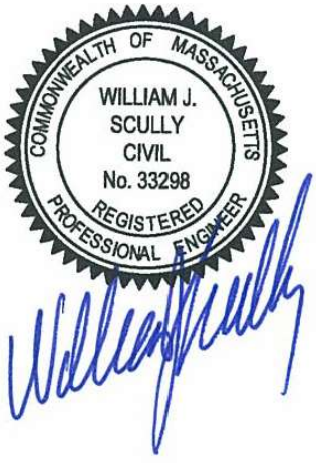
JACKSON SQUARE | ERIC PAPACHRISTOS
WEYMOUTH, MASSACHUSETTS

Traffic Impact, Access, and Parking Study

PREPARED FOR
ERIC PAPACHRISTOS

PREPARED BY
KIMLEY-HORN AND ASSOCIATES, INC.



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EXECUTIVE SUMMARY

PURPOSE OF REPORT AND STUDY OBJECTIVES

The report presents the results of the traffic impact, access, and parking study for a mixed-use redevelopment of 200 residential dwelling units (DU), 5,345 square feet of commercial/retail space, and 5,785 square feet of restaurant space. This report describes the project area's parking, existing traffic volumes and analysis, estimation of Future No-Build and Future Build traffic volumes, and the analysis. The Future Build year for this project is 2030.

SITE LOCATION AND STUDY AREA

The mixed-use redevelopment is located in Jackson Square, Weymouth. Jackson Square is one of the four (4) village centers located in the Town of Weymouth and serves as a focal point for the community. The mixed-use redevelopment includes four (4) buildings with two (2) driveways providing access to the site. Access will be provided via the intersection of Broad Street & Lovell Field Parking Lot, and proposed site driveways along Commercial Street south of Broad Street.

Figure 1 illustrates the location of the redevelopment and the study intersections.

PRINCIPAL FINDINGS AND CONCLUSIONS

The sections of the report described the project, the current traffic network conditions, parking characteristics, and the proposed project. The analysis of traffic and parking with respect to the development of 200 residential dwelling units (DU), 5,345 square feet of commercial/retail space, and 5,785 square feet of restaurant space was completed following standard practice. The key findings of this traffic impact, access, and parking study are as follows:

- The proposed project in total, is estimated to generate less than 200 peak hour vehicle trips that are either entering or exiting the project sites and account for being a transit-oriented development within a quarter mile of the commuter rail station and in a walkable, commercial environment that serves to reduce the vehicle traffic demands.
- The major access ways and drives directly serving the proposed development including the Lovell Field Access Drive and the section of Commercial Street proposed to be redesigned and designated as for one-way traffic flow are expected to operate at more than satisfactory levels of service and the project traffic is expected to be able to enter and exit the respective sites safely.
- The future conditions in the Square with and without the proposed development results in additional vehicle delays at the three signalized intersections in the study area with some approaches anticipated to experience fairly long delays. This is consistent with the Jackson Square TMP.
- The project is providing sufficient parking on-site (Buildings A, C, and D) that fully accommodates the residential supply according to zoning. The peak commercial demand is expected to be accommodated through a combination of available public parking both on-street and off-street as well as parking in 27 space Niko's Lot during evenings under cooperation with ownership.
- There are improvements throughout the Square to enhance and encourage pedestrian movement including safe crossings of the major streets such as Broad Street at Lovell Field as well improve the quality of the sidewalks such as width that would accommodate street furniture and placemaking ability.

MITIGATION

While the project itself is not creating new or unexpected operational deficiencies, the importance of creating safe and efficient access for the project is essential to maintain a safe multimodal traveling network for non-site related traffic. In addition, the project, being designed as a transit-oriented development, should consider actions that help create a walkable and transit-oriented environment. The following proposed mitigation measures have been identified intended to achieve the above:

- Continue working with the Town to implement the one-way section of Commercial Street to include curb extensions, angled parking, loading zone, and safe pedestrian walking/crossings. This would likely require some minor adjustments to the street layout.
- The street design should include some curb extensions at Broad Street along with a small section of flush island treatment to accommodate fire apparatus turns onto Commercial Street at this intersection.
- Install new angle parking along the one-way section of Commercial Street that will add eleven (11) spaces. Two additional parallel spaces can be installed east of the Building C Driveway that can also accommodate time restricted loading zone (i.e. 6AM to 10AM).
- Pavement markings on this section of Commercial Street at Water Street can include a right turn arrow and left turn arrow for a short left turn lane.
- Install enhanced pedestrian crossing of Broad Street at the Lovell Field Access Drive with curb extensions and Rapid Rectangular Flashing Beacons (RRFBs).
- Install safe pedestrian crossings on Commercial Street near post office and the access points to Buildings C and D.
- Maximize width of new sidewalks along Broad Street in the project area to enhance pedestrian experience and accommodate potential placemaking activity.
- Each building should include secured bike storage areas for residents and additionally, external bike racks should be considered for each building in the vicinity of the commercial uses with the number of racks commensurate with the amount and type of commercial activity.
- Work with the Town to implement optimize signal timing adjustments at the intersections of Broad Street & Commercial Street, Broad Street/High Street & Commercial Street, and Water Street & Pleasant Street for short term relief while longer term improvements are evaluated
- Install a DO NOT BLOCK THE BOX pavement marking at the intersection of Broad Street with the Lovell Field Access Drive.

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INTRODUCTION

This report has been prepared by Kimley-Horn and Associates, Inc. to document the potential traffic impacts and parking associated with the mixed-use redevelopment in Jackson Square, Weymouth. The mixed-use redevelopment includes a total of 200 residential dwelling units (DU), 5,345 square feet of commercial/retail space, and 5,785 square feet of restaurant space. As part of the *Jackson Square Transportation Master Plan (TMP)*, which was developed to determine the transportation needs to accommodate the anticipated redevelopment based on the changes to the zoning the Town implemented, the property owner, Eric Papachristos was part of the Stakeholder Group. The *Jackson Square TMP* accounted for the properties being redeveloped with estimated intensities. The purpose of the study was to assess the mixed-use redevelopment's impact on the roadway network, site access, circulation, and parking analysis.

There are four (4) project sites as part of the mixed-use redevelopment, as shown in **Figure 1.**

- **Site A** is located on the north side of Broad Street between Commercial Street/Pleasant Street and Lovell Field Driveway. Site A includes 64 residential DU and 2,200 square feet of commercial/retail space.
- **Site B** is located on the north side of Broad Street between Lovell Field Driveway and Herring Run. Site B includes 42 residential DU, 1,335 square feet of commercial/retail space, and 4,135 square feet of restaurant space.
- **Site C** is located on the south side of Broad Street between Commercial Street/Pleasant Street and Lovell Field Driveway. Site C includes 63 residential DU, 1,320 square feet of commercial/retail space, and 1,650 square feet of restaurant space.
- **Site D** is located on the south side of Commercial Street between Commercial Street/Post Office Driveway and Water Street. Site D includes 40 DU and 490 square feet of commercial/retail space.

This report summarizes the data collection, trip generation, trip distribution and assignment, intersection capacity analysis, and parking analysis.

Figure 1. Site Vicinity

EXISTING CONDITIONS

DESCRIPTION OF STUDY INTERSECTIONS

Pleasant Street/Commercial Street & Broad Street (signalized)

- Four-legged signalized intersection.
- The westbound approach provided by Broad Street permits all movements via one (1) dedicated right-turn lane and one (1) shared left-turn/through lane.
- The eastbound approach provided by Broad Street permits all movements via one (1) shared right-turn/through/left-turn lane.
- The northbound approach provided by Pleasant Street permits all movements via one (1) dedicated left-turn lane and one (1) shared right-turn/through lane.
- The southbound approach provided by Commercial Street permits all movements via one (1) dedicated left-turn lane and one (1) shared right-turn/through lane.

Broad Street & Commercial Street (stop controlled)

- Three-legged unsignalized intersection.
- The westbound free-flowing approach provided by Broad Street permits left turns and through movements via one (1) shared left-turn/through lane.
- The eastbound free-flowing approach provided by Broad Street permits right turns and through movements via one (1) shared right-turn/through lane.
- The northbound stop-controlled approach provided by Commercial Street permits left-turn and right-turn movements via one (1) shared left-turn/right-turn lane.

Broad Street/High Street & Commercial Street (signalized)

- Five-legged signalized intersection.
- The eastbound approach provided by Broad Street permits all movements via one (1) dedicated left-turn lane and one (1) shared right-turn/through lane.
- The westbound approach provided by High Street permits all movements via one (1) dedicated left-turn lane, one (1) dedicated through lane, and one (1) dedicated right-turn lane.
- The southbound approach provided by Commercial Street permits all movements via one (1) dedicated right-turn lane and one (1) shared left-turn/through lane.
- The northbound approach provided by Commercial Street permits all movements via one (1) shared left-turn/through/right-turn lane.
- The northwest approach provided by School Street is a one-way ingress and restricts egress movements.

Water Street & Commercial Street (stop controlled)

- Three-legged unsignalized intersection.
- The westbound free-flowing approach provided by Commercial Street permits right turns and through movements via one (1) shared right-turn/through lane.
- The eastbound free-flowing approach provided by Water Street permits left turns and through movements via one (1) shared left-turn/through lane.
- The southbound stop-controlled approach provided by Commercial Steet permits left-turn and right-turn movements via one shared left-turn/right-turn lane.

Pleasant Street & Water Street (signalized)

- Three-legged signalized intersection.
- The westbound approach provided by Water Street permits left-turn and right-turn movements via one (1) shared left-turn/right-turn lane.

- The southbound approach provided by Pleasant Street permits left turns and through movements via one (1) dedicated through lane and one (1) dedicated left-turn lane.
- The northbound approach provided by Pleasant Street permits right turns and through movements via one (1) dedicated through lane and one (1) dedicated right-turn lane.

Commercial Street & Commercial Street/Post Office Driveway (stop controlled)

- Three-legged unsignalized intersection.
- The westbound stop-controlled approach provided by Commercial Street/Post Office Driveway permits left-turn and right-turn movements via one (1) shared left-turn/right-turn lane.
- The southbound free-flowing approach provided by Commercial Street permits through movements via one (1) dedicated through lane.
- The northbound free-flowing approach provided by Commercial Street permits through movements via one (1) dedicated through lane.

Broad Street & Lovell Field Driveway (stop controlled)

- Three-legged unsignalized intersection.
- The eastbound approach provided by Broad Street permits free flow left-turn and through movements via one (1) shared left-turn/through lane.
- The westbound approach provided by Broad Street permits free flow right-turn and through movements via one (1) shared right-turn/through lane.
- The southbound movement is stop controlled.

PEDESTRIAN FACILITIES

- Sidewalk facilities are generally provided on both sides along Broad Street, Commercial Street, Water Street, and Pleasant Street.
- Pedestrian accessibility from major parking lots is less than desirable to the center of Jackson Square, such as poor lighting, sidewalk widths, and safe crossings.
- There is a lack of ADA compliant curb ramps, in general, within the project area.
- It was observed during field inventories that there were new crosswalk markings and wheelchair ramps at the following locations.
    - Entrance to Lovell Field along Broad Street
    - Broad Street & Commercial Street – on all legs
    - Water Street & Pleasant Street – on all legs
- The following crosswalk markings were noted in the TMP need to be adjusted due to the reason noted.
    - Broad Street & Cottage Street – east leg/along Broad Street (heading southbound) leads into a driveway
    - Broad Street & Shawmut Street – west leg/along Broad Street (heading northbound) leads into a pole.
- The overall pedestrian environment in the Square is not an overly “friendly” or safe area when considering such items as the sidewalk widths, lack of shade trees, street crossings, and below average of neighborhood connections to the center of Jackson Square.

BICYCLE FACILITIES

- Designated bicycle lanes are provided on both sides along the following corridors.
    - Water Street from Pleasant Street to Broad Street/High Street
    - Commercial Street from Broad Street/High Street to the MBTA East Weymouth Station South Driveway

- Bicycle detection exists at the signalized intersection of Commercial Street & MBTA East Weymouth Station South Driveway.
- There is a small amount of bike parking currently near the post office and there should be more provided throughout the Square.
- Aside from the above, there is a lack of designated bicycle facilities or indications of potential bicycle travel within Jackson Square. The three (3) traffic signals under Town jurisdiction do not have bike detection; streets such as Pleasant Street could accommodate bike lanes on streets such as Broad Street where width is limited, sharrows could be incorporated.

