

Report to Annual Town Meeting 2017
Electric Vehicle Charging Station Sub-Committee
Selectmen's Climate Action Committee
April 20, 2017

1) Introduction

Electric vehicles are gaining in popularity and represent a significant environmental improvement over internal combustion engines. A Union of Concerned Scientists study¹ published in 2015 concluded that a car running on electricity, even when factoring in the power plant emissions for the electricity used and the manufacture of the vehicle, produces emissions equivalent to a gas-powered car getting 87 mpg. This environmental performance advantage will only grow as renewable energy becomes a larger portion of our energy portfolio. In Massachusetts, we've seen growth in the availability of EV charging infrastructure, as reported in the Boston Globe² there are over 600 alternative fueling stations in Massachusetts, the majority of which provide EV charging today. In 2010 there were only 10 such stations. A common acronym, EVSE, (electric vehicle supply equipment), refers to the charging stations necessary to "fuel" both BEV's (Battery-electric vehicles) and PHEV's (plug-in hybrid electric vehicles), both of which can use the same charging equipment.

Brookline's Special Town Meeting in Fall 2016 considered three Warrant Articles (#16, 17 & 18), relating to electric vehicle charging stations in the Town of Brookline. These three articles were submitted by C. Scott Ananian, TMM pct. 10, via citizen petition.

- Article 16, a resolution regarding responsibility for Town-owned charging stations was withdrawn prior to Town Meeting, as the issue it addressed was resolved prior to Town Meeting.
- Article 17 sought to amend the Town's Zoning By-law to require a certain number of parking spaces to be "EV-ready", meaning the wiring and electrical capacity necessary for EV charging would be required, but the proposal did not require the installation of the charging station itself.
- Article 18, a resolution urging the Selectmen to petition for a change to the State Electrical Building Code to include EV-ready requirements.

Both Article 17 and 18 were referred to the Selectmen's Climate Action Committee by vote of Town Meeting. In response to this referral, the SCAC established a Sub-Committee, chaired by Linda Olson Pehlke to study the question of how best to expand the availability of EV charging stations or EVSE in Brookline. Fellow SCAC member David Lescohier was appointed to the committee as well. The committee meetings were also attended by SCAC co-chairs Werner Lohe and Nancy Heller, Town staff, and persons with professional expertise and interest in EV's and EV charging. Please see Appendix A for a full list of the committee's contributors and

¹ <http://www.ucsusa.org/clean-vehicles/electric-vehicles/life-cycle-ev-emissions#.WOat4Y61uRs>

² "Alternative Fuel Stations on the Rise", Boston Globe, by Matt Rocheleau, March 28, 2017 pg. B2

participants. This report outlines the work product and recommendations of this committee to date.

Prior to the Fall 2016 Town Meeting, concerns were raised about the broad applicability of the EV-ready zoning requirements proposed in Article 17, which were seen as being potentially onerous for home owners or small businesses making small repairs or changes to their properties. Review revealed one problem with using zoning to proliferate EV charging infrastructure, namely, that zoning must apply uniformly to both existing and new development.

The Committee soon became aware of the multi-faceted and complex nature of seeking to expand the availability of EVSE (Electric Vehicle Supply Equipment) in Brookline. The Committee examined the following topics:

1. Current status and future plans for town-owned EVSE.
2. Private ownership of EV's and EVSE.
3. Evaluation of existing parking facilities for EVSE deployment.
4. Availability of grants and incentives for purchasing EV and EVSE.
5. Current Brookline EV permitting and regulatory mechanisms.
6. State and Federal level regulatory environment, including: legislation, potential Building Code amendments, Eversource programs, fees and incentives.
7. Examples of other municipal by-laws and codes related to EVSE.
8. Potential regulatory mechanisms within Brookline's Zoning By-law and permitting process for incentivizing or requiring EVSE.
9. Identifying challenges unique to Brookline, such as the high proportion of rental and multi-family housing as well as a large number of residents who rent parking off-site, a group we identified as the "garage orphans" and the overnight parking ban.
10. Analyzed the Parking Survey data collected by the Moderator's Parking Committee to determine approximate location of off-site overnight parking demand, (garage orphans).

2) Conclusions and Recommendations

Time constraints did not allow the Sub-Committee to be in a position to advance a Warrant Article for the Spring 2017 Town Meeting. However, we have developed a fairly detailed set of recommendations for further consideration and implementation.

1) Amend Transportation Access Plan guidelines to encourage EVSE installation so that major impact projects better meet the parking needs of users and occupants. **Action: DPW would update TAP guidelines with provisions under parking management to encourage the installation of EVSE.**

2) Amend Zoning By-Law utilizing one of several possible alternative approaches, (See Section 8 for a more detailed discussion of a variety of regulatory approaches). One such approach would be to amend Article 6 – relating to off-street parking facilities, to require or encourage EVSE installation or EVSE-ready wiring for projects of a certain threshold size. **Action: Fall 2017 Warrant Article.**

3) Create a "Best Practices" resource to give employers and project developers with the following information:

- a) Description of the variety of potential billing & user management systems available for EVSE.

- b) Identifies potential sources for funding, tax incentives and grants for EV charging stations.
- c) Examples of successful EV infrastructure installations.
- d) Sample survey mechanisms for determining demand for EVSE.

Action: Survey existing “best-practices” resources, or possibly hire a consultant to create Brookline-specific resource.

4) Pursue all available funding sources and mechanisms for expanding Brookline’s public and private EV charging infrastructure. Action: Include new public EV Charging stations in the Town’s 2017 Green Communities Grant Request (completed). Identify additional suitable locations for EVSE, especially keeping our “garage orphan” situation in mind.

5) Encourage Building Department and Planning Department staff to ask for EV charging infrastructure within their review of building plans and permits. Action: Building Commissioner has made requests for EV charging infrastructure for recent new commercial developments, encourage this practice to continue.

6) Pursue an assessment of Brookline’s need for additional EV charging and make recommendations for location, type, and funding sources for future EV charging expansion. Action: Sub-Committee in discussion with a State-recommended EVSE consulting firm.

7) Advocate for adding a detailed definition of EV charging readiness to the State Building Code. This would aid local government’s efforts to add this requirement to local by-laws by standardizing the definition and specifications. **Action: Testify at BBRS hearings and send letter from the SCAC stating Brookline’s support for EV ready definition.** See Appendix B for letter from SCAC and detailed proposed edit from C. Scott Ananian.

8) Advocate for robust funding and support for EVSE in Eversource’s 17-05 rate filing. Encourage Eversource EVSE programs to take into account the unique challenges of rental, multi-family and “garage orphan” parking in Brookline. **Action: Testify at DPU hearings and send letter from SCAC stating Brookline’s support for robust funding for EV charging infrastructure in Eversource’s DPU rate filing.** See Appendix C for letter from SCAC.

9) Advocate for EV charging infrastructure funding and Zero-Emission vehicle standards at the State legislative level. Action: Advocate for State level solutions suitable for multi-family, rental and condominium properties. California has adopted legislation explicitly permitting EVSE installation in condominiums and rental properties.
https://www.driveclean.ca.gov/pev/Charging/Home_Charging/Multi-unit_Dwellings.php

10) Further analyze the potential for EV charging at open air parking facilities licensed by the Board of Selectmen. Action: Continue studying whether there are opportunities to incentivize EVSE installation in the open air parking licensing process.

3) Status of EV Charging in Brookline

Town Parking Lots: In the summer of 2011, the Town of Brookline utilized an Eversource rebate to purchase a total of three (3) EV charging stations, each capable of charging 2 vehicles. One of these EV charging stations was installed in the Town hall parking lot, and another was

installed in the Babcock public parking lot. The third EV charger was located in the Town hall garage to charge the Building Departments' electric vehicle. Unfortunately, no one staff person was assigned to maintain the EV stations and the grant funding did not include a maintenance contract. The originally installed ChargePoint stations used AT&T's 2G service for connectivity. AT&T began turning off this service in 2016, rendering these stations inoperable. In response to Article 16 at Fall 2016 Town Meeting, Brookline's Department of Public Works assumed responsibility for maintaining the EV charging stations. The Transportation Department is in the process of replacing the two public charging stations, which have been purchased with Eversource rebate funds and the MassEVIP grant program which includes a five-year maintenance contract. (See Section 5 for further information on this grant program).

The Town of Brookline was granted Green Community status in 2011, which made the Town eligible for grant funding from the Commonwealth to fund projects designed to reduce the Town's green house gas emissions. Funding for an additional three EV charging stations is currently being sought as part of the Town's 2017 Green Communities grant request. These three EV charging stations are planned for installation at the following parking lot locations: Centre St. East, Fuller St. and Kent/Webster.

Private Commercial & Academic Charging Stations: EV charging infrastructure is most beneficial when located where parkers remain for a sufficiently long period of time, which for a full charge with a Level II charging station is approximately 4 – 6 hours. Therefore, the best locations for EVSE (electric vehicle service equipment) are places of work and residence. Mr. Ted Steverman, the electrical inspector for the Town of Brookline estimates that approximately 50 homeowners have installed EVSE at their place of residence.

Many retail, hotel and academic locations in our area have EVSE, such as Trilogy in the Fenway, 333 Longwood garage, the Prudential Center, MIT campus, Residence Inn Fenway, Landmark Center 401 Park Dr., etc. There are plans for EVSE to be installed in the new garage being built for the Brookline Place development, as well as the new hotel at 25 Washington St. and the new B.U. theater at 800 Commonwealth Ave. The latter two installations are the result of a request from Mr. Daniel Bennett, the Town of Brookline's Building Commissioner.

4) Assessing Potential for EVSE Expansion in Brookline

To assess the potential for expanding access to EVSE in Brookline, the committee began by trying to get a better understanding of where and how Brookline residents stored their vehicles, especially overnight. That effort produced a partial inventory of available parking facilities in Brookline. We were able to get data on the number of town-owned public parking spaces, parking parcels and the number of spaces contained therein, as identified by the Assessor's database, and the number of rental parking spaces permitted through the Open Air parking licensing process. Privately owned commercial parking facilities that are accessory to a particular use are not included. Also, rental parking in the private market which is not licensed are not included. Because of our "garage orphan" situation, providing EVSE for on-street or other public parking spaces are a good place to start. There are some interesting domestic and international examples of on-street charging infrastructure, such as these street lamps in the UK which were converted to charging stations, <https://techcrunch.com/2017/04/10/char-gy-zaps-the-street-furniture-for-super-powers/>.

Inventory of Parking Facilities in Brookline

Historical Background

In 1896, Brookline Town Meeting voted to forbid parking on public streets: “No person shall occupy any part of any public street as storage room for carriages or other vehicles.” While Brookline was still relatively undeveloped and quite rural, and well before the widespread use of internal combustion and electric powered automobiles, there were already policies about the use of public streets for the storage of vehicles.

In the twenties, as Brookline became more developed, with more streets, more residents, and more vehicles; Town Meeting expanded the bylaw to say that: “No person shall repair, wash, or clean carriages or motor vehicles or cause them to be repaired, washed or cleaned in or on any public way of the town, nor shall any person occupy any part of any public way as storage room for a vehicle of any kind; except in an emergency, temporary repairs may be made.”

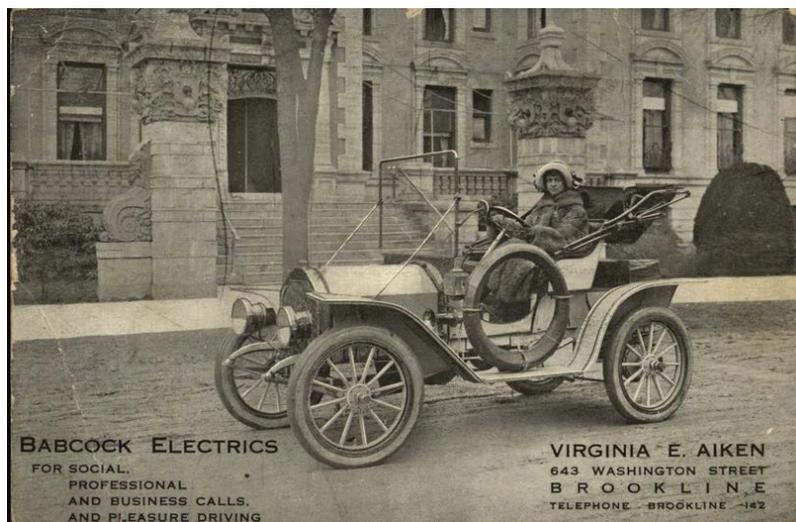
Electric vehicles were very much part of the mix of available vehicles in the early 1900’s as seen by these two examples from Brookline’s history.

An EV charging station and electric vehicle in the Corey Hill Garage on Winchester Street, 1915



Corey Hill Garage.

Virginia Aiken, promoting her electric vehicle company “Babcock Electrics” in 1912. See Ken Liss’s Muddy River Musings for the story of Brookline’s very own electric car company. <http://brooklinehistory.blogspot.com/2016/08/virginia-aiken-teenage-dealer-of.html>



After WW II into the fifties, ownership of vehicles came to be considered a necessity. This led to more regulation of parking and the construction of additional public parking. During this period, several cycles of study committee recommendations, town meeting articles, and home rule petitions seeking additional authority extended the town's capacity and authority to address the growing complexity of managing parking in Brookline. Responding to the demands of Brookline businesses, Brookline took steps to acquire additional land to construct parking lots. The Town converted the Olmsted designed Beacon Street Reservation bridle path into an angled parking area from St. Mary's, through Coolidge Corner and Washington Square, to Cleveland Circle. Arrangements for the regulation of parking continued to evolve until about 1975. Since 1975, the Transportation Board has been the primary agency formulating the evolving parking rules, regulations, and policies as the Town continues to respond to many trends, pressures, changing values, continuing growth, and greater expectations.

