MBTA SALEM COMMUTER RAIL STATION
INTERMODAL CENTER PROJECT
MBTA Contract W92PS02

DRAFT
PHASE I DESIGN REPORT

Prepared for:
Massachusetts Bay Transportation Authority

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- Provide environmental review to identify federal, state, local, and other applicable agency permits, licenses, regulations and environmental studies or statements which the MBTA is required to file during the design phase of the project prior to commencement of construction.

- Provide update of site access/egress, traffic patterns, garage circulation, and level of service.

- Provide overall project implementation schedule, including environmental permitting activities and MBTA review and authorization milestones to achieve December 2011 overall construction completion.

- Provide engineer's estimate of probable cost for each concept alternative as a basis of evaluation.

- Phase I - Conceptual Design activities and alternatives examined with MBTA to confirm preferred alternative to be included in summary report and advanced in the next phase.

1.3 Project Goals

The MBTA, City of Salem, and other stakeholders have identified the following project goals:

- Increase the number of parking spaces on the site to 750 – 900 cars
- Minimize traffic impacts to surrounding streets and neighborhoods
- Improve vehicle circulation into and out of the site
- Improve handicapped access (pedestrian and vehicle parking)
- Improve pedestrian access to train platform
- Improve site amenities (canopy, enclosed waiting area, comfortable seating and communication systems)
- Increase site security via good visibility and lighting
- Minimize scale and visual impact of proposed garage
- Design garage to fit-in with architectural context of Salem

In addition to the functional requirements of the project, the design team will also take into account that Salem Station serves as a point of entry to the City of Salem. The design will provide a space for visitors to orient themselves when arriving at Salem. The design of the waiting area should emphasize safety and security and include MBTA patron amenities. Pedestrian, handicapped accessibility, and bicycle access need to be improved. Given the location of the proposed structure, the facades facing Bridge Street and the North River are crucial to the visual impact of the structure and need to compliment the neighborhood.

2.0 Environmental Report and Checklist

The Salem MBTA Station is located off of Bridge Street adjacent to the North River as shown on Figure 1. The proposed parking garage will provide 750 to 900 parking spaces to be located at the existing Salem MBTA Station site. Based on our review of this project, we believe that issuance of the following environmental permits will be required. We reviewed applicable local (non-zoning), state, and federal environmental permits and have provided a description of these permits below, including whether the permits are required for this particular project. A summary table of the permits is provided at the end of this report. Timeframes associated with individual permits are also included in this table. The entire permitting process, at the local, state, and federal levels, is estimated to take between 8 to 12 months.

2.1 Local Environmental Permits

A. Order of Conditions

An Order of Conditions, to be issued by the Salem Conservation Commission, is required pursuant to the Massachusetts Wetlands Protection Act (M.G.L. c. 131, s. 40) and Regulations (310 CMR 10.00) for work proposed in or adjacent to (i.e., buffer zone) wetland resource areas. The submittal application is called a Notice of Intent. There are no Areas of Critical Environmental Concern (ACECs) or Outstanding Resource Waters (ORWs) identified as being located at or in the near to the site. There are no critical areas in or adjacent to the site as defined by the Massachusetts Stormwater Policy Handbook. As part of the Notice of Intent application, stormwater treatment and discharges will need to be reviewed in accordance with this handbook.

Work is only proposed within the following resource area, which requires approval from the Salem Conservation Commission:

Land Subject to Coastal Storm Flowage (310 CMR 10.04). The entire site is located within Zone A2 (el. 10 NGVD) based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) dated August 5, 1985 (see Figure 2). There are no performance standards for work within this resource area under the Wetlands Protection Act; therefore, we believe that the proposed work is permissible. Requirements for work in this area are found in the Massachusetts Building Code.
Work is proposed within the 100 foot buffer zones to the following wetland resource areas located on or adjacent to the site, which requires approval from the Salem Conservation Commission:

Land under the Ocean (310 CMR 10.25). This resource area includes the land underneath the North River.
Coastal Beach (310 CMR 10.29). According to MassGIS wetland information, the river contains substantial tidal flats and a few small areas of coastal beach.

