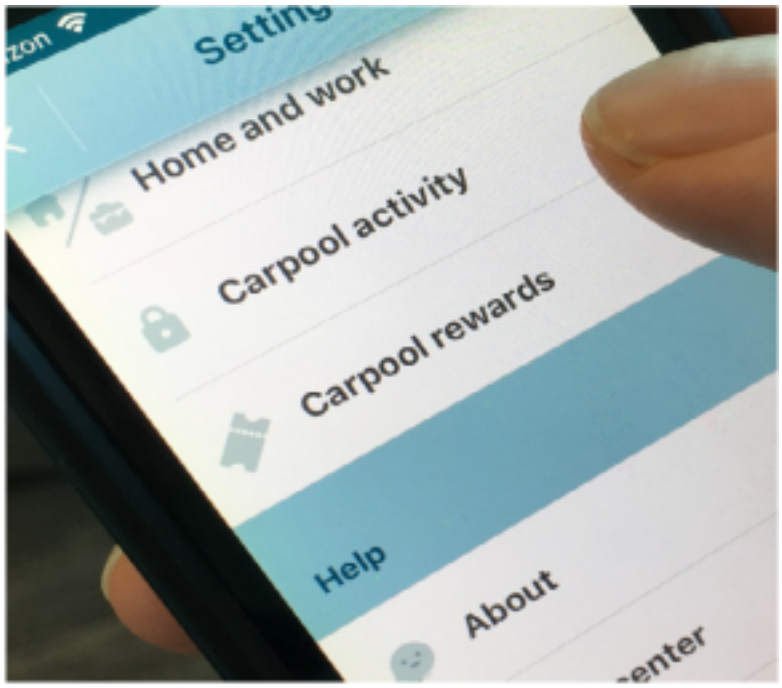

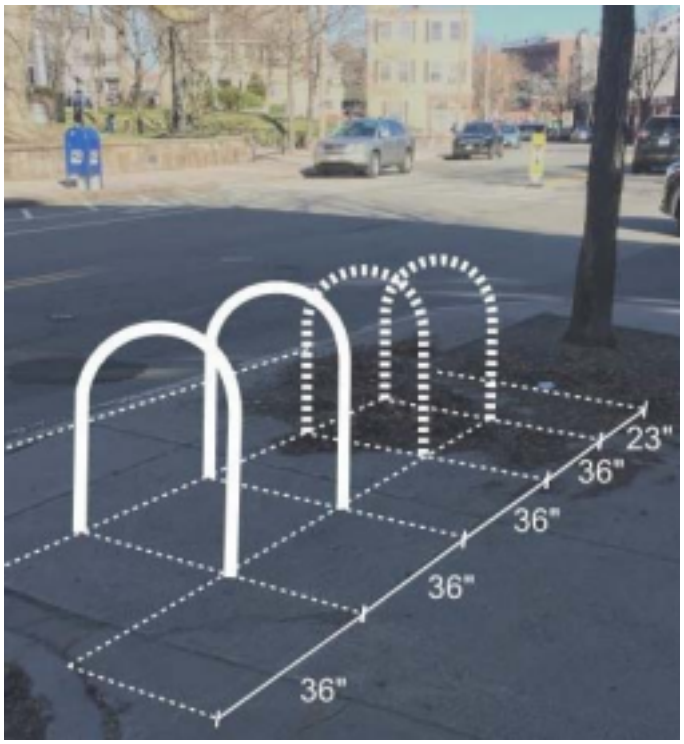

Brookline TDM Implementation Plan

Final Technical Memo

Costs and steps toward reduction of employee paring demand

Brookline, MA

October 2, 2019

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Table of Contents

Introduction 1
The Proposed Commuter Benefit and its Uses .....
3 The New Commuter Benefit .....
3 Limitations of the TRIMMS Model 5
Modeling Results Summary 5
Brookline High School Cluster Details 6
Coolidge Corner (formerly Devotion) School Cluster Results 7
Heath/Runkle/Driscoll Cluster Results 7
South Brookline Cluster Results 7
Town Hall Cluster Results 7
Joining a Transportation Management Association 15
Overview 15
Promotion of Car Pool Matching Services 17
Promotion of bike-sharing, micro-mobility, and other emerging mobility options 18
Primary Direct Costs for the Commuter Benefit, TMA, and MBTA Pass Options 18
Administrative Time Requirements 21
Overview 21
Ongoing duties of the Lead ETC or other administrators 21
Employee selection of commuter benefit spending options 22
Distribution of parking permits ..... **Error! Bookmark not defined.**
Parking enforcement .....
23 Distribution of MBTA LinkPass
..... 24 Distribution the MBTA Eco
Pass ..... 24 Distribution of unused
Commuter Benefits as income ..... 24 Strategy and
encouragement of employees to try new transportation options 25
Workplace Cluster ETC Responsibilities 25
Ride Hailing Use for Intra-travel between Town of Brookline Workplaces 25
Bicycle Parking 26
Background 26
Recommended Bicycle Parking Improvements 26
Webster Place 28
Preferred Option .....
28 Alternative Option A
..... 28 Alternative Option
B ..... **Error! Bookmark not defined.**
Main Library ..... **Error! Bookmark not defined.**

Preferred Option - Completed 31
Expansion Option A, Alternative Options A-B 31
Public Health Building ..... 32 Preferred Option ..... 32 Alternative Option A 32
DPW Water and Sewer Garage ..... 33 Preferred Option (with Expansion Option A) ..... 33 Alternative Option A 33
Pierce Elementary School 36
Preferred Option ..... 36 Expansion Option A 36
Town Hall 39
Preferred Option ..... 39 Expansion Option A 39
Public Safety Building 40
Preferred Option (with Expansion Option A) 40
Alternative Option A 40
Lincoln Elementary School 43
Preferred Option ..... 43 Expansion Option A ..... 43 Preferred Option ..... 45 Expansion Option A 45
Municipal Services Center 47
Preferred Option (with Expansion Option A) 47
Alternative Option A 47
Alternative Option B 47
Other Key Workplaces 51
Estimated Bicycle Parking Costs 52
Appendix A: TRIMMS Modeling Methodology i
Introduction i
TRIMMS Model Inputs and Adjustments i
Analysis Tab Adjustments ii
Parameters Tab Adjustments ii
Model Refinements xii

Appendix B: Detailed fee estimate from Allston/Brighton TMA i

Tables and Figures

Table 1 - Town-Wide Summary Mode Share Results 11
Table 2 - Brookline High School Cluster Mode Share Results 11
Table 3 - Coolidge Corner (formerly Devotion) School Cluster Mode Share Results 12
Table 4 - Heath/Runkle/Driscoll Cluster Mode Share Results 12
Table 5 -South Brookline Cluster Mode Share Results 13
Table 6 - Town Hall Cluster Mode Share Results 13
Table 7 - Primary Direct Costs 20
Table 8 - Additional Cost-Related Information 21
Table 9 - Bicycle Parking at Key Workplaces (Reproduced) 27
Table 10 - Mode Share Conversion to TRIMMS Inputs iii
Table 11 - TRIMMS Model Analysis Tab Adjustments v
Table 12 - TRIMMS Model Parameters Tab Adjustments viii

Figure 1 - Webster Place - Preferred Option 29
Figure 2 - Webster Place – Alternative Option B 30
Figure 3 - Webster Place – Alternative Option B Locus Map ..... 30 Figure 4 - Main Library – Expansion Option A and Alterative Options A-B ..... 31 Figure 5 - DPW Water and Sewer Garage – Preferred Option and Expansion Option A ..... 34 Figure 6 - DPW Water and Sewer Garage – Alternative Option A ..... 35 Figure 7 - DPW Water and Sewer Garage – Locus Map ..... **Error! Bookmark not defined.**
Figure 8 - Pierce Elementary School – Preferred Option ..... 37 Figure 9 - Pierce Elementary School – Expansion Option A ..... 38 Figure 10 - Pierce Elementary School – Preferred Option Locus Map ..... **Error! Bookmark not defined.**
Figure 11 - Town Hall – Preferred Option and Expansion Option A 39
Figure 12 - Public Safety Building – Preferred Option (With Expansion Option A) ..... 41 Figure 13 - Public Safety Building – Alternative Option A ..... 42 Figure 14 - Public Safety Building – Locus Map ..... **Error! Bookmark not defined.**
Figure 15 - Lincoln School - Expansion Option A ..... **Error! Bookmark not defined.**
Figure 16 - Lincoln School – Locus Map ..... 43 Figure 17 - Brookline High School – Preferred Option ..... 46 Figure 18 - Brookline High School – Expansion Option A 46

Figure 19 - Brookline High School – Locus Map ..... **Error! Bookmark not defined.** Figure 20 - Municipal Services Center – Preferred Option, Photo 1 ..... 48 Figure 21 - Municipal Services Center – Preferred Option, Photo 2 ..... 49 Figure 22 - Municipal Services Center – Alternative Option A ..... 49 Figure 23 - Municipal Services Center – Alternative Option B ..... 50 Figure 24 - Municipal Services Center – Locus Map ..... **Error! Bookmark not defined.**

Introduction

In 2018, the Town of Brookline (the Town) engaged HDR to develop the Transportation Demand Management (TDM) Implementation Plan for its employees. The purpose of the Implementation Plan is to estimate the costs and benefits of implementing a variety of techniques that were originally recommended in the 2018 technical memo titled "Recommendations for Transportation Demand Management, Town of Brookline" (herein referred to as the 2018 Recommendations Memo).

The 2018 Recommendations Memo recommended the following:

- Equalizing commuting benefits to all employees (instead of limiting them to free parking for those who drive)
- Joining a Transportation Management Association (TMA) and take advantage of its many services, including:
    - Creating Employee Transportation Coordinators (ETCs) on the Town's staff
    - Carpool Matching
    - Guaranteed Ride Home
    - Promotions and Events
- Increasing bike parking options in certain locations
- Compile a report on TDM progress annually (after implementation begins)

As described in more detail in the following sections, key conclusions from the TDM Implementation plan include:

LIMITED EMPLOYEE DIRECT COSTS

We find that for a small increase in per-employee direct costs and the assignment of at least one part- or full-time employee to coordinate with a local TMA, the Town can reduce Town employee use of single-occupancy vehicles for their commute to work. This can be achieved by providing every employee with a Commuter Benefit that can either be used for a monthly parking permit, a monthly transit pass, or as additional income if the person walks or bikes. Through partnership with the TMA, the Town can also encourage the use of these alternatives to driving as well as carpools, micro-mobility (such as electric scooters) and other ways to commute that exist now, as well as those that may be introduced in the future.

