	18	0	21	13	200	0	0	213	435
08:00 AM	0	0	0	0	0	0	42	0	0	42	0	0	6	0	6	1	40	0	0	41	89
08:15 AM	0	0	0	0	0	0	33	0	0	33	1	0	1	0	2	0	39	0	0	39	74
08:30 AM	0	0	0	0	0	0	55	0	0	55	0	0	3	0	3	1	21	0	0	22	80
08:45 AM	0	0	0	0	0	0	45	0	0	45	0	0	1	0	1	4	35	0	0	39	85
Total	0	0	0	0	0	0	175	0	0	175	1	0	11	0	12	6	135	0	0	141	328
Grand Total	0	0	0	0	0	0	376	0	0	376	4	0	29	0	33	19	335	0	0	354	763
Apprch %	0	0	0	0		0	100	0	0		12.1	0	87.9	0		5.4	94.6	0	0		
Total %	0	0	0	0	0	0	49.3	0	0	49.3	0.5	0	3.8	0	4.3	2.5	43.9	0	0	46.4	
PCs and Peds	0	0	0	0	0	0	364	0	0	364	4	0	23	0	27	13	321	0	0	334	725
% PCs and Peds	0	0	0	0	0	0	96.8	0	0	96.8	100	0	79.3	0	81.8	68.4	95.8	0	0	94.4	95
Heavy Vehicles	0	0	0	0	0	0	12	0	0	12	0	0	6	0	6	6	14	0	0	20	38
% Heavy Vehicles	0	0	0	0	0	0	3.2	0	0	3.2	0	0	20.7	0	18.2	31.6	4.2	0	0	5.6	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

	From North					Pearl From East					Smith From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	**55**	0	0	**55**	**2**	0	5	0	**7**	**5**	**66**	0	0	**71**	**133**
07:15 AM	0	0	0	0	0	0	50	0	0	50	0	0	2	0	2	1	50	0	0	51	103
07:30 AM	0	0	0	0	0	0	47	0	0	47	1	0	**6**	0	7	5	47	0	0	52	106
07:45 AM	0	0	0	0	0	0	49	0	0	49	0	0	5	0	5	2	37	0	0	39	93
Total Volume	0	0	0	0	0	0	201	0	0	201	3	0	18	0	21	13	200	0	0	213	435
% App. Total	0	0	0	0		0	100	0	0		14.3	0	85.7	0		6.1	93.9	0	0		
PHF	.000	.000	.000	.000	.000	.000	.914	.000	.000	.914	.375	.000	.750	.000	.750	.650	.758	.000	.000	.750	.818
PCs and Peds																					
% PCs and Peds	0	0	0	0	0	0	97.5	0	0	97.5	100	0	77.8	0	81.0	69.2	94.5	0	0	93.0	94.5
Heavy Vehicles	0	0	0	0	0	0	5	0	0	5	0	0	4	0	4	4	11	0	0	15	24
% Heavy Vehicles	0	0	0	0	0	0	2.5	0	0	2.5	0	0	22.2	0	19.0	30.8	5.5	0	0	7.0	5.5
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

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N / S: Smith Street
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : AM Peak - Pearl @ Smith
Site Code : 4
Start Date : 3/19/2019
Page No : 1

Groups Printed- Heavy Vehicles

	From North					Pearl From East					Smith From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	1	3	0	0	4	6
07:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	7
07:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	3	0	3	2	0	0	0	2	6
07:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	2	0	0	3	5
Total	0	0	0	0	0	0	5	0	0	5	0	0	4	0	4	4	11	0	0	15	24
08:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	1	1	0	0	2	6
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
08:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	1	0	0	0	1	3
08:45 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
Total	0	0	0	0	0	0	7	0	0	7	0	0	2	0	2	2	3	0	0	5	14
Grand Total	0	0	0	0	0	0	12	0	0	12	0	0	6	0	6	6	14	0	0	20	38
Apprch %	0	0	0	0		0	100	0	0		0	0	100	0		30	70	0	0		
Total %	0	0	0	0	0	0	31.6	0	0	31.6	0	0	15.8	0	15.8	15.8	36.8	0	0	52.6	

	From North					Pearl From East					Smith From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	1	3	0	0	4	6
07:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	**6**	0	0	**6**	**7**
07:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	**3**	0	**3**	**2**	0	0	0	2	6
07:45 AM	0	0	0	0	0	0	**2**	0	0	**2**	0	0	0	0	0	1	2	0	0	3	5
Total Volume	0	0	0	0	0	0	5	0	0	5	0	0	4	0	4	4	11	0	0	15	24
% App. Total	0	0	0	0		0	100	0	0		0	0	100	0		26.7	73.3	0	0		
PHF	.000	.000	.000	.000	.000	.000	.625	.000	.000	.625	.000	.000	.333	.000	.333	.500	.458	.000	.000	.625	.857

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N / S: Betty Spring Road
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : PM Peak - Pearl @ Betty Spring
Site Code : 2
Start Date : 3/19/2019
Page No : 1

Groups Printed- PCs and Peds - Heavy Vehicles - Bicycles

	From North					Pearl From East					Betty Spring From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	0	0	0	0	0	0	61	3	0	64	4	0	8	0	12	22	50	0	0	72	148
02:15 PM	0	0	0	0	0	0	67	0	0	67	4	0	27	0	31	19	54	0	0	73	171
02:30 PM	0	0	0	0	0	0	60	5	0	65	3	0	13	0	16	31	77	0	0	108	189
02:45 PM	0	0	0	0	0	0	61	1	0	62	2	0	12	0	14	22	61	0	0	83	159
Total	0	0	0	0	0	0	249	9	0	258	13	0	60	0	73	94	242	0	0	336	667
03:00 PM	0	0	0	0	0	0	69	2	0	71	2	0	20	0	22	14	67	0	0	81	174
03:15 PM	0	0	0	0	0	0	47	2	0	49	5	0	12	0	17	18	71	0	0	89	155
03:30 PM	0	0	0	0	0	0	78	5	0	83	7	0	20	0	27	20	82	0	0	102	212
03:45 PM	0	0	0	0	0	0	63	6	0	69	1	0	19	0	20	21	64	0	0	85	174
Total	0	0	0	0	0	0	257	15	0	272	15	0	71	0	86	73	284	0	0	357	715
04:00 PM	0	0	0	0	0	0	87	3	0	90	5	0	23	0	28	12	63	0	0	75	193
04:15 PM	0	0	0	0	0	0	51	2	0	53	6	0	29	0	35	16	70	0	0	86	174
04:30 PM	0	0	0	0	0	0	63	2	0	65	10	0	25	1	36	19	73	0	0	92	193
04:45 PM	0	0	0	0	0	0	69	2	0	71	1	0	19	0	20	25	68	0	0	93	184
Total	0	0	0	0	0	0	270	9	0	279	22	0	96	1	119	72	274	0	0	346	744
Grand Total	0	0	0	0	0	0	776	33	0	809	50	0	227	1	278	239	800	0	0	1039	2126
Apprch %	0	0	0	0		0	95.9	4.1	0		18	0	81.7	0.4		23	77	0	0		
Total %	0	0	0	0	0	0	36.5	1.6	0	38.1	2.4	0	10.7	0	13.1	11.2	37.6	0	0	48.9	
PCs and Peds	0	0	0	0	0	0	763	32	0	795	49	0	225	1	275	230	776	0	0	1006	2076
% PCs and Peds	0	0	0	0	0	0	98.3	97	0	98.3	98	0	99.1	100	98.9	96.2	97	0	0	96.8	97.6
Heavy Vehicles	0	0	0	0	0	0	13	1	0	14	1	0	2	0	3	9	23	0	0	32	49
% Heavy Vehicles	0	0	0	0	0	0	1.7	3	0	1.7	2	0	0.9	0	1.1	3.8	2.9	0	0	3.1	2.3
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0

	From North					Pearl From East					Betty Spring From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	0	0	0	0	0	78	5	0	83	**7**	0	20	0	27	20	**82**	0	0	**102**	**212**
03:45 PM	0	0	0	0	0	0	63	**6**	0	69	1	0	19	0	20	**21**	64	0	0	85	174
04:00 PM	0	0	0	0	0	0	**87**	3	0	**90**	5	0	23	0	28	12	63	0	0	75	193
04:15 PM	0	0	0	0	0	0	51	2	0	53	6	0	**29**	0	**35**	16	70	0	0	86	174
Total Volume	0	0	0	0	0	0	279	16	0	295	19	0	91	0	110	69	279	0	0	348	753
% App. Total	0	0	0	0		0	94.6	5.4	0		17.3	0	82.7	0		19.8	80.2	0	0		
PHF	.000	.000	.000	.000	.000	.000	.802	.667	.000	.819	.679	.000	.784	.000	.786	.821	.851	.000	.000	.853	.888
PCs and Peds																					
% PCs and Peds	0	0	0	0	0	0	98.6	93.8	0	98.3	94.7	0	100	0	99.1	91.3	97.1	0	0	96.0	97.3
Heavy Vehicles	0	0	0	0	0	0	4	1	0	5	1	0	0	0	1	6	7	0	0	13	19
% Heavy Vehicles	0	0	0	0	0	0	1.4	6.3	0	1.7	5.3	0	0	0	0.9	8.7	2.5	0	0	3.7	2.5
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0	0.3	0.1

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N / S: Betty Spring Road
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : PM Peak - Pearl @ Betty Spring
Site Code : 2
Start Date : 3/19/2019
Page No : 1

Groups Printed- Heavy Vehicles

	From North					Pearl From East					Betty Spring From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	5	0	0	6	8
02:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
02:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	5
02:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	1	12	0	0	13	19
03:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	2	0	2	0	2	0	0	2	5
03:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
03:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	2	0	0	5	6
Total	0	0	0	0	0	0	5	0	0	5	1	0	2	0	3	3	6	0	0	9	17
04:00 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	1	0	0	3	4
04:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	2	0	0	3	4
04:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	2	0	0	4	5
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	2	1	0	3	0	0	0	0	0	5	5	0	0	10	13
Grand Total	0	0	0	0	0	0	13	1	0	14	1	0	2	0	3	9	23	0	0	32	49
Apprch %	0	0	0	0		0	92.9	7.1	0		33.3	0	66.7	0		28.1	71.9	0	0		
Total %	0	0	0	0	0	0	26.5	2	0	28.6	2	0	4.1	0	6.1	18.4	46.9	0	0	65.3	

	From North					Pearl From East					Betty Spring From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:00 PM																					
02:00 PM	0	0	0	0	0	0	**2**	0	0	**2**	0	0	0	0	0	**1**	**5**	0	0	**6**	**8**
02:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
02:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	5
02:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total Volume	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	1	12	0	0	13	19
% App. Total	0	0	0	0		0	100	0	0		0	0	0	0		7.7	92.3	0	0		
PHF	.000	.000	.000	.000	.000	.000	.750	.000	.000	.750	.000	.000	.000	.000	.000	.250	.600	.000	.000	.542	.594

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N / S: Ridgewood Lane
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : PM Peak - Pearl @ Ridgewood
Site Code : 3
Start Date : 3/19/2019
Page No : 1

Groups Printed- PCs and Peds - Heavy Vehicles - Bicycles

	Ridgewood From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	8	0	2	0	10	4	55	0	1	60	0	0	0	0	0	0	48	9	0	57	127
02:15 PM	10	0	0	2	12	0	59	0	0	59	0	0	0	1	1	0	51	6	0	57	129
02:30 PM	5	0	1	0	6	1	54	0	0	55	0	0	0	0	0	0	65	8	0	73	134
02:45 PM	12	0	0	0	12	1	52	0	0	53	0	0	0	0	0	0	59	7	0	66	131
Total	35	0	3	2	40	6	220	0	1	227	0	0	0	1	1	0	223	30	0	253	521
03:00 PM	6	0	0	0	6	1	58	0	0	59	0	0	0	0	0	0	58	9	1	68	133
03:15 PM	9	0	1	0	10	3	40	0	0	43	0	0	0	0	0	0	59	18	0	77	130
03:30 PM	10	0	0	1	11	1	74	0	0	75	0	0	0	0	0	0	65	22	0	87	173
03:45 PM	9	0	2	0	11	2	63	0	1	66	0	0	0	0	0	0	54	11	0	65	142
Total	34	0	3	1	38	7	235	0	1	243	0	0	0	0	0	0	236	60	1	297	578
04:00 PM	9	0	3	1	13	4	82	0	0	86	0	0	0	0	0	0	58	7	0	65	164
04:15 PM	7	0	1	4	12	1	38	0	0	39	0	0	0	1	1	0	60	15	0	75	127
04:30 PM	9	0	0	0	9	2	60	0	0	62	0	0	0	1	1	0	72	10	0	82	154
04:45 PM	10	0	1	0	11	1	58	0	0	59	0	0	0	0	0	0	62	10	0	72	142
Total	35	0	5	5	45	8	238	0	0	246	0	0	0	2	2	0	252	42	0	294	587
Grand Total	104	0	11	8	123	21	693	0	2	716	0	0	0	3	3	0	711	132	1	844	1686
Apprch %	84.6	0	8.9	6.5		2.9	96.8	0	0.3		0	0	0	100		0	84.2	15.6	0.1		
Total %	6.2	0	0.7	0.5	7.3	1.2	41.1	0	0.1	42.5	0	0	0	0.2	0.2	0	42.2	7.8	0.1	50.1	
PCs and Peds	100	0	10	7	117	21	666	0	2	689	0	0	0	3	3	0	673	129	1	803	1612
% PCs and Peds	96.2	0	90.9	87.5	95.1	100	96.1	0	100	96.2	0	0	0	100	100	0	94.7	97.7	100	95.1	95.6
Heavy Vehicles	4	0	1	0	5	0	27	0	0	27	0	0	0	0	0	0	38	3	0	41	73
% Heavy Vehicles	3.8	0	9.1	0	4.1	0	3.9	0	0	3.8	0	0	0	0	0	0	5.3	2.3	0	4.9	4.3
Bicycles	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles	0	0	0	12.5	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1

	Ridgewood From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	9	0	1	0	10	3	40	0	0	43	0	0	0	0	0	0	59	18	0	77	130
03:30 PM	**10**	0	0	**1**	11	1	74	0	0	75	0	0	0	0	0	0	**65**	**22**	0	**87**	**173**
03:45 PM	9	0	2	0	11	2	63	0	**1**	66	0	0	0	0	0	0	54	11	0	65	142
04:00 PM	9	0	**3**	1	**13**	**4**	**82**	0	0	**86**	0	0	0	0	0	0	58	7	0	65	164
Total Volume	37	0	6	2	45	10	259	0	1	270	0	0	0	0	0	0	236	58	0	294	609
% App. Total	82.2	0	13.3	4.4		3.7	95.9	0	0.4		0	0	0	0		0	80.3	19.7	0		
PHF	.925	.000	.500	.500	.865	.625	.790	.000	.250	.785	.000	.000	.000	.000	.000	.000	.908	.659	.000	.845	.880
PCs and Peds																					
% PCs and Peds	94.6	0	83.3	100	93.3	100	96.1	0	100	96.3	0	0	0	0	0	0	97.9	98.3	0	98.0	96.9
Heavy Vehicles	2	0	1	0	3	0	10	0	0	10	0	0	0	0	0	0	5	1	0	6	19
% Heavy Vehicles	5.4	0	16.7	0	6.7	0	3.9	0	0	3.7	0	0	0	0	0	0	2.1	1.7	0	2.0	3.1
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