Coastal Bank (310 CMR 10.30). The area between the river and the parking area is comprised of a retaining wall (need to confirm) and dumped rip-rap. This area is defined as the coastal bank.
Land Containing Shellfish (310 CMR 10.34). According to MassGIS, soft-shelled clams are located within the North River although harvesting of shellfish is prohibited in this area due to contamination.
Fish Runs (310 CMR 10.37). The North River contains anadromous fish habitat. Restoration of this fisheries habitat has been ongoing within the river.
Riverfront Area (310 CMR 10.58). The site is within the Riverfront Area resource area associated with the North River. The Riverfront Area provisions of the Wetlands Protection Act do not apply if structures or activities are subject to Chapter 91. The entire site is subject to Chapter 91 jurisdiction, and is therefore exempt from these regulations (see Section 2.3 below).

Design requirements for this permit include stormwater management and any State Building Code requirements for construction in coastal floodplains.

B. Order of Conditions under the General Wetlands Ordinance

As a state agency, the MBTA is exempt from local bylaws including the Salem General Wetlands Ordinance. Therefore no approval is required under this ordinance.

2.2 State Environmental Permits

A. Massachusetts Environmental Policy Act Review

This project will require the submittal of an Environmental Notification Form (ENF) and may require the preparation of an Environmental Impact Report (EIR) pursuant to the Massachusetts Environmental Policy Act (MEPA) (M.G.L. c. 30, §§ 61-62H). MEPA establishes jurisdiction over projects undertaken by an Agency (e.g., MBTA), those aspects of a project within the subject matter of any required state permit, and a project involving financial assistance such as in this case where state and federal funds will be used. Based upon our understanding of the project, MEPA permitting triggers specific to this project include, but are not necessarily limited to the proposed creation of over 300 new parking spaces pursuant to 301 CMR 11.03 (6)(b)15. There are no threshold triggers relative to Chapter 91 because the project is considered water-dependent (see discussion in Section 2.3 below).

There are no specific design requirements associated with its state approval. MEPA is intended to provide an opportunity for the public and other state agencies to review a project prior to actual state permits being issued to determine if any damage to the environmental can be avoided, minimized, or mitigated. No state permits can be issued until the MEPA process is completed. MEPA does require a review of the proposed project relative to the Greenhouse Gas Emissions Policy and Protocol.

B. Superseding Order of Conditions

Should the local Order of Conditions issued by the Salem Conservation Commission be appealed, a Superseding Order of Conditions would be issued by the Massachusetts Department of Environmental (DEP). An Order of Conditions can be appealed by the applicant, the DEP, or any ten citizens within the town. This superseding Order would be considered as a state permit whereas the local Order of Conditions is considered a local permit.

C. Chapter 91 Waterways License

Based upon AECOM's review of the project locus and preliminary project plans, we believe the site to be located entirely within historically filled tidelands and is within the jurisdiction of the Public Waterfront Act (M.G.L. c. 91) and the Waterways Regulations (310 CMR 9.00) (Chapter 91). Research recently completed at the DEP's Division of Wetlands and Waterways in Boston indicated that there are no Waterways Licenses specific to any features or uses at the subject site.

The fill placed at the site was authorized by the state legislature (Chapter 185 Acts and Resolves) in 1883. The MBTA purchased the railroad for commuter use in 1970's, and for the purposes of this permitting summary, we are assuming that the Salem Station and parking existed prior to January 1, 1984 although this will need to be confirmed. Therefore, the parking and use of the site for the commuter rail is defined as a "public service project" and an "infrastructure facility" as defined at 310 CMR 9.02. The Chapter 91 provisions at 310 CMR 9.05(3)(c) indicate that a Chapter 91 license or permit is not needed for the "continuation of any existing, unauthorized public service project, provided that no unauthorized structural alteration or change in use has occurred subsequent to January 1, 1984, unless the Department determines, upon notice and opportunity for public comment, that licensing is essential to prevent significant harm to an overriding water-related public interest." We recommend that coordination with the DEP – Waterways Division be held to discuss these issues and clarify if a license or a modification to previous authorization is required for the proposed parking improvements. It is our opinion that the proposed work is defined as a water-depend-industrial use as it is a "...infrastructure facility which cannot be reasonably located at an inland site..." in accordance with 310 CMR 9.12(2)(b)9.