LIMITED STAFFING NEEDS

While the implementation of the transportation benefit and the monthly parking permits described below and in the 2018 Recommendations Memo should occur at the same point in time, many of the other elements of the TDM program can be incrementally implemented. This approach would allow for a single staff person to lead the TDM program, with assistance from Town departments as needed—similar to any change in employee policy.

SEVERAL TDM PROGRAM BENEFITS

The benefits of reducing the number of Town employees who drive will extend beyond the reduction in parking demand that results. Implementing Transportation Demand Management will help achieve other goals the Town has, including:

- Improving the health of employees by encouraging physical activity
- Reducing the use of fossil fuels and greenhouse gas emissions
- A deeper understanding of commuting patterns could help inform implementation of the Town's complete streets, bike sharing, and transit service improvement goals, as outlined in the Brookline Climate Action Plan
    - Commuting patterns for Town employees may be similar to, and thus indicative of, others who work nearby (Brookline's greatest job densities cluster along Harvard Street between Coolidge Corner and the intersection of Washington and Boylston Streets)

METHODOLOGY

Throughout this memo, the Town's 51 workplaces (defined as separate departments and/or facilities—which in several cases are housed in the same building) are broken out into the five (5) clusters listed below. The number of employees per cluster was estimated based on the best information provided by the Town in Spring 2019, and these numbers are slightly different than the 2018 Recommendations Memo. The use of the clusters also reflects the fact that the workplaces are served by similar transportation options. The five (5) clusters are:

- Town Hall (23 workplaces in 8 locations, 524 full-time employees estimated) • Brookline High School (6 workplaces, 345 full-time employees estimated) • Coolidge Corner (formerly Devotion) (6 workplaces, 206 full-time employees estimated) • Heath/Runkle/Driscoll (6 workplaces in 5 locations, 196 full-time employees estimated) • South Brookline (10 workplaces in 6 locations, 242 full-time employees estimated)

The first three clusters listed are also areas of relatively high job density for Brookline, according to U.S. Census data. There are also two workplaces that are geographic outliers which are situated in a location that does not correlate with any of the five listed clusters. These include the Soule Recreation Center in Chestnut Hill (9 full-time employees), and the Fire Department's Station 7 in Washington Square (18 full-time employees). These two workplaces are not addressed in this memo, and their combined 25 full-time employees represent less than .02 percent of the Town's full time employees, and would not significantly change this memo's conclusions.

Parking availability and access to transit varies among the clusters. Several contain one or more workplaces that are experiencing problems related to parking, including Brookline High School's planned expansion and Town Hall's parking garage, which is operating at capacity. At the same time, other clusters, such as South Brookline, have an abundance of parking. Each cluster also has a unique level of access to transit, ranging from the pair of bus routes serving South Brookline to the many train and bus options serving Town Hall and the Coolidge Corner Clusters.

KEY RESULTS FOR PARKING DEMAND

Reflecting the northern section of Brookline's historic development as a streetcar suburb of Boston, the places where density is high and parking is difficult are also the places where transit is more available, and where the TDM strategies explored in this memo are anticipated to have the most impact. The areas further south, where transit was not

- **Town-wide**: Depending on which of the strategies below are chosen, we estimate that the Town can reduce parking demand amongst all of its employees by between 5 and 15 percent.
- **South Brookline:** In the South Brookline cluster of workplaces, where transit options are limited to two bus lines, a modest parking demand reduction of between 4 and 11 percent may be achieved.
- **Town Hall:** At the Town Hall cluster, where the parking garage is perceived by some as "always full," employee parking demand may be reduced by between 5 and 18 percent.
- **Coolidge Corner**: In the Coolidge Corner cluster, where employee parking competes with parking for local businesses, parking demand may be reduced by between 11 and 28 percent.
- **Brookline High School:** At Brookline High School a reduction of employee parking demand between 4 and 11 percent reduction may help make more room for a planned school expansion, and its new teachers.
- **Heath/Runkle/Driscoll:** In the cluster dominated by three of Brookline's elementary schools, the parking demand reduction may be reduced by between 6 and 14 percent.

The Proposed Commuter Benefit and its Uses

Proposed Commuter Benefit

To better manage parking and travel demand among Brookline's approximately 1,500 full-time employees, the use of a Commuter Benefit was investigated to equalize commuting benefits among all employees. Currently the only commuting benefit provide by the Town is to offer free parking to employees who drive to work. This has incentivized parking, which costs the Town money to construct and maintain, and sometimes competes with other land use or parking needs and/or other uses for curbside space.

The proposed Commuter Benefit Scenarios evaluated in the Implementation Plan are designed to be used by the employee to pay for whichever mode of transportation (drive, transit, bike, or walk) they use for commuting to work. Each benefit would be matched in cash value with a new cost for a monthly parking permit ($45 and $90 levels were used to test behavioral change). The four scenarios listed below were modeled using the Trip Reduction Impacts of Mobility Management Strategies (TRIMMS) tool developed by the University of South Florida's Center for Urban Transportation Research (CUTR) for each workplace cluster.

Scenario 1	Scenario 2	Scenario 3	Scenario 4
$90 Commuter Benefit (and $90 Monthly Parking Fee) plus MBTA Eco Pass for all employees	$45 Commuter Benefit (and $45 Monthly Parking Fee) plus MBTA Eco Pass for all employees	$90 Commuter Benefit (and $90 Monthly Parking Fee) and opportunity to purchase an MBTA Link Pass pre-tax	$45 Commuter Benefit (and $45 Monthly Parking Fee) and opportunity to purchase an MBTA Link Pass pre-tax

The TRIMMS tool is a visual basic application spreadsheet model recommended by the Institute of Transportation Engineers for worksites or subareas that estimates the impacts of a broad range of transportation demand initiatives and provides program cost effectiveness assessment, such as net program benefit and benefit-to-cost ratio analysis. It evaluates TDM tactics based on “default literature-based parameters” that are specific to the Boston metropolitan area (and 99 other metro areas) and constant-elasticity demand functions (see Appendix A for more information).

KEY MODEL ASSUMPTIONS

- **Parking:** If the employee drives, they would have the opportunity to purchase a monthly parking pass that would allow them to use any on-street, parking lot, or parking garage associated with a Town of Brookline workplace. The parking pass would cost the same amount as the Commuter Benefit provides. As a result, any employee choosing to drive would not incur any additional cost whatsoever.
- **Transit:** Whether the employee takes transit or not, under scenarios 1 and 2, they would automatically have access to an MBTA Eco Pass. The Eco Pass is a pilot program offered by the MBTA to large employers wherein all employees receive a transit pass that can be incorporated with their employer ID card via a microchip. The employer then pays the MBTA on the basis of actual usage, instead of the number of passes distributed. Under the scenarios with an Eco Pass (Scenarios 1 and 2), a person who only takes transit part of the time and also drives part of the time would still have the option to pay for a monthly parking permit with their Commuter Benefit. The Eco Pass applies to the subway and buses in the MBTA system, similar to a Monthly LinkPass, and does not apply to the commuter rail or commuter buses. In Scenarios 3 and 4, employees could opt to use their Commuter Benefit to pay for part or all of the cost of an MBTA Monthly LinkPass.
- **Walking and Biking:** Under all scenarios, employees who walk or bike but do not drive or take transit could opt to keep the Commuter Benefit as part of their income. This incentivizes employees not to park, and thus can reduce the costs of providing parking for employees.

Reporting the Commuter Benefit to the Internal Revenue Service (IRS)

How an employee chooses to use his or her commuter benefit may change the way in which the Town of Brookline’s administration should report it on IRS tax returns. In some cases, the

benefit will not be counted as taxable income for the individual employee, and in other cases it will be counted as income. These regulations are also subject to change on a regular basis, including a recent change that takes away a pre-tax option for allow for bicycle-related expenses. For this reason, this memo refers to section 132f—“Qualified Transportation Fringes” of the Internal Revenue Code at https://www.irs.gov/pub/irs-drop/rr-14-32.pdf, and a resource for interpreting the code at https://www.bestworkplaces.org/resource-center/qualified transportation-fringe-benefits/.

Limitations of the TRIMMS Model

HDR made a number of assumptions and a few adjustments to the TRIMMS tool in order to better match the Town’s characteristics. These are detailed in Appendix A, and we believe the

adjustments have provided a clearer prediction of the Commuter Benefit's potential impacts. However, there are several new trends in transportation that are not fully considered by the TRIMMS model. While HDR did include ride hailing impacts using the TRIMMS tool, the TRIMMS tool does not yet take into account bike sharing, electric scooters, or new developments in carpool matching applications that have recently become available on smart phones, such as Waze Carpool and Scoop (both of which would be promoted to Brookline employees via a membership in any local Transportation Management Association). The widening number of transportation options made available to Brookline's employees are likely to modestly improve their ability and desire to reduce their drive alone trips to work in any of the results described below.

Modeling Results Summary

As documented in Table 1,

- Scenario 1, which offers the most incentive and most flexibility, provides the greatest reduction in parking demand (as evidenced by a town-wide 16 percent reduction in the number of employees who choose to drive alone to work). While the percent reduction in drive-alone vehicle use is modest in some clusters under Scenario 1, the estimated increase in the percentage of employees who use transit, biking and walking to get around is often dramatic and less variable from cluster to cluster. Transit use would nearly double, and biking and walking would both increase by a third. These forms of transportation have significant long-term health and productivity benefits for employees and the Town, and should not be overlooked when considering the costs and benefits of the Commuter Benefit.
- The most significant reductions are possible in the workplace locations that are adjacent to the most useful and frequent transit services, including the Coolidge Corner School Cluster and the Town Hall Cluster (near Brookline Village). Other clusters, where transit options are fewer and frequency of buses is lower have less opportunity for significant mode shift, such as the Heath/Runkle/Driscoll, Brookline High School, and South Brookline and Clusters.
- Scenario 4 is the least effective at reducing the overall drive alone rate (a 6 percent reduction town-wide).

The following provides additional details on the results for each cluster and Tables 2 through 6 below present the full model results.