(For a detailed history, see "Vehicle Parking in Brookline"; Craig Bolon, August 2000.)

<http://www.brooklinema.gov/documentcenter/view/2348>

Among the factors that are today shaping the management of our public ways, parking, and transportation infrastructure is the need to reduce carbon emissions impacting the climate and global warming and an awareness of the harmful health impacts of pollution from vehicle emissions.

In order to transition from a fossil fuel powered transportation infrastructure to one using renewable energy, all motor vehicles must become electric. As the Town continues to manage, regulate, and plan for the public, as well as private, transportation and parking infrastructure the Town will likely encourage and construct additional public and private electric vehicle charging facilities, in response to the changing needs of Brookline's residents and visitors.

Parking Inventory

There are three principal types of parking facilities in Brookline:

- Public Parking
- Licensed Open Air Parking
- Private Parking, Assessor's Data

Public Parking

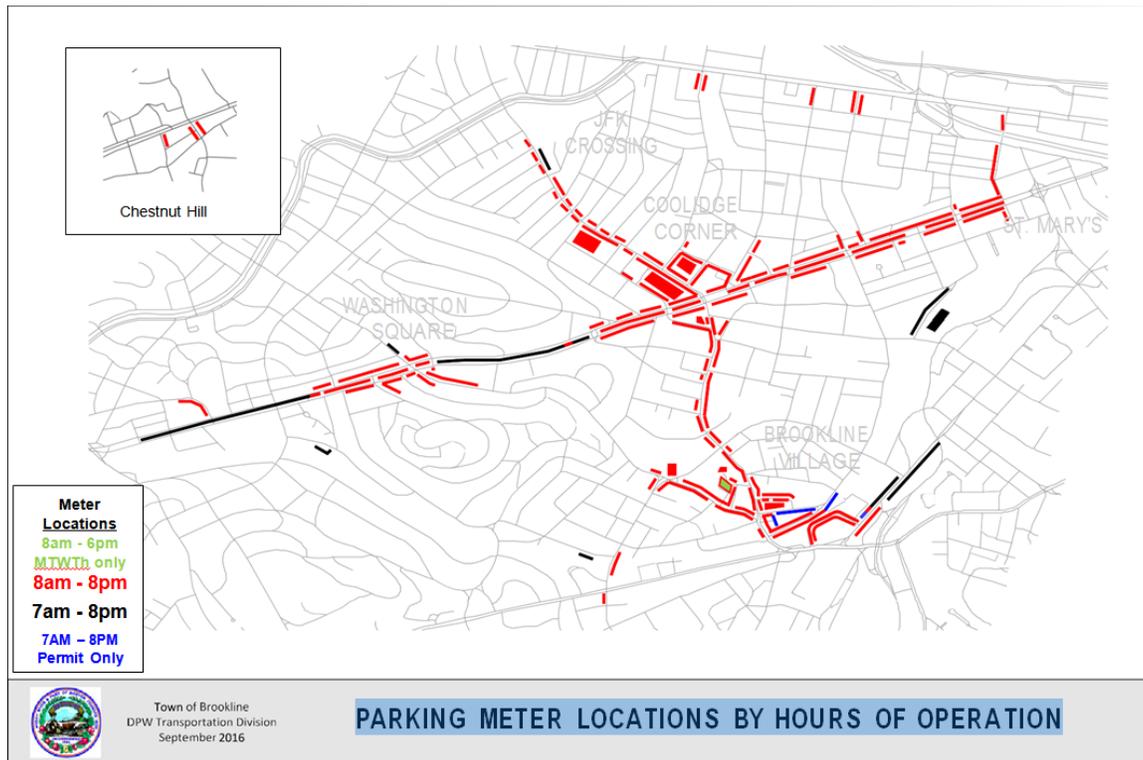
All of Brookline's parking regulations and policies stem from the 1896 street parking restriction bylaw. However, as each decade has meant more economic, demographic, and social change; the Town has added provisions that could not be imagined in 1896. These provisions have been adopted in recognition of the need to accommodate emerging concerns of residents and businesses. As the number of electric vehicles grows, there may be a growing demand for allocation of public parking resources to EV charging station use. From an environmental impact benefit standpoint, the Transportation Board may determine that installation of EV charging facilities on public ways or in public parking lots, particularly for those who would not have access otherwise (garage orphans) merits appropriate accommodation. Here is a concise review of the current public parking regulation regime in Brookline.

On-Street Meters

Parking meters are located on-street and off-street in the vicinity of the following commercial areas:

- Brookline Village
- Cleveland Circle

- Coolidge Corner
- JFK Crossing
- Washington Square
- St. Mary's / Lower Beacon Street



Relaxing the On-Street Two-Hour Rule with Special Permits

The Transportation Board has adopted rules and procedures to issue permits that waive the two-hour parking limit under certain circumstances such as the following:

- Guests or Visitors
- In-Home Childcare Providers
- In-Home Healthcare Providers
- Residents with Construction-Related Activities
- Seasonal Tradesmen
- Tradesmen
- Residents on high-parking demand streets
- Employees

Town Owned Parking Lots

LOCATION	Spaces	Time Limit	Resident Overnight	Guest Overnight
FULLER ST	50	4hr	3	10
JOHN ST	14	Commercial Employee Permits	14	0
BABCOCK ST	65	3hr	47	18
CENTRE ST EAST	143	4hr	10	20

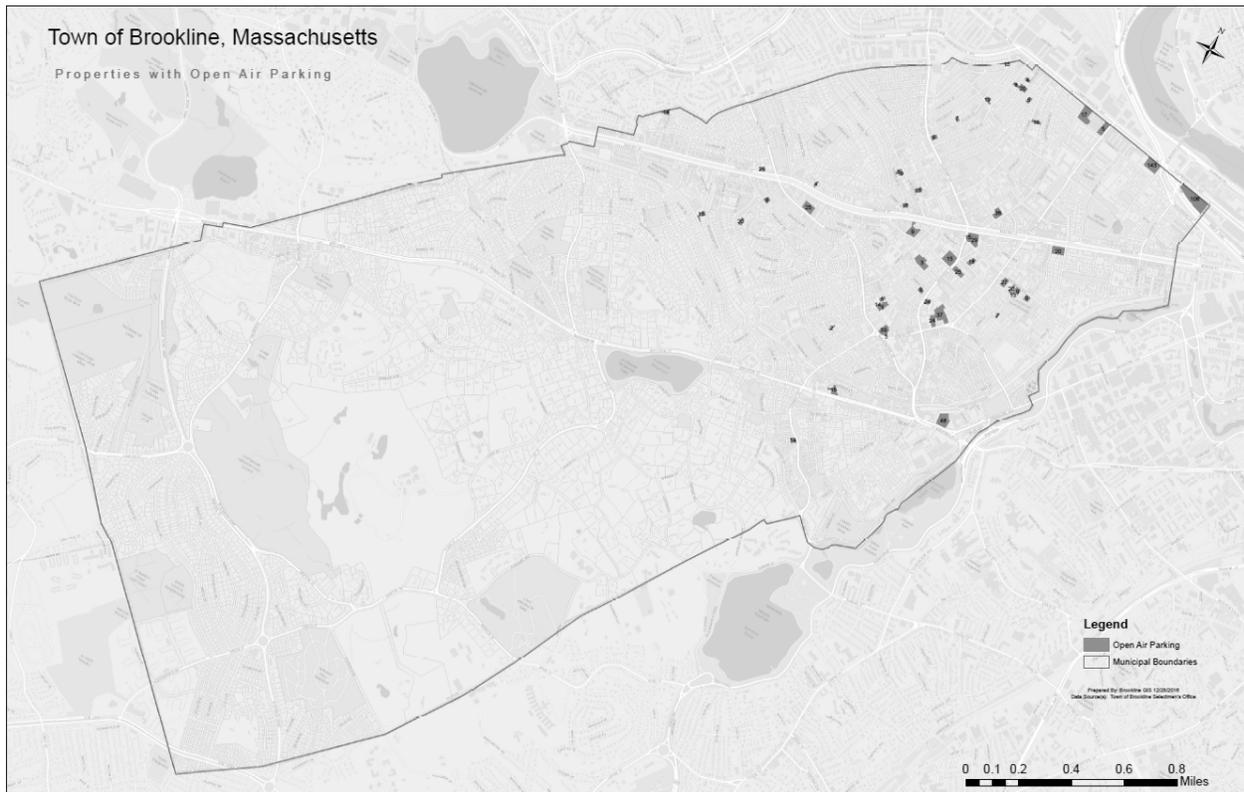
CENTRE ST WEST	56	Commercial Employee Permits, Farmer's Market	56	0
WEBSTER ST EAST	13	3hr	0	13
BEACON ST.MEDIAN/ MARION&FAIRBANKS ST	60	13hr	60	0
SCHOOL ST	24	5hr	14	0
333 WASHINGTON ST	42	2hr	0	0
KENT & WEBSTER ST	39	3hr	23	16
KENT & STATION ST	45	10hr meter with Commercial Employee Permits	60	0
40 WEBSTER ST (Marriot Hotel)	60	3hr	60	0
BEACON ST.MEDIAN\ COREY&WARWICK RD	38	13r	16	22
Total	649		363	99

Licensed Open Air Parking

Massachusetts General Law, Chapter 148, Section 56:

“In any city or town which accepts the provisions of this section, no person shall engage in the business of conducting or maintaining an open-air parking space without a license therefor granted, in the city of Boston, by its commissioner of transportation, and in any other city or town, by the local licensing authority, approved in all cases by the head of the fire department. Each license granted under this section and the application therefor shall specify all the premises to be occupied by the licensee for the purpose of conducting the licensed business, the total area of the space therein to be actually used for parking or storing vehicles, and the maximum number of vehicles to be parked or stored in such area.”

In Brookline, there are 1,050 licensed open air parking spaces at 53 sites:



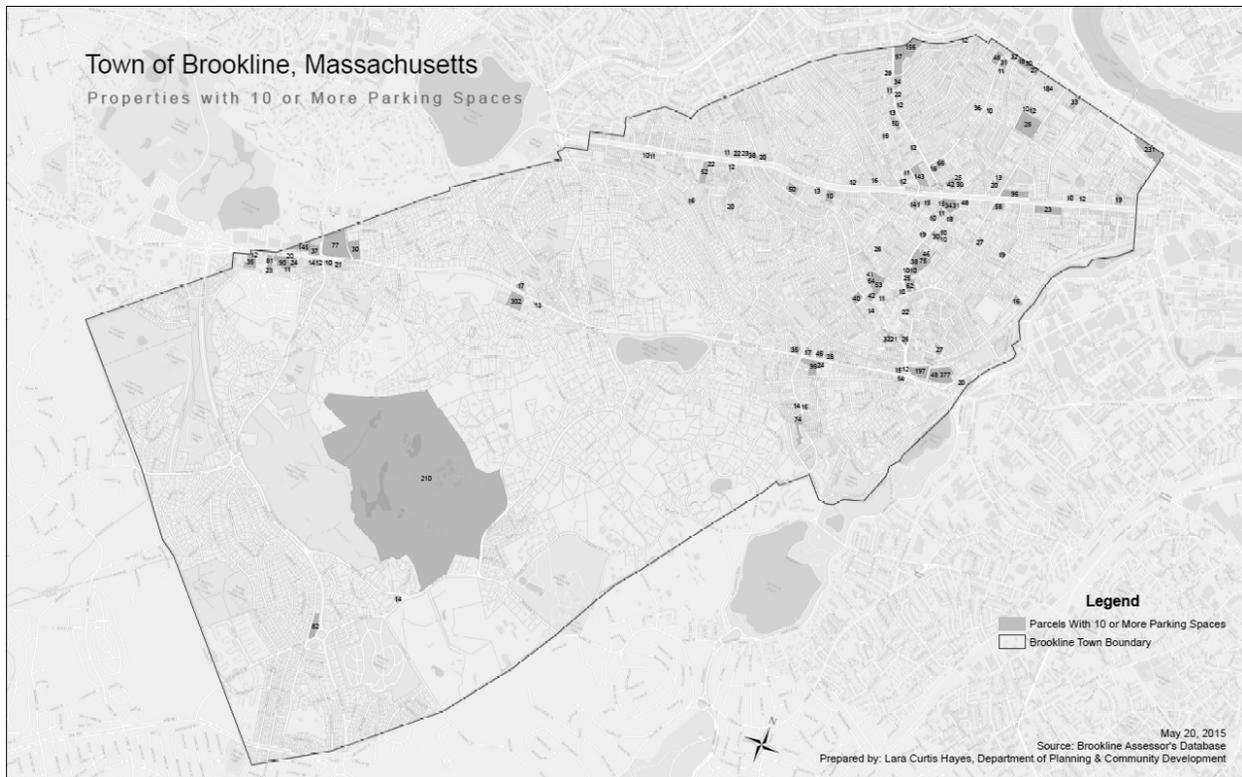
Thirty-Three Licensed Open Air Parking Lots, More than 10 Spaces		
Address	Sq. Ft.	#Spaces
808 Commonwealth Ave.	72,460	143
766 Commonwealth Ave.	31,657	106
2 Brookline Place	19,275	48
Rear of 397 Washington St.	16,127	39
12 St. Paul St.	14,862	37
32 Pleasant St.	15,000	36
1309 Beacon St	15,000	29
83 Longwood Ave.	10,000	27
1646 Beacon St.	10,000	25
209 Harvard St.	20,000	25
637 Washington St.	7,000	25
40 Aspinwall Ave.	13,728	24
137 Harvard St	12,800	24
28 Pleasant St.	10,395	24
1187 Beacon St	7,489	20
101 Longwood Ave.	6,000	20
195 Rawson St.	10,240	20
41 Winslow Rd	23,020	20
108 Naples Rd.	7,000	19

12 Stearns Rd.	8,474	18
135 Dummer St.	2,300	17
173 Babcock St.	6,400	16
265 Boylston St.	2,500	16
0-9 Summit Ave.	5,750	16
1319 Beacon St.	8,369	15
94 Beaconsfield Rd.	7,500	15
210 Harvard St.	3,200	15
43 Winchester St.	2,190	15
227 Cypress St	9,799	14
56 Harvard Ave.	4,500	14
60 Kilsyth Rd	4,600	14
224 Fuller St.	4,100	13
105 Longwood Ave.	1,500	13

It is a commonly held belief that there are many more parking spaces that are privately rented which do not apply for an open-air parking license. The potential for encouraging the owners of these facilities to provide EV charging station(s) is a possible topic for further investigation. The map shows that these facilities are predominantly in the densely developed parts of Brookline where overnight parking is scarcer.