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N / S: Ridgewood Lane
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : PM Peak - Pearl @ Ridgewood
Site Code : 3
Start Date : 3/19/2019
Page No : 1

Groups Printed- Heavy Vehicles

	Ridgewood From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	5	1	0	6	9
02:15 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	4	1	0	5	7
02:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	9	0	0	9	11
02:45 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	6	0	0	6	9
Total	2	0	0	0	2	0	8	0	0	8	0	0	0	0	0	0	24	2	0	26	36
03:00 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	5
03:15 PM	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	6
03:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
03:45 PM	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	0	1	1	0	2	5
Total	1	0	1	0	2	0	11	0	0	11	0	0	0	0	0	0	7	1	0	8	21
04:00 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3
04:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
04:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	7
04:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	1	0	0	0	1	0	8	0	0	8	0	0	0	0	0	0	7	0	0	7	16
Grand Total	4	0	1	0	5	0	27	0	0	27	0	0	0	0	0	0	38	3	0	41	73
Apprch %	80	0	20	0		0	100	0	0		0	0	0	0		0	92.7	7.3	0		
Total %	5.5	0	1.4	0	6.8	0	37	0	0	37	0	0	0	0	0	0	52.1	4.1	0	56.2	

	Ridgewood From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:00 PM																					
02:00 PM	**1**	0	0	0	**1**	0	2	0	0	2	0	0	0	0	0	0	5	**1**	0	6	9
02:15 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	4	1	0	5	7
02:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	**9**	0	0	**9**	**11**
02:45 PM	0	0	0	0	0	0	**3**	0	0	**3**	0	0	0	0	0	0	6	0	0	6	9
Total Volume	2	0	0	0	2	0	8	0	0	8	0	0	0	0	0	0	24	2	0	26	36
% App. Total	100	0	0	0		0	100	0	0		0	0	0	0		0	92.3	7.7	0		
PHF	.500	.000	.000	.000	.500	.000	.667	.000	.000	.667	.000	.000	.000	.000	.000	.000	.667	.500	.000	.722	.818

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N / S: Catherine Street
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : PM Peak - Pearl @ Catherine
Site Code : 1
Start Date : 3/19/2019
Page No : 1

Groups Printed- PCs and Peds - Heavy Vehicles - Bicycles

	Catherine From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	53	0	11	0	64	8	63	0	0	71	0	0	0	0	0	0	63	49	0	112	247
02:15 PM	29	0	12	1	42	14	80	0	0	94	0	0	0	0	0	0	64	39	0	103	239
02:30 PM	71	0	24	0	95	5	66	0	0	71	0	0	0	0	0	0	78	25	0	103	269
02:45 PM	17	0	16	0	33	3	68	0	0	71	0	0	0	0	0	0	66	10	0	76	180
Total	170	0	63	1	234	30	277	0	0	307	0	0	0	0	0	0	271	123	0	394	935
03:00 PM	21	0	5	1	27	6	89	0	0	95	0	0	0	0	0	0	88	21	0	109	231
03:15 PM	15	0	8	0	23	4	57	0	0	61	0	0	0	0	0	0	81	23	0	104	188
03:30 PM	26	0	14	1	41	2	86	0	0	88	0	0	0	0	0	0	73	27	0	100	229
03:45 PM	8	0	5	1	14	7	80	0	0	87	0	0	0	0	0	0	78	35	0	113	214
Total	70	0	32	3	105	19	312	0	0	331	0	0	0	0	0	0	320	106	0	426	862
04:00 PM	45	0	8	1	54	5	102	0	0	107	0	0	0	0	0	0	63	17	0	80	241
04:15 PM	17	0	5	1	23	6	68	0	0	74	0	0	0	0	0	0	80	12	0	92	189
04:30 PM	17	0	3	0	20	2	90	0	0	92	0	0	0	0	0	0	89	8	0	97	209
04:45 PM	4	0	4	0	8	0	89	0	0	89	0	0	0	0	0	0	91	8	0	99	196
Total	83	0	20	2	105	13	349	0	0	362	0	0	0	0	0	0	323	45	0	368	835
Grand Total	323	0	115	6	444	62	938	0	0	1000	0	0	0	0	0	0	914	274	0	1188	2632
Apprch %	72.7	0	25.9	1.4		6.2	93.8	0	0		0	0	0	0		0	76.9	23.1	0		
Total %	12.3	0	4.4	0.2	16.9	2.4	35.6	0	0	38	0	0	0	0	0	0	34.7	10.4	0	45.1	
PCs and Peds	306	0	110	6	422	58	926	0	0	984	0	0	0	0	0	0	886	265	0	1151	2557
% PCs and Peds	94.7	0	95.7	100	95	93.5	98.7	0	0	98.4	0	0	0	0	0	0	96.9	96.7	0	96.9	97.2
Heavy Vehicles	17	0	5	0	22	4	12	0	0	16	0	0	0	0	0	0	27	9	0	36	74
% Heavy Vehicles	5.3	0	4.3	0	5	6.5	1.3	0	0	1.6	0	0	0	0	0	0	3	3.3	0	3	2.8
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0

	Catherine From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:00 PM																					
02:00 PM	53	0	11	0	64	8	63	0	0	71	0	0	0	0	0	0	63	**49**	0	**112**	247
02:15 PM	29	0	12	**1**	42	**14**	**80**	0	0	**94**	0	0	0	0	0	0	64	39	0	103	239
02:30 PM	**71**	0	**24**	0	**95**	5	66	0	0	71	0	0	0	0	0	0	**78**	25	0	103	**269**
02:45 PM	17	0	16	0	33	3	68	0	0	71	0	0	0	0	0	0	66	10	0	76	180
Total Volume	170	0	63	1	234	30	277	0	0	307	0	0	0	0	0	0	271	123	0	394	935
% App. Total	72.6	0	26.9	0.4		9.8	90.2	0	0		0	0	0	0		0	68.8	31.2	0		
PHF	.599	.000	.656	.250	.616	.536	.866	.000	.000	.816	.000	.000	.000	.000	.000	.000	.869	.628	.000	.879	.869
PCs and Peds																					
% PCs and Peds	91.2	0	92.1	100	91.5	93.3	98.6	0	0	98.0	0	0	0	0	0	0	97.0	92.7	0	95.7	95.4
Heavy Vehicles	15	0	5	0	20	2	4	0	0	6	0	0	0	0	0	0	8	9	0	17	43
% Heavy Vehicles	8.8	0	7.9	0	8.5	6.7	1.4	0	0	2.0	0	0	0	0	0	0	3.0	7.3	0	4.3	4.6
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

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
Innovativedatallc.com or 1.413.668.5094

N / S: Catherine Street
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : PM Peak - Pearl @ Catherine
Site Code : 1
Start Date : 3/19/2019
Page No : 1

Groups Printed- Heavy Vehicles

	Catherine From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	8	0	2	0	10	1	1	0	0	2	0	0	0	0	0	0	5	2	0	7	19
02:15 PM	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	0	0	3	0	3	6
02:30 PM	6	0	2	0	8	0	1	0	0	1	0	0	0	0	0	0	2	4	0	6	15
02:45 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3
Total	15	0	5	0	20	2	4	0	0	6	0	0	0	0	0	0	8	9	0	17	43
03:00 PM	1	0	0	0	1	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2	6
03:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
Total	1	0	0	0	1	1	6	0	0	7	0	0	0	0	0	0	8	0	0	8	16
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
04:15 PM	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	4	0	0	4	6
04:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
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	1	0	0	0	1	1	2	0	0	3	0	0	0	0	0	0	11	0	0	11	15
Grand Total	17	0	5	0	22	4	12	0	0	16	0	0	0	0	0	0	27	9	0	36	74
Apprch %	77.3	0	22.7	0		25	75	0	0		0	0	0	0		0	75	25	0		
Total %	23	0	6.8	0	29.7	5.4	16.2	0	0	21.6	0	0	0	0	0	0	36.5	12.2	0	48.6	

	Catherine From North					Pearl From East					From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:00 PM																					
02:00 PM	**8**	0	**2**	0	**10**	**1**	**1**	0	0	**2**	0	0	0	0	0	0	**5**	2	0	**7**	**19**
02:15 PM	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	0	0	3	0	3	6
02:30 PM	6	0	2	0	8	0	1	0	0	1	0	0	0	0	0	0	2	**4**	0	6	15
02:45 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3
Total Volume	15	0	5	0	20	2	4	0	0	6	0	0	0	0	0	0	8	9	0	17	43
% App. Total	75	0	25	0		33.3	66.7	0	0		0	0	0	0		0	47.1	52.9	0		
PHF	.469	.000	.625	.000	.500	.500	1.00	.000	.000	.750	.000	.000	.000	.000	.000	.000	.400	.563	.000	.607	.566

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
Innovativedatallc.com or 1.413.668.5094

N / S: Smith Street
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : PM Peak - Pearl @ Smith
Site Code : 4
Start Date : 3/19/2019
Page No : 1

Groups Printed- PCs and Peds - Heavy Vehicles - Bicycles

	From North					Pearl From East					Smith From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	0	0	0	0	0	0	54	0	0	54	0	0	4	0	4	6	41	0	0	47	105
02:15 PM	0	0	0	0	0	0	56	0	0	56	0	0	1	0	1	1	51	0	0	52	109
02:30 PM	0	0	0	0	0	0	46	0	0	46	0	0	4	0	4	9	55	0	0	64	114
02:45 PM	0	0	0	0	0	0	46	0	0	46	0	0	5	0	5	6	53	0	0	59	110
Total	0	0	0	0	0	0	202	0	0	202	0	0	14	0	14	22	200	0	0	222	438
03:00 PM	0	0	0	0	0	0	60	0	0	60	0	0	8	0	8	7	53	0	0	60	128
03:15 PM	0	0	0	0	0	0	39	0	0	39	0	0	3	0	3	9	49	0	0	58	100
03:30 PM	0	0	0	0	0	0	65	0	0	65	3	0	4	0	7	9	55	0	0	64	136
03:45 PM	0	0	0	0	0	0	60	1	0	61	0	0	6	0	6	7	47	0	0	54	121
Total	0	0	0	0	0	0	224	1	0	225	3	0	21	0	24	32	204	0	0	236	485
04:00 PM	0	0	0	0	0	0	79	0	0	79	0	0	3	0	3	4	56	0	0	60	142
04:15 PM	0	0	0	0	0	0	39	0	0	39	0	0	3	0	3	5	56	0	0	61	103
04:30 PM	0	0	0	0	0	0	54	0	0	54	1	0	4	0	5	7	66	0	0	73	132
04:45 PM	0	0	0	0	0	0	57	0	0	57	0	0	3	0	3	5	53	0	0	58	118
Total	0	0	0	0	0	0	229	0	0	229	1	0	13	0	14	21	231	0	0	252	495
Grand Total	0	0	0	0	0	0	655	1	0	656	4	0	48	0	52	75	635	0	0	710	1418
Apprch %	0	0	0	0		0	99.8	0.2	0		7.7	0	92.3	0		10.6	89.4	0	0		
Total %	0	0	0	0	0	0	46.2	0.1	0	46.3	0.3	0	3.4	0	3.7	5.3	44.8	0	0	50.1	
PCs and Peds	0	0	0	0	0	0	643	1	0	644	4	0	41	0	45	67	616	0	0	683	1372
% PCs and Peds	0	0	0	0	0	0	98.2	100	0	98.2	100	0	85.4	0	86.5	89.3	97	0	0	96.2	96.8
Heavy Vehicles	0	0	0	0	0	0	12	0	0	12	0	0	7	0	7	8	19	0	0	27	46
% Heavy Vehicles	0	0	0	0	0	0	1.8	0	0	1.8	0	0	14.6	0	13.5	10.7	3	0	0	3.8	3.2
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

	From North					Pearl From East					Smith From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	0	0	0	0	0	65	0	0	65	**3**	0	4	0	**7**	**9**	55	0	0	**64**	136
03:45 PM	0	0	0	0	0	0	60	**1**	0	61	0	0	**6**	0	6	7	47	0	0	54	121
04:00 PM	0	0	0	0	0	0	**79**	0	0	**79**	0	0	3	0	3	4	**56**	0	0	60	**142**
04:15 PM	0	0	0	0	0	0	39	0	0	39	0	0	3	0	3	5	56	0	0	61	103
Total Volume	0	0	0	0	0	0	243	1	0	244	3	0	16	0	19	25	214	0	0	239	502
% App. Total	0	0	0	0		0	99.6	0.4	0		15.8	0	84.2	0		10.5	89.5	0	0		
PHF	.000	.000	.000	.000	.000	.000	.769	.250	.000	.772	.250	.000	.667	.000	.679	.694	.955	.000	.000	.934	.884
PCs and Peds																					
% PCs and Peds	0	0	0	0	0	0	98.4	100	0	98.4	100	0	87.5	0	89.5	88.0	97.7	0	0	96.7	97.2
Heavy Vehicles	0	0	0	0	0	0	4	0	0	4	0	0	2	0	2	3	5	0	0	8	14
% Heavy Vehicles	0	0	0	0	0	0	1.6	0	0	1.6	0	0	12.5	0	10.5	12.0	2.3	0	0	3.3	2.8
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

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
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N / S: Smith Street
E / W: Pearl Street
City, State: Gardner, Massachusetts
Client: Fuss & O'Neill

File Name : PM Peak - Pearl @ Smith
Site Code : 4
Start Date : 3/19/2019
Page No : 1

Groups Printed- Heavy Vehicles

	From North					Pearl From East					Smith From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
02:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	1	5	0	0	6	8
02:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
02:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2	2	0	0	4	6
02:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	4	0	0	4	0	0	2	0	2	3	10	0	0	13	19
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	1	0	0	2	4
03:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
03:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	2	1	0	0	3	6
03:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Total	0	0	0	0	0	0	5	0	0	5	0	0	3	0	3	3	5	0	0	8	16
04:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	2	3
04:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	1	2	0	0	3	6
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	3	0	0	3	0	0	2	0	2	2	4	0	0	6	11
Grand Total	0	0	0	0	0	0	12	0	0	12	0	0	7	0	7	8	19	0	0	27	46
Apprch %	0	0	0	0		0	100	0	0		0	0	100	0		29.6	70.4	0	0		
Total %	0	0	0	0	0	0	26.1	0	0	26.1	0	0	15.2	0	15.2	17.4	41.3	0	0	58.7	

	From North					Pearl From East					Smith From South					Pearl From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:00 PM																					
02:00 PM	0	0	0	0	0	0	**1**	0	0	**1**	0	0	**1**	0	**1**	1	**5**	0	0	**6**	**8**
02:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
02:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	**2**	2	0	0	4	6
02:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total Volume	0	0	0	0	0	0	4	0	0	4	0	0	2	0	2	3	10	0	0	13	19
% App. Total	0	0	0	0		0	100	0	0		0	0	100	0		23.1	76.9	0	0		
PHF	.000	.000	.000	.000	.000	.000	1.00	.000	.000	1.00	.000	.000	.500	.000	.500	.375	.500	.000	.000	.542	.594

