

MassDOT Kendall Square Mobility Task Force

I. SCOPE OF SERVICES

McMahon Associates and their subconsultants (i.e., “the selected consultant team” or “the consultant”) will be directed by MassDOT’s Office of Transportation Planning, and the consultant’s progress will be monitored by the Project Manager. The selected consultant will perform specific tasks as outlined below, with summary report, presentation materials (presumably in MS PowerPoint software), and other products as needed for each major task. The Kendall Square Mobility Task Force plan will be developed in accordance with MassDOT policies and incorporate a multi-modal approach to alternatives. The culmination of this effort will result in a set of short- and long-range recommendations to enhance local mobility and regional access with a clear implementation plan (the Plan or Study). Throughout the Plan process, the consultant will use graphics, maps, and summary tables as much as possible to depict both qualitative and quantitative analysis in order to improve general understanding of the issues and recommendations, without relying on text-dense documents and long reports.

Each task will be accomplished in coordination with a public involvement plan.

Task 1 – Study Area, Goals and Objectives, Evaluation Criteria, and Public Participation

The purpose of this task is to develop the framework necessary to conduct the study. The consultant, in consultation with MassDOT and the study’s Task Force, will finalize the study area and will develop goals and objectives, evaluation criteria, and a public involvement plan. Evaluation criteria will be determined based on the defined goals and objectives.

A. Study Area

The Primary Study Area is defined below, although the boundaries of the areas to be analyzed will differ by task and need. The Primary Study Area, and other relevant study areas (e.g. regional highway system connections, connectivity to destinations, etc.) will be finalized in the initial stages of the study with input from the study’s Task Force. The study areas should be defined to incorporate both local and regional impacts of any alternative.

The initial Primary Study Area boundary can generally be defined as the area bounded by the Charles River to the east and south; Massachusetts Avenue, Main Street, Portland Street and Cardinal Medeiros Way and Binney Street to the west; the Grand Junction rail corridor to the northwest, and Monsignor O’Brien Highway (Route 28) on the northeast.

The definition of the study area will also recognize that just beyond the boundaries of the primary study area, significant investment in transportation infrastructure is being made that will impact the mobility in Kendall Square. In anticipation of the growth and continued vitality of the Kendall Square area, the consultant will define and explore connections between the primary and supplemental study areas, as well as those planned or proposed connections that would occur within the heart of Kendall Square itself:

- New Lechmere Station on the north side of Monsignor O’Brien Highway.
 - Extension of First Street across Monsignor O’Brien Highway as part of the NorthPoint Development.
 - New connections at Third Street/Broadway/Main Street that will allow:
 - o Southbound vehicle connections from Third Street to Main Street (replacing the “bus turnaround” on Broadway).
 - o Northbound and southbound bicycle infrastructure between Third Street and Main Street.
 - o A westbound left turn for bicycles from the Longfellow Bridge to Main Street.
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- Changes to Longfellow Bridge, with new bicycle infrastructure, reduced emphasis on efficient vehicular movements to the detriment to other modes.
- Potential for a new “gateway” to Cambridge as one enters via the Longfellow Bridge with an enhanced median with landscaping, and possible new pedestrian crossing controlled by a hybrid pedestrian beacon (HAWK).
- Re-designed McGrath Highway that will provide an at-grade alternative to replace the McCarthy Viaduct, influencing the traffic that accesses East Cambridge from that area.
- Evaluation of EZRide shuttle routes to better meet both existing and planned future growth.

For the evaluation and analysis of regional transportation impacts, a larger Regional Study Area will include the following routes listed below. Evaluation of the benefits and impacts of the alternatives with respect to economic development, and land use or zoning changes will extend to this area. While these regional transportation factors will be considered as part of the overall mobility of Kendall Square, only those aspects of connections to Kendall Square will be evaluated for this study. Resolving system-wide capacity issues are beyond the scope of this study.

- MBTA Red Line corridor, from Alewife to South Station,
- MBTA Green Line corridor from Union Square and Washington Street Stations on the Green Line Extension to Park Street Station,
- MBTA Orange Line corridor from Oak Grove to Downtown Crossing Station,
- Potential rail connections to/from North Station,
- EZ Ride shuttle route in Boston,
- Route 28 from the Mystic River to the Charles River,
- Longfellow Bridge,
- Memorial Drive from Western Avenue to the Primary Study Area,
- Hampshire/Beacon Street from Somerville Avenue to the Primary Study Area,
- Massachusetts Avenue from Boylston Street in Boston to Prospect Street in Cambridge, and
- Broadway from Harvard Square to the Primary Study Area.
- Changes to the Worcester Commuter Rail line, such as proposed new stations (West Station and Boston Landing), that have been considered for future transit investments (such as Urban Rail Service links to North Station).
- Use of the Grand Junction line for freight, rail, pedestrians and bicycles.
- Potential crosstown connections such as to NorthPoint, Assembly Square, and Longwood Medical and Academic Area (LMA).