Private Parking, Assessor's Data

According to the Assessor's database, there are 229 parcels containing 6,231 parking spaces on 15 million square feet of land, which is .54 square miles or approximately one-twelfth of Brookline's land area.



The potential for encouraging the owners of these facilities to provide EV charging stations is a possible topic for further investigation. The map shows that these facilities are predominantly in the densely developed part of Brookline where overnight parking is commonly rented. An outlier is the Country Club property which is a private golf club but assessed for property tax purposes as a parking lot with parking for 210 vehicles.

Potential for Residential EVSE: Indicators of the Prevalence of “Garage Orphans” by Neighborhood

The Electric Vehicle Charging Study Committee has adopted the term “EV garage orphan”. EV garage orphans are Brookline residents who do not own and control private, off-street overnight parking suitable for EV charger use. Overnight parking that lacks a power outlet suitable for EV charging is a disincentive to purchasing an electric vehicle. Without convenient overnight access to an EV charger, owning and operating an EV may not be practical.

The EV garage orphan phenomenon is widespread in Brookline. There are four factors contributing to this circumstance in Brookline:

- Because there are densely developed neighborhoods in Brookline that were built prior to widespread reliance on automobiles, many properties simply do not have on-site, private, off-street parking;
- In addition, 50% of Brookline properties are rental, not owner-occupied, and prospective EV purchasers living in rented dwellings are not in a position to invest in or adapt their home for EV;
- Properties that have been converted to condominiums may allow somewhat more control over parking facilities, but there are still many barriers for a prospective EV purchasers specific to the circumstances of each condominium;
- The Brookline overnight on-street parking ban and dense development are reasons why available land is scarce, expensive, and in great demand in many parts of Brookline. In many parts of Brookline there are open air lots and other off-street properties dedicated to parking for hire, however, these parking facilities are not necessarily available to prospective EV purchasers, and the owners of the lots may have little incentive to provide EV charging facilities to their customers.

An Analysis of Available Data

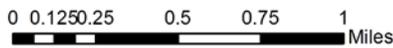
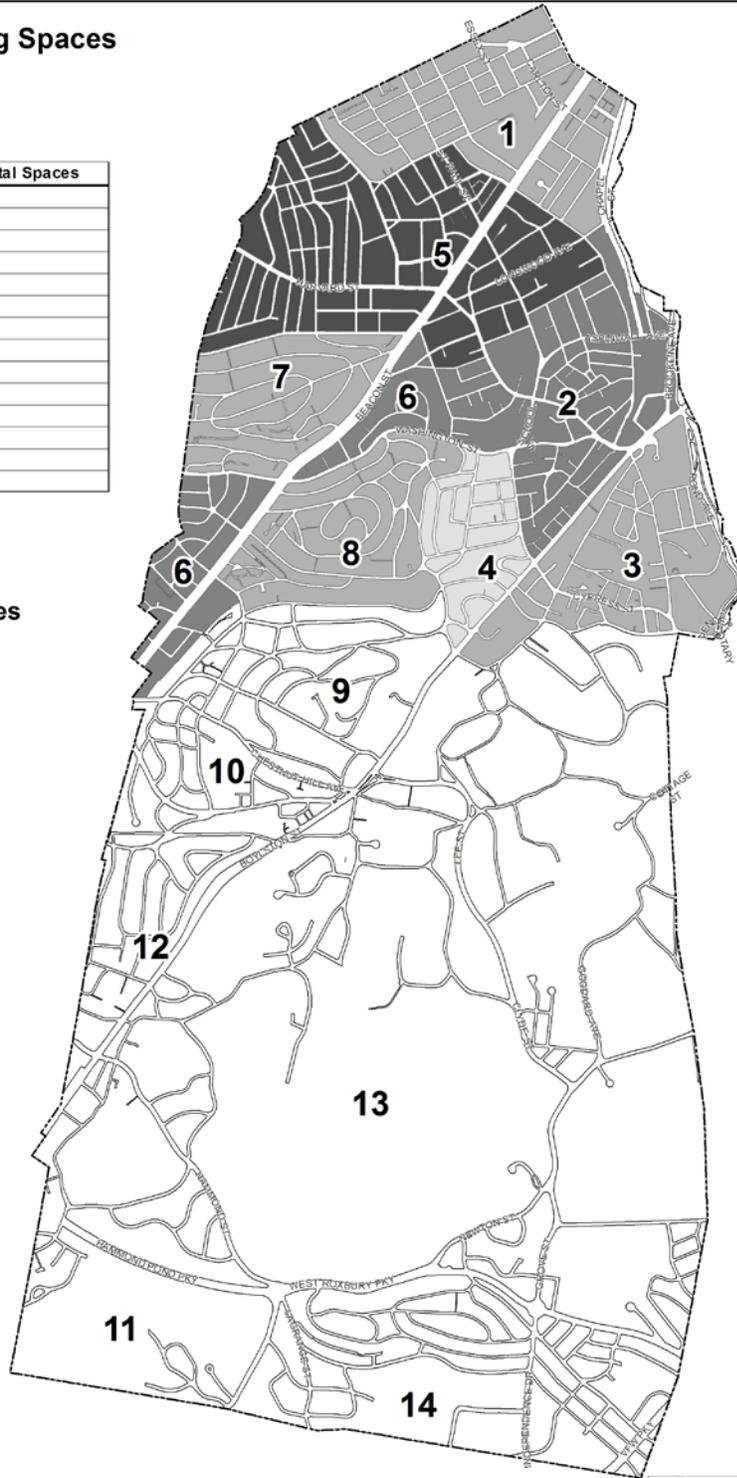
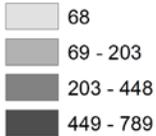
In order to understand and explore the number and location of Brookline residents who currently rent parking for the vehicles they own, we have analyzed recent, available data which quantifies the number of Brookline residents who report the lack of parking for vehicles they own. As the interest in and prevalence of EV ownership expands, this data helps us understand the possible neighborhood by neighborhood risk of Brookline residents having to solve a Garage Orphan problem. The pattern observed is consistent with the expected result. Analysis of this data, however, means we do not need to rely on guess work. We can be more confident that our assumptions about the distribution of garage orphan risk are sound.

Number of Rented Parking Spaces by Neighborhood

April 2017, Brookline

Area	Description	Total Spaces
1	St. Mary's	198
2	Brkn Village	448
3	Pill Hill	147
4	Brkn Hills	68
5	CC / JFK	789
6	Wash Sq	297
7	Corey Hill	154
8	Aspinwall	203
9	Fisher Hill	NA
10	Heath Eliot	NA
11	Hammond	NA
12	Chestnut Hill	NA
13	Country Club	NA
14	Putterham	NA

Total Rented Parking Spaces



In January 2012, with the assistance of Brookline Town Clerk Patrick Ward and Brookline Assessor Gary McCabe, the Moderator's Committee on Parking developed a survey questionnaire that was mailed to all Brookline households together with the annual Town Census. The Town Clerk's office advises that approximately 24,000 Census Forms were returned. A

total of 12,015 Parking Survey forms were also returned – i.e., representing a response rate of approximately 50% relative to the (mandatory) Census Forms.

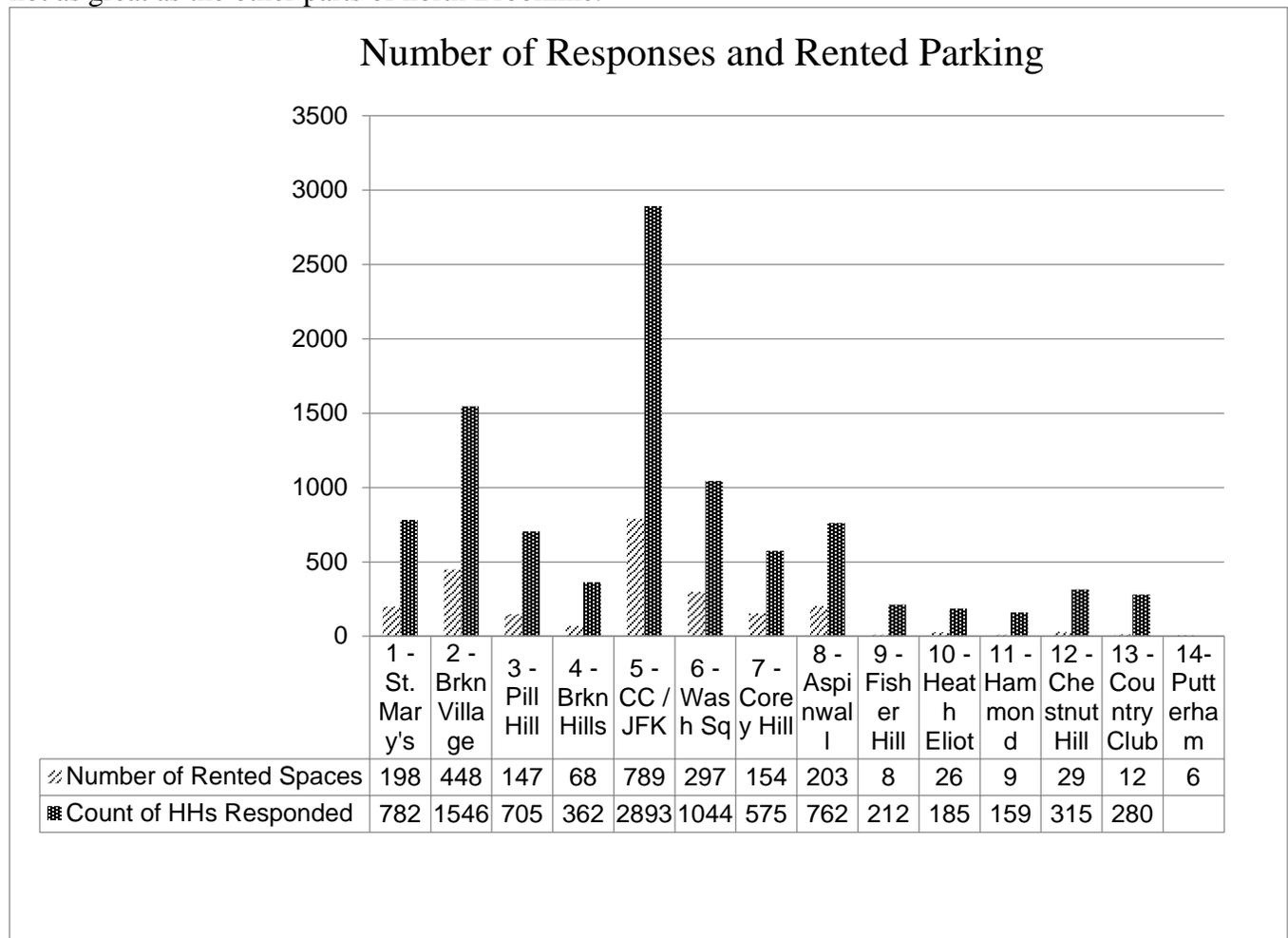
With the assistance of the Assessor’s Office, 14 specific “parking neighborhoods” were defined, and respondents were asked to identify their neighborhood.

Question 8 on this survey asked: “How many parking spaces do you rent at another location because your residence lacks sufficient parking?”