Appendix D

Automatic Traffic Recorder (ATR) Data

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
Innovativedatallc.com or 1.413.668.5094

Location: Pearl Street
Location: b/w Ridgewood & Smith
Location: Gardner, Massachusetts
Client: Fuss & O'Neill

Start Time	19-Mar-19 Tue	Eastbound A.M.	Eastbound P.M.	Westbound A.M.	Westbound P.M.	Combined A.M.	Combined P.M.	20-Mar- Wed	Eastbound A.M.	Eastbound P.M.	Westbound A.M.	Westbound P.M.	Combined A.M.	Combined P.M.
12:00		3	46	3	51	6	97		1	44	0	57	1	101
12:15		4	52	1	34	5	86		3	58	2	50	5	108
12:30		3	44	1	41	4	85		1	51	0	54	1	105
12:45		1	35	0	40	1	75		2	58	0	51	2	109
01:00		3	45	1	34	4	79		2	39	2	38	4	77
01:15		1	50	3	42	4	92		1	44	0	37	1	81
01:30		0	61	1	48	1	109		0	55	3	37	3	92
01:45		0	55	0	41	0	96		0	51	1	56	1	107
02:00		1	47	0	57	1	104		1	64	0	53	1	117
02:15		0	53	0	60	0	113		1	38	1	65	2	103
02:30		0	67	0	54	0	121		0	57	0	61	0	118
02:45		0	55	0	51	0	106		1	64	0	73	1	137
03:00		2	59	0	66	2	125		1	68	0	71	1	139
03:15		0	58	0	***44***	0	102		1	62	1	52	2	114
03:30		0	66	1	***73***	1	139		1	***79***	1	***71***	2	***150***
03:45		2	55	1	***63***	3	118		1	***61***	1	***72***	2	***133***
04:00		0	61	1	***85***	1	146		2	***72***	3	***63***	5	***135***
04:15		3	***62***	4	40	7	***102***		3	***75***	1	***68***	4	***143***
04:30		3	***71***	6	53	9	***124***		5	70	6	66	11	136
04:45		8	***64***	6	67	14	***131***		12	64	6	67	18	131
05:00		3	***91***	6	63	9	***154***		7	67	8	61	15	128
05:15		7	56	9	44	16	100		8	61	9	40	17	101
05:30		10	48	10	57	20	105		11	61	6	56	17	117
05:45		16	36	6	54	22	90		15	54	14	53	29	107
06:00		20	59	10	35	30	94		20	47	3	49	23	96
06:15		23	36	18	52	41	88		23	50	22	38	45	88
06:30		38	40	35	44	73	84		37	39	27	41	64	80
06:45		***59***	43	36	33	***95***	76		***54***	33	42	37	***96***	70
07:00		***67***	30	***62***	28	***129***	58		***61***	45	***58***	37	***119***	82
07:15		***55***	38	***52***	19	***107***	57		***58***	37	***51***	31	***109***	68
07:30		***50***	31	***54***	23	***104***	54		***44***	37	***58***	23	***102***	60
07:45		38	24	***51***	29	89	53		51	34	***45***	29	96	63
08:00		40	32	48	19	88	51		33	33	45	20	78	53
08:15		39	24	34	10	73	34		36	29	46	13	82	42
08:30		22	22	59	20	81	42		27	34	52	17	79	51
08:45		41	23	47	6	88	29		37	21	51	11	88	32
09:00		42	18	42	7	84	25		40	19	39	11	79	30
09:15		41	11	44	12	85	23		25	11	47	14	72	25
09:30		23	18	28	4	51	22		39	18	29	8	68	26
09:45		36	5	43	6	79	11		24	11	47	7	71	18
10:00		28	8	34	12	62	20		27	5	40	8	67	13
10:15		33	17	31	6	64	23		40	15	36	5	76	20
10:30		38	12	37	5	75	17		38	12	36	9	74	21
10:45		38	10	38	5	76	15		43	9	46	10	89	19
11:00		38	9	38	13	76	22		47	7	36	9	83	16
11:15		37	3	44	4	81	7		52	10	22	7	74	17
11:30		44	3	32	6	76	9		33	7	31	2	64	9
11:45		48	6	42	3	90	9		49	7	28	4	77	11
Total		1008	1859	1019	1663	2027	3522		1018	1987	1002	1812	2020	3799
Day Total		2867		2682		5549			3005		2814		5819	
% Total		18.2%	33.5%	18.4%	30.0%				17.5%	34.1%	17.2%	31.1%		
Peak		06:45	04:15	07:00	03:15	06:45	04:15		06:45	03:30	07:00	03:30	06:45	03:30
Vol.		231	288	219	265	435	511		217	287	212	274	426	561
P.H.F.		0.862	0.791	0.883	0.779	0.843	0.830		0.889	0.908	0.914	0.938	0.895	0.935

ADT ADT 5,681 AADT 5,681

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
Innovativedatallc.com or 1.413.668.5094

Location: Pearl Street
Location: b/w Ridgewood & Smith
Location: Gardner, Massachusetts
Client: Fuss & O'Neill

Eastbound

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	85th Percent	95th Percent
03/19/19	0	0	0	0	1	4	5	1	0	0	0	0	0	0	11	44	45
01:00	0	0	0	0	1	2	1	0	0	0	0	0	0	0	4	*	*
02:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	*	*
03:00	0	0	0	0	0	1	2	1	0	0	0	0	0	0	4	*	*
04:00	0	0	0	1	3	4	3	3	0	0	0	0	0	0	14	45	47
05:00	0	0	0	1	11	9	11	4	0	0	0	0	0	0	36	44	47
06:00	0	0	**1**	**3**	**22**	45	45	17	7	0	0	0	0	0	140	46	50
07:00	0	0	0	0	10	**47**	**79**	**58**	**12**	**3**	1	0	0	0	**210**	48	51
08:00	0	0	0	0	7	40	50	39	5	1	0	0	0	0	142	47	50
09:00	0	0	0	0	2	29	56	44	8	2	1	0	0	0	142	48	51
10:00	0	0	0	0	7	47	48	26	6	1	**2**	0	0	0	137	47	50
11:00	0	0	0	2	10	41	76	31	6	1	0	0	0	0	167	46	50
12 PM	0	0	0	3	13	47	72	33	6	**3**	0	0	0	0	177	47	50
13:00	**1**	**1**	**2**	**4**	**23**	66	78	32	4	0	0	0	0	0	211	45	49
14:00	1	1	2	0	22	69	86	35	6	0	0	0	0	0	222	46	49
15:00	0	0	0	1	13	65	102	**50**	6	1	0	0	0	0	238	47	50
16:00	0	0	0	4	21	75	**104**	49	5	0	0	0	0	0	**258**	46	49
17:00	0	0	0	1	13	**77**	88	44	**8**	0	0	0	0	0	231	46	50
18:00	1	0	1	2	10	69	60	29	5	1	0	0	0	0	178	46	50
19:00	0	0	0	4	19	49	32	17	2	0	0	0	0	0	123	45	48
20:00	0	0	0	0	17	50	28	5	1	0	0	0	0	0	101	43	46
21:00	0	0	0	1	10	17	18	6	0	0	0	0	0	0	52	44	47
22:00	0	0	0	3	9	14	12	6	3	0	0	0	0	0	47	46	50
23:00	0	0	0	1	3	11	1	5	0	0	0	0	0	0	21	46	48
Total	3	2	6	31	247	878	1058	535	90	13	4	0	0	0	2867		
Percent	0.1%	0.1%	0.2%	1.1%	8.6%	30.6%	36.9%	18.7%	3.1%	0.5%	0.1%	0.0%	0.0%	0.0%			
AM Peak			06:00	06:00	06:00	07:00	07:00	07:00	07:00	07:00	10:00				07:00		
Vol.			1	3	22	47	79	58	12	3	2				210		
PM Peak	13:00	13:00	13:00	13:00	13:00	17:00	16:00	15:00	17:00	12:00					16:00		
Vol.	1	1	2	4	23	77	104	50	8	3					258		

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
Innovativedatallc.com or 1.413.668.5094

Location: Pearl Street
Location: b/w Ridgewood & Smith
Location: Gardner, Massachusetts
Client: Fuss & O'Neill

Eastbound

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	85th Percent	95th Percent
03/20/19	0	0	0	0	2	2	1	1	1	0	0	0	0	0	7	*	*
01:00	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3	*	*
02:00	0	0	0	0	1	1	1	0	0	0	0	0	0	0	3	*	*
03:00	0	0	0	0	2	1	0	1	0	0	0	0	0	0	4	*	*
04:00	0	0	0	1	3	7	9	1	1	0	0	0	0	0	22	44	46
05:00	0	0	0	**2**	8	12	15	4	0	0	0	0	0	0	41	44	46
06:00	0	0	0	2	**22**	44	47	15	3	0	0	**1**	0	0	134	45	48
07:00	0	0	0	0	15	**57**	**82**	**47**	**10**	1	**2**	0	0	0	**214**	47	50
08:00	0	0	0	1	12	37	55	23	5	0	0	0	0	0	133	46	50
09:00	0	0	0	0	9	23	55	34	4	2	1	0	0	0	128	48	50
10:00	0	0	0	0	16	35	57	33	6	0	0	1	0	0	148	47	50
11:00	0	0	0	0	9	45	73	40	9	**5**	0	0	0	0	181	48	52
12 PM	0	**1**	1	3	13	64	86	36	6	1	0	0	0	0	211	46	49
13:00	0	0	0	2	23	66	59	31	8	0	0	0	0	0	189	46	50
14:00	0	0	1	**6**	**27**	68	74	35	11	1	0	0	0	0	223	46	50
15:00	**1**	0	**3**	1	21	80	110	40	11	**3**	0	0	0	0	270	46	50
16:00	0	0	1	3	20	**101**	**118**	32	5	1	0	0	0	0	**281**	45	48
17:00	0	0	0	3	14	60	98	**55**	**12**	1	0	0	0	0	243	47	50
18:00	0	0	0	1	9	40	73	41	5	0	0	0	0	0	169	47	50
19:00	0	0	0	1	22	52	55	17	4	2	0	0	0	0	153	45	49
20:00	0	0	0	2	12	48	38	15	1	1	0	0	0	0	117	45	48
21:00	0	0	0	2	10	25	16	6	0	0	0	0	0	0	59	44	47
22:00	0	0	0	1	3	11	17	6	2	1	0	0	0	0	41	46	50
23:00	0	0	0	0	1	8	13	6	3	0	0	0	0	0	31	48	51
Total	1	1	6	31	275	889	1152	519	107	19	3	2	0	0	3005		
Percent	0.0%	0.0%	0.2%	1.0%	9.2%	29.6%	38.3%	17.3%	3.6%	0.6%	0.1%	0.1%	0.0%	0.0%			
AM Peak				05:00	06:00	07:00	07:00	07:00	07:00	11:00	07:00	06:00			07:00		
Vol.				2	22	57	82	47	10	5	2	1			214		
PM Peak	15:00	12:00	15:00	14:00	14:00	16:00	16:00	17:00	17:00	15:00					16:00		
Vol.	1	1	3	6	27	101	118	55	12	3					281		
Total	4	3	12	62	522	1767	2210	1054	197	32	7	2	0	0	5872		
Percent	0.1%	0.1%	0.2%	1.1%	8.9%	30.1%	37.6%	17.9%	3.4%	0.5%	0.1%	0.0%	0.0%	0.0%			

	15th Percentile :	35 MPH
	50th Percentile :	41 MPH
	85th Percentile :	46 MPH
	95th Percentile :	50 MPH
Stats	10 MPH Pace Speed :	37-46 MPH
	Number in Pace :	3735
	Percent in Pace :	63.6%
	Number of Vehicles > 40 MPH :	3446
	Percent of Vehicles > 40 MPH :	58.7%
	Mean Speed(Average) :	42 MPH

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
Innovativedatallc.com or 1.413.668.5094

Location: Pearl Street
Location: b/w Ridgewood & Smith
Location: Gardner, Massachusetts
Client: Fuss & O'Neill

Westbound

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	85th Percent	95th Percent
03/19/19	0	0	0	0	0	5	0	0	0	0	0	0	0	0	5	39	39
01:00	0	0	0	0	3	2	0	0	0	0	0	0	0	0	5	34	34
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2	*	*
04:00	0	0	0	1	5	9	2	0	0	0	0	0	0	0	17	39	41
05:00	0	0	0	1	14	12	3	1	0	0	0	0	0	0	31	39	42
06:00	0	0	0	3	32	48	13	3	0	0	0	0	0	0	99	40	44
07:00	0	0	**1**	**6**	35	**109**	**58**	10	0	0	0	0	0	0	**219**	43	45
08:00	0	0	0	5	**36**	103	39	4	1	0	0	0	0	0	188	41	44
09:00	0	0	0	2	34	80	34	7	0	0	0	0	0	0	157	42	45
10:00	0	0	0	2	25	48	50	**12**	**3**	0	0	0	0	0	140	44	48
11:00	0	0	1	1	27	72	46	7	1	0	**1**	0	0	0	156	43	45
12 PM	0	0	**1**	3	35	85	36	5	1	0	0	0	0	0	166	42	45
13:00	0	0	0	6	31	69	54	3	**2**	0	0	0	0	0	165	43	45
14:00	0	0	0	**17**	44	85	67	8	1	0	0	0	0	0	222	43	45
15:00	0	0	0	3	31	**122**	74	15	1	0	0	0	0	0	**246**	43	46
16:00	0	0	0	9	**61**	114	51	9	1	0	0	0	0	0	245	42	45
17:00	0	0	0	3	17	102	**79**	**17**	0	0	0	0	0	0	218	44	46
18:00	**1**	0	0	1	32	79	45	6	0	0	0	0	0	0	164	42	45
19:00	0	0	0	7	20	55	17	0	0	0	0	0	0	0	99	41	43
20:00	0	0	0	2	12	27	13	0	1	0	0	0	0	0	55	42	44
21:00	0	0	0	1	4	12	8	4	0	0	0	0	0	0	29	44	47
22:00	0	0	0	1	6	17	3	1	0	0	0	0	0	0	28	40	42
23:00	0	0	0	1	11	10	2	2	0	0	0	0	0	0	26	38	40
Total	1	0	3	75	516	1265	695	114	12	0	1	0	0	0	2682		
Percent	0.0%	0.0%	0.1%	2.8%	19.2%	47.2%	25.9%	4.3%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak			07:00	07:00	08:00	07:00	07:00	10:00	10:00		11:00				07:00		
Vol.			1	6	36	109	58	12	3		1				219		
PM Peak	18:00		12:00	14:00	16:00	15:00	17:00	17:00	13:00						15:00		
Vol.	1		1	17	61	122	79	17	2						246		

Innovative Data, LLC

PO Box 468
Belchertown, Massachusetts
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Location: Pearl Street
Location: b/w Ridgewood & Smith
Location: Gardner, Massachusetts
Client: Fuss & O'Neill

