



48-50 Bishop Allen Drive Cambridge, MA

Special Permit Application

March \_\_, 2023

Dobia Properties Corporation

Khalsa Design Inc.

Volume 3: Application Appendix

## **Volume 4 – Table of Contents**

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# APPENDIX A

**City of  
Cambridge**

**Cool Factor Score Sheet**

**6/22/2022**

Project Address <b>50 Bishop Allen Drive</b>	Special Permit Number <b>PE-</b>	Total Lot Area (SF) <b>5150</b>	
Applicant Name <b>Stu-Lin Family Trust</b>	Phone Number <b>617-491-1932</b>	Open Space Requirement (%) <b>20%</b>	
Applicant Contact / Address <b>907 Massachusetts Avenue, Cambridge MA 02139</b>	Email Address <a href="mailto:sdhope77@gmail.com">sdhope77@gmail.com</a>	Includes High SRI Roof <input checked="" type="checkbox"/> <b>Yes</b>	SRI Value <b>82</b>
Project Description <b>Demolition of the existing structure and construction of a six story residential structure containing 22 dwelling units.</b>		Result <b>Pass</b>	

Enter minimum required open space ratio. If the ratio is less than 20%, enter 20 here.

Low slope roofs (i.e. ≤ 2:12) must have a minimum SRI of 82. Steep slope roofs (i.e. > 2:12) must have a minimum SRI of 39.

		Outside 20' of PROW	Value Factor	+	Within 20' of PROW	Value Factor	Contributing Area	
<b>Trees</b>  Enter the number of trees in each category. Count each tree only once on this form.	<b>Preserved Existing Trees</b>							
	<b>A1</b>	Understory tree currently <10' canopy spread	0	0.80	+	0	1.60	-
	<b>A2</b>	Understory tree currently >10' canopy spread	0	1.00	+	0	2.00	-
	<b>A3</b>	Canopy tree currently <15' canopy spread	0	0.80	+	0	1.60	-
	<b>A4</b>	Canopy tree currently between 15' and 25' canopy spread	0	1.00	+	0	2.00	-
	<b>A5</b>	Canopy tree currently >25' canopy spread	0	1.20	+	0	2.40	-
	<b>New or Transplanted Trees</b>							
	<b>A6</b>	Understory tree	4	0.60	+	3	1.20	900
<b>A7</b>	Canopy tree	0	0.70	+	0	1.40	-	
<b>Planting Areas</b>  Enter area in square feet of each component in the box provided	<b>B1</b>	Lawn	0	0.30	+	0	0.60	-
	<b>B2</b>	Low Planting	160	0.40	+	112	0.80	154
	<b>B3</b>	Planting	74	0.50	+	226	1.00	263
<b>Green Roofs &amp; Facades</b>  For definitions, see reference document.	<b>C1</b>	Green Façade	0	0.10	+	0	0.20	-
	<b>C2</b>	Living Wall	0	0.30	+	0	0.60	-
	<b>C3</b>	Green Roof	0	0.30	+	0	0.60	-
	<b>C4</b>	Short Intensive Green Roof	0	0.50	+	0	1.00	-
	<b>C5</b>	Intensive Green Roof	0	0.60	+	0	1.20	-
<b>Paving &amp; Structures</b>	<b>D1</b>	High-SRI Roof	Required	N/A				
	<b>D2</b>	High-SRI Paving	256	0.1				26
	<b>D3</b>	High-SRI Shade Structure	0	0.2	+	0	0.40	-
<b>Project Summary</b>	Portion of lot area utilizing green strategies . . . . .				<b>Total Contributing Area</b>		<b>1,342</b>	
	Portion of score from green strategies . . . . .				<b>Total Area Goal</b>		<b>1,030</b>	
	Portion of score from trees . . . . .				<b>COOL FACTOR SCORE</b>		<b>1.30</b>	
	Portion of score contributing to public realm cooling . . . . .							

When entering strategies that are within 20' of the public right of way (column L), do not also enter them in column H.

High-SRI roofs are a prerequisite of the Cool Factor and therefore are not assigned a point value.

If your project scores 1 or above, you have successfully met the requirements of the Cool Factor.

## APPENDIX B

### MEMORANDUM

**TO:** Mr. Ben Deb  
First Cambridge Realty Corporation  
907 Massachusetts Avenue  
Cambridge, MA 02139

**FROM:** F. Giles Ham, P.E. *and*  
Derek Roach E.I.T.  
Vanasse & Associates, Inc.  
35 New England Business Center Drive  
Suite 140  
Andover, MA 01810  
(978) 474-8800

**DATE:** September 8, 2020

**RE:** 8419

**SUBJECT:** Parking and Traffic Assessment - Proposed Residential Development  
50 Bishop Allen Drive, Cambridge, Massachusetts

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Vanasse & Associates, Inc. (VAI) has completed a Parking and Traffic Assessment of a proposed 22-unit residential development to be located at 50 Bishop Allen Drive in Cambridge, Massachusetts (Project). The site currently accommodates 11 units. Contained within this memorandum is a parking supply and demand analysis, estimated trip generation by mode split, and a recommended Travel Demand Management (TDM) plan.

#### **PARKING SUPPLY AND DEMAND ANALYSIS**

A comprehensive field inventory of the existing parking supply of the Project was conducted in December 2019. Figure 1 depicts the study area. The field inventory consisted of on-street parking by quantity and type (handicapped, permit only, and regulations). In conducting the parking analysis, the study area was subdivided into eighteen (18) distinct parking zones in order to identify parking trends occurring within the study area. Figure 2 identifies the total parking supply in the area which totals 534 parking spaces. Figure 3 depicts the residential permit parking spaces and unregulated spaces which consists of 455 spaces. Figure 4 depicts the location of MBTA stations, MBTA bus stops, car-sharing locations, and BLUEbike stations in relations to the site. As can be seen from Figure 4, the nearest MBTA subway station, MBTA bus stop, and BLUEbike station are 0.2 miles from the site which equates to a 4 minute walk. The nearest car-sharing station is approximately 120 feet from the site which equates to a 1 minute walk.