TRANSIT FACILITIES

- Public transportation is provided by the Massachusetts Bay Transit Authority (MBTA), commuter rail, and bus routes.
- The East Weymouth Commuter Rail station is approximately 0.25 miles or 1,400 feet north of the signalized intersection of Commercial Street & Broad Street/High Street. The Greenbush Line provides service to Boston. An off-street parking lot is provided at the Commuter Rail station, which provides 335 parking spaces.
- Bus Route 222 (East Weymouth – Quincy Center Station) runs along Broad Street, west of Commercial Street/Pleasant Street, Pleasant Street, Water Street, and High Street with stops along the roadways as shown in **Figure 2**. Bus Route 222 provides service from East Weymouth to Quincy Center Station.
- One thing noted about the Bus Route 222 is that it circulates within Jackson Square but it does not provide direct service to the East Weymouth Commuter Rail station.

Figure 2. Public Transportation in the Study Area

TRAFFIC DATA COLLECTION

Existing traffic volumes were based upon turning movement counts (TMCs) collected on Thursday, June 9, 2022, during the AM peak period (7:00 -9:00 AM) and PM peak period (3:00 – 6:00 PM) during the development of the *Jackson Square TMP*. School was still in session when the traffic counts were conducted. **Figure 3** presents the existing turning movement volumes during the AM and PM peak hours. Automatic traffic recorders (ATRs) for 72-hours were collected from Thursday, June 9, 2022, to Saturday, June 11, 2022, to understand the travel patterns as shown in **Figure 4**. These data form the basis of this traffic impact study and analysis of impacts resulting from the proposed development. The traffic data are included in **Appendix A**.

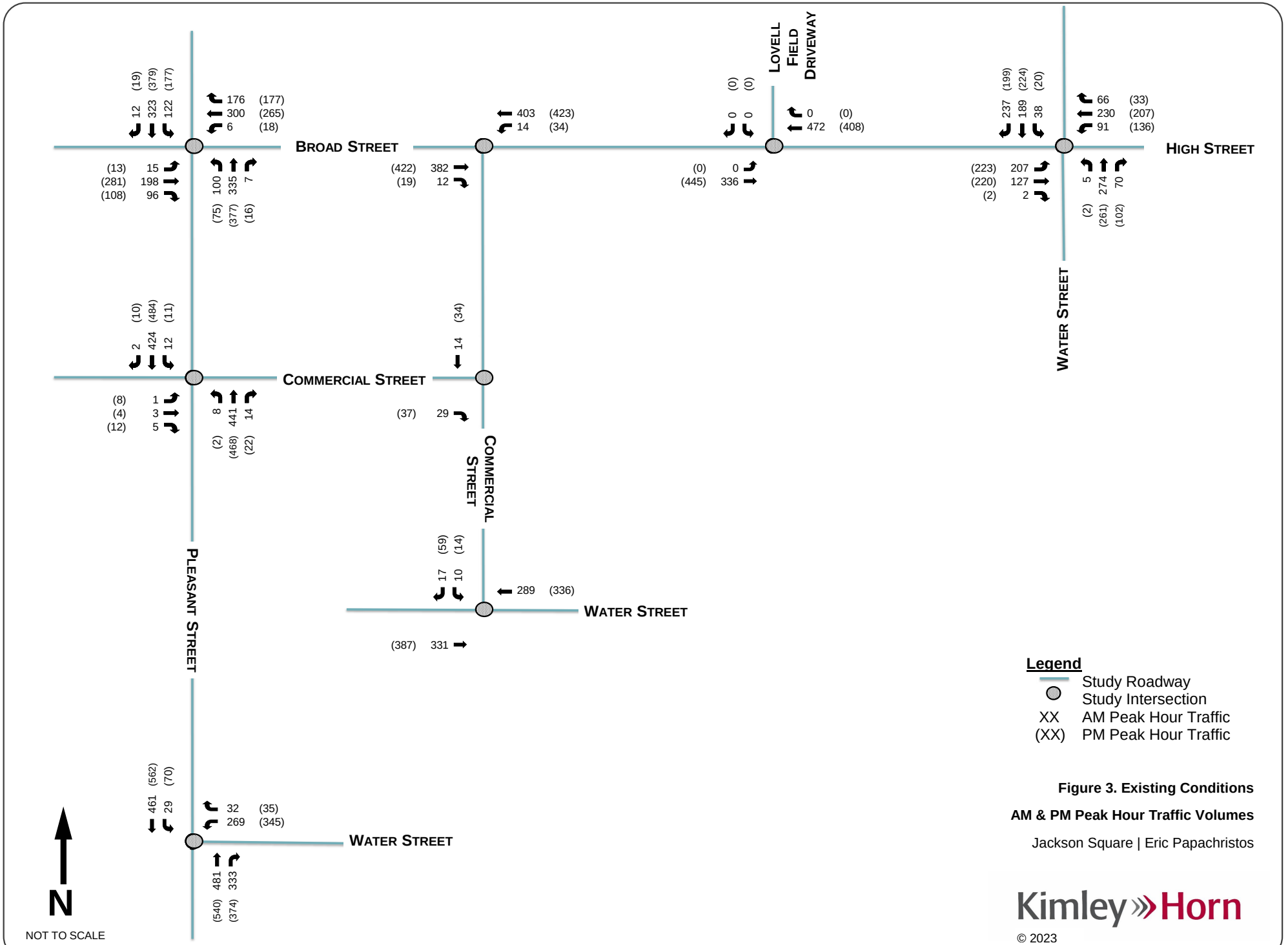

Figure 3. Existing Conditions

AM & PM Peak Hour Traffic Volumes

Jackson Square | Eric Papachristos

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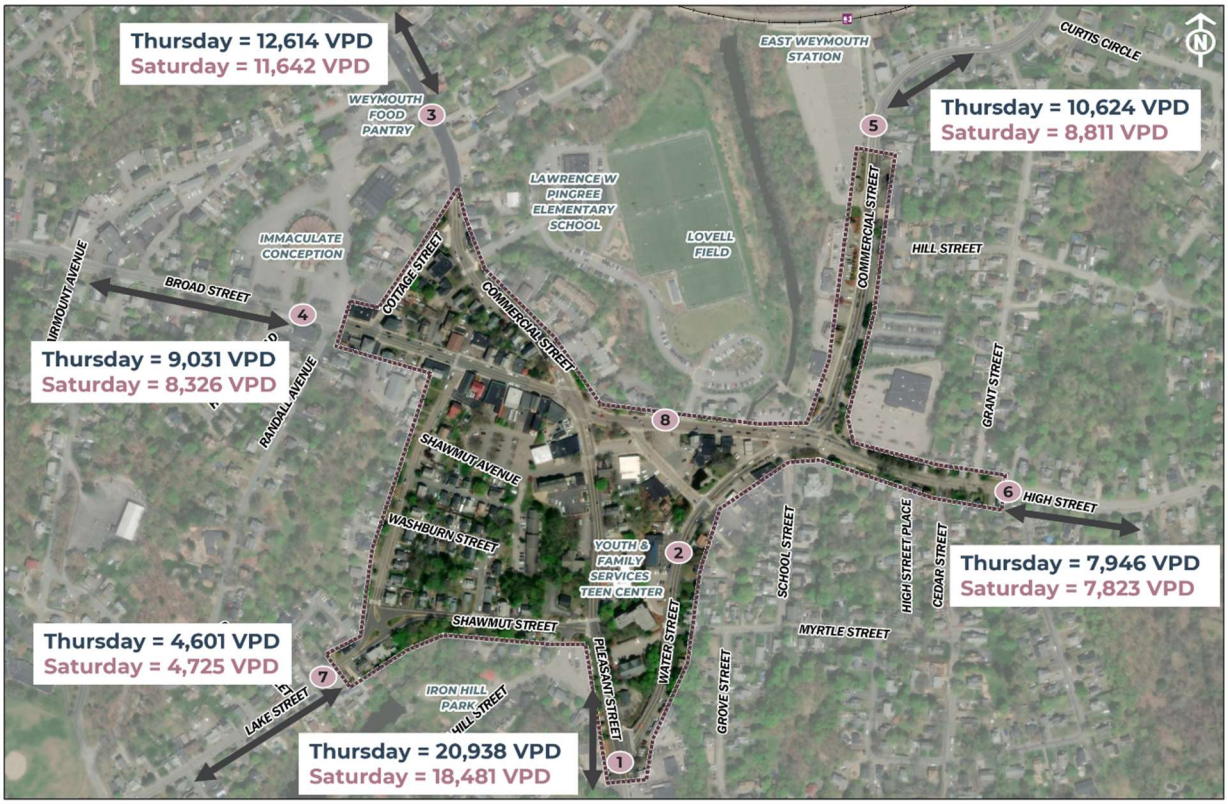

Figure 4. ATR Locations and Traffic Flows

CRASH HISTORY

As noted in the *Jackson Square TMP*, the recent crash history for the study intersections for the most recent three-year period available (2017-2019) was reviewed. Crash data presented in this report were obtained from the MassDOT Interactive Mapping Portal for Analysis and Crash Tracking (IMPACT). The 2017-2019 period was selected due to the Covid years of 2020-2021 affecting the traffic flow and results could be affected and not typical. That said, the latest years of data were also reviewed to identify anything significant that should be taken into consideration. MassDOT District 6, which includes the study area, has an average crash rate of 0.71 for signalized intersections and 0.52 for unsignalized intersections. MassDOT statewide average, which also accounts for the study area, has an average crash rate of 0.78 for signalized intersections and 0.57 for unsignalized intersections. As shown in **Figure 5** is the range of the intersection crash rates compared to MassDOT District 6's average.

- There was a total of 24 crashes at the 15 study intersections.
- There were zero reported occurrences of crashes at seven (7) out of the 15 study intersections.
- There were no fatalities and two (2) injury crashes reported with the rest of the reported crashes being property damage only types.
- Half of the reported crashes were angle crashes.
- The signalized Intersection Broad/High Street & Commercial Street has a crash rate of 0.76, above the District 6 average, but below the MassDOT statewide average for signalized intersections. A total of 15 crashes occurred at this intersection with 13 reported as property damage and two (2) reported as injury. Of the 15 crashes, seven (7) were an angle, three (3) were a rear-end, two (2)

were head-on, one (1) were side-swipe, and two (2) were other/unknown. Additional detailed data for this location was provided by the Weymouth Police Department. Some input gathered for this intersection suggests that the existing angle of the intersection and excessive open area with less than ideal lane definition may be contributing factors to the current crash experience.

- The rest of the intersections are below the average crash rates.

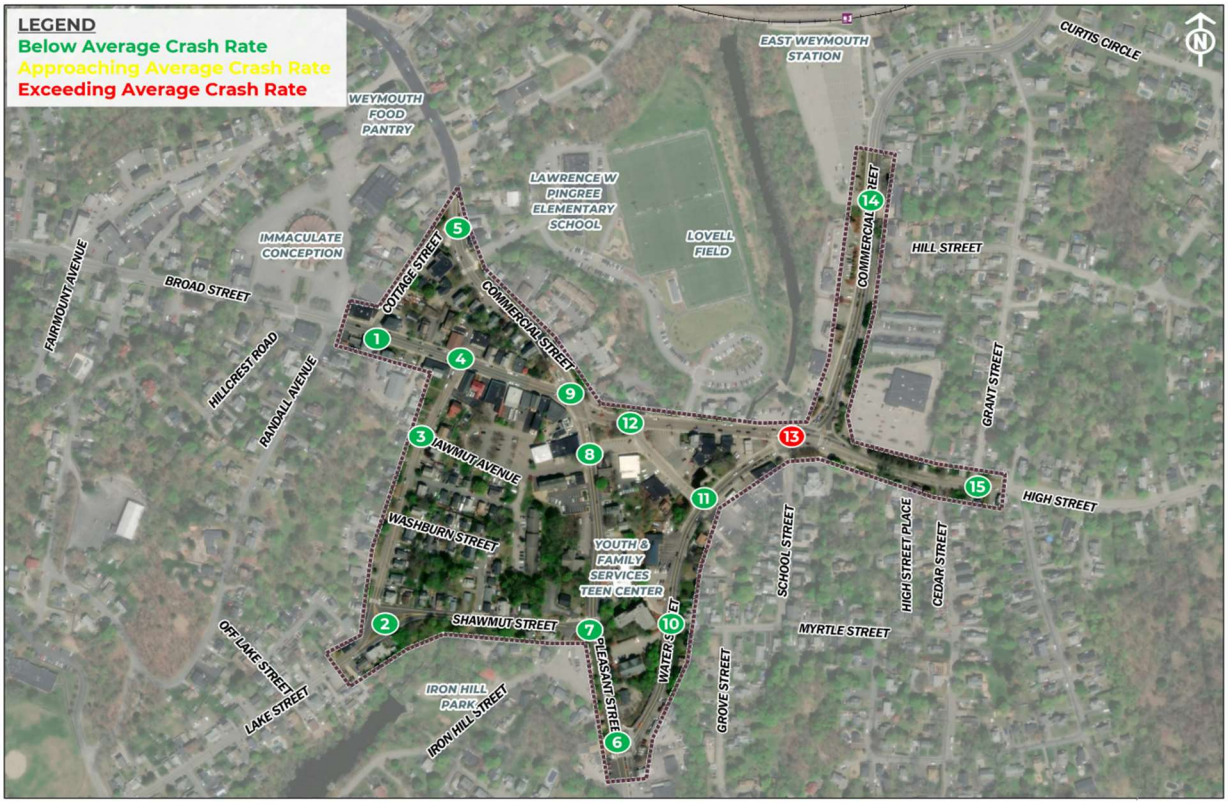

Figure 5. Range of Intersection Crash Rates

PARKING CONDITIONS

Data Collection

A parking occupancy and demand of available on-street parking and off-street parking within the study area was conducted on Thursday, June 22, 2022, as part of the *Jackson Square TMP*. Parking opportunities within Jackson Square consists of on-street parking and public and private surface lots.