Westbound

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	85th Percent	95th Percent
03/20/19	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	*	*
01:00	0	0	0	0	1	3	1	0	1	0	0	0	0	0	6	38	38
02:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	*	*
03:00	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3	*	*
04:00	0	0	0	0	4	9	2	1	0	0	0	0	0	0	16	39	41
05:00	0	0	0	4	9	17	6	1	0	0	0	0	0	0	37	41	44
06:00	0	0	0	5	18	46	18	6	1	0	0	0	0	0	94	42	46
07:00	0	0	**1**	**6**	**58**	77	**57**	**12**	1	0	0	0	0	0	**212**	43	46
08:00	0	0	0	6	44	**95**	44	5	0	0	0	0	0	0	194	42	45
09:00	0	0	1	4	32	79	38	8	0	0	0	0	0	0	162	42	45
10:00	0	0	0	0	27	81	44	5	1	0	0	0	0	0	158	43	45
11:00	0	0	0	2	15	42	47	5	**6**	0	0	0	0	0	117	44	49
12 PM	0	**1**	1	**20**	40	88	51	**10**	1	0	0	0	0	0	212	43	46
13:00	0	0	1	8	46	71	36	6	0	0	0	0	0	0	168	42	45
14:00	0	0	**3**	10	51	121	59	7	0	0	0	**1**	0	0	252	42	45
15:00	0	0	0	4	44	**123**	**85**	8	2	0	0	0	0	0	**266**	43	45
16:00	0	0	0	8	**55**	117	73	10	1	0	0	0	0	0	264	43	45
17:00	0	0	0	5	30	98	69	8	0	0	0	0	0	0	210	43	45
18:00	0	0	0	1	32	66	56	9	1	0	0	0	0	0	165	43	46
19:00	0	0	0	7	26	64	19	4	0	0	0	0	0	0	120	41	44
20:00	0	0	0	4	10	36	10	1	0	0	0	0	0	0	61	41	44
21:00	0	0	0	2	6	17	13	2	0	0	0	0	0	0	40	43	45
22:00	0	0	0	1	6	13	8	1	**3**	0	0	0	0	0	32	43	51
23:00	0	0	0	2	4	6	8	2	0	0	0	0	0	0	22	44	46
Total	0	1	7	100	561	1271	744	111	18	0	0	1	0	0	2814		
Percent	0.0%	0.0%	0.2%	3.6%	19.9%	45.2%	26.4%	3.9%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak			07:00	07:00	07:00	08:00	07:00	07:00	11:00						07:00		
Vol.			1	6	58	95	57	12	6						212		
PM Peak		12:00	14:00	12:00	16:00	15:00	15:00	12:00	22:00			14:00			15:00		
Vol.		1	3	20	55	123	85	10	3			1			266		
Total	1	1	10	175	1077	2536	1439	225	30	0	1	1	0	0	5496		
Percent	0.0%	0.0%	0.2%	3.2%	19.6%	46.1%	26.2%	4.1%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%			

	15th Percentile :	32 MPH
	50th Percentile :	37 MPH
	85th Percentile :	43 MPH
	95th Percentile :	45 MPH
Stats	10 MPH Pace Speed :	34-43 MPH
	Number in Pace :	3829
	Percent in Pace :	69.7%
	Number of Vehicles > 40 MPH :	1827
	Percent of Vehicles > 40 MPH :	33.2%
	Mean Speed(Average) :	38 MPH

Innovative Data, LLC

PO Box 468
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Innovativedatallc.com or 1.413.668.5094

Location: Pearl Street
Location: b/w Ridgewood & Smith
Location: Gardner, Massachusetts
Client: Fuss & O'Neill

Eastbound, Westbound

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	85th Percent	95th Percent
03/19/19	0	0	0	0	1	9	5	1	0	0	0	0	0	0	16	43	45
01:00	0	0	0	0	4	4	1	0	0	0	0	0	0	0	9	38	39
02:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	*	*
03:00	0	0	0	0	1	1	3	1	0	0	0	0	0	0	6	43	43
04:00	0	0	0	2	8	13	5	3	0	0	0	0	0	0	31	43	46
05:00	0	0	0	2	25	21	14	5	0	0	0	0	0	0	67	43	46
06:00	0	0	**1**	**6**	**54**	93	58	20	7	0	0	0	0	0	239	44	48
07:00	0	0	1	6	45	**156**	**137**	**68**	**12**	**3**	1	0	0	0	**429**	46	50
08:00	0	0	0	5	43	143	89	43	6	1	0	0	0	0	330	45	49
09:00	0	0	0	2	36	109	90	51	8	2	1	0	0	0	299	46	49
10:00	0	0	0	2	32	95	98	38	9	1	**2**	0	0	0	277	46	49
11:00	0	0	1	3	37	113	122	38	7	1	1	0	0	0	323	45	49
12 PM	0	0	1	6	48	132	108	38	7	**3**	0	0	0	0	343	45	49
13:00	1	**1**	**2**	10	54	135	132	35	6	0	0	0	0	0	376	44	48
14:00	1	1	2	**17**	66	154	153	43	7	0	0	0	0	0	444	44	48
15:00	0	0	0	4	44	187	**176**	**65**	7	1	0	0	0	0	484	45	48
16:00	0	0	0	13	**82**	**189**	155	58	6	0	0	0	0	0	**503**	44	48
17:00	0	0	0	4	30	179	167	61	**8**	0	0	0	0	0	449	45	49
18:00	**2**	0	1	3	42	148	105	35	5	1	0	0	0	0	342	44	48
19:00	0	0	0	11	39	104	49	17	2	0	0	0	0	0	222	43	46
20:00	0	0	0	2	29	77	41	5	2	0	0	0	0	0	156	42	45
21:00	0	0	0	2	14	29	26	10	0	0	0	0	0	0	81	45	48
22:00	0	0	0	4	15	31	15	7	3	0	0	0	0	0	75	44	49
23:00	0	0	0	2	14	21	3	7	0	0	0	0	0	0	47	44	48
Total	4	2	9	106	763	2143	1753	649	102	13	5	0	0	0	5549		
Percent	0.1%	0.0%	0.2%	1.9%	13.8%	38.6%	31.6%	11.7%	1.8%	0.2%	0.1%	0.0%	0.0%	0.0%			
AM Peak			06:00	06:00	06:00	07:00	07:00	07:00	07:00	07:00	10:00				07:00		
Vol.			1	6	54	156	137	68	12	3	2				429		
PM Peak	18:00	13:00	13:00	14:00	16:00	16:00	15:00	15:00	17:00	12:00					16:00		
Vol.	2	1	2	17	82	189	176	65	8	3					503		

Innovative Data, LLC

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Location: Pearl Street
Location: b/w Ridgewood & Smith
Location: Gardner, Massachusetts
Client: Fuss & O'Neill

Eastbound, Westbound

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	85th Percent	95th Percent
03/20/19	0	0	0	0	3	3	1	1	1	0	0	0	0	0	9	37	38
01:00	0	0	0	0	2	5	1	0	1	0	0	0	0	0	9	39	40
02:00	0	0	0	0	2	1	1	0	0	0	0	0	0	0	4	*	*
03:00	0	0	0	1	3	2	0	1	0	0	0	0	0	0	7	34	34
04:00	0	0	0	1	7	16	11	2	1	0	0	0	0	0	38	42	45
05:00	0	0	0	6	17	29	21	5	0	0	0	0	0	0	78	43	46
06:00	0	0	0	**7**	40	90	65	21	4	0	0	**1**	0	0	228	44	48
07:00	0	0	**1**	6	**73**	**134**	**139**	**59**	11	1	**2**	0	0	0	**426**	45	49
08:00	0	0	0	7	56	132	99	28	5	0	0	0	0	0	327	44	48
09:00	0	0	1	4	41	102	93	42	4	2	1	0	0	0	290	45	49
10:00	0	0	0	0	43	116	101	38	7	0	0	1	0	0	306	45	49
11:00	0	0	0	2	24	87	120	45	**15**	**5**	0	0	0	0	298	47	51
12 PM	0	**2**	2	**23**	53	152	137	46	7	1	0	0	0	0	423	45	48
13:00	0	0	1	10	69	137	95	37	8	0	0	0	0	0	357	44	48
14:00	0	0	**4**	16	**78**	189	133	42	11	1	0	**1**	0	0	475	44	48
15:00	**1**	0	3	5	65	203	**195**	48	**13**	**3**	0	0	0	0	536	45	48
16:00	0	0	1	11	75	**218**	191	42	6	1	0	0	0	0	**545**	44	47
17:00	0	0	0	8	44	158	167	**63**	12	1	0	0	0	0	453	46	49
18:00	0	0	0	2	41	106	129	50	6	0	0	0	0	0	334	45	49
19:00	0	0	0	8	48	116	74	21	4	2	0	0	0	0	273	44	48
20:00	0	0	0	6	22	84	48	16	1	1	0	0	0	0	178	44	47
21:00	0	0	0	4	16	42	29	8	0	0	0	0	0	0	99	43	47
22:00	0	0	0	2	9	24	25	7	5	1	0	0	0	0	73	46	52
23:00	0	0	0	2	5	14	21	8	3	0	0	0	0	0	53	46	50
Total	1	2	13	131	836	2160	1896	630	125	19	3	3	0	0	5819		
Percent	0.0%	0.0%	0.2%	2.3%	14.4%	37.1%	32.6%	10.8%	2.1%	0.3%	0.1%	0.1%	0.0%	0.0%			
AM Peak			07:00	06:00	07:00	07:00	07:00	07:00	11:00	11:00	07:00	06:00			07:00		
Vol.			1	7	73	134	139	59	15	5	2	1			426		
PM Peak	15:00	12:00	14:00	12:00	14:00	16:00	15:00	17:00	15:00	15:00		14:00			16:00		
Vol.	1	2	4	23	78	218	195	63	13	3		1			545		
Total	5	4	22	237	1599	4303	3649	1279	227	32	8	3	0	0	11368		
Percent	0.0%	0.0%	0.2%	2.1%	14.1%	37.9%	32.1%	11.3%	2.0%	0.3%	0.1%	0.0%	0.0%	0.0%			

	15th Percentile :	34 MPH
	50th Percentile :	39 MPH
	85th Percentile :	45 MPH
	95th Percentile :	48 MPH
Stats	10 MPH Pace Speed :	36-45 MPH
	Number in Pace :	7339
	Percent in Pace :	64.6%
	Number of Vehicles > 40 MPH :	5274
	Percent of Vehicles > 40 MPH :	46.4%
	Mean Speed(Average) :	40 MPH

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Location: Pearl Street
Location: b/w Ridgewood & Smith
Location: Gardner, Massachusetts
Client: Fuss & O'Neill

Eastbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
03/19/19	0	11	0	0	0	0	0	0	0	0	0	0	0	0	11
01:00	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
04:00	0	10	4	0	0	0	0	0	0	0	0	0	0	0	14
05:00	0	23	8	0	5	0	0	0	0	0	0	0	0	0	36
06:00	1	96	22	4	14	0	1	0	2	0	0	0	0	0	140
07:00	0	142	40	3	22	2	0	1	0	0	0	0	0	0	210
08:00	0	94	25	1	22	0	0	0	0	0	0	0	0	0	142
09:00	0	88	31	1	22	0	0	0	0	0	0	0	0	0	142
10:00	1	84	33	0	18	0	1	0	0	0	0	0	0	0	137
11:00	0	107	38	1	19	1	0	1	0	0	0	0	0	0	167
12 PM	0	123	32	0	19	1	0	2	0	0	0	0	0	0	177
13:00	2	150	31	1	26	1	0	0	0	0	0	0	0	0	211
14:00	0	143	42	3	31	0	0	2	0	1	0	0	0	0	222
15:00	1	165	40	2	30	0	0	0	0	0	0	0	0	0	238
16:00	0	192	33	1	31	1	0	0	0	0	0	0	0	0	258
17:00	0	169	34	0	24	1	0	2	1	0	0	0	0	0	231
18:00	0	143	22	0	12	0	0	1	0	0	0	0	0	0	178
19:00	0	95	21	0	7	0	0	0	0	0	0	0	0	0	123
20:00	0	74	19	0	7	0	0	1	0	0	0	0	0	0	101
21:00	0	38	9	0	5	0	0	0	0	0	0	0	0	0	52
22:00	0	33	10	0	4	0	0	0	0	0	0	0	0	0	47
23:00	0	14	3	0	4	0	0	0	0	0	0	0	0	0	21
Total	5	2001	499	17	322	7	2	10	3	1	0	0	0	0	2867
Percent	0.2%	69.8%	17.4%	0.6%	11.2%	0.2%	0.1%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	07:00	06:00	07:00	07:00	06:00	07:00	06:00						
Vol.	1	142	40	4	22	2	1	1	2						
PM Peak	13:00	16:00	14:00	14:00	14:00	12:00		12:00	17:00	14:00					
Vol.	2	192	42	3	31	1		2	1	1					

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Eastbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
03/20/19	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
01:00	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
02:00	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
03:00	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
04:00	0	12	8	0	2	0	0	0	0	0	0	0	0	0	22
05:00	0	33	6	0	2	0	0	0	0	0	0	0	0	0	41
06:00	0	96	19	5	13	0	0	0	1	0	0	0	0	0	134
07:00	0	149	43	2	18	1	0	1	0	0	0	0	0	0	214
08:00	1	97	16	1	17	1	0	0	0	0	0	0	0	0	133
09:00	0	87	26	1	14	0	0	0	0	0	0	0	0	0	128
10:00	0	100	31	1	15	1	0	0	0	0	0	0	0	0	148
11:00	0	120	35	0	24	1	0	0	0	0	0	0	0	1	181
12 PM	2	147	40	1	20	1	0	0	0	0	0	0	0	0	211
13:00	0	131	40	0	18	0	0	0	0	0	0	0	0	0	189
14:00	0	147	36	3	33	0	0	2	2	0	0	0	0	0	223
15:00	3	186	54	3	21	1	0	0	2	0	0	0	0	0	270
16:00	1	213	40	1	26	0	0	0	0	0	0	0	0	0	281
17:00	2	182	34	0	24	0	0	0	1	0	0	0	0	0	243
18:00	0	120	27	1	21	0	0	0	0	0	0	0	0	0	169
19:00	0	115	27	0	10	1	0	0	0	0	0	0	0	0	153
20:00	0	94	16	0	7	0	0	0	0	0	0	0	0	0	117
21:00	0	39	17	0	3	0	0	0	0	0	0	0	0	0	59
22:00	0	29	11	0	1	0	0	0	0	0	0	0	0	0	41
23:00	0	20	5	0	6	0	0	0	0	0	0	0	0	0	31
Total	9	2132	533	19	295	7	0	3	6	0	0	0	0	1	3005
Percent	0.3%	70.9%	17.7%	0.6%	9.8%	0.2%	0.0%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	07:00	07:00	06:00	11:00	07:00		07:00	06:00					11:00	
Vol.	1	149	43	5	24	1		1	1					1	
PM Peak	15:00	16:00	15:00	14:00	14:00	12:00		14:00	14:00						
Vol.	3	213	54	3	33	1		2	2						
Grand Total	14	4133	1032	36	617	14	2	13	9	1	0	0	0	1	5872
Percent	0.2%	70.4%	17.6%	0.6%	10.5%	0.2%	0.0%	0.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	