In order to determine the availability of parking spaces, a parking demand survey was conducted during a typical weekday (December 10, 2019 to December 11, 2019). Parking observations were recorded at 12:00 Noon, 10:00 PM, and 6:00 AM. The parking observations identified the number of vacant spaces within the parking survey area. Table 1 and Figure 5 summarize the parking demand observations for the available resident parking.





Source: Google-Earth.  
0 225 450 Scale in Feet

Figure 1

Parking Study Area



**Legend:**

- Permit Only
- No Parking
- Loading Zone
- Handicap Parking
- 2 Hour Metered Parking (8AM - 6PM) Except Sundays
- 30 Minute Parking (8AM - 8PM) Except Sundays
- 2 Hour Metered Parking (9AM - 5PM) Except Saturdays and Sundays
- 2 Hour Metered Parking (8AM - 8PM) Except Sundays
- 2 Hour Parking (8AM - 6PM) Except Sundays
- 2 Hour Parking (8AM - 8PM) Except Sundays / Permit Only (8PM - 8AM)
- No Parking School Day Only
- Pick Up Drop Off Only (7AM - 4PM) Except Saturdays and Sundays
- Reserved for Construction
- No Regulations
- On-Street Parking Spaces



Source: Google Earth. 1:5 2:0 Scale in Feet

Figure 2

Existing Parking Supply



Zone	PARKING BY PERMIT ONLY INVENTORY	
	Permit Parking/ No Regulation	Handicap
1	20	0
2	31	0
3	24	0
4	27	0
5	8	0
6	26	5
7	43	0
8	33	0
9	23	1
10	48	0
11	46	2
12	18	0
13	24	0
14	20	0
15	6	0
16	4	0
17	22	0
18	21	3
TOTAL	444	11

**Legend:**

- XX On-Street Parking Space
- XX Zone Designation



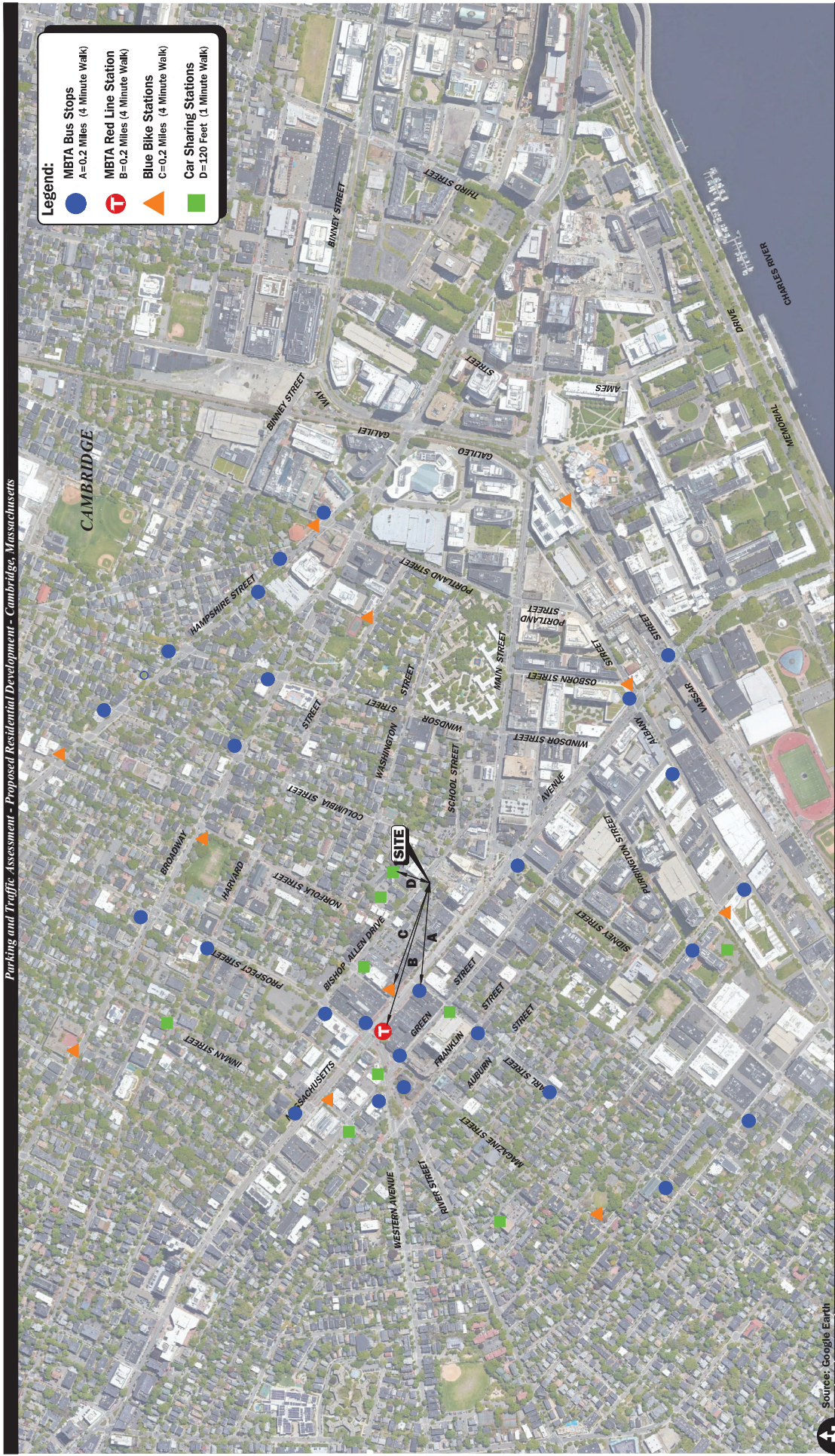
Source: Google Earth.  
 0 225 450 Scale in Feet

**Figure 3**  
 Parking Inventory



**Legend:**

- MBTA Bus Stops  
A=0.2 Miles (4 Minute Walk)
- T MBTA Red Line Station  
B=0.2 Miles (4 Minute Walk)
- ▲ Blue Bike Stations  
C=0.2 Miles (4 Minute Walk)
- Car Sharing Stations  
D=120 Feet (1 Minute Walk)



