View of Centre and Willow Streets - Looking Southwest

Owner:	Acre Development Corporation Andover, MA
Developer/Project Manager:	Gary Martell Real Estate Equity Consulting Jamaica Plain, MA
Attorney:	Pulgini & Norton, LLP Braintree, MA
Architect:	RF Schmidt Architect, LLC, Brookline, MA

1789 Centre Street, West Roxbury, MA 02132

PULGINI | NORTON, LLP
ATTORNEYS AT LAW

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October 22, 2015

Mr. Brian Golden
Director
The Boston Redevelopment Authority
One City Hall Square (9th Floor)
Boston, MA 02201

RE: 1789 Centre Street, West Roxbury, MA
Article 80E, Small Project Review Application Submission

Dear Director Golden:

On behalf of Acre Development Corporation and Gary C. Martell, I am pleased to submit this letter as Notice of our Small Project Review Application submission under Article 80E of the Boston Zoning Code, in connection with the proposed development at 1789 Centre Street, in the West Roxbury section of Boston.

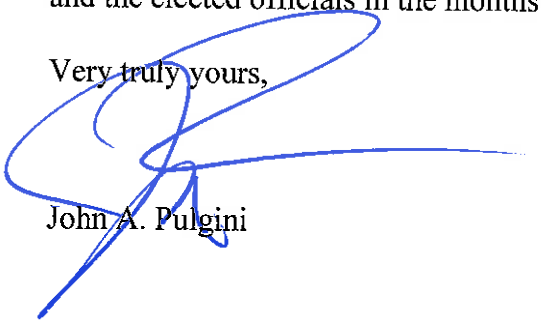
The project site consists of an approximately 11,834 square foot lot bounded by Centre Street and Willow Street. Presently, the parcel contains the former used car business, known as West Roxbury Motors (the "Site), which is presently vacant, and considered an eyesore to the community. Redevelopment of the Site will enhance the street frontage of both Centre and Willow Streets, adding energy and vitality with the inclusion of sixteen (16) new residential condominiums, and (1) commercial condominium (the "Proposed Project").

The Proposed Project is a four-story building comprised of sixteen (16) residential units on floors two through four. Level one will consist of a resident's lobby, a commercial condominium, and storage and mechanical space. The development will provide twenty-nine (29) on-site parking spots, with approximately fifteen (15) contained in the interior of the structure and fourteen (14) exterior spaces.

The development team will be led by equity partner and project manager Gary C. Martell. Mr. Martell will lead a team of professional architects, engineers, contractors, and consultants with years of experience in the development of residential and commercial projects. The team has already hosted two neighborhood/abutters meetings sponsored with the cooperation of Chris Tracy form the BRA and Chris Rusk from the Mayor's Office of Neighborhood Services. In addition, there have been preliminary design meetings with BRA staff members and associated city agencies.

We intend to pursue the Article 80E Small Project Review Process for this Proposed Project and we look forward to continuing our strong working relationship with the BRA, the community, and the elected officials in the months ahead.

Very truly yours,



John A. Pulgini

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Project Team

Principal Owner:	Acre Development Corporation 9 Prides Circle Andover, MA 01810
Developer/Project Manager:	Gary Martell Real Estate Equity Consulting 15 Brownson Terrace Jamaica Plain, MA 02130
Attorney:	Pulgini & Norton, LLP 10 Forbes Road West, Suite 410 Braintree, MA 02184
Architect:	RF Schmidt Architect, LLC 78 Wolcott Road Brookline, MA 02467
Landscape Architect:	Blair Hines Design Associates Landscape Architects 318 Harvard Street, Suite 25 Brookline, MA 02446
Civil Engineer:	Norwood Engineering Co., Inc. 1410 Route One Norwood, MA 02062

Investment Members:

Principal owner, Greg Alexandris has been developing and building residential and commercial projects in and around Greater Boston since 1987. Greg is a hands-on owner, involved in all aspects of the project, from design inception through construction and resident occupancy. Greg received his bachelor of Civil Engineering from the University of Lowell, Lowell, MA. *Please see a more detailed bio at the end of this section.*

Project Manager Gary C. Martell, a life-long Parkway Area resident, is well known in both the neighborhoods and city hall for investments, design, and project management with new construction and rehab developments through-out West Roxbury, Roslindale, Jamaica Plain, Roxbury, and Hyde Park. He is a lifelong resident of Boston and his track-record dates back to starting his first new construction job in Roslindale in 1987.

Project examples

The following projects were completed by the investment team over the past 6-7 years.

Warren Avenue, Hyde Park … single-family, new construction.

Project examples

22 - 26 Hawthorne Street, Roxbury… 8-units, new construction

302 - 306 Allandale Road … 3 single-families, new construction

Project examples

337 - 345 Belgrade Avenue, Roslindale … 16-units commercial/residential building, new construction

17 Park Lane, Jamaica Plain … single-family, new construction

Project examples

60 - 64 Pond Street, Jamaica Plain … 3-unit conversion, restoration

8 - 12 Stedman Street, Jamaica Plain … 3-units, new construction

Project examples

194 - 196 Durnell Avenue, Roslindale … 2-units, new construction

Willoughby Estates, Andover, MA … nine executive homes, new construction

Nathan Frye House, 166 North Main Street, Andover, MA … Mixed-use, 12,000 sf (residential, retail and commercial) restoration, expansion and adaptive reuse of an historic landmark

62 Centre Street, Brookline, MA … 3-unit restoration, 9,000 sf

29 Chestnut Street, Andover, MA….commercial build-out, modernization

Lincoln Woods, Andover, MA….24-Residential townhouse units, new construction

1789 Centre Street, West Roxbury, MA 02132

9 PRIDES CIRCLE • ANDOVER MA •
978 375 4418•GREGALEXANDRIS@GMAIL.COM

ACRE DEVELOPMENT CORPORATION

OBJECTIVE

To develop, build, or renovate by using fundamental architectural principals that will not only fulfill each particular need but will also stand the test of time.

PRESIDENT AND PRINCIPAL

Greg Alexandris

EDUCATION

Bachelor of Science degree in Civil Engineering 1987
University of Lowell
Lowell MA 01854

PRINCIPAL HISTORY & EXPERIENCE

Greg Alexandris has been involved in all aspects of the construction and development business since 1987. From the beginning he has been involved in commercial and industrial construction. However during the past two decades he has been focused on residential development.

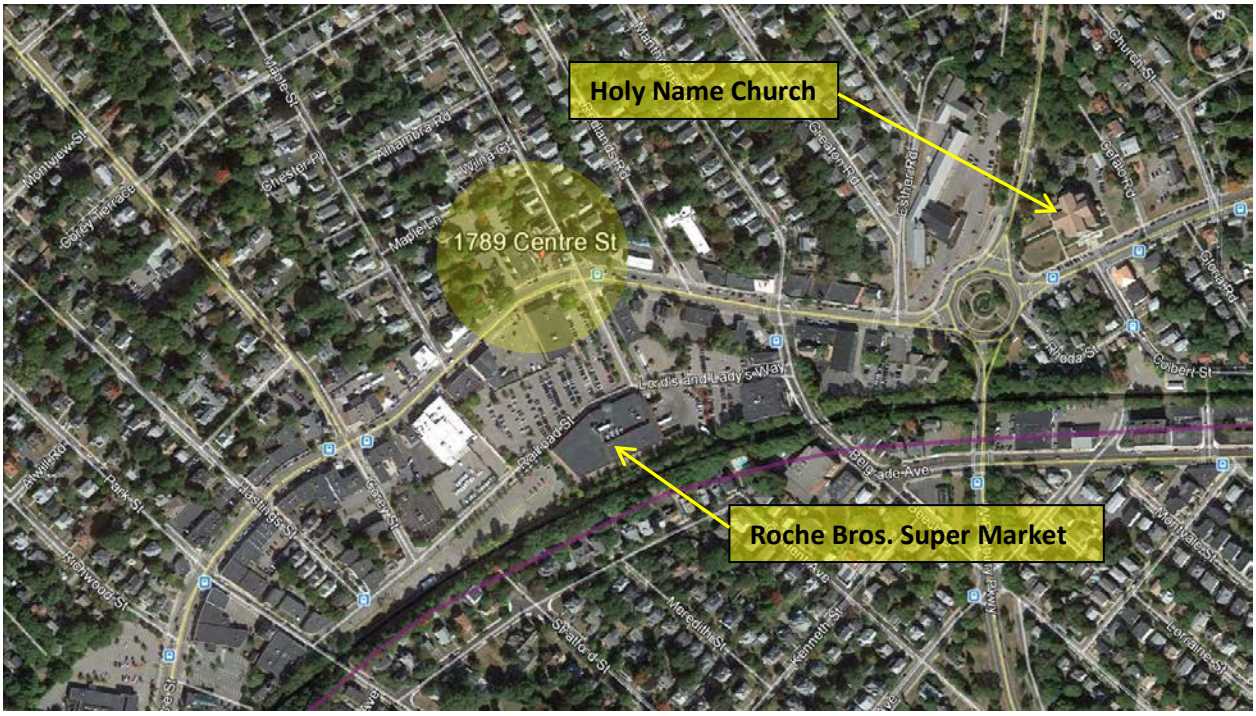
NOTABLE PROJECTS COMPLETED IN GREATER BOSTON AREA

- **166 North Main Street Andover. (Nathan Frye Building)** Rehabilitation and modernization of historic mixed use building.
- **Lincoln Woods.** Development and construction of 24 Townhouses in Andover MA
- **28 Chestnut Street, Andover MA** Commercial build out and Modernization
- **Willoughby Estates Andover MA** Construction of 9 Single Family Executive Residences

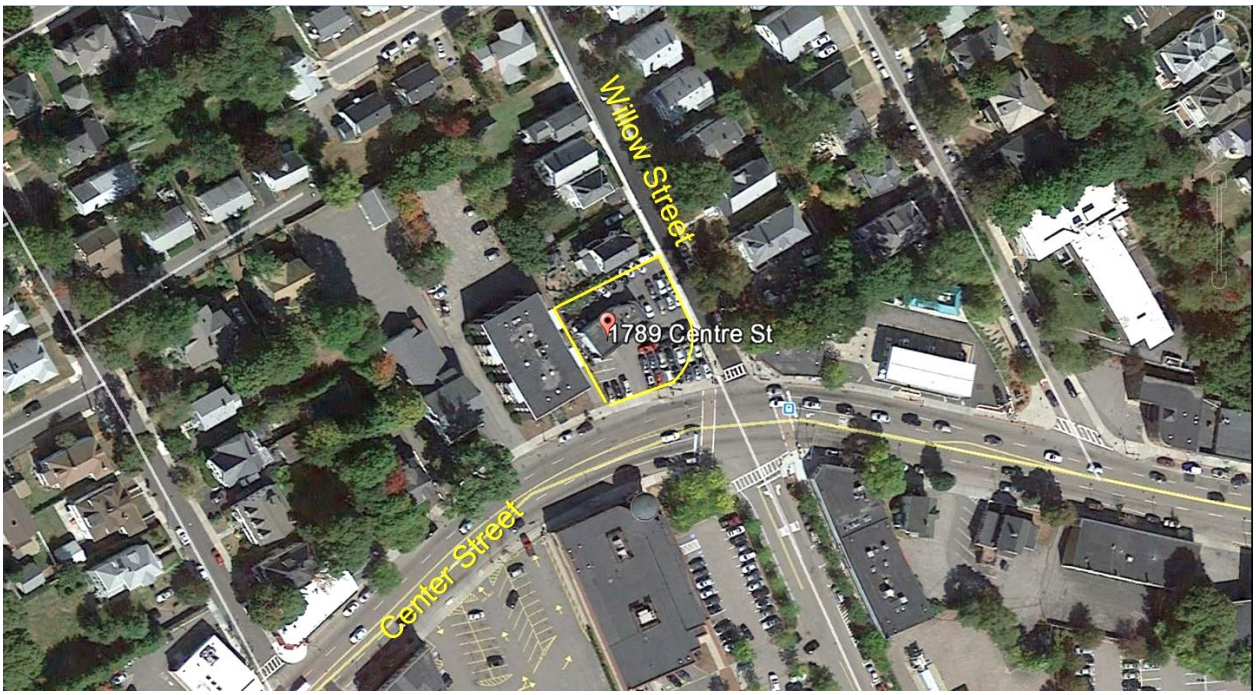
PROJECTS COMPLETED IN BOSTON AREA

- ☐ **250 Allston Street Brighton MA** three luxury townhouses built in 1998
- ☐ **254 Allston Street Brighton MA** three luxury townhouses built in 1998
- ☐ **258 Allston Street Brighton MA** three luxury townhouses built in 2000
- ☐ **305 Summit Avenue** total gut rehab of five two bedroom units completed in 2001
- ☐ **62 Centre Street Brookline MA** total gut rehab of three luxury units completed in 2009

Neighborhood/Context



Overview aerial photo of proposed project site (former West Roxbury Motors).



Close-up aerial photo of proposed project site (former West Roxbury Motors).

Neighborhood/Context

View of proposed project site looking northeast at corner of Centre St. and Willow St.

View of proposed project site looking southwest at corner of Centre St. and Willow St.

Neighborhood/Context

View of proposed project site looking south on Willow St.

View of proposed project site looking south on Willow St. towards the entrance to Roche Bros.

Project Description

This new transit-oriented construction will consist of a mixed-use, four-story "for-sale" residential condominium building comprised of 16 dwelling units and 1 commercial condominium.

The first floor is comprised of a residents' lobby, commercial office space, accessory parking (for building occupants) and mechanical/electrical/utility space.

There is small penthouse to accommodate utilities and to provide access to a common roof deck.

The building does not have a basement.

The building will have an elevator.

The building will be constructed with a concrete foundation and a concrete slab on grade,

The building structure will be comprised of load-bearing, wood framed interior and exterior walls, with an engineered wood framed floor and roof.

The exterior walls will be clad with cement fiber siding.

Building Area:

First Floor:	2,236 sf
Second Floor:	6,952 sf (ea.)
Third Floor:	6,772 sf (ea.)
Fourth Floor:	6,872 sf
Roof:	499 sf
Total Area:	23,331 sf (does not include garage)

Lot Size: 11,834 sf

Program:

First Floor:

15 Enclosed parking spaces in a heated garage.

Residents' lobby, commercial office space, utility rooms and multi-purpose room.

Second through Fourth Floors - Residences:

4 - Two Bed Room/Two Bath Duplexes with gross areas ranging from 1,181 sf to 1,252 sf.

12 - Two Bed Room Units/Two Bath Flats with gross areas ranging from 1,070 sf to 1,342 sf.

Roof:

There is a 910 sf +/- common deck.

Design and Design Process

Design. The project proposes to demolish a former used car business, known as West Roxbury Motors.

The project scope includes remediation of the site and the transformation this eye-sore into 16-handsome new residences.

The building is sited to enhance the street frontage of both Centre and Willow Streets.

Site vehicular access and egress will be via a new curb cut on Willow Street. Four existing curb cuts (2 on Willow Street and 2 on Centre Street) will be eliminated. The proposed curb cut changes will improve pedestrian safety, allow for additional on-street parking.

The majority of on-site parking will be located within an enclosed garage. On-grade parking will be screened and landscaped to minimize public views of the parking.

The building is sited to complement the pattern of the existing buildings sited on the northerly end of the block. The free-standing West Roxbury Motors building, set far back from the street, will be replaced by a new residential building of contemporary design, sited to reinforce the position of street facing building façades on this block. In fact, the building plan bends in response to the curve of Centre Street.

The façade design and scale reflects the residential nature of the building through the development of window patterns and the materials used to clad the building. The mass of the building is broken down to a human-scale through plane changes, the articulation of bays and through use of architectural elements such as cornices and parapets which will create variations in the way the building meets the sky.

The main building entrances are proposed at the base of the building along Centre Street to enhance pedestrian activity and encourage street life. A generous commercial space fronts directly onto Centre Street, as does the main entrance for building residents. The base of the building is delineated with generous and welcoming storefront openings to further enhance these objectives. The substantial storefront openings activate the base of the building. The location of the main entrance to the building is well defined and the lobby has Willow Street facing windows. The small portion of the Centre Street façade which encloses a portion of the parking structure is designed to complement the commercial façades.

Head houses required to access the roof deck are sloped to minimize visibility. The varied roof line will minimize views of mechanical equipment in addition to creating a visual break at the top of the façade.

Design Process. The design of the proposed building has been shaped by substantial input from neighbors, the Mayor's Office and the BRA. During the preliminary design phase, the project team attended community meetings on June 15 and June 29, 2015 and preliminary design meetings with BRA and representative from the Mayor's Office.

As a result of these meetings the following issues were issues raised and addressed:

Public Realm:

- We were encouraged to design the Centre Street sidewalk in compliance with the City of Boston Complete Streets Guidelines.
    - *The proposed design reflects the City of Boston Complete Streets Guidelines for a Neighborhood Connector Street.*
- The owner was encouraged to take ownership of the City-owned property at the corner of Centre and Willow Streets.
    - *The project team is in the process of obtaining the property from the City of Boston.*

Traffic safety and parking:

- Many of the discussions with neighbors focused on traffic safety and parking issues. As a result of neighborhood and City of Boston Transportation Department Meetings:
    - *A traffic study was commissioned. See attached exhibit C.*

Site Plan and Building Location:

Discussions with the neighborhood and BRA resulted in this proposal for 16-dwelling units, 1-commercial condominium and 29 parking spaces.