The primary, supplemental and regional study areas will be developed in consultation with the MassDOT and Task Force, and the exploration of existing conditions in Task 2.

Product:

- Primary Study Area definition
- Definition of any supplemental study areas
- Mapping and other supporting documentation for study areas

B. Goals and Objectives

Goals and objectives, which define the purpose of the study and its guiding principles, will be developed for this project in close coordination with the study Task Force and the public. The goals and objectives provide a “mission statement” for the study as a whole, as well as for addressing a particular issue or set of issues. The goals and objectives should shape the framework for the entire study. The Kendall Square Mobility Task Force’s goals will serve as a base, but will not preclude modifications or additional

goals and objectives from being developed.

Product:

- Goals and Objectives

C. Evaluation Criteria

The evaluation criteria are specific considerations, or measures of effectiveness, used to assess benefits and impacts of alternatives developed during the study. The evaluation criteria will be based on the defined objectives, and must support the ultimate goals of study. The evaluation criteria shall consider the criteria being developed by the Project Selection Advisory Council in order to apply a similar philosophy to this study. Such criteria commonly include, but are not limited to, those that fall in the following categories:

- Mobility in all major transportation modes
- Contribution towards MassDOT Mode Shift and Healthy Transportation policy goals
- Accessibility
- Safety
- Efficiency
- Reliability
- System Preservation
- Environmental effects, including air quality and greenhouse gas impacts
- Health effects, including promotion of healthy transportation options as well as discussion of other public health factors, such as air quality and noise
- Consistency with existing and planned land use and economic development, in particular any redevelopment of the Volpe National Transportation Systems Center property
- Community effects / Title VI / Environmental Justice Analysis
- Cost, including both capital and operating cost
- Ability to leverage technology and, in particular, the local innovation community, to address transportation challenges

The evaluation criteria will be used for Task 4 (alternatives analysis) of the study. The criteria should be logically related to objectives, and wherever possible, be quantitatively measured and directly derived from either previously developed information or analysis techniques used in the study. All evaluation criteria – containing both quantifiable or more subjective, qualitative measures of effectiveness – should be used to determine the best solutions for the defined goals and objectives.

Product:

- Evaluation criteria and measurement methods

D. Public Involvement Plan

The study's Public Involvement Plan will, at a minimum, have two components: 1) meetings with the Task Force and 2) general public informational meetings at key project milestones.

The consultant team will work with MassDOT and the Task Force to design the approach to meetings and workshops that results in productive outcomes to advance the plan. This could include an approach to public meetings with an open house format, encouraging participants to interact directly with the project team.

Task Force meetings will be scheduled at key project milestones with input from the members, and will be conducted by MassDOT Planning and the consultant. The consultant team will work with MassDOT to develop recommendations for Task Force membership, including stakeholders that represent Title VI communities. However, it is assumed that MassDOT will lead the process for securing the membership of the Task Force including outreach to prospective members and drafting letters of invitation. Once the Task Force is in place, the team will assist MassDOT in planning and staffing Task Force meetings at key project milestones. A total of six (6) Task Force meetings will be held. It is assumed that all Task Force meetings will be held in public spaces that are consistent with MassDOT and ADA accessibility requirements, and are free of charge to the consulting team.

MassDOT and the consultant will conduct public informational meetings at major project milestones. Public meetings will be scheduled and publicized by MassDOT Planning and the consultant. The consultant team will organize, set up, staff and summarize three (3) public meetings on this project at key milestones.

Since the intent of these meetings is to solicit useful feedback from the community and other stakeholders, the project team will assist MassDOT in developing highly interactive meeting formats. The consultant team is prepared to work with MassDOT to develop the meeting format most appropriate to this project. The consultant team's goal is to hold interactive and creative meetings to enhance the project by making the public process collaborative and engaging.

In addition to developing email blasts announcing meetings (see below), the consultant team will also develop meeting flyers that will be available in multiple languages. The consultant team will work with local community groups to publicize these meetings to their members. All meeting materials will include information about access accommodations and how to request interpreter or other services.