The parking supply for on-street parking is currently unmarked, therefore the number of parking spaces was based on the linear distance of free parking along all blocks on Broad Street and Commercial Street. These linear distances were converted to a total number of parking spaces by dividing each section by 22 feet (the typical dimension of a parking space) and rounding to the nearest whole number. On-street parking occupancy data was collected between 9:00 AM and 5:00 PM, with observations made every 30 minutes that enabled the calculation of parking durations and space turnover.

- Upper Broad Street/Commercial Street – Broad Street west of the intersection of Broad Street & Pleasant Street and Commercial Street north of the intersection.
- Lower Broad Street/Commercial Street – Broad Street east of the intersection of Broad Street & Pleasant Street, and Commercial Street south of Broad Street

The parking occupancy for off-street public lots was collected during four (4) time periods, 9:00 AM, 11:00 AM, 2:00 PM, and 4:00 PM.

- Occupancy at the MBTA lot and CVS lot were collected during two time periods, 11:00 AM and 4:00 PM. The occupancy at the MBTA parking lot was collected at those times periods to maximize the number of commuters in the lot.
- Parking occupancy for off-street private lots was collected at various periods.
    - George Washington Toma TV & Appliance – parking was observed during four (4) periods, 9:00 AM, 11:00 AM, 2:00 PM, and 4:00 PM.
    - The Venetian – parking was observed during three time periods, 12:00 PM, 5:00 PM, and 7:00 PM. The evening observations were done to gauge evening demands.

Types of Parking

All on-street parking within Jackson Square is unmarked and free, but some areas of Broad Street and Commercial Street are restricted between certain hours as shown in **Figure 6**.

- Unrestricted – No time restriction denoted by signage, vehicles may park for any length of time on any day of the week.
    - Lower Commercial Street
- 2 Hour Unrestricted – Vehicles may park for up to two (2) hours
    - North side of Lower Broad Street
    - Both sides of Upper Broad Street
    - West side of Upper Commercial Street
- 2 Hour Restricted – Vehicles may park for up to two (2) hours. Restrictions are typically enforced from 9:00 AM to 6:00 PM and Monday to Saturday.
    - South side of Lower Broad Street
    - East side of Upper Commercial Street

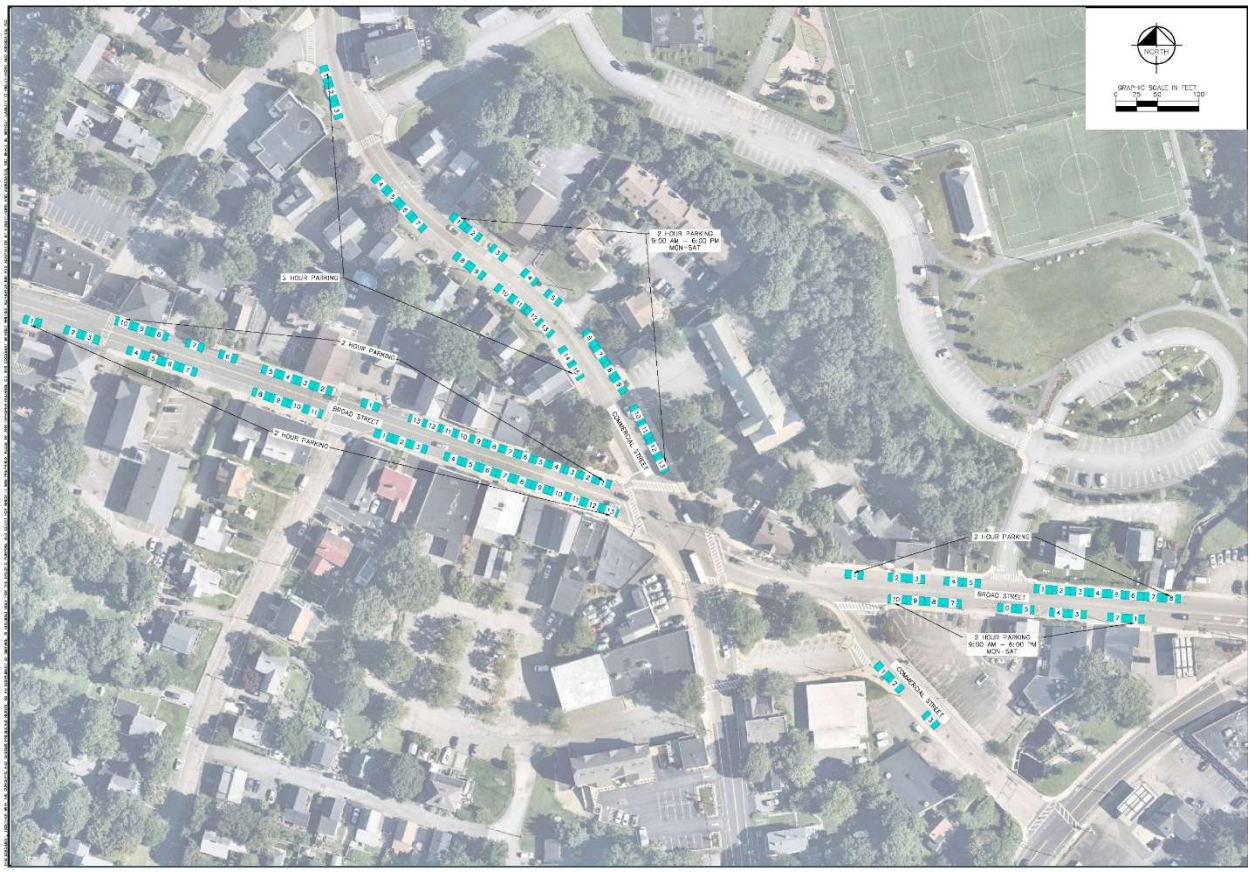

Figure 6. On-Street Parking Supply

There are currently ten (10) surface lots generally open to the public within the study area that were included in the analysis. All facilities are located within or nearby the square. Six (6) of these facilities are owned by the Town of Weymouth. The remaining facilities included were either the MBTA commuter rail lot or privately owned and operated.

- Public Lots – Lovell Fields, Upper Broad Public Lot, Post Office, Teen Center, Former Library, Iron Hill, and MBTA Lot
- Private Lots – George Washington Toma TV & Appliance, CVS, and The Venetian

Parking Inventory

On-street and off-street parking inventory data for the study area are summarized in **Table 1** and shown in **Figure 7**. Within the study area, there are 101 on-street parking spaces, 198 municipal off-street public parking spaces, 335 parking spaces at the MBTA lot, and 173 off-street parking spaces in private lots.

Table 1. On-Street & Off-Street Parking Supply	
On-Street Supply	
Upper Broad/Commercial	75
Lower Broad/Commercial	26
On- Street Supply Subtotal	**101**

Off-Street Public Lots Supply	
Lovell Field	77
Large Upper Broad Lot	61
Post Office	11
Teen Center	19
Former Library	15
Iron Hill	15
Off-Street Public Lots Supply Subtotal	**198**
MBTA Total	**335**
Off-Street Private Lots Supply	
George Washington TV	10
CVS	130
The Venetian	33
Off-Street Private Lots Supply Subtotal	**173**

Figure 7. On-Street & Off-Street Parking Supply

The observed on-street parking demand is summarized in **Figure 8**. Listed below are the highlights of the on-street parking demand.

- The Upper Broad area remained mostly occupied throughout the duration of the collection, over 50% of the parking spaces were occupied.
- Lower Broad spaces were mostly unoccupied. Note that the Lower Square has more vacant buildings.
- Cars parked on Lower Commercial were there the majority of the day.
- The average duration of the cars was less than 2 hours but there were over five (5) vehicles that parked well above the 2 hours.
- The average turnover was two (2) vehicles along Upper Square.

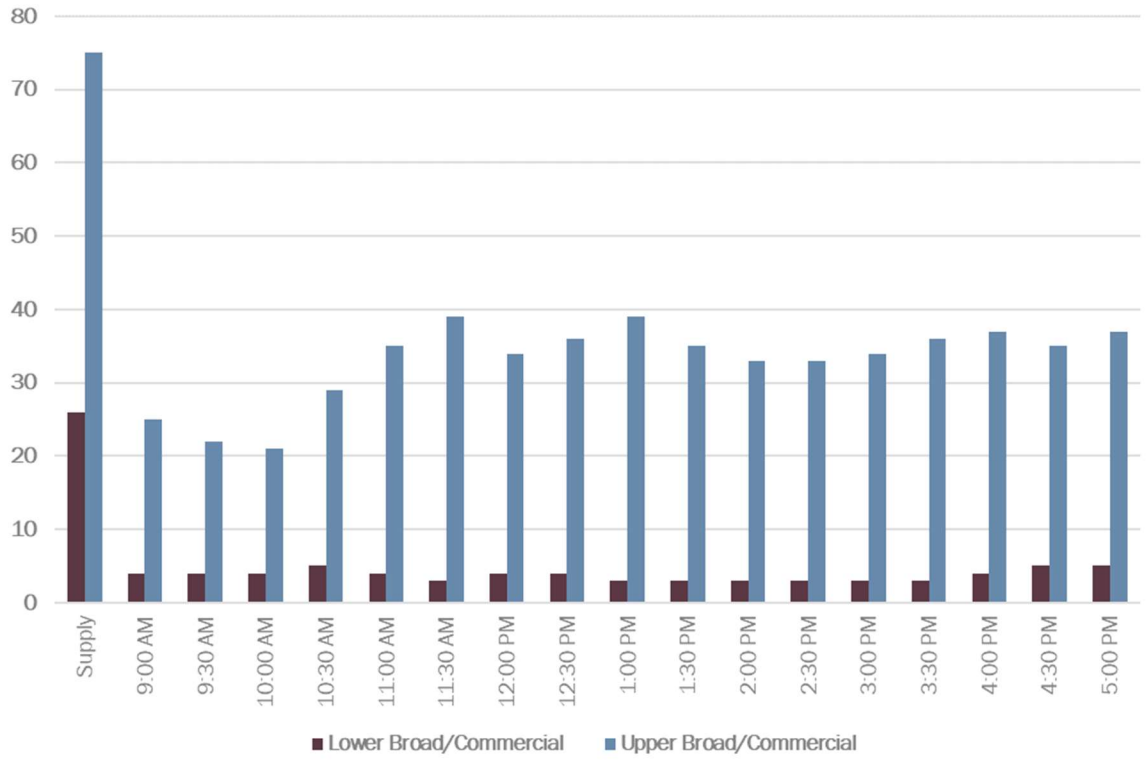

Figure 8. On-Street Parking Supply & Demand

The observed off-street public parking supply and demand can be seen in **Figure 9.** This depicts the observed demand for each public lot during the collection times and compared it to their respective supply. Listed below are the highlights of the off-street public parking demand.

- The Upper Broad public lot was less than 50% occupied during the afternoon observations.
- The parking demand approached the capacity at the small parking area near the Post Office
- The parking demand at Iron Hill Lot approached the lot capacity during all the observation times, though it is a fairly small lot.
- Lovell Fields, Teen Center Lot, and Former Library Lot had the lowest occupancies during the collection times.