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Westbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
03/19/19	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
01:00	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
04:00	0	14	2	0	1	0	0	0	0	0	0	0	0	0	17
05:00	0	19	9	0	3	0	0	0	0	0	0	0	0	0	31
06:00	0	74	21	1	3	0	0	0	0	0	0	0	0	0	99
07:00	0	178	23	4	12	0	0	2	0	0	0	0	0	0	219
08:00	0	144	31	2	10	1	0	0	0	0	0	0	0	0	188
09:00	0	104	39	0	13	0	0	1	0	0	0	0	0	0	157
10:00	1	109	21	1	7	0	0	1	0	0	0	0	0	0	140
11:00	0	120	26	1	7	2	0	0	0	0	0	0	0	0	156
12 PM	0	120	38	0	7	0	0	0	0	1	0	0	0	0	166
13:00	1	134	24	0	5	1	0	0	0	0	0	0	0	0	165
14:00	0	174	34	1	12	0	0	1	0	0	0	0	0	0	222
15:00	0	195	35	1	13	1	0	1	0	0	0	0	0	0	246
16:00	0	202	32	1	10	0	0	0	0	0	0	0	0	0	245
17:00	0	185	27	0	4	0	0	2	0	0	0	0	0	0	218
18:00	0	145	16	0	2	0	0	0	0	0	0	0	0	1	164
19:00	0	89	9	0	1	0	0	0	0	0	0	0	0	0	99
20:00	0	46	8	0	1	0	0	0	0	0	0	0	0	0	55
21:00	0	29	0	0	0	0	0	0	0	0	0	0	0	0	29
22:00	0	23	5	0	0	0	0	0	0	0	0	0	0	0	28
23:00	0	24	2	0	0	0	0	0	0	0	0	0	0	0	26
Total	2	2139	403	12	111	5	0	8	0	1	0	0	0	1	2682
Percent	0.1%	79.8%	15.0%	0.4%	4.1%	0.2%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	07:00	09:00	07:00	09:00	11:00		07:00							
Vol.	1	178	39	4	13	2		2							
PM Peak	13:00	16:00	12:00	14:00	15:00	13:00		17:00		12:00				18:00	
Vol.	1	202	38	1	13	1		2		1				1	

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Westbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
03/20/19	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
01:00	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
04:00	0	13	2	0	1	0	0	0	0	0	0	0	0	0	16
05:00	0	25	8	0	4	0	0	0	0	0	0	0	0	0	37
06:00	1	70	18	1	4	0	0	0	0	0	0	0	0	0	94
07:00	0	177	26	3	6	0	0	0	0	0	0	0	0	0	212
08:00	0	158	23	2	8	2	0	0	1	0	0	0	0	0	194
09:00	0	117	30	0	14	0	0	1	0	0	0	0	0	0	162
10:00	0	129	19	0	8	2	0	0	0	0	0	0	0	0	158
11:00	0	83	25	1	7	0	0	1	0	0	0	0	0	0	117
12 PM	0	170	31	1	9	0	0	1	0	0	0	0	0	0	212
13:00	2	134	29	0	3	0	0	0	0	0	0	0	0	0	168
14:00	1	201	33	1	13	0	0	2	1	0	0	0	0	0	252
15:00	0	214	42	1	8	0	0	1	0	0	0	0	0	0	266
16:00	0	220	30	1	11	0	0	2	0	0	0	0	0	0	264
17:00	0	175	29	0	6	0	0	0	0	0	0	0	0	0	210
18:00	0	139	25	0	0	1	0	0	0	0	0	0	0	0	165
19:00	0	108	12	0	0	0	0	0	0	0	0	0	0	0	120
20:00	0	54	4	0	3	0	0	0	0	0	0	0	0	0	61
21:00	0	33	7	0	0	0	0	0	0	0	0	0	0	0	40
22:00	0	30	1	0	1	0	0	0	0	0	0	0	0	0	32
23:00	0	19	1	0	2	0	0	0	0	0	0	0	0	0	22
Total	4	2280	396	11	108	5	0	8	2	0	0	0	0	0	2814
Percent	0.1%	81.0%	14.1%	0.4%	3.8%	0.2%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	09:00	07:00	09:00	08:00		09:00	08:00						
Vol.	1	177	30	3	14	2		1	1						
PM Peak	13:00	16:00	15:00	12:00	14:00	18:00		14:00	14:00						
Vol.	2	220	42	1	13	1		2	1						
Grand Total	6	4419	799	23	219	10	0	16	2	1	0	0	0	1	5496
Percent	0.1%	80.4%	14.5%	0.4%	4.0%	0.2%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

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Eastbound, Westbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
03/19/19	0	16	0	0	0	0	0	0	0	0	0	0	0	0	16
01:00	0	8	1	0	0	0	0	0	0	0	0	0	0	0	9
02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:00	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
04:00	0	24	6	0	1	0	0	0	0	0	0	0	0	0	31
05:00	0	42	17	0	8	0	0	0	0	0	0	0	0	0	67
06:00	1	170	43	5	17	0	1	0	2	0	0	0	0	0	239
07:00	0	320	63	7	34	2	0	3	0	0	0	0	0	0	429
08:00	0	238	56	3	32	1	0	0	0	0	0	0	0	0	330
09:00	0	192	70	1	35	0	0	1	0	0	0	0	0	0	299
10:00	2	193	54	1	25	0	1	1	0	0	0	0	0	0	277
11:00	0	227	64	2	26	3	0	1	0	0	0	0	0	0	323
12 PM	0	243	70	0	26	1	0	2	0	1	0	0	0	0	343
13:00	3	284	55	1	31	2	0	0	0	0	0	0	0	0	376
14:00	0	317	76	4	43	0	0	3	0	1	0	0	0	0	444
15:00	1	360	75	3	43	1	0	1	0	0	0	0	0	0	484
16:00	0	394	65	2	41	1	0	0	0	0	0	0	0	0	503
17:00	0	354	61	0	28	1	0	4	1	0	0	0	0	0	449
18:00	0	288	38	0	14	0	0	1	0	0	0	0	0	1	342
19:00	0	184	30	0	8	0	0	0	0	0	0	0	0	0	222
20:00	0	120	27	0	8	0	0	1	0	0	0	0	0	0	156
21:00	0	67	9	0	5	0	0	0	0	0	0	0	0	0	81
22:00	0	56	15	0	4	0	0	0	0	0	0	0	0	0	75
23:00	0	38	5	0	4	0	0	0	0	0	0	0	0	0	47
Total	7	4140	902	29	433	12	2	18	3	2	0	0	0	1	5549
Percent	0.1%	74.6%	16.3%	0.5%	7.8%	0.2%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	07:00	09:00	07:00	09:00	11:00	06:00	07:00	06:00						
Vol.	2	320	70	7	35	3	1	3	2						
PM Peak	13:00	16:00	14:00	14:00	14:00	13:00		17:00	17:00	12:00				18:00	
Vol.	3	394	76	4	43	2		4	1	1				1	

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Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
03/20/19	0	9	0	0	0	0	0	0	0	0	0	0	0	0	9
01:00	0	8	1	0	0	0	0	0	0	0	0	0	0	0	9
02:00	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
03:00	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
04:00	0	25	10	0	3	0	0	0	0	0	0	0	0	0	38
05:00	0	58	14	0	6	0	0	0	0	0	0	0	0	0	78
06:00	1	166	37	6	17	0	0	0	1	0	0	0	0	0	228
07:00	0	326	69	5	24	1	0	1	0	0	0	0	0	0	426
08:00	1	255	39	3	25	3	0	0	1	0	0	0	0	0	327
09:00	0	204	56	1	28	0	0	1	0	0	0	0	0	0	290
10:00	0	229	50	1	23	3	0	0	0	0	0	0	0	0	306
11:00	0	203	60	1	31	1	0	1	0	0	0	0	0	1	298
12 PM	2	317	71	2	29	1	0	1	0	0	0	0	0	0	423
13:00	2	265	69	0	21	0	0	0	0	0	0	0	0	0	357
14:00	1	348	69	4	46	0	0	4	3	0	0	0	0	0	475
15:00	3	400	96	4	29	1	0	1	2	0	0	0	0	0	536
16:00	1	433	70	2	37	0	0	2	0	0	0	0	0	0	545
17:00	2	357	63	0	30	0	0	0	1	0	0	0	0	0	453
18:00	0	259	52	1	21	1	0	0	0	0	0	0	0	0	334
19:00	0	223	39	0	10	1	0	0	0	0	0	0	0	0	273
20:00	0	148	20	0	10	0	0	0	0	0	0	0	0	0	178
21:00	0	72	24	0	3	0	0	0	0	0	0	0	0	0	99
22:00	0	59	12	0	2	0	0	0	0	0	0	0	0	0	73
23:00	0	39	6	0	8	0	0	0	0	0	0	0	0	0	53
Total	13	4412	929	30	403	12	0	11	8	0	0	0	0	1	5819
Percent	0.2%	75.8%	16.0%	0.5%	6.9%	0.2%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	07:00	06:00	11:00	08:00		07:00	06:00					11:00	
Vol.	1	326	69	6	31	3		1	1					1	
PM Peak	15:00	16:00	15:00	14:00	14:00	12:00		14:00	14:00						
Vol.	3	433	96	4	46	1		4	3						
Grand Total	20	8552	1831	59	836	24	2	29	11	2	0	0	0	2	11368
Percent	0.2%	75.2%	16.1%	0.5%	7.4%	0.2%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	

Appendix E

Conceptual Site Plan

SITE PLAN

1"=80'-0"

Appendix F

Intersection Capacity Analysis Worksheets – Weekday AM Peak Hour

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	42	212	271	6	6	24
Future Vol, veh/h	42	212	271	6	6	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	160
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	0	6	1	17	0	4
Mvmt Flow	56	283	361	8	8	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	369	0	-	0	760	365
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	395	-
Critical Hdwy	4.1	-	-	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.336
Pot Cap-1 Maneuver	1201	-	-	-	377	676
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	685	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1201	-	-	-	359	676
Mov Cap-2 Maneuver	-	-	-	-	359	-
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	685	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1201	-	-	-	359	676
HCM Lane V/C Ratio	0.047	-	-	-	0.022	0.047
HCM Control Delay (s)	8.1	-	-	-	15.3	10.6
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	159	59	13	220	54	7
Future Vol, veh/h	159	59	13	220	54	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	7	0	3	3	11
Mvmt Flow	175	65	14	242	59	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	240	0	445	175
Stage 1	-	-	-	-	175	-
Stage 2	-	-	-	-	270	-
Critical Hdwy	-	-	4.1	-	6.43	6.31
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.2	-	3.527	3.399
Pot Cap-1 Maneuver	-	-	1339	-	569	846
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	773	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1339	-	562	846
Mov Cap-2 Maneuver	-	-	-	-	562	-
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	764	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	562	846	-	-	1339	-
HCM Lane V/C Ratio	0.106	0.009	-	-	0.011	-
HCM Control Delay (s)	12.2	9.3	-	-	7.7	0
HCM Lane LOS	B	A	-	-	A	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	22	138	179	4	2	50
Future Vol, veh/h	22	138	179	4	2	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	7	7	0	0	2
Mvmt Flow	25	155	201	4	2	56

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	205	0	-	0	408	203
Stage 1	-	-	-	-	203	-
Stage 2	-	-	-	-	205	-
Critical Hdwy	4.15	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.245	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1349	-	-	-	603	838
Stage 1	-	-	-	-	836	-
Stage 2	-	-	-	-	834	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1349	-	-	-	591	838
Mov Cap-2 Maneuver	-	-	-	-	591	-
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	834	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1349	-	-	-	825
HCM Lane V/C Ratio	0.018	-	-	-	0.071
HCM Control Delay (s)	7.7	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	11	1	135	6	0	175
Future Vol, veh/h	11	1	135	6	0	175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	60	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	18	0	2	33	0	4
Mvmt Flow	13	1	165	7	0	213

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	382	169	0	0	172	0
Stage 1	169	-	-	-	-	-
Stage 2	213	-	-	-	-	-
Critical Hdwy	6.58	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.58	-	-	-	-	-
Critical Hdwy Stg 2	5.58	-	-	-	-	-
Follow-up Hdwy	3.662	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	590	880	-	-	1417	-
Stage 1	823	-	-	-	-	-
Stage 2	786	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	590	880	-	-	1417	-
Mov Cap-2 Maneuver	590	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	786	-	-	-	-	-

Approach	WB	NE	SW
HCM Control Delay, s	11	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	WBLn1	WBLn2	SWL	SWT
Capacity (veh/h)	-	-	590	880	1417	-
HCM Lane V/C Ratio	-	-	0.023	0.001	-	-
HCM Control Delay (s)	-	-	11.2	9.1	0	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	48	244	311	7	7	28
Future Vol, veh/h	48	244	311	7	7	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	160
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	0	6	1	17	0	4
Mvmt Flow	64	325	415	9	9	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	424	0	-	0	873	420
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	453	-
Critical Hdwy	4.1	-	-	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.336
Pot Cap-1 Maneuver	1146	-	-	-	323	629
Stage 1	-	-	-	-	667	-
Stage 2	-	-	-	-	645	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1146	-	-	-	305	629
Mov Cap-2 Maneuver	-	-	-	-	305	-
Stage 1	-	-	-	-	630	-
Stage 2	-	-	-	-	645	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1146	-	-	-	305	629
HCM Lane V/C Ratio	0.056	-	-	-	0.031	0.059
HCM Control Delay (s)	8.3	-	-	-	17.2	11.1
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1	0.2

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	183	68	15	253	62	8
Future Vol, veh/h	183	68	15	253	62	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	7	0	3	3	11
Mvmt Flow	201	75	16	278	68	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	276	0	511	201
Stage 1	-	-	-	-	201	-
Stage 2	-	-	-	-	310	-
Critical Hdwy	-	-	4.1	-	6.43	6.31
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.2	-	3.527	3.399
Pot Cap-1 Maneuver	-	-	1299	-	521	818
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	741	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1299	-	513	818
Mov Cap-2 Maneuver	-	-	-	-	513	-
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	730	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	513	818	-	-	1299	-
HCM Lane V/C Ratio	0.133	0.011	-	-	0.013	-
HCM Control Delay (s)	13.1	9.4	-	-	7.8	0
HCM Lane LOS	B	A	-	-	A	A
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	159	206	5	2	57
Future Vol, veh/h	25	159	206	5	2	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	7	7	0	0	2
Mvmt Flow	28	179	231	6	2	64

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	237	0	-	0	469	234
Stage 1	-	-	-	-	234	-
Stage 2	-	-	-	-	235	-
Critical Hdwy	4.15	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.245	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1313	-	-	-	556	805
Stage 1	-	-	-	-	810	-
Stage 2	-	-	-	-	809	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1313	-	-	-	543	805
Mov Cap-2 Maneuver	-	-	-	-	543	-
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	809	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1313	-	-	-	792
HCM Lane V/C Ratio	0.021	-	-	-	0.084
HCM Control Delay (s)	7.8	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	155	7	0	201	13	1
Future Vol, veh/h	155	7	0	201	13	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	30
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	168	8	0	218	14	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	176	0	390	172
Stage 1	-	-	-	-	172	-
Stage 2	-	-	-	-	218	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1400	-	614	872
Stage 1	-	-	-	-	858	-
Stage 2	-	-	-	-	818	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1400	-	614	872
Mov Cap-2 Maneuver	-	-	-	-	614	-
Stage 1	-	-	-	-	858	-
Stage 2	-	-	-	-	818	-