The consultant shall be principally responsible for the preparation of presentation and display materials for Task Force meetings and public informational meetings. These materials shall be prepared in advance to allow MassDOT Planning adequate time for review and approval. At MassDOT Planning's discretion, the consultant may be required to present presentation materials in advance of the Task Force or public informational meeting.

A project website will be created, maintained, and updated by MassDOT. The consultant will be responsible for providing content data for development of this website. The consultant will also be responsible for providing relevant historical documents, task deliverables, and both pre- and post-meeting materials to the MassDOT project manager for posting in a timely manner.

The consultant team will assist MassDOT in developing content to be used for a project webpage, including an appropriate digital header. All project documents prepared by the team for posting on the web will be in an accessible format.

The consultant team will be responsible for developing and maintaining an up-to-date project database that will be used for regular email updates and meeting announcements, using MassDOT's GovDelivery, email marketing program.

The consultant team will also maintain an issues log for the project. Key issues discussed at Task Force meetings, community meetings, and via comments submitted to MassDOT will be captured and tracked in this issues log.

All elements of the Public Involvement Plan must include specific communication strategies to provide continuous and meaningful opportunities for involvement by the public throughout the study process. These strategies must provide the opportunity for the full and fair participation by all potentially affected communities, including minority and low-income populations, at this stage of the transportation decision-

making process. Likewise, these strategies must include provisions to actively engage minorities and gather their responses, as well as mitigate against potential discrimination based on race, color, national origin, English proficiency, income, religious creed, ancestry, disability, age, gender, sexual orientation, military service, or gender identity or expression. Please refer to the following address for additional information on accessibility:

<http://www.adobe.com/accessibility/products/acrobat/pdf/A9-accessible-pdf-from-word.pdf>

The consultant team will work with MassDOT to develop a comprehensive Public Involvement Plan for the project. The Plan will comply with Title VI of the Civil Rights Act of 1964. It will identify specific stakeholders and strategies for inclusion as well as specific strategies for those groups. The consultant team will tailor the Public Involvement Plan to the needs of the project; prepare materials that are accessible and comply with federal and state standards; and also organize meetings and events that meet MassDOT's Office of Civil Rights Public Participation Plan and Accessible Meeting Policy.

Products:

- Public Involvement Plan

FINAL PRODUCTS FOR TASK 1:

1. Draft report/chapter containing the following:
 - Study areas
 - Goals and objectives
 - Evaluation criteria and measurement methods
2. Public Involvement Plan

Task 2 – Existing Conditions, Future No-Build Conditions, and Issues Evaluation

Since much work has already been done to document existing conditions, the consultant team's approach is to avoid re-creating a baseline inventory and will instead focus on collecting and mapping conditions only when necessary to complete specific tasks. This allows the consultant team to complete an appropriate level of analysis for decision making by identifying key issues and opportunities, without getting bogged down in "analysis paralysis." The goal is the high efficiency of utilizing existing resources for this project so that the focus on the key questions of what to do for the mobility of Kendall Square can be central to the efforts.

Existing transportation conditions will be inventoried and evaluated, as well as anticipated future-year conditions. Existing and future land use and environmental constraints will be examined and documented. Work on this task should be informed by parallel efforts by the MBTA and MassDOT (MBTA Futures and the Program for Mass Transportation, respectively), particularly as related to Red Line capacity issues. Other issues raised by the Task Force may be evaluated if feasible.

Emphasis will be placed on understanding issues and opportunities in Kendall Square and the regional study area, with an eye toward identifying priorities and goals of past studies related to analysis of the study area. While the consultant team will work with existing studies and reports, the consultant will also collect information through a number of different approaches:

- **Photographic inventory** – A thorough photographic inventory will be gathered of the primary study area, including various conditions including day and night, and circulation patterns to reference during the ensuing tasks.

- **Base mapping** – The consultant will use aerial photography, GIS and other resources to document key issues and opportunities.

- **Community interaction and workshops** – Community interaction and input will be used to encourage participants to map how they use and move through the area. This information will be utilized to present at the Task Force and public workshops meetings.

A. Existing Conditions and Data Collection

Current year (2014) transportation conditions will be analyzed for the study area facilities. Existing data from MassDOT, the MBTA (particularly as it relates to Red Line reliability and peak period demand and capacity), and the City of Cambridge (including the parking survey results of the Cambridge Parking and Transportation Demand Management Ordinance) and other sources will be used to the degree feasible.