**Figure 4**  
Alternative Transportation Services

Source: Google Earth  
300 600 Scale in Feet





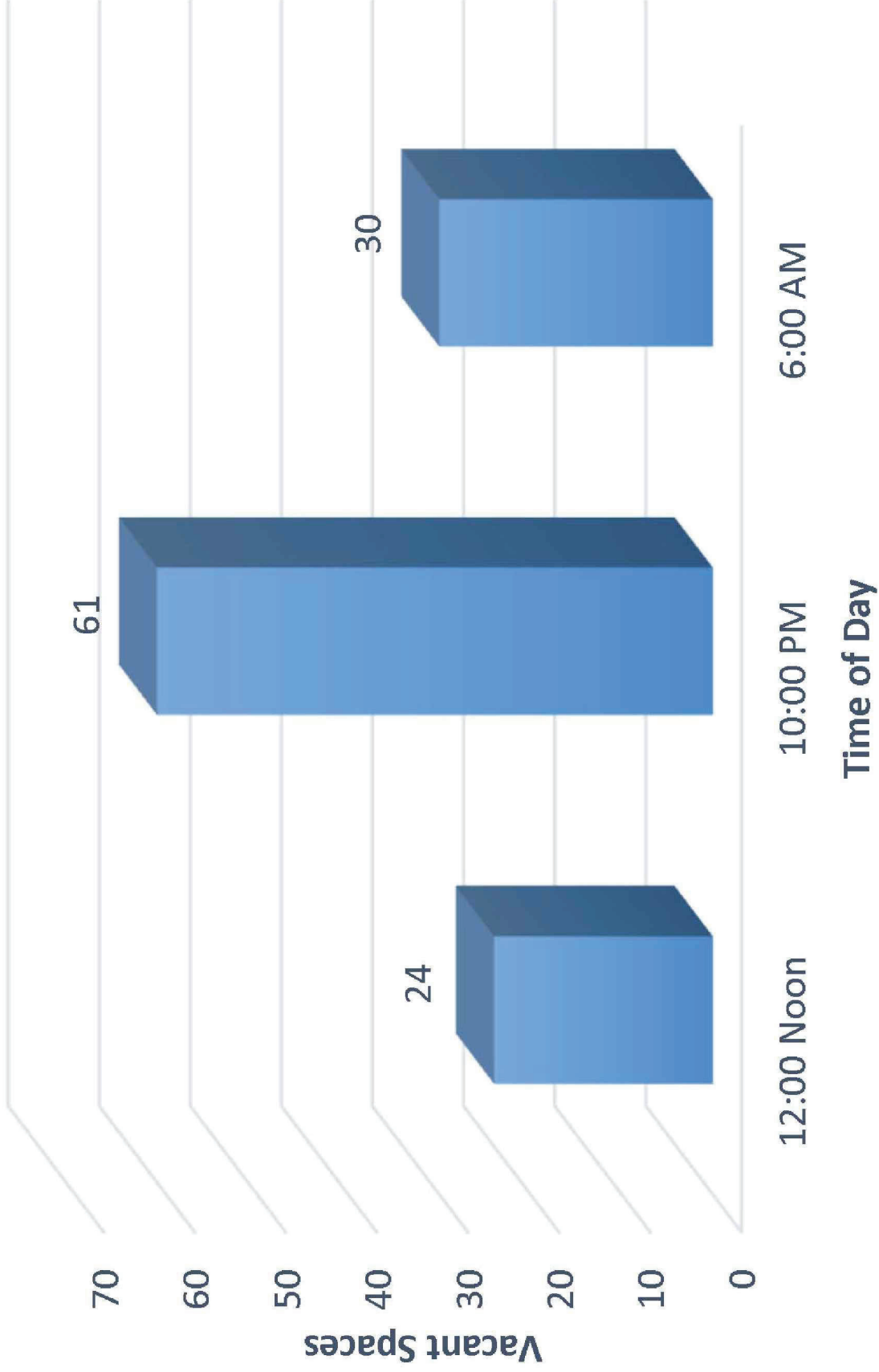


Figure 5

Parking Chart

**Table 1**  
**CAMBRIDGE PARKING DEMAND OBSERVATIONS**  
**December 10, 2019 to December 11, 2019**

Zone	Parking Supply	Vacant Spaces		
		6:00 AM	12:00 PM	10:00 PM
1	20	0	0	2
2	31	2	2	6
3	24	0	0	12
4	27	4	3	5
5	8	0	0	1
6	31	0	2	0
7	43	3	1	2
8	33	3	1	5
9	24	1	1	3
10	48	4	2	8
11	48	8	3	9
12	18	0	2	0
13	24	1	4	1
14	20	1	1	3
15	6	0	0	1
16	4	1	0	0
17	22	1	0	2
18	24	1	2	1
<b>TOTAL</b>	<b>455</b>	<b>30</b>	<b>24</b>	<b>61</b>

As shown in Table 1 and Figure 5 the peak hour demand occurs at 6:00 AM when 24 spaces were vacant.

The Project is proposing to only have on-street parking. By not providing parking, the Project impact will be minimized as auto ownership will be discouraged. Auto ownership is expected at 0.50 vehicles per unit and with 11 new units the new demand will be 6 spaces. Zoning requires one space per unit. Typical residential peak parking occurs after 10:00PM. Based upon the above, there is more than adequate on-street parking to accommodate the Project.

**PROPOSED SITE TRIP GENERATION**

Traffic volumes expected to be generated by the Project were determined by using the ITE *Trip Generation Manual*<sup>1</sup> Land Use Code (LUC) 221, Multifamily Housing (Mid-Rise). The existing building on-site contains 11 units and the Project entails constructing a new building containing 22 units. Therefore, the net increase in the number of units for the site is 11 which is what was used to determine the expected increase in site generated traffic. It is expected that a significant portion of the residents of the Project will utilize alternative modes of transportation other than automobiles. Based upon the U.S. Census the total

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<sup>1</sup>*Trip Generation Manual, 10<sup>th</sup> Edition*; Institute of Transportation Engineers; Washington, DC; 2017.

mode split of the Project is estimated as follows: 22 percent automobile trips; 36 percent transit; 32 percent pedestrian; 10 percent bicycle/other trips.