The discussions also generated the exploration of several design options before settling on this scheme. The issues discussed and studied included:

- The siting and alignment of the building was studied and refined to reflect the curve of Centre Street
- A program proposed with 18-dwelling units:
    - *Neighbors and the BRA requested fewer units*
        - *The project was revised to the current 16 units*
    - *Neighbors and the BRA requested more commercial storefront*
        - *The first floor plan and program was revised to maximize the opportunity for an active storefront on Centre Street*
- The issues of traffic and parking were discussed;
        - *Howard Stein Hudson was hired to prepare a transportation study*

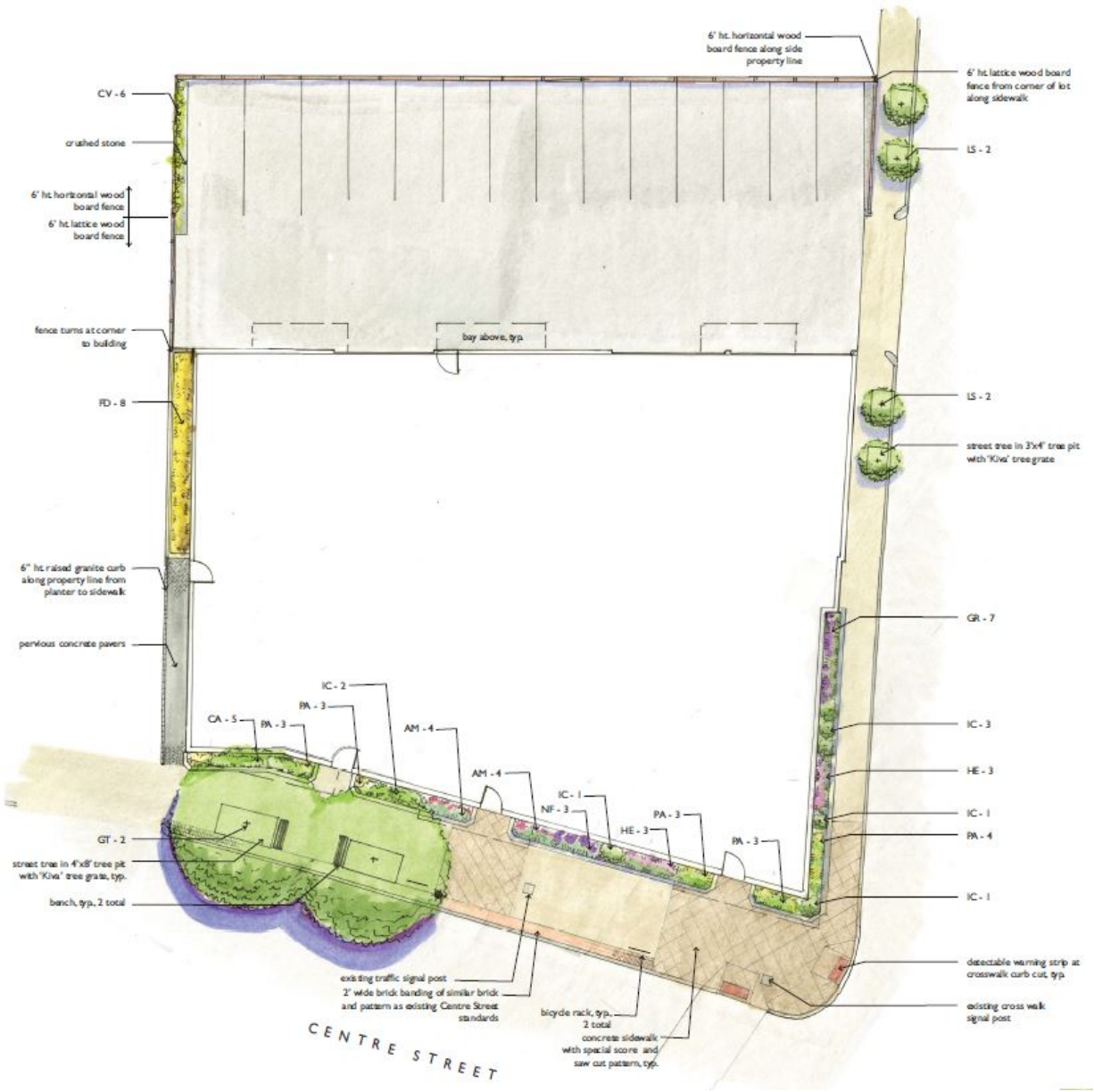
Architecture and Massing:
Discussions with the neighborhood and BRA resulted in this proposal for 16-dwelling units with 29 parking spaces.

Corner view of Centre and Willow Streets

The discussions also generated the exploration of several design options before settling on this scheme. The issues discussed and the options studied included:

- Creating an emphasis on the corner of Centre and Willow Streets
- Creating a masonry base for the building
- Cornices and projecting bays are used to:
    - *Create human-scaled design elements*
- The proposed building materials are:
    - *Masonry veneer on the Centre Street and Willow Street first floor façades, with cementitious clapboard siding, aka Hardi-Siding on the remainder of the façades.*
        - *Complementary material colors will be selected.*
        - *The Hardi-Siding will be installed in varying exposures to help reduce the scale of the building and create a variety of façade details.*

Landscape Design



The landscape plan for the project at 1789 Centre Street is proposed as a durable and beautiful complement to the architecture in the center of the commercial district of West Roxbury. The redevelopment of the lot will include a planting palette of six new street trees and sixty-four new shrubs, perennials, and vines. The proposed plan will enliven and provide comfort for the shopping streetscape by adding some much needed shade to the public sidewalk, where possible. The street trees are proposed to be planted within enlarged sand-based planting medium areas extending below the new concrete paving for ample root zone growth with tree grates to maximize the accessible sidewalk.

Providing proper screening and separation from the neighbors has been carefully considered. Between the parking area and the sidewalk along Willow Street, 6' height lattice fencing will provide screening of the parking while still allowing some visibility and safety to the residents accessing their vehicles. Between the abutters to the north and the project site will be a 6' height wood board fence, which will also screen the parking. Along the property border between the project site and their neighbors on Centre Street, a combination of lattice fence with vines and wood board fence will provide screening of the parking. Along the western edge of the property, the access to the garage will feature pervious concrete pavers with a 6" height granite curb providing protection from vehicles exiting the neighboring property.

The streetscape along Centre Street will continue the design standards established elsewhere for this corridor. A 2' wide brick accent edge along the public sidewalk will be installed where possible. A special saw cut concrete paving pattern will bring a subtle distinction to the main entrances for the residences and commercial space. A bike rack along the Centre Street corridor is also proposed on the plan, which will support multi-modal transit in the area. Framing the entrance to the rear parking, will be four fastigiated sweetgum trees in tree grates and sand-based planting medium area.

Zoning Review

Article 56 West Roxbury Neighborhood District. Zoning District: NS – Neighborhood Shopping Subdistrict per Map 11B.

The project zoning was reviewed and approved by the City of Boston Inspectional Services, Planning and Zoning Division.

Anticipated Permit Requirements

The table below lists the permits and approvals that are anticipated for this project.

Agency	Approval
Boston Redevelopment Authority	Article 80 Small Project Review (SPR)
Inspectional Services	Compliance with MA State Building Code for issuance of building permit
City of Boston Public Improvements Commission	Sidewalk and intersection design

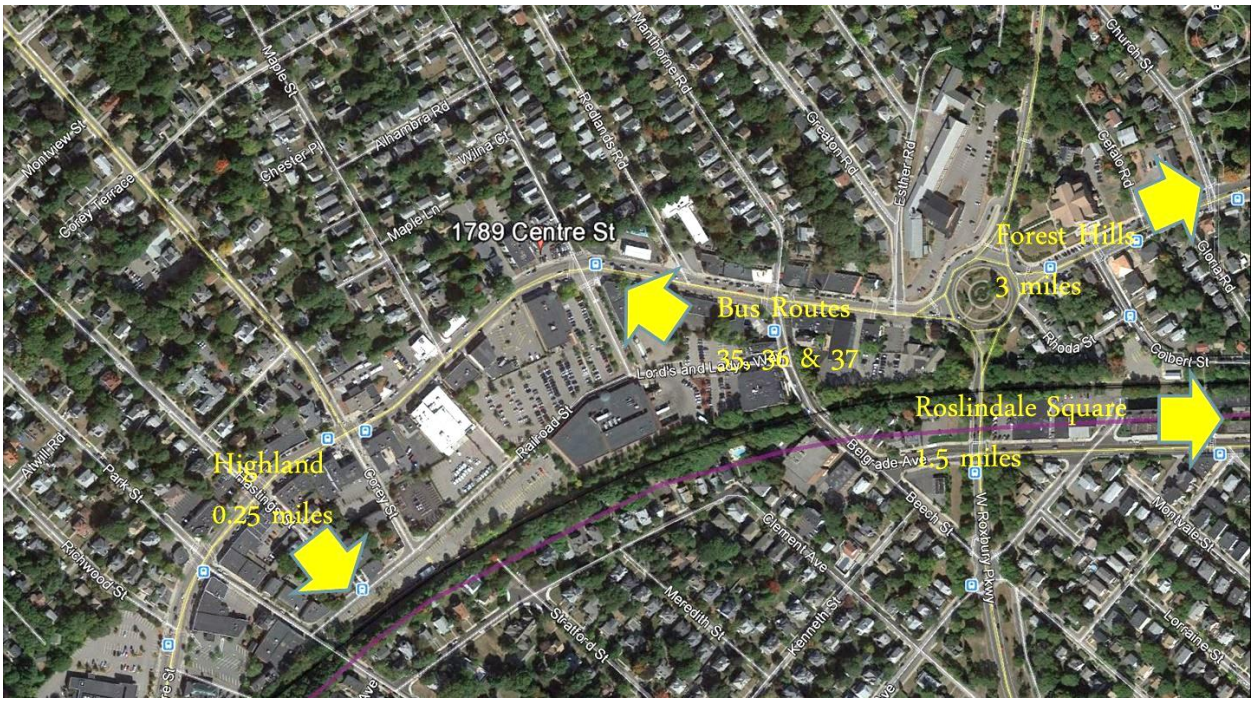
Construction Impact

No negative impact is anticipated on the site or surrounding area. All staging, construction materials, equipment, storage, and most worker/parking can be accommodated on the site. We anticipate obtaining a permit (from the public works department) to install temporary fencing on parts of the public sidewalk.

In addition, there will be numerous police details anticipated as necessary throughout the construction process. The biggest impact will be at the excavation/foundation stage of the job because of limited storage and staging for material and equipment. All efforts will be made to minimize the foundation installation impact on the traffic and pedestrian flows. The same attention to minimize any negative impact to the area will be followed by the project management team for the entire length of construction.

Traffic, Parking and Site Access

This transit-oriented site is located within 0.25 of a mile of Commuter Rail and 3 miles of the Forest Hills T Station on the Orange Line. The no. 35, 36 and 37 bus stops are adjacent to and directly across the street from the site. These bus lines provide riders with access to the Orange Line.



Resident parking is provided on site in excess of the rate required by the City of Boston Zoning Code (1.5 spaces per dwelling unit) at a rate of 1.53 spaces per dwelling unit.

Based on the evaluation presented in the transportation study, the Project at 1789 Centre Street will have minimal impact on the surrounding transportation infrastructure. The Project is expected to generate ten or fewer trips per hour during the peak commuter periods. This is the equivalent of one additional vehicle every six minutes, which is within the range of typical fluctuations in daily and hourly traffic volumes. The surrounding transportation infrastructure has the capacity to accommodate the minimal amount of additional trips expected to be generated by the Project without the need for any additional improvements.

The access to the site was studied in and the Willow Street driveway was determined to be most desirable from a safety and traffic operations perspective.

For a more in-depth analysis of traffic and parking see Exhibit C.

Proposed New Mixed-Use, 16-Dwelling Unit Residential Condominium Building

1789 Centre Street, West Roxbury, MA

rf schmidt
ARCHITECTS

78 Wolcott Road
Chestnut Hill, MA
02467.3109

617.731.7770

Article 80 Small Project Review Submission: October 21, 2015

List of Drawings

CS.1	Cover Sheet
	Site Plan
	Landscaping Plan
A.1	First Floor Plan
A.2	Second Floor Plan
A.3	Third Floor Plan
A.4	Fourth Floor Plan
A.5	Roof Plan
A.6	Exterior Elevations
A.7	Building Section

Project Description:
New four-story Mixed-Use, Residential Condominium Building comprised of 16 dwelling units. The first floor is comprised of a lobby, commercial office space, accessory parking (for building occupants) and mechanical/electrical/utility space. There is small penthouse to accommodate the elevator head override and to provide access to a common roof deck. The building does not have a basement.The building will be constructed with a concrete foundation, load-bearing, wood framed interior and exterior walls, with an engineered wood framed floor and roof for the majority of the residences. The first floor will be constructed with a steel frame and concrete slab on grade and a concrete slab on metal deck at the second floor. The exterior walls will be clad with cement fiber siding. The building will have an elevator.

Building Area:

Roof:	499 sf
Floor 4:	6,872 sf
Floor 3:	6,715 sf
Floor 2:	6,952 sf
First Floor:	2,236 sf
Total Area:	25,331 sf (does not include garage)

BENCHMARKS

REFERENCE BENCHMARK: SMH 148 (FROM BWSC G.I.S. MAPS)
SMH 148 IN FRONT OF 1779 CENTRE STREET AS SHOWN ON BWSC G.I.S. MAPS – RIM=151.02 INVERT=140.90 (BOSTON CITY BASE)

CONSTRUCTION BENCHMARK: CONC TRAFFIC SIGNAL BASE X-CUT SET IN CONCRETE TRAFFIC SIGNAL BASE – ELEVATION= 151.43 (BOSTON CITY BASE)

PLAN NOTES

THE PROPERTY LINE AND TOPOGRAPHIC INFORMATION IS BASED ON AN ACTUAL ON THE GROUND INSTRUMENT SURVEYS PERFORMED BY NORWOOD ENGINEERING COMPANY, INC. BETWEEN MAY OF 2014 AND AUGUST OF 2015.

LOCATION OF UNDERGROUND UTILITIES ARE APPROXIMATE ONLY, AND ARE NOT WARRANTED TO BE CORRECT. UNDERGROUND UTILITIES ARE SHOWN BASED ON RECORD DATA PROVIDED BY THE OPERATING AUTHORITIES, AND HAVE BEEN FIELD INSPECTED WHERE POSSIBLE. ADDITIONAL UTILITIES MAY EXIST WHICH ARE NOT INDICATED ON THESE PLANS. ALL EXISTING UTILITIES SHALL BE VERIFIED FOR SERVICE, SIZE, INVERT ELEVATION, LOCATIONS, ETC. PRIOR TO NEW CONNECTIONS TO OR RELOCATION OF SAME. CONTRACTOR MUST NOTIFY DIG-SAFE AT 1-888-344-7233 AT LEAST 72 HOURS PRIOR TO ANY CONSTRUCTION. NOTIFY THIS FIRM IN WRITING OF ANY AND ALL DISCREPANCIES PRIOR TO COMMENCING ANY WORK. THE BOSTON WATER AND SEWER COMMISSION IS NOT PART OF DIG SAFE THEREFORE, FIELD LOCATIONS OF WATER AND SEWER LINES MUST BE MARKED BY THE COMMISSION. CALL 1-617-330-9400 FORTY EIGHT HOURS IN ADVANCE OF ANY EXCAVATION.

ASSESSOR'S PARCELS 20-6248-000 AND 20-6278-000 ARE TO BE CONSOLIDATED WITH 300 SQUARE FEET OF THE THE STREET LAYOUT AT THE CORNER OF WILLOW STREET AND CENTRE STREET CREATING LOT A WITH AN COMBINED LOT AREA OF 11,834 SQUARE FEET.
SEE ARCHITECTURAL PLANS PREPARED BY R.F. SMITH ARCHITECTS, 78 WOLCOTT ROAD, CHESTNUT HILL, MA 02467-3109. PHONE: 617-731-7770

SEE LAND TITLE SURVEY PREPARED BY H&R SURVEY RECORDED AT THE SUFFOLK COUNTY REGISTRY IN BOOK 20727, PAGE 352.

SEE PLAN PREPARED BY BOSTON SURVEY, INC ENTITLED "CONSOLIDATION PLAN OF LAND IN WEST ROXBURY, MA" DATED DECEMBER 12, 2002.

ZONING CLASSIFICATION:
WEST ROXBURY NEIGHBORHOOD DISTRICT
NEIGHBORHOOD SHOPPING SUBDISTRICT (NS)
ARTICLE 56 – TABLES B, F & I – MAP No. 11B

DIMENSIONAL REQUIREMENTS

	REQUIRED	PROPOSED
USE: 16 RES. & 1 COMM. UNIT (A)	NONE	11,834 sf (B)
MAXIMUM LOT SIZE	2.0	1.971
MAXIMUM FLOOR AREA RATIO	23,688 SF	23,331 SF (C)
MAXIMUM GROSS FLOOR AREA	35 FT	34.71 FT (H)
MAXIMUM BUILDING HEIGHT	N/A	N/A
MIN. LOT AREA/DWELLING UNIT	800 SF (1)	910 SF (D)
MIN. OPEN SPACE/DWELLING UNIT	NONE	100.80 FT
MINIMUM LOT WIDTH	NONE	103.01 FT (E)
MINIMUM LOT FRONTAGE	NONE (2)	0.20 FT
MINIMUM FRONT YARD	NONE	0.54 FT (F)
MINIMUM SIDE YARD (3)	40 FT	40.66 FT/36.83 FT (F)
MINIMUM REAR YARD (4)	26 SPACES	29 SPACES (G)
PARKING SPACES		

ZONING NOTES

A. ALLOWED USE – SEE SECTION 56-45 TABLE 'B' – A MULTI-FAMILY DWELLING IS ALLOWED (ABOVE THE FIRST FLOOR PER FOOTNOTE 7). ALLOWED ACCESSORY USES INCLUDE GENERAL OFFICE SPACE ALONG WITH PARKING AND ACCESSORY SERVICES FOR THE BUILDING RESIDENTS.

B. THE PROPOSED LOT AREA INCLUDES A 300 SQUARE FOOT PORTION OF THE STREET LAYOUT AT THE INTERSECTION OF WILLOW STREET AND CENTRE STREET AS SHOWN ON THIS PLAN.

C. THE PROPOSED GROSS FLOOR AREA (SHEET A.1) IS SHOWN ON THE ATTACHED ARCHITECTURAL PLANS PREPARED BY, RF SCHMIDT, ARCHITECT, LLC.

D. THE PROPOSED 910 SQUARE FOOT OPEN SPACE AREA ON A COMMON ROOF DECK IS SHOWN ON THE ATTACHED ARCHITECTURAL PLANS (SHEET A.5) PREPARED BY, RF SCHMIDT, ARCHITECT, LLC.

E. LOT FRONTAGE IS ON CENTRE STREET. SEE SECTION 56-36.1, STREET WALL CONTINUITY .... SHALL APPLY TO ANY PROPOSED PROJECT, EXCEPT A PROPOSED PROJECT FOR RESIDETIAL USE ... SECTION 56-40.2 TRAFFIC VISIBILITY ACROSS CORNER "WHENEVER A MINIMUM FRONT YARD IS REQUIRED AND THE LOT IS A CORNER LOT ..." (NOT APPLICABLE, THERE IS NO MINIMUM FRONT YARD IN THE NEIGHBORHOOD SHOPPING SUBDISTRICT).

F. MAIN BUILDING/BUILDING PROJECTION SETBACKS
SEE ARTICLE 2A – SIDE YARD/REAR YARD DEFINITIONS – "... NO STRUCTURE SHALL BE ERECTED EXCEPT .... (D) OTHER FIRE ESCAPES, BAYS, BALCONIES, CHIMNEYS AND FLUES NO COMING WITHIN THREE (3) FEET OF ANY SIDE LOT LINE AND NOT EXTENDING INTO THE SIDE YARD MORE THAN ONE-THIRD (1/3) OF THE WIDTH OF SUCH YARD NOR MORE THAN THREE AND ONE-THIRD (3-1/3) FEET IN ANY EVENT...."

G. PARKING REQUIREMENTS FROM TABLE I
RESIDENTIAL PARKING – 1.5 SPACES/DWELLING UNIT – 1.5x16 UNITS = 24 SPACES REQUIRED
OFFICE / RETAIL AREA 950 SF± – 2 SPACES PER 1000 SQUARE FEET – 2 SPACES REQUIRED
REQUIRED PARKING 26 SPACES – PROPOSED 29 SPACES (15 ● 8.5'x20' & 14 ● 7'x18')

H. SEE AVERAGE GRADE AT BUILDING AND BUILDING HEIGHT CALCULATIONS BELOW.

WEST ROXBURY NEIGHBORHOOD DISTRICT – TABLE F – FOOTNOTES
1. IN A NEIGHBORHOOD BUSINESS SUBDISTRICT, ALL OR A PORTION OF REQUIRED USABLE OPEN SPACE MAY BE MET BY SUITABLY DESIGNED AND ACCESSIBLE SPACE ON BALCONIES OF MAIN BUILDINGS OR ON ROOFS OF WINGS OF MAIN BUILDINGS, OR ON THE ROOFS OF ACCESSORY BUILDINGS.
REQUIRED OPEN SPACE IS 50 SF/UNIT (16 UNITS x 50 SF = 800 SF OF OPEN SPACE IS REQUIRED)

2. SEE SECTION 56-36.1, STREET WALL CONTINUITY .... SHALL APPLY TO ANY PROPOSED PROJECT, EXCEPT A PROPOSED PROJECT FOR RESIDETIAL USE ...