Brookline High School Cluster Details

Table 2 shows results for the Brookline High School cluster. There are six workplaces included in this cluster, including two with a high numbers of employees: The William H. Lincoln K-8 School and the High School. In this cluster, it is estimated that the drive alone rate could be reduced by between 11 and 4 percent, a less dramatic change than is indicated for Town-wide or other, denser areas of the Town. This cluster is served only by the Green Line's D Branch and the Route 60 Bus, and doesn't have direct transit connections to Jamaica Plain, Roslindale or West Roxbury, where many of its employees live, yet transit use still has the potential to grow by 86 percent (18 employees) under Scenario 1, helping to reduce drive-alone mode share by 11 percent.

One of the benefits of reducing parking demand in the Brookline High School cluster will be reducing the need for additional parking to accommodate additional teachers and other staff in the current plans for the school's expansion. According to an estimate from the Brookline High School expansion's lead architect William Rawn Associates, the high school's staff is expected to grow to between 404 and 424 employees in that expansion. If reflective of current staffing (as noted in their estimate), 90 percent of those employees will be full-time and thus be eligible for the parking permit program. This would mean

there is estimated to be between 364 and 382 full-time employees in the future expansion. Without implementing any of the TDM measures described in this memo, we can assume around 78 percent of those employees would drive (similar to the percentage who chose to drive at the time of the employee transportation survey included in the 2018 Recommendations Memo), meaning between 284 and 298 employees would be competing for the 294 currently permitted parking spots (on-street and off-street).

Under Scenario 1, the demand for parking would drop to between 251 and 264, and under Scenario 4, it would only drop to between 273 and 287. Either of these options will likely provide the opportunity for the Town to use existing surface parking options near the High School, perhaps expanding the number of permitted spots available while holding the impacts to the surrounding neighborhood to a minimum. According to the 2018 Recommendations Memo, there is potential for an additional 121 spots of permitted on street parking.

For comparison purposes, the average cost just for the construction of one new ground level parking space is between $28,000 and $46,400, and for below ground-level parking it is between $33,200 and $53,200.[1] Add to that the cost of land and other internal and external costs, including maintenance costs, and encouraging employees to arrive at work without their vehicles becomes a cost-effective strategy that also helps meet the Town's Climate Action goals.

[1] Based on Rider Levett Bucknall's First Quarter 2019 North America Quarterly Construction Cost Report, p.5 "Indicative Construction Costs" for parking in Boston (assuming an average 332 square feet needed per garage parking space).

Please note that the relatively new Town of Brookline workplace at 2 Clark Road was not included in these modelling results. However, this location hosts a relatively small number of employees and is not likely to change the recommendations resulting from the modelling results. Also, this workplace can be captured and studied in future TDM Annual Reports for the Town of Brookline.

Coolidge Corner (formerly Devotion) School Cluster Results

Table 3 shows results for the Coolidge Corner School Cluster. This Cluster includes 200 full-time employees in 6 workplaces, of which the Coolidge Corner K-8 School and Amos A. Lawrence K-8 School have the highest number of employees. The area is relatively well served by transit, with access to the Green Line's C Branch and the 66 Bus, the latter making an important connection to Allston and Jamaica Plain, where many employees live. However, the highest geographic concentration of employees in this cluster is living in North Brookline—near enough to walk.

Of all five clusters, the Coolidge Corner School cluster currently has the lowest baseline mode share for drive-alone at 63 percent, the lowest supply of exclusive parking, and also the greatest potential to reduce drive-alone trips. The TRIMMS model forecasts that drive-alone mode share could be reduced by 29 percent under Scenario 1 (to only 45 percent of all trips), or by 11 percent under Scenario 4. This is achieved primarily with an

increase in public transit use, which could increase by an estimated 78 percent (24 trips) under Scenario 1, or by 13 percent (4 trips) under Scenario 4, but also by significant increases in biking and walking.

Heath/Runkle/Driscoll Cluster Results

Table 4 shows results for the Heath/Runkle/Driscoll Cluster. In this cluster there are six workplaces and approximately 196 full-time employees, with the three schools (the Health, Runkle, and Driscoll K-8 Schools) having the highest numbers of employees. While the Driscoll School is served by the B and C branches of the Green Line and the 65 Bus, and the Runkle School is served by the C and D branches and the 51 Bus, the Health is only served by the 51 and 60 Buses. Both buses that provide access to the Health are low frequency and do not serve the locations where many employees live (such as West Roxbury and Allston).

The drive-alone mode share for the cluster measured by the 2018 Recommendations Memo was 75 percent, which based on the results of the model runs could be reduced by 14 percent in Scenario 1, or by 6 percent in Scenario 4. As shown in the table, those trips are assumed to shift to public transit (rising by 83 percent or 12 trips) and walking (a 32 percent increase which is equivalent to 22 trips).

South Brookline Cluster Results

Error! Reference source not found. shows results for the South Brookline cluster. This cluster has 242 employees in 10 workplaces in 7 locations, with the most employees located at the Municipal Service Center and the Baker K-8 School. Many of these employees live in South Brookline, West Roxbury or Dedham, but in general employees from this cluster are widely dispersed. Only the 51 Bus and the 60 Bus traverse this part

of the Town, serving only roughly half of these workplaces. Both buses are low ridership and low frequency. It should be noted that the TRIMMS model uses a measure of transit access that is general for the cluster, and not specifically connecting known origins and destinations of employees, and for this reason the Public Transit increases predicted here may be overly optimistic.

Likely as a result of these limited transportation options, this cluster currently has the highest drive-alone mode share of any cluster (83 percent) and is less likely to see a substantial change in mode split under any of the four scenarios. Scenario 1 shows a 10 percent reduction resulting in drive-alone mode share of 74 percent. However, the TRIMMS model has predicted a 95 percent increase in transit use (18 trips), which may be overly optimistic. Furthermore, walking and biking trips are low in number, which means their increases, though significant in percentage, are unlikely to reduce the drive alone mode share in a noticeable way.

Town Hall Cluster Results

Table 6 shows the promising results for the Town Hall cluster. The Town Hall cluster has the highest number of employees (528), but also represents the cluster with the lowest percent of peak-period commuters (77 percent) due to the high number of public safety (fire and police) employees stationed there. Our study identified eight tightly clustered work locations. Most work locations in the cluster benefit from close proximity to the D Branch of the Green Line, and the 60, 65 and 66 Buses. The 39 Bus is also a ½ mile walk (or ride) from Town Hall. Many Town Hall Cluster employees live nearby in Brookline, and also in West Roxbury, Dedham, Jamaica Plain, and Roslindale. Despite this transit proximity, anecdotal reports of parking pressures at the parking garage many of these workplaces share are well known.

The drive-alone mode share for this cluster could be reduced by 19 percent under Scenario 1, or by 7 percent in Scenario 4. Model results for all scenarios estimate a reduction in parking demand at the garage.

Please note that these modelling results include the 24 Webster Place location in the Town Hall Cluster. The Webster Place workplace is no longer leased by the Town. This location had a relatively small number of employees, and as a result is unlikely to significantly change the modelling results now that those employees have moved to a new location.

TRIMMS MODEL RESULT CONCLUSIONS

By providing a Commuter Benefit to all of Brookline's employees similar to that described by Scenario 1, rather than offering the benefit of free parking only to those who drive, the Town can lower demand for parking at high use locations where parking is in low supply. The Town could also avoid constructing a new parking structure at the Brookline High School. At Town Hall, the crowding of the parking garage documented in the 2018 Recommendations Memo could also be significantly reduced.

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Joining a Transportation Management Association

Overview

Another question evaluated as part of this Implementation Plan is what are the direct costs and how many hours of labor it takes to implement the Commuter Benefit and the other TDM measures described herein. To answer that first requires an explanation of the benefits a Transportation Management Association membership, which can greatly reduce the costs and

effort for an employer the size of the Town of Brookline

However, any partnership with a TMA does require staff time to ensure that:

1) Town employees are engaged;
2) Town employees have in-house support for questions about the commuting options available; and
3) There is a strong internal liaison with the TMA.

To meeting the first two goals, the Town can identify an Employee Transportation Coordinator (ETC) for each workplace cluster to provide information on biking, walking, transit, and other commuting options. The best employees in this role already enthusiastically bike, walk, and/or use transit and understand enough to teach others to do the same. To meet the third goal, and to coordinate internal activities and help manage the Commuter Benefit, the Town would also identify a lead ETC to be the main point of contact for the TMA. This person would most likely be part of the Town Administrator or Human Resources office.

HDR approached the two TMAs nearest Brookline, which are MASCO and the Allston-Brighton TMA (the latter is affiliated with the organization: A Better City). While MASCO's charter limits its members to the Longwood Medical Area, the Allston-Brighton TMA is more flexible and is enthusiastic to partner with Brookline on TDM.

We note it is also possible for the Town to independently subscribe to a TDM software solution such as Commutifi, Luum, or RideAmigos. These services can help employers manage their own TDM programs, but running a TDM program internally typically requires additional dedicated employees, and may not be the most efficient method for the Town.

Recently, however, an association of Eastern Massachusetts TMAs, including Allston-Brighton TMA, acquired the RideAmigos software and that company's support in their TDM efforts for hundreds of employers in Eastern Massachusetts. The RideAmigos software offers carpool matching, trip planning, gamification of commuting options, and incentives for employees, as well as data analysis and reporting for the Allston Brighton TMA and by extension, the Town.

RideAmigos also offered an estimated cost (included in Table 7) for implementing a customization of their software for the Town that would help automatically manage the proposed Commuter Benefit program. Capabilities of the Ride Amigos software includes the ability to:

- Query employees by email on their monthly choice between receiving the Commuter Benefit as income or applying it to:

  - A monthly parking permit
  - A monthly MBTA LinkPass
- Communicate directly with the Town's automated payroll provider
- Communicate directly with the MBTA's corporate pass program for updated passes
- Generate PDFs that can be printed and act as monthly parking permits, or to update records associated vehicle information contained in license plate sticker RFID codes that already help parking enforcement verify vehicles (the Town can also opt to distribute its own permits)

Note that RideAmigos does not distribute passes or permits (beyond the electronically generated PDFs), and this would be a responsibility of the Town that could be completed by mail or by distribution to workplaces. However, once an MBTA MonthlyLink pass is distributed, it can be updated remotely by the MBTA.

A full explanation of RideAmigos software can be found at rideamigos.com/platform.