The Project trip generation by mode is summarized in Table 2.

**Table 2  
PROJECT TRIP GENERATION SUMMARY**

Time Period/Direction	Person Trips – 11 Unit Increase						
	Vehicle Trips <sup>a</sup> (A)	Person Trips <sup>b</sup> (B = A*1.06)	Auto Trips <sup>c</sup> (C)	Transit Trips <sup>d</sup> (D)	Walk Trips <sup>e</sup> (E)	Bicycle/ Others Trips <sup>f</sup> (F)	New Vehicle Trips <sup>g</sup> (G=C/1.02)
<i>Average Weekday Daily:</i>	60	64	14	24	20	6	14
<i>Weekday Morning Peak Hour:</i>							
Entering							
Exiting	1	1	0	1	0	0	0
Total	<u>3</u>	<u>3</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>1</u>
	4	4	1	2	1	0	1
<i>Weekday Evening Peak Hour:</i>							
Entering							
Exiting	3	3	1	1	1	0	1
Total	<u>2</u>	<u>2</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>
	5	5	1	2	2	0	1

<sup>a</sup>Based on ITE LUC 221 Multifamily Housing (Mid-Rise), for 11 units.

<sup>b</sup>Converted to person trips using American Community Survey 2017 5-year estimates for U.S. – 1.06 persons per vehicle.

<sup>c</sup>22 percent of total person trips

<sup>d</sup>36 percent of total person trips.

<sup>e</sup>32 percent of total person trips.

<sup>f</sup>10 percent of total person trips.

<sup>g</sup>Converted to vehicle trips using American Community Survey 2017 5-year estimates for U.S. Census Tract 3531.01. – 1.02 persons per vehicle.

As can be seen in Table 2, the Project is expected to generate approximately 14 new vehicle trips on an average weekday (7 entering/7 exiting), with approximately 1 new vehicle trips (0 entering/1 exiting) expected during the weekday morning peak-hour. During the weekday evening peak hour, the Project is expected to generate approximately 1 new vehicle trips (1 entering/0 exiting).

**TRANSPORTATION DEMAND MANAGEMENT (TDM)**

Reducing the amount of traffic generated by the Project is an important component of the development plan. The goal of the TDM plan is to reduce the use of Single Occupant Vehicles by encouraging car/vanpooling, bicycle commuting, the use of public transportation and pedestrian travel. The following measures will be implemented as a part of the proposed project management team in an effort to reduce the number of vehicle trips generated:

- In order to encourage the use of public transportation, the property management team will make available public transportation schedules, which will be posted in a centralized location for residents.

- In order to encourage car/vanpooling, the property management team will coordinate with MassRIDES and the Charles River Transportation Management Association (CRTMA) to identify car/vanpool resources that may be available to residents. This information will be posted in a centralized location.
- The property management team will investigate joining the CRTMA. The CRTMA could provide a ridematching program among the residents.
- The property management team will provide information on available pedestrian and bicycle facilities in the vicinity of the project site. This information will be posted in a centralized location.
- Bicycle racks will be provided on-site.
- Upon initial move-in and lease renewal, residents will be offered the choice of: (1) annual HUBWAY membership (including one-time discounted helmet through Hubway), (2) \$90 credit for ride share service; (3) 1-month adult MBTA Monthly LinkPass, and/or (4) 3-month Student or Senior Monthly LinkPass.

The above strategies will encourage non-auto travel by the residents.

## **SUMMARY**

In summary, a detailed parking survey was completed in the area of the Project and based upon this data it can be concluded that there is more than sufficient availability of on-street parking to accommodate the Project. The Project proponent is committed to implementing a Travel Demand Management plan which promotes alternatives modes of transportation and will minimize the Project's impact on available on-street parking and traffic in the area.



## APPENDIX

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### TRIP GENERATION CALCULATIONS

## TRIP GENERATION CALCULATIONS

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**Institute of Transportation Engineers (ITE)**  
**Trip Generation, 10th Edition**  
**Land Use Code (LUC) 221 - Multifamily Housing (Mid-Rise)**

Average Vehicle Trips Ends vs: Dwelling Units  
Independent Variable (X): 11

**AVERAGE WEEKDAY DAILY**

$$T = 5.44 * (X)$$

$$T = 5.44 * 11$$

$$T = 59.84$$

$$T = 60.00$$

$$T = 60 \text{ vehicle trips}$$

with 50% ( 30 vpd) entering and 50% ( 30 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 0.36 * (X)$$

$$T = 0.36 * 11$$

$$T = 3.96$$

$$T = 4 \text{ vehicle trips}$$

with 26% ( 1 vph) entering and 74% ( 3 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 0.44 * (X)$$

$$T = 0.44 * 11$$

$$T = 4.84$$

$$T = 5.00$$

$$T = 5 \text{ vehicle trips}$$

with 61% ( 3 vph) entering and 39% ( 2 vph) exiting.

**AVERAGE SATURDAY**

$$T = 4.91 * (X)$$

$$T = 4.91 * 11$$

$$T = 54.01$$

$$T = 54.00$$

$$T = 54 \text{ vehicle trips}$$

with 50% ( 27 vpd) entering and 50% ( 27 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

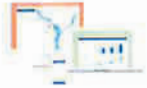
$$T = 0.44 * (X)$$

$$T = 0.44 * 11$$

$$T = 4.84$$

$$T = 5 \text{ vehicle trips}$$

with 49% ( 2 vph) entering and 51% ( 3 vph) exiting.



As of July 1, 2019 [data.census.gov](https://data.census.gov) is now the primary way to access Census Bureau data, including the latest releases from the 2018 American Community Survey and 2017 Economic Census and the upcoming 2020 Census and more. American FactFinder will be decommissioned in 2020.