Design requirements for construction within Chapter 91 jurisdiction includes limitations on uses and structures within the Water Dependent Use Zone (WDUZ) and height limitations as described below. Please refer to Figure 4 which provides a sketch of the WDUZ and height limitation setbacks.

WDUZ: The WDUZ at any site may vary between 25 feet to 100 feet from mean high water (MHW). The MHW mark is synonymous at this site with the project shoreline and is located adjacent to the existing coastal bank (retaining wall) and riprap. We have performed a rough calculation of a WDUZ at the site of 65 feet based on a weighted average of lot line setbacks from MHW which will need to be confirmed with the DEP. No parking is typically allowed within a WDUZ. Nonetheless, parking presently exists at

the site and will likely be allowed to continue although this should be confirmed with the DEP. See Figure 4 for a sketch of this WDUZ.

Height: In accordance with 310 CMR 9.51(3)(e) "new or expanded buildings for nonwater-dependent use shall not exceed 55 feet in height if located over the water or within 100 feet landward of the high water mark; at greater landward distances, the height of such buildings shall not exceed 55 feet plus one-half foot for every additional foot of separation from the high water mark". For example, the part of the building set back 150 feet from the retaining wall could only be 80 feet in height. Height allowances are shown on Figure 4 in brackets.

D. Section 401 Water Quality Certification

In accordance with Section 401 of the Federal Clean Act (33 U.S.C. 1251 et seq.) and the Massachusetts Clean Waters Act (G.L. c. 21 §§ 26-53), work within federal wetlands is subject to water quality standards and requires a Massachusetts DEP-issued 401 Water Quality Certification (WQC). No federal wetlands have been identified on the site, therefore, no dredging or filling of federal wetlands is proposed. As such, no 401 WQC will be required for the proposed parking improvements. Work proposed in the flood plain is not considered as a wetland subject to federal jurisdiction pursuant to the WQC.

E. Conservation and Management Permit

A review of the current (13th Edition) Massachusetts Natural Heritage Atlas issued by the Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife (DFW) indicates that the site in not currently located within either a mapped Estimated Habitat of Rare Wildlife or within a Priority Habitat of Rare Species. As such, the project will not be required to undergo Project Review by the NHESP and a Conservation and Management Permit will not be needed in accordance with Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A).

F. Coastal Zone Consistency Statement

As this project is located within the Coastal Zone and requires federal action (i.e., funding), the project is subject to the Massachusetts Coastal Zone Management (CZM) Program Federal Consistency Review Regulations (301 CMR 21.00). Authority for this review is provided by the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.) and by the Massachusetts Coastal Zone Management Act (M.G.L. c. 21A, §§ 2,4). It appears that no federal permits will be required as described above; however, because the project will receive federal funding, a consistency review will be needed. This review requires consistency with various applicable policies pertaining to the Coastal Zone including water quality, wildlife habitat, energy, etc.

G. Historic Preservation Act

A historic railroad signal tower is located on the site that is listed on the National Register of Historic Places. As this project will obtain state and federal funding and will require a filing pursuant to MEPA, coordination with the Massachusetts Historical Commission (MHC) is required. In accordance with MHC guidance "Any projects that require funding from federal agencies must be reviewed in compliance with Section 106 of the National Historic Preservation Act of 1966. In Massachusetts, these steps are taken in consultation with the Massachusetts State Historic Preservation Officer (SHPO). The Massachusetts Historical Commission (MHC) is the office of the SHPO. Other interested parties such as local historical commissions or Indian Tribes are also consulted.... Any projects that require funding, licenses, or permits from any state agency must be reviewed by MHC in compliance with Massachusetts General Laws Chapter 9, sections 26-27C. These regulations set up a process that mirrors the federal "Section 106" regulations: identification of historic properties; assessment of effect; and consultation among interested parties to avoid, minimize, or mitigate any adverse effects." It is likely that design requirements subject to these reviews will include possible restoration or renovation of the signal tower and/or mitigation of potential impacts to the tower. MHC reviews projects either through the submittal of a Project Notification Form (PNF) or through the MEPA review process.