Approach	EB	WB	NW
HCM Control Delay, s	0	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	NWLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	614	872	-	-	1400	-
HCM Lane V/C Ratio	0.023	0.001	-	-	-	-
HCM Control Delay (s)	11	9.1	-	-	0	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	48	244	311	7	7	28
Future Vol, veh/h	48	433	496	7	7	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	160
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	0	6	1	17	0	4
Mvmt Flow	64	577	661	9	9	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	670	0	-	0	1371	666
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	705	-
Critical Hdwy	4.1	-	-	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.336
Pot Cap-1 Maneuver	930	-	-	-	163	456
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	494	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	930	-	-	-	152	456
Mov Cap-2 Maneuver	-	-	-	-	152	-
Stage 1	-	-	-	-	479	-
Stage 2	-	-	-	-	494	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	16.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	930	-	-	-	152	456
HCM Lane V/C Ratio	0.069	-	-	-	0.061	0.082
HCM Control Delay (s)	9.2	-	-	-	30.2	13.6
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2	0.3

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	183	68	15	253	62	8
Future Vol, veh/h	372	68	23	438	62	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	7	0	3	3	11
Mvmt Flow	409	75	25	481	68	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	484	0	940	409
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	531	-
Critical Hdwy	-	-	4.1	-	6.43	6.31
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.2	-	3.527	3.399
Pot Cap-1 Maneuver	-	-	1089	-	291	623
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	588	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1089	-	282	623
Mov Cap-2 Maneuver	-	-	-	-	282	-
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	570	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	19.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	282	623	-	-	1089	-
HCM Lane V/C Ratio	0.242	0.023	-	-	0.023	-
HCM Control Delay (s)	21.8	10.9	-	-	8.4	0
HCM Lane LOS	C	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	159	206	5	2	57
Future Vol, veh/h	25	353	399	8	3	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	5	7	7	0	0	2
Mvmt Flow	28	397	448	9	3	64

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	457	0	-	0	906	453
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	453	-
Critical Hdwy	4.15	-	-	-	6.4	6.22
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.245	-	-	-	3.5	3.318
Pot Cap-1 Maneuver	1088	-	-	-	309	607
Stage 1	-	-	-	-	645	-
Stage 2	-	-	-	-	645	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1088	-	-	-	299	607
Mov Cap-2 Maneuver	-	-	-	-	299	-
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	645	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1088	-	-	-	577
HCM Lane V/C Ratio	0.026	-	-	-	0.117
HCM Control Delay (s)	8.4	0	-	-	12.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	155	7	0	201	13	1
Future Vol, veh/h	239	11	0	331	21	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	30
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	260	12	0	360	23	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	272	0	626	266
Stage 1	-	-	-	-	266	-
Stage 2	-	-	-	-	360	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1291	-	448	773
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	706	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1291	-	448	773
Mov Cap-2 Maneuver	-	-	-	-	448	-
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	706	-

Approach	EB	WB	NW
HCM Control Delay, s	0	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	NWLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	448	773	-	-	1291	-
HCM Lane V/C Ratio	0.051	0.001	-	-	-	-
HCM Control Delay (s)	13.5	9.7	-	-	0	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	161	214	0	0	0
Future Vol, veh/h	195	161	214	138	88	196
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	4	7	3	3	4	4
Mvmt Flow	238	196	261	168	107	239

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	429	0	-	0	1017	345
Stage 1	-	-	-	-	345	-
Stage 2	-	-	-	-	672	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1120	-	-	-	261	693
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	504	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1120	-	-	-	199	693
Mov Cap-2 Maneuver	-	-	-	-	199	-
Stage 1	-	-	-	-	543	-
Stage 2	-	-	-	-	504	-

Approach	EB	WB	SB
HCM Control Delay, s	5	0	22.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1120	-	-	-	199	693
HCM Lane V/C Ratio	0.212	-	-	-	0.539	0.345
HCM Control Delay (s)	9.1	0	-	-	42.5	12.9
HCM Lane LOS	A	A	-	-	E	B
HCM 95th %tile Q(veh)	0.8	-	-	-	2.8	1.5

Appendix G

Intersection Capacity Analysis Worksheets – Weekday PM Peak Hour

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	91	294	336	20	32	96
Future Vol, veh/h	91	294	336	20	32	96
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	160
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	4	1	5	0	1
Mvmt Flow	112	363	415	25	40	119

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	440	0	-	0	1015	428
Stage 1	-	-	-	-	428	-
Stage 2	-	-	-	-	587	-
Critical Hdwy	4.1	-	-	-	6.4	6.21
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.309
Pot Cap-1 Maneuver	1131	-	-	-	266	629
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	560	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1131	-	-	-	240	629
Mov Cap-2 Maneuver	-	-	-	-	240	-
Stage 1	-	-	-	-	596	-
Stage 2	-	-	-	-	560	-

Approach	EB	WB	SB
HCM Control Delay, s	2	0	14.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1131	-	-	-	240	629
HCM Lane V/C Ratio	0.099	-	-	-	0.165	0.188
HCM Control Delay (s)	8.5	-	-	-	22.9	12
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.6	0.7

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	279	69	16	279	91	19
Future Vol, veh/h	279	69	16	279	91	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	9	6	2	0	5
Mvmt Flow	317	78	18	317	103	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	395	0	670	317
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	353	-
Critical Hdwy	-	-	4.16	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.345
Pot Cap-1 Maneuver	-	-	1142	-	425	717
Stage 1	-	-	-	-	743	-
Stage 2	-	-	-	-	716	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1142	-	417	717
Mov Cap-2 Maneuver	-	-	-	-	417	-
Stage 1	-	-	-	-	743	-
Stage 2	-	-	-	-	702	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	15.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	417	717	-	-	1142	-
HCM Lane V/C Ratio	0.248	0.03	-	-	0.016	-
HCM Control Delay (s)	16.5	10.2	-	-	8.2	0
HCM Lane LOS	C	B	-	-	A	A
HCM 95th %tile Q(veh)	1	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	237	257	8	6	35
Future Vol, veh/h	55	237	257	8	6	35
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	88	88	89	89
Heavy Vehicles, %	2	3	3	0	17	3
Mvmt Flow	62	266	292	9	7	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	302	0	-	0	688	298
Stage 1	-	-	-	-	298	-
Stage 2	-	-	-	-	390	-
Critical Hdwy	4.12	-	-	-	6.57	6.23
Critical Hdwy Stg 1	-	-	-	-	5.57	-
Critical Hdwy Stg 2	-	-	-	-	5.57	-
Follow-up Hdwy	2.218	-	-	-	3.653	3.327
Pot Cap-1 Maneuver	1259	-	-	-	390	739
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	653	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1258	-	-	-	367	738
Mov Cap-2 Maneuver	-	-	-	-	367	-
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	652	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1258	-	-	-	643
HCM Lane V/C Ratio	0.049	-	-	-	0.072
HCM Control Delay (s)	8	0	-	-	11
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	16	3	214	25	1	243
Future Vol, veh/h	16	3	214	25	1	243
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	60	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	88	88	88	88
Heavy Vehicles, %	13	0	2	12	0	2
Mvmt Flow	20	4	243	28	1	276

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	535	257	0	0	271	0
Stage 1	257	-	-	-	-	-
Stage 2	278	-	-	-	-	-
Critical Hdwy	6.53	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	488	787	-	-	1304	-
Stage 1	761	-	-	-	-	-
Stage 2	744	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	488	787	-	-	1304	-
Mov Cap-2 Maneuver	488	-	-	-	-	-
Stage 1	761	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	WB	NE	SW
HCM Control Delay, s	12.2	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	WBLn1	WBLn2	SWL	SWT
Capacity (veh/h)	-	-	488	787	1304	-
HCM Lane V/C Ratio	-	-	0.04	0.005	0.001	-
HCM Control Delay (s)	-	-	12.7	9.6	7.8	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	0	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	91	294	336	20	32	96
Future Vol, veh/h	105	338	386	23	37	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	160
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	4	1	5	0	1
Mvmt Flow	130	417	477	28	46	136

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	505	0	-	0	1168	491
Stage 1	-	-	-	-	491	-
Stage 2	-	-	-	-	677	-
Critical Hdwy	4.1	-	-	-	6.4	6.21
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.309
Pot Cap-1 Maneuver	1070	-	-	-	216	580
Stage 1	-	-	-	-	619	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1070	-	-	-	190	580
Mov Cap-2 Maneuver	-	-	-	-	190	-
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	509	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	17.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1070	-	-	-	190	580
HCM Lane V/C Ratio	0.121	-	-	-	0.24	0.234
HCM Control Delay (s)	8.8	-	-	-	29.8	13.1
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.4	-	-	-	0.9	0.9

Intersection	
Int Delay, s/veh	2.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	279	69	16	279	91	19
Future Vol, veh/h	320	79	18	320	105	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	9	6	2	0	5
Mvmt Flow	364	90	20	364	119	25

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	454	0	768	364
Stage 1	-	-	-	-	364	-
Stage 2	-	-	-	-	404	-
Critical Hdwy	-	-	4.16	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.345
Pot Cap-1 Maneuver	-	-	1086	-	373	674
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	679	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1086	-	364	674
Mov Cap-2 Maneuver	-	-	-	-	364	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	663	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	18
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	364	674	-	-	1086	-
HCM Lane V/C Ratio	0.328	0.037	-	-	0.019	-
HCM Control Delay (s)	19.6	10.5	-	-	8.4	0
HCM Lane LOS	C	B	-	-	A	A
HCM 95th %tile Q(veh)	1.4	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	237	257	8	6	35
Future Vol, veh/h	63	272	295	9	7	40
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	88	88	89	89
Heavy Vehicles, %	2	3	3	0	17	3
Mvmt Flow	71	306	335	10	8	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	346	0	-	0	789	341
Stage 1	-	-	-	-	341	-
Stage 2	-	-	-	-	448	-
Critical Hdwy	4.12	-	-	-	6.57	6.23
Critical Hdwy Stg 1	-	-	-	-	5.57	-
Critical Hdwy Stg 2	-	-	-	-	5.57	-
Follow-up Hdwy	2.218	-	-	-	3.653	3.327
Pot Cap-1 Maneuver	1213	-	-	-	339	699
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	613	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1212	-	-	-	314	698
Mov Cap-2 Maneuver	-	-	-	-	314	-
Stage 1	-	-	-	-	638	-
Stage 2	-	-	-	-	612	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1212	-	-	-	590
HCM Lane V/C Ratio	0.058	-	-	-	0.09
HCM Control Delay (s)	8.2	0	-	-	11.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	16	3	214	25	1	243
Future Vol, veh/h	18	3	246	29	1	279
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	60	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	88	88	88	88
Heavy Vehicles, %	13	0	2	12	0	2
Mvmt Flow	22	4	280	33	1	317

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	616	297	0	0	313	0
Stage 1	297	-	-	-	-	-
Stage 2	319	-	-	-	-	-
Critical Hdwy	6.53	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	437	747	-	-	1259	-
Stage 1	729	-	-	-	-	-
Stage 2	713	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	437	747	-	-	1259	-
Mov Cap-2 Maneuver	437	-	-	-	-	-
Stage 1	729	-	-	-	-	-
Stage 2	712	-	-	-	-	-

Approach	WB	NE	SW
HCM Control Delay, s	13.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	WBLn1	WBLn2	SWL	SWT
Capacity (veh/h)	-	-	437	747	1259	-
HCM Lane V/C Ratio	-	-	0.05	0.005	0.001	-
HCM Control Delay (s)	-	-	13.7	9.8	7.9	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	0	-

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	105	338	386	23	37	110
Future Vol, veh/h	105	422	496	23	37	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	160
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	4	1	5	0	1
Mvmt Flow	130	521	612	28	46	136

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	640	0	-	0	1407	626
Stage 1	-	-	-	-	626	-
Stage 2	-	-	-	-	781	-
Critical Hdwy	4.1	-	-	-	6.4	6.21
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.309
Pot Cap-1 Maneuver	954	-	-	-	155	486
Stage 1	-	-	-	-	537	-
Stage 2	-	-	-	-	455	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	954	-	-	-	134	486
Mov Cap-2 Maneuver	-	-	-	-	134	-
Stage 1	-	-	-	-	464	-
Stage 2	-	-	-	-	455	-

Approach	EB	WB	SB
HCM Control Delay, s	1.9	0	22.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	954	-	-	-	134	486
HCM Lane V/C Ratio	0.136	-	-	-	0.341	0.279
HCM Control Delay (s)	9.4	-	-	-	45.2	15.3
HCM Lane LOS	A	-	-	-	E	C
HCM 95th %tile Q(veh)	0.5	-	-	-	1.4	1.1

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	320	79	18	320	105	22
Future Vol, veh/h	404	79	22	430	105	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	9	6	2	0	5
Mvmt Flow	459	90	25	489	119	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	549	0	998	459
Stage 1	-	-	-	-	459	-
Stage 2	-	-	-	-	539	-
Critical Hdwy	-	-	4.16	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.345
Pot Cap-1 Maneuver	-	-	1001	-	273	596
Stage 1	-	-	-	-	641	-
Stage 2	-	-	-	-	589	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1001	-	264	596
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	641	-
Stage 2	-	-	-	-	569	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	25.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	264	596	-	-	1001	-
HCM Lane V/C Ratio	0.452	0.05	-	-	0.025	-
HCM Control Delay (s)	29.4	11.4	-	-	8.7	0
HCM Lane LOS	D	B	-	-	A	A
HCM 95th %tile Q(veh)	2.2	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	63	272	295	9	7	40
Future Vol, veh/h	63	360	409	11	8	40
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	88	88	89	89
Heavy Vehicles, %	2	3	3	0	17	3
Mvmt Flow	71	404	465	13	9	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	479	0	-	0	1019	473
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	546	-
Critical Hdwy	4.12	-	-	-	6.57	6.23
Critical Hdwy Stg 1	-	-	-	-	5.57	-
Critical Hdwy Stg 2	-	-	-	-	5.57	-
Follow-up Hdwy	2.218	-	-	-	3.653	3.327
Pot Cap-1 Maneuver	1083	-	-	-	246	589
Stage 1	-	-	-	-	597	-
Stage 2	-	-	-	-	551	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1082	-	-	-	225	588
Mov Cap-2 Maneuver	-	-	-	-	225	-
Stage 1	-	-	-	-	546	-
Stage 2	-	-	-	-	550	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1082	-	-	-	463
HCM Lane V/C Ratio	0.065	-	-	-	0.116
HCM Control Delay (s)	8.6	0	-	-	13.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	249	29	1	279	18	3
Future Vol, veh/h	304	35	1	332	21	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	40
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	330	38	1	361	23	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	368	0	712	349
Stage 1	-	-	-	-	349	-
Stage 2	-	-	-	-	363	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1191	-	399	694
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	704	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1191	-	399	694
Mov Cap-2 Maneuver	-	-	-	-	399	-
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	703	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	399	694	-	-	1191	-
HCM Lane V/C Ratio	0.057	0.005	-	-	0.001	-
HCM Control Delay (s)	14.6	10.2	-	-	8	0
HCM Lane LOS	B	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	279	297	0	0	0
Future Vol, veh/h	89	279	297	56	61	116
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	75
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	9	3	2	5	5	7
Mvmt Flow	101	317	338	64	69	132