Read more about the [Census Bureau's transition to data.census.gov](https://www.census.gov/newsroom/press-releases/2018/08/08-01-2018.html).

S0801

**COMMUTING CHARACTERISTICS BY SEX**  
2013-2017 American Community Survey 5-Year Estimates

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the [Technical Documentation](#) section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the [Methodology](#) section.

Versions of this table are available for the following years:

**2017**  
**2016**  
**2015**  
**2014**  
**2013**  
**2012**  
**2011**  
**2010**

1 - 57 of 57	Subject	Census Tract 3531.01, Middlesex County, Massachusetts					
		Total		Male		Female	
		Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
	Workers 16 years and over	1,603	+/-216	847	+/-165	756	+/-184
	<b>MEANS OF TRANSPORTATION TO WORK</b>						
	Car, truck, or van	22.6%	+/-7.5	23.8%	+/-9.8	21.3%	+/-9.5
	Drove alone	22.0%	+/-7.5	23.8%	+/-9.8	20.0%	+/-9.1
	Carpooled	0.6%	+/-0.8	0.0%	+/-4.0	1.3%	+/-1.6
	In 2-person carpool	0.2%	+/-0.4	0.0%	+/-4.0	0.4%	+/-0.9
	In 3-person carpool	0.0%	+/-2.2	0.0%	+/-4.0	0.0%	+/-4.5
	In 4-or-more person carpool	0.4%	+/-0.7	0.0%	+/-4.0	0.9%	+/-1.4
	Workers per car, truck, or van	1.02	+/-0.03	1.01	+/-0.04	1.04	+/-0.08
	Public transportation (excluding taxicab)	35.6%	+/-6.6	26.3%	+/-8.6	45.9%	+/-10.1
	Walked	32.4%	+/-7.3	38.3%	+/-11.0	25.9%	+/-8.3
	Bicycle	6.7%	+/-3.4	8.5%	+/-4.8	4.6%	+/-4.0
	Taxicab, motorcycle, or other means	0.0%	+/-2.2	0.0%	+/-4.0	0.0%	+/-4.5
	Worked at home	2.7%	+/-2.1	3.1%	+/-3.1	2.2%	+/-2.9
	<b>PLACE OF WORK</b>						
	Worked in state of residence	99.6%	+/-0.6	99.3%	+/-1.1	100.0%	+/-4.5
	Worked in county of residence	66.0%	+/-6.5	66.1%	+/-7.9	65.9%	+/-10.5
	Worked outside county of residence	33.6%	+/-6.5	33.2%	+/-8.0	34.1%	+/-10.5
	Worked outside state of residence	0.4%	+/-0.6	0.7%	+/-1.1	0.0%	+/-4.5
	Living in a place	100.0%	+/-2.2	100.0%	+/-4.0	100.0%	+/-4.5
	Worked in place of residence	41.2%	+/-8.1	44.4%	+/-12.3	37.7%	+/-11.1
	Worked outside place of residence	58.8%	+/-8.1	55.6%	+/-12.3	62.3%	+/-11.1
	<b>Not living in a place</b>	0.0%	+/-2.2	0.0%	+/-4.0	0.0%	+/-4.5
	Living in 12 selected states	100.0%	+/-2.2	100.0%	+/-4.0	100.0%	+/-4.5
	Worked in minor civil division of residence	41.2%	+/-8.1	44.4%	+/-12.3	37.7%	+/-11.1
	Worked outside minor civil division of residence	58.8%	+/-8.1	55.6%	+/-12.3	62.3%	+/-11.1
	Not living in 12 selected states	0.0%	+/-2.2	0.0%	+/-4.0	0.0%	+/-4.5
	Workers 16 years and over who did not work at home	1,560	+/-217	821	+/-171	739	+/-181
	<b>TIME LEAVING HOME TO GO TO WORK</b>						
	12:00 a.m. to 4:59 a.m.	1.0%	+/-1.6	1.9%	+/-2.9	0.0%	+/-4.6
	5:00 a.m. to 5:29 a.m.	0.4%	+/-0.6	0.7%	+/-1.2	0.0%	+/-4.6
	5:30 a.m. to 5:59 a.m.	1.0%	+/-1.0	0.5%	+/-0.9	1.5%	+/-1.8
	6:00 a.m. to 6:29 a.m.	2.1%	+/-1.5	2.2%	+/-2.2	2.0%	+/-2.1
	6:30 a.m. to 6:59 a.m.	5.8%	+/-3.3	6.7%	+/-4.9	4.7%	+/-3.7
	7:00 a.m. to 7:29 a.m.	8.0%	+/-4.0	9.6%	+/-5.0	6.2%	+/-4.6
	7:30 a.m. to 7:59 a.m.	10.3%	+/-3.6	3.3%	+/-2.4	18.0%	+/-7.4
	8:00 a.m. to 8:29 a.m.	19.6%	+/-8.0	14.3%	+/-4.8	25.6%	+/-14.9
	8:30 a.m. to 8:59 a.m.	14.8%	+/-4.9	19.9%	+/-5.5	9.2%	+/-6.3
	9:00 a.m. to 11:59 p.m.	37.1%	+/-7.6	40.9%	+/-6.6	32.7%	+/-12.1
	<b>TRAVEL TIME TO WORK</b>						
	Less than 10 minutes	17.8%	+/-4.7	23.9%	+/-6.0	11.1%	+/-5.3
	10 to 14 minutes	16.4%	+/-4.9	16.9%	+/-6.2	15.8%	+/-8.6
	15 to 19 minutes	14.9%	+/-4.9	13.9%	+/-6.0	16.1%	+/-7.7
	20 to 24 minutes	8.3%	+/-3.5	7.1%	+/-4.3	9.6%	+/-6.5
	25 to 29 minutes	12.3%	+/-4.6	11.0%	+/-5.8	13.8%	+/-7.1
	30 to 34 minutes	13.5%	+/-4.7	13.0%	+/-6.1	14.1%	+/-6.9
	35 to 44 minutes	11.4%	+/-4.2	10.8%	+/-4.4	12.0%	+/-7.0
	45 to 59 minutes	1.9%	+/-1.3	1.5%	+/-1.5	2.4%	+/-2.1
	60 or more minutes	3.4%	+/-2.1	1.9%	+/-1.9	5.0%	+/-3.4
	Mean travel time to work (minutes)	21.3	+/-1.9	19.0	+/-1.9	23.8	+/-2.8
	<b>VEHICLES AVAILABLE</b>						