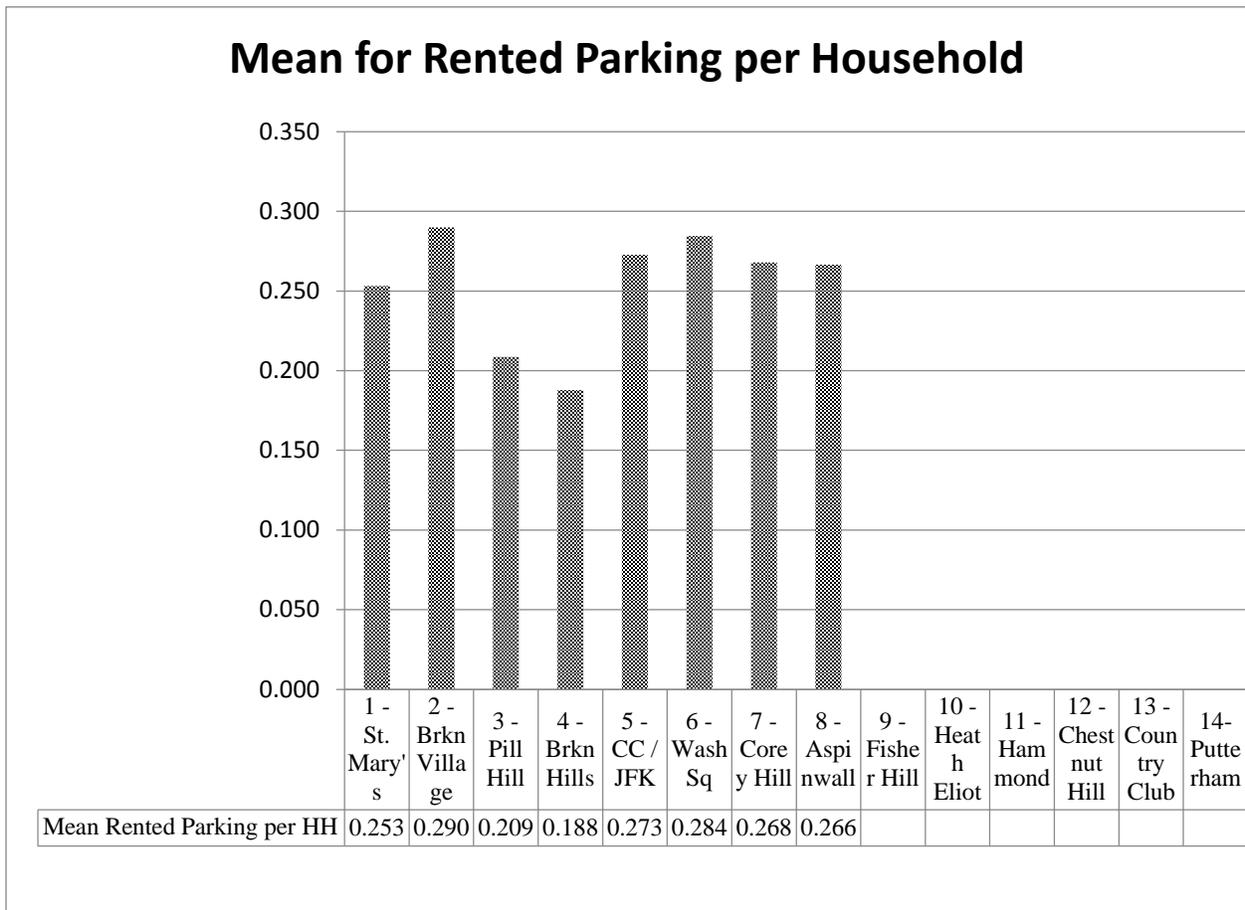
Discussion

The number of respondents reporting rental of one (or more) rented parking spaces is a useful indicator of the relative prevalence of off-site parking demand, or the number of “Garage Orphans” by neighborhood. We calculated the number of rented parking spaces respondents reported by neighborhood and the mean number of parking spaces per household rented by neighborhood.

The residents in neighborhoods 9 – 14 reported using very few rental parking spaces. Therefore, these neighborhoods are white on the maps and coded as “NA”, not applicable on the “Number of Rented Parking Spaces by Neighborhood” map. Neighborhoods 1 – 8 ranged from 68 to 789 reported rented spaces. Coolidge Corner / JFK Crossing (5) respondents reported the most rentals, 789 spaces. Brookline Village (2), Washington Square (6), and Aspinwall Hill (8) respondents reported a substantial amount of parking rental, ranging from 203 to 448. St. Mary’s (1), Corey Hill (7), and Brookline Hills (4) ranged from 198 – 68, still a significant number of rentals, but not as great as the other parts of north Brookline.



This table, “Number of Responses and Rented Parking”, compares the number of rented parking spaces reported with the number of survey responses by neighborhood. Of note, the Coolidge Corners / JFK Crossing (5) neighborhood that reported the most rented spaces had the most responses.



The means for neighborhoods 9 – 14 show little need and are white on the “Average Number of Renter Parking Spaces per Responding Household by Neighborhood” map. The table above, “Mean for Rented Parking per Household” displays the values for Neighborhoods 1 – 8, which range from 0.188 to 0.290. For St. Mary’s (1), Brookline Village (2), Coolidge Corner / JFK Crossing (5), For Washington Square (6), Corey Hill (7), and Aspinwall Hill (8), the means are quite similar, ranging from 0.253 to 0.290. Pill Hill (3) and Brookline Hills, which respondents reported the least number of rented spaces, have lower means, ranging from 0.188 to 0.209.

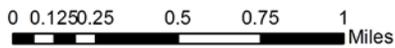
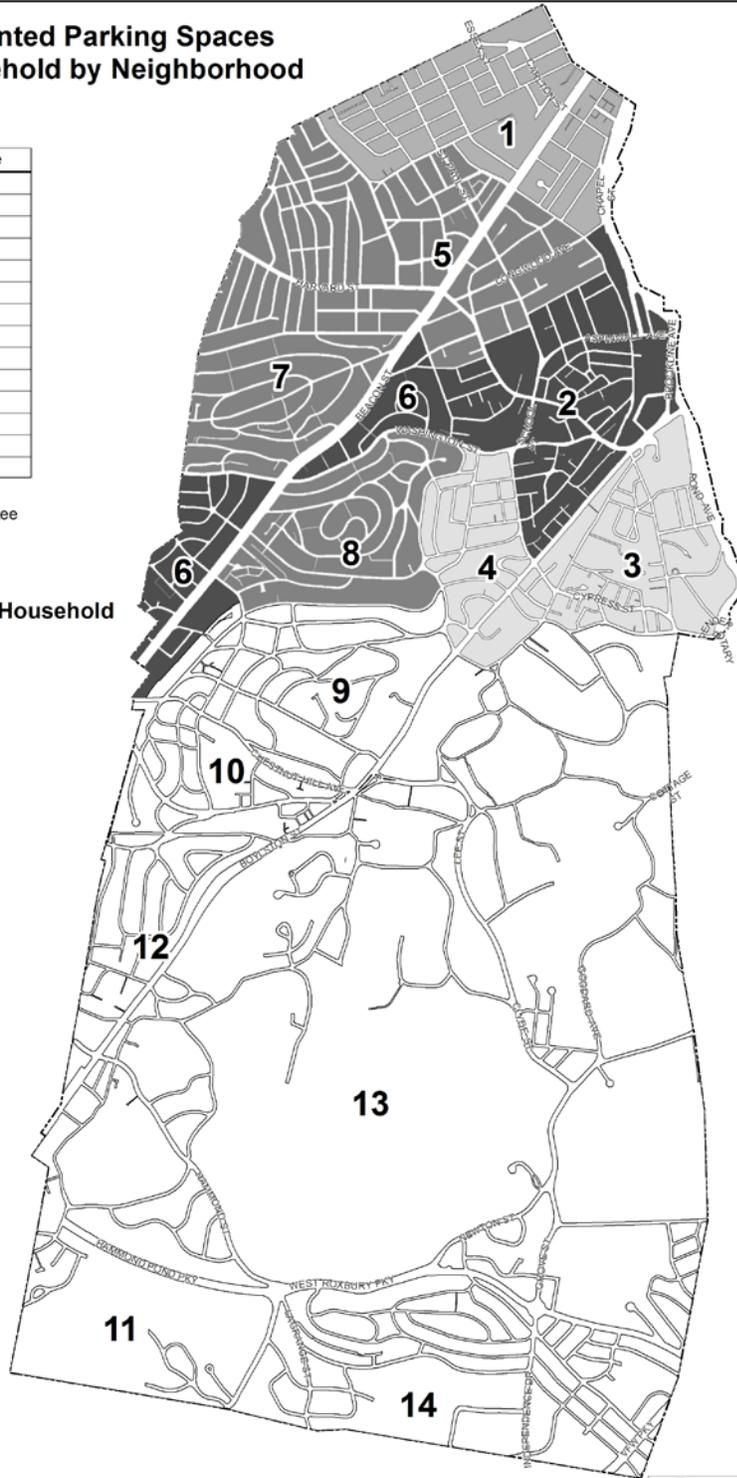
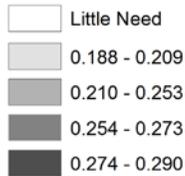
Average Number of Rented Parking Spaces per Responding Household by Neighborhood

April 2017, Brookline

Area	Description	Average
1	St. Mary's	0.253
2	Brkn Village	0.290
3	Pill Hill	0.209
4	Brkn Hills	0.188
5	CC / JFK	0.273
6	Wash Sq	0.284
7	Corey Hill	0.268
8	Aspinwall	0.266
9	Fisher Hill	Little Need
10	Heath Eliot	Little Need
11	Hammond	Little Need
12	Chestnut Hill	Little Need
13	Country Club	Little Need
14	Putterham	Little Need

Source: Report of the Moderator's Committee on Parking, August 30, 2013 (12,016 responses)

Average Rented Spaces per Household



Conclusion

These data indicate that (or suggest) in a general way that St. Mary's, Brookline Village, Coolidge Corner / JFK Crossing, Washington Square, Corey Hill, and Aspinwall Hill are neighborhoods where the Garage Orphan risk is most prevalent. Any initiative to provide overnight EV charging facilities in public parking lots, in on-street areas, or in private open air parking properties should give priority to the residents of these neighborhoods.

5) Potential Funding & Incentives for EVSE

Electric vehicles need to be charged. This is true for both electric-only EVs (BEVs) as well as for plug-in hybrids (PHEVs).

There are three classes of EV chargers based on power level.

- Level 1 chargers use low amp (15-20A) household current at household line voltage (120V) to deliver a slow charge to the vehicle. It might take 10 hours to fully charge an EV with a 25 kWh battery. Most EVs come with a portable Level 1 charger. Level 1 charging is at a rate of approximately 4 miles of range for an hour of charging.
- Level 2 chargers use 16 to 32amps of power with 240V on the equivalent of a household dryer circuit. At 16 amps the charger delivers 3.8 kW of charge power; at 32 amps it delivers 7.7kW of power. At the higher level, the 60 kWh battery in the new Chevy Bolt will take about 8 hours to fully charge. Level 2 charging is at a rate of about 20 miles of range for an hour of charging.
- Level 3 or DC Fast chargers. These chargers (like Tesla's public highway fast chargers) supply DC power directly to the battery pack without inverting the power to AC through a special plug increasingly offered as a standard, or at least an optional feature on new EVs. Typically rated at 50kW or above these chargers can deliver many miles of charge in a relatively short time (for example, Chevy claims that its Bolt can get a 90 mile charge by a 50 kW DC fast charger in 30 minutes). However, these chargers are expensive and usually not necessary for vehicles that have more than a few hours available for charging. They also require major delivery capacity in the local grid that supplies them. Level 3 charging is at a rate of about 200 miles of range for an hour of charging.

Most Level 1 and Level 2 chargers come with a standard SAE J1772 plug (the standard format blessed by the Society of Automotive Engineers). Most EV owners have a Level 2 charger at home. They will expect a Level 2 charger in a public or "orphan" parking spot overnight as well as in employer or public places for charging while at work or "topping off" while doing errands or attending social events.

Overnight charging – or day-long workplace charging at a Level 2 rate will provide a full charge for most EVs. The following table shows the most popular EVs and PHEVs along with their kWh battery size, estimated range at full charge and time to full charge using a Level 2 charger.

Battery, Range and Charging Times for Most Popular EVs					
	Battery	Range at		Level 2 Full Chrg	US units sold
Make and model	Size (kWh)	full chrg	mi/kWh	Hrs @ 7.5 kW	1Q2017
<u>Pure EV</u>					
Tesla S	90	294	3.27	12.0	6100
Nissan LEAF	30	107	3.57	4.0	3287
Chevy Bolt	60	238	3.97	8.0	3092
BMW i3	33	97	2.94	4.4	1403
<u>Plug-in Hybrid</u>					
Chevy Volt PHEV	18.4	53	2.88	2.5	5563
Prius Prime PHEV	8.8	25	2.84	1.2	4346
Ford Fusion Energi PHEV	7.6	21	2.76	1.0	2445
				sub-total	26,236
				Est total US EV sales 1Q2017	40,000

Level 2 chargers

There are over a dozen Level 2 chargers in the market, many made by large companies. Prices range from \$400 to over \$1500 depending on the power levels (higher power = more expensive) and the features (internet connectivity and remote controllability = more expensive). Among the most popular chargers are the following:

- Bosch Power Max
- AeroVironment TurboCord
- Schneider Electric EVlink
- ChargePoint Home
- GE Durastation
- Siemens Versicharge
- Leviton Evr-Green

We have listed some informational websites at the end of this report that provide additional information on chargers.

Government Incentives

Federal Tax Incentives

Federal Tax Credit

A Federal Tax credit of 30% of alternative vehicle refueling property, including the installed cost of EV charging equipment, was available to individuals and in some cases businesses through December 31, 2016 under the Fixing America's Surface Transportation (FAST) Act. It is possible but highly unlikely that this incentive could be re-instated in future years.