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	402	0	-	0	889	370
Stage 1	-	-	-	-	370	-
Stage 2	-	-	-	-	519	-
Critical Hdwy	4.19	-	-	-	6.45	6.27
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.281	-	-	-	3.545	3.363
Pot Cap-1 Maneuver	1120	-	-	-	310	665
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	591	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1120	-	-	-	276	665
Mov Cap-2 Maneuver	-	-	-	-	276	-
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	591	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	15.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1120	-	-	-	276	665
HCM Lane V/C Ratio	0.09	-	-	-	0.251	0.198
HCM Control Delay (s)	8.5	0	-	-	22.4	11.7
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.3	-	-	-	1	0.7

Appendix H

Intersection Crash Rate Worksheets

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Gardner, MA COUNT DATE : 3/19/2019

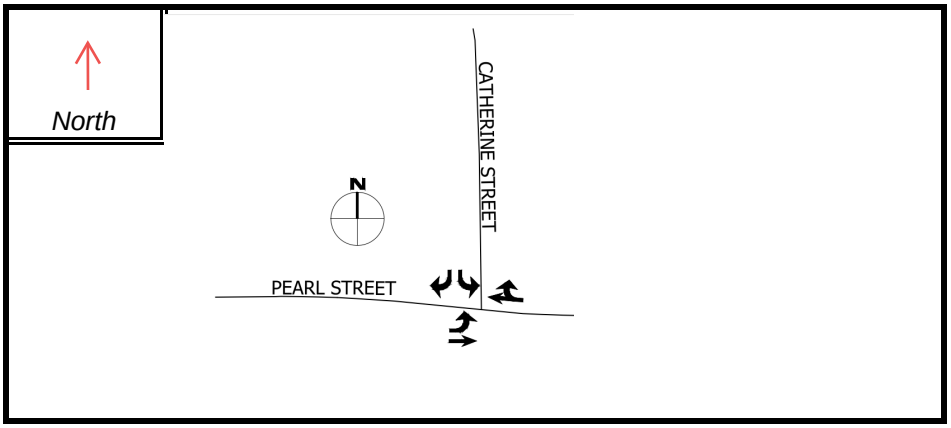
DISTRICT : 3 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Pearl St

MINOR STREET(S) : Catherine St

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	WB			
PEAK HOURLY VOLUMES (AM/PM) :	234	394	307			935

" K " FACTOR : 0.094

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 9,947

TOTAL # OF CRASHES : 1

OF YEARS : 3

AVERAGE # OF CRASHES PER YEAR (**A**) : 0.33

CRASH RATE CALCULATION : 0.09

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

Comments :

Project Title & Date:

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Gardner, MA COUNT DATE : 3/19/2019

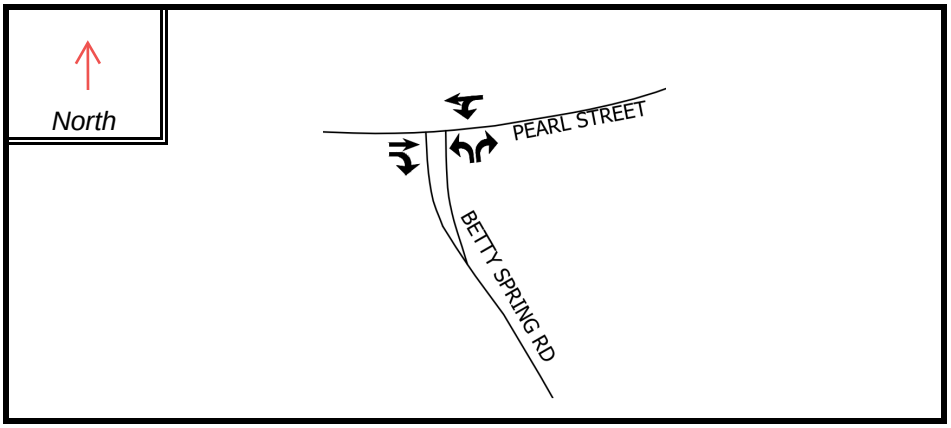
DISTRICT : 3 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Pearl St

MINOR STREET(S) : Betty Spring Rd

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	EB	WB			
PEAK HOURLY VOLUMES (AM/PM) :	110	348	295			735

" K " FACTOR : 0.094

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 8,011

TOTAL # OF CRASHES : 1

OF YEARS : 3

AVERAGE # OF CRASHES PER YEAR (**A**) : 0.33

CRASH RATE CALCULATION : 0.11

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

Comments :

Project Title & Date:

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Gardner, MA COUNT DATE : 3/19/2019

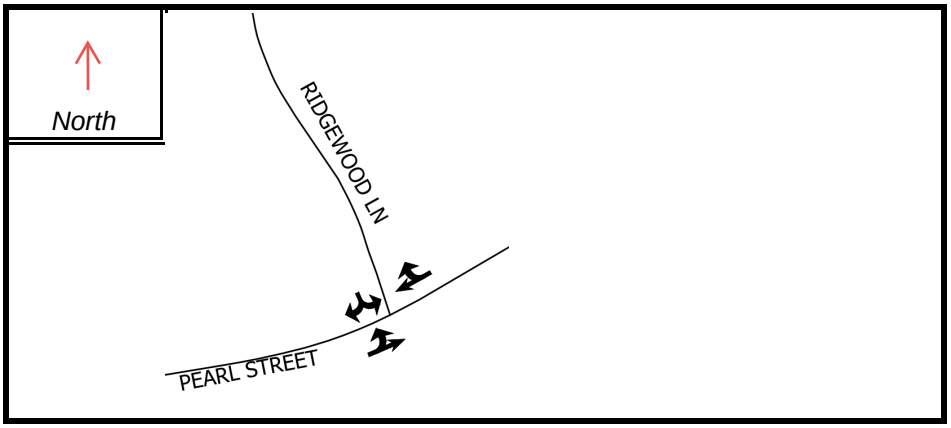
DISTRICT : 3 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Pearl St

MINOR STREET(S) : Ridgewood Ln

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	WB			
PEAK HOURLY VOLUMES (AM/PM) :	45	294	270			609

" K " FACTOR : 0.094

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 6,479

TOTAL # OF CRASHES : 2

OF YEARS : 3

AVERAGE # OF CRASHES PER YEAR (**A**) : 0.67

CRASH RATE CALCULATION : 0.28

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

Comments :

Project Title & Date:

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Gardner, MA COUNT DATE : 3/19/2019

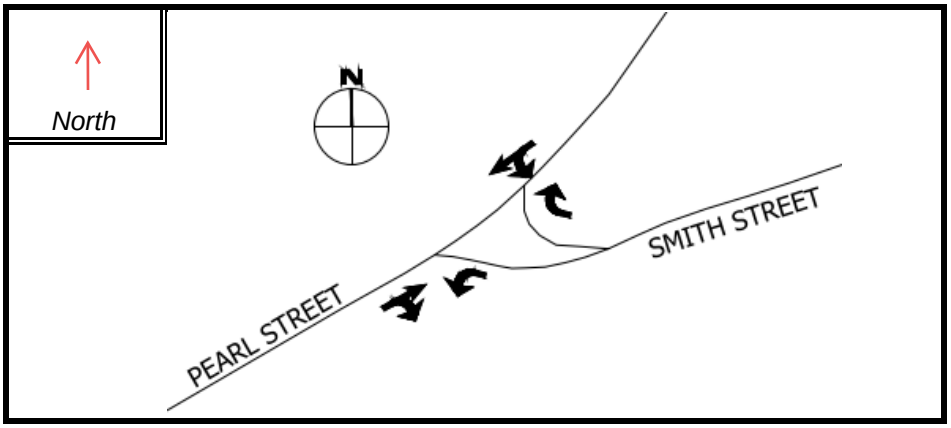
DISTRICT : 3 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Pearl St

MINOR STREET(S) : Smith St

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SB	EB	WB			
PEAK HOURLY VOLUMES (AM/PM) :	19	239	244			502

" K " FACTOR : 0.094

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 5,340

TOTAL # OF CRASHES : 0

OF YEARS : 3

AVERAGE # OF CRASHES PER YEAR (**A**) : 0

CRASH RATE CALCULATION : 0

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

Comments :

Project Title & Date:

Appendix I

Sight Distance Calculations

FUSS & O'NEILL, INC.
1550 Main St Suite 400
Springfield, MA 01103

Location Sketch

Proposed New Elementary School in Gardner, MA
Primary Sight Access Road

Prep. By:	Date:	Chk. by:	Date:
AJK	04/11/19		
Project No:		Sheet No:	
20180363.T10		1 of 5	

FUSS & O'NEILL, INC.
1550 Main St Suite 400
Springfield, MA 01103

Prep. By:	Date:	Chk. by:	Date:	Project No:
AJK	04/11/2019	XXX	XX/XX/XX	20180363.T10
Proposed New Elementary School in Gardner, MA Observed Speeds Pearl St between Ridgewood Ln and Smith St				Sheet No: 2 of 5

Percentile	NB		Percentile	SB	
15th	35	mph	15th	32	mph
50th	41	mph	50th	37	mph
85th	46	mph	85th	43	mph
95th	50	mph	95th	45	mph

85th (both directions): 45 mph

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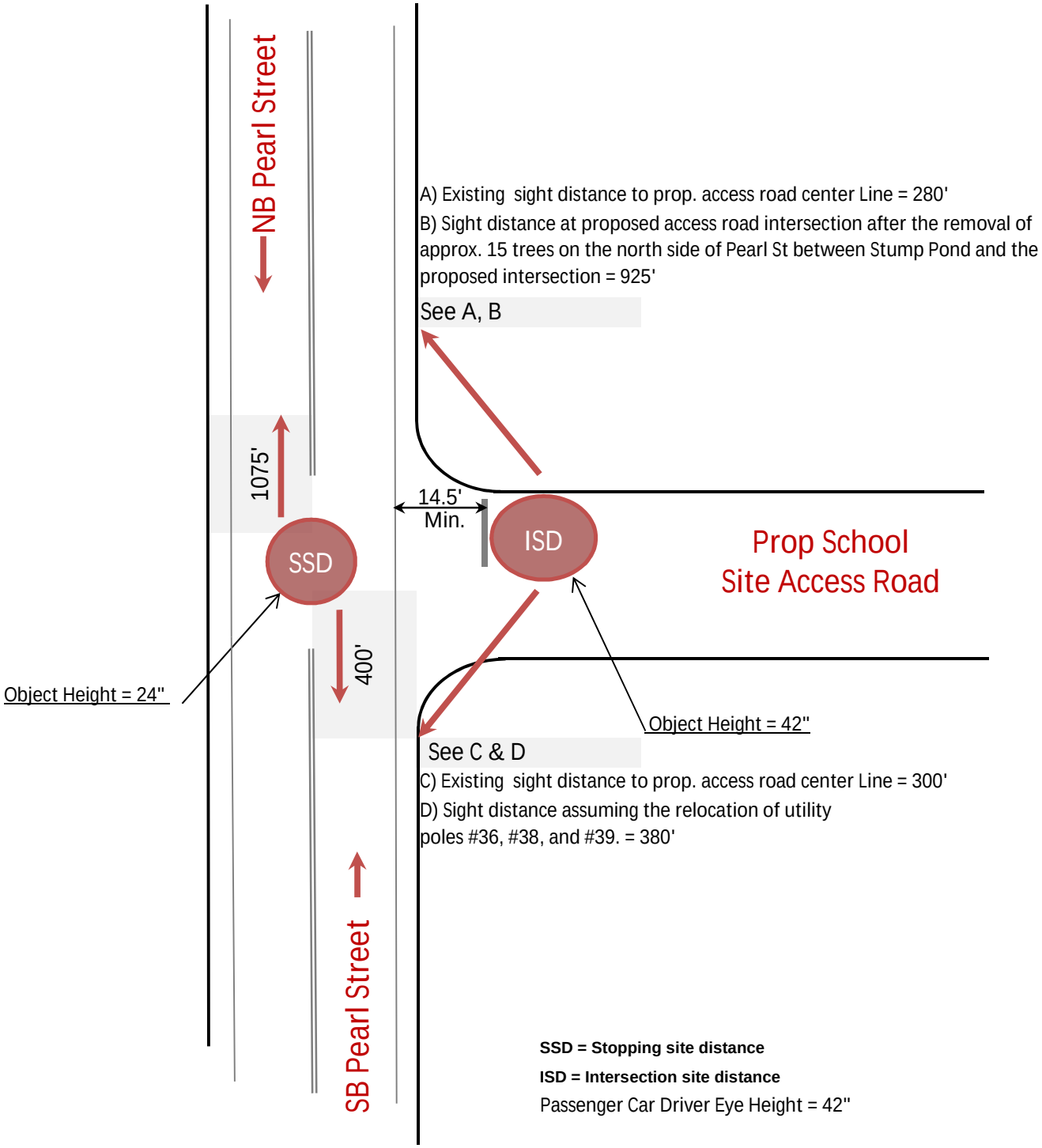
1550 Main St Suite 400
Springfield, MA 01103

Prep. By:	Date:	Chk. by:	Date:	Project No:
AJK	04/11/2019			20180363.T10

Existing Sight Distance Schematic
Proposed New Elementary School in Gardner, MA



A) Existing sight distance to prop. access road center Line = 280'
B) Sight distance at proposed access road intersection after the removal of approx. 15 trees on the north side of Pearl St between Stump Pond and the proposed intersection = 925'

See A, B

See C & D

C) Existing sight distance to prop. access road center Line = 300'
D) Sight distance assuming the relocation of utility poles #36, #38, and #39. = 380'

SSD = Stopping site distance

ISD = Intersection site distance

Passenger Car Driver Eye Height = 42"

Pearl St Southbound

SSD

AASHTO Equations 3-2 & 3-3

NOTE: Sloped roadways

Table 3-2, page 3-5

$$SSD = 1.47Vt + \frac{V^2}{30\left[\left(\frac{a}{32.2}\right) \pm G\right]}$$

	At observerd 85th percentile Speed:	At Posted Speed Limit	At Posted Speed Limit
	43 mph	30 mph	20 mph
t:	2.5 sec	2.5 sec	2.5 sec
a:	11.2 ft/sec^2	11.2 ft/sec^2	11.2 ft/sec^2
G:	-0.03 ft/ft	-0.03 ft/ft	-0.03 ft/ft
SSD =	**351.9 ft**	**204.6 ft**	**115.5 ft**
SSD design=	**355 ft**	**205 ft**	**120 ft**

Pearl St Northbound

SSD

AASHTO Equations 3-2 & 3-3

NOTE: Sloped roadways

Table 3-2, page 3-5

$$SSD = 1.47Vt + \frac{V^2}{30\left[\left(\frac{a}{32.2}\right) \pm G\right]}$$

	At observerd 85th percentile Speed:	At Posted Speed Limit	At Posted Speed Limit
	46 mph	30 mph	20 mph
t:	2.5 sec	2.5 sec	2.5 sec
a:	11.2 ft/sec^2	11.2 ft/sec^2	11.2 ft/sec^2
G:	-0.02 ft/ft	-0.02 ft/ft	-0.02 ft/ft
SSD =	**384.2 ft**	**201.8 ft**	**115.0 ft**
SSD design=	**385 ft**	**205 ft**	**115 ft**