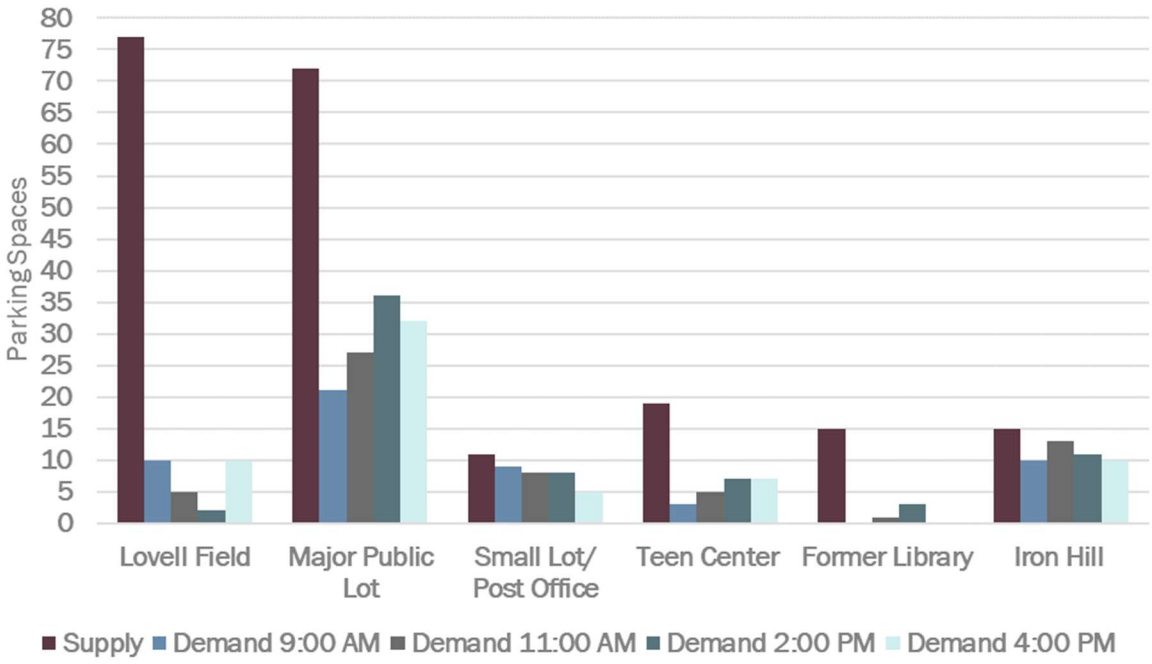

Figure 9. Public Off-Street Parking Lots Supply & Demand

The MBTA Parking Lot supply and demand can be seen in **Figure 10.** The MBTA Station Lot has the largest supply with 335 parking spaces. The decline in occupancy at that time can be attributed to the Covid-19 pandemic and the capability of working from home. Demands have been seen to be increasing in 2023.

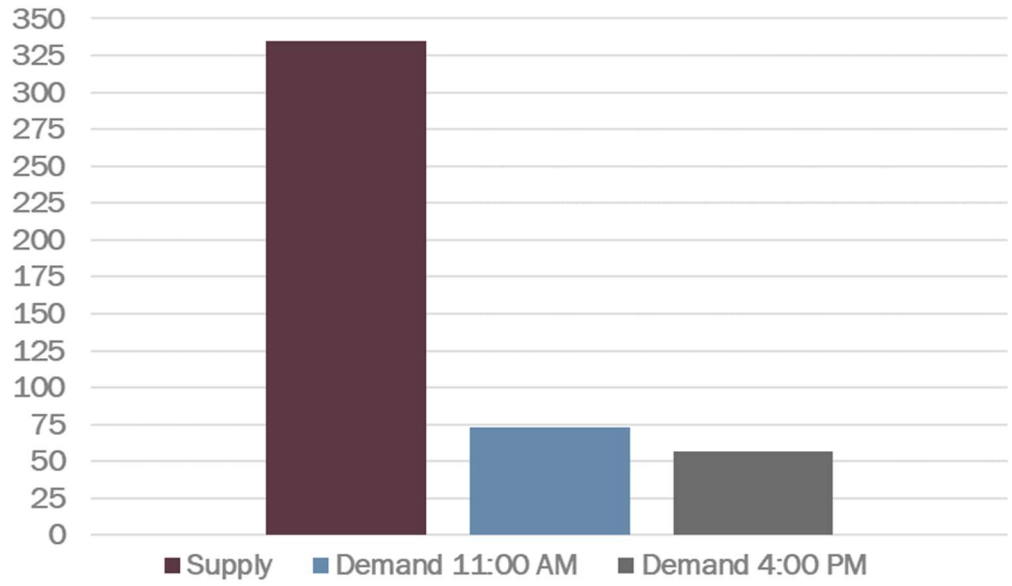

Figure 10. MBTA Parking Lot Supply & Demand

Off-street private parking supply and. demand is shown in **Figure 11.** During the evening collections, the Venetian Lot approaches the available supply as would be expected with the restaurant use. The CVS lot experienced fairly low demands with a large amount of available supply through most of the day.

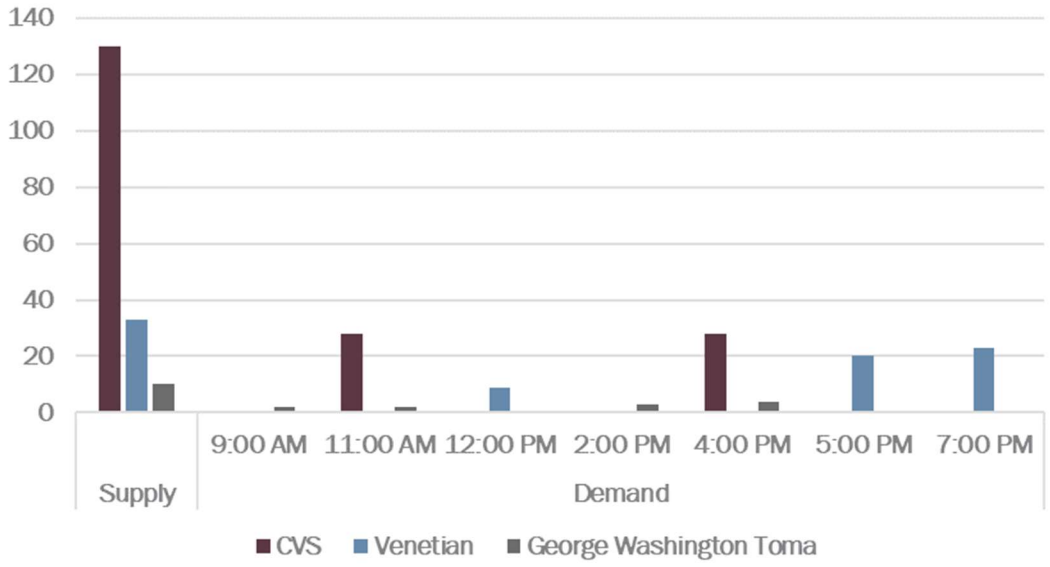

Figure 11. Private Parking Lots Supply & Demand

FUTURE NO-BUILD CONDITIONS

Future No-Build traffic conditions are defined as expected traffic conditions on the roadway network in the year 2030 without the construction of the mixed-use redevelopment. Future No-Build traffic volumes used in the analysis are the sum of the existing traffic, vicinity development traffic, and additional traffic generated by the overall growth in the study area, which is consistent with the *Jackson Square TMP*.

BACKGROUND TRAFFIC PROJECTIONS

The analysis of 2030 traffic conditions was based on project traffic volumes at that time. The estimated traffic growth that included a general background traffic growth that tends to occur over time due to population and employment changes in both the town of Weymouth but also the region as well. The annual background traffic growth rate was determined based upon MassDOT TDMS Historical Traffic Count Locations from 2017 to 2021, utilizing an annual growth rate of 1.0%. Therefore, an annual growth rate of 1.0% will be applied annually to the existing traffic volumes for future (2030) No-Build Conditions.

In addition, it was assumed the following were included.

- Commuter rail would be operating at pre-covid demands.
- Lovell Fields anticipated demands based upon 3.5 fields.
- 1441 Commercial Street is an approved redevelopment. This project includes 1,600 square feet of retail space and 21 dwelling units and provides 43 parking spaces.

Refer to **Figure 12** for the Future 2030 peak hour No-Build traffic volumes.

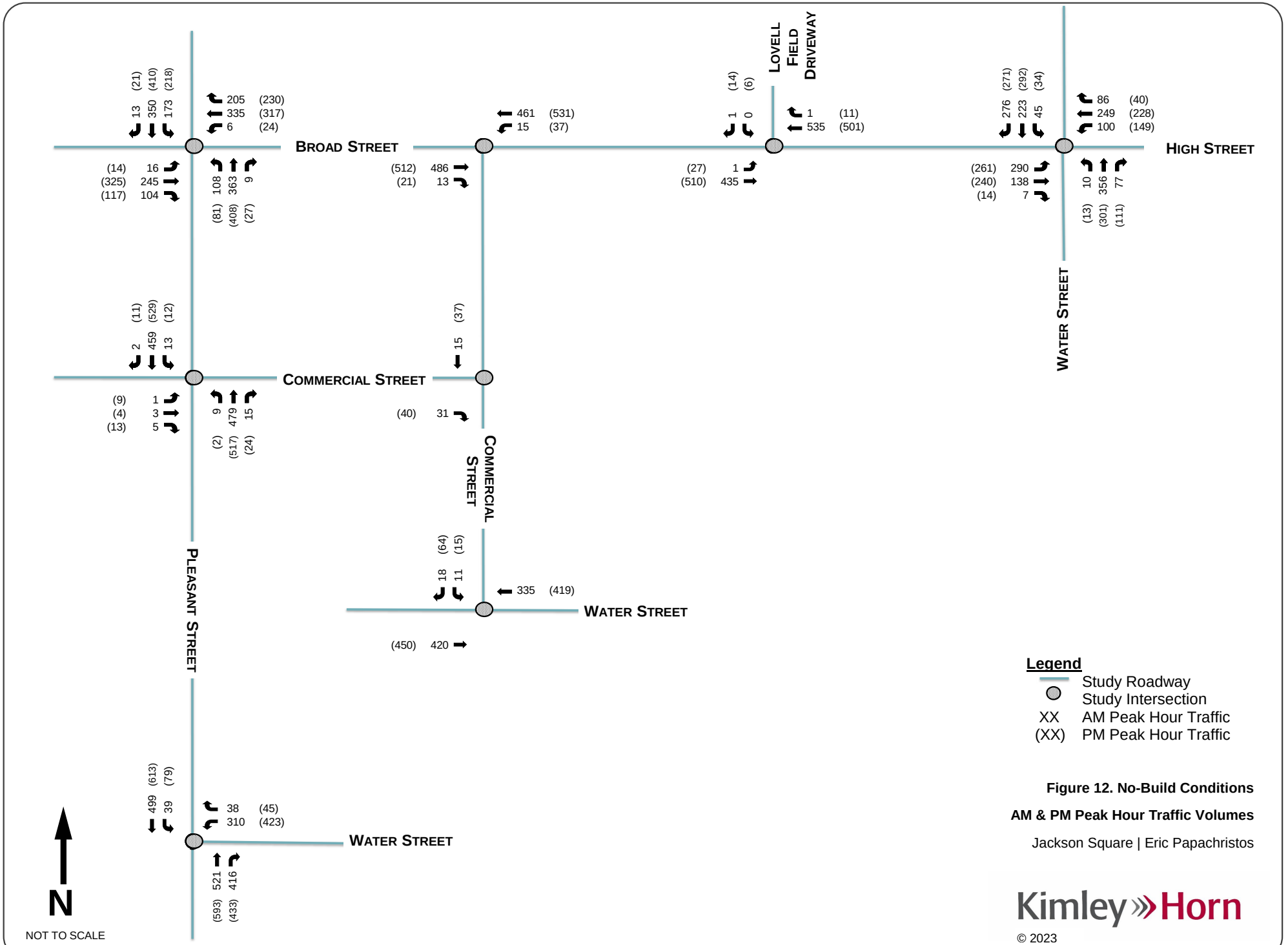

Figure 12. No-Build Conditions

AM & PM Peak Hour Traffic Volumes

Jackson Square | Eric Papachristos

Kimley»Horn

PROJECT TRAFFIC

Project traffic used in this analysis is defined as the vehicle trips expected to be generated by the mixed-use redevelopment and the distribution and assignment of that traffic over the study roadway network. It is anticipated that under the Future Build Conditions, Commercial Street between Broad Street and Water Street will be converted to a one-way street with travel direction from Broad Street to Water Street. This action, which was identified in the Jackson Square TMP, was incorporated into the trip forecasts and analysis of the 2030 Build Conditions.