Depreciation for Business

A business may use rapid depreciation rules for the installed cost of an EV charging station. Some have argued that the Modified Accelerated Cost Recovery System (MACRS) and the Bonus Depreciation rules may apply, allowing the business owner to depreciate charging stations over a short period of time (check with your tax advisor).

State Incentives

The Massachusetts Electric Vehicle Incentive Program (MassEVIP) provides 50% or up to \$25,000 for hardware costs to employers installing Level 2 charging stations. The MassEVIP Fleets Program offers financial assistance to eligible entities for Level 2 dual-head charging stations with the acquisition of at least one battery electric vehicle (BEV). Charging station incentives are based on the number of BEVs acquired; \$7,500 for one to two BEVs acquired, \$10,500 for three to four BEVs acquired, and \$13,500 for five or more BEVs acquired. MassEVIP's funding is subject to availability.

<http://www.mass.gov/eea/agencies/massdep/air/grants/massevip.html>

Private Sources of Funding

While we haven't searched extensively, there may be several sources of private funding available to help with the purchase and installation of EV chargers.

First, several foundations do fund clean transportation projects and might be approached for assistance in procuring chargers. Most likely a foundation would be more interested in funding a demonstration project or pilot program that might have replicability in other communities rather than simply purchasing chargers. Foundations typically fund non-profits or government entities rather than private businesses, so the town or an apartment or owners association might assemble a charger initiative that could be circulated to foundations for support. Here are three foundations that support clean transportation programs:

Blue Planet: <https://blueplanetfoundation.org/team/lidia-henderson/>

Barr Foundation:

https://www.barrfoundation.org/grantmaking/grants?query=&program_areas%5B%5D=climate

Energy Foundation: <http://www.ef.org/programs/transportation/>

Second, the utility companies themselves have a very strong interest in the rational and planned introduction of EV charging stations, as they represent a significant new load and opportunity for additional revenue. An approach to Eversource for funding for an EV charging initiative would be entirely reasonable. Making Eversource our partner in such a project could be fruitful for all parties. (See Section 5 "Current Regulatory Environment" for information on Eversource's rate setting petition currently under review by the Department of Public Utilities, which contains an EV charging infrastructure component.)

Third, the charger manufacturers and EV manufacturers themselves, as well as the auto dealers offering EVs should be sources of funding help. There may be financing programs available from these sources that would allow for greater purchase and installation of EV chargers.

Fourth, the VW Settlement Fund, created when VW settled with the US and State governments over its air pollution controls cheating scandal, which allocated \$2.7 billion to the states under an Environmental Mitigation Trust (\$69mm to Massachusetts) for Nox emissions reduction and an additional \$2.0 billion to the US for Zero Emission Vehicle investments. There may be ways that an innovative EV charger program in Brookline could qualify for some of these funds under the subject of clean vehicle infrastructure support.

<https://content.sierraclub.org/evguide/sites/content.sierraclub.org/evguide/files/THE%20VW%20SETTLEMENT%20GUIDE%20-%20for%20Advocates.pdf>

6) Current Regulatory Environment

State Building Code

On February 8, 2016, Ian Finlayson, from the Massachusetts Department of Energy Resources (DOER), and Linda Benevides, from the Executive Office of Energy and Environmental Affairs (EEA), presented a proposal to the state Board of Building Regulations and Services (BBRS) and Department of Public Safety (DPS) staff to include solar-ready provisions; electric vehicle charging provisions; and updates to the stretch code in the forthcoming 9th Edition of the State building code (780 CMR). This proposal was supported by Emily Norton of the Sierra Club.

The 9th edition of the state building code updates the Massachusetts building code to the 2015 edition of the International Building Code (IBC), with amendments. The proposed electric vehicle provisions would be Massachusetts-specific amendments, and were provisionally numbered R404.2 in the Residential Code and C405.10 in the Commercial Code. For residential buildings R404.2 states “at least one minimum 40-ampere branch circuit shall be provided to garages and/or the exterior of the building to accommodate a future dedicated Society of Automotive Engineers (SAE) standard J1772-approved Level 2 EVSE.” and provides that 1 “EV READY” parking space be identified for single-family and two-family dwellings, and 1 per two units for 3 or more unit buildings.

For commercial buildings, C405.10 proposed that “Group A-1, B, E, I, M and R buildings with more than 3 dedicated parking spaces shall provide sufficient electrical capacity and physical capacity at the service panel to accommodate future simultaneous vehicle charging at a minimum of 4% of parking spaces and in no case less than one space. Calculated spaces shall be rounded up to the nearest whole number.”

In Spring 2016 the state BBRS declined to take up these amendments in order to defer to the legislature, which was then debating bills (H3085 and S1824) which would require specific action by the BBRS regarding electric vehicle infrastructure. For example, S1824 (presented by Frank I. Smizik of Brookline and Jonathan Hecht of Cambridge) stated, “In consultation with the Department of Energy Resources, to develop requirements and promulgate regulations as part of the state building code within one year of the effective date of this act, for electric vehicle charging. Such regulations may include separate requirements for capability to install electric vehicle charging stations in the future and direct requirements for electric vehicle charging stations.” The BBRS elected to defer action until the specific directive of the legislature was known.

The original bills were revised in May 2016 (H4282/S2266) and again in November/December 2016 (S2505/H4781). Titled “An Act Promoting Zero Emission Vehicle Adoption” S.2505 was finally passed and signed by the Governor on January 13, 2017. See <https://malegislature.gov/Bills/189/S2505> for complete text of S2505.

The final text of the act states:

SECTION 3. Notwithstanding any general or special law to the contrary, the state board of building regulations and standards established pursuant to section 93 of chapter 143 of the General Laws, in consultation with the department of energy resources, may include

requirements for electric vehicle charging for residential and appropriate commercial buildings as amendments to the state building and electric code. The requirements may include separate specifications for installed electric vehicle charging stations and for maintaining the capability to install electric vehicle charging stations.

Crucially, the final text states that the BBRS “may include requirements for electric vehicle charging”, not that they “must”.

The DOER and EEA reintroduced their proposed ‘EV ready’ amendments (R404.2 and C405.10) to the state BBRS after passage of S2505. However, in the February 14, 2017 meeting of the BBRS, the board voted to again remove these requirements from the 9th edition draft.

The BBRS conducted public hearings on the proposed 9th Edition building code on March 7, 2017 in Boston and March 28, 2017 in Springfield. At the March 7 hearing six attendees offered comments strongly encouraging the restoration of the EV ready amendments: Emily Norton (MA director of the Sierra Club), MA State Representative Jonathan Hecht (Watertown/Cambridge), Kevin Miller (ChargePoint), Kathleen Conners (Voltrek), Megan Herzog (Conservation Law Foundation), and C. Scott Ananian (Brookline Town Meeting member, precinct 10).

In particular, Representative Hecht expressed his disappointment that the BBRS removed the EV ready requirements even after the successful passage of S2505. He stated that he had a petition signed by 10 legislators (and counting) expressing their belief that the passage of S2505 was a directive to the BBRS to draft appropriate EV ready requirements for the building code.

Town Meeting member C. Scott Ananian had an informal conversation with BBRS Vice Chair John Couture after the hearing (chair Richard Crowley did not attend). The Vice Chair indicated that the BBRS felt that "the problem was [DOER and EEA] went for a home run" on the EV-ready requirements, setting the bar too high in the first introduction of EV support to the building code. He mentioned the 4% parking space number as an example. He indicated that the BBRS felt they represented "three parts of Massachusetts" (West, South, and greater Boston) and that the EV-ready provisions would be a significant burden for the non-urban areas. He cited his property as an example: 12 acres, in a rural area, with a significant setback from the road. He claimed the EV-ready requirement of an additional 40A service from the road would add \$7,000 to the cost of providing electrical service, due to the voltage drop and distance from the road. Vice Chair Couture was very supportive of towns using zoning (instead of the building code) to implement EV requirements, and indicated the BBRS would feel more comfortable adding statewide requirements after a number of towns had “taken the first step”. There was some inconclusive discussion of state law limitations on local zoning bylaws, and using the G.L. c. 143, § 98 process to allow EV requirements not possible through zoning.

The state BBRS met on April 11, 2017 and referred comments on the EV ready provision to their Energy Advisory Committee, which will meet and offer recommendations prior to the next meeting of the BBRS on May 16, 2017. At their May meeting, the BBRS will vote on the final amendments to the 9th edition building code. The Selectmen’s Climate Action Committee has requested that the BBRS at least define “EV ready” in the building code, even if no requirements are set, in order to facilitate future zoning action by the Town. See Appendix B for a copy of the SCAC letter to the BBRS and a proposed edit submitted by C. Scott Ananian.

Eversource Distribution Rate Setting

On January 17, 2017, Eversource energy filed a petition with the Massachusetts Department of Public Utilities (DPU) seeking approval of increases in base distribution rates for electric service pursuant to G.L. c. 164, § 94. This case is DPU docket number DPU 17-05. The proposed rate plan includes a performance-based ratemaking mechanism (PBR) that would allow Eversource to adjust its distribution rates on an annual basis. Within the PBR mechanism, Eversource proposes to undertake \$400 million in incremental capital investments over the next five years on projects intended to integrate distributed energy resources and improve service reliability, including projects to develop electric vehicle infrastructure and electric-storage capabilities.

Some of these investments were previously included in a Grid Modernization Plan, filed as DPU 15-122/15-123. Eversource intends to move the investments from the Grid Modernization Plan to their new PBR mechanism, as part of a “Grid Modernization Base Commitment” (GMBC).

The Electric Vehicle Charging Infrastructure component of the GMBC, as described in DPU 17-05 Exhibit ES-GMBC-1, proposes the “construction of make-ready EV charging infrastructure necessary to expand the network of charging stations”:

The make-ready infrastructure the Company is proposing to install will include the following electrical equipment and connections:

- The distribution primary lateral service feed;
- The necessary transformer and transformer pad;
- The new service meter;
- The new service panel; and
- The associated conduit and conductor necessary to connect each piece of equipment. [page 91]

Eversource will construct the electrical supply, but program participants will purchase, own, and operate the charging stations, be responsible for energy costs, and agree to maintain the charging station in working order for ten years following installation. [page 122]

Phase I of the program will support customer deployment of up to 30 DC fast charging stations and approximately 1,000 Level II charging stations at various sites throughout the company’s service territories. Phase II of the program will support customer deployment of approximately 36 additional DC fast charging stations and approximately 3,100 Level II charging stations at customer sites. [page 115]

In particular:

The Company intends to target three types of charging locations. Each of these three charging locations provides opportunities to increase EV ownership and use, while also facing barriers to infrastructure investment. [...]

The first type of location the Company will target is multi-unit dwellings, including apartment complexes. These multiunit dwellings present a particular challenge for at-home EV charging infrastructure because at-home charging access is essential to EV ownership. Unlike EV drivers in single family detached homes, residents of apartments and other multi-unit dwellings often lack the ability install EV charging infrastructure in these locations because these drivers may not have ownership or control of the space where the charging station will be installed. [...] In Massachusetts, about 62.1 of households are owner-occupied housing. The remaining households face a difficult EV

ownership experience if they are unable to secure reliable access to EV charging. Installing charging stations at apartment buildings and other multifamily dwellings could unlock a broader and larger market for EVs.

The second type of location is places of employment and other long-dwell-time locations such as universities or hospitals, which are another important segment where charging stations would spur additional vehicle sales. [...] Adding charging stations in these locations can extend the daily range achievable with a EV and create a “showroom effect” to increase EV visibility. Nissan credits a workplace charging initiative with a fivefold increase in monthly EV purchases by employees at Cisco Systems, Coca-Cola, Google, Microsoft, and Oracle. Likewise, the U.S. Department of Energy (“DOE”) recently concluded that employees of companies participating in its Workplace Charging Challenge were 20 times more likely to drive a EV than the average worker. [...]

The third type of location is public parking spaces, which represent another important segment where additional charging stations are expected to drive increased EV adoption by allowing flexible charging station opportunities for EV owners. [...] Consumer research shows that the lack of “robust DC fast charging infrastructure is seriously inhibiting the value, utility, and sales potential” of typical battery electric vehicles. [page 107-109]

Specifically, for Level II charging infrastructure:

Level II charging takes approximately four hours. Therefore, the program will target installation of Level II charging infrastructure at sites where EV drivers typically park for durations of at least four hours. Eversource has identified the following types of sites for Level II charging infrastructure:

- Workplaces,
- Colleges and Universities,
- Fleet parking facilities,
- Public parking garages, parks, stadiums, beaches, airports, train stations,
- Hotels, hospitals, and clinics,
- Federal, State & Municipal properties,
- Select dining, entertainment and shopping venues, and
- Apartment buildings. [page 120-121]

Eversource will target deploying up to 10 percent of the EV charging infrastructure in environmental justice communities and will provide rebates for the cost of the EV chargers located in these communities. The proposed program also includes “market education outreach and transportation electrification advisory services to increase overall customer awareness” [page 113] and may spend any unallocated funds each year on partial electrification of its bucket truck fleet. Eversource proposes the following budget for the program: [page 114]

EV Program Cost (million \$)						
	2018	2019	2020	2021	2022	Total
Capital	5.7	7.2	10.7	10.7	10.7	45.0

O&M plus Marketing	1.2	1.7	2.1	2.3	2.6	9.9
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A representative of Attorney General Maura Healy vigorously objected to Eversource’s proposal in a March 30, 2017 public hearing in Cambridge. As relates to the EV infrastructure component, the Office of the Attorney General (AGO) objected to the PBR mechanism which includes these investments. Although the AGO supported the infrastructure investments, it stated the public should decide how infrastructure funds were spent and it was “not Eversource’s place to make those investment decisions;” Eversource shouldn’t “get a blank check”. In a motion on February 8, 2017, the AGO formally requested that the Grid Modernization, EV infrastructure, and grid-scale storage infrastructure components be split from the PBR and the rate setting case. This motion was denied on February 23, 2017.