3. IN A NEIGHBORHOOD BUSINESS SUBDISTRICT, NO SIDE YARD IS REQUIRED EXCEPT IN THE CASE OF A LOT WITH A SIDE LOT LINE ABUTTING A RESIDENTIAL SUBDISTRICT, WHICH SHALL HAVE SIDE YARDS AS IF IT WERE IN SUCH ABUTTING DISTRICT ... (SEE FOOTNOTE 6. EVERY SIDE YARD SO REQUIRED THAT DOES NOT ABUT A STREET LINE SHALL, ALONG EVERY LOT LINE ON WHICH SUCH YARD ABUTS, BE AT A LEVEL NO HIGHER THAN THAT OF THE LOWEST WINDOW SILL OF THE LOWEST ROOM DESIGNED FOR HUMAN OCCUPANCY OR SO OCCUPIED, AND RELYING UPON NATURAL LIGHT OR NATURAL VENTILATION FROM WINDOWS OPENING ON SUCH YARD.

4. IN A NEIGHBORHOOD BUSINESS SUBDISTRICT, EVERY REAR YARD REQUIRED BY THIS CODE THAT DOES NOT ABUT A STREET LINE SHALL, ALONG EVERY LOT LINE ON WHICH SUCH YARD ABUTS, BE AT A LEVEL NO HIGHER THAN THE LEVEL OF THE LOWEST WINDOW SILL IN THE LOWEST ROOM DESIGNED FOR HUMAN OCCUPANCY OR SO OCCUPIED, AND RELYING UPON NATURAL LIGHT OR NATURAL VENTILATION FROM WINDOWS OPENING ON SUCH YARD. (SEE ARTICLE 2A SIDE YARD (REAR YARD) PROJECTIONS DEFINTION ABOVE)

DESIGN REVIEW AND DESIGN GUIDELINES
I. ARTICLE 80-E2.1(b)(i) – SMALL PROJECT REVIEW – REQUIRED FOR PROPOSED PROJECTS WITH OVER 20,000 SF AND LESS THAN 50,000 SF

II. ARTICLE 80-E2.1(b)(ii) – SMALL PROJECT REVIEW – REQUIRED FOR PROPOSED PROJECTS WITH 15 NEW DWELLING UNITS OR MORE

III. SECTION 56-35.2(c) – PARKING SCREENING – THE PROJECT WAS REVIEWED WITH THE BRA AND WILL BE ADEQUATELY SCREENED WITH PLANTINGS AND FENCING. A LANDSCAPING PLAN WILL BE PREARED INCORPORATING 'BRA' COMMENTS AND WILL BE SUBMITTED WITH THE FORMAL ARTICLE 80E SMALL PROJECT REVIEW.

IV. SECTION 56-35.2 (h) CONTEMPORARY DESIGN – THE LOCATION AND CONTEMPORARY DESIGN OF THE BUILDING, INCLUDING THE DESIGN AND LOCATION OF BAYS AND BUILDING ENTRANCES REDUCE THE BULK OF THE BUILDING WILL BE REVIEWED BY THE 'BRA' WHO WILL PROVIDE FINAL DESIGN COMMENTS AS PART OF THE FINAL DESIGN REVIEW.

AVERAGE GRADE AT PERIMETER OF BUILDING

	GRADE	LENGTH (FT)	PRODUCT
CENTRE	154.25	8.63	1331.18
STREET	151.75	5.17	784.55
	154.25	32.26	4976.11
	151.25	5.17	781.96
	154.25	19.17	2956.97
	151.10	5.17	781.19
	154.25	20.41	3184.24
WILLOW	152.12	38.34	5832.28
STREET	154.25	44.52	6867.21
TOTAL	____	178.84	27495.69

PRODUCT / PERIMETER = AVERAGE GRADE
27,495.69 / 178.84 = 153.74
AVERAGE GRADE ELEVATION = 153.74±

AVEARGE GRADE AT BUILDING ALONG STREETS = 153.74
AVERAGE GRADE AT PERIMETER OF BUILDING = 153.26
AVERAGE GRADE AT WILLOW STREET LINE = 151.1±
AVERAGE GRADE AT CENTRE STREET LINE = 151.1±
DIFFERENCE 153.74 -151.1 = 2.64 FT < 5.00 FT

*ARTICLE 2A GRADE DEFINITION .....
"THE AVERAGE ELEVATION AT THE STREET CAN BE NO MORE THAN FIVE FEET BELOW AVERAGE ELEVATION OF GROUND IMMEDIATELY CONTIGUOUS TO THE BUILDING"

ROOF BEAM ELEVATION (+8.94)*	187.92
4TH FLOOR ELEVATION (+8.94)*	178.98
3RD FLOOR ELEVATION (+8.94)*	170.04
2ND FLOOR ELEVATION (+9.85)*	161.10
AVG GRADE AT BLDG (ALONG STREETS)	153.74
AVG GRADE AT BLDG (PERIMETER)	153.26
1ST FLOOR ELEVATION (COMM. UNIT)	151.25*

* INFORMATION FROM ARCHITECTURAL PLANS

MAXIMUM BUILDING HEIGHT ALLOWED IS 35 FEET
ROOF ELEVATION – AVERAGE GRADE = BUILDING HEIGHT
187.92 FEET – 153.74 FEET = 34.18 FEET

PROPOSED BUILDING HEIGHT = 34.18 FEET < 35 FEET

LEGEND

- DRAIN MANHOLE (DMH)
- CATCH BASIN (CB)
- SEWER MANHOLE (SMH)
- ELECTRIC MANHOLE (EMH)
- TELEPHONE MANHOLE (TMH)
- GAS GATE (GG)
- GAS SERVICE (GS)
- WATER GATE (WG)
- WATER SERVICE (WS)
- HYDRANT (HYD)
- SPLASH BLOCK
- LIGHT POLE (LP)
- UTILITY POLE (UP)
- UP w/LIGHT (UPLP)
- HAND HOLE (HH)
- GC GRANITE CURB (GC)
- BB BIT. CONC. BERM (BB)
- CC CONCRETE CURB (CC)
- EP EDGE OF PAVEMENT (EP)
- SIGN

REVISIONS

09-21-2015	SITE GRADING AND BUILDING HEIGHT CALCULATIONS
10-01-2015	REVISED BUILDING HEIGHT CALCULATIONS PER ISD

DEED REFERENCE:
SUFFOLK COUNTY REGISTRY
BOOK 54396 – PAGE 55
BOOK 39781 – PAGE 155
BOOK 39781 – PAGE 157

ASSESSOR'S REFERENCE:
PARCEL 20-06248-000
PARCEL 20-06278-000
MAP No. 20062

PLAN REFERENCE:
SUFFOLK COUNTY REGISTRY
BOOK 20727 – PAGE 352
BOOK 7668 – PAGE 40
BOOK 6601 – PAGE 576
BOOK 6181 – PAGE 300
BOOK 5757 – PAGE 257

NORFOLK COUNTY REGISTRY
BOOK 206 – PAGE END

PLAN REFERENCE:
MASSACHUSETTS LAND COURT
LC PLAN No. 3628

CITY STREET LAYOUTS:
CENTRE STREET L-5265
CENTRE STREET L-5266
CENTRE STREET L-5267
ALHAMBRA ROAD L-6425
WILLOW STREET SS-376

CITY FIELD NOTES:
BOOK 128 PAGE 2
BOOK 877 PAGE 10
BOOK 1253 PAGE 104
BOOK 1360 PAGE 36

BWSC UTILITY PLANS:
WATER & SEWER G.I.S. MAPS
BWSC PLAN No. A55-37
BWSC PLAN No. A55-62

OWNER:
ALLSTON STREET GROUP, LLC
189 WELLS AVENUE
NEWTON CENTRE, MA 02459

CONTACT:
GARY MARTELL
15 BROWNSON TERRACE
JAMAICA PLAIN, MA 02130
PHONE: 617-877-4127

MATTHEW D. SMITH CIVIL No. 39908 REGISTERED PROFESSIONAL ENGINEER

MATTHEW D. SMITH LAND SURVEYOR No. 39884 REGISTERED PROFESSIONAL LAND SURVEYOR

BUILDING PERMIT PLAN
1789 CENTRE STREET
BOSTON, MASS.
(WEST ROXBURY – 02132-1941)

SCALE: 1"=10' SEPTEMBER 3, 2015

NORWOOD ENGINEERING CO., INC.
CIVIL ENGINEERS & LAND SURVEYORS
1410 ROUTE ONE, NORWOOD, MA 02062
PHONE: 781-762-0143 FAX 781-762-8595

METERS 0 2.5 5 10
FEET 0 5 10 20 30

SHEET No. 1 OF 1 8291-14

8291-14-BPP IV.DWG

PROPOSED PLANT LIST

KEY	QTY	LATIN NAME	COMMON NAME	SIZE	NOTES
TREES					
GT	2	Gledeitsia triacanthos var. inermis	Common Thornless Honeylocust	2.5"-3" cal.	B&B
LS	4	Lirodendron stryraciflua 'Slender Silhouette'	Slender Silhouette Sweetgum	2.5"-3" cal.	B&B
SHRUBS/GRASSES/VINES					
CA	5	Calamagrostis × acutiflora 'Karl Foerster'	Feather Reed Grass	#2 Pot	
CV	6	Clematis virginiana	Virgin Bower's Vine	#2 Pot	
FD	8	Fargesia sp. Dracocephala'	Dragon's Head Clumping Bamboo	#2 Pot	
IC	8	Ilex crenata 'Dwarf Pagoda'	Dwarf Japanese Holly	#3 Pot	
PA	13	Penniseum alopecuroides 'Little Bunny'	Dwarf Fountain Grass	#1 Pot	
PERENNIALS					
AM	8	Achillea millefolium 'Apple Blossom'	Yarrow	2 gal.	Pots
GR	7	Geranium rozanne	Cranesbill	2 gal.	Pots
HE	3	Heuchera 'Encore'	Coralbells	2 gal.	Pots
NF	6	Nepeta faassenii	Catmint	2 gal.	Pots

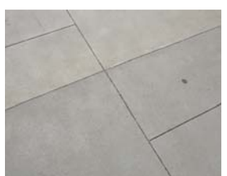
PLANTING NOTES

1. All plant material shall be approved by the Landscape Architect prior to arrival on the site.
2. All plant material shall conform to the guidelines established by "The American Standard for Nursery Stock", published by the American Association of Nurserymen, Inc.
3. No substitution of plant species will be allowed without the approval of the Landscape Architect.
4. The Contractor shall locate and verify all utility line locations prior to staking and report any conflicts to the Landscape Architect.
5. All plants shall be staked out in their approximate location by the Contractor. The Contractor shall adjust the locations of these stakes as required by the Landscape Architect to account for subsurface utilities, other field conditions and to achieve design intent. Final locations must be approved by the Landscape Architect prior to planting.
6. No planting shall be installed before acceptance of rough grading of topsoil.
7. The rootballs of trees shall be planted 3" above adjacent finished grade. Excavate holes no deeper than the rootball of trees. Holes shall be at least 3' greater in diameter than root ball. Backfill planting hole with 'planting mix'. All plants which settle out of plumb or below finished grade shall be immediately replanted.
8. The rootballs of shrubs shall be planted 2" above adjacent finished grade. Excavate holes no deeper than the rootball of shrubs.
9. All shrubs, groundcovers and perennials shall be planted in continuous planting beds. All beds shall be excavated 12" and the topsoil and subsoil set aside for reuse. Remove all stone and debris from excavated soil. Backfill beds with 12" of 'planting mix' before planting shrubs, perennials and groundcovers.
10. 'Planting Mix' shall consist of 2 parts of topsoil saved from site excavations and 1 part compost. Thoroughly mix to create uniform blended mixture. If insufficient topsoil is available on the site, mix existing soil in a ratio of 1 part soil to 1 part compost. Remove all stones and debris larger than 2" from planting mix.
11. All beds as shown on the drawings shall be edged with a 4" trench neatly cut and backfilled with bark mulch. All beds shall be covered with no less than 2"depth settled bark mulch and no greater than 3" depth bark mulch.
12. All plants are to be thoroughly watered after installation, at least twice within the first 24 hours.


Pervious Pavers


Horizontal Wood Board Fence


Victor Stanley 'Eva' Bench - 4 Ft. Length


Concrete with Special Saw Cut Pattern


Wood Lattice Fence with Vines


Street Tree with 'Kiva' Tree Grate


Victor Stanley 'Freesia' Bicycle Rack

Blair Hines Design Associates
LANDSCAPE ARCHITECTS

1789 Centre Street | West Roxbury, MA

Illustrative Landscape Plan

SCALE: 1/8"=1'-0"
0 2' 4' 8' 20'

September 25, 2015

1 Notes

PARKING CALCS:
56-TABLE - I

26 TOTAL REQUIRED

29 PROPOSED

1.5 SPACES per D.U.= 24
2.0/1,000 SF OFFICE/RETAIL= 2

PROGRAM:
Roof = 499 sf
4th fl=6,872 sf
3rd fl=6,772 sf
2nd fl=6,952 sf

Total: 17 Units
16 Residential units
(12 - 2BR flats + 4 2BR duplexes)
1 Commercial

1st Floor = 2,236 sf

2 Total Area = 23,331 sf

SITE:
LOT SIZE: 11,834sf

FAR=2.0/23,668 sf ALLOWED
FAR=1.97 PROPOSED

SEE SITE PLAN FOR GRADING INFORMATION

rf schmidt
ARCHITECT, LLC
78 Wolcott Road
Chestnut Hill, MA
02467.3109
617.731.7770

3 Project North

Seal

REGISTERED ARCHITECT RICHARD F. SCHMIDT JR. No. 7447 COMMONWEALTH OF MASSACHUSETTS

NEW MIXED-USE BUILDING:

1789 CENTRE STREET
WEST ROXBURY, MA

4

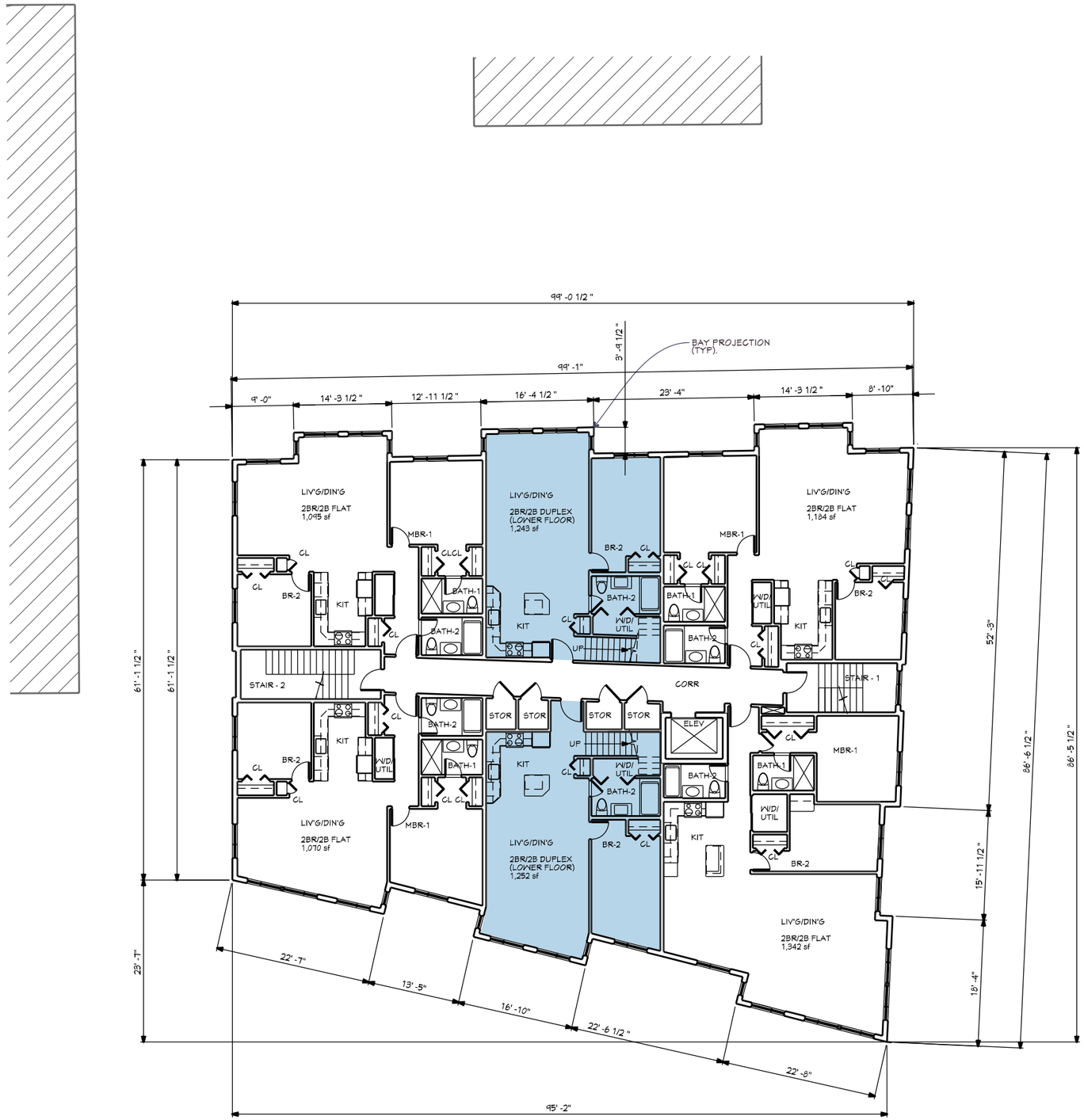
Scale	Commission No.
0 4 8 16	1405
Date	**Issue**
3 Sep 15	Zoning Submission
21 Oct 15	Art. 80 Small Project Review

Title

First Floor Plan

A.1

FIELD VERIFY ALL DIMENSIONS. DRAWINGS ARE NOT TO BE SCALED. CONTACT ARCHITECT FOR INTERPRETATION OF DIMENSIONS.



1 Notes

PARKING CALCS:
56-TABLE - 1

26 TOTAL REQUIRED

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FAR=1.97 PROPOSED

rf schmidt
ARCHITECT, LLC
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Chestnut Hill, MA
02467.3109
617.731.7770

3 Project North

Seal

REGISTERED ARCHITECT
RICHARD F. SCHMIDT JR.
No. 7447
BOSTON
MA
COMMONWEALTH OF MASSACHUSETTS

NEW MIXED-USE BUILDING:

1789 CENTRE STREET
WEST ROXBURY, MA

4

Scale
0 4 8 16

Commission No.
1405

Date
3 Sep 15
21 Oct 15

Issue
Zoning Submission
Art. 80 Small Project Review

Title

Second Floor Plan

A.2

FIELD VERIFY ALL DIMENSIONS. DRAWINGS ARE NOT TO BE SCALED. CONTACT ARCHITECT FOR INTERPRETATION OF DIMENSIONS.

PARKING CALCS:
56-TABLE - 1

29 TOTAL REQUIRED

29 PROPOSED

1.5 SPACES per D.U.=27
2.0/1,000 SF OFFICE/RETAIL=2

PROGRAM:
Roof = 571 sf
2nd-4th Floors = 7,075 sf
2 - 1BR/1B
4 - 2BR/2B

Total: 19 Units
18 Residential units
(12 - 2BR + 6 - 1BR)
1 Commercial

1st Floor = 1,691 sf

Total Area = 23,487 sf

SITE:
LOT SIZE: 11,534sf + 375sf=11,909sf

FAR=2.0/23,818 sf ALLOWED
FAR=1.97 PROPOSED

rf schmidt
ARCHITECT, LLC
78 Wolcott Road
Chestnut Hill, MA
02467.3109
617.731.7770

Project North

Seal

REGISTERED ARCHITECT
RICHARD F. SCHMIDT JR.
No. 7447
BOSTON
MA
COMMONWEALTH OF MASSACHUSETTS

NEW MIXED-USE BUILDING:

1789 CENTRE STREET
WEST ROXBURY, MA

Scale

Commission No.