Subject	Census Tract 3531.01, Middlesex County, Massachusetts					
	Total		Male		Female	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Workers 16 years and over in households	1,386	+/-204	748	+/-153	638	+/-165
No vehicle available	39.0%	+/-11.0	34.1%	+/-12.1	44.7%	+/-15.1
1 vehicle available	42.7%	+/-10.3	43.0%	+/-12.0	42.3%	+/-13.8
2 vehicles available	17.7%	+/-10.2	22.6%	+/-14.8	11.9%	+/-9.4
3 or more vehicles available	0.6%	+/-1.8	0.3%	+/-1.0	1.1%	+/-2.8
<b>PERCENT ALLOCATED</b>						
Means of transportation to work	29.7%	(X)	(X)	(X)	(X)	(X)
Private vehicle occupancy	41.3%	(X)	(X)	(X)	(X)	(X)
Place of work	33.6%	(X)	(X)	(X)	(X)	(X)
Time leaving home to go to work	41.3%	(X)	(X)	(X)	(X)	(X)
Travel time to work	41.0%	(X)	(X)	(X)	(X)	(X)
Vehicles available	2.7%	(X)	(X)	(X)	(X)	(X)

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

#### Explanation of Symbols:

An "N" entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.

An "-" entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.

An "-" following a median estimate means the median falls in the lowest interval of an open-ended distribution.

An "+" following a median estimate means the median falls in the upper interval of an open-ended distribution.

An "N" entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.

An "\*\*\*\*\*" entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.

An "N" entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.

An "(X)" means that the estimate is not applicable or not available.

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

The 12 selected states are Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Wisconsin.

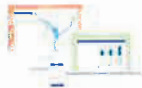
Workers include members of the Armed Forces and civilians who were at work last week.

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While the 2013-2017 American Community Survey (ACS) data generally reflect the February 2013 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

Estimates of urban and rural populations, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.





As of July 1, 2019 [data.census.gov](https://data.census.gov) is now the primary way to access Census Bureau data, including the latest releases from the 2018 American Community Survey and 2017 Economic Census and the upcoming 2020 Census and more. American FactFinder will be decommissioned in 2020.

Read more about the [Census Bureau's transition to data.census.gov](#).

**S0801** | **COMMUTING CHARACTERISTICS BY SEX**  
2013-2017 American Community Survey 5-Year Estimates

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the [Technical Documentation](#) section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the [Methodology](#) section.

Versions of this table are available for the following years:

- [2017](#)
- [2016](#)
- [2015](#)
- [2014](#)
- [2013](#)
- [2012](#)
- [2011](#)
- [2010](#)
- [2009](#)

1 57 of 57	Subject	United States					
		Total		Male		Female	
		Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
	Workers 16 years and over	148,432,042	+/-153,416	78,647,149	+/-79,166	69,784,893	+/-81,719
	<b>MEANS OF TRANSPORTATION TO WORK</b>						
	Car, truck, or van	85.6%	+/-0.1	85.6%	+/-0.1	85.6%	+/-0.1
	Drove alone	76.4%	+/-0.1	76.4%	+/-0.1	76.5%	+/-0.1
	Carpooled	9.2%	+/-0.1	9.3%	+/-0.1	9.0%	+/-0.1
	In 2-person carpool	7.0%	+/-0.1	7.0%	+/-0.1	7.0%	+/-0.1
	In 3-person carpool	1.3%	+/-0.1	1.3%	+/-0.1	1.3%	+/-0.1
	In 4-or-more person carpool	0.9%	+/-0.1	1.0%	+/-0.1	0.8%	+/-0.1
	Workers per car, truck, or van	1.06	+/-0.01	1.06	+/-0.01	1.06	+/-0.01
	Public transportation (excluding taxicab)	5.1%	+/-0.1	4.8%	+/-0.1	5.4%	+/-0.1
	Walked	2.7%	+/-0.1	2.8%	+/-0.1	2.7%	+/-0.1
	Bicycle	0.6%	+/-0.1	0.8%	+/-0.1	0.3%	+/-0.1
	Taxicab, motorcycle, or other means	1.2%	+/-0.1	1.5%	+/-0.1	1.0%	+/-0.1
	Worked at home	4.7%	+/-0.1	4.5%	+/-0.1	5.0%	+/-0.1
	<b>PLACE OF WORK</b>						
	Worked in state of residence	96.3%	+/-0.1	95.6%	+/-0.1	97.0%	+/-0.1
	Worked in county of residence	72.4%	+/-0.1	70.0%	+/-0.1	75.1%	+/-0.1
	Worked outside county of residence	23.9%	+/-0.1	25.7%	+/-0.1	21.9%	+/-0.1
	Worked outside state of residence	3.7%	+/-0.1	4.4%	+/-0.1	3.0%	+/-0.1
	Living in a place	75.1%	+/-0.1	74.6%	+/-0.1	75.5%	+/-0.1
	Worked in place of residence	31.4%	+/-0.1	29.7%	+/-0.1	33.4%	+/-0.1
	Worked outside place of residence	43.6%	+/-0.1	45.0%	+/-0.1	42.1%	+/-0.1
	Not living in a place	24.9%	+/-0.1	25.4%	+/-0.1	24.5%	+/-0.1
	Living in 12 selected states	25.0%	+/-0.1	24.5%	+/-0.1	25.6%	+/-0.1
	Worked in minor civil division of residence	7.6%	+/-0.1	7.1%	+/-0.1	8.3%	+/-0.1
	Worked outside minor civil division of residence	17.4%	+/-0.1	17.4%	+/-0.1	17.3%	+/-0.1
	Not living in 12 selected states	75.0%	+/-0.1	75.5%	+/-0.1	74.4%	+/-0.1
	Workers 16 years and over who did not work at home	141,404,632	+/-164,332	75,118,548	+/-90,747	66,286,084	+/-81,356
	<b>TIME LEAVING HOME TO GO TO WORK</b>						
	12:00 a.m. to 4:59 a.m.	4.6%	+/-0.1	6.1%	+/-0.1	2.9%	+/-0.1
	5:00 a.m. to 5:29 a.m.	3.9%	+/-0.1	5.2%	+/-0.1	2.4%	+/-0.1
	5:30 a.m. to 5:59 a.m.	4.9%	+/-0.1	6.0%	+/-0.1	3.6%	+/-0.1
	6:00 a.m. to 6:29 a.m.	8.9%	+/-0.1	10.5%	+/-0.1	7.0%	+/-0.1
	6:30 a.m. to 6:59 a.m.	9.8%	+/-0.1	10.2%	+/-0.1	9.4%	+/-0.1
	7:00 a.m. to 7:29 a.m.	14.7%	+/-0.1	14.0%	+/-0.1	15.5%	+/-0.1
	7:30 a.m. to 7:59 a.m.	12.5%	+/-0.1	10.6%	+/-0.1	14.6%	+/-0.1
	8:00 a.m. to 8:29 a.m.	11.0%	+/-0.1	9.9%	+/-0.1	12.3%	+/-0.1
	8:30 a.m. to 8:59 a.m.	5.4%	+/-0.1	4.4%	+/-0.1	6.4%	+/-0.1
	9:00 a.m. to 11:59 p.m.	24.4%	+/-0.1	23.0%	+/-0.1	25.9%	+/-0.1
	<b>TRAVEL TIME TO WORK</b>						
	Less than 10 minutes	12.7%	+/-0.1	11.8%	+/-0.1	13.7%	+/-0.1
	10 to 14 minutes	13.6%	+/-0.1	12.7%	+/-0.1	14.6%	+/-0.1
	15 to 19 minutes	15.3%	+/-0.1	14.6%	+/-0.1	16.0%	+/-0.1
	20 to 24 minutes	14.6%	+/-0.1	14.3%	+/-0.1	14.9%	+/-0.1
	25 to 29 minutes	6.4%	+/-0.1	6.3%	+/-0.1	6.4%	+/-0.1
	30 to 34 minutes	13.7%	+/-0.1	14.2%	+/-0.1	13.1%	+/-0.1
	35 to 44 minutes	6.8%	+/-0.1	7.1%	+/-0.1	6.5%	+/-0.1
	45 to 59 minutes	8.1%	+/-0.1	8.7%	+/-0.1	7.5%	+/-0.1
	60 or more minutes	8.9%	+/-0.1	10.3%	+/-0.1	7.3%	+/-0.1
	Mean travel time to work (minutes)	26.4	+/-0.1	27.8	+/-0.1	24.7	+/-0.1
	<b>VEHICLES AVAILABLE</b>						