DPU held ten public hearings across the state between March 22, 2017 and April 26, 2017. Evidentiary Hearings are scheduled for June 2 - June 30, 2017. DPU will make a decision by November 30, 2017 for new rates which will become effective January 1, 2018.

The Selectmen’s Climate Action Committee submitted testimony in the Eversource case encouraging that pilot programs be selected which addressed the “garage orphan” problem as well as the special challenges to rental and multi-family housing. (See Appendix C to see the SCAC letter to DPU.)

Fees for EV ownership in lieu of Gas Tax Revenue

Maintenance of roads and vehicle infrastructure in Massachusetts is partially funded by a tax on gasoline. Since electric vehicles consume much less gas (for plug-in hybrids) or no gas (battery electric vehicles), as the vehicle fleet is electrified these funds must be drawn from other sources. When S2505 was passed in January 2017, it commissioned a study of this issue.

Section 6 of S2505, “An Act Promoting Zero Emission Vehicle Adoption” states the following: “The secretary of the Massachusetts Department of Transportation, in consultation with the secretary of energy and environmental affairs, shall conduct a study examining the advisability and feasibility of assessing surcharges, levies or other assessments to offset projected gas tax revenue loss from the purchase or operation of zero emission vehicles. The study shall examine practices in other states and shall include input from electric vehicle manufacturers, dealers and trade associations, the zero emission vehicle commission, electric vehicle and fuel cell vehicle manufacturers, electric vehicle charging station manufacturers and hydrogen providers, as well as transportation, environmental and clean energy advocacy groups. For the purposes of this section, “zero emissions vehicle”, shall mean a battery electric vehicle, a plug-in hybrid electric vehicle or a fuel cell vehicle. The report shall be filed with the clerks of the senate and house of representatives, the chairs of the senate and house committees on ways and means and the senate and house chairs of the joint committee on transportation not later than December 1, 2017.”

Annual fees in lieu of gas tax have been levied on EV owners in 10 states. The Sierra Club considers these a harmful disincentive to the adoption of electric vehicles and prefers alternative solutions such as the "vehicles miles traveled" tax program implemented in

Oregon. (<https://content.sierraclub.org/evguide/blog/2017/02/flurry-state-bills-introduced-likely-backed-oil-industry-penalize-electric-car-drivers>)

7) Possible Local Regulatory Support for EVSE

The following section was compiled by Brookline Planning and Community Development staff, in consultation with the EV study committee and additional Town staff. While the committee does not necessarily endorse all of these options, we are open to exploring the variety of ways the Town might achieve our goal of improving access to electric vehicle supply equipment (EVSE) for Town residents and employees.

- Path 1 Require that major impact projects be wired to be EV-ready (Zoning By-law Art 6.00)
- Path 2 Require installation of EVSE on major impact projects (Zoning By-law Art 6.00)
- Path 3 Update the Transportation Access Plan guidelines (TAP guidelines referenced in Zoning By-law 5.09)
- Path 4 Expand Public Benefits provisions which grant greater height or FAR in exchange (Zoning By-law Sec. 5.21 and 5.32)
- Path 5 Update zoning by-law to require residential conversions and non-residential renovations to install EVSE (Zoning By-law Sec. 6.01.2a and Sec. 6.02)
- Path 6 Update Energy Efficiency section of the Community and Environmental Impact and Design Standards in Design Review guidelines (Zoning By-law Section 5.09.4m)

Path 1: Require EV-ready infrastructure in new, major impact projects [16+ residential units or 25,000 sf non-residential space] or some other threshold

Proposed By-Law Section: In Article 6, between 6.05 and 6.06

Likelihood of amending bylaw: Low. Zoning regulations are not the place for wiring requirements according to the Building Department. Furthermore, updating the local building code, though legally possible, is not recommended because State Building Code provides no definition of EV-ready to guide Town's Building Department. Interestingly, the BBRs contends that local zoning would be the preferred route for implementing EVSE requirements.

Commentary:

One of the barriers to requiring electric-vehicle charging stations on existing structures is the expense of installing or retrofitting the infrastructure to accommodate the equipment. Requiring that new projects be "EV-ready" would ensure that construction costs are not prohibitive when the property owner decides to install equipment to meet occupant/consumer/employee need.

According to Deputy Building Commissioner, it is not advisable to require wiring standards through zoning regulations without guidance in the State Building Code. At this time, the State Building Code does not provide a definition of EV-ready and it appears that it will not do so in the near future. If the State Building Code provided this guidance, the most pragmatic approach would be to require that new large projects and major renovations have infrastructure installed to accommodate Level 2 EVSEs in the future, because (a) it reduces construction costs involved with retrofits and (b) it allows the property owners to install EVSE when and if demand at the facility requires it.

Models in other municipalities: Boston, MA requires EV charging for developments that trigger either a Transportation Access Plan Agreement or Parking Freeze Permit. The policy calls for a minimum of 5% of total parking spaces with sufficient infrastructure capacity such that the installation of future EVSE does not require an upgrade to service or panels for future accommodation of at least 15% of total parking spaces. Fremont, Oakland, and most recently San Francisco passed ordinances to requiring that parking spaces in new construction be EV-ready. For example, the San Francisco's building code ordinance stipulates that for new residential and commercial buildings, all the parking spaces constructed will meet the following criteria:

- 10% will be “turnkey ready” for EV charger installation
- 10% will be “EV flexible” (i.e. have the potential for charging and upgrades)
- 80% will be “EV capable” (during construction, conduit must be laid in difficult to access areas, hence reducing the cost of running electrical cables in the future)

Source: February 28, 2017 Press Release from the Office of the Mayor of San Francisco, Edwin M. Lee

According to the San Francisco Department of the Environment: “By taking an innovative approach that combines distributed panels and load management, staff’s proposal will provide flexible charging access to vehicles in 100% of parking spaces while minimizing development costs. By utilizing a separate electrical service for EVs, this proposal also supports future zero net energy building goals by isolating transportation load from loads related to building operations.”

It should be noted that the 2013 California Building Standards Code requires 3 percent of parking spaces to be designed to serve electric vehicles.

Accordingly, the Committee and the Building Department do not advise updating our local building code unless the State Building Code is revised.

Path 2: Require installation electric-vehicle charging stations in projects that meet whatever threshold Committee discerns [sites that are suitable for longer charging stations, such as multifamily and workplace facilities]

Proposed By-Law Section: In Article 6, between 6.05 and 6.06; using language analogous to installation of bike spaces.

Likelihood of amending bylaw: Low. Amending the by-law could be complicated. It may not be practical to require EVSE installation in multifamily condos, where parking spaces are deeded, for example, although individual condominium associations may find creative ways of allocating this resource. Providing a mechanism for making EVSE installation a priority on suitable new projects on a case by case basis may be more practical.

Commentary: Michael Yanovitch recommends this path with thresholds identified. However, Maria Morelli foresees complications with requiring installation of EVSE through the zoning by-law. Encouraging installation rather than requiring it is more likely to ensure that regulations do not unfairly burden property owners.

Path 3: Amend Transportation Access Plan guidelines to include installation of electric vehicle charging stations among guidelines for Transportation Demand Management (TDM) Plans or Transportation Access Plan Agreements for individual projects [see chart for thresholds]

Likelihood of amending the TAP: Very good. Jurisdiction is Department of Public Works. Although the TAP guidelines are ready for modernization in regard to access and mobility; it should be noted that DPW does provide robust conditions that are memorialized in the Zoning Board of Appeals decisions and developer agreements. Updating the TAP guidelines would expand the menu of provisions that project teams can consider, with staff's encouragement. DPW's Todd Kirrane and Peter Ditto are very supportive of updating TAP guidelines to encourage EVSE installation, as is the Planning Department.

Commentary: According to Section 5.09 Design Review, projects with more than 25,000 sf of non-residential space or 25 dwelling units require the preparation of a traffic impact study in accordance with the TAP guidelines. This threshold would target a wide range of projects in which installation of EVSE would be practical (office facilities, mixed use projects, rental housing developments). Utilizing the TAP process for EVSE and EV-ready requirements has been implemented in Boston, as outlined under the commentary for Path 1.

Conditions drawn from TAP guidelines, or its subset TDMs, are integral conditions in ZBA decisions or developer agreements for major impact projects. Staff and boards may be involved directly in the negotiations with the developer, unless the ZBA has jurisdiction instead of local boards (as in the case of 40B comprehensive permit projects). Even in the case of comprehensive permit projects, the ZBA relies heavily on the recommendations of the Transportation Board and staff.

Updating the TAP with this provision creates awareness of the Town's priorities to mitigate greenhouse gas emissions. Furthermore, it gives the Transportation Board and staff traction in negotiations because the provision is explicitly listed in the guidelines. Moreover, modernizing the TAP guidelines, specifically the parking management section, would ensure that new facilities are constructed to meet the parking needs of the occupants, employees and tenants of those projects.

Senior Planner Maria Morelli highly recommends this path. Requiring installation of EVSE in TAP Agreements is the mechanism that the City of Boston uses for projects that trigger Article 80 Large Project Review (adding 50,000 sf or more).

Although the TAP guidelines are not regulations, conditions based on the TAP guidelines that are incorporated in ZBA decisions and developer agreements travel with the deed on the property and are enforceable by the Town.

Although it is not critical, Maria Morelli recommends updating references in the Zoning By-law to TAP guidelines (under Section 5.09.6b) so that the threshold triggering traffic impact studies is the same as the definition for major impact projects (compare 25 residential units in Section 5.09.6.b with 16 residential units in Section 5.09.3.3.b).

Path 4 Providing EVSE installation as one of the public benefits that could be provided in exchange for granting additional height or FAR (floor-area ratio).

Proposed By-Law Sections: Sec. 5.21 and Sec. 5.32

Likelihood of amending by-law: Practical in a legal sense but not advised as it may send the wrong message to developers that exceptions to FAR and height are permissible if a modest provision is offered.

Commentary: “Public benefits” does not mean access to the general public, according to Polly Selkoe, Assistant Director for Regulator Planning. The Planning Department does not advise amending this Section of the By-law to enable EVSE installation to be offered as public benefits allowing increased height and/or floor-area ration. Furthermore, the public benefits provision of the By-law is not typically invoked in decisions for most projects that would trigger it.

Path 5: Providing waivers for residential conversion projects that do not meet the minimum parking requirement, if EVSE are provided

Proposed By-Law Sections: Sec. 6.01.2a and Sec. 6.02

Likelihood: It is possible but the committee questions how effective it would be.

Commentary: This would be a way to include retrofit projects for installation of EVSE, if the developer deems it possible, but amending this by-law would not address a wide range of projects and therefore would have limited impact.

Path 6: Update Energy Efficiency section of the Community and Environmental Impact and Design Standards in the Zoning By-law Section 5.09, Design Review guidelines.

Proposed Zoning By-Law Sections: Sec. 5.09.4.m

Likelihood: Very good.

Commentary: By adding this provision to the Energy Efficiency section, the Town would create greater awareness among developers, the Planning Department, and the Planning Board (which makes recommendations to the Zoning Board of Appeals) that EVSE installation is a meaningful mitigation tool. Updating this section on its own, without Path 3, would not necessarily have a great impact, as Section 5.09.4 are guidelines only, not regulations. However, providing specific suggestions for energy efficiency measures or references to the Climate Action Plan creates valuable awareness of the Town’s energy efficiency and sustainability goals.

CONCLUSION: Path 3 would have the greatest impact and the least burden on property owners. In addition, Path 6 would be viable but only if incorporated with Path 3.

For a survey of local regulatory measures taken elsewhere, see Appendix D.

List of Appendices:

Appendix A: Names of EV Charger Study Sub-Committee members and contributors.

Appendix B: SCAC letter to BBRS & Proposed Edit to State Building Code from C. Scott Ananian.

Appendix C: SCAC letter to Department of Public Utilities on Eversource rate filing 17-05

Appendix D: Information from Sarah Olexsak, U.S. Department of Energy and DOE Clean Cities Technical Response Service on local EVSE regulations.

