

Rethinking the MIT Campus Transportation System

Recommendations on Accessibility and Land Uses Policies



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Introduction

“Our Institute is undergoing a transformation -- a physical transformation of new buildings, academic centers, activities complexes, and residential housing. At the same time, the City of Cambridge is changing, maturing as a center for high-tech and biotechnology as old industrial sites are converted to office and biochemical lab use. As the face of M.I.T. grows and changes, we must look to the future of our “evolving campus” in the context of an evolving city.

Along the northern edge of our campus, we have the tremendous opportunity to weave new connections in the fabric of Cambridge. The Vassar Street rail corridor has long been the center of a scar that divides the main M.I.T. campus from the rest of the City of Cambridge, strewn with empty lots and physically separated by an active rail line. With the development of our campus reaching into and beyond this scar, we have the unique opportunity to create new connections and new neighborhood where only vacant industrial brownfields now exist¹.”

MIT is a world institution which focuses on technology, and which has a stated commitment to sustainable development and greenhouse gas emission reduction, through decreased reliance on the auto and increased use of transit. Thus MIT can set an example of sustainable urban form that will influence patterns world-wide. In particular, the perceptions which MIT students develop are relevant, as they will become leaders throughout the world.

The course 1.252/11.380J – Urban Transportation Planning, offered last fall, featured an application of these principles to MIT’s urban environment. In this context, **this report summarizes the discussions** held in class on MIT’s problems and opportunities as well as **the recommendations contained in the reports written by the students** who took the course.

These ideas are organized as follows:

- General recommendations (“Cross-Cutting Issues”) requiring a paradigm shift towards a more sustainable form of mobility, involvement in the Urban Ring planning process and architectural coherence in favor of pedestrian access and integration of surrounding urban activities.
- Specific recommendations on Massachusetts Avenue, Vassar Street, Memorial Drive and Kendall Square. These range from traffic calming measures to a more balanced and agreeable distribution of public space

¹ From the final report by Yu -Han Chang

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“Transportation remains a key force in shaping the campus, because of its urban location. The campus is not gated, and forms a contiguous part of the urban fabric in eastern Cambridge. It is because of this continuity with the city that MIT is bound to work with the city of Cambridge towards common goals that benefit both communities”².

It is pertinent to remember that:

“The Institute recognizes that, as one of the world's preeminent problem solvers, it must perpetually reinvent itself.”³

As editors, we would be very pleased if this report would fit-in with that tradition and lead to the establishment of a process between the MIT community, the MIT institution, the MDC, the Secretary of Environmental Affairs, and the City of Cambridge, following the guidelines suggested herein. We feel that this report could well serve as a starting point for that process. Furthermore, we hope that an early implementation of the planned pedestrian safety steps would send a strong signal that progress is a priority and is indeed possible.

² quoted from an student report

³ <http://web.mit.edu/evolving/shaping.html>

Cross-cutting issues

The Challenge

1. MIT is a major institution which needs to integrate four aspects of its functioning:
 - a. internal;
 - b. interactive with business, other universities;
 - c. co-existence or synergy with neighbors
 - d. growth

2. MIT is also a world institution which focuses on technology, the main driver of economic progress and simultaneously a major driver of environmental degradation.
 - a. the perceptions MIT students develop are highly relevant, as these students will become leaders throughout the world.
 - b. MIT can set an example of sustainable urban form that will influence patterns world-wide.

3. MIT has a stated commitment to sustainable development and greenhouse gas emission reduction, decreased reliance on the auto, and increased use of transit.

4. MIT needs to interact with a business and technology community which is dispersed throughout an auto-dependent metropolitan area, and depends on a teaching and research base which is often suburban. While it is desirable to reduce unnecessary auto use, MIT is in competition for talent and must provide some convenient auto access, and both commuter and visitor parking (visitor parking is in particularly short supply).

5. MIT depends on access to the airport.

The Opportunities

1. Many MIT students and support staff have reasonably short convenient walk, transit, and bicycle options, particularly to the northwest, where the combination of Red Line and commuter rail provides access to a variety of urban and suburban housing choices.
2. The proposed Urban Ring transit service could make transit substantially more convenient for a broader range of choices, by expanding easy transit access to the Orange and Green Lines, the northern, western, and southwestern commuter rail services, and the airport.
3. The Mass Pike Allston interchange brings auto and truck access close to MIT, but creates congestion and conflict with Cambridge residential uses. The Big Dig will make MIT more accessible to I-93N and I-93S, and Logan by auto and cab, but the access path to MIT is not clearly defined.
4. The Charles River is a spectacular environmental asset of great imageability.
5. MIT does not support the housing needs of its undergraduates, graduate students, faculty or staff, placing a burden on affordable urban housing. It is publicly committed to increased student housing.
6. MIT controls a significant amount of urban real estate, some in low efficiency land uses such as surface parking.
7. MIT is growing, and constantly under construction. This provides an opportunity to "grow smart", achieving critical density for transit and reducing automobile parking. It also means that construction disruption is a permanent condition, so a plan must include redundancy to accommodate key movements.