The Allston-Brighton TMA also offers the following services and benefits to its member organizations:

- Advocacy
- Commuter Programs
    - Commuter Benefit Management (by special arrangement for the Town of Brookline with RideAmigos)
    - ETC training
    - Commuter Rewards Programs (Workout to Work)
    - Guaranteed Ride Home
    - Carpool matching (see an explanation of recent developments below)
    - Transit Subsidies (for a 3-month introductory period)
        - $100/month for MBTA express bus, ferry, or private coach
        - $50/month for carpool or vanpool
- Outreach
    - Weekly newsletter
    - Customized marketing campaigns
- Engagement
    - Transportation fairs
    - Bike tune-ups
    - Educational and promotional events

Many of the services above can be facilitated at the Town level through the involvement of ETCs at Town work locations or clusters or by electronic services available via RideAmigos software or other mechanisms administered by the TMA, taking most of the burden of running a TDM program for employees off of Town administrators. While oversight is needed for the entire program, the more routine tasks for Town administrators generally relate to the management of the Commuter Benefit program. The employee selection of their benefit options can be entirely automated by the RideAmigos software, but certain tasks are still required to distribute the ways

in which benefits are used, such as parking permits, passes, and pay. These needs are described in the management section below.

One critical issue to be aware of regarding these new carpool services, however, is that neither of these web-based services assumes any liability for them. They do not vet drivers or riders. Instead they allow users to rate each other. Any user of them would be on their own in terms of liability. The town may want to make this clear to potential users of the service, and also ensure that it is not held liable for its use.

Promotion of Carpool Matching Services

The Allston-Brighton TMA also offers carpool matching via the RideAmigos software. In the past, carpool matching has been difficult to implement and has rarely had a significant effect on reducing single-occupancy vehicles or parking demand, but that picture may be just beginning to change. Prior to June 30, 2019, many of Massachusetts' various Transportation Management Associations (TMAs) were using NURide, a car pool matching service coordinated by MassDOT's Bay State Commute program, to help would be car poolers find people to commute

to work with. On June 30, 2019, Bay State Commute's funding for the NuRide Service ended, and now over a dozen TMAs in the state are banding together to contract a new service, RideAmigos, which will also help them track people's travel behavior in real time, and also how individuals engage in any of their programs. RideAmigos has its own carpool matching service that all of the TMAs will promote, and it also links to emerging carpool matching services Waze Carpool and Scoop.

The challenge of carpooling, according to many in the industry, is getting to critical mass. In other words, having enough people engaged to make finding someone who lives near you and also works near you an easy task. The last time carpooling peaked was in the early 1970s, during the fuel crisis, when millions of people were motivated to find another way to work. The number of people who carpool today is less than half of what it was then, and over half of all carpoolers are "fam-pools" (comprised of the driver's family members only).

Where carpooling is more prevalent in the recent past it is typically precipitated by heavily congested traffic and some form of managed lanes. In Washington DC, single drivers pick up passengers at designated locations in order to be able to take the HOV lanes into the city, thus traveling much faster. A softer encouragement approach has often had less than stellar results. In Boston, a version of the carrot approach is currently being piloted at the Longwood Medical Area (LMA) by MASCO, the TMA responsible for Transportation Demand Management for most of the LMA's numerous large employers. Employees who organize carpools in private cars for 6 months are being offered $250 gas gift cards and individual employees who put their parking spaces on hold (saving hundreds of dollars on parking fees) are offered $40 credit per month that can be used for Lyft Line rides. According to sources at MASCO, the incentives have not yet resulted in a significant uptick in carpooling behavior, partly due to the high costs of Lyft Line rides during peak commuting hours.

There are also larger-scale efforts underway from private companies to crack the code on carpooling, including Waze Carpool, Scoop, SoMo, TripBuddy, and Ride Shark, to name a few.

These services have reportedly had mixed results in different parts of the country, which are often reported to be related to the same critical mass problem. Some of these services are placing carpool as just one option of many that a commuter can choose. Other apps that do not yet offer carpooling are also aggregating wide varieties of mobility options. As these services aggregate more and more options and attract more and more users, the viability of a carpooling option may increase as well. Some of the TDM software firms interviewed, such as Commutifi, reported that carpooling has become a stronger option for their clients who promote Waze Carpool and Scoop via Commutifi's software.

The Town's association with the Allston-Brighton TMA and RideAmigos will promote Waze Carpool and Scoop—which is promising, particularly if paired with other incentives. Carpooling apps could also be the topic of questions on future annual TDM surveys—anticipating that at some point, one or more will begin to be adopted or well-known to Brookline employees.[2]

Promotion of bike-sharing, micro-mobility, and other emerging mobility options

The Allston/Brighton TMA is also organized to encourage employee participation in emerging transportation options, including Bluebikes, Zipcar, and several other new mobility options. Many of these services also offer corporate memberships that discount the cost of membership for employees. For example, Bluebikes offers companies a choice between several levels of corporate membership. The lowest level splits a discounted annual fee of $70 (normally $99) between the employee ($52.50) and the company or in this case the Town ($17.50). Additional trip fees are paid for by the employee. The highest level assigns all costs to the company.

Acquiring Zipcar's corporate program's fees requires an exchange of information with the Town, and is customized to each organization. If desired, the town can integrate Zipcar payments from employees into the Commuter Benefit management solution provided by RideAmigos.

These types of services that have annual fees and sometimes per-ride pricing can be added to Brookline's TDM program, as needed, with the help of the TMA working with a dedicated Town of Brookline employee. The best source of information on the potential usage for these types of services are the service providers, and if asked they can provide an cost and or usage estimate (perhaps with the added benefit of the 2017 employee transportation survey's results).

Estimated Primary Direct Costs for the Commuter Benefit, TMA, and MBTA Pass Options

Based on the previously described scenarios, the TRIMMS model results and TMA research, Table 7 provides an estimate of monthly primary direct costs. As mentioned early primary direct costs include (provide a brief summary of the assumptions used for the items in the table.) The estimates in the table are intended to support the current policy discussions regarding

[2] This section of the report is based on conversations with staff at Allston/Brighton TMA, Charles River TMA, and MASCO as well as related research on carpooling trends and the apps themselves.

establishing a TDM Program. Actual monthly costs would reflect employee participation, program parameters and the potential role of the TMA.

Table 7 – Estimated Primary Direct Costs

	Baseline	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Estimated number of employees (Spring 2019)	1,509	1,509	1,509	1,509	1,509
Amount of Commuter Benefit	$ -	$90.00	$45.00	$90.00	$45.00
Number of employees who Drive Alone	1,123	944	1,007	1,025	1,059

Estimated Direct Costs to pay Commuter Benefit to employees (or transit passes for employees) who do not drive alone (Monthly)	$ -	$50,850.00	$22,590.00	$43,560.00	$20,250.00
MBTA Monthly Costs to Employer (MBTA Eco Pass)*	$ -	$32,000.00	$24,800.00	$ -	$ -
Monthly Cost of Commuter Benefit Management Software via Ride Amigos**	$ -	$1,666.00	$1,666.00	$1,666.00	$1,666.00
Monthly Cost of TMA Membership***	$ -	$1,274.00	$1,274.00	$1,274.00	$1,274.00
Total Monthly Direct Costs to Town	**$ -**	**$85,790.00**	**$50,330.00**	**$46,500.00**	**$23,190.00**

*Estimate for Scenario 1 provided by MBTA (the MBTA's ridership growth assumptions were similar to HDR estimates for this scenario), Estimate for Scenario 2 adjusted the MBTA's estimate used in Scenario 1 using HDR transit ridership estimates. These fees are provided as estimates only.

**In response to a request from HDR, RideAmigos provided an estimate of $10,000 to $20,000 annually for customizing their software to allow Town of Brookline employees to administer their Commuter Benefit online. The details of this customization will be up to the Town and other vendors such as the MBTA and the Town's automated payroll service. This is provided only as an estimate given by a third party, and HDR provides no guaranteed of its observance.

***In response to a query from HDR, the Allston-Brighton TMA provided the annual membership dues estimate. Typically the organization charges dues based on the number of workplaces serviced, but in the case of the Town of Brookline they have agreed to consider a reduced fee estimate that is instead based on continuing this report's practice of clustering worksites. This fee is provided here as an estimate given by a third party, and HDR provides no guarantee of its observance.

Table 8 - Additional Cost-Related Information

	Baseline	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Monthly Direct Cost per employee	$ -	$56.85	$33.35	$30.82	$15.37
Employees who use Public Transit for two-way trips	139	264	211	179	157

Number of employees who receive Commuter Benefit as income	0	565	502	305	294
MBTA Costs to an Employee who does not drive and instead uses Public Transit for two-way trips (with a pass)	$90.00	$ -	$ -	$ -	$45.00

Administrative Time Requirements

Overview

The scope of this study did not include research and analysis to obtain a a full working knowledge of the existing systems used within the Town for payroll administration, administering parking permits, parking enforcement, and other existing systems, that would be required to estimate the number of hours require to initiate a TDM program. However, the Allston/Brighton TMA has decades of experience working with large and small employers to implement TDM Programs, and the RideAmigos service that the TMA now uses can also consult and aid in this process as part of its service to the Town. These two organizations are expert at making the maintenance of any TDM program a relatively simple task once systems are in place.

More important to determining the level of effort involved at the outset, based on our interviews with the Allston/Brighton TMA and RideAmigos, is creating a role within the Town that is dedicated to TDM. In their words, that person can spend anywhere from a few hours to 40 hours a week working to change employee commuting habits. However, given the ambitious nature of the Commuter Benefit program and the other desires expressed by the Town's support of the 2018 Recommendations Memo, HDR recommends initially assigning one person as the Town's Lead ETC with between .5 and 1 FTE, or 20 to 40 hours per week. This will allow implementation of Brookline's TDM program to take place over time. Part of that person's role can be creating a schedule for implementing the policies outlined in this memo and the 2018 Recommendations Memo. Once initial implementation is achieved the Town can monitor and assess again the time demands for the role.

The Lead ETC would be someone in or added to the Town's administrative offices or the Transportation Department who has access to top-level decision makers in the town's administration, and is also able to interact with payroll providers, Brookline parking enforcement,

and transportation-related vendors, such as the MBTA, Zipcar, and Bluebikes. The ideal candidate is someone who is enthusiastic about their own commuting choice, but also a strong communicator with clear leadership qualities. They would ideally have experience in marketing, communication, training, facilitation, and/or program management and understand policy. Their ability to create behavioral change should be well demonstrated in their prior experience.