0 4 8 16

1405

Date

Issue

3 Sep 15 — Zoning Submission
21 Oct 15 — Art. 80 Small Project Review

Title

Third Floor Plan

A.3

FIELD VERIFY ALL DIMENSIONS. DRAWINGS ARE NOT TO BE SCALED. CONTACT ARCHITECT FOR INTERPRETATION OF DIMENSIONS.

Notes

PARKING CALCS:
56-TABLE - I

29 TOTAL REQUIRED

29 PROPOSED

1.5 SPACES per D.U.=27
2.0/1,000 SF OFFICE/RETAIL=2

PROGRAM:
Roof = 571 sf
2nd-4th Floors = 7,075 sf
2 - 1BR/1B
4 - 2BR/2B

Total: 19 Units
18 Residential units
(12 - 2BR + 6 - 1BR)
1 Commercial

1st Floor = 1,691 sf

Total Area = 23,487 sf

SITE:
LOT SIZE: 11,534sf + 375sf=11,909sf

FAR=2.0/23,818 sf ALLOWED
FAR=1.97 PROPOSED

rf schmidt
ARCHITECT, LLC
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Chestnut Hill, MA
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Project North

Seal

REGISTERED ARCHITECT
RICHARD F. SCHMIDT, JR.
No. 7447
BOSTON MA
COMMONWEALTH OF MASSACHUSETTS

NEW MIXED-USE BUILDING:

1789 CENTRE STREET
WEST ROXBURY, MA

Scale
Commission No.
0 4 8 16
1405

Date
Issue

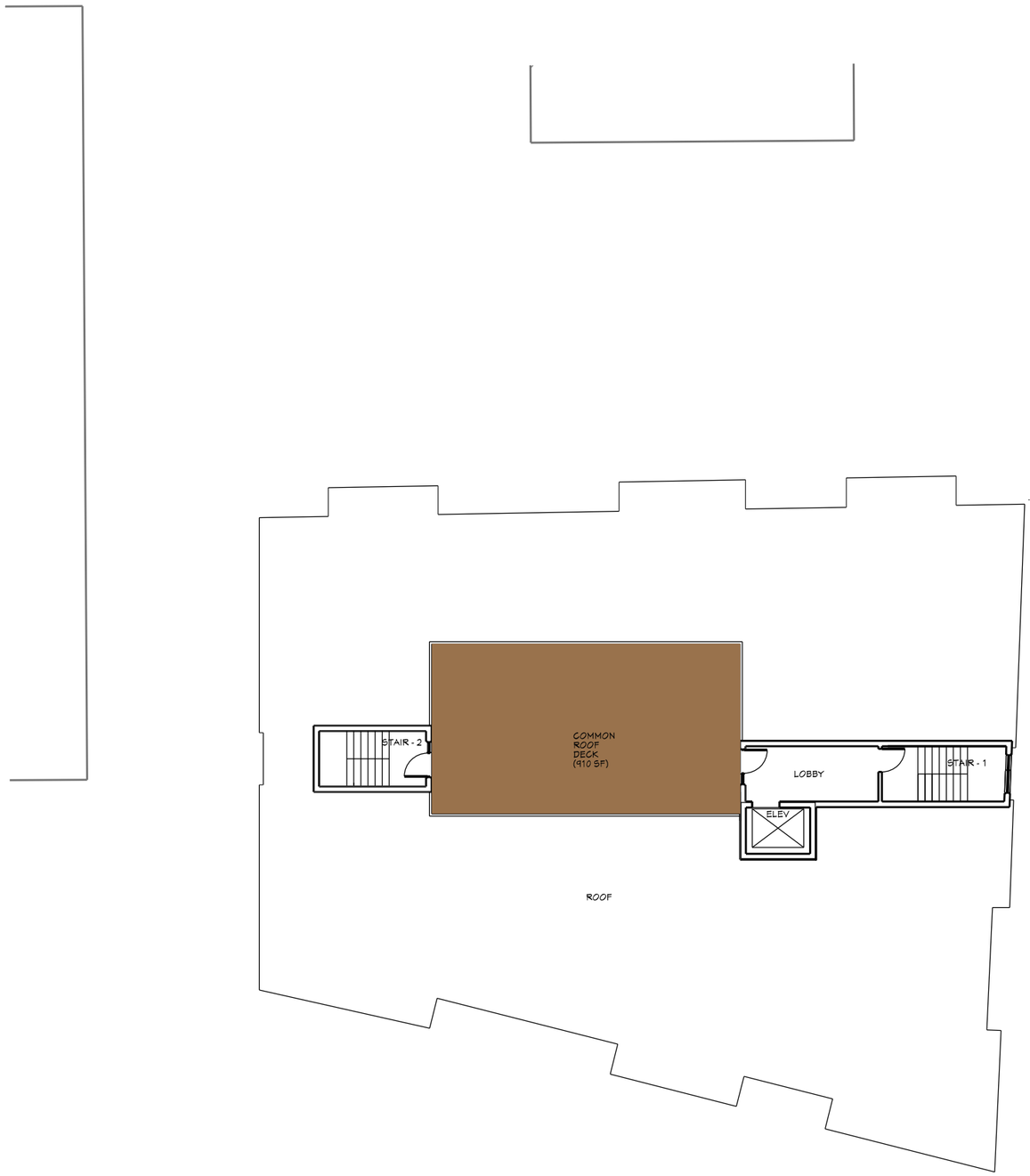
3 Sep 15 — Zoning Submission
21 Oct 15 — Art. 80 Small Project Review

Title

Fouth Floor Plan

A.4

FIELD VERIFY ALL DIMENSIONS. DRAWINGS ARE NOT TO BE SCALED. CONTACT ARCHITECT FOR INTERPRETATION OF DIMENSIONS.



Notes

PARKING CALCS:
56-TABLE - 1

29 TOTAL REQUIRED

29 PROPOSED

1.5 SPACES per D.U.=27
2.0/1,000 SF OFFICE/RETAIL=2

PROGRAM:
Roof = 571 sf
2nd-4th Floors = 7,075 sf
2 - 1BR/1B
4 - 2BR/2B

Total: 19 Units
18 Residential units
(12 - 2BR + 6 - 1BR)
1 Commercial

1st Floor = 1,691 sf

Total Area = 23,487 sf

SITE:
LOT SIZE: 11,534sf + 375sf=11,909sf

FAR=2.0/23,818 sf ALLOWED
FAR=1.97 PROPOSED

rf schmidt
ARCHITECT, LLC
78 Wolcott Road
Chestnut Hill, MA
02467.3109
617.731.7770

Project North

Seal

REGISTERED ARCHITECT
RICHARD F. SCHMIDT JR.
No. 7447
BOSTON
MA
COMMONWEALTH OF MASSACHUSETTS

NEW MIXED-USE BUILDING:

1789 CENTRE STREET
WEST ROXBURY, MA

Scale

0 4 8 16

Commission No.

1405

Date

3 Sep 15

21 Oct 15

Issue

Zoning Submission

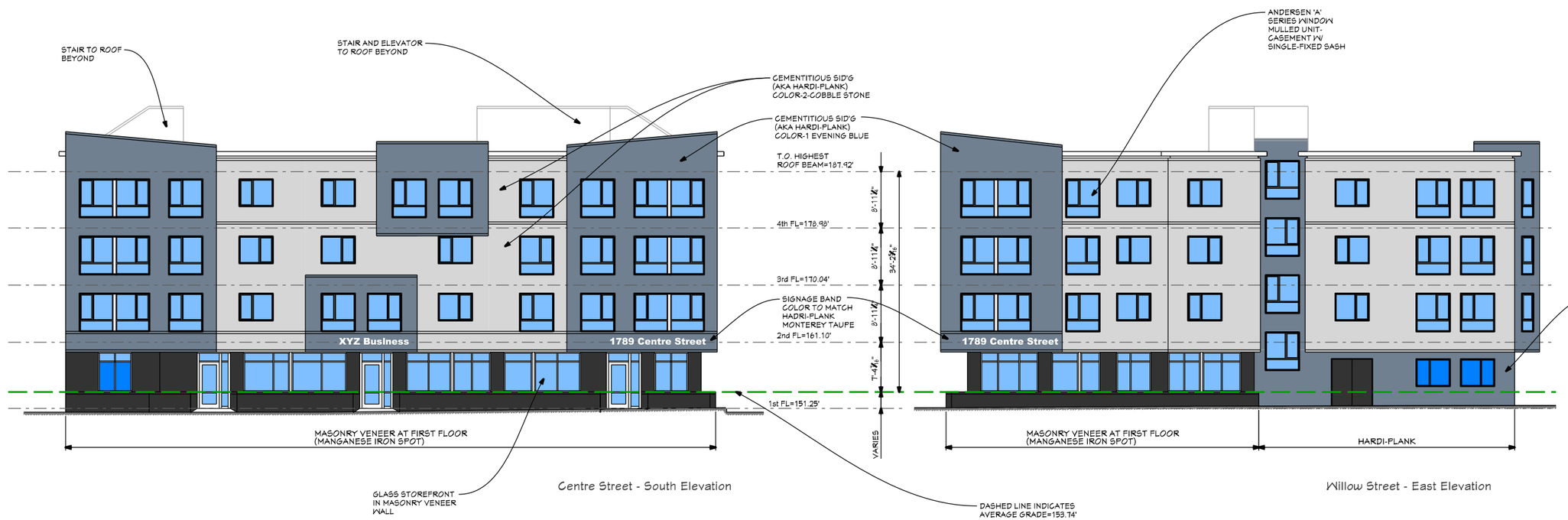
Art. 80 Small Project Review

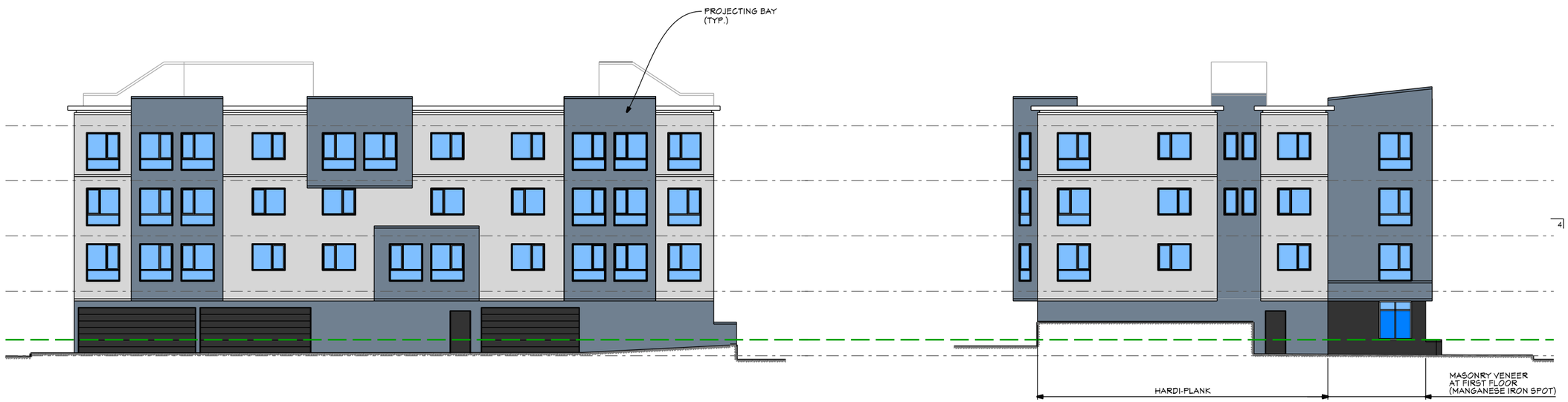
Title

Roof Plan

A.5

FIELD VERIFY ALL DIMENSIONS. DRAWINGS ARE NOT TO BE SCALED. CONTACT ARCHITECT FOR INTERPRETATION OF DIMENSIONS.





Notes

SEE A.7 FOR BUILDING HEIGHT

rf schmidt
ARCHITECT, LLC
78 Wolcott Road
Chestnut Hill, MA
02467.3109
617.731.7770

Seal

REGISTERED ARCHITECT RICHARD F. SCHMIDT JR. No. 7447 BOSTON MA COMMONWEALTH OF MASSACHUSETTS

NEW MIXED-USE BUILDING:

1789 CENTRE STREET
WEST ROXBURY, MA

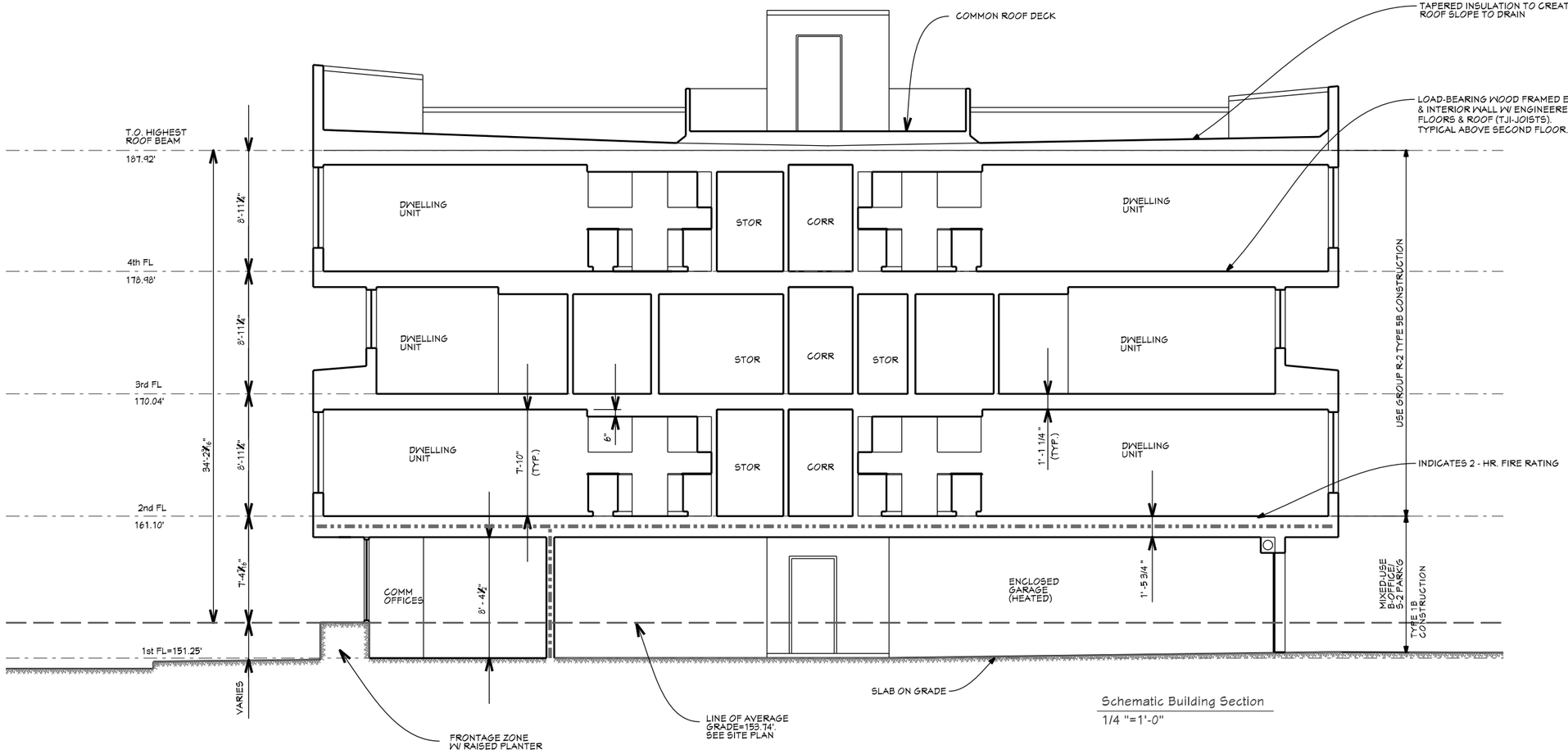
Scale	Commission No.
0 4 8 16	1405
Date	**Issue**
3 Sep 15	Zoning Submission
21 Oct 15	Art. 80 Small Project Review

Title

Exterior Elevations

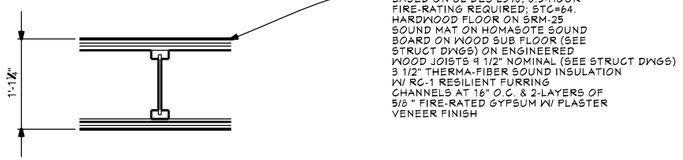
A.6

FIELD VERIFY ALL DIMENSIONS. DRAWINGS ARE NOT TO BE SCALED. CONTACT ARCHITECT FOR INTERPRETATION OF DIMENSIONS.



Schematic Building Section

1/4 "=1'-0"



Schematic Floor Detail (3rd & 4th Floors)

N.T.S.

FIELD VERIFY ALL DIMENSIONS. DRAWINGS ARE NOT TO BE SCALED. CONTACT ARCHITECT FOR INTERPRETATION OF DIMENSIONS.

Notes

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ARCHITECT, LLC
78 Wolcott Road
Chestnut Hill, MA
02467-3109
617.731.7770

Seal

REGISTERED ARCHITECT RICHARD F. SCHMIDT JR. No. 7487 COMMONWEALTH OF MASSACHUSETTS

NEW MIXED-USE BUILDING:

1789 CENTRE STREET
WEST ROXBURY, MA

Scale

0 2 4 8

Commission No.

1405

Date

3 Sep 15
21 Oct 15

Issue

Zoning Submission
Art. 80 Small Project Review

Title

Schematic Building Section

A.7

To:	Mr. Gary Martell	DATE:	July 23, 2015
FROM:	Michael A. Santos, P.E., PTOE Michael Littman	HSH PROJECT NO.:	2015089.00
SUBJECT:	1789 Centre Street Transportation Evaluation		

Introduction

Howard Stein Hudson (HSH) has conducted an evaluation of the transportation impacts of the redevelopment of 1789 Centre Street (the "Project") in West Roxbury, Massachusetts. The site currently contains the former West Roxbury Motors and will be redeveloped to include a total of 18 residential condominium units and one commercial space. The commercial space will be approximately 1,000 square feet (sf). The Project site is well situated to take advantage of numerous public transportation opportunities and car sharing services. The Massachusetts Bay Transportation Authority (MBTA) operates three bus lines that travel past the site (bus routes 35, 36, and 37), providing access to Roslindale Village and Forest Hills Station in Jamaica Plain. Highland Station and Bellevue Station are also within walking distance of the Project site and serve the MBTA's commuter rail Needham Line, providing convenient access into South Station and downtown Boston.

This study includes an evaluation of existing conditions and future conditions with and without the Project. Based on the results of the evaluation summarized in this memorandum, the Project is expected to have negligible impact on the surrounding transportation infrastructure.

Project Description

The Project site is located at 1789 Centre Street in Boston's West Roxbury neighborhood. The site is bounded by Centre Street to the south, Willow Street to the east, and residential properties to the north and west. The Project site currently contains the former West Roxbury Motors and has two curb cuts along Centre Street and one curb cut along Willow Street.

The Project includes the demolition of the existing building and the construction of a new building containing 18 residential condominium units and approximately 1,000 sf of ground floor commercial space that will front Centre Street. A total of 29 parking spaces will be provided on the site (27 to serve the residential uses and two to serve the commercial space).