TRIP GENERATION

Trip generation calculations for the proposed developments were performed using the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 11th Edition. The trip generation for the proposed mixed-use redevelopments was determined using ITE Land Use Code (LUC) 221 (Multifamily Housing (Mid-Rise), LUC 822 (Strip Retail Plaza (<40k), LUC 930 (Fast Casual Restaurant), LUC 931 (Fine Dining Restaurant), and LUC 936 (Coffee/Donut Shop without Drive-Through Window). Project trips were estimated for the weekday AM and PM peak hours. The forecasts are described below while detailed trip generation information is included in **Appendix B**. As shown in **Table 2,** the proposed mixed-use redevelopment is expected to generate 189 net new vehicle trips (79 entering and 110 exiting) during the AM peak hour and 177 net new vehicle trips (107 entering and 70 exiting) during the PM peak hour.

Table 2. Trip Generation						
AM Peak Hour (PM Peak Hour)						
Building	**Future Land Use (ITE Code)**	**Scale**	**Daily**	**Net External Trips**	**Entering Trips**	**Exiting Trips**
A	Multifamily Housing (Mid-Rise) (221)[1]	64	130	16 (16)	2 (12)	14 (4)
	Strip Retail Plaza (<40k) (822)[2]	2,465	134	6 (16)	3 (8)	3 (8)
B	Multifamily Housing (Mid-Rise) (221)[1]	42	84	11 (11)	2 (8)	9 (3)
	Strip Retail Plaza (<40k) (822)[2]	2,335	74	3 (9)	2 (4)	1 (5)
	Fine Dining Restaurant (931)[2]	4,285	360	3 (33)	3 (22)	0 (11)
C	Multifamily Housing (Mid-Rise) (221)[1]	63	128	16 (16)	2 (12)	14 (4)
	Fast Casual Resturant[2]	2,030	198	3 (25)	1 (14)	2 (11)
	Coffee/Donut Shop without Drive-Through Window[2]	1,320	764	123 (43)	62 (21)	60 (22)
D	Multifamily Housing (Mid-Rise) (221)[1]	31	62	8 (8)	1 (6)	7 (2)
Net New Vehicle Trips			**1,934**	**189 (177)**	**79 (107)**	**110 (70)**

[1] Land Use Subcategory: Close to Rail Transit and Setting/Location: Dense Multi-Use Urban

[2] Setting/Location: General Urban/Suburban

TRIP DISTRIBUTION AND ASSIGNMENT

The anticipated distribution of traffic was forecasted for the trips expected to be generated by the redevelopments as shown in **Table 3** and **Figure 13**. The distribution was estimated for all vehicles that may access the Square. For the Square's general traffic, the trip distribution estimate was based on existing traffic patterns. The trip distribution percentages were applied to the projected trip generation by location resulting in the estimated 2023 peak hour traffic flow networks. These networks were then analyzed in terms of delays and levels of service.

Table 3. Trip Distribution	
Direction	**Percentage of Trips**
Coming to/From the South (Pleasant Street)	35%
Coming to/From the South (Lake Street)	5%
Coming to/From the North (Commercial Street)	5%
Coming to/From the North (Commercial Street)	25%
Coming to/From the East (High Street)	10%
Coming to/From the West (Broad Street)	20%
Total	**100%**

Figure 13 presents the trip distribution for the 2032 Build Conditions. Trip assignments for the weekday AM and PM peak hour for the 2032 Build Conditions are shown in **Figure 14**. The specific trip distribution and trip assignment for the individual Buildings are shown in **Appendix B**.

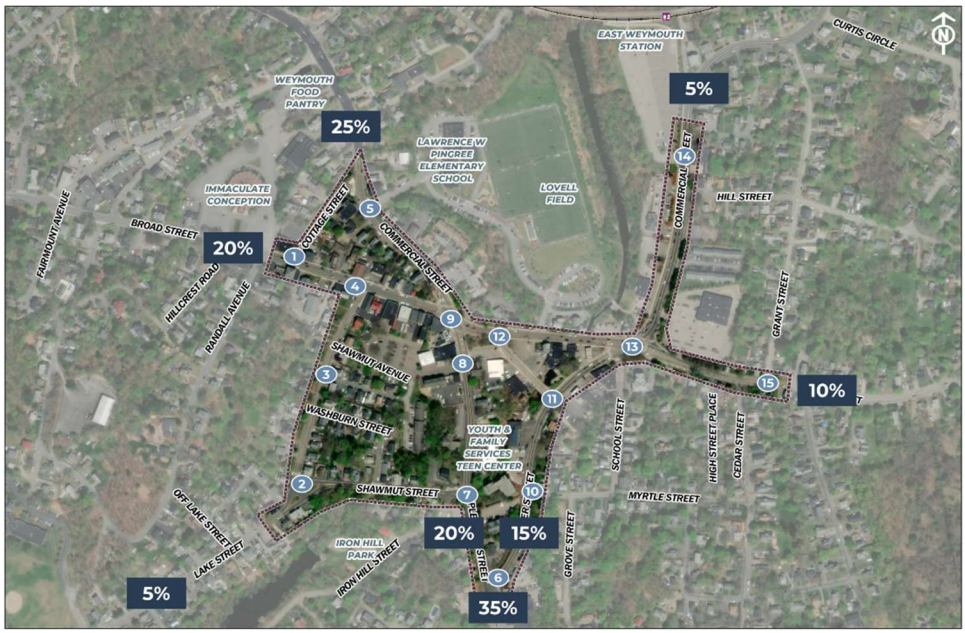

Figure 13. Trip Distribution

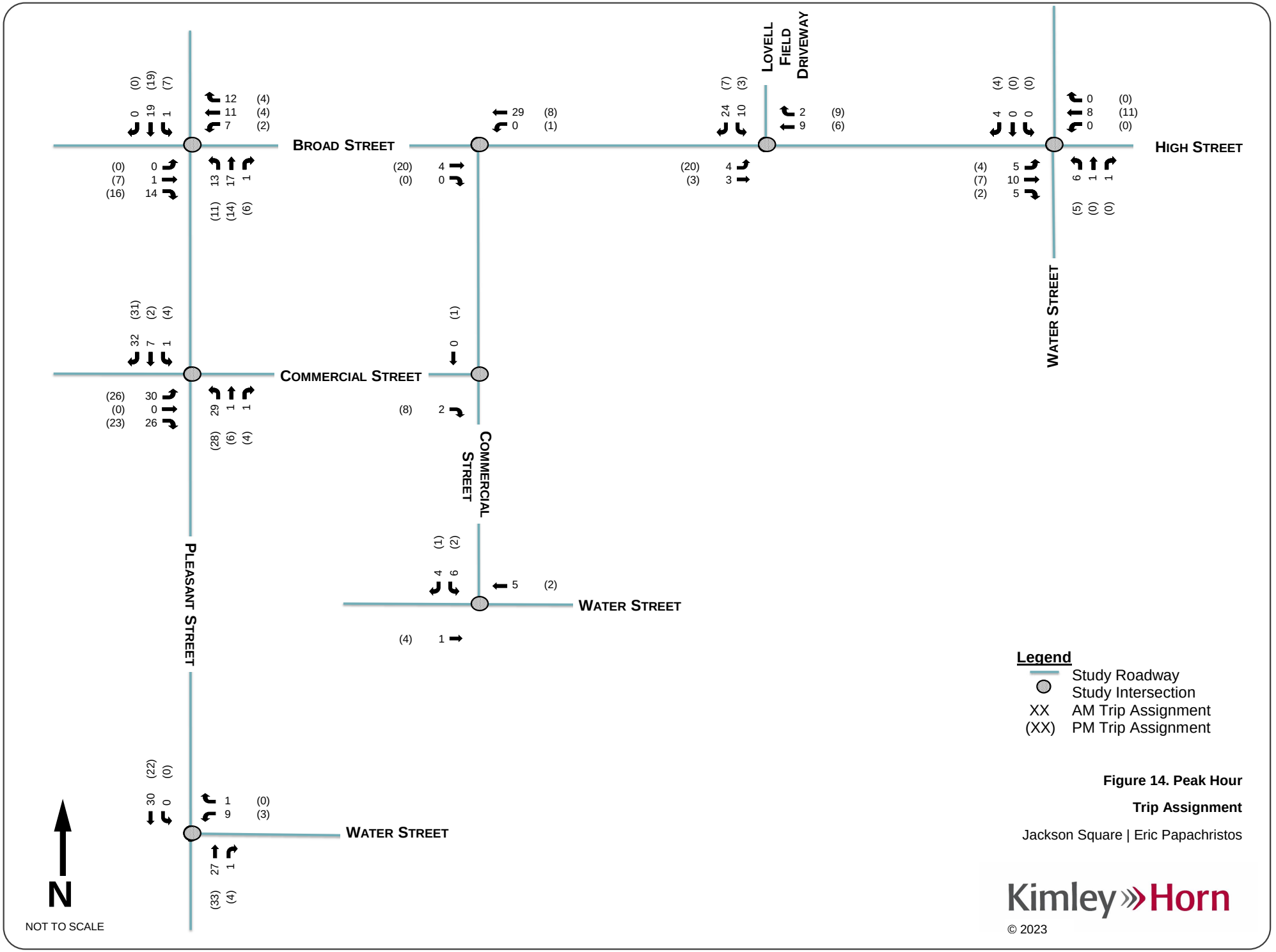

Figure 14. Peak Hour Trip Assignment

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FUTURE BUILD CONDITIONS

Future Build Conditions are defined as the expected traffic conditions in the year 2030 after the mixed- use redevelopment of the project. Under Build Conditions, Commercial Street, in front of Buildings C and D will be converted into a one-way southbound road. The total traffic volumes considered in the analysis for this project are the sum of the background traffic volumes and the expected project traffic volumes. **Figure 15** presents the future total turning movement volumes at the study intersections during the weekday AM and PM peak hours for 2030. Volume Development worksheets for the study intersections are included in **Appendix D**.