Note that this plan to assign just one Lead ETC assumes that the lead ETC would be able to easily engage with the School department's employees from the vantage of the Town's administrative offices. If it is not possible to be effective between the administrative and school departments different systems from this vantage, it may be advisable to have two separate Lead ETCs, one for the schools and one for the Town, but this would likely be less cost efficient.

In addition to the Lead ETC, we would also recommend designating workplace cluster ETCs for

each of the five clusters named in this memo. According to the Allston/Brighton TMA, workplace cluster ETCs could ideally spend an *average* of 2-3 hours per week helping their fellow employees move into new commuting options by passing along information from the TMA and also answering basic employee questions about the program and about commuting options, and potentially by organizing and holding annual events in collaboration with the TMA. However, the time each ETC spends varies by organization and individual.

The Lead ETC would begin with the task of implementing the Commuter Benefit, Parking Permit, and MBTA pass programs and their maintenance, (with the help of the TMA and RideAmigos staff) and then assess the need for adding services and events via strategy meetings with the TMA.

Ongoing duties of the Lead ETC or other administrators

The main tasks of the ongoing monthly management of the proposed TDM Program would fall to the Town's administrators and the Lead ETC, but would be assisted by the TMA and RideAmigos.

The following tasks are viewed as the main administrative activities associated with the monthly choices employees will be able to make with the commuter benefit. Each task is discussed in order to provide the Town with a sense of the level of effort involved.

Employee selection of Commuter Benefit spending options

Every employee will be offered the choice of spending their Commuter Benefit on either a parking permit or an MBTA transit pass, or taking the benefit as income and finding another way to work. The Town will also have the additional options of offering all employees a transit pass (Eco Pass Option), or allowing employees to use the benefit for other transportation options such as Bluebikes and/or Zipcar. Those selections can be made on a monthly basis online via the RideAmigos software. Other services are available to serve this purpose, however RideAmigos is recommended as they are the service used by several TMAs in the state, including the Allston/Brighton TMA.

Distribution and enforcement of parking permits

Depending on the systems currently in place at the Town, this task could be manually achieved via the mail each month, or automatically via a combination of RideAmigos' software and the Town's administration or the Lead ETC. How that is automated is variable depending on the existing parking permit system the Town currently employs and its capabilities, as well as the capabilities of the equipment carried by parking enforcement officers carry. One possibility is to have RideAmigos set up an automated online PDF generator to create a new permit each month for each employee to print out and put on their dashboard. Another possibility may be to associate the vehicle ID (transmitted to parking enforcement officers by RFID chips in every vehicle's registration sticker) with a permit's validity, and to update that validity each month in the parking enforcement department's system. Both of these methods would need to be verified by the departments involved. The Lead ETC working with RideAmigos and the Town's parking permit and parking enforcement departments may yield an additional option.

The new monthly parking permits should be designed to have very little or no impact on

the time or resources needed to enforce parking in the Town. This can be achieved by providing enforcement officers a simple way to check on the validity of parking permits that can also be changed on a monthly basis. There are four distinct parking situations for the Town's workplace parking: on-street parking, parking lots with no assigned spaces for employees, parking lots with assigned spaces for employees, and the central parking garage. Each of these separate situations should ideally share the same system for permitting and enforcement, however there are some differences that bear explanation.

We recommend a common strategy for all four situations (with some variation in how it is implemented and enforced for each location) as described below. The common strategy is to distribute an identification sticker for all employee vehicles—this is merely to identify employees who may or may not have chosen to use their commuter benefit for parking on that particular month. Currently, there are different ways in which parking enforcement can check to see if that employee's parking permit is current.

On-Street Parking – For on-street parking, Brookline's parking enforcement department can identify which vehicles have current parking permits via their license plates. The updated list each month, with any changed access highlighted, can be provided by RideAmigos.

Parking Lots with No Assigned Spaces for Employees – For parking lots with no assigned spaces, facilities management or the administration of that workplace can receive a list of vehicle license plates that have parking permits each month from the central administration who obtains the original list from RideAmigos. There may be ways in which this process could be automated that could be explored by the Town with RideAmigos. That list need not be separated by workplace, but can include all license plates in an easily searchable format.

That list can then be used by local workplaces to identify any vehicles that are not permitted, which can then be towed.

Parking Lots with Assigned Spaces for Employees – For parking lots with assigned spaces, the same monthly list of all permitted license plates described above can be used to ensure those assigned spaces are up to date with their permits.

Central Parking Garage – Access to the central parking garage is currently governed by key fobs with RFID chips. For this system, all employees for whom access has been changed can be reported to the administration by RideAmigos via the same list described above, and fob access can be changed on a monthly basis. It is expected that the access changes will be a small percentage of total employees, with some months of peak change that would be associated with the change of seasons.

Parking enforcement

The new monthly parking permits should be designed to have very little or no impact on the time or resources needed to enforce parking in the Town. This can be achieved by providing enforcement officers a simple way to check on the validity of parking permits that can also be changed on a monthly basis.

Distribution of MBTA LinkPass

The MBTA is now promoting the "Perq" pass, which allows companies to make bulk

purchases of Monthly LinkPasses. The Charlie Card associated with the pass is distributed only once for each employee (although Charlie Cards expire after 10 years), and then is updated automatically. The choice the employee makes as to dedicating their Commuter Benefit to paying for the pass can be made automatically via the RideAmigos software. Employees can also purchase these passes pre-tax once the system is initiated.

Distribution the MBTA Eco Pass
The MBTA Eco Pass Option has been piloted with the Massachusetts Institute of Technology, and the MBTA is actively seeking new partners to pilot it. This pass would be distributed to all employees just once but also has the opportunity to be integrated with a company's ID card.

Distribution of unused Commuter Benefits as income
When an employee chooses not to apply their Commuter Benefit to a parking permit, transit pass, or other option, it would become income for the employee. RideAmigos has experience with a variety of existing automated payroll services and depending on the service, this can be achieved either by manually sending the payroll service a list of employees that is automatically generated each month by the RideAmigos software, or by allowing the RideAmigos software to communicate directly with the Payroll services software to communicate this choice. It is dependent on the payroll services method of operation.

Strategy and encouragement of employees to try new transportation options
Working with the TMA, the lead ETC will continue to work on new strategies and tactics for encouraging less single occupancy driving to work and parking, and more of every other commuting option. The level of effort for this task is variable, but the TMA offers regularly scheduled strategy meetings and assistance as part of its membership. This will also involve coordination with Workplace Cluster ETCs who can assist in taking campaigns down to the workplace level.

Workplace Cluster ETC Responsibilities

Workplace Cluster ETCs are dedicated to encouragement, both in ensuring the messages from the TMA and the Lead ETC reach the employees in their workplace cluster, and in answering questions that come from employees about commuting that can be handled at the local level. Workplace ETCs should also be empowered to suggest their own ideas for encouragement, and be selected for their enthusiasm, communication and social skills, and exemplary commuting behavior in using transit, walking and biking to get to work. The TMA offers training and assistance to all ETCs as part of membership dues.

Annual Reporting as a Measure of Success

Once the Town of Brookline implements some or all of the measures described in this memo, it is essential to measure progress on the goal of reducing employee parking demand at the workplaces described in this study, and at any new workplaces that are added. This can be achieved by repeating the 2017 Brookline Employee Transportation Survey. Each time the survey is conducted, the majority of questions should remain largely the same so that comparisons can be made for years to come. However some review is required to ensure that

the questions remain relevant, and any new information needs are addressed.

The results of the second and all subsequent annual surveys can be used to inform strategic planning with the Transportation Management Association as well as identifying new goals, strategies, and objectives for the Town of Brookline as the landscape of transportation technology continues to evolve.

Ride Hailing Use for Intra-travel between Town of Brookline Workplaces

The Town of Brookline has also expressed interest in using ride hailing services to allow employees who travel between Brookline's many workplaces as a way to avoid bringing their own vehicle to work. In order to assess the costs of this benefit, the Town would need to understand the total demand for it. It is also important to understand that ride hailing can be an expensive option, particularly during rush hour periods or other peak travel times (which can sometimes be event driven, e.g. Red Sox games at Fenway Park). A lower cost alternative would be to offer Bluebikes or electric scooters to employees for this purpose (which may not be comfortable for all people in all seasons). Zipcar is another service which offers vehicles for rent, which are then returned to the same location. This option would require vehicles to be

returned to the same location, and thus is likely to ultimately be a more expensive option than ride hailing services.

If ride hailing or electric scooters is the method to Town chooses to test, HDR recommends a pilot program for employees, with a limited budget for first fiscal year it is used. The budget could either be limited by employee, or by total budget, or by both. The reimbursement for these services would be administered in the same fashion as any reimbursement, or could be administered directly through a provider (such as Uber or Lyft) and actively managed with a team account. Ride hailing services also offer vouchers, and many other ways to allow employees access to company-paid rides.

If Bluebikes is the method the Town chooses, the equation is simpler as this service is available for an annual fee with an additional charge for all rides that go over 45 minutes in duration. The Town has the option to require employees to pay for that overage, or to pay for it for employees. The required information to determine costs would be the number of employees for whom this service would be useful.

The number of intra-workplace rides in the Town are likely to be minimal when compared to the number of commuters to and from work. No evidence or data was found in the research for this memo supporting the concept that adding this service for employees would contribute to a significant reduction in drive-alone commuting, however, such a solution may help people in leadership positions commit to not driving, which in turn can help set trends. We recommend including questions related to travel between workplaces in the next Annual Town of Brookline Employee Transportation Survey (see the previous section of this report) to assess demand for these trips. The data collected in that survey can be used to formulate strategy in collaboration with the Transportation Management Association mentioned above.

Bicycle Parking Improvements

Background

Improved access to quality bike parking was outlined in the 2018 Recommendations Memo as a strategy for increasing cycling. Quality bike parking is convenient, secure, located close to

building entrances, well-lit, visible, and when possible, indoors or sheltered.

Recommended Bicycle Parking Improvements

The 2018 Recommendations Memo identified 10 key workplaces where additional or improved bike parking facilities would be beneficial. The 2018 Recommendations Memo recommended a number of additional spaces and rack styles for each location, reproduced in the table below. Several additional locations were assessed in the original study, but were not recommended for additional bike parking. These locations are discussed toward the end of this chapter.