The team proposes to document and analyze current transit conditions in Kendall Square, including:

- Service provided by bus routes (Routes 1, CT1, CT2, 64, 68 and 85) including their frequency, average speed, span of service, capacity vs ridership, and service reliability;
- Service provided by MBTA Red Line, especially capacity and reliability;
- Circulation and movement of buses in the area;
- Pedestrian access to and between the various transit stops; and
- Adequacy of physical infrastructure and boarding areas in the area

Existing rail use (including freight) on the Grand Junction will be documented. Prior studies relative to additional rail service on the Grand Junction will be reviewed and issues and opportunities summarized. Information regarding existing commuter rail operations at North Station will be obtained.

The work will include a traffic analysis in the area, including all available traffic volume, turning movement, and crash data; transit services, availability, and ridership; freight rail operations and volumes; bicycle connections and volumes; pedestrian volumes; and any other data required for a complete understanding of the transportation conditions within the study area. The study area will be analyzed for traffic volumes and levels of service, safety, transit service level of service, bicycling and pedestrian demand and environment, and other conditions as necessary. Other transportation issues as suggested in the public involvement process may be evaluated as appropriate. The consultant will utilize microsimulation software such as SYNCHRO and VISSIM as required to perform the analysis of current year transportation conditions.

Given the broader objectives of the Kendall Square Mobility Task Force initiative and the available resources for the development of the plan, the analysis will focus on the “gateway” intersections in the primary study area as those most critical to understand in order to develop solutions to address mobility needs. A total of ten (10) intersections within the primary study area in the City of Cambridge will be analyzed. This task assumes that traffic count data is readily available from other sources. Collection of new traffic count data is not proposed as part of this scope of work.

The ten (10) intersections to be analyzed will be confirmed with MassDOT and the Task Force as part of the Task 1 Study Area confirmation.

The consultant team will use readily available traffic volume data to review existing operations at up to 10 intersections during the weekday morning and weekday afternoon peak hour using the Synchro capacity

analysis software. Available pedestrian and bicycle data will be collected for the study area intersections and included in the Synchro analysis of those locations.

The level of service results of the capacity analysis will be presented in tabular form. Vehicle delay, vehicle queues, pedestrian level-of-service and bicycle level-of-service will be included in the output for the ten (10) study area intersections.

The selected consultant will initially use the data from the MassDOT Crash Records database (developed from the Registry of Motor Vehicle crash data) to provide a preliminary review. The most recent three years of accident data from the MassDOT Crash Records at the ten study area intersections will be obtained and summarized. However, the actual crash reports from both State and local Police will need to be obtained by the selected consultant, for the three most recent years available, to ensure a thorough understanding of the existing safety conditions and future impacts to safety. The most recent three years of accident data will also be requested from the Massachusetts State Police and from the Cambridge Police Department for any intersections exhibiting accident rates higher than the state averages. The consultant team will complete collision diagrams for any intersections with accident rates over the state average.

In addition to these traditional sources of transportation data, the Consultant should demonstrate a familiarity with new and emerging sources of data, including recent efforts by MIT and the MBTA to model origin/destination information from CharlieCard data, and the variety of ways in which Bluetooth and phone based data is being employed to understand travel patterns and reliability.

Existing land use/economic development and environmental data will also be reviewed and assembled for the defined study area, from existing sources to the degree feasible. The K2C2 Study provides a basis for the existing conditions analysis and the future No-Build in terms of the recommendations for future land use and development in Kendall Square. The assessment of land use regulations and zoning that are necessary for this task were already completed through the K2C2 process, and extensive public outreach. The consultant team will focus on exploring data using Boston MPO, CTPS, MassDOT, U.S. Census and municipal data such as assessed values and real estate data to supplement work completed to date.

The consultant team will evaluate socioeconomic data, general land use trends and economic development issues in the study area by reviewing planning documents, proposed developments, available GIS data, aerial photography, a visual tour of the study area and discussion with the Task Force and MassDOT. The consultant team will collect and analyze historic trends and future projections of demographic and economic conditions such as population, households, building permits, property values, tax revenue data, regional employment, and other key variables from existing secondary sources for the region. The consultant team will also identify existing commercial and industrial built space and available/potentially developable land that may impact transportation in the study area. Maps will be prepared to present the data gathered.