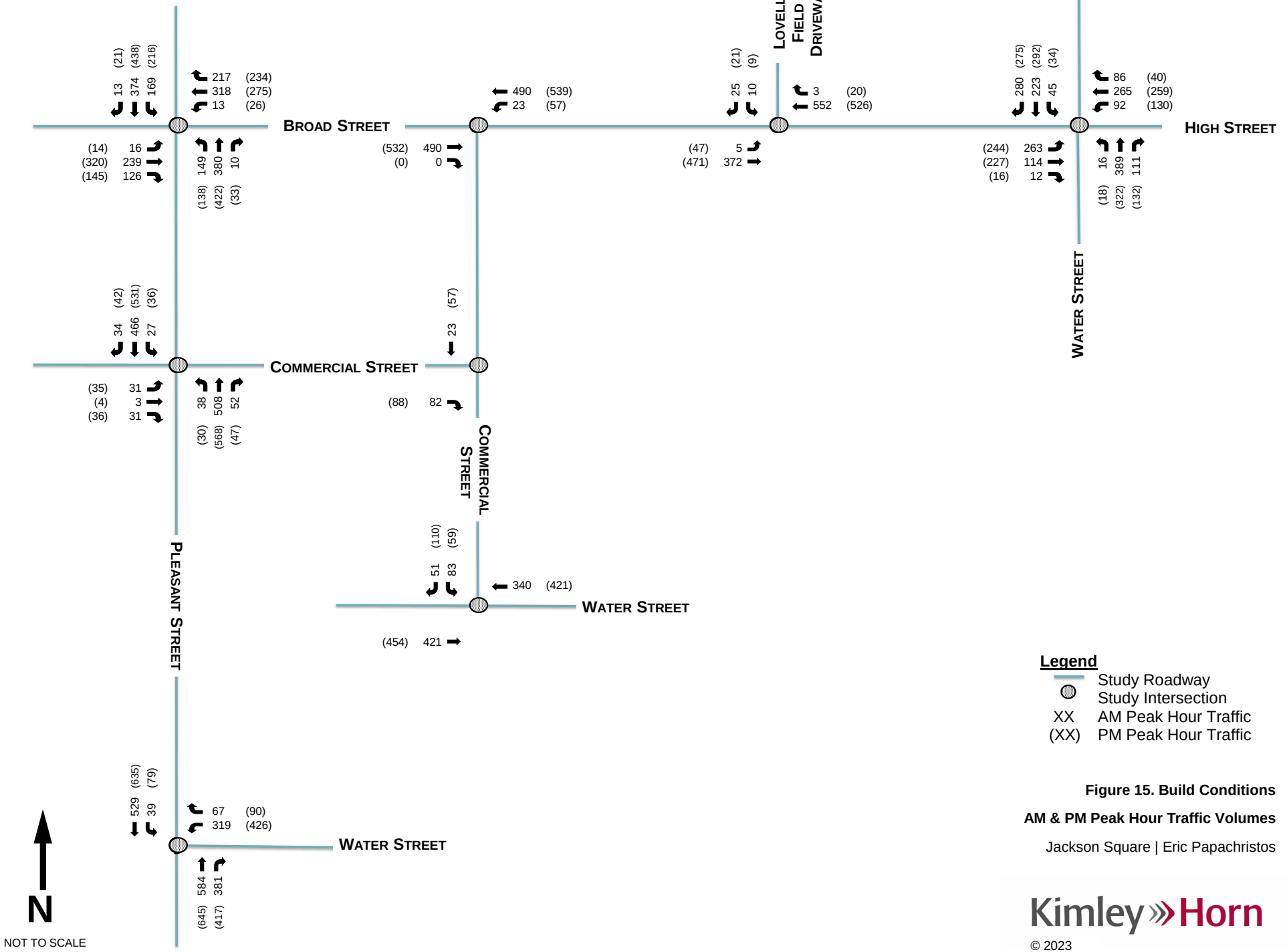

Figure 15. Build Conditions

AM & PM Peak Hour Traffic Volumes

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Kimley»Horn

ANALYSIS

INTERSECTION CAPACITY ANALYSIS

Methodology

Intersection capacity analyses were performed for Existing, 2030 Future No-Build, and 2030 Future Build traffic volumes for the study area intersections. The analyses were performed using the Synchro Software Package (Version 11), which utilizes methodologies contained in the *Highway Capacity Manual (6th Edition)* for signalized and unsignalized intersections. For intersections with timing configurations that are incompatible with *HCM 6th Edition*, the built-in Synchro analysis methodology is used. According to the *HCM 6th Edition*, capacity is defined as the maximum number of vehicles that can pass over a particular road segment or through a particular intersection within a fixed time duration. The grading condition is described by Level of Service (LOS) to indicate the operating characteristics of a road segment or intersection. LOS is defined as a qualitative measure that describes operational conditions and motorist perceptions within a traffic stream and relates to the level of delay experienced. The *HCM 6th Edition* defines six levels of service, LOS A through LOS F, with A being the best and F being the worst. Typically, a LOS "D" or better at signalized and unsignalized intersections is preferred, although lower levels are tolerated during peak travel hours, particularly in the more built up, urban like areas. The ranges of delay for each level of service are shown in **Table 4**.

Table 4. Level of Service Range of Delay

Level of Service (LOS)	Delay per Vehicle (seconds per vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	10 -20	10 -15
C	20 – 35	15 – 25
D	35 – 55	25 – 35
E	55 – 80	35 – 50
F	≥ 80	≥ 50

Intersection Capacity Analysis Summary

A summary of the intersection capacity analysis for the weekday AM and PM peak hours for the Existing Conditions, 2030 No-Build Conditions, 2030 Build Conditions, 2030 Build Mitigation Conditions can be found in **Table 5** and **Table 6**, respectively. Shown in the tables are the average vehicle delays, levels of service either per movement or overall intersection and the maximum vehicle queue information. Additional details can be found in the intersection analysis worksheets that are contained in **Appendix E**.

The following section highlights key results of the LOS analysis by analysis conditions. Overall, however, the analysis has shown that the major points of access to the development parking areas will operate at

good levels of service and relatively short delays. The major signalized intersections will experience some impact due to the additional traffic generated by the development with operating conditions consistent with the projections in the Jackson Square TMP. As will be outlined later in the report, traffic signal timing adjustments can be implemented at each of the intersections in the short term to mitigate the impacts of the development.

Table 5. AM and PM Peak Hour Capacity Analysis																			
Intersection	Movement	2022 Existing						2030 No-Build						2030 Build					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)
Broad Street, Pleasant Street & Commercial Street (Signalized)	EBL																		
	EBT	24.5	C	196	42.5	D	#384	32.8	C	#273	59.8	E	#457	35.1	D	#289	70	E	#483
	Approach	**24.5**	**C**	-	**42.5**	**D**	-	**32.8**	**C**	-	**59.8**	**E**	-	**35.1**	**D**	-	**70**	**E**	-
	WBT	24.6	C	198	31.8	C	#229	28.6	C	222	41.4	D	#330	28.7	C	217	39.3	D	#292
	WBR	8.2	A	59	10.1	B	70	10.2	B	75	14.2	B	108	11	B	82	12.4	B	99
	Approach	**18.6**	**B**	-	**23.5**	**C**	-	**21.7**	**C**	-	**30.4**	**C**	-	**21.7**	**C**	-	**27.6**	**C**	-
	NBL	24.2	C	77	29	C	75	25.5	C	84	29.8	C	81	30.5	C	117	38.7	D	#151
	NBT	29.7	C	#227	43.2	D	#375	34	C	#274	49.9	D	#431	35.4	D	#294	56.4	E	#458
	Approach	**28.4**	**C**	-	**40.9**	**D**	-	**32.1**	**C**	-	**46.7**	**D**	-	**34.1**	**C**	-	**52.3**	**D**	-
	SBL	11.1	B	53	18.9	B	105	12.8	B	72	25.7	C	#167	12.8	B	70	25.6	C	#166
	SBT	12.3	B	138	16.8	B	237	12	B	150	17.2	B	259	12.3	B	163	17.9	B	281
	Approach	**12**	**B**	-	**17.5**	**B**	-	**12.2**	**B**	-	**20.1**	**C**	-	**12.5**	**B**	-	**20.3**	**C**	-
	Intersection	**20.5**	**C**	**-**	**30**	**C**	**-**	**23.8**	**C**	**-**	**37.3**	**D**	**-**	**25**	**C**	**-**	**40.8**	**D**	**-**
Commercial Street & Broad Street	NBL	14.3	B	17.5	18.7	C	25	17.2	C	25	25.2	D	37.5	n/a					
	Approach	**14.3**	**B**	-	**18.7**	**C**	-	**17.2**	**C**	-	**25.2**	**D**	-						
	EBT	0	A	0	0	A	2.5	0	A	0	0	A	2.5						
	EBR	0	A	0	0	A	0	0	A	0	0	A	0						
	Approach	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-						
	WBL	8.2	A	0	8.4	A	0	8.5	A	0	8.7	A	0						
	WBT	0	A	0	0	A	0	0	A	0	0	A	0						

Table 5. AM and PM Peak Hour Capacity Analysis																			
Intersection	Movement	2022 Existing						2030 No-Build						2030 Build					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)
	Approach	**0.3**	**A**	-	**0.6**	**A**	-	**0.3**	**A**	-	**0.6**	**A**	-						
Broad Street & Lovell Field Driveway	EBL	-						8.6	A	0	8.6	A	0	8.7	A	0	8.8	A	0
	EBT							0	A	0	0	A	5	0	A	7.5	0	A	7.5
	Approach							**0**	**A**	-	**0.4**	**A**	-	**0.1**	**A**	-	**0.8**	**A**	-
	WBT							0	A	0	0	A	0	0	A	0	0	A	0
	WBR							0	A	0	0	A	0	0	A	0	0	A	0
	Approach							**0**	**A**	-	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-
	SBL							12	B	0	15.5	C	0	15	C	0	16.6	C	0
	Approach							**12**	**B**	-	**15.5**	**C**	-	**15**	**C**	-	**16.6**	**C**	-
Commercial Street & Commercial Street/Post Office Driveway	EBL	8.5	A	0	8.6	A	0	8.5	A	0	8.7	A	0	8.7	A	0	9	A	0
	Approach	**8.5**	**A**	-	**8.6**	**A**	-	**8.5**	**A**	-	**8.7**	**A**	-	**8.7**	**A**	-	**9**	**A**	-
	SBT	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0
	Approach	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-
Water Street & Commercial Street	EBL	8	A	0	8.1	A	0	8.1	A	0	8.3	A	0			7.5			17.5
	EBT	0	A	5	0	A	12.5	0	A	5	0	A	15	0	A	0	0	A	0
	Approach	**0.7**	**A**	-	**0.4**	**A**	-	**0.6**	**A**	-	**0.3**	**A**	-	**0**	**A**	-	**0**	**A**	-
	WBT	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0
	WBR	0	A	0	0	A	0	0	A	0	0	A	0			0			0
	Approach	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-	**0**	**A**	-
	SBL	12.1	B	0	12.3	B	0	13.2	B	0	13.8	B	0	19	C	0	20.2	C	0
	SBR			0			0			0			0	10.7	B	0	12.2	B	0

Table 5. AM and PM Peak Hour Capacity Analysis																		
Intersection	Movement	2022 Existing						2030 No-Build						2030 Build					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)
	Approach	**12.1**	**B**	-	**12.3**	**B**	-	**13.2**	**B**	-	**13.8**	**B**	-	**15.9**	**C**	-	**15**	**C**	-
Broad Street/High Street & Commercial Street (Signalized)	EBL	10.2	B	94	22.8	C	169	13.7	B	133	26.3	C	200	13	B	119	26	C	186
	EBT	17.4	B	89	31.3	C	211	18.6	B	97	32.3	C	240	17.9	B	85	32	C	228
	Approach	**13**	**B**	-	**27**	**C**	-	**15.4**	**B**	-	**29.3**	**C**	-	**14.6**	**B**	-	**28.9**	**C**	-
	WBL	8.9	A	45	19.7	B	106	9.7	A	49	20.5	C	115	9.6	A	45	19.9	B	101
	WBT	18.8	B	151	30.9	C	197	20.6	C	163	31.9	C	218	20.9	C	173	32.8	C	246
	WBR	0	A	0	0	A	0	0.1	A	0	0	A	0	0.1	A	0	0	A	0
	Approach	**13.3**	**B**	-	**24.2**	**C**	-	**14**	**B**	-	**24.9**	**C**	-	**14.5**	**B**	-	**25.9**	**C**	-
	NBT	40.5	D	283	65.2	E	#456	46.7	D	#421	114	F	#608	73.1	E	#533	195.8	F	#722
	Approach	**40.5**	**D**	-	**65.2**	**E**	-	**46.7**	**D**	-	**114**	**F**	-	**73.1**	**E**	-	**195.8**	**F**	-
	SBT	34.3	C	189	50.1	D	277	35.9	D	230	87.7	F	#470	38.9	D	238	102.3	F	#484
	SBR	2.9	A	39	3.4	A	32	2.8	A	42	3.4	A	36	2.8	A	42	3.4	A	36
	Approach	**18.3**	**B**	-	**29.1**	**C**	-	**19.1**	**B**	-	**49.3**	**D**	-	**20.4**	**C**	-	**56.9**	**E**	-
	Intersection	**20.9**	**C**	**-**	**35.5**	**D**	**-**	**23.6**	**C**	**-**	**52.8**	**D**	**-**	**32.2**	**C**	**-**	**76.5**	**E**	**-**
Pleasant Street/Commercial Street & Shawmut Avenue/Commercial Street/Post Office Driveway	NBL	8.3	A	0	8.4	A	0	8.4	A	0	8.5	A	0	8.6	A	2.5	8.7	A	2.5
	NBT	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0
	NBR	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0
	Approach	**0.1**	**A**	-	**0**	**A**	-	**0.1**	**A**	-	**0**	**A**	-	**0.5**	**A**	-	**0.4**	**A**	-
	EBL	12.4	B	2.5	15	C	5	12.9	B	2.5	16.2	C	5	23.3	C	25	26.1	D	32.5
	Approach	**12.4**	**B**	-	**15**	**C**	-	**12.9**	**B**	-	**16.2**	**C**	-	**23.3**	**C**	-	**26.1**	**D**	-
	SBL	8.4	A	0	8.4	A	0	8.5	A	0	8.6	A	0	8.8	A	0	8.9	A	0