Vehicular access/egress will be provided by way of a driveway that will intersect Willow Street, in the approximate location of the existing curb cut. The existing curb cuts along Centre Street will be closed as part of the Project.

Study Area

The study area selected for the Project includes the intersection of Centre Street/Willow Street and a qualitative analysis of the surrounding roadway network including Centre Street, Willow Street, Maple Street, and Alhambra Road.

Study Methodology

This transportation study and supporting analyses were conducted in accordance with BTD guidelines and is described below.

The existing conditions analysis includes an inventory of the existing (2015) transportation conditions such as roadway capacities, traffic characteristics, parking and curb usage, transit, pedestrian circulation, bicycle facilities, and Site conditions. Existing vehicle, bicycle, and pedestrian counts were collected in June 2015. The traffic counts form the basis for the transportation analysis conducted as part of this evaluation.

The future transportation conditions analysis evaluates potential transportation impacts associated with the Project. Long-term impacts are evaluated for the year 2020, based on a five-year horizon from the existing year (2015). Expected roadway, parking, transit, pedestrian, bicycle accommodation, and loading capacities and deficiencies, if any, are identified. This section includes the following scenarios:

- The 2020 No-Build conditions scenario includes both general background traffic growth and traffic growth associated with specific developments that are planned in the vicinity of the Site. Transportation infrastructure improvements in the study area are identified and incorporated into the 2020 No-Build conditions.
- The 2020 Build conditions scenario includes Project-generated traffic volume estimates added to the traffic volumes developed as part of the 2020 No-Build conditions scenario.

The final part of the transportation study identifies measures to mitigate Project-related impacts and to address any traffic, pedestrian, bicycle, transit, safety, or construction related issues that are necessary to accommodate the Project.

An evaluation of short-term traffic impacts associated with construction activities is also provided.

Existing Conditions

Existing Roadway Conditions

The study area roadways are described below. The descriptions reflect functional classifications by the Massachusetts Department of Transportation (MassDOT) Highway Division's Office of Transportation Planning.

Centre Street is a two-way, four lane roadway located adjacent to the south side of the Project site. Centre Street is classified as an urban minor arterial roadway under BTD jurisdiction that runs in an east-west direction in the immediate vicinity of the site and more generally in a north-south direction between Jackson Square in Jamaica Plain to the north and the Dedham Town Line to the south. On-street parking is prohibited on both sides of the roadway adjacent to the site; however, parking is provided along Centre Street to the east and west of the Project. Sidewalks are provided along both sides of the roadway.

Willow Street is a one-way southbound, one lane roadway located adjacent to the east of the Project site. Willow Street is classified as a local roadway under BTD jurisdiction and runs in a predominately north-south direction between Farmington Road near the VFW Parkway to the north and the Roche Brothers parking lot to the south. In the vicinity of the Project, unrestricted on-street parking is provided on the east side of the roadway and sidewalks are provided on both sides of the roadway.

Existing Intersection Conditions

The existing conditions at the study area intersection are described below.

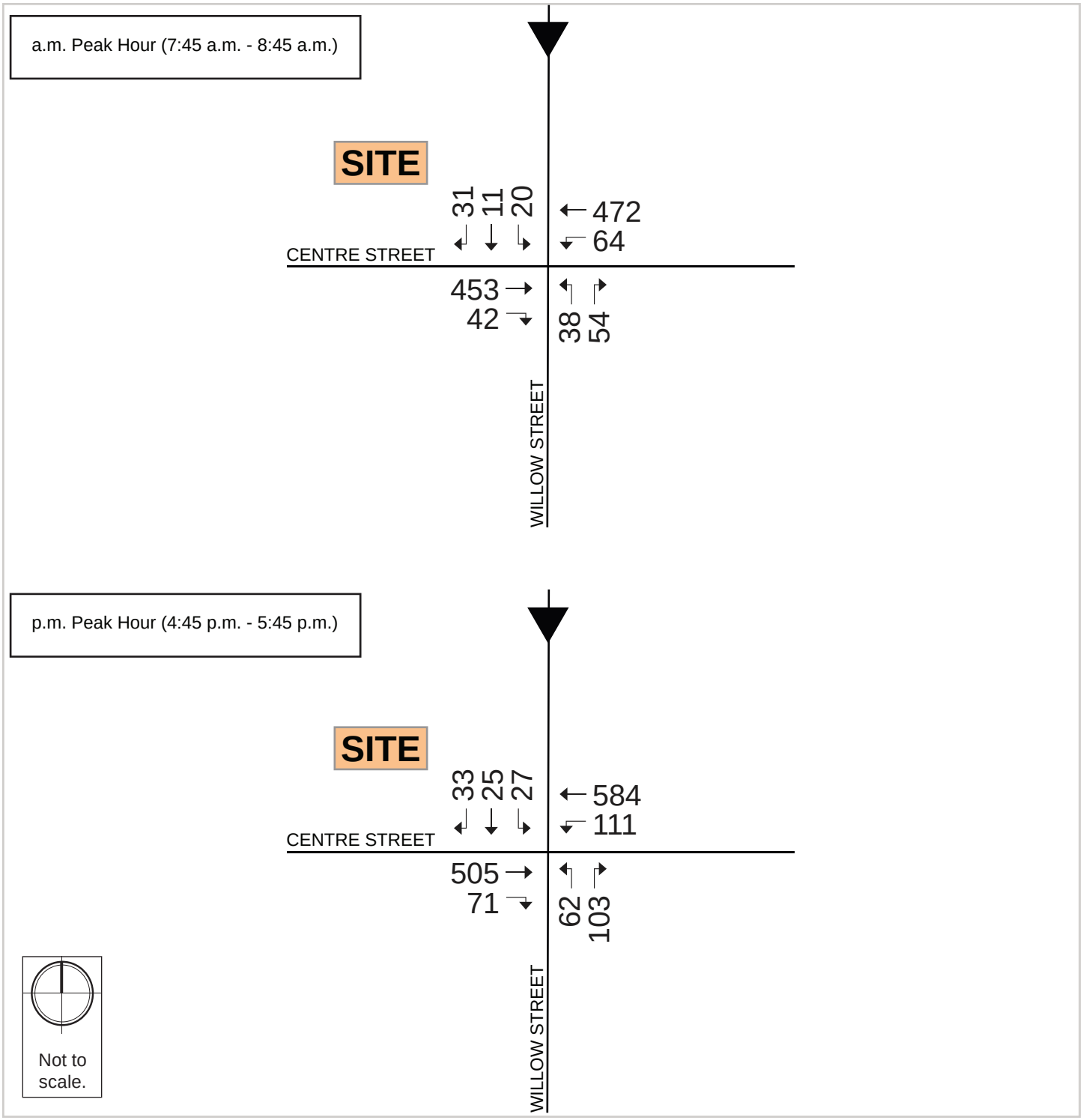
Centre Street/Willow Street is a four legged, signalized intersection with four approaches. The Centre Street eastbound approach consists of two through travel lanes and an exclusive right-turn lane. The Centre Street westbound approach consists of an exclusive left-turn lane and two through travel lanes. The Willow Street northbound approach consists of two lanes, a left-turn only lane, and a right-turn only lane, with on-street parking and serves as the driveway to the Roche Brothers commercial plaza. The Willow Street southbound approach is one-way and consists of a single shared left-turn/thru/right-turn lane, with on-street parking provided along the east side of the roadway.

Concrete sidewalks and provided along both sides of all approaches. Crosswalks with handicap accessible ramps and count-down pedestrians signal indications are provided across all approaches to the intersection.

Existing Traffic Conditions

Traffic movement data was collected the study area intersection on Tuesday June 30, 2015. Manual turning movement counts (TMCs) and vehicle classification counts were conducted during the weekday a.m. and p.m. peak periods (7:00-9:00 a.m. and 4:00-6:00 p.m., respectively) for the study area intersection. The vehicle classification counts included car, truck, pedestrian, and bicycle movements and are presented in **Figure 1**. Based on the TMCs, the peak hours of vehicular traffic throughout the study area are 7:45-8:45 a.m. and 4:45-5:45 p.m. The detailed traffic counts are provided in the **Appendix**.

Figure 1. ***Existing (2015) Condition Turning Movement Counts***



Existing Traffic Operations

The criterion for evaluating traffic operations is level of service (LOS), which is determined by assessing average delay experienced by vehicles at intersections and along intersection approaches. Trafficware's Synchro (version 9) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2000 Highway Capacity Manual (HCM).

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. **Table 1** displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered desirable during the peak hours of traffic in urban and suburban settings.

Table 1. | Intersection Level of Service Criteria

Level of Service	Average Stopped Delay (seconds/vehicle)	
	Signalized Intersection	Unsignalized intersection
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Source: 2000 Highway Capacity Manual, Transportation Research Board

In addition to delay and LOS, the operational capacity and vehicular queues are calculated and used to further quantify traffic operations at intersections. The following describes these other calculated measures.

The volume-to-capacity (v/c) ratio is a measure of congestion at an intersection approach. A v/c ratio below one indicates that the intersection approach has adequate capacity to process the arriving traffic volumes over the course of an hour. A v/c ratio of one or greater indicates that the traffic volume on the intersection approach exceeds capacity.

The 95th percentile queue, measured in feet, denotes the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line. This maximum queue occurs five percent, or less, of the time during the peak hour and typically does not develop during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" condition. Queues at an intersection are generally below the 95th percentile length throughout most of the peak hour. It is also unlikely that 95th percentile queues for each approach to an intersection occur simultaneously.

Table 2 presents the Existing (2015) Condition intersection capacity analysis for the study area intersection during the weekday a.m. and p.m. peak hours. The detailed analysis sheets are provided in the **Appendix**.

Table 2. | Existing (2015) Conditions Intersection Operations Analysis

Intersection	LOS	Delay	V/C Ratio	50th Percentile Queue (feet)	95th Percentile Queue (feet)
a.m. Peak Hour					
Centre Street/Willow Street	C	21.8	-	-	-
Centre Street eastbound thru|thru	C	24.8	0.38	134	183
Centre Street eastbound right	C	24.0	0.08	21	48
Centre Street westbound left	B	14.8	0.14	21	48
Centre Street westbound thru|thru	B	14.8	0.28	96	146
Willow Street northbound left	D	47.4	0.34	26	57
Willow Street northbound right	A	5.9	0.17	0	21
Willow Street southbound left/thru/right	D	51.8	0.48	44	81
p.m. Peak Hour					
Centre Street/Willow Street	C	24.9	-	-	-
Centre Street eastbound thru|thru	C	31.0	0.45	170	228
Centre Street eastbound right	C	29.5	0.15	40	80
Centre Street westbound left	B	15.1	0.25	42	83
Centre Street westbound thru|thru	B	15.9	0.37	138	205
Willow Street northbound left	E	63.3	0.57	46	89
Willow Street northbound right	A	5.8	0.23	0	38
Willow Street southbound left/thru/right	E	58.3	0.56	63	110

Grey shading indicated LOS of E or F

The intersection of Centre Street/Willow Street currently operates at LOS C during both the weekday a.m. and p.m. peak hours. The longest queues at the intersection occur along Centre Street during the peak hours, with 95th percentile queues ranging from 146 feet to 183 feet (approximately 6 to 8 vehicles) during the a.m. peak hour and 205 feet to 228 feet (approximately 9 to 10 vehicles) during the p.m. peak hour.

Existing Public Transportation

The Project site is located in the vicinity of the MBTA Commuter Rail Needham Line and three bus lines that have stops along Centre Street. The nearby public transportation services are shown in **Figure 2**.

COMMUTER RAIL NEEDHAM LINE

The Needham Line of the MBTA commuter rail system stops at Highland Station, approximately 1,500 feet from the Project site, and Bellevue Station, approximately 2,000 feet from the site. The Needham Line runs between South Station in Boston and Needham Heights. The Needham Line operates with weekday service from 6:05 a.m. to 11:10 p.m. with approximately 30 minute peak hour headways. Saturday service runs from 7:10 a.m. to 12:00 a.m. with 120 minute headways.

MBTA BUS LINES

There are three bus lines that operate in the vicinity of the Project that provide service to/from Forest Hills Station, which serves the MBTA Orange Line. The inbound bus stop is located at the southeast corner of Centre Street/Corey Street and the outbound bus stop is located at the northeast corner of Centre Street/Willow Street. The three bus lines are highlighted in **Table 3**.

Table 3. | MBTA Bus Routes

Bus Number	Bus Route	Approximate Peak Headway (min)
35	Dedham Mall/Stimson Street – Forest Hills Station	15
36	Charles River Loop or VA Hospital - Forest Hills Station	20
37	Baker and Vermont Streets – Forest Hills Station	20

Figure 2. ***Public Transportation***

Existing Pedestrian and Bicycle Facilities

Pedestrian and bicycle counts at the study area intersection were conducted concurrently with the vehicle counts on June 30, 2015 during the weekday a.m. and p.m. peak periods (7:00-9:00 a.m. and 4:00-6:00 p.m., respectively)

The highest pedestrian volume occurs at the crossing southern crosswalk along Centre Street crossing Willow Street. There were 20 pedestrians observed using this crosswalk during the a.m. peak hour and 31 pedestrians during the p.m. peak hour. The highest bicycle volume occurs at the Centre Street eastbound approach. There were 5 bikes during the a.m. peak hour and 5 bikes during the p.m. peak hour.

Sidewalks in the Project area are in good condition and supply adequate capacity. Handicapped-accessible ramps and crosswalks are provided at all approaches to the study area intersection. There is no on-street bicycle infrastructure provided in the vicinity of the Project. The Existing (2015) Condition bicycle and pedestrian volumes are shown in **Figure 3**.

Existing Car Sharing Services

Car sharing enables easy access to short term vehicular transportation. Vehicles are rented on an hourly or daily basis and all vehicle costs (gas, maintenance, insurance, and parking) are included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location.

Nearby car sharing services provide an important transportation option and reduce the need for private vehicle ownership. A map of all car sharing locations within the Project site vicinity is shown in **Figure 4**.

Figure 3. ***Existing (2015) Condition Bicycle and Pedestrian Volumes***

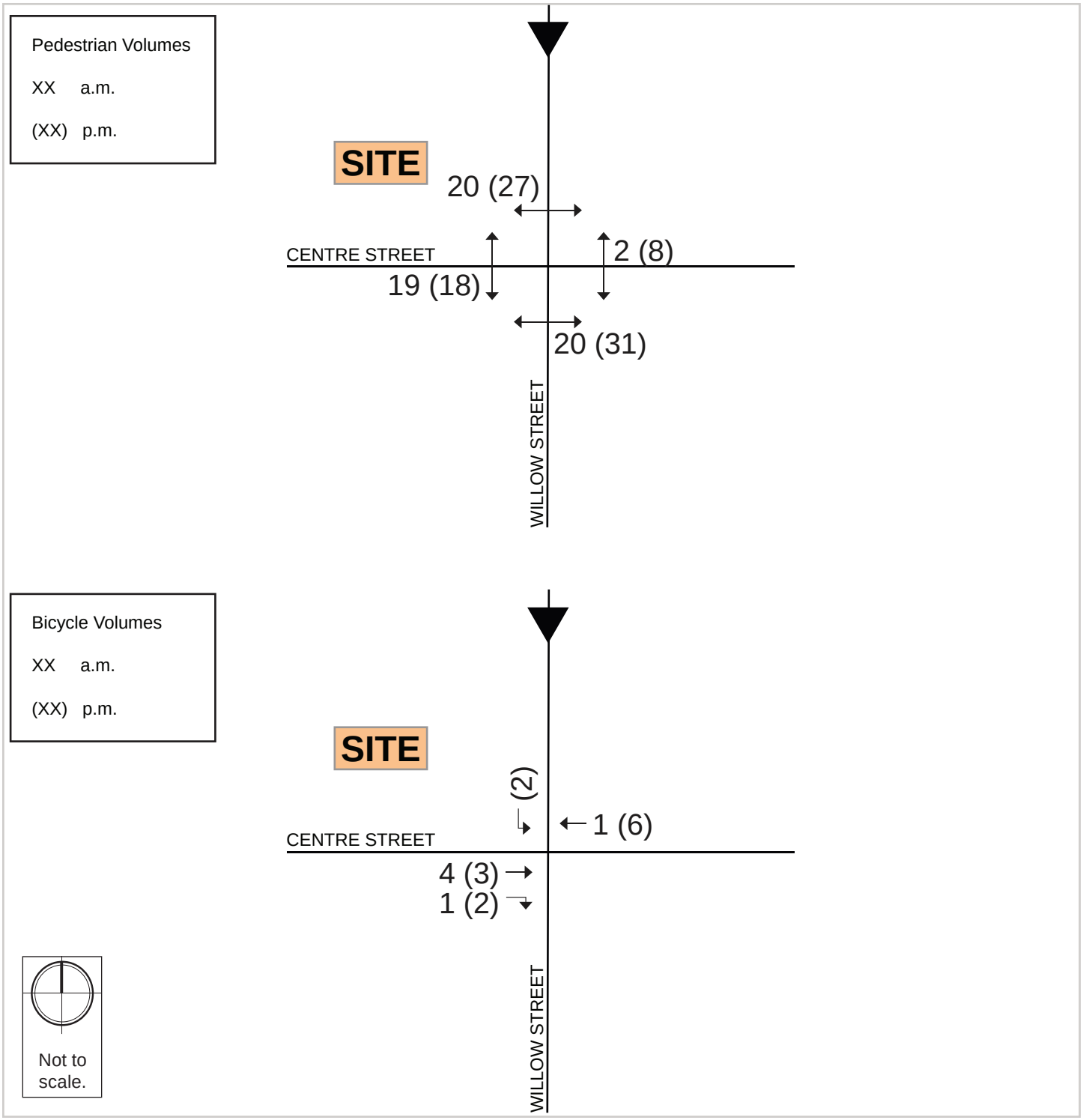
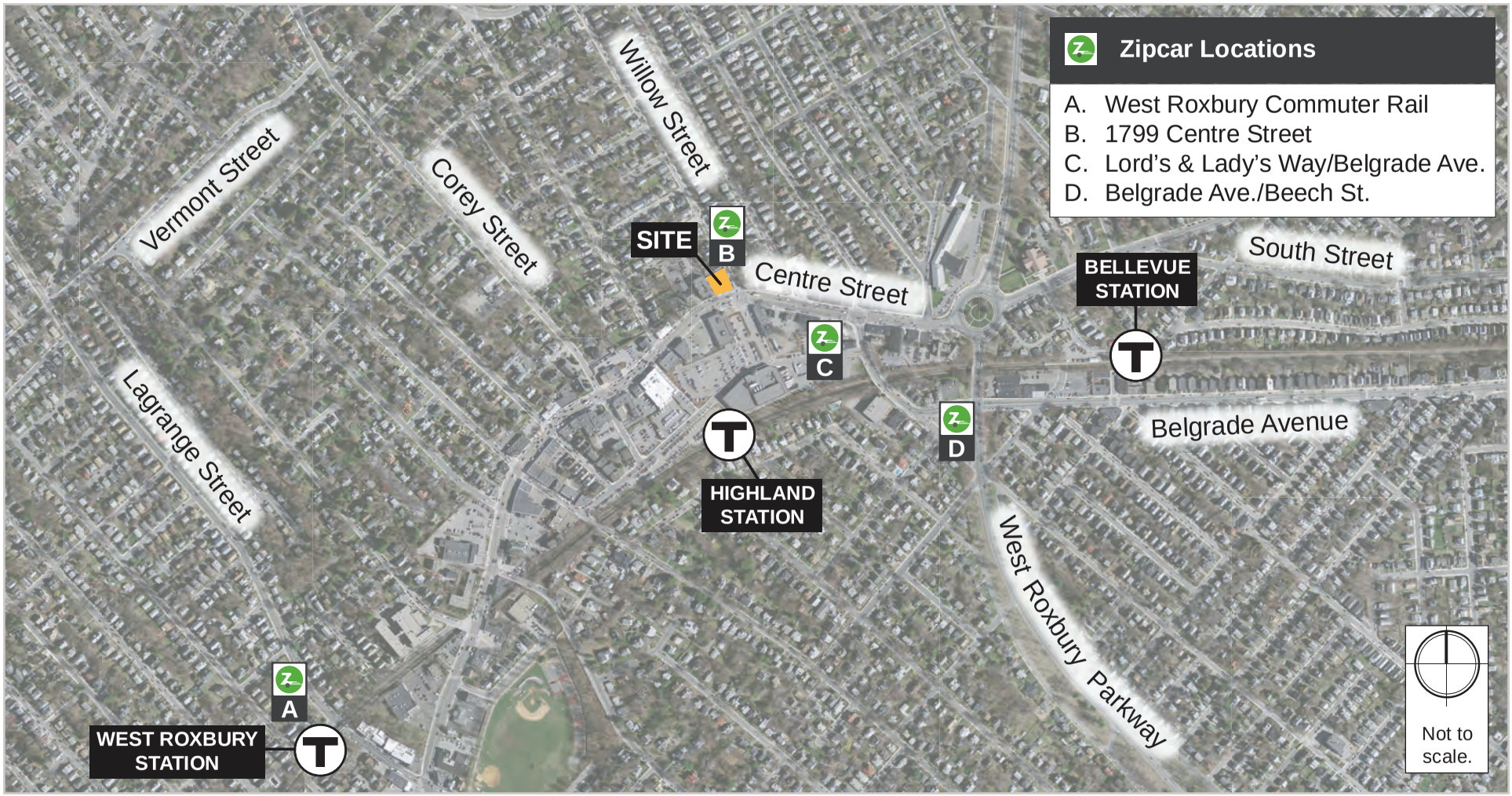


Figure 4. ***Car Sharing Services***



Future Conditions

No-Build Condition

NO-BUILD CONDITION TRAFFIC VOLUMES

The No-Build Condition reflects a future scenario that incorporates any anticipated traffic volume changes independent of the Project and any planned infrastructure improvements that will affect travel patterns throughout the study area. Infrastructure improvements include roadway, public transportation, pedestrian, and bicycle improvements. Background traffic growth is based on two factors: an annual growth rate and growth associated with specific developments near the project. Based on a review of available information provided by the City of Boston, there are no major developments in the vicinity of the Project site that will have a measureable impact on operations at the intersection of Centre Street/Willow Street.