Subject	United States					
	Total		Male		Female	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Workers 16 years and over in households	146,982,992	+/-156,459	77,847,868	+/-81,086	69,135,124	+/-83,114
No vehicle available	4.4%	+/-0.1	4.2%	+/-0.1	4.5%	+/-0.1
1 vehicle available	20.9%	+/-0.1	18.7%	+/-0.1	23.3%	+/-0.1
2 vehicles available	41.2%	+/-0.1	42.3%	+/-0.1	40.0%	+/-0.1
3 or more vehicles available	33.5%	+/-0.1	34.8%	+/-0.1	32.2%	+/-0.1
<b>PERCENT ALLOCATED</b>						
Means of transportation to work	9.4%	(X)	(X)	(X)	(X)	(X)
Private vehicle occupancy	10.6%	(X)	(X)	(X)	(X)	(X)
Place of work	12.6%	(X)	(X)	(X)	(X)	(X)
Time leaving home to go to work	19.5%	(X)	(X)	(X)	(X)	(X)
Travel time to work	14.1%	(X)	(X)	(X)	(X)	(X)
Vehicles available	1.2%	(X)	(X)	(X)	(X)	(X)

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

**Explanation of Symbols:**

An '\*\*\*' entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.

An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.

An '-' following a median estimate means the median falls in the lowest interval of an open-ended distribution.

An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.