Land use/economic development data collected may include, but are not limited to:

- Local comprehensive planning documents
- Previous conceptual planning studies
- Institutional master plans
- Land-use patterns
- Zoning regulations
- Right-of-way
- Property values
- Tax revenue data
- Car and truck access

- Transit access
- Bicycle facilities
- Pedestrian facilities
- Parking
- Regional employment
- Emergency response
- Public facilities and utilities

Environmental resources within the study area, including waterbodies, floodplains, parklands, and historic resources will be identified and mapped using existing GIS data. Additional information regarding environmental issues will be obtained in consultation with the Cambridge Environmental and Transportation Planning Division. Environmental data collected may include, but are not limited to:

- Floodplain information
- Surface geology
- Protected and recreational open space
- Hazardous materials sites
- Noise levels
- Air quality
- Cultural, historical, and archaeological resources

Recent and proposed commercial/industrial developments, major residential and mixed-use projects, and other proposed projects with significant trip generation in the study area will be identified and mapped.

The Consultant will also document the various ways in which residents, students, visitors and employees of the Kendall area pay for transportation—including the MIT Mobility Pass—and any employer or institutional programs incentivizing alternative modes of travel. The highly successful Transportation Demand Management (TDM) programs in Cambridge are a national model of best practices. The broad set of strategies to reduce single occupant vehicle trips and promote alternative forms of transportation would not be nearly as successful without the focus on diverse land uses and development density to support mode choice.

MassDOT will provide available aerial photography files and any previously existing maps for the development or updating of base maps by the consultant as necessary. The general accuracy of these data will be confirmed through site visits. Final resolution/scales of photographs and base maps will be determined jointly by MassDOT and the consultant team, and will be based on available data files.

Using the above collected data, a base map will then be assembled in a GIS format for use in the future tasks. The consultant team will identify all potential land use and environmental constraints that could affect the feasibility of any alternatives developed during the study. The data will be used for other analytical purposes as well.

The consultant shall also be responsible for obtaining or collecting other data and information that are needed to execute the study scope.

Products:

- Existing traffic volumes, turning movements, levels of service, and crash data (with collision diagrams and crash rates)
- Existing transit services and ridership for study area
- Existing rail services and ridership for the study area
- Existing environmental and land-use/economic development data
- Other data and information as needed

B. Future Year Conditions

Conditions in the study area will be forecasted for the horizon year of 2035. The Central Transportation Planning Staff will work under a separate contract managed by MassDOT and employ the regional travel demand model to estimate future regional and external traffic volumes, and projected transit to assess the future no-build (do nothing) condition in the Kendall/East Cambridge area. This future no-build condition should also include the most current socio-economic projections (population, households, and employment), and estimates of future land use, including potential redevelopment of Volpe National Transportation Systems Center property.

The consultant team will use 2035 estimated transit conditions provided by the Central Transportation Planning Staff (CTPS) to understand forecasted transit ridership and services. The future year conditions will inform the identification of issues and opportunities.

The consultant team will use the future year 2035 base volumes provided by CTPS to complete capacity analysis at the 10 study area intersections using Synchro capacity analysis software.

A combination of Synchro and VISSIM will be used for traffic simulation, with VISSIM used to model the future year conditions. The consultant team will complete a VISSIM model for the most critical three to five intersection system within the study area during the critical peak hour. The subject area for the VISSIM model will be identified by the Task Force based on a review of the Synchro outputs and an understanding of the study area. The consultant team suggests that the area around the new Third Street/Main Street connection be modeled in VISSIM, including the intersections of Broadway and Third Street, Broadway and Main Street and Third Street and Main Street. The VISSIM model will include passenger cars, pedestrians, bicycles and bus service, and will use a 2D backdrop. The VISSIM model will only be used visually under Task 2 and will not be used to produce any analytical outputs until alternatives have been identified.

The consultant team will review land use projections by Transportation Analysis Zone (TAZ) provided by CTPS and compare to known development and future community planning scenarios identified through the K2C2 Study. The proposed “Enhanced TDM” scenario outlined in the K2C2 Study is assumed to be the No-Build land use scenario. Assumptions regarding the future development of the Volpe property will be confirmed with the City of Cambridge. Coordination with CTPS will be required to confirm the land use scenario to be modeled for the 2035 Future Year No-Build. The issues and opportunities that emerged from that process, in the form of specific recommendation in a wide range of topics, will form the basis of the No-Build analysis for land use and economic development.