To develop the 2020 No-Build Condition traffic volumes at the study area intersection, a half-percent per year annual growth rate was applied to the 2015 Existing Condition traffic volumes. The 2020 No-Build a.m. and p.m. peak hour traffic volumes are show in **Figure 5**.

NO-BUILD CONDITION TRAFFIC OPERATIONS

The 2020 No-Build Condition operation analysis uses the same methodology as the 2015 Existing Condition operation analysis. **Table 4** presents the 2020 No-Build Condition operations analysis for the a.m. and p.m. peak hours. The detailed analysis sheets are provided in the **Appendix**.

Based on the analysis presented in **Table 4**, the intersection of Centre Street/Willow Street will continue to operate at an overall LOS C during both the weekday a.m. and p.m. peak hours.

Figure 5. ***No-Build (2020) Condition Traffic Volumes***

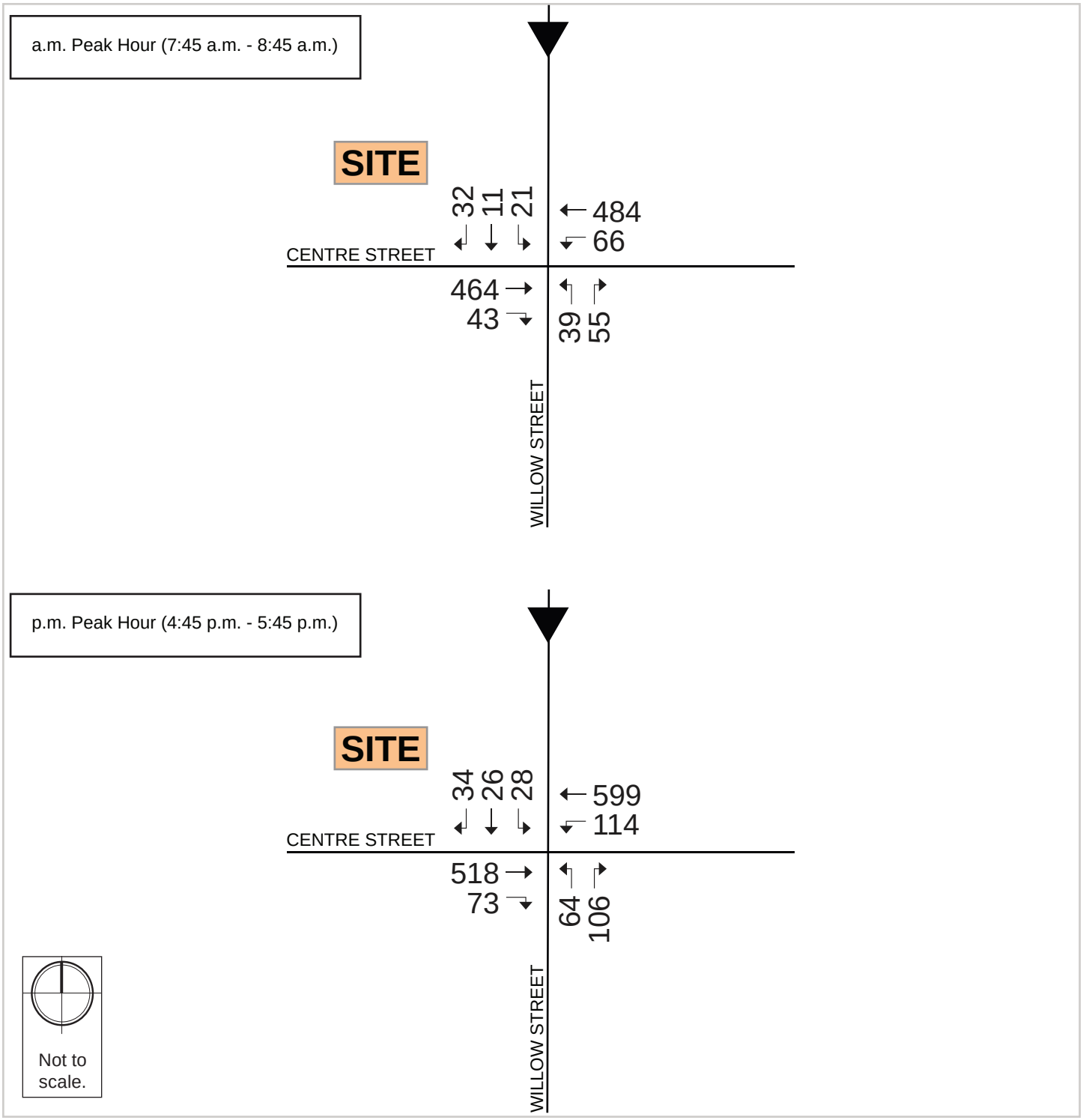


Table 4. | No-Build (2020) Condition Intersection Operations Analysis

Intersection	LOS	Delay	V/C Ratio	50th Percentile Queue (feet)	95th Percentile Queue (feet)
a.m. Peak Hour					
Centre Street/Willow Street	C	23.6	-	-	-
Centre Street eastbound thru|thru	C	27.6	0.54	208	275
Centre Street eastbound right	C	24.1	0.08	21	48
Centre Street westbound left	B	15.4	0.19	22	50
Centre Street westbound thru|thru	B	15.0	0.28	99	151
Willow Street northbound left	D	47.5	0.35	26	57
Willow Street northbound right	A	6.1	0.17	0	22
Willow Street southbound left/thru/right	D	51.8	0.48	45	83
p.m. Peak Hour					
Centre Street/Willow Street	C	25.3	-	-	-
Centre Street eastbound thru|thru	C	31.3	0.47	175	234
Centre Street eastbound right	C	29.6	0.16	41	81
Centre Street westbound left	B	15.4	0.26	44	87
Centre Street westbound thru|thru	B	16.2	0.38	144	213
Willow Street northbound left	E	64.5	0.59	48	91
Willow Street northbound right	A	5.8	0.23	0	38
Willow Street southbound left/thru/right	E	58.1	0.57	65	113

Build Condition

SITE ACCESS AND CIRCULATION

Vehicular access/egress will be provided by a new driveway located off of Willow Street, approximately 90 feet north of Centre Street. The driveway will accommodate two-way travel and provide access to the 29 ground-level parking spaces that will serve the Project. Since Willow Street is one-way in the southbound direction, vehicles will need to access the site by way of one of the cross streets to the north such as Alhambra Road, Schirmer Road, or Weld Street. Due to the size of the Project and its potential trip generating characteristics, this will represent a very minimal increase in traffic in the surrounding neighborhood to the north during the peak hours.

Primary pedestrian access for the residential portion of the Project will be located near the corner of Centre Street/Willow Street and primary pedestrian access for the commercial portion of the Project will be located along Centre Street. Secondary access for pedestrians will be provided along Willow Street and through the parking area. The sidewalks abutting the Project site will be upgraded and/or reconstructed around the perimeter of the site.

An alternative driveway location was also considered throughout the development of the site plan. A driveway location along Centre Street was reviewed and it was determined that the location along Willow Street would be more desirable from a safety and traffic operations perspective. Locating a driveway along Centre Street would introduce additional vehicle-pedestrian conflicts due to the higher pedestrian volumes along Centre Street. Access and egress along Centre Street is also more difficult than at Willow Street due to the need to cross several lanes of traffic for vehicles making a left-turn maneuver into or out of the Project site. Access and egress along Willow Street would be restricted to right-turns only due to the one-way nature of Willow Street. The Willow Street location would also have significantly fewer turning movement conflicts due to the much lower traffic volumes along Willow Street.

TRIP GENERATION

Trip generation is a complex, multi-step process that produces an estimate of vehicle trips, transit trips, walk trips, and bicycle trips associated with a proposed project and a specific land use program. A project's location and proximity to different modes determines how people will travel to and from that project site.

To estimate the number of trips expected to be generated by the Project, data published by the Institute of Transportation Engineers (ITE) in the Trip Generation Manual[1] were used. ITE provides data to estimate the total number of unadjusted vehicular trips associated with the Project. In an urban setting well served by transit, adjustments are necessary to account for other travel mode shares such as walking, bicycling, and transit.

Trip generation estimates for the Project were derived using the following Land Use Codes (LUC):

LUC 220 – Apartment. The apartment land use can be a rental dwelling unit located within the same building with at least three other dwelling units.

LUC 820 – Shopping Center. The shopping center land use is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. The trip generation characteristics of this LUC are expected to provide a conservative estimate for the proposed retail space.

MODE SPLIT

The BTD publishes vehicle, transit, and walking mode split rates for different areas of Boston. The Project is located within designated Area 19 – West Roxbury. The BTD's travel mode share data for Area 19 is shown in **Table 5**. The unadjusted vehicular trips were converted to person trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[2] . Since the mode splits shown in **Table 5** are for the entirety of West Roxbury, it is expected that the Project's transit mode share will be higher due to the Project's proximity to good public transportation opportunities for commuting into Boston when compared to other areas of West Roxbury.

[1] *Trip Generation Manual*, 9th Edition; Institute of Transportation Engineers; Washington, D.C.; 2012.
[2] *Summary of Travel Trends: 2009 National Household Travel Survey*; FHWA; Washington, D.C.; June 2011.

Table 5. | Mode Split

Land Use		Walk/Bike Share[1]	Transit Share[1]	Auto Share[1]	Local Vehicle Occupancy Rate[2]
Daily					
Residential	In	11%	7%	82%	1.13
	Out	11%	7%	82%	1.13
Retail	In	11%	7%	82%	1.78
	Out	11%	7%	82%	1.78
a.m. Peak Hour					
Residential	In	13%	7%	80%	1.13
	Out	9%	18%	73%	1.13
Retail	In	13%	7%	80%	1.78
	Out	9%	18%	73%	1.78
p.m. Peak Hour					
Residential	In	9%	18%	73%	1.13
	Out	13%	7%	80%	1.13
Retail	In	9%	18%	73%	1.78
	Out	13%	7%	80%	1.78

1 Boston Transportation Department mode share data for Area 19.
2 2009 National Household Travel Survey.

TRIP GENERATION SUMMARY

The trip generation process described above yields the trips adjusted by mode split associated with the Project. The Project-generated trips are summarized in **Table 6**, with detailed trip generation information provided in the **Appendix**.

Table 6. | Project Trip Generation

Time Period	Direction	New Vehicular Trips	New Transit Trips	New Walk/Bicycle Trips
Daily	In	60	6	11
	Out	60	6	11
	Total	120	12	22
a.m. Peak Hour	In	2	0	0
	Out	5	1	1
	Total	7	1	1
p.m. Peak Hour	In	6	1	1
	Out	4	0	1
	Total	10	1	2

As shown in **Table 6**, the Project is expected to generate approximately 120 new daily vehicle trips, with 7 new vehicle trips (2 entering and 5 exiting) during the weekday a.m. peak hour and 10 new vehicle trips (6 entering and 4 exiting) during the weekday p.m. peak hour. This corresponds to an increase of approximately one new vehicle trip every 8 minutes during the weekday a.m. peak hour and one new vehicle trip every 6 minutes during the weekday p.m. peak hour. These increases fall within the range of typical fluctuations in traffic volumes over the course of the day and during the peak hours.

The Project is also expected to generate approximately 12 new transit trips and 22 new walk/bicycle trips on a daily basis. As previously mentioned, the mode split data used is for the entirety of West Roxbury and it is expected that the Project will have a lower vehicular mode split and higher transit/walk mode splits than what is shown in **Table 5**.

TRIP DISTRIBUTION

The trip distribution identifies the various travel paths for vehicles arriving and leaving the Project Site. Trip distribution patterns for the Project were based on existing roadway volumes at the study area intersection. The trip distribution pattern for the Project is illustrated in **Figure 6**.

The Project-generated vehicle trips were assigned to the study area roadway network based on the trip distribution patterns shown in **Figure 6** and are shown in **Figure 7** for the a.m. and p.m. peak

hours. The Project-generated trips were then added to the 2020 No-Build Condition traffic volumes to develop the 2020 Build Condition peak hour traffic volume networks and are shown in **Figure 8** for the a.m. and p.m. peak hours.

BUILD CONDITION TRAFFIC OPERATIONS

The 2020 Build Condition operations analysis use the same methodology as the 2015 Existing and 2020 No-Build Condition operations analysis. The results of the 2020 Build conditions traffic analysis at study area intersection is presented in **Table 7** for the a.m. and p.m. peak hours. The detailed analysis sheets are provided in the **Appendix**.

Table 7. | Build (2020) Condition Intersection Operations Analysis

Intersection	LOS	Delay	V/C Ratio	50th Percentile Queue (feet)	95th Percentile Queue (feet)
a.m. Peak Hour					
Centre Street/Willow Street	C	23.9	-	-	-
Centre Street eastbound thru|thru	C	27.6	0.54	208	275
Centre Street eastbound right	C	24.1	0.08	21	48
Centre Street westbound left	B	15.8	0.19	22	51
Centre Street westbound thru|thru	B	15.3	0.29	101	154
Willow Street northbound left	D	47.3	0.35	26	57
Willow Street northbound right	A	6.1	0.17	0	22
Willow Street southbound left/thru/right	D	52.2	0.51	49	88
p.m. Peak Hour					
Centre Street/Willow Street	C	25.5	-	-	-
Centre Street eastbound thru|thru	C	31.3	0.47	175	234
Centre Street eastbound right	C	29.7	0.16	41	81
Centre Street westbound left	B	15.6	0.27	44	87
Centre Street westbound thru|thru	B	16.4	0.38	146	215
Willow Street northbound left	E	64.6	0.59	48	92
Willow Street northbound right	A	5.8	0.23	0	38
Willow Street southbound left/thru/right	E	58.8	0.59	68	118