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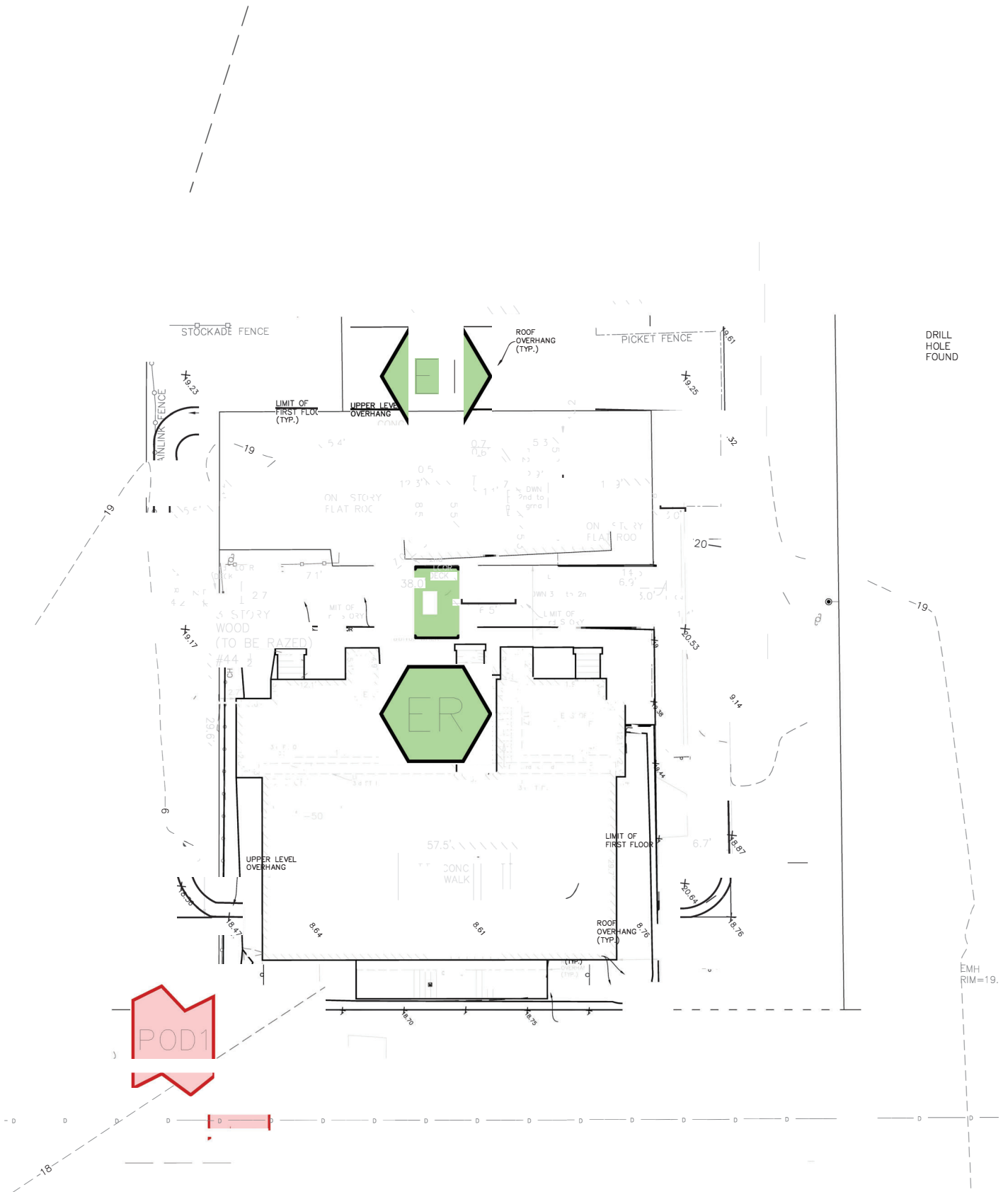
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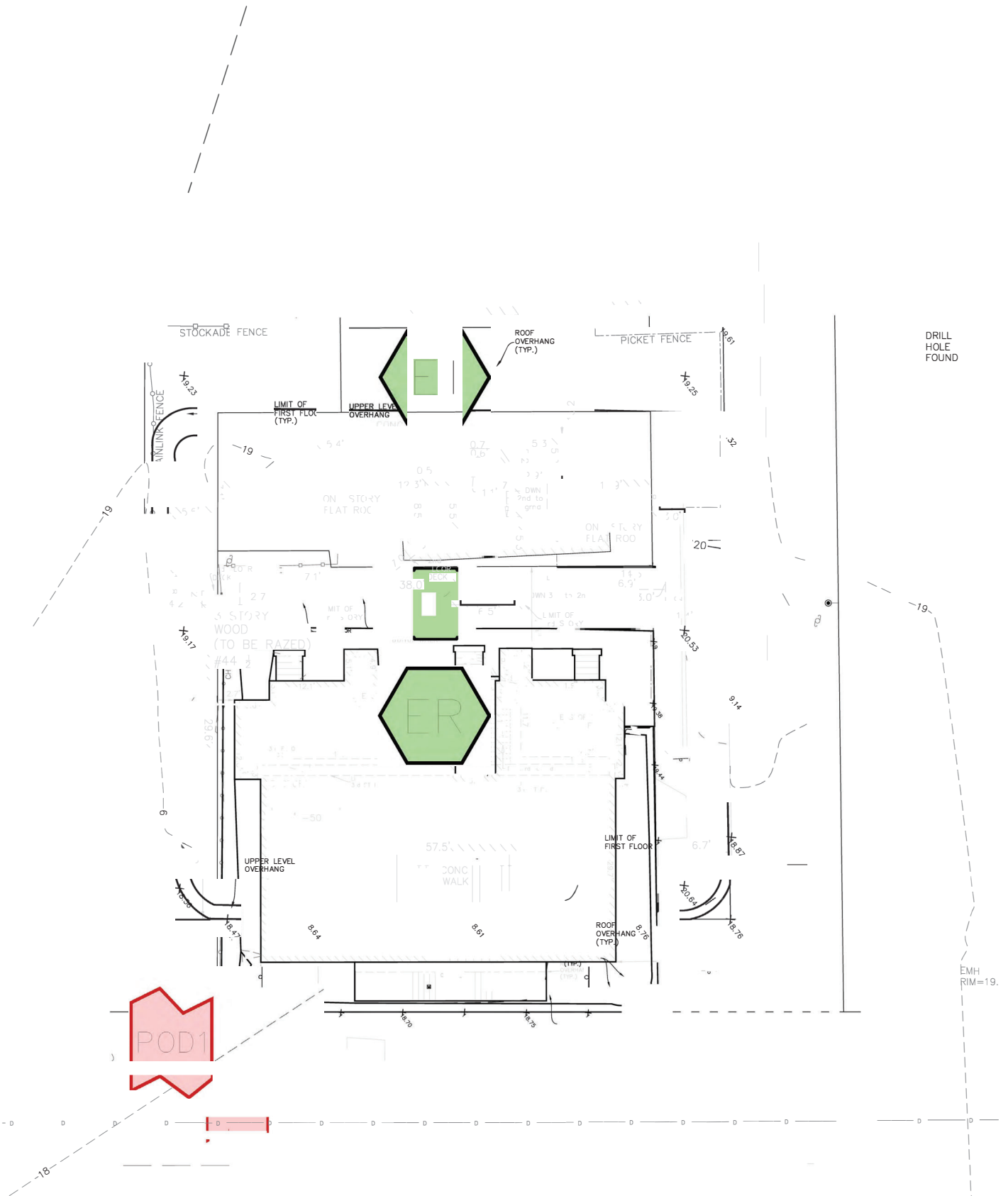
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# APPENDIX C



PRE-DEVELOPMENT CONDITIONS





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