H. Massachusetts 21E Compliance

Massachusetts Chapter 21E is the state's Superfund Law which requires that when contamination of the soil or groundwater at a site is found, then the DEP must be notified and remediation of the contamination is required. It is not known at this time if the site contains any identified hazardous materials or waste. The public records available for this area indicate adjacent sites which do have known contamination. Any soil testing performed at the site would indicate if contamination levels are exceeded.

2.3 Federal Environmental Permits

A. National Environmental Policy Act (NEPA)

Pursuant to the National Environmental Policy Act (NEPA)(42 U.S.C. §4321 et seq.) and the NEPA Regulations (40 CFR 1500), the project will require the preparation of a Categorical Exclusion Checklist which is for projects that are unlikely to cause significant impacts to the environment. Should an Environmental Assessment (EA) be required and the lead federal agency determines that a broader examination of project alternatives, impacts, and mitigation must be performed, then preparation of an Environmental Impact Statement (EIS) would be required. The federal agency involved in the funding for this project will be the reviewing authority for this checklist, presumably the Federal Highway Administration (FHWA).

B. Massachusetts Programmatic General Permit

For work in wetlands, the U.S. Army Corps of Engineers issues permits subject to the Clean Water Act (Section 404 - 33 U.S.C. §1251) and Rivers & Harbors Act (Section 10 - 33 U.S.C. §§401-413). In Massachusetts, this work is permitted pursuant to the Massachusetts Programmatic General Permit (PGP). Should there be any federal wetlands (e.g., Waters of the U.S. or Navigable Waters of the U.S.) identified at the site that will need to be filled or excavated in order to complete the proposed project, issuance of U.S. Army Corps of Engineers authorization(s) would be needed. It is our opinion that the site does not contain any federal wetland resources other than potentially those immediately adjacent to the North River and no federal wetland authorizations are needed.

C. National Pollution Discharge Elimination System (NPDES) Program

Construction activities that disturb one acre or more are regulated under the NPDES stormwater program in accordance with the Federal Water Pollution Control Act (33 U.S.C. §1251) and the Massachusetts Clean Waters Act (M.G.L. c. 21 § 26-53). The operators of this project will be required to develop and implement a stormwater pollution and prevention plan (SWPPP). A Notice of Intent is filed electronically with the EPA typically by the contractor at least seven days prior to construction commencement. After seven days, the Construction General Permit (CGP) that will authorize the SWPPP will be required. This program incorporates erosion control measures to insure that no wetlands or waterways are impacted from construction activities. The program requires that erosion control measures be observed once a week and after every rainfall that exceeds 1/2 inch of rain. Observation forms need to be filled in for each observation.

Table 1 – Permitting Summary and Estimated Timelines

Issuing Agency	Permit Name	Authorization	Time Frame	Requirements
Local Permits				
Salem Conservation Commission	Order of Conditions	Massachusetts Wetlands Protection Act	2 – 6 months	Yes
Salem Conservation Commission	Order of Conditions	General Wetlands Ordinance	NA	Exempt
State Permits				
Massachusetts Environmental Policy Act Unit	Certificate – Environmental Notification Form (ENF)	Massachusetts Environmental Policy Act (MEPA)	1.5 months	Yes
Massachusetts Environmental Policy Act Unit	Certificate – Environmental Impact Report (EIR)	Massachusetts Environmental Policy Act	1.5 months	Yes
Massachusetts Department of Environmental Protection	Superseding Order of Conditions	Massachusetts Wetlands Protection Act	6 – 8 months	To be determined
Massachusetts Department of Environmental Protection	Chapter 91 Waterways License	Public Waterfront Act	6 – 8 months	Yes
Massachusetts Department of Environmental Protection	Water Quality Certification (WQC)	Clean Water Act (Section 401)	NA	No
Massachusetts Natural Heritage and Endangered Species	Conservation and Management Permit	Massachusetts Endangered Species Act (MESA)	NA	No
Massachusetts Office of Coastal Zone Management	Coastal Zone Consistency Statement	Federal and Massachusetts Coastal Zone Management Acts	1 month	Yes
Massachusetts Historical Commission	Project Review	Historic Preservation Act	1 month	Yes
Massachusetts Department of Environmental Protection	Massachusetts 21E Compliance	Massachusetts Superfund Act (Chapter 21E)	Ongoing	To be determined
Federal Permits				
Federal Highway Administration (or other federal funding agency)	Categorical Exclusion Checklist	National Environmental Policy Act (NEPA)	Ongoing	Yes
US Army Corps of Engineers	Massachusetts Programmatic General Permit (PGP)	Clean Water Act (Section 404) and Rivers & Harbors Act (Section 10)	NA	No
Environmental Protection Agency	National Pollution Discharge Elimination System (NPDES) Program	Clean Water Act	1 week	Yes