Figure 6. ***Vehicle Trip Distribution***

Figure 7. ***Project Generated Vehicle Trips***

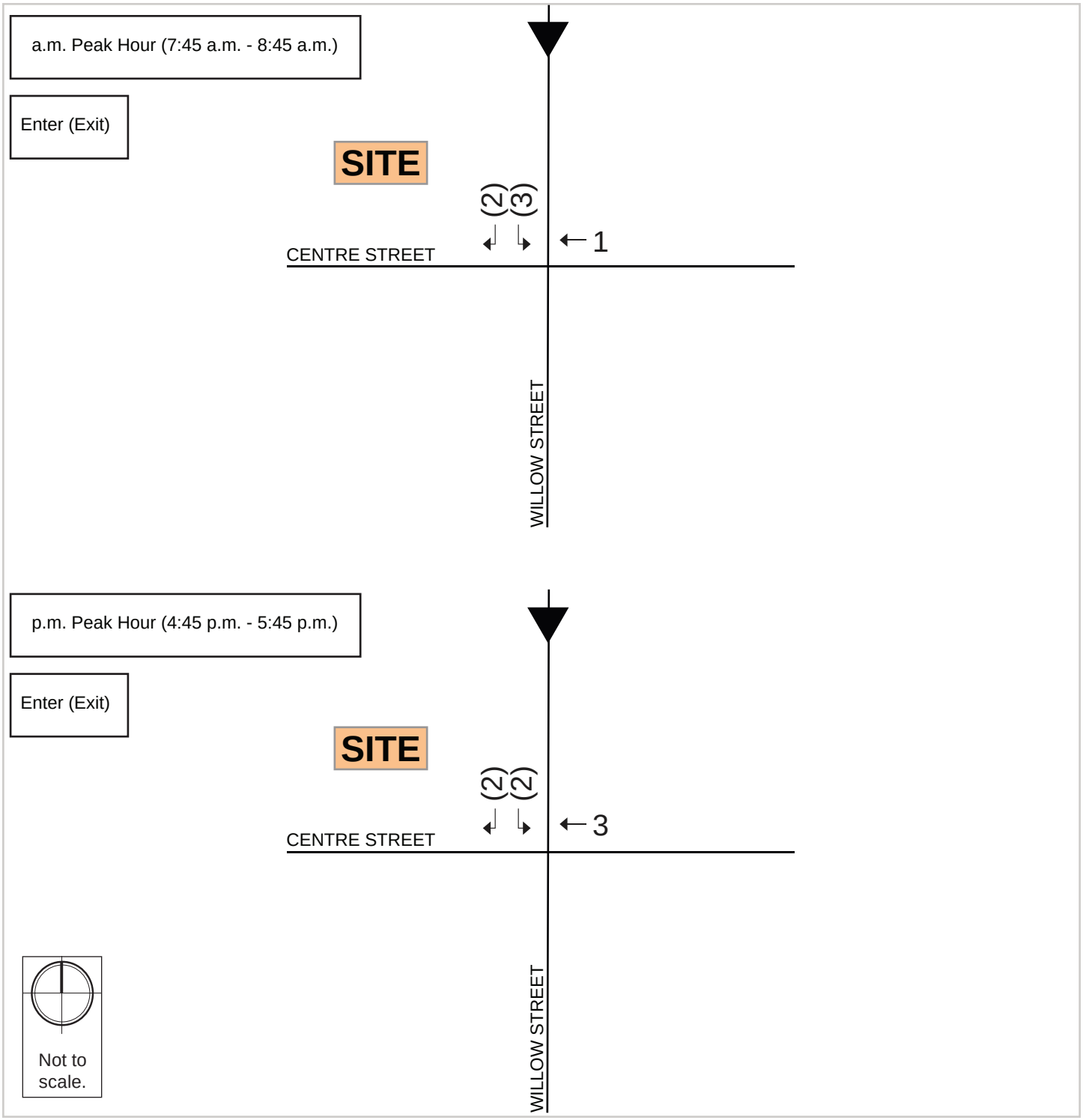
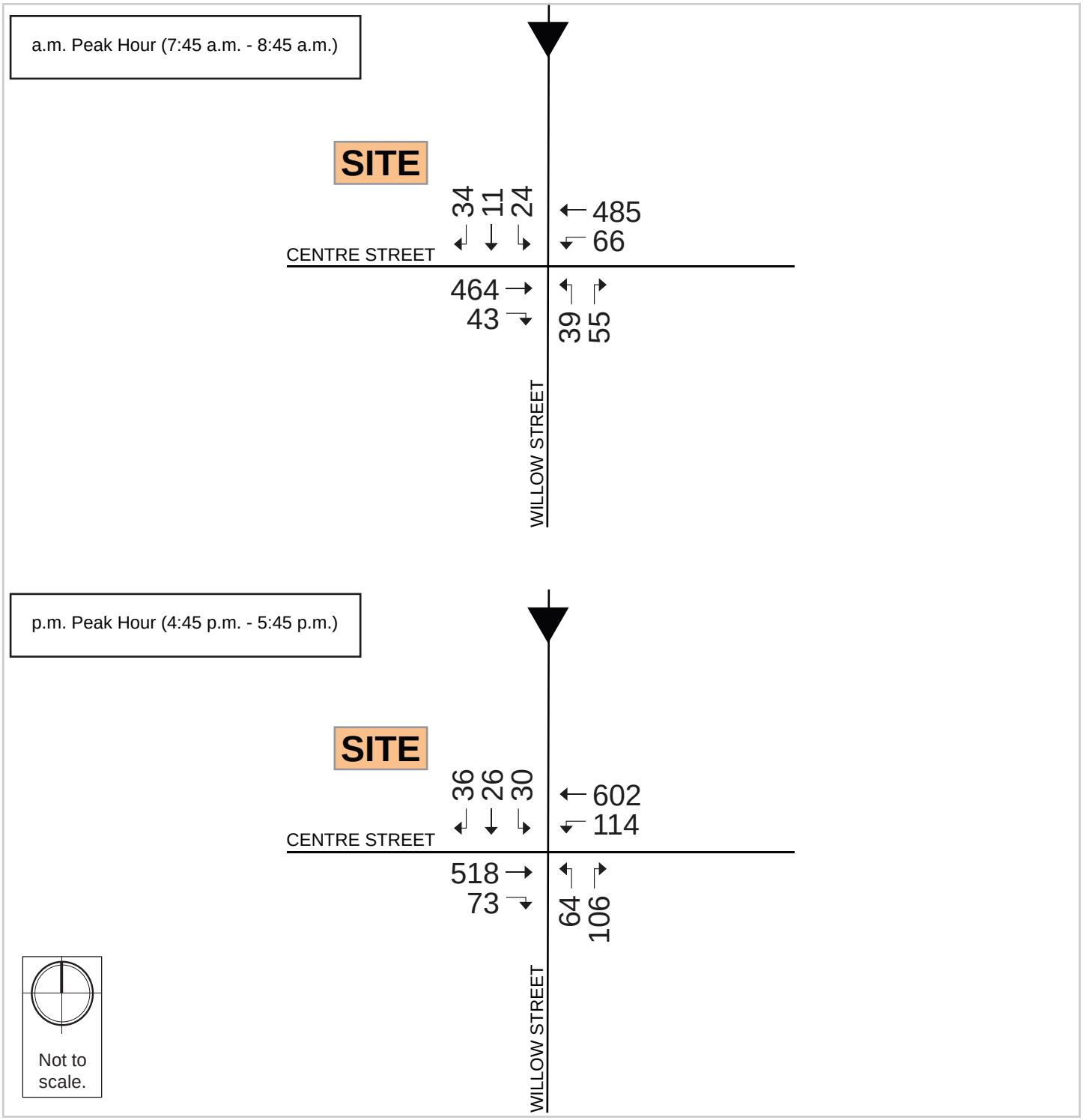


Figure 8. ***Build (2020) Condition Traffic Volumes***



As shown in **Table 7**, the intersection of Centre Street/Willow Street will continue to operate at LOS C during both the weekday a.m. and p.m. peak hours with the occupancy of the Project. The Project is expected to have little impact on operations at the signal intersection due to its minimal trip generating characteristics. The Project will also have minimal impact upon the surrounding roadway network including Alhambra Road, Schirmer Road, and Weld Street. The surrounding roadway network will see a slight, but mostly unperceivable, increase in traffic volumes from the Project and has the operating capacity to accommodate the Project-generated trips without the need for any additional improvements.

PARKING

The Project will provide a total of 29 parking spaces on the site. A total of 27 parking spaces will be provided for the residences on the site and two parking spaces will be provided for the commercial space. The on-site parking supply is consistent with the requirements of the zoning regulations for this site.

Conclusion

Based on the evaluation presented in this memorandum, the Project at 1789 Centre Street will have minimal impact on the surrounding transportation infrastructure. The Project is expected to generate ten or fewer trips per hour during the peak commuter periods. This is the equivalent of one additional vehicle every six minutes, which is within the range of typical fluctuations in daily and hourly traffic volumes. The surrounding transportation infrastructure has the capacity to accommodate the minimal amount of additional trips expected to be generated by the Project without the need for any additional improvements.

Appendix

TRAFFIC VOLUME COUNTS

TRIP GENERATION CALCULATIONS

INTERSECTION CAPACITY ANALYSIS WORKSHEETS

TRAFFIC VOLUME COUNTS

File Name: C:\TMC 2015\04584A.ppd
Start Date: 6/30/2015
Start Time: 7:00:00 AM
Site Code: 2015089
Comment 1: N/S: Willow Street
Comment 2: E/W: Centre Street
Comment 3: City, State: W. Roxbury, MA
Comment 4: Client: HSH/M. Littman

	Willow Street From North			Centre Street From East			Willow Street From South			Centre Street From West				
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left		
07:00 AM	3	4	6	0	94	11	14	0	7	8	94	0	1132	1173
07:15 AM	2	1	6	0	100	15	13	0	17	8	105	0	1188	1240
07:30 AM	6	4	6	0	119	13	17	0	10	13	119	0	1188	1243
07:45 AM	9	2	7	0	130	11	16	0	5	12	125	0	1185	1252
08:00 AM	9	2	5	0	116	19	14	0	8	6	118	0	1149	1221
08:15 AM	6	4	2	0	106	14	12	0	11	10	102	0		
08:30 AM	7	3	6	0	120	20	12	0	14	14	108	0		
08:45 AM	5	1	5	0	112	17	15	0	8	18	100	0		
Volume	31	11	20	0	472	64	54	0	38	42	453	0		
PHF		0.86			0.95			0.88			0.90			
HV%	3%	0%	0%	0%	4%	0%	2%	0%	5%	7%	3%	0%		

	Willow Street From North				Centre Street From East				Willow Street From South				Centre Street From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	0	0	0	3	0	1	0	0	0	0	0	3	0	1	0	1	41
07:15 AM	0	0	0	4	0	1	0	0	0	0	1	4	0	1	0	4	52
07:30 AM	0	0	0	2	0	0	0	0	0	0	0	2	0	3	0	1	55
07:45 AM	0	0	0	1	0	1	0	0	0	0	0	4	0	0	0	3	67
08:00 AM	0	0	0	8	0	0	0	0	0	0	0	3	0	1	0	8	72
08:15 AM	0	0	0	4	0	0	0	0	0	0	0	7	1	1	0	5	
08:30 AM	0	0	0	7	0	0	0	2	0	0	0	6	0	2	0	3	
08:45 AM	0	0	0	2	0	1	0	1	0	0	0	7	0	1	0	2	
Volume	0	0	0	20	0	1	0	2	0	0	0	20	1	4	0	19	

File Name: C:\TMC 2015\04584AA.ppd
Start Date: 6/30/2015
Start Time: 4:00:00 PM
Site Code: 2015089
Comment 1: N/S: Willow Street
Comment 2: E/W: Centre Street
Comment 3: City, State: W. Roxbury, MA
Comment 4: Client: HSH/M. Littman

	Willow Street From North			Centre Street From East			Willow Street From South			Centre Street From West				
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left		
04:00 PM	10	7	4	0	154	22	26	0	15	23	129	0	1451	1518
04:15 PM	5	4	11	0	131	17	17	0	19	20	96	0	1437	1513
04:30 PM	9	5	6	0	144	23	19	0	14	19	116	0	1486	1567
04:45 PM	11	6	6	0	146	27	22	0	15	17	136	0	1521	1618
05:00 PM	8	9	2	0	136	30	29	0	16	17	129	0	1510	1605
05:15 PM	7	4	10	0	132	30	23	0	16	19	128	0		
05:30 PM	7	6	9	0	170	24	29	0	15	18	112	0		
05:45 PM	12	2	10	0	143	23	26	0	20	23	116	0		
Volume	33	25	27	0	584	111	103	0	62	71	505	0		
PHF		0.92			0.90			0.92			0.94			
HV%	0%	0%	0%	0%	3%	0%	0%	0%	2%	4%	3%	0%		

	Willow Street From North				Centre Street From East				Willow Street From South				Centre Street From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	1	0	0	0	2	0	0	0	4	0	0	0	4	67
04:15 PM	0	0	0	2	0	1	0	1	0	0	0	8	0	1	0	2	76
04:30 PM	0	0	0	9	0	3	0	0	0	0	0	5	0	0	0	1	81
04:45 PM	0	0	0	6	0	2	0	0	0	0	0	5	0	1	0	9	97
05:00 PM	0	0	1	9	0	1	0	1	0	0	0	4	1	2	0	1	95
05:15 PM	0	0	0	5	0	2	0	1	0	0	0	7	1	0	0	4	
05:30 PM	0	0	1	7	0	1	0	6	0	0	0	15	0	0	0	4	
05:45 PM	1	0	0	6	0	1	0	1	0	0	0	10	0	0	0	2	
Volume	0	0	2	27	0	6	0	8	0	0	0	31	2	3	0	18	

TRIP GENERATION CALCULATIONS

1789 Centre Street - West Roxbury, MA

Trip Generation Assessment

Project Number 2015089.00

HOWARD/STEIN-HUDSON ASSOCIATES

23-Jul-15

Land Use	Size	Category	Trip Rates (Trips/ksf or unit)	Unadjusted Vehicle Trips	Internal trips	Pass-by %	Less capture trips	Assumed national vehicle occupancy rate[1]	Converted to Person trips	Transit Share[2]	Transit Trips	Walk/Bike/ Other Share[2]	Walk/ Bike/ Other Trips	Vehicle Share[2]	Total Vehicle Person Trips	Assumed local auto occupancy rate for autos [3]	Total Adjusted Auto Trips
Daily Peak Hour																	
Residential[4]	19	Total	5.79	110	0%	0%	110	1.13	**124**		**8**		**14**		102	1.13	**90**
	units	In	2.89	55	0%	0%	55	1.13	**62**	7%	**4**	11%	**7**	82%	51	1.13	**45**
		Out	2.89	55	0%	0%	55	1.13	**62**	7%	**4**	11%	**7**	82%	51	1.13	**45**
Retail[5]	0.84	Total	42.86	36	0%	0%	36	1.78	**64**		**4**		**8**		52	1.78	**30**
	KSF	In	21.43	18	0%	0%	18	1.78	**32**	7%	**2**	11%	**4**	82%	26	1.78	**15**
		Out	21.43	18	0%	0%	18	1.78	**32**	7%	**2**	11%	**4**	82%	26	1.78	**15**
				146					**188**		**12**		**22**				**120**
				73					**94**		**6**		**11**				**60**
				73					**94**		**6**		**11**				**60**
AM Peak Hour																	
Residential[4]	19	Total	0.42	8	0%	0%	8	1.13	**9**		**1**		**1**		7	1.13	**6**
	units	In	0.05	1	0%	0%	1	1.13	**1**	7%	**0**	13%	**0**	80%	1	1.13	**1**
		Out	0.37	7	0%	0%	7	1.13	**8**	18%	**1**	9%	**1**	73%	6	1.13	**5**
Retail[5]	0.84	Total	1.19	1	0%	0%	1	1.78	**2**		**0**		**0**		2	1.78	**1**
	KSF	In	1.19	1	0%	0%	1	1.78	**2**	7%	**0**	13%	**0**	80%	2	1.78	**1**
		Out	0.00	0	0%	0%	0	1.78	**0**	18%	**0**	9%	**0**	73%	0	1.78	**0**
				9					**11**		**1**		**1**				**7**
				2					**3**		**0**		**0**				**2**
				7					**8**		**1**		**1**				**5**
PM Peak Hour																	
Residential[4]	19	Total	0.53	10	0%	0%	10	1.13	**11**		**1**		**1**		8	1.13	**7**
	units	In	0.37	7	0%	0%	7	1.13	**8**	18%	**1**	9%	**1**	73%	6	1.13	**5**
		Out	0.16	3	0%	0%	3	1.13	**3**	7%	**0**	13%	**0**	80%	2	1.13	**2**
Retail[5]	0.84	Total	3.57	3	0%	0%	3	1.78	**6**		**0**		**1**		5	1.78	**3**
	KSF	In	1.19	1	0%	0%	1	1.78	**2**	18%	**0**	9%	**0**	73%	1	1.78	**1**
		Out	2.38	2	0%	0%	2	1.78	**4**	7%	**0**	13%	**1**	80%	3	1.78	**2**
				13					**17**		**1**		**2**				**10**
				8					**10**		**1**		**1**				**6**
				5					**7**		**0**		**1**				**4**

1. 2009 National vehicle occupancy rates - 1.13:home to work; 1.84: family/personal business; 1.78: shopping; 2.2 social/recreational
2. Mode shares based on peak-hour BTD Data for Area 19
3. Local vehicle occupancy rates based on 2009 National vehicle occupancy rates.
4. ITE Trip Generation Rate, 9th Edition, LUC 230 (Residential Condominium/Townhouse), average rate

INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Volume (vph)	0	453	42	64	472	0	38	0	54	20	11	31	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		120	125		0	0		80	0		0	
Storage Lanes	0		1	1		0	1		1	0		0	
Taper Length (ft)	25			30			100			25			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor			0.98										
Frt			0.850						0.850		0.932		
Flt Protected				0.950			0.950				0.984		
Satd. Flow (prot)	0	3110	1358	1624	3080	0	1392	0	1275	0	1383	0	
Flt Permitted				0.420			0.798				0.984		
Satd. Flow (perm)	0	3110	1325	718	3080	0	1170	0	1275	0	1383	0	
Right Turn on Red			No			No			Yes			No	
Satd. Flow (RTOR)									76				
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		513			640			311			412		
Travel Time (s)		11.7			14.5			7.1			9.4		
Confl. Bikes (#/hr)			4										
Peak Hour Factor	0.90	0.90	0.90	0.95	0.95	0.95	0.88	0.88	0.88	0.86	0.86	0.86	
Heavy Vehicles (%)	0%	3%	7%	0%	4%	0%	5%	0%	2%	0%	0%	3%	
Bus Blockages (#/hr)	0	7	0	0	7	0	0	0	0	0	0	0	
Parking (#/hr)							0	0	1	1	1	1	
Adj. Flow (vph)	0	503	47	67	497	0	43	0	61	23	13	36	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	503	47	67	497	0	43	0	61	0	72	0	
Turn Type		NA	Perm	D.P+P	NA		D.Pm		pm+ov	Perm	NA		
Protected Phases		1		4	1 4				4		3		2
Permitted Phases			1	1			3		3	3			
Detector Phase		1	1	4	1 4		3		4	3	3		
Switch Phase													
Minimum Initial (s)		10.0	10.0	6.0			8.0		6.0	8.0	8.0		4.0
Minimum Split (s)		16.0	16.0	11.0			14.0		11.0	14.0	14.0		28.0
Total Split (s)		39.0	39.0	11.0			22.0		11.0	22.0	22.0		28.0
Total Split (%)		39.0%	39.0%	11.0%			22.0%		11.0%	22.0%	22.0%		28%
Maximum Green (s)		33.0	33.0	6.0			16.0		6.0	16.0	16.0		24.0
Yellow Time (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
All-Red Time (s)		3.0	3.0	2.0			3.0		2.0	3.0	3.0		1.0
Lost Time Adjust (s)		0.0	0.0	0.0			0.0		0.0		0.0		
Total Lost Time (s)		6.0	6.0	5.0			6.0		5.0		6.0		
Lead/Lag		Lead	Lead	Lag			Lead		Lag	Lead	Lead		Lag
Lead-Lag Optimize?		Yes	Yes	Yes			Yes		Yes	Yes	Yes		Yes
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
Recall Mode		C-Max	C-Max	None			None		None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													17.0
Pedestrian Calls (#/hr)													61
Act Effct Green (s)		43.0	43.0	53.5	58.7		10.9		23.6		10.9		
Actuated g/C Ratio		0.43	0.43	0.54	0.59		0.11		0.24		0.11		
v/c Ratio		0.38	0.08	0.14	0.28		0.34		0.17		0.48		
Control Delay		24.8	24.0	14.8	14.8		47.4		5.9		51.8		
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0		0.0		
Total Delay		24.8	24.0	14.8	14.8		47.4		5.9		51.8		
LOS		C	C	B	B		D		A		D		
Approach Delay		24.8			14.8						51.8		
Approach LOS		C			B						D		
Queue Length 50th (ft)		134	21	21	96		26		0		44		
Queue Length 95th (ft)		183	48	48	146		57		21		81		
Internal Link Dist (ft)		433			560			231			332		
Turn Bay Length (ft)			120	125					80				
Base Capacity (vph)		1336	569	470	1807		187		359		221		
Starvation Cap Reductn		0	0	0	0		0		0		0		
Spillback Cap Reductn		0	0	0	0		0		0		0		
Storage Cap Reductn		0	0	0	0		0		0		0		
Reduced v/c Ratio		0.38	0.08	0.14	0.28		0.23		0.17		0.33		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 80 (80%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 21.8 — Intersection LOS: C
Intersection Capacity Utilization 43.7% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Willow Street & Centre Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Volume (vph)	0	505	71	111	584	0	62	0	103	27	25	33	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		120	125		0	0		80	0		0	
Storage Lanes	0		1	1		0	1		1	0		0	
Taper Length (ft)	25			30			100			25			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor			0.98										
Frt			0.850						0.850		0.947		
Flt Protected				0.950			0.950				0.984		
Satd. Flow (prot)	0	3154	1358	1624	3110	0	1433	0	1301	0	1426	0	
Flt Permitted				0.375			0.683				0.984		
Satd. Flow (perm)	0	3154	1326	641	3110	0	1031	0	1301	0	1426	0	
Right Turn on Red			No			No			Yes			No	
Satd. Flow (RTOR)									112				
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		513			640			311			412		
Travel Time (s)		11.7			14.5			7.1			9.4		
Confl. Bikes (#/hr)			3										
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	3%	4%	0%	3%	0%	2%	0%	0%	0%	0%	0%	
Bus Blockages (#/hr)	0	0	7	0	7	0	0	0	0	0	0	0	
Parking (#/hr)							0	0	1	1	1	1	
Adj. Flow (vph)	0	537	76	123	649	0	67	0	112	29	27	36	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	537	76	123	649	0	67	0	112	0	92	0	
Turn Type		NA	Perm	D.P+P	NA		D.Pm		pm+ov	Perm	NA		
Protected Phases		1		4	1 4				4		3		2
Permitted Phases			1	1			3		3	3			
Detector Phase		1	1	4	1 4		3		4	3	3		
Switch Phase													
Minimum Initial (s)		10.0	10.0	6.0			8.0		6.0	8.0	8.0		4.0
Minimum Split (s)		16.0	16.0	11.0			14.0		11.0	14.0	14.0		28.0
Total Split (s)		38.0	38.0	18.0			26.0		18.0	26.0	26.0		28.0
Total Split (%)		34.5%	34.5%	16.4%			23.6%		16.4%	23.6%	23.6%		25%
Maximum Green (s)		32.0	32.0	13.0			20.0		13.0	20.0	20.0		24.0
Yellow Time (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
All-Red Time (s)		3.0	3.0	2.0			3.0		2.0	3.0	3.0		1.0
Lost Time Adjust (s)		0.0	0.0	0.0			0.0		0.0		0.0		
Total Lost Time (s)		6.0	6.0	5.0			6.0		5.0		6.0		
Lead/Lag		Lead	Lead	Lag			Lead		Lag	Lead	Lead		Lag
Lead-Lag Optimize?		Yes	Yes	Yes			Yes		Yes	Yes	Yes		Yes
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
Recall Mode		C-Max	C-Max	None			None		None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													17.0
Pedestrian Calls (#/hr)													84
Act Effct Green (s)		41.4	41.4	58.9	62.9		12.7		35.2		12.7		
Actuated g/C Ratio		0.38	0.38	0.54	0.57		0.12		0.32		0.12		
v/c Ratio		0.45	0.15	0.25	0.37		0.57		0.23		0.56		
Control Delay		31.0	29.5	15.1	15.9		63.3		5.8		58.3		
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0		0.0		
Total Delay		31.0	29.5	15.1	15.9		63.3		5.8		58.3		
LOS		C	C	B	B		E		A		E		
Approach Delay		30.8			15.8						58.3		
Approach LOS		C			B						E		
Queue Length 50th (ft)		170	40	42	138		46		0		63		
Queue Length 95th (ft)		228	80	83	205		89		38		110		
Internal Link Dist (ft)		433			560			231			332		
Turn Bay Length (ft)			120	125					80				
Base Capacity (vph)		1187	499	499	1761		187		498		259		
Starvation Cap Reductn		0	0	0	0		0		0		0		
Spillback Cap Reductn		0	0	0	0		0		0		0		
Storage Cap Reductn		0	0	0	0		0		0		0		
Reduced v/c Ratio		0.45	0.15	0.25	0.37		0.36		0.22		0.36		