The General Recommendations

1. To make a significant demonstration of pragmatic sustainability and smart growth, MIT needs a "**paradigm shift**", to grow while reducing generation of air pollution and greenhouse gases significantly; scenarios for 10%, 25%, and 50% reduction would help to establish parameters for a 10 to 15 year evolution.
2. Building blocks for achieving such reduction might include:
 - negotiating a group purchase of a University T Pass with the MBTA, to provide all MIT students, faculty, and staff free passes for the T.
 - the number of parking spaces should be steadily reduced, and be re-prioritized for visitor and short-term use. (Cambridge needs to develop clear implementation rules for its Clean Air Act parking freeze substitute.)
 - the amount of student, faculty, staff, and general affordable housing within walking distance should grow dramatically
 - the quality of transit service, pedestrian safety and quality, and bicycle safety and quality, should improve each year. A set of pertinent indicators should be established to gauge progress towards these goals.
 - architectural policies at MIT, which are quite eclectic and individualistic, need to be revised to enhance pedestrian access, consistent with universal design principles.
 - A well-publicized and vigorous interactive process within the MIT community to assist in the choice of strategies to achieve improvement, and develop political support for decisions. Interaction with neighbors, the cities of Cambridge and Boston, and State agencies such as MBTA and MDC are essential to success.
 - Systematic measurements of progress and evaluation with public discussion of results and revisions in techniques will be periodically required to maintain commitment and effectiveness.

Re-Design of Massachusetts Avenue

Pedestrian quality, public transportation priority, and bicycle friendliness are not consistent priorities at present.

77 Mass Ave:

Today: leaky bus shelters, scant information, reasonable pedestrian safety and highly-imageable sense of grand entrance.

Options:

- A. depressing the street would alienate the pedestrian level from the buses, cabs, falafel trucks, and bicycle routes that now interact reasonably well, and involve the disruption of massive sewer lines now being installed; Amherst St. access would be permanently disrupted. Construction impacts would be extremely high, in terms of cost, disruption, and length of time.
- B. improving the existing street could include providing bus/bicycle lanes, pedestrian bulb outs, state-of-the-art bus shelter with "next bus" information, and a substantial improvement to the #1 bus (Dudley to Harvard), with improved frequency and schedule adherence (possibly integrating the CT-1 with the 1), and by MIT participating in Harvard's privately-run shuttle service.
- C. providing a pedestrian overpass directly from the first floor MIT level to the upper plaza level at the Student Center, that might spring from one side of the grand staircase in a slight arch shape, incorporating bus and taxi waiting shelter under it at the street level, complementing but not replacing the at-grade pedestrian crossing. This could be considered to provide a sort of signature sculpture celebrating the connection of the two halves of the campus, but at a more modest cost and disruption than depressing the street. (On the other hand, it might reduce the critical mass of pedestrians at grade, and become the excuse to increase auto orientation of the street.)



Mass Ave and Memorial Drive

Today: the pedestrian hazards are unacceptable, at a minimum traffic signals to protect pedestrians and bicycles crossing Mass Ave along the Charles should be provided immediately.

Recommendations:

- A. the median should be removed, to allow eastbound Memorial Drive traffic to turn left onto Mass Ave (and to access MIT), and southbound Mass Ave traffic to turn left onto Memorial Drive eastbound, to clarify access to and egress from Mass Ave (and MIT). The lack of provision for these movements creates hazardous conditions elsewhere on Massachusetts Avenue and Memorial Drive. The left turn from northbound Mass Ave to westbound Memorial Drive could be provided at Amherst and Vassar Streets, with proper signage, if permitting left turns at Memorial Drive would overload the intersection. A full traffic analysis of the intersection would be required to determine if all four left turns could be permitted at the intersection. Having some automobile movements at the intersection at the bridge will reinforce the traffic light for pedestrians, and calm the racing that occurs on the bridge. Pedestrian and bicycle connections to Boston are important.
- B. bicycle lane or bus/bicycle lane treatment of Mass Ave must continue across the Harvard Bridge, both to calm auto speeds on the excessively wide bridge, and to provide safety for bicycles connecting to Boston and the Storrow bicycle paths, and to eliminate the hazardous bicycle/pedestrian conflicts on the sidewalks.
- C. the intersection at Amherst Street needs to be integrated with the Memorial Drive intersection, and include a left-turning lane for northbound Mass Ave to Amherst Street (and westbound Memorial Drive) lane. Pedestrian crossings at Mass Ave at both the MIT and river sides of Memorial drive and on Amherst Street are very important and require exclusive pedestrian phases.