Appendix E: Other Information Sources

Appendix A – EV Charging Station Study Sub-Committee Members & Contributors:

Linda Olson Pehlke – Chair, SCAC member

David Lescohier – SCAC member

Nancy Heller – SCAC co-chair, member Board of Selectmen

Werner Lohe – SCAC co-chair

C. Scott Ananian – Original WA petitioner

Daniel Bennett – Town of Brookline Building Commissioner

Maria Morelli – Town of Brookline Senior Planner

Michael Yanovitch – Town of Brookline Deputy Building Commissioner

Francis T. Steverman – Town of Brookline Electrical Inspector

Peter Ditto – Town of Brookline Director of Engineering and Transportation

Todd Kirrane – Town of Brookline Transportation Administrator

Polly Selkoe – Town of Brookline Assistant Director for Regulatory Planning

Kara Brewton – Town of Brookline Director of Economic Development and Long-Range Planning

Joslin Ham Murphy – Town of Brookline Town Counsel

Scott Englander – Transportation Board

John Helveston – B.U. Postdoctoral Associate, Institute for Sustainable Energy

Willy Osborn – Brookline resident and consultant on relevant topics

Appendix B



TOWN OF BROOKLINE Massachusetts

DEPARTMENT OF PLANNING
AND COMMUNITY DEVELOPMENT

ALISON C. STEINFELD
Planning Director

April 7, 2017

Department of Public Safety
Board of Building Regulations and Standards
One Ashburton Place, Room 1301
Boston, MA 02108-1618

Attn: Robert Anderson

Dear Mr. Anderson:

Re: Proposed Ninth Edition Building Code (780 CMR)

On behalf of the Selectmen's Climate Action Committee of the Town of Brookline, we wish to urge the reintroduction of the "EV ready" requirements (R404.2 and C405.10) to the ninth edition building code (780 CMR). Encouraging the adoption of Electric Vehicles in our town is a key part of our efforts to address climate change, and an EV ready building code removes key barriers to adoption and ensures that vehicle charging is performed safely.

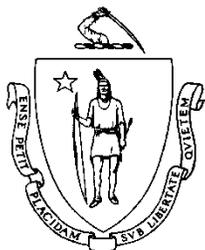
The BBRS is the appropriate body designated by the state to standardize and enact EV ready requirements. Towns are generally prohibited from amending the building code except under the "special conditions" provision of Chapter 143 Section 98, which has not been used since 1975, and zoning bylaws are generally prohibited from attempts to "regulate or restrict the interior area of a single family residential building" under Chapter 40A Section 3.

If the EV-ready requirements are seen as too burdensome, especially in rural areas or for single family residences, they should be codified but made optional, so that towns like Brookline can easily opt-in to the EV requirements without imposing the burden of drafting appropriate Ch 143 s 98 language or zoning workarounds on our town building officials. At a minimum, BBRS definition of the term "EV ready" would aid local efforts and reduce confusion and enhance safety by ensuring that the details of such provisions do not unnecessarily vary from town to town.

Sincerely,

A handwritten signature in black ink, appearing to read "W. Lohe".

Werner Lohe
CO-Chair, Selectmen's Climate Action Committee



Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Daniel Bennett
Secretary

The Commonwealth of Massachusetts
Department of Public Safety
Board of Building Regulations and Standards
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Matthew Moran
Commissioner

Richard Crowley
Chairman

Robert Anderson
Administrator

MASSACHUSETTS STATE BUILDING CODE – CODE AMENDMENT FORM

Impacted code:	<input checked="" type="checkbox"/> 9 th Edition Base Code <input checked="" type="checkbox"/> 9 th Edition Residential Code	State Use Only	
Date Submitted:	April 5, 2017	Date Received:	
Code Section:	Energy Efficiency	Code Change Number:	
Name of proponent:	Clifford Scott Ananian		
Company / Organization represented, if any:		Check <input checked="" type="checkbox"/> if representing self	
Address (number, street, city, state, ZIP):	103 Griggs Road, Brookline, MA 02446		
Telephone number:	617-233-1238		
Email address:	brookline@cscott.net		

PLEASE CHECK OFF THE TYPE OF AMENDMENT PROPOSED

- Change existing section language Add new section Delete existing section and substitute
 Delete existing section, no substitute Other, Explain: _____

PLEASE TYPE THE PROPOSED AMENDMENT BELOW. If you propose to change a section, please copy the original text from either the relevant model code and/or MA amendment. Indicate, with a strikethrough, the text that you propose to delete. Please also indicate any new text in both *italic* and **red** font. Finally, for each proposal submitted, please provide the justification items requested below. Completed code amendment forms may be emailed to Felix Zemel, Director of Code Development and Manufactured Buildings at felix.zemel@state.ma.us. Please attach additional pages as necessary.

Existing language:

None (but compare to the original proposal from DOER/EEA, removed from draft on February 14, 2017)

Proposed changes:

MA 9th edition: Draft EV-Ready Regulations

Residential

ELECTRIC VEHICLE SERVICE EQUIPMENT (EVSE) Level -2 (220 - 240V). Equipment expressly designed for the safe charging of battery electric and plug-in hybrid electric vehicles.

N1101.13 Revise the section as follows:

N1101.13 (R401.2) Compliance. Projects shall comply with one of the following:

1. Sections N1101.14 through N1104 *except* N1104.2.
 2. Section N1105 and the provisions of Sections N1101.14 through N1104 labeled “Mandatory.”
 3. An energy rating index (ERI) approach, or approved alternative energy performance rating method in Section N1106.
- Qualifying approaches include the following:
- a. Certified RESNET HERS rating with MA amendments.
 - b. Certified Energy Star Homes, Version 3.1.
 - c. Certified Passivehaus performance method

N1104.2 Add new section:

N1104.2 (R404.2) Electric Vehicle Service Equipment (EVSE) Ready. Garages and/or the exterior of the building may provide “EV READY” parking spaces, which must meet the requirements of this section. In accordance with 527 CMR 210.17 and this section, at least one minimum 50-ampere branch circuit for each “EV READY” parking space. The branch circuit may terminate in a NEMA 14-50 or NEMA 6-50 outlet or a dedicated Society of Automotive Engineers (SAE) standard J1772-approved Level 2 EVSE. The circuit must terminate in a location which would allow EVSE installed on that circuit, whether hard-wired or cord-connected to the installed outlet, to be compliant with 527 CMR 627.17(A)(3) and 527 CMR 625.50. The circuits shall have no other outlets. The service panel shall provide sufficient capacity and space to accommodate the circuit and over-current protective device. A permanent and visible label stating “EV READY” shall be posted in a conspicuous place at both the service panel and the circuit termination point. The location and number of “EV READY” parking spaces shall be identified on construction documents.

Commercial

ELECTRIC VEHICLE SERVICE EQUIPMENT (EVSE) Level -2 (220 - 240V). Equipment expressly designed for the safe charging of battery electric and plug-in hybrid electric vehicles.

C401.2 Revise the section as follows:

C401.2 Application.

Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.

2. The requirements of Sections C402 through C405 *except C405.10*. In addition, commercial buildings shall comply with Section C406 and tenant spaces shall comply with Section C406.1.1.
3. The requirements of Sections C402.5, C403.2, C404, C405.2, C405.3, C405.5, C405.6 and C407. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

C405.10 Add new section:

C405.10 Electric Vehicle Service Equipment (EVSE) Ready.

Buildings may provide “EV READY” parking spaces, which must meet the requirements of this section. In accordance with 527 CMR 210.17 and this section, at least one minimum 50-ampere branch circuit for each “EV READY” parking space. The branch circuit may terminate in a NEMA 14-50 or NEMA 6-50 outlet or a dedicated Society of Automotive Engineers (SAE) standard J1772-approved Level 2 EVSE, although the outlet may be inside a locked enclosure or the branch circuit de-energized to prevent unauthorized use. The circuit must terminate in a location which would allow EVSE installed on that circuit, whether hard-wired or cord-connected, to be compliant with 527 CMR 627.17(A) and 527 CMR 625.50. The circuits shall have no other outlets. The service panel shall provide sufficient capacity and space to accommodate the circuit and over-current protective device. A permanent and visible label stating “EV READY” shall be posted in a conspicuous place at both the service panel and the circuit termination point. The location and number of “EV READY” parking spaces shall be identified on construction documents

Background and rationale:

The “EV READY” provisions of the 9th edition building code were removed from the draft in the February 14 meeting of the BBRS over concerns about compliance cost, especially in non-urban areas. The BBRS expressed a desire to see towns “take the first step” before imposing new requirements. However, cities and towns generally lack the expertise to define appropriate electrical standards for EV infrastructure. The present proposal eliminates the mandatory requirements from the DOER/EEA “EV READY” proposal while retaining the definition. In addition, some technical improvements to the DOER/EEA definition are made.

On April 3, 2017, the Selectmen’s Climate Action Committee for the Town of Brookline approved a formal comment on the 9th edition building code requesting reinstatement of the original “EV READY” amendments or, lacking that, the inclusion of a state-wide “EV READY” definition. This amendment is intended to be responsive to that request.

Pros of the proposed change:

This amendment will allow cities and towns to more easily introduce Electric Vehicle infrastructure requirements via zoning and other local measures by reference to a state “EV

READY” standard. This reduces the burden of drafting appropriate electrical specifications from the local cities and towns and promotes consistency across the state. The BBRS is the appropriate qualified body to promulgate this definition; local zoning review and other boards are generally ill-equipped to evaluate appropriate electrical standards when considering Electric Vehicle Infrastructure requirements. Another concern from local zoning boards is how to “future-proof” their local bylaws. Centralizing the “EV READY” definition in the state building code allows it to be more easily updated by the BBRS as technology evolves, for example if the J1772 standard becomes obsolete.

The original DOER/EEA proposal seemed to imply that “EV READY” requirements required “accommodat[ing] a future dedicated [...] Level 2 EVSE” but disallowed present installation of EVSE on that circuit. The technical requirements have been clarified to ensure that presently-installed as well as future EVSE is compliant.

Finally, the service requirement has been raised to 50A with the option of installing a NEMA 14-50 or NEMA 6-50 outlet on the EVSE circuit. This accommodates current commercially available plug-in EVSE, such as those available from ClipperCreek (HCS-40P), ChargePoint (ChargePoint Home), eMotorWerks (JuiceBox 40), Tesla (Mobile Connector), Nissan (Home Charging Dock), General Motors (AeroVironment EVSE-RS), and others. Installing an outlet on the “EV READY” circuit ensures “day 1” availability of charging for new EV owners, as well as the ability to provide occasional charging for visitors and guests.

Cons of the proposed change:

By limiting the scope of the code amendment to definition and not imposing new requirements, the state misses the opportunity to ensure that buildings constructed today meet the needs of future vehicles. Homeowners without mandatory EV READY wiring in their homes may create a risk to public safety by attempting to charge their vehicles, or vehicles of visitors and guests, from inappropriate circuits.

The requirement to add an outlet on the EV READY circuit adds an additional cost, although this is small.

Commercial buildings may be concerned that an outlet on the EV READY circuit may allow visitors or customers to “steal” electricity, despite the language clarifying that the outlet may be locked or de-energized.

Estimated impact on life safety:

By facilitating local government’s efforts to add EV READY requirements in their local jurisdictions, safety risks of inappropriate vehicle charging may be reduced in cities and towns which choose to implement these requirements.

Estimated impact on cost:

None. The proposed code amendment imposes no requirements.

Appendix C



TOWN OF BROOKLINE Massachusetts

DEPARTMENT OF PLANNING
AND COMMUNITY DEVELOPMENT

ALISON C. STEINFELD
Planning Director

April 7, 2017

Mark D. Marini, Secretary
Massachusetts Department of Public Works
One South Station, 5th Floor
Boston, MA 02110

Dear Mr. Marini:

Re: Docket No. 17-05

On behalf of the Selectmen's Climate Action Committee of the Town of Brookline, we would like to express our appreciation of and support for the Electric Vehicle Charging Infrastructure as a component of the Eversource Grid Modernization Base Commitment. Brookline recognizes its responsibility to encourage Electric Vehicle adoption as a necessary component of our actions to combat climate change, and we appreciate the actions proposed by Eversource to address key barriers to EV ownership.

As detailed by Eversource in their proposal, "[i]n Massachusetts, about 62.1% of households are owner-occupied housing. In Brookline, owner-occupied housing accounts for approximately 50% of households. In addition, only 24% of Brookline housing units are single-family homes, with the remaining units being multi-family housing. Renters and those living in multi-family units face unique challenges to accessing EV charging infrastructure. Thus, many households face a difficult EV ownership experience if they are unable to secure reliable access to EV charging." (Exhibit ES-GMBC-1, page 108).

In selecting sites for make-ready EV charging infrastructure, we urge Eversource to concentrate Level 2 infrastructure on the "parking orphan" problem, which we define as individuals who own vehicles but do not own a corresponding parking space. The proposal mentions multi-unit dwellings, but in Brookline, due to the fact that many housing units were built without parking and our overnight on-street parking ban, many residents also use town-owned overnight parking, and rentals from private holders of Open Air Parking licenses. We urge the consideration of pilot projects which address the issues unique to multi-family housing, rental occupancy and "garage orphans" in order to facilitate EV adoption.

Sincerely,

Werner Lohe
Co-Chair, Selectmen's Climate Action Committee

Copies via email to dpw.efiling@state.ma.us and Marc.Tassone@state.ma.us and via postal mail to:

Brookline Town Hall · 333 Washington Street Third Floor · Brookline, MA 02445 · 617-730-2130 · Fax 617-260-2442

Appendix D:

Sarah Olexsak

Energy Efficiency & Renewable Energy | U.S. Department of Energy

1000 Independence Avenue, SW | Washington, DC 20585

P 202.586.2149 | sarah.olexsak@ee.doe.gov

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Provisions for electric vehicle charging infrastructure. The *building project* shall comply with one of the following:

1. Two or more electric vehicle charging stations shall be available to the building occupants and shall be located not more than 1/4 mile (400 m) from the *building project*.
2. Electrical raceways shall be installed and extend from one or more of the building's electrical power distribution panels to not less than the number of parking spaces specified in the table below, to facilitate the future installation of vehicle charging stations. Electrical power distribution panels serving such raceways shall be sized to supply the future charging stations based on a design load of not less than 40 amperes per required parking space at a supply voltage of not less than 208/240 VAC.