6.0 Architectural Program

6.1 Program Elements

The program for station and parking improvements for Salem Commuter Rail Station has been defined by the MBTA as follows:

- 750 – 900 parking spaces within proposed garage
- Curb length for 5 MBTA regular bus berths (300 FT) and 2 layover berths
- 15 – 20 "kiss and ride" drop-off/pick-up parking spaces
- Taxi drop-off/pick-up parking spaces
- Covered, unheated storage for garage maintenance and traffic control equipment
- Station improvements: enclosed waiting area and elevator from Bridge Street level to platform level

The architectural program is determined by the MBTA's need to accommodate 750-900 parking spaces to satisfy the growing need for parking for the commuter rail station. The program needs to accommodate this development within an existing site and its historic fabric. The new parking facility will incorporate all applicable code and transportation requirements and will include facilities for pedestrian, bicycle, vehicular and handicapped commuters. Improving access to the parking facility structure from its surrounding landscape will be an asset to the project and to the City of Salem.

6.2 Height and Massing

The City of Salem and nearby communities are concerned about the height and mass of the proposed parking facility because it will be facing both Bridge Street and communities across the North River. To address these concerns, the design has minimized the overall height and footprint of the building.

All design options feature four building stories on the Bridge Street side in order to align with the height of the adjacent courthouse and six stories on the North River side. The approximately 18 foot change in grade between Bridge Street and the parking facility's ground floor allows for additional access to be located on the facility's second level, off of Bridge Street.

Water Dependent Use Zone (WDUZ) height restrictions provide limitations on the height of any buildings within a certain radius of the water. The Building Studies drawing shows how the massing of the parking facility can be achieved with sensitivity towards the WDUZ restrictions. The sixth floor would be abbreviated along the river; this plan was explored as the sixth floor plan for Option 1. All other options explored did not have an

abbreviated sixth floor plan to show how many parking spaces would otherwise be achievable.

6.3 Conceptual Plans

Three options were studied for the conceptual plan of the parking facility. Different combinations of architectural and site features were explored as alternatives to Options 1 and 2.

Due to the existing conditions at the site and at the Bridge Street / Washington Street intersection (where additional vehicular access will be built), the grade change from the ground floor to the second floor of the parking facility is 18'-0. All subsequent floor-to-floor heights are 11'-0. Since the slope of the ramp is thus steeper from the ground floor to the second floor, there is no parking along the ramps between those levels in any option. The ramps between all subsequent levels can allow parking on the ramps.

Option 1

In this option, the bus lane is situated farther back (north) in the site than in the other options. Bus circulation is concentric to taxi and kiss & ride circulation.

Vehicle Parking: The vehicular ramp system of the parking facility is located interior of the building's footprint.
Kiss & Ride: The kiss & ride parking spaces are at 90° and share circulation with the taxis.
Taxi Lane: Taxi circulation overlaps with the kiss & ride circulation.
Bus Lane: Bus circulation is exclusive.