Mass Ave and Vassar Street

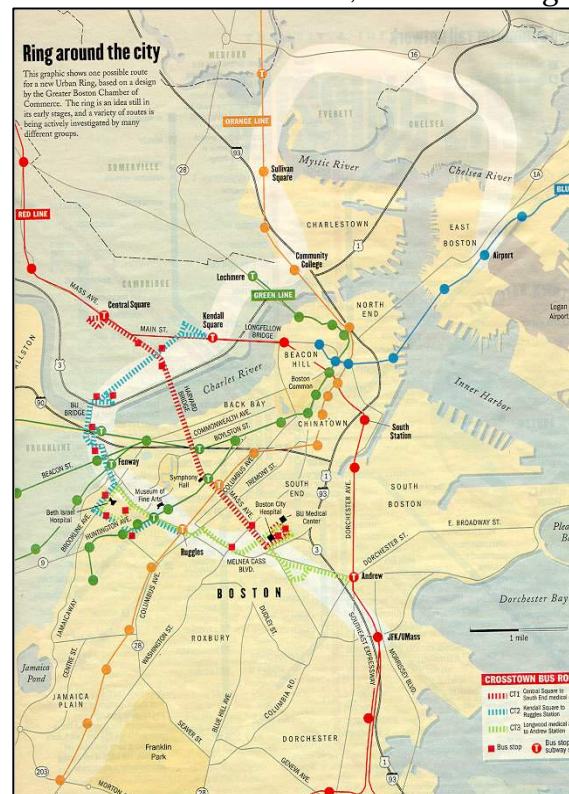
Today: Current pedestrian conditions are unacceptable. Reintroducing an exclusive pedestrian phase, and "no right turn on red" restrictions are needed to calm it down immediately.

Recommendations:

A. whether the "Urban Ring" is eventually to be BRT on Vassar Street, BRT or LRT on the railroad, or BRT or LRT in a grade-separated underpass, today it is the CT-2 bus at Vassar. This requires bus shelters for both the CT-2 and #1 bus services, and a "cleaning up" of the "street and sidewalkscapes" here in the immediate future.

B. the bus/bicycle/pedestrian redevelopment of Mass Avenue needs to be extended to Lafayette Square and Central Square. (It appears that this is happening.)

C. Mass Avenue is so important to the activity pattern of the MIT community today, that it is the best opportunity to engage the attention of students, faculty, and staff in an interactive participatory process. It ought to be possible to develop an interactive process with not only "traditional" methods, with the essential face-to-face workshops and meetings, and displays in the entrance at 77 Mass Ave and the Student Center. It ought to be possible to organize an international MIT world community interaction via email, with cutting-edge visualization tools to test reaction to alternative proposals and seek new alternatives. DUSP and the Media Lab, as well as CTS, should be major assets of MIT in developing a plan for the improvement of Mass Avenue that seriously engages the entire community and sets the stage for similar efforts on other campus issues.



<http://www.ai.mit.edu/~ychang/transportation/urbanring.html>

D. mid-range, it is extremely important for land use at the four corners of the intersection, all of which are controlled by MIT, to be recycled into more pedestrian-oriented active uses, to celebrate the policy that Vassar Street is to be a more important pedestrian access.

Re-conceptualizing the relationship to the Charles River and Memorial Drive

The Charles River is an incredible amenity for MIT, and the symbolic front door of the university, but the erosion of pedestrian safety and access to MIT caused by the existing high-speed auto orientation of the roadway needs to be dramatically reversed.

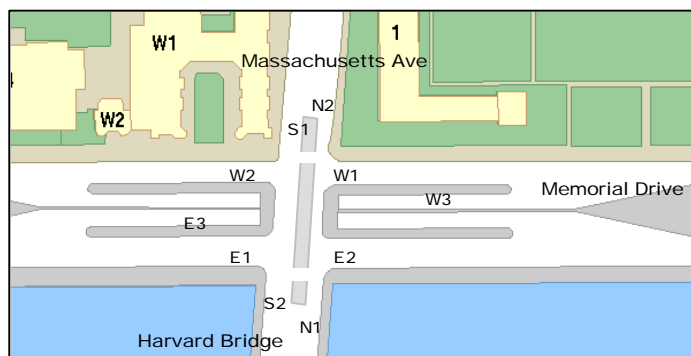
The fact that it has taken the MDC years to respond to the pedestrian fatalities and begin to install a pedestrian signal at Ames Street, while continuing to stonewall at Mass Ave (one of the 100 worst intersections in Massachusetts), is an embarrassment. The MDC is supposed to be a steward of parklands, not a highway agency. MIT should directly engage State Secretary of Environmental Affairs Durand and Governor Swift (who is on the board of directors at MIT) to get reasonable attention from the MDC.