Products:

- Forecasted traffic levels and conditions
- Forecasted transit ridership and services
- Socio-economic projections
- Land use projections

C. Definition and Evaluation of Issues and Opportunities

Deficiencies and issues in the study area will be identified, quantified, and evaluated for use in subsequent tasks. Opportunities for new connections and improvements to infrastructure, access, mobility, and economic development will also be identified, quantified, and evaluated.

As part of defining transportation issues in the study area, the following elements should be considered: current and future traffic congestion, safety, environmental issues, health determinants, community

effects, economic development, land use, transit and transit capacity constraints, demand for north/south connections, bicycling, pedestrians, and other factors as appropriate. Wherever feasible, the defined issues and opportunities will be presented in graphical or map form suitable for presentation at a public informational meeting.

The consultant team will use the preliminary list of issues identified in the RFR as a basis, with refinements based on the data collection and analyses conducted in Parts A and B to define a list of issues and opportunities. The consultant team anticipates that the list will primarily focus on capacity, connectivity, physical infrastructure, and access and transfers, and may include, but not be limited to, the following specific issues and opportunities:

- On-street bus improvements, both public and private.
- Red Line capacity at Kendall Square and to/from South Station
- MBTA Bus Route 1 capacity during peak times
- Service reliability for Red Line and bus connections
- New transit connections to nodes in Boston, Cambridge, and Somerville
- Quality of connection to North Station
- The quality of bus shelters and waiting areas
- Grand Junction conditions and operations
- Operational deficiencies within the study area
- Pedestrian and bicycle levels-of-service
- Crash data and safety issues
- Access needs for new development
- Commutersheds for Kendall employees
- Environmental and community constraints for transportation infrastructure development, such as parkland.

The defined issues will be presented using maps and graphics at public presentations. VISSIM can be used to visually display certain deficiencies at select intersections within the study area.

Product:

- Inventory and definition of issues and opportunities

FINAL PRODUCT FOR TASK 2:

Completed draft chapter/section containing the following:

- Existing traffic volumes, turning movements, levels of service, and crash data
- Existing transit services for the study area
- Existing bicycling/pedestrian activity for the study area
- Existing environmental and land-use data
- Forecasted traffic levels and conditions
- Forecasted transit ridership and services
- Socio-economic projections
- Land use projections
- Inventory and definition of issues and opportunities

Task 3 – Alternatives Development

Based on work completed in prior tasks, short- and long-range alternatives will be developed in this step. In consultation with the Task Force, MassDOT and the consultant team will develop alternatives and refine a selection of alternatives for detailed analysis in Task 4. Where applicable, visual imaging tools (ranging from maps and graphics) will be used as part of this task if appropriate. The consultant should ensure that a broad range of innovative, technology-based solutions are considered as part of this task. Coordination with MBTA Futures and the Program for Mass Transportation processes, particularly as they relate to Red Line capacity constraints, will be critical to ensure that strategies are consistent to the extent practicable. As part of the alternatives development process, consideration should be given to potential transportation uses along the Grand Junction corridor, and to potential bus routes extensions which may serve to increase one-seat transit ride access to the study area.

A series of short- and long-range alternatives will be developed based on the Goals and Objectives developed in Task 1 and the understanding of study area conditions, issues and opportunities developed in Task 2. Identification of issues through the existing conditions assessment will be useful to determine future needs and identify alternatives. Consideration of future conditions will be conducted from both a technical and visionary perspective. A “trends extended” analysis will be supplemented by proactively defining alternatives for the future transportation system. For example, capacity of the Red Line and the potential future use of the Grand Junction corridor is a key determinant in allowing the City of Cambridge to realize the “Enhanced TDM” strategy for mode share for projected development, versus mode shares that are more dependent on walking, cycling, and driving.

The alternatives will focus on the land use and transportation coordination that is required for the sustainable development focus for Kendall Square. The transportation alternatives will influence land use development demand, choices, and patterns. It is anticipated that a broad range of alternatives will be developed that might include policy recommendations, technology-based solutions, new or modified services, and infrastructure improvements. Alternatives will emerge by addressing questions such as the following:

- *What can be done to increase Red Line capacity?*
- *How much travel demand (trips) can be accommodated by MBTA bus? Can new bus service help reduce congestion on the Red Line?*
- *Are there options for new or extended bus routes that provide more direct service?*
- *What is the role of EZ Ride, other private services? Can EZRide expand its service to other areas such as Central Square?*
- *How can the Grand Junction ROW/ infrastructure be utilized? Can a new rail service be provided? Can it be used to provide opportunities to introduce additional cyclists to the area by offering safer, more direct routes that do not currently exist?*
- *How can crosstown trips to Lechmere or to the Boston side of the Charles River be accommodated?*
- *What can be done to improve bus operations? Can intersection improvements such as dedicated bus lanes and queue jumps be explored to achieve these goals? Can new connections such as between Third Street and Main Street will present opportunities to optimize existing bus schedules?*
- *What is the role of technology?*
- *What are the incentives for non-single occupancy vehicle modes of travel?*