Table 9 - Bicycle Parking at Key Workplaces (Reproduced)[3]

Location	Recommended Additional Spaces
Webster Place*	4 in visible garage location
Main Library	4 in visible garage location
Public Health Building	4 in visible garage location
DPW Water and Sewer Garage	8 to 11
Pierce Elementary	Replace grid with 1 five-hump rolling rack in visible garage location
Town Hall (incl. School Office)	10 to 11 in visible garage location
Public Safety Building (in Three Shifts)	4
Lincoln Elementary School	Replace triangular rack with 1 or 2 five-hump rolling racks
Brookline High School	Replace or remove grid rack
Municipal Service Center	8 to 11

The following recommendations are based on those originally provided in the 2018 Recommendations Memo. However, when practical, additional and alternative options should there be unforeseen constraints at a recommended location or should future demand soon exceed capacity. If the expansion options are not chosen, the selected racks should be installed in a manner that does not to preclude the placement of additional racks in the future.

Each workplace's associated workplace cluster is noted in parenthesis at the chapter heading. Note that the 2018 Recommendations Memo was not a comprehensive survey of bike parking, but instead looked at key workplaces with significant numbers of employees. When implementing the installation of new bike parking, the Town may also want to confirm that there

is bike parking available for employees and visitors at all of its workplaces.

While installing bike parking on its own is not likely to significantly increase bicycle commuting in a given cluster, when paired with the Commuter Benefit and the TMA membership described above, it will contribute a visual element to the Town's overall TDM strategy. Employees who commute by bicycle will be able to see that the Town is working to support them in that choice.

[3] Source: Howard Stein Hudson, Brookline TDM Recommendations Memorandum, 2018

Brookline Adult & Community Education, 24 Webster Place (Town Hall Cluster)

2018 Recommendation	Option	Option A		
4 spaces in visible garage location Preferred	8 spaces in Parking Garage near Pierce & Holden Streets (Figure 1) Expansion	N/A Alternative Option A	See Town Hall Expansion Option A (Figure 11) Alternative Option B	8 spaces in Kent & Webster municipal Parking Lot (Figure 3)

*** NOTE ON 24 WEBSTER PLACE LOCATION**

After this study was largely completed, it has come to pass that the location at 24 Webster Place is no longer used by the Town of Brookline, and a new location at 2 Clark Road has been leased by the school department. The information and recommendations below, for 24 Webster Place, are maintained in this memo for future reference. This study does not include bike parking recommendations for 2 Clark Road.

PREFERRED OPTION

For the Brookline Adult & Community Education center at 24 Webster place, the 2018 Recommendations Memo specified the addition of four bike parking spaces in a visible garage location. The nearest potential indoor bike parking option is a 4-minute walk away at the municipal parking garage entrance at Pierce and Holden Streets. This is inconvenient, and an additional outdoor option should be considered to provide convenient bike parking. For employees who do value shelter in inclement weather, installing bike parking in the upper level of the parking garage nearest the Pierce and Holden Street entrance would require the removal of one parking space. To be most useful to employees, this space would ideally be the one directly to the right of the Pierce/Holden Street entrance. In this space the Town could install four surface-mounted hoop racks at an angle to the wall with a capacity of eight bikes to be shared with the parking demand for the Public Health Building, see Figure 1. This configuration would also benefit from protective bollards to ward off the possibility of cars colliding with bicycles.

ALTERNATIVE OPTION A

If the preferred option proves impractical, riders working in Webster Place desiring a garage space could use four of the 10 additional bike parking space recommended to be installed in the lower garage level for the Town Hall under Expansion Option A. This configuration would also benefit from protective bollards to ward off the possibility of cars colliding with bicycles.

ALTERNATIVE OPTION B

To provide a more conveniently located option for bike parking, consider installing four rail-mounted hoop racks at the entrance to the Kent & Webster municipal parking lot

across the street from 24 Webster Place (see Figures 2 and 3). While two hoop racks would supply the recommended parking capacity for Webster Place employees, the placement of the racks in a more public space would likely mean some spaces are

occupied by other riders. Installing four racks would provide maximum capacity for up to eight bikes at this location and a better chance of finding an open rack for employees.

Figure 1 - Indoor Bike Parking Option for 24 Webster Place Employees (in the municipal parking garage)

Figure 2 – Locus Map for Outdoor Bike Parking Option for 24 Webster Place Employees

Image Source: Google earth

Figure 3 - Outdoor Bike Parking Option for 24 Webster Place Employees

Public Library of Brookline, 361 Washington Street (Town Hall Cluster)

2018 Recommendation	4 spaces in Preferred location	Completed	Option Expansion Option A	8 additional spaces in library parking garage	Alternative Option A (Figure 4)	Alternative Option B
visible garage					- -	

PREFERRED OPTION - COMPLETED

Since the original bicycle parking survey was conducted as part of the 2018 Recommendations Memo (four spaces in a visible garage location), one four-hump rolling rack was installed inside the Public Library's parking garage, with an installed capacity of up to six bikes.

EXPANSION OPTION A

Parking capacity can be further expanded along the wall immediately opposite the recently installed rack with the installation of four rail-mounted hoop racks. This would provide an additional eight bike parking spaces, see Figure 4.

Figure 2 - Bike Parking Expansion Option A for Public Library Employees

Public Health Department, 11 Pierce Street (Town Hall Cluster)

2018 Recommendation	location Preferred Option	Indoor Option (Figure 1) Expansion Option A	Alternative Option A	Alternative Option B
4 spaces in visible garage	See Brookline Adult & Community Education	-	See Town Hall - Expansion Option A (Figure 11)	-

PREFERRED OPTION

The preferred option for the Public Health Department is combined with the Indoor Option for the Brookline Adult & Community Education employees above. Installing this bike parking in the upper level of the parking garage nearest the Pierce and Holden Street entrance would require the removal of one parking space, ideally the space directly to the right of the entrance (see Figure 1). In this space consider installing four surface-mounted hoop racks with capacity for eight bikes at an angle to the wall. This configuration would also benefit from protective bollards to ward off the possibility of cars colliding with bicycles.

ALTERNATIVE OPTION A

If it is impractical to remove a parking garage space on the upper level, riders working in the Public Health Building desiring a garage space could use four of the 10 additional bike parking spaces recommended to be installed in the lower garage level for the Town Hall under Expansion Option A (see Figure 11).

DPW Water and Sewer Garage (Town Hall Cluster)

2018 Recommendation	**8 to 11 spaces**	employee parking lot (Figure 6)	employee parking lot (Figure 6)	(Figure 7)
	Preferred Option	**Expansion Option A**	**Alternative Option A**	**Alternative Option B**
	10 spaces near	6 additional spaces near	10 spaces near visitor parking lot	-

PREFERRED OPTION

Existing vehicle parking demand with respect to capacity at the DPW Water and Sewer Garage is likely higher than most workplace locations addressed in the study. The parking lot is frequently parked with several rows of vehicles blocking one another in, with the remaining space used for movement and storage of municipal vehicles. If vehicle parking spaces cannot be removed at this location, we recommend installing five rail-mounted hoop racks with capacity for 10 bikes on a proposed concrete pad between the south employee lot and the sidewalk as shown in Figure 6. Figure 5 shows the location of all bike parking options for this workplace.

EXPANSION OPTION A

Six additional spaces can be added to this location if desired with the installation of three rail-mounted hoop racks (see Figure 6).

ALTERNATIVE OPTION A

If the location of the preferred option is unsuitable, it is also possible to utilize an existing paved area between the sidewalk and roadway to the left of the visitor parking lot entrance. Five rail-mounted hoop racks could be located there with capacity for 10 bikes,

as depicted in Figure 7. Figure 5 shows the location of all bike parking options for this workplace.

Figure 5 - Locus Map for Outdoor Bike Parking Options for DPW Water and Sewer Garage Employees

Image Source: Google earth

Figure 6 – Bike Parking Preferred and Expansion A Options for DPW Water and Sewer Garage Employees

Figure 7 – Bike Parking Alternative Option A for DPW Water and Sewer Garage Employees

Image Source: Google Streetview

Pierce Elementary School (Town Hall Cluster)

2018 Recommendation **11 spaces in**

Preferred Option

12 spaces near **Expansion Option A**

6 additional spaces, also **Alternative Option A**

Alternative Option B

garage entrance (Figure 9)

visible garage location

parking

near

the parking garage entrance (Figure 10)

- -

PREFERRED OPTION

Improved protected bike parking can be provided at Pierce Elementary School by replacing the existing inconspicuously placed grid rack with six rail-mounted hoop racks with capacity for 12 bikes installed in a more visible location. We recommend installing it along the outside of the parking garage entrance circle, between the third and fourth garage entrances and to the left of the door (see Figure 9). Figure 8 shows the location of both options for the Pierce Elementary School.

EXPANSION OPTION A

If more bike parking is preferred, an additional three rail-mounted hoop racks with capacity for six bikes can be installed along the wall, left of and perpendicular to the rack recommended in the preferred option (see Figure 10). Figure 8 shows the location of both options for the Pierce Elementary School.

Figure 8 - Locus Map for Outdoor Bike Parking Options for Pierce Elementary School

Image Source: Google earth

Figure 9 - Bike Parking Preferred Option for Pierce Elementary School

Figure 10 - Bike Parking Expansion Option A for Pierce Elementary School

Town Hall (Town Hall Cluster)

	Recommendation	**in**		
2018	**10-11 spaces**	**Preferred Option**	10 spaces in **Expansion Option A**	**Alternative Option A** **Alternative Option B**
visible garage	**location** lower level of the garage (Figure 11)	10 additional spaces in lower level of garage (Figure 11)	- -	

PREFERRED OPTION

To accommodate the parking needs of employees at Town Hall, five rail-mounted hoop racks with capacity for 10 bikes could be installed in the existing no-parking area of the lower garage level (at the bottom of the garage ramp leading to the Washington Street entrance, as shown in Figure 11). This option would benefit from bollards to protect bicycles from damage from vehicles maneuvering into and out of parking spaces.

EXPANSION OPTION A

At the same location as in the preferred option above, there is ample room to install an additional five rail-mounted hoop racks with capacity for 10 bikes as shown in Figure 11. This expansion option would be necessary if this location will be relied on to accommodate the garage parking recommended for the Brookline Adult & Community Education center and the Public Health Building above (their Alternative Option A). Note that this option would also require bollards to physically protect bicycles from damage from vehicles maneuvering into and out of parking spaces.