Intersection Summary

Area Type: CBD
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 24.9 — Intersection LOS: C
Intersection Capacity Utilization 48.5% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Willow Street & Centre Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Volume (vph)	0	646	43	66	484	0	39	0	55	21	11	32	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		120	125		0	0		80	0		0	
Storage Lanes	0		1	1		0	1		1	0		0	
Taper Length (ft)	25			30			100			25			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor			0.98										
Frt			0.850						0.850		0.932		
Flt Protected				0.950			0.950				0.984		
Satd. Flow (prot)	0	3110	1358	1624	3080	0	1392	0	1275	0	1383	0	
Flt Permitted				0.289			0.787				0.984		
Satd. Flow (perm)	0	3110	1325	494	3080	0	1154	0	1275	0	1383	0	
Right Turn on Red			No			No			Yes			No	
Satd. Flow (RTOR)									76				
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		513			640			311			412		
Travel Time (s)		11.7			14.5			7.1			9.4		
Confl. Bikes (#/hr)			4										
Peak Hour Factor	0.90	0.90	0.90	0.95	0.95	0.95	0.88	0.88	0.88	0.86	0.86	0.86	
Heavy Vehicles (%)	0%	3%	7%	0%	4%	0%	5%	0%	2%	0%	0%	3%	
Bus Blockages (#/hr)	0	7	0	0	7	0	0	0	0	0	0	0	
Parking (#/hr)							0	0	1	1	1	1	
Adj. Flow (vph)	0	718	48	69	509	0	44	0	62	24	13	37	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	718	48	69	509	0	44	0	62	0	74	0	
Turn Type		NA	Perm	D.P+P	NA		D.Pm		pm+ov	Perm	NA		
Protected Phases		1		4	1 4				4		3		2
Permitted Phases			1	1			3		3	3			
Detector Phase		1	1	4	1 4		3		4	3	3		
Switch Phase													
Minimum Initial (s)		10.0	10.0	6.0			8.0		6.0	8.0	8.0		4.0
Minimum Split (s)		16.0	16.0	11.0			14.0		11.0	14.0	14.0		28.0
Total Split (s)		39.0	39.0	11.0			22.0		11.0	22.0	22.0		28.0
Total Split (%)		39.0%	39.0%	11.0%			22.0%		11.0%	22.0%	22.0%		28%
Maximum Green (s)		33.0	33.0	6.0			16.0		6.0	16.0	16.0		24.0
Yellow Time (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
All-Red Time (s)		3.0	3.0	2.0			3.0		2.0	3.0	3.0		1.0
Lost Time Adjust (s)		0.0	0.0	0.0			0.0		0.0		0.0		
Total Lost Time (s)		6.0	6.0	5.0			6.0		5.0		6.0		
Lead/Lag		Lead	Lead	Lag			Lead		Lag	Lead	Lead		Lag
Lead-Lag Optimize?		Yes	Yes	Yes			Yes		Yes	Yes	Yes		Yes
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
Recall Mode		C-Max	C-Max	None			None		None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													17.0
Pedestrian Calls (#/hr)													61
Act Effct Green (s)		43.0	43.0	53.3	58.5		11.1		23.6		11.1		
Actuated g/C Ratio		0.43	0.43	0.53	0.58		0.11		0.24		0.11		
v/c Ratio		0.54	0.08	0.19	0.28		0.35		0.17		0.48		
Control Delay		27.6	24.1	15.4	15.0		47.5		6.1		51.8		
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0		0.0		
Total Delay		27.6	24.1	15.4	15.0		47.5		6.1		51.8		
LOS		C	C	B	B		D		A		D		
Approach Delay		27.4			15.1						51.8		
Approach LOS		C			B						D		
Queue Length 50th (ft)		208	21	22	99		26		0		45		
Queue Length 95th (ft)		275	48	50	151		57		22		83		
Internal Link Dist (ft)		433			560			231			332		
Turn Bay Length (ft)			120	125					80				
Base Capacity (vph)		1336	569	369	1802		184		359		221		
Starvation Cap Reductn		0	0	0	0		0		0		0		
Spillback Cap Reductn		0	0	0	0		0		0		0		
Storage Cap Reductn		0	0	0	0		0		0		0		
Reduced v/c Ratio		0.54	0.08	0.19	0.28		0.24		0.17		0.33		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 80 (80%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 23.6 Intersection LOS: C
Intersection Capacity Utilization 49.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Willow Street & Centre Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Volume (vph)	0	518	73	114	599	0	64	0	106	28	26	34	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		120	125		0	0		80	0		0	
Storage Lanes	0		1	1		0	1		1	0		0	
Taper Length (ft)	25			30			100			25			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor			0.98										
Frt			0.850						0.850		0.947		
Flt Protected				0.950			0.950				0.984		
Satd. Flow (prot)	0	3154	1358	1624	3110	0	1433	0	1301	0	1426	0	
Flt Permitted				0.365			0.674				0.984		
Satd. Flow (perm)	0	3154	1326	624	3110	0	1017	0	1301	0	1426	0	
Right Turn on Red			No			No			Yes			No	
Satd. Flow (RTOR)									115				
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		513			640			311			412		
Travel Time (s)		11.7			14.5			7.1			9.4		
Confl. Bikes (#/hr)			3										
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	3%	4%	0%	3%	0%	2%	0%	0%	0%	0%	0%	
Bus Blockages (#/hr)	0	0	7	0	7	0	0	0	0	0	0	0	
Parking (#/hr)							0	0	1	1	1	1	
Adj. Flow (vph)	0	551	78	127	666	0	70	0	115	30	28	37	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	551	78	127	666	0	70	0	115	0	95	0	
Turn Type		NA	Perm	D.P+P	NA		D.Pm		pm+ov	Perm	NA		
Protected Phases		1		4	1 4				4		3		2
Permitted Phases			1	1			3		3	3			
Detector Phase		1	1	4	1 4		3		4	3	3		
Switch Phase													
Minimum Initial (s)		10.0	10.0	6.0			8.0		6.0	8.0	8.0		4.0
Minimum Split (s)		16.0	16.0	11.0			14.0		11.0	14.0	14.0		28.0
Total Split (s)		38.0	38.0	18.0			26.0		18.0	26.0	26.0		28.0
Total Split (%)		34.5%	34.5%	16.4%			23.6%		16.4%	23.6%	23.6%		25%
Maximum Green (s)		32.0	32.0	13.0			20.0		13.0	20.0	20.0		24.0
Yellow Time (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
All-Red Time (s)		3.0	3.0	2.0			3.0		2.0	3.0	3.0		1.0
Lost Time Adjust (s)		0.0	0.0	0.0			0.0		0.0		0.0		
Total Lost Time (s)		6.0	6.0	5.0			6.0		5.0		6.0		
Lead/Lag		Lead	Lead	Lag			Lead		Lag	Lead	Lead		Lag
Lead-Lag Optimize?		Yes	Yes	Yes			Yes		Yes	Yes	Yes		Yes
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
Recall Mode		C-Max	C-Max	None			None		None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													17.0
Pedestrian Calls (#/hr)													84
Act Effct Green (s)		41.3	41.3	58.6	62.6		13.0		35.3		13.0		
Actuated g/C Ratio		0.38	0.38	0.53	0.57		0.12		0.32		0.12		
v/c Ratio		0.47	0.16	0.26	0.38		0.59		0.23		0.57		
Control Delay		31.3	29.6	15.4	16.2		64.5		5.8		58.1		
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0		0.0		
Total Delay		31.3	29.6	15.4	16.2		64.5		5.8		58.1		
LOS		C	C	B	B		E		A		E		
Approach Delay		31.1			16.1						58.1		
Approach LOS		C			B						E		
Queue Length 50th (ft)		175	41	44	144		48		0		65		
Queue Length 95th (ft)		234	81	87	213		91		38		113		
Internal Link Dist (ft)		433			560			231			332		
Turn Bay Length (ft)			120	125					80				
Base Capacity (vph)		1183	497	490	1753		184		502		259		
Starvation Cap Reductn		0	0	0	0		0		0		0		
Spillback Cap Reductn		0	0	0	0		0		0		0		
Storage Cap Reductn		0	0	0	0		0		0		0		
Reduced v/c Ratio		0.47	0.16	0.26	0.38		0.38		0.23		0.37		

Intersection Summary

Area Type: CBD
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 25.3 — Intersection LOS: C
Intersection Capacity Utilization 49.3% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Willow Street & Centre Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Volume (vph)	0	646	43	66	485	0	39	0	55	24	11	34	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		120	125		0	0		80	0		0	
Storage Lanes	0		1	1		0	1		1	0		0	
Taper Length (ft)	25			30			100			25			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor			0.98										
Frt			0.850						0.850		0.933		
Flt Protected				0.950			0.950				0.983		
Satd. Flow (prot)	0	3110	1358	1624	3080	0	1392	0	1275	0	1383	0	
Flt Permitted				0.289			0.753				0.983		
Satd. Flow (perm)	0	3110	1325	494	3080	0	1104	0	1275	0	1383	0	
Right Turn on Red			No			No			Yes			No	
Satd. Flow (RTOR)									76				
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		513			640			311			412		
Travel Time (s)		11.7			14.5			7.1			9.4		
Confl. Bikes (#/hr)			4										
Peak Hour Factor	0.90	0.90	0.90	0.95	0.95	0.95	0.88	0.88	0.88	0.86	0.86	0.86	
Heavy Vehicles (%)	0%	3%	7%	0%	4%	0%	5%	0%	2%	0%	0%	3%	
Bus Blockages (#/hr)	0	7	0	0	7	0	0	0	0	0	0	0	
Parking (#/hr)							0	0	1	1	1	1	
Adj. Flow (vph)	0	718	48	69	511	0	44	0	62	28	13	40	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	718	48	69	511	0	44	0	62	0	81	0	
Turn Type		NA	Perm	D.P+P	NA		D.Pm		pm+ov	Perm	NA		
Protected Phases		1		4	1 4				4		3		2
Permitted Phases			1	1			3		3	3			
Detector Phase		1	1	4	1 4		3		4	3	3		
Switch Phase													
Minimum Initial (s)		10.0	10.0	6.0			8.0		6.0	8.0	8.0		4.0
Minimum Split (s)		16.0	16.0	11.0			14.0		11.0	14.0	14.0		28.0
Total Split (s)		39.0	39.0	11.0			22.0		11.0	22.0	22.0		28.0
Total Split (%)		39.0%	39.0%	11.0%			22.0%		11.0%	22.0%	22.0%		28%
Maximum Green (s)		33.0	33.0	6.0			16.0		6.0	16.0	16.0		24.0
Yellow Time (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
All-Red Time (s)		3.0	3.0	2.0			3.0		2.0	3.0	3.0		1.0
Lost Time Adjust (s)		0.0	0.0	0.0			0.0		0.0		0.0		
Total Lost Time (s)		6.0	6.0	5.0			6.0		5.0		6.0		
Lead/Lag		Lead	Lead	Lag			Lead		Lag	Lead	Lead		Lag
Lead-Lag Optimize?		Yes	Yes	Yes			Yes		Yes	Yes	Yes		Yes
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
Recall Mode		C-Max	C-Max	None			None		None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													17.0
Pedestrian Calls (#/hr)													61
Act Effct Green (s)		43.0	43.0	52.9	58.1		11.5		23.6		11.5		
Actuated g/C Ratio		0.43	0.43	0.53	0.58		0.12		0.24		0.12		
v/c Ratio		0.54	0.08	0.19	0.29		0.35		0.17		0.51		
Control Delay		27.6	24.1	15.8	15.3		47.3		6.1		52.2		
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0		0.0		
Total Delay		27.6	24.1	15.8	15.3		47.3		6.1		52.2		
LOS		C	C	B	B		D		A		D		
Approach Delay		27.4			15.4						52.2		
Approach LOS		C			B						D		
Queue Length 50th (ft)		208	21	22	101		26		0		49		
Queue Length 95th (ft)		275	48	51	154		57		22		88		
Internal Link Dist (ft)		433			560			231			332		
Turn Bay Length (ft)			120	125					80				
Base Capacity (vph)		1336	569	362	1789		176		359		221		
Starvation Cap Reductn		0	0	0	0		0		0		0		
Spillback Cap Reductn		0	0	0	0		0		0		0		
Storage Cap Reductn		0	0	0	0		0		0		0		
Reduced v/c Ratio		0.54	0.08	0.19	0.29		0.25		0.17		0.37		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 80 (80%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 23.9 — Intersection LOS: C
Intersection Capacity Utilization 50.1% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Willow Street & Centre Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	ø2
Lane Configurations													
Volume (vph)	0	518	73	114	602	0	64	0	106	30	26	36	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		120	125		0	0		80	0		0	
Storage Lanes	0		1	1		0	1		1	0		0	
Taper Length (ft)	25			30			100			25			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor			0.98										
Frt			0.850						0.850		0.947		
Flt Protected				0.950			0.950				0.984		
Satd. Flow (prot)	0	3154	1358	1624	3110	0	1433	0	1301	0	1426	0	
Flt Permitted				0.365			0.660				0.984		
Satd. Flow (perm)	0	3154	1326	624	3110	0	996	0	1301	0	1426	0	
Right Turn on Red			No			No			Yes			No	
Satd. Flow (RTOR)									115				
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		513			640			311			412		
Travel Time (s)		11.7			14.5			7.1			9.4		
Confl. Bikes (#/hr)			3										
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	3%	4%	0%	3%	0%	2%	0%	0%	0%	0%	0%	
Bus Blockages (#/hr)	0	0	7	0	7	0	0	0	0	0	0	0	
Parking (#/hr)							0	0	1	1	1	1	
Adj. Flow (vph)	0	551	78	127	669	0	70	0	115	33	28	39	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	551	78	127	669	0	70	0	115	0	100	0	
Turn Type		NA	Perm	D.P+P	NA		D.Pm		pm+ov	Perm	NA		
Protected Phases		1		4	1 4				4		3		2
Permitted Phases			1	1			3		3	3			
Detector Phase		1	1	4	1 4		3		4	3	3		
Switch Phase													
Minimum Initial (s)		10.0	10.0	6.0			8.0		6.0	8.0	8.0		4.0
Minimum Split (s)		16.0	16.0	11.0			14.0		11.0	14.0	14.0		28.0
Total Split (s)		38.0	38.0	18.0			26.0		18.0	26.0	26.0		28.0
Total Split (%)		34.5%	34.5%	16.4%			23.6%		16.4%	23.6%	23.6%		25%
Maximum Green (s)		32.0	32.0	13.0			20.0		13.0	20.0	20.0		24.0
Yellow Time (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
All-Red Time (s)		3.0	3.0	2.0			3.0		2.0	3.0	3.0		1.0
Lost Time Adjust (s)		0.0	0.0	0.0			0.0		0.0		0.0		
Total Lost Time (s)		6.0	6.0	5.0			6.0		5.0		6.0		
Lead/Lag		Lead	Lead	Lag			Lead		Lag	Lead	Lead		Lag
Lead-Lag Optimize?		Yes	Yes	Yes			Yes		Yes	Yes	Yes		Yes
Vehicle Extension (s)		3.0	3.0	3.0			3.0		3.0	3.0	3.0		3.0
Recall Mode		C-Max	C-Max	None			None		None	None	None		None
Walk Time (s)													7.0
Flash Dont Walk (s)													17.0
Pedestrian Calls (#/hr)													84
Act Effct Green (s)		41.2	41.2	58.4	62.4		13.2		35.4		13.2		
Actuated g/C Ratio		0.37	0.37	0.53	0.57		0.12		0.32		0.12		
v/c Ratio		0.47	0.16	0.27	0.38		0.59		0.23		0.59		
Control Delay		31.3	29.7	15.6	16.4		64.6		5.8		58.8		
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0		0.0		
Total Delay		31.3	29.7	15.6	16.4		64.6		5.8		58.8		
LOS		C	C	B	B		E		A		E		
Approach Delay		31.1			16.3						58.8		
Approach LOS		C			B						E		
Queue Length 50th (ft)		175	41	44	146		48		0		68		
Queue Length 95th (ft)		234	81	87	215		92		38		118		
Internal Link Dist (ft)		433			560			231			332		
Turn Bay Length (ft)			120	125					80				
Base Capacity (vph)		1180	496	487	1747		181		503		259		
Starvation Cap Reductn		0	0	0	0		0		0		0		
Spillback Cap Reductn		0	0	0	0		0		0		0		
Storage Cap Reductn		0	0	0	0		0		0		0		
Reduced v/c Ratio		0.47	0.16	0.26	0.38		0.39		0.23		0.39		

Intersection Summary

Area Type: CBD
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 25.5 — Intersection LOS: C
Intersection Capacity Utilization 49.6% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Willow Street & Centre Street