Table 5. AM and PM Peak Hour Capacity Analysis																		
Intersection	Movement	2022 Existing						2030 No-Build						2030 Build					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)
	SBT	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0
	SBR	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0	0	A	0
	Approach	**0.2**	**A**	-	**0.2**	**A**	-	**0.2**	**A**	-	**0.2**	**A**	-	**0.4**	**A**	-	**0.6**	**A**	-
Pleasant Street & Water Street (Signalized)	WBL	24.2	C	223	39.8	D	#502	26.7	C	#292	59.7	E	#658	37.2	D	#359	112.1	F	#763
	Approach	**24.2**	**C**	-	**39.8**	**D**	-	**26.7**	**C**	-	**59.7**	**E**	-	**37.2**	**D**	-	**112.1**	**F**	-
	NBT	22.5	C	312	39.9	D	#569	25	C	343	38	D	#659	22.5	C	406	36.6	D	#744
	NBR	0.7	A	12	1.9	A	41	0.8	A	13	2.5	A	56	0.8	A	15	2.8	A	66
	Approach	**13.6**	**B**	-	**24.4**	**C**	-	**14.3**	**B**	-	**23**	**C**	-	**13.9**	**B**	-	**23.3**	**C**	-
	SBL	8.4	A	18	17.9	B	56	9	A	21	18.1	B	61	8.5	A	21	17.8	B	60
	SBT	12.8	B	210	23.2	C	446	14.7	B	230	23.1	C	504	13	B	250	22.1	C	528
	Approach	**12.5**	**B**	-	**22.6**	**C**	-	**14.3**	**B**	-	**22.5**	**C**	-	**12.7**	**B**	-	**21.6**	**C**	-
	Intersection	**15.2**	**B**	**-**	**26.9**	**C**	**-**	**16.6**	**B**	**-**	**30.7**	**C**	**-**	**18.2**	**B**	**-**	**42.8**	**D**	**-**

Table 6. PM Peak Hour Mitigation Comparison							
Intersection	Movement	2030 Build			2030 Build Mitigated		
		PM Peak Hour			PM Peak Hour		
		Delay (s)	LOS	95th% Queue Length (ft)	Delay (s)	LOS	95th% Queue Length (ft)
Broad Street & Commercial Street (Signalized)	EBT	70	E	#483	39.4	D	#447
	Approach	**70**	**E**	-	**39.4**	**D**	-
	WBT	39.3	D	#292	28.7	C	240
	WBR	12.4	B	99	10.3	B	93
	Approach	**27.6**	**C**	-	**20.7**	**C**	-
	NBL	38.7	D	#151	38.4	D	#152
	NBT	56.4	E	#458	53.1	D	#468
	Approach	**52.3**	**D**	-	**49.7**	**D**	-
	SBL	25.6	C	#166	56.4	E	#221
	SBT	17.9	B	281	22	C	316
	Approach	**20.3**	**C**	-	**33**	**C**	-
	Intersection	**40.8**	**D**	**-**	**35.8**	**D**	**-**
Broad Street/High Street & Commercial Street (Signalized)	EBL	26	C	186	30.6	C	202
	EBT	32	C	228	35.5	D	245
	Approach	**28.9**	**C**	-	**32.9**	**C**	-
	WBL	19.9	B	101	22.7	C	109
	WBT	32.8	C	246	36.3	D	263
	WBR	0	A	0	0	A	0
	Approach	**25.9**	**C**	-	**28.9**	**C**	-
	NBT	195.8	F	#722	89.9	F	#662
	Approach	**195.8**	**F**	-	**89.9**	**F**	-
	SBT	102.3	F	#484	58.6	E	#433
	SBR	3.4	A	36	3.1	A	35
	Approach	**56.9**	**E**	-	**33.1**	**C**	-
	Intersection	**76.5**	**E**	**-**	**45.7**	**D**	**-**
Pleasant Street & Water Street (Signalized)	WBL	112.1	F	#763	58.5	E	#686
	Approach	**112.1**	**F**	-	**58.5**	**E**	-
	NBT	36.6	D	#744	44.1	D	#787
	NBR	2.8	A	66	1.7	A	38
	Approach	**23.3**	**C**	-	**27.4**	**C**	-
	SBL	17.8	B	60	26.6	C	69
	SBT	22.1	C	528	28.5	C	603
	Approach	**21.6**	**C**	-	**28.3**	**C**	-
	Intersection	**42.8**	**D**	**-**	**34.7**	**C**	**-**

Existing Conditions

The Existing Conditions analysis was based on the existing traffic volumes, lane uses, and traffic controls at the study area intersections. A peak hour factor (PHF) was calculated by approach and the heavy vehicle percentages were calculated for each movement based on existing TMC data. As stated previously in the report, the Existing Conditions was based on the peak hour networks developed as part of the Jackson Square TMP. Listed below are the key findings for Existing Conditions.

- During the AM peak hour, all intersections operate at an overall LOS C or better. The individual approaches and movements operate at LOS C or better except at the intersection of Broad Street/High Street & Commercial Street. The northbound approach operates at LOS D with a delay of 40.5 seconds per vehicle and a volume to capacity (V/C) ratio of 0.76.
- During the PM peak hour, all intersections operate at an overall LOS C or better, except the intersection of Broad Street/High Street & Commercial Street, which operates at LOS D with a delay of 35.5 seconds per vehicle. The northbound approach of this intersection was estimated to operate at LOS E with a delay of 65.2 seconds per vehicle and a V/C ratio of 0.90.

2030 No-Build Conditions

The 2030 No-Build Conditions analysis was based on the estimate of 2030 No-Build traffic volumes with the existing lane geometry, traffic controls, and heavy vehicle percentages and not including the proposed development. The PHF were updated to 0.92 for urban areas for the overall intersection based on the *MassDOT Highway Division Traffic and Safety Engineering 25% Design Submission Guidelines.* Listed below are the key findings for the 2030 No-Build Conditions.

- In an overall sense, there is relatively small changed in operating conditions between Existing Conditions and the 2030 No-Build Conditions, although some individual approaches at the major intersections worsen.
- During the AM peak hour, all intersections operate at an overall LOS C or better. The individual approaches and movements operate at LOS C or better except at the intersection of Broad Street/High Street & Commercial Street. The northbound approach of this intersection was estimated to operate at LOS D with a delay of 46.7 seconds per vehicle and a volume to capacity (V/C) ratio of 0.85.
- During the PM peak hour, all intersections operate at an overall LOS C or better, except the intersection of Broad Street/High Street & Commercial Street, which operates at LOS D with a delay of 52.8 seconds per vehicle. The northbound approach operates at LOS F with a delay of 113.5 seconds per vehicle. At the intersection of Commercial Street, Pleasant Street & Broad Street, the eastbound approach operates at LOS E with a delay of 59.8 seconds per vehicle.
- At the intersection of Pleasant Street & Water Street, the westbound approach operates at LOS E with a delay of 59.7 seconds per vehicle during the PM peak hour

2030 Build Conditions

The 2030 Build Conditions analysis was based on the Build traffic volumes with the Future No-Build lane geometry, traffic controls, and heavy vehicle percentages at the study area intersections. The PHFs were the same as those used in the 2030 No-Build analysis. Listed below are the key findings for the 2030 Build Conditions.

- During the AM and PM peak hour, the intersections of Broad Street & Lovell Field Driveway, Commercial Street & Commercial Street/Post Office, and Water Street & Commercial Street are projected to operate at LOS AC or better The southbound approach at the intersection of Broad Street & Lovell Field Driveway operates at LOS C with a delay of 15.0 and 16.6 seconds per vehicle for the AM and PM peak hour. The southbound right-turn at the intersection of Water Street & Commercial operates at LOS C with a delay of 20.2 seconds per vehicle for the PM Peak hour.
- During the AM peak hour, all intersections operate at an overall LOS C or better. At the signalized intersection of Commercial Street, Pleasant Street & Broad Street, the eastbound approach operates at LOS D with a delay of 35.1 seconds per vehicle. The northbound approach at the intersection of Broad Street/High Street & Commercial Street operates at LOS E with a delay of 73.1 seconds per vehicle.
- During the PM peak hour, all intersections operate at an overall LOS D or better, except the intersection of Broad Street/High Street & Commercial Street, which is estimated to operate at LOS E with a delay of 76.5 seconds per vehicle. The northbound approach operates at LOS F with a delay of 195.8 seconds per vehicle. At the intersection of Commercial Street, Pleasant Street & Broad Street, the eastbound approach operates at LOS E with a delay of 70.0 seconds per vehicle. At the intersection of Pleasant Street & Water Street, the westbound approach is estimated to operate at LOS F with a delay of 112.1 seconds per vehicle while the overall intersection operating condition is expected to be LOS D.

2030 Build Mitigation Conditions

While the impact of the proposed development on the Squares major intersections was shown to be small to moderate depending on the intersection and the intersection approach, the analysis results required an examination of potential actions to mitigate the impact. The findings of this analysis are generally consistent with the Jackson Square TMP as well. Traffic signal timing improvements were evaluated. The 2030 Build Mitigation Conditions analysis was based on the 2030 Build PM Peak Hour Conditions. Signal timings were optimized at the three signalized intersections: Broad Street & Commercial Street, Broad Street/High Street & Commercial Street, and Water Street & Pleasant Street. Optimization affects the traffic signal cycle and the timing for each movement. In general, the evaluation showed that with signal timing optimization, the impacts of the proposed development are mitigated. **Table 6** compares the 2030 Build conditions at the three signalized intersection with and without the mitigation. Listed below are the key findings for the 2030 Build Mitigation Conditions.

- The intersection of Broad Street & Commercial Street operates at LOS D with a reduction of delay to 35.8 seconds per vehicle, during the PM peak hour. The eastbound approach operates at LOS D with a delay of 39.4 seconds and a V/C ratio of 0.82.
- During the PM peak hour, the intersection of Broad Street/High Street & Commercial Street is estimated to operate at LOS D with a reduced vehicle delay of 45.7 seconds per vehicle. The northbound approach is estimated to continue operating at LOS F, although with a delay of 89.9 seconds per vehicle, noticeably lower than under 2030 No-Build Conditions. The southbound approach operates at LOS C with a delay of 33.1 seconds per vehicle and a V/C ratio of 0.82.
- The intersection of Pleasant Street & Water Street is projected to operate at LOS C with a delay of 34.7 vehicles per second during the PM peak hour. The westbound approach is expected to operate at LOS E with a delay of 58.5 seconds per vehicle and a V/C ratio of 0.92, which is a significant improvement.

PARKING CONDITIONS

Required Parking Spaces

The mixed-use redevelopment is within the Jackson Square Overlay District, which is intended to support a vibrant, mixed-use village center and that protects and enhances the significant natural resource of Herring Run Brook and connects the village and the brook to existing open space and recreation resources. The Jackson Square Overlay District establishes reasonable standards that permit and control mixed-use residential, commercial, governmental, institutional, and office uses.

The off-street parking spaces within the Jackson Square Overlay District is listed below.

- **Residential**
  - Studio Housing Unit: one (1) parking space per unit
  - All Other Types: 1.5 parking spaces per unit
  - All parking for residential uses must be provided for onsite or on a lot under the same ownership and within reasonable walking distance.
  - For the commercial component, at least 75% of the required parking must be provided on-site.
  - The use of offsite parking and/or shared parking to meet no more than 25% the minimum required of the proposal commercial use can be considered.
- **Eating and Drinking Establishments:** one (1) parking space for each four (4) seats
- **Retail, Office, and Other Commercial:** one (1) parking space per 400 square feet of gross floor area
- **Charging Stations for Electric, Hybrid, or Similar Type Vehicles based on parking spaces**
  - One (1) to ten (10) spaces: None
  - Eleven (11) to twenty-five (25) spaces: One (1)
  - 26 to 50 spaces: Two (2)
  - 51 to 100 spaces: Three (3)

Table 7 provides the parking accommodation required for each land use associated with the four (4) Buildings. According to the Town's code, the required amount of parking spaces with the mixed-use redevelopment program is 290 accounting for the commercial component reduction (75% of the required parking must be provided on-site).

Table 7. Redevelopment Program Parking Code Requirements

Building	Land Use	Intensity	Required Parking	Requirement Parking Reduction[1]
A	Commercial/Retail	2,465 GSF	7	5
	Residential Units – Studio	24 DU	24	84
	Residential Units – Other Units	40 DU	60	
B	Restaurant	4,285 GSF / 70 Seats	18	14
	Commercial/Retail	1,335 GSF	3	2

Table 7. Redevelopment Program Parking Code Requirements				
Building	**Land Use**	**Intensity**	**Required Parking**	**Requirement Parking Reduction[1]**
	Residential Units – Studio	24 DU	24	51
	Residential Units – Other Units	18 DU	27	
C	Restaurant	2,030 GSF / 30 Seats	7	6
	Commercial/Retail	1,320 GSF	3	2
	Residential Units – Studio	22 DU	22	84
	Residential Units – Other Units	41 DU	62	
D	Commercial/Retail	490 GSF	2	1
	Residential Units – Studio	13 DU	13	40
	Residential Units – Other Units	18 DU	27	
Subtotal Commercial/Retail/Restaurant		**11,925 SF / 100 Seats**	**41**	**31**
Subtotal Residential Units		**200 DU**	**259**	**259**
		Total	**300**	**290**

[1] For the commercial component, at least 75% of the required parking must be provided on-site.