Figure 3 - Bike Parking Preferred and Expansion A Options for Town Hall Employees

Public Safety Department (Town Hall Cluster)

2018 Recommendation	**4 spaces**	Washington and Thayer Streets (Figure 13)	Washington and Thayer Streets (Figure 13)	Safety Building (Figure 14)
	Preferred Option	**Expansion Option A**	**Alternative Option A**	**Alternative Option B**
	4 spaces at corner of	4 additional spaces at corner of	4 to 8 spaces behind Public	-

PREFERRED OPTION

Four convenient bike parking spaces can be provided near the Public Safety Department's building with the installation of two in-ground hoop racks on the curb extension to the left side of the building's front entrance, at the corner of Washington Street and Thayer Street (see Figure 13). This configuration would also benefit from protective bollards to ward off the possibility of cars colliding with bicycles. Figure 12 shows the location of both options for the Public Safety Department.

EXPANSION OPTION A

An additional four bike parking spaces can be provided at the location of the preferred option, (see Figure 13), by instead installing four rail-mounted hoop racks. Figure 12 shows the location of both Public Safety Department options.

ALTERNATIVE OPTION A

An area between the rear of the Public Safety Building and the Brookline Municipal Court currently used for Public Safety storage is the next most convenient bike parking location for Public Safety Department employees. At this location, a concrete pad can be poured to place two to four in-ground hoop racks at an angle to the building with capacity for four to eight bikes (see Figure 14). Figure 12 shows the location of both Public Safety Department options.

Figure 12 - Locus Map for Outdoor Bike Parking Options for Public Safety Building

Image Source: Google earth

Figure 13 - Bike Parking Preferred and Expansion A Options for Public Safety Building

Figure 14 - Bike Parking Alternative Option A for Public Safety Building

Lincoln Elementary School (Brookline High School Cluster)

2018 Recommendation	Preferred Option	Expansion Option A	Alternative Option A	Alternative Option B
11 to 22 spaces the existing bike racks	10 spaces in footprint (not shown)	10 additional spaces near school entrance	Alternative Option A: e from Hedge Road	Option B: d (Figure 16)
				- -

PREFERRED OPTION

To accommodate employee bicycle parking at the Lincoln Elementary School, the existing low-profile triangle rack along the Kennard Road entrance can be replaced with five rail-mounted hoop racks with capacity for 10 bikes (in the original rack's footprint). Figure 15 shows the location of both options for the Lincoln Elementary School.

EXPANSION OPTION A

Install five rail-mounted hoop racks with capacity for 10 bikes beside the walkway along the Hedge Road entrance to serve employees travelling from the west (see Figure 16). Figure 15 shows the location of both options for the Lincoln Elementary School.

Figure 15 - Locus Map for Outdoor Bike Parking Options for Lincoln School

Image Source: Google earth

Figure 16 - Bike Parking Expansion Option A for Lincoln School

Brookline High School (Brookline High School Cluster)

2018 Recommendation	Preferred Option	Expansion Option A	Alternative Option B
11 spaces	12 spaces at front entrance of school (Figure 18)	Up to 24 additional spaces	- -

PREFERRED OPTION

To accommodate the high demand for bicycle parking at Brookline High School, the grid rack at the front entrance can be replaced with six rail-mounted hoop racks with capacity for 12 bikes, see Figure 17 for rack location and Figure 18 for rack layout.

EXPANSION OPTION A

At Brookline High School, where the school is being expanded, additional bike racks will get used. Up to 12 rail-mounted hoop racks with capacity for 24 bikes can be installed along the Tappan Street Entrance to the High School, see Figure 17 for rack location and Figure 19 for rack layout.

Figure 17 - Locus Map for Outdoor Bike Parking Options for Brookline High School

Image Source: Google earth

Figure 18 - Bike Parking Preferred and Expansion A Options for Brookline High School

Image Source: Google Streetview

Figure 19 - Bike Parking Preferred and Expansion A Options for Brookline High School

Image Source: Google Streetview

Municipal Services Center (South Brookline Cluster)

Original Recommendation: 8-11 spaces

2018 Recommendation	Preferred Option	Expansion Option A	Alternative Option A	Alternative Option B
8 to 11 spaces	12 spaces in two locations near lower and upper parking lots (Figure 21 and Figure 22)	-	12 spaces in two locations near lower and upper parking lots (Figure 23 and Figure 22)	12 spaces in two locations near lower and upper parking lots (Figure 24 and Figure 22)

PREFERRED OPTION

There are two separate parking lots and entrances serving the Municipal Services Center. To best serve all this location's employees, providing bike parking convenient to each entrance would be ideal. Two sets of three rail-mounted hoop racks with a combined capacity for 12 bikes could be installed to the right of the lower lot building entrance (see Figure 21), and in the striped gore area of the upper parking lot (see Figure 22). The latter would also require protective bollards to prevent cars from colliding with parked bicycles. Figure 20 shows all potential Municipal Services Center bike rack locations.

ALTERNATIVE OPTION A

If the preferred option is not feasible to the right of the lower lot entrance (Figure 21), three rail-mounted hoop racks with capacity for six bikes could be installed under the building overhang to the left of the lower lot entrance (see Figure 23). The upper lot location would remain in the striped gore area of the upper parking lot (Figure 22).

Figure 20 shows all potential Municipal Services Center bike rack locations.

ALTERNATIVE OPTION B

If employee parking is restricted within the gated lower lot area entirely, three rail mounted hoop racks with capacity for six bikes could be installed in the parking space immediately outside the security gate (see Figure 24). Note that the options adjacent to parking would also require bollards placed to physically protect bicycles from damage that could be inflicted by vehicles entering and leaving parking spaces. The upper lot location would remain in the striped gore area of the upper parking lot (Figure 22). Figure 20 shows all potential Municipal Services Center bike rack locations.

Figure 20 - Locus Map for Outdoor Bike Parking Options for Municipal Services Center

Image Source: Google earth

Figure 4 - Bike Parking Preferred Option Location 1 for Municipal Services Center

Figure 5 - Bike Parking Preferred Option Location 2 for Municipal Services Center

Figure 6 - Bike Parking Alternative Option A for Municipal Services Center

Figure 7 - Bike Parking Alternative Option B for Municipal Services Center

Other Key Workplaces

Several key workplaces outlined in the 2018 Recommendations Memo were determined to already have adequate bike parking. No additional parking is recommended for these locations.

Lawrence Elementary

Lawrence Elementary has 22 high-visibility hoop racks with capacity for 44 bikes and was not recommended for additional bike parking in the 2018 Recommendations Memo.

Coolidge Corner (formerly Devotion) Elementary School

Coolidge Elementary School was under construction during initial investigations for the 2018 Recommendations Memo, which ultimately recommended the installation of 10-11 bike parking spaces. Now complete, Coolidge Corner Elementary School has 12 high visibility hoop rack with capacity for 24 bikes, as well as a dedicated bike parking location within the parking garage. No additional bike parking is recommended at this time.

Heath School

It was recommended that occupancy observations be performed at existing racks during the school year at the Heath School. The school has 20 high-visibility hitch racks with capacity for 40 bikes. On Monday June 17, 2019 during the school day 10 bikes were observed using the racks. No additional bike parking is recommended at this time.

Runkle School

The Runkle School has 7 hitch racks and 11 hoop racks with capacity for 36 bikes. No additional bike parking is recommended in the 2018 Recommendations Memo.

Driscoll School

The Driscoll Scholl has 7 hitch racks with capacity for 14 bikes. No additional bike parking was recommended in the 2018 Recommendations Memo.

Baker Elementary

Baker Elementary has 1 four-hump rolling rack and 3 three-hump rolling racks with capacity for 30 bikes. No additional bike parking was recommended in the 2018 Recommendations Memo.

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Appendix A: TRIMMS Modeling Methodology

Introduction

The University of South Florida Center for Urban Transportation Research (CUTR) developed a model to simulate impacts to mode share after implementation of transportation demand management (TDM) strategies. This model, Trip Reduction Impacts of Mobility Management

Strategies (TRIMMS), was used to evaluate four potential TDM scenarios that the Town of Brookline (the Town) could implement for its approximately 1,509 employees at five work locations (work clusters).

For the purposes of this planning analysis, two TDM strategies were evaluated: the use of a parking cashout program and a transit subsidy. More specifically, the Town currently provides free parking for all employees. Under the parking cashout TDM approach, the Town could implement a monthly parking fee, and all Town employees would be given a monthly stipend in the same amount as the parking fee. Therefore, employees have the choice of either continuing to drive to work and using the stipend for parking (a net-zero fee) or finding an alternative to driving to work and walking away with additional income in the amount of the parking fee.

The second TDM approach reflects the Town providing a free monthly transit pass for all employees (EcoPass), and the Town would pay the Massachusetts Bay Transportation Authority (MBTA) based on actual usage of the passes. Based on these two approaches, the following scenarios were evaluated:

- Scenario 1: $90 parking cashout plus free transit pass for all employees
- Scenario 2: $45 parking cashout plus free transit pass for all employees
- Scenario 3: $90 parking cashout only
- Scenario 4: $45 parking cashout only

This 2018 Recommendations Memo documents assumptions made in the model inputs and summarizes the results from the four scenarios by work cluster.

TRIMMS Model Inputs and Adjustments

As a starting point, the TRIMMS model allows users to evaluate the impact TDM approaches have on travel mode decisions for a Census-designated Metropolitan Statistical Area (MSA). The model also provides the ability for the user to select whether the analysis is area-wide (the entire MSA) or to modify the data input to evaluate a single site within the MSA. For this analysis, the Boston MSA was selected as a starting point, but where feasible, data specific to Brookline was incorporated using available Census data, ArcMap GIS analysis, and the previously completed employee survey results. These inputs were incorporated for the five workplace clusters to reflect characteristics unique to the sites.

The following sections summarize the adjustments that were made to the TRIMMS model in order to focus the analysis on the Brookline workplace cluster locations.

Analysis Tab Adjustments

The Analysis tab is where project details are entered into the model and evaluation of all strategies can be conducted.

- **Employee Adjustments**: Inputs within the Analysis Details section include total employment, occupations, and industry sector. Total employment numbers were provided by the Town of Brookline for each cluster. For this analysis, only the “All Occupations” category within the “Government” sector were analyzed for each cluster and each scenario. In other words, the model was refined to analyze only Town employees at each workplace location.
- **TDM Benefit Adjustments:** It is assumed that the Town would join a Transportation Management Association (TMA) to help administer the TDM program. To reflect this, the default TDM benefits and support program information included in the TRIMMS model were adjusted to reflect the benefits offered by the TMA. For example, the TMA offers

carpool matching services and emergency rides home, but does not offer flexible work hours nor teleworking options. The TRIMMS model however does not account for recent improvements in carpool matching that may or may not change the attractiveness of that option for employees.