Recommendations:

Mass Ave/Memorial Drive intersection.

The four-lane underpass of Memorial Drive sets a parameter of speed and auto orientation that creates safety hazards all along the MIT campus, and is totally inconsistent with the permanent capacity constraints of Memorial Drive further west, where the "sycamores" (London Plane Trees) grace the Harvard area of the river, and to the east, where the traffic lights and bottlenecks near the Science Museum constrain the automobile.

If the underpass were restricted to one moving lane in each direction, the severe hazards to the west (at Amherst Alley), and the three-lane raceway to the east could be calmed, producing an immediate benefit in terms of safety and compatibility. (The current construction, creating a left-turn lane to accommodate the westbound vehicles destined to U-turn to access the Harvard Bridge to Boston, will ease the westbound hazard, but exacerbate the eastbound hazard unless the intersection is signalized. Another alternative would be to permit the left turn from westbound Memorial Drive to southbound Mass Ave at the Mass Ave signal.)



Ames Street, Wadsworth Street at the east end near the MIT Medical center, and Audrey Streets at west end could be signalized to allow auto access to and egress from the MIT campus to Memorial Drive.

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There is no more imageable way to arrive at MIT by auto than Memorial Drive, but the modifications to Memorial Drive decades ago removed the MIT access features and prioritized speed on the roadway to arrive at the eastern and western boundaries. Auto access and turns at these intersections would make the traffic lights "real" and increase pedestrian safety.

Wadsworth Street

Kendall Square is a stone's throw from the Charles River, but with no auto access the relationship is unclear.

Longfellow Bridge

Access from Boston to MIT is a "secret" right turn, while egress from Kendall Square to Memorial Drive eastbound is impossible. Short-range signage could quickly cure the secret right turn problem. A longer-range reconceptualization of the relationship between Kendall Square and Third Street to the river and Memorial Drive would require a longer-range capital investment.

Overpass at BU Bridge

At the western approaches to Mass Avenue the four-lane, high-speed overpass at the BU Bridge, the merges with the connecting ramps, the dangerous unsignalized left turn for vehicles attempting to access Vassar Street (caused in part by the impossibility of accessing MIT from Memorial Drive at Mass Ave or Ames Street) creates a bad situation at the western gateway to MIT from the Mass Pike interchange, and the lack of clear auto and truck access to the MIT area sends regional auto and truck movements down River Street into the Central Square neighborhoods.

In the short run, the overpass could be "calmed" in the eastbound direction by restricting it to one travel lane, and the left turn to access Vassar Street either signalized or prohibited (access to the Hyatt Hotel is signalized).

In the longer run, the BU bridge is in very bad physical shape, creating an opportunity for the entire Charles River crossing, including the Memorial Drive overpass, the railroad bridge, and the relationship to Vassar, and/or Albany Street to be totally restructured if a comprehensive plan is developed now. Without a plan, each element will get rebuilt physically locking in a dysfunctional pattern for another 50 to 100 years.

Memorial Drive Median

The large but unusable median of Memorial Drive could be reduced to create more park land adjacent to the river, and formalizing bicycle lanes to reduce bicycle/ pedestrian conflicts. This

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would be a major capital investment, requiring planning, but is an opportunity to capture significantly expanded parkland adjacent to the river -- a rare opportunity.

Parking along Memorial Drive

The parking along Memorial Drive, now essentially available to early-bird commuters, could be metered, to make it a visitor parking resource (and provide some revenue to MDC).

Re-conceptualization of the Vassar Street/Railroad/Albany Street Corridor

This is an area of increasing priority for MIT, as major new buildings and re-landscaping of Vassar Street are underway. The MBTA is exploring the Urban Ring. The growth in MIT-related activities in University Park create new pressures for pedestrian railroad crossings and new traffic generators along the major permeable interface with the Cambridge community.