FUSS & O'NEILL, INC. 1550 Main St Suite 400	Prep. By:	Date:	Chk. by:	Date:	Project No:
	AJK	04/11/2019			20180363.T10
	Intersection Sight Distance New Elementary School Gardner, MA				5 of 5

Pearl St and Proposed Site Access Road

ISD *AASHTO* Equation 9-1

NOTE: Case B1, Left Turn from stop on minor street — Table 9-7, page 9-45

$$ISD = 1.47 V_{MAJOR} t_g$$

At 85th pctl. Speed:	46 mph	At Posted Speed Limit	30 mph	At School Zone Speed	20 mph
Time Gap:	9.5 sec (Single Unit Truck)	Time Gap:	9.5 sec (Single Unit Truck)*	Time Gap:	9.5 sec (Single Unit Truck)*
ISD =	**642.4 ft**	**ISD =**	**419.0 ft**	**ISD =**	**279.3 ft**
Design ISD=	**645 ft**	**Design ISD=**	**420 ft**	**Design ISD=**	**280 ft**

ISD *AASHTO* Equation 9-1

NOTE: Case B2, Right Turn from stop on minor street and Case B3, crossing maneuver — Table 9-9, page 9-48

$$ISD = 1.47 V_{MAJOR} t_g$$

At 85th pctl. Speed:	43 mph	At Posted Speed Limit	30 mph	At School Zone Speed	20 mph
Time Gap:	8.5 sec (Single Unit Truck)	Time Gap:	8.5 sec (Single Unit Truck)*	Time Gap:	8.5 sec (Single Unit Truck)*
ISD =	**537.3 ft**	**ISD =**	**374.9 ft**	**ISD =**	**249.9 ft**
Design ISD=	**540 ft**	**Design ISD=**	**375 ft**	**Design ISD=**	**250 ft**

ISD *AASHTO* Equation 9-1

NOTE: Case F, Left Turn from the Major Road — Table 9-17, page 9-45

$$ISD = 1.47 V_{MAJOR} t_g$$

At 85th pctl. Speed:	43 mph	At Posted Speed Limit	30 mph	At School Zone Speed	20 mph
Time Gap:	6.5 sec (Single Unit Truck)	Time Gap:	6.5 sec (Single Unit Truck)*	Time Gap:	6.5 sec (Single Unit Truck)*
ISD =	**410.9 ft**	**ISD =**	**286.7 ft**	**ISD =**	**191.1 ft**
Design ISD=	**415 ft**	**Design ISD=**	**290 ft**	**Design ISD=**	**195 ft**

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road	
B1: Passanger Car	7.5	AASHTO Table 9-6 page 9-44
B1: Single Unit Truck	9.5	AASHTO Table 9-6 page 9-44
B2: Passanger Car	6.5	AASHTO Table 9-8 page 9-47
B2: Single Unit Truck	8.5	AASHTO Table 9-8 page 9-47
B3: Passanger Car	6.5	AASHTO Table 9-8 page 9-49
B3: Single Unit Truck	8.5	AASHTO Table 9-8 page 9-49
F: Passanger Car	5.5	AASHTO Table 9-16 page 9-57
F: Single Unit Truck	6.5	AASHTO Table 9-16 page 9-57

* The Time gap for Single Unit Truck was selected due to the prevalence of school buses at the proposed Site Access Road.

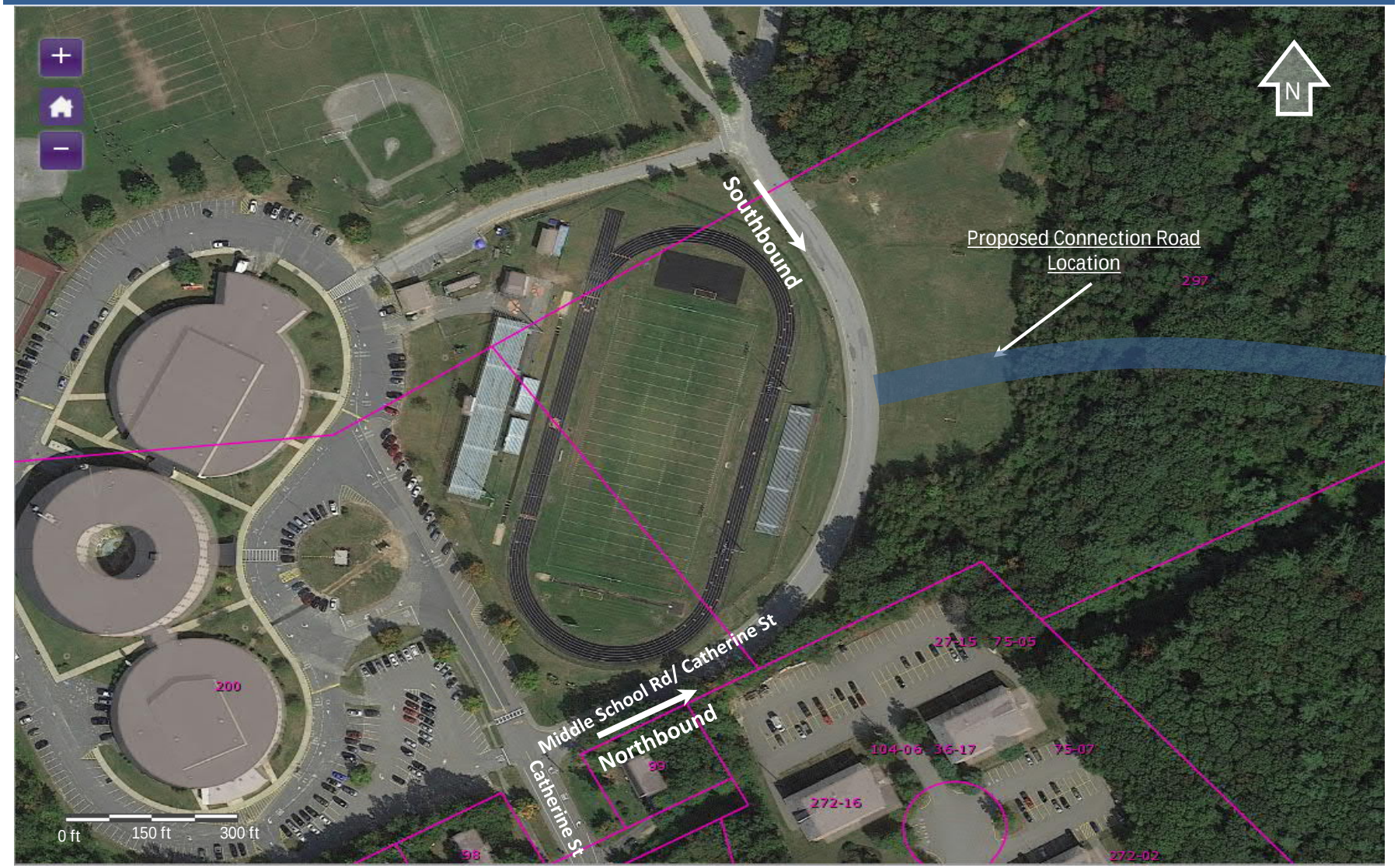
Number of lanes crossed:	1 lanes		0 factor
Minor Street up-grade:	0.0%	===>	0.00 factor

FUSS & O'NEILL, INC.
1550 Main St Suite 400
Springfield, MA 01103

Location Sketch

Proposed New Elementary School in Gardner, MA
Connection Road to Middle School Rd/Catherine St

Prep. By:	Date:	Chk. by:	Date:
AJK	04/11/19		
Project No:		Sheet No:	
20180363.T10		1 of 5	



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Springfield, MA 01103

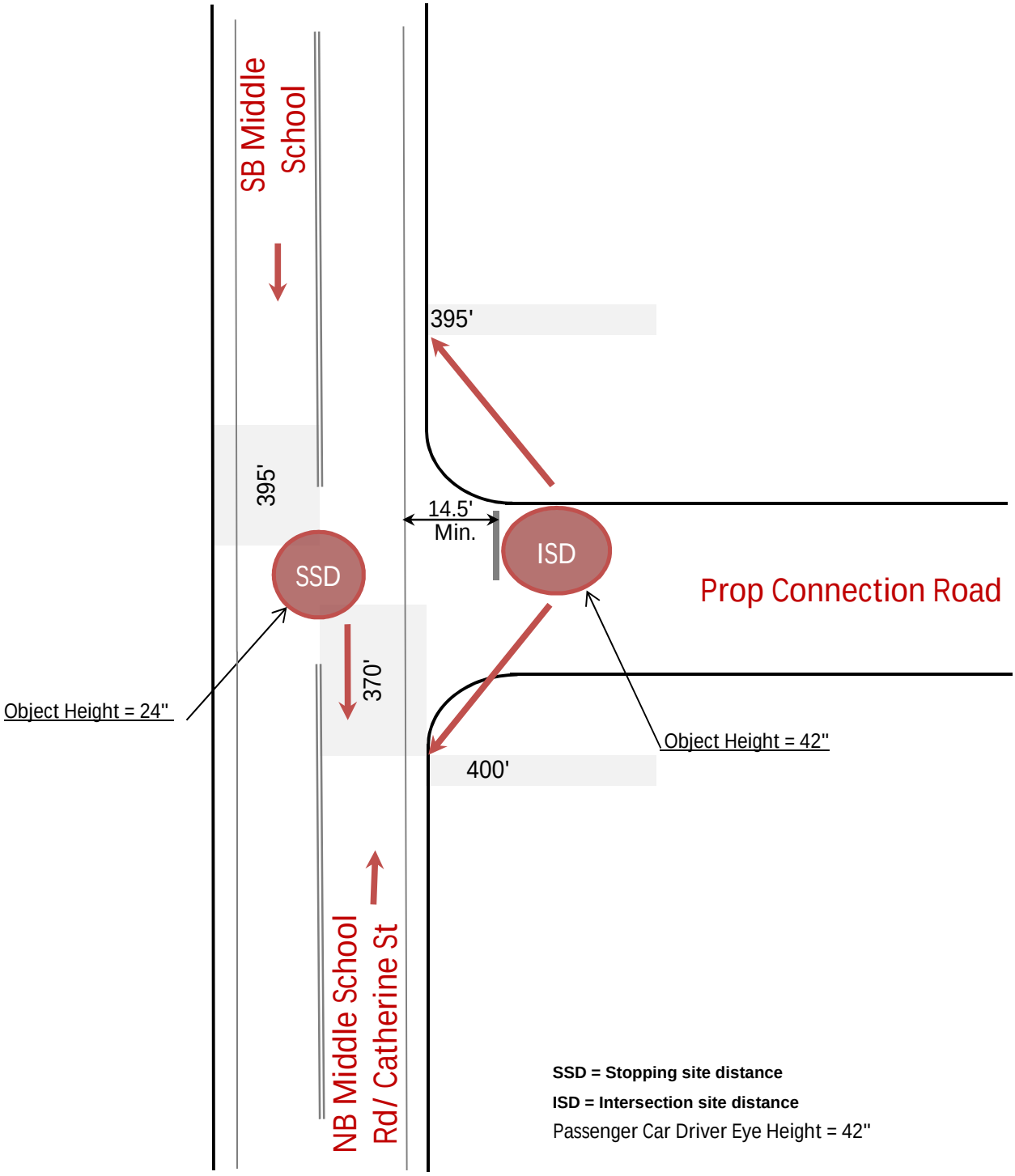
Prep. By:	Date:	Chk. by:	Date:	Project No:
AJK	04/11/2019			20180363.T10
Proposed New Elementary School in Gardner, MA Connection Road to Middle School Rd/Catherine St				Sheet No: 2 of 5

The posted speed limit of 20 mph was used for analysis of the proposed connection road and Middle School Rd/ Catherine St.
No speed data was observed.

FUSS & O'NEILL, INC.
1550 Main St Suite 400
Springfield, MA 01103

Prep. By:	Date:	Chk. by:	Date:	Project No:
AJK	04/11/2019			20180363.T10

Existing Sight Distance Schematic
Proposed New Elementary School in Gardner, MA



Middle School Rd/Catherine St Southbound

SSD — *AASHTO* Equations 3-2 & 3-3

NOTE: Sloped roadways — Table 3-1, page 3-4

$$SSD = 1.47Vt + \frac{V^2}{30\left[\left(\frac{a}{32.2}\right) \pm G\right]}$$

At Posted Speed Limit	20	mph
t:	2.5	sec
a:	11.2	ft/sec^2
G:	0	ft/ft
SSD =	**111.8**	**ft**
SSD design=	**115**	**ft**

Middle School Rd/Catherine St Northbound

SSD — *AASHTO* Equations 3-2 & 3-3

NOTE: Sloped roadways — Table 3-1, page 3-4

$$SSD = 1.47Vt + \frac{V^2}{30\left[\left(\frac{a}{32.2}\right) \pm G\right]}$$

At Posted Speed Limit	20	mph
t:	2.5	sec
a:	11.2	ft/sec^2
G:	0	ft/ft
SSD =	**111.8**	**ft**
SSD design=	**115**	**ft**

Proposed Connection Road and Middle School Rd/Catherine St

ISD

AASHTO Equation 9-1

NOTE: Case B1, Left Turn from stop on minor street — Table 9-7, page 9-45

$$ISD = 1.47 V_{MAJOR} t_g$$

At Posted Speed Limit	20	mph
Time Gap:	0.0	sec (Single Unit Truck)*
ISD =	**0.0**	**ft**
Design ISD=	**280**	**ft**

ISD

AASHTO Equation 9-1

NOTE: Case B2, Right Turn from stop on minor street and Case B3, crossing maneuver — Table 9-9, page 9-48

$$ISD = 1.47 V_{MAJOR} t_g$$

At Posted Speed Limit	20	mph
Time Gap:	0.0	sec (Single Unit Truck)*
ISD =	**0.0**	**ft**
Design ISD=	**250**	**ft**

ISD

AASHTO Equation 9-1

NOTE: Case F, Left Turn from the Major Road — Table 9-17, page 9-45

$$ISD = 1.47 V_{MAJOR} t_g$$

At Posted Speed Limit	20	mph
Time Gap:	0.0	sec (Single Unit Truck)*
ISD =	**0.0**	**ft**
Design ISD=	**195**	**ft**

Design Vehicle	Time Gap (t_g)(s) at Design Speed of Major Road	
B1: Passanger Car	7.5	AASHTO Table 9-6 page 9-44
B1: Single Unit Truck	9.5	AASHTO Table 9-6 page 9-44
B2: Passanger Car	6.5	AASHTO Table 9-8 page 9-47
B2: Single Unit Truck	8.5	AASHTO Table 9-8 page 9-47
B3: Passanger Car	6.5	AASHTO Table 9-8 page 9-49
B3: Single Unit Truck	8.5	AASHTO Table 9-8 page 9-49
F: Passanger Car	5.5	AASHTO Table 9-16 page 9-57
F: Single Unit Truck	6.5	AASHTO Table 9-16 page 9-57

* The Time gap for Single Unit Truck was selected due to the prevalence of school buses at the proposed Connection Road.

Number of lanes crossed:	1	lanes		0 factor
Minor Street up-grade:	0.0%	===>		0.00 factor