FINAL PRODUCT FOR TASK 3:

Draft section/chapter containing the following:

- Descriptions of short and long-range alternatives
- Maps, graphics, and other visualizations showing alternatives

Task 4 – Alternatives Analysis

The alternatives will be analyzed based on the evaluation criteria from Task 1. The consultant will be responsible for analyzing:

- the impacts of alternatives on mobility in the study area
- the traffic safety impacts in the study area for each alternative to the degree feasible, including examining the impacts on vehicular, rail, bicycle and pedestrian movements in the study area
- the environmental impacts for each alternative to the degree feasible
- land use, economic development and business impacts for each alternative to the degree feasible
- the community impacts for each alternative to the degree feasible
- the possible social equity impacts of the alternatives analyzed and how they may impact or benefit the minority or low-income populations that may be affected by any of the alternatives
- approximate construction, operations, and right-of-way costs will be estimated for each alternative

A broad range of potential alternatives will be developed in Task 4 to address the mobility needs of Kendall Square. A screening level evaluation of each of the alternatives will be completed using the evaluation criteria developed in Task 1, presented in the form of a matrix. Each potential option will be assigned a rating, such as high, medium-high, medium, medium-low or low value for each of the criteria, based on a planning-level analysis, according to the subtasks defined below. Alternatives will be compared to the future No-Build conditions developed in Task 2B so that the pros and cons of a proposed alternative can be identified for a 2035 time frame.

- *Mobility Analysis*

All local and regional alternatives will be subject to a screening evaluation to identify to what extent an alternative provides a new transit route or service, additional capacity or improves operations to enhance mobility benefits, in accordance with the evaluation criteria.

Up to three future alternatives at the selected study area intersections will be modeled using Synchro capacity analysis to analyze the effects of improvements such as traffic signal timing optimization, pedestrian and bicycle improvements, or transit enhancements. This analysis will allow for a comparison of vehicle delay, vehicle queues, pedestrian level-of-service and bicycle level-of-service for the modeled alternatives.

The VISSIM model will be used to analyze and display up to two alternatives during the critical peak hour to review the interactions of multiple mode types. If the area around the new Third Street/Main Street connection is selected by the Task Force for modeling, VISSIM will allow the project team to visually display how potential new bus connections will interact with passenger cars, bicyclists and pedestrians in this critical area adjacent to a Red Line head house.

We propose working with CTPS to model options to gauge the effectiveness of new planned bus and rail transit improvements, either new planned services or improvements to existing services proposed through this study. The model will incorporate ridership and vehicle volumes to

generate quantitative model outputs that allow comparative information to be presented for each transit alternative. Measures of effectiveness could include changes in vehicle miles travelled, ridership and reduction in vehicle emission impacts.

- *Safety Analysis*

- Safety will be evaluated for vehicular, transit, railroad, and bicycle movements for each alternative modeled at the selected study intersections. Elements such as capacity and congestion, sight distance, and potential geometric improvements associated with each alternative and other factors will be assessed. Crash data analysis for the intersections completed in Task 2 will also be utilized.

Safety considerations related to additional uses on the Grand Junction corridor will also be evaluated. This will include consideration of Federal Railroad Administration, Federal Transit Administration and MBTA safety requirements, conflicts at roadway grade crossings and the potential use of the corridor by multiple modes.

A discussion of safety advantages and disadvantages of each alternative for vehicles, transit, pedestrians and bicyclists will be provided.

- *Environmental Analysis*

Environmental impacts will be identified at a planning level on a qualitative basis by reviewing environmental and land use data compiled in Task 2. Noise impacts will be evaluated qualitatively based on the proximity of sensitive receptors. Quantitative data obtained from the CTPS alternatives model will be used to evaluate air quality and Greenhouse Gas Emissions.