- **Worksite Characteristics Adjustments:** Worksite characteristics were identified using a combination of Google Maps and the Brookline TDM Recommendations Memo (2018). These inputs included information such as surrounding land use and transportation facilities. These were tailored for each work cluster to illustrate the differences in access to transportation modes and services such as childcare, shopping, and banks.
- **Program Marketing Assumptions:** It is assumed that program marketing would consist of snail mail, email, and events, including 8 hours of program management per week. The program marketing strategies are based on employer-specific strategies that have an impact at the worksite level.
- **Other Assumptions:** Any remaining inputs on the Analysis tab not addressed herein used the default inputs for the Boston MSA, as these assumptions could not be further refined to reflect the characteristics of the Town nor work clusters.

Table 11 summarizes the adjustments made to the Analysis tab inputs used in this analysis.

Parameters Tab Adjustments

TRIMMS uses global and regional parameters. Global parameters are default values that do not change by MSA, while regional parameters are values that are specific to a given area. The TRIMMS model has flexibility for all of these inputs to be adjusted to project areas and scenarios.

- **Use of Brookline Census Data:** Regional statistics were refined to reflect Brookline Census data instead of Boston MSA where applicable and available. This includes adjustments to employment numbers, household income, and population density.
- **Use of Employee Survey for Mode Share Percentages:** The Boston MSA mode share percentages were replaced with percentages calculated for each work cluster using the results of the 2017 employee transportation survey that was detailed in the 2018

Recommendations Memo. The survey responses were converted to match the TRIMMS mode share inputs, as shown in **Table 10**. The mode split represents the average daily commute since based on the survey results some Town employees alternate between numerous modes.

- **Transit Category Assumptions:** As shown in **Table 10**, the transit mode share reflects a combination of the T, bus service, and MBTA's The Ride. Additionally, for this analysis, it was assumed that the number of employees using commuter rail is negligible because none of the Brookline workplace clusters are served by MBTA Commuter Rail.
- **Other Category Assumption:** Finally, based on the survey results, the only "Other" mode category reflects employees that worked from home.

Table 10 - Mode Share Conversion to TRIMMS Inputs

Survey Response	TRIMMS Input
Walked	Walked
Biked	Biked

Drove Alone Drove Alone
Carpool / Vanpool Vanpool
MBTA's The Ride Transit (Other)
Rideshare (Taxi/Uber) Rideshare (Taxi/Uber)
Train (T) Transit (Other)
Bus Transit (Other)
Worked from Home Other

- **Peak Period Assumptions:** The percent of employees commuting during peak periods was calculated by work cluster using data provided by the Town summarizing the number of employees per worksite by hour. Employees starting in the 7, 8, or 9 AM hours were assumed to be traveling during peak periods. The split between peak and off-peak periods is used to determine how likely employees are to switch modes based on access to transportation alternatives. For example, some employees work overnight shifts and do not have access to the T regardless of TDM strategies, so their mode choice is less elastic than those who work traditional office hours.
  - **Vehicle Occupancy Assumptions:** Average vehicle occupancy was also calculated using the 2017 employee transportation survey, including the average carpool size. The average vehicle occupancy for the "Other" mode share was assumed to be zero, since "Other" only accounts for those that work from home and therefore do not travel at all.
- **One-Way Commute Trip Length:** The average one-way trip length was calculated by mode and by cluster using a combination of the 2017 employee transportation survey and a GIS analysis using ArcMap. First, ArcMap was used to develop two origin destination matrices of the total distance traveled between all home zip codes identified in the survey and the five work clusters. One analysis and matrix utilized the roadway network and therefore represented travel distance for drive-alone, rideshare, vanpool, walk, and bike mode shares. Note that vanpool distance was increased by 15 percent to account for out-of-direction travel to pick up or drop off carpoolers. The second analysis

and matrix utilized the regional transit network to calculate the distance between the transit stops nearest to the home zips and the transit stops nearest to the workplace clusters, and therefore represented travel distance for transit modes.

The origin-destination matrices were used to assign a travel distance to every Town employee for each day of the week based on their responses to the survey for home zip, work location, and mode used. These distances were then averaged by mode and by cluster for the TRIMMS inputs. As expected, walk and bike commutes tend to be shorter than transit and driving commutes. Again, the average travel distance for the "Other" mode share was assumed to be zero, since "Other" only accounts for those that work from home and therefore do not travel at all.
- **Other Assumptions:** Within the Global Parameters section, minor adjustments were made to average fuel price, U.S. population density, U.S. household income, and number of working days to reflect the current year. Any remaining inputs on the Parameters tab not addressed herein used the default inputs for the Boston MSA, as these assumptions could not be further refined to reflect the characteristics of the Town nor work clusters.

Table 12 summarizes the adjustments made to the Parameters tab inputs used in this analysis.

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Model Refinements

In conducting preliminary model runs to validate the use of the TRIMMS model for this planning exercise, some limitations were discovered. Multiple test model runs provided insight into model functionality and helped adjust the final results to best reflect the four TDM scenarios. Specifically, the team discovered limitations in scenario definitions and how the mode categories of Other, Bicycling, and Walking were calculated. The following summarizes the refinements that were made to better reflect the unique characteristics of the Town and this TDM analysis.

"Other" Mode

As mentioned previously, the "Other" mode only consists of employees who work from home based on the Town survey results. However, within the TRIMMS model, the "Other" category represents anything not captured by the other mode categories. This could include anything from riding a motorcycle to working from home. Therefore, the TRIMMS model forecasted an increase in the "Other" mode share under all four TDM scenarios, presumably to account for a rise in commute trips using non-traditional modes. For the purposes of this analysis, it is assumed that the four TDM scenarios will not result in an increase in the number of employees who work from home compared to the 2017 employee transportation survey. It is assumed that the TDM benefits are unlikely to entice additional employees to work from home, and it is assumed Town policy will not change to provide additional workplace flexibility under the TDM scenarios. Therefore, the "Other" mode share was held constant to reflect the baseline conditions under all scenarios.

Bicycling & Walking

As part of this planning exercise, it was determined that the TRIMMS model is limited in its ability to account for the employees that could generate additional income by changing their commuting to bicycle or foot. To account for this limitation, an adjustment was made to the model to include travel costs for bicyclists and pedestrians in the baseline condition. Under the four TDM scenarios, the travel costs for bicyclists and pedestrians were reduced in order to create a proxy for increased take-home pay. To correct for this proxy, growth rates for bicycling and walking mode shares were calculated using prior model test runs. The resulting increase in bicycling and walking mode shares were subtracted from the drive-alone mode share to still reflect a total of 100 percent split across all modes.

Appendix B: Detailed fee estimate from Allston/Brighton TMA

Town of Brookline Allston-Brighton TMA Member Dues Scenarios				
Brookline High Cluster	Address	# of Employees	Per Site Cost	Cluster Pricing
Brookline High School	115 Greenough St.	262	$ 3,575.00	
Kirrane Aquatic Center	60 Tappan St.	2	$ 770.00	
Lincoln School	19 Kennard Road	63	$ 1,100.00	
Old Lincoln School	194 Boylston St.	2	$ 770.00	
Unified Arts Building	46 Tappan St.	1	$ 770.00	
Total for Cluster		**330**	**$ 6,985.00**	**$ 3,575.00**
Chestnut Hill	Address	# of Employees	Per Site Cost	Cluster Pricing
Soule Recreation Center	652 Hammond St.	**9**	**$770**	**$ 770.00**
Devotion Cluster	Address	# of Employees	Per Site Cost	Cluster Pricing
Brookline Senior Center	93 Winchester St.	10	$ 770.00	
Coolidge Corner Branch Librar		6	$ 770.00	
Coolidge Corner School	345 Harvard St.	97	$ 1,100.00	
Law rence School	27 Francis St	67	$ 1,100.00	
Fire Station 5	49 Babcock St.	32	$ 770.00	
Total for Cluster		**212**	**$ 4,510.00**	**$ 2,200.00**
Heath Runkle Driscoll Cluster	Address	# of Employees	Per Site Cost	Cluster Pricing
Brookline Recreation Depar		8	$ 770.00	
Driscoll Elementary School	64 Westbourne Terr.	69	$ 1,100.00	
Heath School	100 Eliot St.	44	$ 770.00	
Runkle School	50 Druce St.	66	$ 1,100.00	
Fire Station 4	827 Boylston St.	24	$ 770.00	
DPW Transfer Station	827 Boylston St.	1	$ 770.00	
Total for Cluster		**212**	**$ 5,280.00**	**$ 2,200.00**
South Brookline Cluster	Address	# of Employees	Per Site Cost	Cluster Pricing
Baker Elementary	205 Beverly Rd	76	$ 1,100.00	
Larz Anderson Park	19 New ton St.	7	$ 770.00	
Municipal Service Center	870 Hammond St.	123	$ 2,200.00	
Putterham Branch Library	95 West Roxbury Pkw y	3	$ 770.00	

Course		3	$ 770.00	
Fire Station 6	962 Hammond St.	24	$ 770.00	
Total for Cluster		**236**	**$ 6,380.00**	**$ 2,200.00**
Tow n Hall Cluster	Address	# of Employees	Per Site Cost	Cluster Pricing
Main Library	361 Washington St	25	$ 770.00	
Pierce Elementary School	11 Pierce St.	97	$ 1,100.00	
Public Health Building	11 Pierce St.	60	$ 1,100.00	
Public Safety Building	350 Washington St.	158	$ 2,200.00	
Fire Station 1	140 Washington St.	40	$ 770.00	
Tow n Hall	333 Washington St	108	$ 2,200.00	
Total for Cluster		**488**	**$ 8,140.00**	**$ 3,575.00**
Washington Square Outlier	Address	# of Employees	Per Site Cost	Cluster Pricing
Fire Station 7	Washington Sq.	**24**	**$ 770.00**	**$ 770.00**
Tow n of Brookline	All Sites	# of Employees	Per Site Cost	Cluster Pricing
Quote		**1,511**	**$32,835.00**	**15,290.00**

Note: Provided by Allston-Brighton TMA