Projected Parking Demands

Land uses were grouped as accurately as possible into land use categories created by the ITE *Parking Generation Manual, 5th Edition.* The purpose of identifying the land uses is to disclose the inputs for the proposed conditions into the parking model, which uses ITE Parking Demand Ratios, as opposed to parking requirements set by the Town. The peak parking demand for the uses is determined based on the ITE formulas or rates, as applicable, to calculate parking demand. The parking demand models are based on actual observations of similar uses and characterized by type of area (i.e. urban/suburban, near transit or not). The rates and models are developed from the empirical data. **Table 8** depicts the estimated peak parking demands for the proposed mixed-use redevelopment program based on the ITE models and the presumed setting. As shown and according to the ITE *Parking General Manual* methodology, the amount of parking spaces with this proposed mixed-use development is 290 spaces during the weekday peak and 337 during the Saturday peak. The estimates in **Table 8** do not take into account the parking demand pattern over the course of the day where peaking characteristics will vary by land use. For example, the percent peak parking demand for residential uses is at 4:00 AM at 100%, when the commercial/restaurant space will not be opened. This is discussed in more detail later in the report.

Table 8. Redevelopment Program ITE Peak Parking Generation Estimates				
ITE Land Use	**ITE Code**	**Intensity**	**Weekday (Monday – Thursday)**	**Saturday**
Multifamily Housing (Mid-Rise) / General Urban/Suburban (< 1/2 mile to rail transit)	221	200 DU	213	230
Shopping Center - Non-December / General Urban/Suburban	820	5,610 GSF	12	16
Fast Casual Restaurant / General Urban/Suburban	930	20 GSF	20	18
Quality Restaurant / General Urban/Suburban	931	45 GSF	45	73
		Total	**290**	**337**

Provided Parking Spaces

Based upon the mixed-use redevelopment and the Niko's, there are approximately 286 parking spaces provided and this does not include the use of on-street and other public off-street lot as shown in **Table 9**. However, with the inclusion of the off-site public parking spaces such as the Commercial Street southbound one-way street, which will include 11 angle parking spaces, Broad Street on-street parking spaces of 25 spaces, and the use of the Teen Center/Former Library (between 6:00 PM to 1:00 AM) of 34 parking spaces, that is an additional 70 parking spaces available. There would be a total of 356 parking spaces available for commercial/retail use. Note that there are other nearby public off-street lots and on-street parking in Jackson Square, all within walking distance.

Table 9. Provided Parking Spaces	
Building	**Number of Parking Spaces**
A	218
B	0
C	28
D	13
Niko's	27
Subtotal On-Site Provided Parking Spaces	**286**
Subtotal Off-Site Public Parking Spaces	**70[1]**
Total Available Parking Spaces	**356**

[1] Off-Site Public Parking Spaces include the Commercial Street angle parking of 11 spaces, Broad Street on-street parking of 25 spaces, and Teen Center/Former Library (nighttime) of 34 spaces, totaling up to 70 spaces.

The mixed-use redevelopment is located right in Jackson Square with sidewalk facilities on both sides and an easily accessible location for public transportation. Based on the Town's Code, evaluating each land use independently of one another will require 290 parking spaces to be provided, accounting for the reduction of the commercial component, at least 75% of the required parking must be provided on-site. When using the methodology from ITE's land use-based parking demand, the parking spaces during the weekday peak is 290 spaces and during the Saturday peak is 337. However, the percent peak parking demand for residential and commercial/retail does not occur at the same time. For example, the percent peak parking demand for residential uses is at 4:00 AM at 100%, when the commercial/restaurant space will not be opened. Shown in **Figure 16** and **Figure 17** is the parking time of day distribution during a weekday and Saturday, respectively. During the weekday and Saturday, the peak occurs at 8:00 PM, with an anticipated demand of 219 spaces during the weekday and 263 spaces during Saturday. The mixed-use redevelopment will provide a total of 286 parking spaces on-site, which indicates there will be a surplus during the peak of 67 parking spaces and 23 parking spaces for a typical weekday and Saturday, respectively.

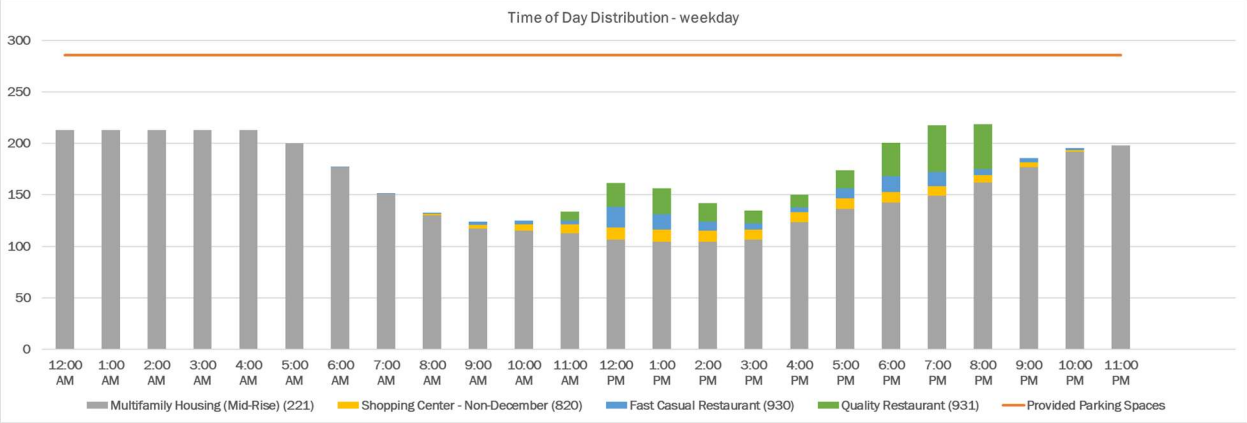

Figure 16. Parking Time of Day Distribution – Weekday

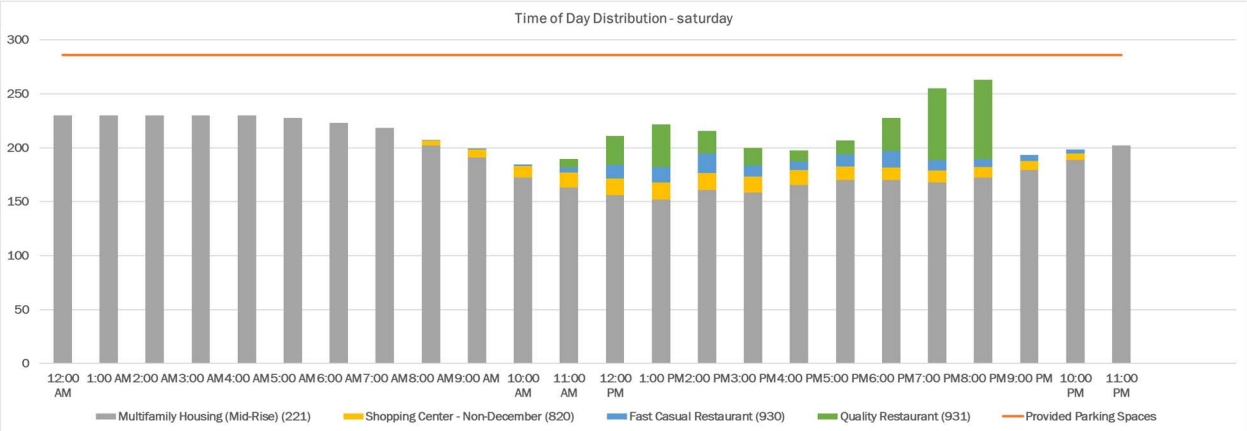

Figure 17. Parking Time of Day Distribution – Saturday

SITE ACCESS

As shown in **Figure 1**, the development encompasses four distinct sites – two on the north side of Broad Street and two to the south. However, the majority of parking for the entire project is to be located in the Building A garage while there is no parking in Building B. Access to Building A is off the Lovell Field Access Drive. Access to both Buildings C and D relative to the residential parking access is to be via the redesigned one-way Commercial Street section between Broad Street and Water Street. There will be an off-street loading drive for Building B while it is proposed to designate an on-street loading zone on the one way section of Commercial Street. The site plan can be found in **Appendix F**.

While the final engineering of the project, access and abutting street modifications will need to be completed, the movement of large vehicles such as fire apparatus were evaluated for entering both the redesigned one-way section of Commercial Street and the Lovell Field Access Drive. The tests also included the ability for the fire apparatus to move along the redesigned one-way section of Commercial Street with on-street parking in place. Conceptual refinements have been incorporated and based on the analysis to date, the redesigned one-way section of Commercial Street with some minor widening to create a 32 foot minimum curb to curb width will allow for angle parking and safe one way movement.

The large vehicle movement test for the Lovell Field Access Drive took into account the proposed enhanced pedestrian crossing of Broad Street with curb extensions.

CONCLUSIONS AND MITIGATIONS

The previous sections of the report described the project, the current traffic network conditions, parking characteristics and the proposed project. The analysis of traffic and parking with respect to the development 200 residential dwelling units (DU), 5,345 square feet of commercial/retail space, and 5,785 square feet of restaurant space was completed following standard practice. The key findings of this traffic impact, access, and parking study are as follows:

- The proposed project in total, is estimated to generate less than 200 peak hour vehicle trips that are either entering or exiting the project sites and account for being a transit-oriented development within a quarter mile of the commuter rail station and in a walkable, commercial environment that serves to reduce the vehicle traffic demands.
- The major access ways and drives directly serving the proposed development including the Lovell Field Access Drive and the section of Commercial Street proposed to be redesigned and designated as for one-way traffic flow are expected to operate at more than satisfactory levels of service and the project traffic is expected to be able to enter and exit the respective sites safely.
- The future conditions in the Square with and without the proposed development results in additional vehicle delays at the three signalized intersections in the study area with some approaches anticipated to experience fairly long delays. This is consistent with the Jackson Square TMP.
- The project is providing sufficient parking on-site (Buildings A, C, and D) that fully accommodates the residential supply according to zoning. The peak commercial demand is expected to be accommodated through a combination of available public parking both on-street and off-street as well as parking in 27 space Niko's Lot during evenings under cooperation with ownership.
- There are improvements throughout the Square to enhance and encourage pedestrian movement including safe crossings of the major streets such as Broad Street at Lovell Field as well improve the quality of the sidewalks such as width that would accommodate street furniture and placemaking ability.

MITIGATION

While the project itself is not creating new or unexpected operational deficiencies, the importance of creating safe and efficient access for the project is essential to maintain a safe multimodal traveling network for non-site related traffic. In addition, the project, being designed as a transit-oriented development, should consider actions that help create a walkable and transit-oriented environment. The following proposed mitigation measures have been identified intended to achieve the above:

- Continue working with the Town to implement the one-way section of Commercial Street to include curb extensions, angled parking, loading zone, and safe pedestrian walking/crossings. This would likely require some minor adjustments to the street layout.
- The street design should include some curb extensions at Broad Street along with a small section of flush island treatment to accommodate fire apparatus turns onto Commercial Street at this intersection.
- Install new angle parking along the one-way section of Commercial Street that will add eleven (11) spaces. Two additional parallel spaces can be installed east of the Building C Driveway that can also accommodate time restricted loading zone (i.e. 6AM to 10AM).
- Pavement markings on this section of Commercial Street at Water Street can include a right turn arrow and left turn arrow for a short left turn lane.

- Install enhanced pedestrian crossing of Broad Street at the Lovell Field Access Drive with curb extensions and Rapid Rectangular Flashing Beacons (RRFBs).
- Install safe pedestrian crossings on Commercial Street near post office and the access points to Buildings C and D.
- Maximize width of new sidewalks along Broad Street in the project area to enhance pedestrian experience and accommodate potential placemaking activity.
- Each building should include secured bike storage areas for residents and additionally, external bike racks should be considered for each building in the vicinity of the commercial uses with the number of racks commensurate with the amount and type of commercial activity.
- Work with the Town to implement optimize signal timing adjustments at the intersections of Broad Street & Commercial Street, Broad Street/High Street & Commercial Street, and Water Street & Pleasant Street for short term relief while longer term improvements are evaluated
- Install a DO NOT BLOCK THE BOX pavement marking at the intersection of Broad Street with the Lovell Field Access Drive.