The Opportunities

1. In the short run, the CT-2 bus is the Urban Ring precursor, and improving its visibility and success is essential to both MIT, which will see dramatically improved transit accessibility, and the MBTA.
2. Providing for an acceptable truck route, to relieve River Street, is an essential good-neighbor responsibility of MIT. With the current fluid land use situation, there is no valid excuse for failing to provide a truck route in the corridor (either on Vassar or Albany Streets, or along the railroad right-of-way). A short-term truck route should be established immediately, but it should be consistent with a long-range plan that can evolve over time.
3. Pedestrian (and possibly auto, truck, and bus) crossings of the railroad need to be formalized and agreed to, to accommodate the growing need for interaction with the University Park initiative.
4. The short-, mid-, and long-range plans for the Urban Ring and rail link in this corridor need to be conceptualized now to establish a mutually compatible evolutionary path, or it is likely that short-term actions either preclude or create major disruption problems for later larger initiatives.

The Options

1. If a depressed or tunnel configuration for the essential existing rail link (and eventual possible BRT or LRT Urban Ring initiative) is to be preserved as an option, then Vassar and Albany Streets will need to be capable of serving auto, bus, and truck needs, so that it will be possible to handle the complicated physical redevelopment of the rail corridor into a tunnel, while maintaining rail service during construction, and accommodating rail freight, commuter rail, maintenance access, possibly inter-city rail, LRT or BRT in the completed configuration. (MIT may have an interest in a long-range future that would allow the entire Albany-to-Vassar corridor to be conceptualized with no surface path in the current railroad alignment.)
2. As the University Park-type development proceeds, creating opportunities for "walk to MIT" housing, essential equity issues of including proportionate affordable housing, examining the desirability of restoring rent control, and provision of service jobs and walk-to-MIT housing opportunities for traditional blue-collar Cambridge residents should be actively pursued with the City of Cambridge.

The Recommendations

1. MIT has been strangely silent on the Urban Ring. There is enormous opportunity to improve public transportation to the MIT and Cambridge communities in this initiative, and it is the only opportunity to even explore the possibility of putting the existing rail link underground. MIT needs to proactively engage in short-, mid-, and long-range planning process with its neighbors and the MBTA.
2. Vassar Street, even if bus and truck access increase dramatically, will handle far less traffic than Mass Ave, which bisects the MIT campus, while providing reasonable pedestrian safety and comfort, at least at 77 Mass Ave. The real problem is not the traffic, it is the lousy environment created by MIT, with lots of "dead" buildings such as the parking garage and Metropolitan Storage. Landscaping can't "fix" Vassar, only intensification of the land uses with buildings which generate significant activity can remedy the current unfriendly environment.

Kendall Square

This is an area of great potential to implement a paradigm shift towards sustainability, but it is currently somewhat incoherent physically, with no clearly-articulated path to the future.



Options and Recommendations

1. The Kendall-MIT Red Line station is the one strong link to the MBTA system at MIT, but Kendall is no Harvard Square. Undeveloped and underdeveloped MIT real estate in the area is the key to a potential dramatic transformation of this situation in three ways: first, the incoherent relationship to the Charles River and Memorial Drive could be clarified by establishing identifiable boulevard-type connections from Broadway to Memorial Drive at Third Street, and two other opportunities closer to the Longfellow Bridge. Secondly, the Sloan School expansion is a major opportunity to establish an MIT presence on the Square. Thirdly, increasing walk-to-work housing, both MIT and generally available, would humanize the Square and provide night and weekend activity for the Square and its public transportation services.
2. There is currently an excessive amount of off-street parking in the area, given the level of transit access, and more parking being developed. MIT needs to control its own parking demand, and to encourage its business neighbors to do the same.
3. The CT-2 bus, as precursor of the Urban Ring, needs to be given priority access to the T station and beyond to Lechmere, and that needs action now while the real estate is still fluid. Perhaps someday there will be a new tunnel LRT with an interchange with a new Red Line station at Albany/Vassar, and that possibility should be explored seriously with MBTA. In the short range, the CT-2 is the Urban Ring and if it cannot be made much more successful it will dampen enthusiasm for a much larger capital investment. Improved frequency should dramatically improve it.

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4. Longfellow Bridge is the gateway to this part of MIT from Boston and the airport. But it is currently a very auto-oriented quasi-highway with no sense of arrival at MIT. In the short run, improved signage for Memorial Drive, MIT and Kendall Square, traffic calming, additional pedestrian crossings, and removing the median fence could improve the situation, but a long-term game plan to improve the connections between the Square and the river, and introduction of important visible MIT buildings is an opportunity for continuous improvement.

There is major opportunity in the Square, but it can only be realized with an interactive process of communication with the City, business community, neighborhood residents, and the MBTA.