Total number of parking spaces <u>provided</u>	Number of spaces <u>required to have raceways</u>
<u>1-25</u>	1
26-50	2
51-75	4
76-100	5
101-150	7
151-200	10
201 and over	5% of total

This email is from the U.S. Department of Energy's Clean Cities Technical Response Service in response to your inquiry regarding examples of local legislation that focus on plug-in electric vehicle (PEV) readiness and require electric vehicle supply equipment (EVSE) infrastructure in new and residential construction.

For information on current laws and regulations pertaining to PEV deployment, please refer to the Alternative Fuels Data Center (AFDC) Laws and Incentives database (<http://www.afdc.energy.gov/laws>). You may view local examples of laws and regulations here:

http://www.afdc.energy.gov/laws/local_examples. Additionally, for state-level examples, the Advanced Search options (<http://www.afdc.energy.gov/laws/search>) allow you to identify specific incentives by jurisdiction, technology/fuel type (e.g., all-electric vehicles (EVs), plug-in hybrid electric vehicles (PHEVs)), incentive/regulation type, and user type.

While there is no "ideal" or one-size-fits-all PEV readiness strategy, parking requirements, zoning, and codes (including permitting) are three particularly powerful tools to encourage PEV and EVSE adoption. We have provided you with a number of case studies and examples of PEV and EVSE requirements below:

Parking Requirements

State and local jurisdictions can implement mandatory minimum requirements for multi-family dwellings and public parking garages in order to ensure that the infrastructure is in place to encourage PEV deployment. Below are a few examples from regions across the country:

Hawaii Plug-In PEV Parking Requirement (<http://www.afdc.energy.gov/laws/6566>)

All parking facilities that are available for use by the general public and include at least 100 parking spaces must designate at least one parking space specifically for PEVs, provided that no parking spaces required by the Americans with Disabilities Act Accessibility Guidelines are reduced or displaced. Spaces must be clearly marked and equipped with EVSE. An owner of multiple parking lots may designate and install EVSE in fewer parking spaces than required in one or more parking lots, as long as the owner meets the requirement for total number of aggregate spaces for all parking lots. A fee of \$50-100 applies for non-PEVs that park in spaces designated for PEVs. (Reference [Hawaii Revised Statutes](#) 291-71 and 291-72)

New York City, NY PEV Ready Parking Facility Requirements

(http://www.afdc.energy.gov/laws/local_examples#9)

The New York City Department of City Planning requires that all newly constructed and upgraded parking garages and open lots include the necessary hardware for EVSE in at least 20% of each facility's parking spaces. For more information, see the New York City [General Administrative Provisions for Construction Codes](#), Section 28-101.4.3, as well as the New York City [Building Code](#), Sections 406.2.11 and 406.7.11.

Zoning

Zoning ordinances are also useful tools for state and local governments to indicate where EVSE are allowed or prohibited. Planners and other officials can also use zoning to incentivize or require EVSE throughout a municipality's zoning districts or in specific areas. Officials can leverage zoning ordinances to formally define EVSE and ensure that installation is permissible at the state and local levels. See below for examples of local zoning ordinances that facilitate the advancement of PEVs:

Los Angeles, CA PEV Ready Building Requirements

(http://www.afdc.energy.gov/laws/local_examples#9)

Newly constructed buildings in Los Angeles must provide the necessary hardware for PEV

charging. One- and two-family dwellings and townhouses must be equipped with at least one PEV charging outlet, which is a 208/240 volt, 40 ampere, grounded alternating current outlet, or panel capacity and conduit for such outlet installation for each dwelling unit. Other residential buildings that have a common parking area must be equipped with PEV charging outlets in at least 5% of the total parking spaces or panel capacity and conduit for these upgrades in the future. The parking area of new high-rise residential and non-residential buildings must include PEV charging outlets in at least 5% of the total parking spaces. For more information, see the [2011 Los Angeles Amendment Green Building Code](#).

Washington Local Government PEV Infrastructure Requirements

Jurisdictions must develop regulations to allow the use of PEV infrastructure and battery charging stations in all areas except critical areas or areas zoned for residential or resource use. The Washington Department of Commerce included a model ordinance, development regulations, and guidance for local governments for site assessment and installing PEV infrastructure in [Electric Vehicle Infrastructure: A Guide for Local Governments in Washington State \(PDF\)](#). This requirement applies to jurisdictions that meet specific location criteria and is contingent upon federal funding. Additionally, cities or municipalities may adopt incentive programs to encourage retrofitting of existing structures capable of charging PEVs. (Reference [Revised Code of Washington](#) 35.63.126, 35.63.127, 35A.63.107, 36.70.695, 36.70A.695, and 43.31.970)

Methuen, Massachusetts EVSE Zoning Ordinance

The city of [Methuen, MA](#) has adopted an addendum to a pre-existing zoning ordinance to specify permissible use of EVSE in single- and multi-family dwellings as well as commercial or industrial zones. This addendum is included in [Section V-T \(PDF\)](#) of the Zoning Ordinance.

Codes and Permitting

Lastly, codes can be particularly effective tools to specify requirements, goals, or limits for new construction features. They can also provide new permitting or inspection protocols and remove barriers to EVSE installation.

See below for examples of codes that have expedited the *permitting and installation* process for EVSE:

Houston's EVSE Permitting and Installation Process

To facilitate Houston's electric vehicle adoption, the Public Works and Engineering department's permitting office created a 24-hour permitting process. The EVSE customer's electrician applies for a permit via the Houston Code Enforcement Group's [Online Permits](#) system. Approval is automatic and instantaneous for standard installations that provide load analysis and, on a case-by-case basis, a one-line diagram. The fee is currently \$83.01 for Level 2 EVSE. More complex installations have different permitting requirements. The city also applied its existing online express permitting process to EVSE installations. With

this process, online permits from Houston's [Code Enforcement Group](#) are issued automatically and instantaneously for standard EVSE, and an inspection can be performed on the same day as installation. Thus, the entire assessment, permitting, installation, and inspection process for a simple EVSE project can be completed in one day. You may find more information here: <http://www.afdc.energy.gov/case/1003>.

Los Angeles' EVSE Permitting and Installation Process

The city of Los Angeles, California has streamlined its permitting and installation process similarly. For standard installations, the EVSE customer's electrician applies for a permit online via the Los Angeles Department of Building and Safety (LADBS) Express Permit system. Issuance of a permit is automatic and instantaneous for standard installations. The fee is generally \$75. More complex installations, such as commercial EVSE over 600 amps, may have additional requirements. Similar to the city of Houston, LADBS applied its existing online [Express Permit system](#) to EVSE installations. The system enables customers installing standard EVSE to receive a permit instantaneously and start using their EVSE immediately after inspection, which occurs within 24 hours of notification that EVSE is installed. LADBS created a separate EVSE inspection division to help ensure this rapid turnaround. The entire city falls under LADBS' jurisdiction, which gives customers and their contractors a consistent process. Please refer to the AFDC case study, *Los Angeles Sets the Stage for Plug-In Electric Vehicles* (<http://www.afdc.energy.gov/case/1002>) for more details.

Raleigh's EVSE Permitting and Installation Process

The licensed electrician or EVSE customer/homeowner visits one of two City of Raleigh inspection centers to obtain a permit. The process to apply for and receive a permit takes approximately one hour and costs \$81. Raleigh also applied its existing "stand alone" permitting and inspection process to EVSE installations. This is also called a "walk through" process because the permit is completed as the applicant is walked through the process by permitting personnel. Getting a permit takes about one hour, and inspections can be performed the day after installation. As a result, the entire assessment, permitting, installation, and inspection process for a simple home-based EVSE project can be completed in as few as two days. Raleigh views the process as an opportunity to train permitting staff and electricians about EVSE. The city also has an e-fax number so paperwork may be submitted electronically. You may learn more about the success of PEV deployment in Raleigh here: <http://www.afdc.energy.gov/case/1001>.

The state of California has implemented a policy that strives to *remove barriers* to EVSE installations in multi-unit dwellings:

EVSE Policies for Multi-Unit Dwellings (<http://www.afdc.energy.gov/laws/9579>)

A common interest development, including a community apartment, condominium, and cooperative development, may not prohibit or restrict the installation or use of EVSE in a homeowner's designated parking space. These entities may put reasonable restrictions on EVSE,

but the policies may not significantly increase the cost of the EVSE or significantly decrease its efficiency or performance. If installation in the homeowner's designated parking space is not possible, with authorization, the homeowner may add EVSE in a common area for their use. The homeowner must obtain appropriate approvals from the common interest development association and agree in writing to comply with applicable architectural standards, engage a licensed installation contractor, provide a certificate of insurance, and pay for the electricity usage associated with the EVSE. Any application for approval should be processed by the common interest development association without willful avoidance or delay. The homeowner and each successive homeowner of the parking space equipped with EVSE is responsible for the cost of the installation, maintenance, repair, removal, or replacement of the station, as well as any resulting damage to the EVSE or surrounding area. The homeowner must also maintain a \$1 million umbrella liability coverage policy and name the common interest development as an additional insured entity under the policy. If EVSE is installed in a common area for use by all members of the association, the common interest development must develop terms for use of the EVSE. (Reference [California Civil Code](#) 4745 and 6713)

For more information about EVSE requirements across the country, please see the AFDC PEV Deployment Policy Tools: Zoning, Codes, and Parking Ordinances page (<http://www.afdc.energy.gov/bulletins/technology-bulletin-2015-08.html>).

You may also be interested in the following resources for guidance on PEV readiness and best policy practices:

- *Title 24 – Building Codes for PEVS* presentation (http://www.pevcollaborative.org/sites/all/themes/pev/files/combined_title24_presentation.pdf): This PEV Collaborative webinar covers the main components of California's building code as it relates to PEV readiness. Note that requirements for EVSE installation fall into the "Green Building Standards Code" section.
- *Assessment of Leading Electric Vehicle Promotion Activities in United States Cities* (http://www.theicct.org/sites/default/files/publications/ICCT_EV-promotion-US-cities_20150729.pdf): Published by the International Council on Clean Transportation, this study analyzes the success of various PEV and EVSE incentives and requirements in cities across the country and their impact on PEV adoption. In particular, pages 14-15 discuss local EVSE deployment efforts.
- *Residential EVSE Permit Process Best Practices* (<http://www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/Permit-Process-Streamlining.pdf>): This report details best practices for state-wide and city-wide residential EVSE permitting processes, providing specific examples from pages 3 to 4. The end of the report also includes sample permitting applications for guidance.

Please do not hesitate to follow up if you have additional questions.

* * * * *

[Clean Cities](#) advances the nation's economic, environmental, and energy security by supporting local actions to cut petroleum use in transportation. Clean Cities carries out this mission through a network of nearly 100 coalitions, which bring together stakeholders in the public and private sectors to deploy alternative and renewable fuels, idle-reduction measures, fuel economy improvements, and emerging transportation technologies. Stay connected through the Clean Cities [blog](#) and [News and Events subscriptions](#), including webinar alerts and Clean Cities Now, a biannual newsletter.

The [Vehicle Technologies Office](#) works with industry leaders, national laboratories, universities, and state and local governments to develop and accelerate the deployment of advanced vehicle technologies and renewable fuels.

To order the Model Year 2017 [Fuel Economy Guide](#), please refer to the [online order form](#). You may also view fuel economy ratings directly at [FuelEconomy.gov](#).

Thank you,

Lindsay Kirschner, ICF Supporting the U.S. Department of Energy
and National Renewable Energy Laboratory -

Clean Cities Technical Response Service

technicalresponse@icf.com

800-254-6735

www.cleancities.energy.gov/

www.afdc.energy.gov/

www.fueleconomy.gov/

Appendix E: Further EV and Charger Information

www.greencarreports.com

www.pluginamerica.org

<http://www.ucsusa.org/clean-vehicles#.WORSvzd1qAg>

<https://energy.gov/public-services/vehicles>

<http://insideevs.com/>

<http://www.mass.gov/eea/docs/doer/clean-cities/ev-charging-infrastructure-manual.pdf>

INSTALLATION GUIDE FOR ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) An Introduction to EVSE Prepared by: The Massachusetts Department of Energy Resources June, 2014

[http://www.calstart.org/Libraries/Publications/Best Practices for Workplace Charging.sflb.ashx](http://www.calstart.org/Libraries/Publications/Best_Practices_for_Workplace_Charging.sflb.ashx)

BEST PRACTICES FOR WORKPLACE CHARGING. Employer EV Initiative Supporting solutions for workplace charging. CALSTART is a non-profit organization that works with the public and private sectors to develop advanced transportation technologies and foster companies that will help clean the air, lessen our dependence on foreign oil, reduce global warming, and create jobs. Published: September 2013

<https://avt.inl.gov/sites/default/files/pdf/reports/MassachusettsCaseStudyDec2016.pdf>

Massachusetts Plug-in Electric Vehicle and Charging Infrastructure Case Study Fred Wagner Jim Francfort Sera White December 2016, Idaho National Laboratory, a U.S. Department of Energy National Laboratory operated by Battelle Energy Alliance