- *Land Use, Economic Development and Business Impacts*

Land use and economic development are intrinsically linked to transportation. The consultant team will compare the alternatives to known development and future community planning scenarios identified through the K2C2 Study to identify potential benefits and impacts within the Kendall Square area. Site accessibility and the need for right of way acquisition will also be determined. The consultant team will evaluate land use and economic development issues based on the existing GIS data developed in Task 2, as well as a visual tour of the study area and discussions with the City of Cambridge. Evaluation of regional impacts will focus on the communities within the commutersheds of employees working in Kendall Square based on the potential for new services or enhanced regional access based on new transportation services.

- *Community Effects/Environmental Justice (EJ)/Title VI Analysis*

All of the above factors will be evaluated to assess overall community and impacts. Factors such as air quality, noise, safety, mobility, pedestrian and bicycle friendliness of the alternatives will be considered and potential health effects discussed. Alternatives will be evaluated within the context of MassDOT's Healthy Transportation Policy Directive and City of Cambridge initiatives, such as the Let's Move initiative to prevent childhood obesity.

We will evaluate social equity impacts within the context of Boston MPO principles of equitable distribution of benefits and burdens in the transportation system by determining if:

- The alternative improves transit, bicycle or pedestrian access for an EJ or Title VI community.
- Creates negative effects to an EJ or Title VI community.

The analysis will use the Boston MPO definition of EJ and Title VI communities based on GIS data developed in Task 2.

- **Costs**

Approximate costs for construction will be based on broad unit costs using comparable construction examples to provide order-of magnitude costs. For example, construction costs for a potential rail alternative will be based on average cost per mile. Operating costs for transit alternatives will be based on MBTA average hourly cost per revenue hour operating cost for bus and rail. Alternatives including increases in bus service levels or the introduction of new bus services will consider the costs associated with the design and construction of new maintenance facility capacity. Right of way estimates will be based on City Assessors information.

FINAL PRODUCT FOR TASK 4:

Draft report section evaluating all alternatives based on Task 1 criteria, including:

- Mobility in all major transportation modes
- Accessibility
- Safety
- Environmental effects, including air quality and greenhouse gas impacts
- Health effects, including promotion of healthy transportation options as well as discussion of other public health factors, such as air quality and noise
- Land use and economic development
- Community effects
- Cost, including both capital and operating cost

Task 5 – Recommendations

Recommendations may include both short-range (within five years) and long-range recommendations as a result of the analysis completed in the previous tasks. The recommendations shall also be presented in the form of an implementation plan that identifies key stakeholders, issues, milestones, regulatory and procedural requirements, and other relevant issues. The recommendations must reflect a consensus of the public attained and documented through the public participation plan. The consultant will work with the identified stakeholders to outline the steps necessary to implement the recommended improvements.

The consultant team will assist the Task Force in choosing amongst the selected and analyzed alternatives to develop the short- and long-term recommendations, based on evaluation criteria, public outreach and agency input. Using knowledge of state and federal permitting and funding, the consultant team will identify the most likely sources for funding for the recommended options. The steps leading up to implementation will be identified. The consultant team will prepare an implementation plan for recommended alternatives.

The recommendations will be presented to the Task Force for review and concurrence, with an eye toward presentation at a Public Meeting with materials focused on summary tables, maps, graphics and displays to support limited narrative text.

FINAL PRODUCT FOR TASK 5:

Draft report section/chapter on recommendations containing:

- Tables of short- and long-range recommendations
- Recommendation narrative and implementation plan
- Recommendation maps, graphics, and displays

Task 6 – Final Report

A Final Report will be prepared in Word consisting of revised versions of the report chapters developed under Tasks 2 through 5, with an introductory chapter discussing the overall project and the goals-related material developed in Task 1. The report will also include an executive summary and appendices. The consultant team will be expected to deliver thirty (30) paper copies of the report to MassDOT. The final report will also be made available in accessible PDF format, with 100 compact disc copies provided to the Office of Transportation Planning. All electronic files (Word, Powerpoint, GIS Data layers, traffic analysis software, etc.) used to print the final report should also be provided to MassDOT on compact disc.

The consultant team proposes that the Executive Summary be designed to be a stand-alone document in up to three languages other than American English. Source materials, community feedback and other detailed data will be prepared in an appendix format.

FINAL PRODUCTS FOR TASK 6:

- An electronic PDF and one (1) hard copy of the Draft final report will be provided for MassDOT review.
- The consultant team will make one set of revisions based on a compilation of all MassDOT comments (including those made by the Task Force and other reviewing agencies whose opinions are sought by MassDOT).
- PowerPoint document of recommendations
- Revised final report - – 30 printed copies of Final Report with Appendices in PDF format on CD; 100 CD copies of Final Report and associated Appendices