PARKING COUNT – OPTION 1	Total:
Existing Parking	342
Net Additional Parking	580
Total Parking	**922**

Option 2

Vehicle Parking: The vehicular ramp system of the parking facility is located interior of the building's footprint.
Kiss & Ride: The kiss & ride parking spaces are a combination of 90° spaces and diagonal spaces. Circulation is exclusive.
Taxi Lane: Taxi circulation is shared with bus circulation. The taxi lane is located just across the roadway from the train platform.

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Option 1

In this option, the bus lane is situated farther back (north) in the site than in the other options. Bus circulation is concentric to taxi and kiss & ride circulation.

Vehicle Parking: The vehicular ramp system of the parking facility is located interior of the building's footprint.
Kiss & Ride: The kiss & ride parking spaces are at 90° and share circulation with the taxis.
Taxi Lane: Taxi circulation overlaps with the kiss & ride circulation.
Bus Lane: Bus circulation is exclusive.

PARKING COUNT – OPTION 1	Total:
Existing Parking	342
Net Additional Parking	580
Total Parking	**922**

Option 2

Vehicle Parking: The vehicular ramp system of the parking facility is located interior of the building's footprint.
Kiss & Ride: The kiss & ride parking spaces are a combination of 90° spaces and diagonal spaces. Circulation is exclusive.
Taxi Lane: Taxi circulation is shared with bus circulation. The taxi lane is located just across the roadway from the train platform.

Bus Lane: Bus circulation is shared with taxi circulation. All bus berths are located at a distance from the train platform and some are located adjacent to the platform.

PARKING COUNT – OPTION 2	Total:
Existing Parking	342
Net Additional Parking	507
Total Parking	**849**

Option 2A

This alternative to Option 2 moves the taxi circulation from sharing with the bus circulation to sharing with the kiss & ride circulation.

Vehicle Parking: The vehicular ramp system of the parking facility is located interior of the building's footprint.
Kiss & Ride: The kiss & ride parking spaces are 90° spaces. Circulation is shared with taxis.
Taxi Lane: Taxi circulation is shared with kiss & ride circulation. The taxi lane is located just across the roadway from the train platform.
Bus Lane: Bus circulation is exclusive. Some bus berths are located at a distance from the train platform and some are located adjacent to the platform.

PARKING COUNT – OPTION 2A	Total:
Existing Parking	342
Net Additional Parking	506
Total Parking	**848**

Option 3

Vehicle Parking: The vehicular ramp system of the parking facility is located interior of the building's footprint, but the ground-to-second level ramp is located closer to the south edge of the building. Entrance to the parking facility is situated perpendicularly from the MBTA Driveway.
Kiss & Ride: The kiss & ride parking spaces are diagonal spaces. Circulation is shared with taxis.
Taxi Lane: Taxi circulation is shared with kiss & ride circulation. The taxi lane is located just across the roadway from the train platform.
Bus Lane: Bus circulation is exclusive. Some bus berths are located at a distance from the train platform and some are located adjacent to the platform.

PARKING COUNT – OPTION 3	Total:
Existing Parking	342
Net Additional Parking	455
Total Parking	**797**

6.4 Exterior Building Materials

The proposed parking facility façade has taken into consideration the history and context of the city of Salem by using brick as one of the main materials and incorporating bays as organizing elements. The mass of the building will be de-emphasized by the use of translucent metal mess on some of the facades. The building code requires that much of the façade remain open.

6.5 Code Requirements

The use group for parking garages is defined as S-2 (low hazard material storage). The S-2 determination includes open parking structures. The requirements for open parking structures are described in section 406 in the Massachusetts building code 780 CMR. The code specifies that an open parking structure must be open for 40% of the wall area on at least two sides. The garage will be defined under the S-2 open parking structure designation.

The following major codes are applicable to this project:

- Massachusetts Building Code (780 CMR) - 7th Edition, revised as of August 22. 2008
  Permit required: Building permit filed with local department of inspectional services

- Architectural Access Board Rules and Regulations (521 CMR)- Architectural Access Board, February 1 2002
  Permit not required: Enforceable through building permit

6.6 Accessibility

All public spaces and functions shall be accessible to persons with disabilities. An accessible route from each space to the platform will be required. The station currently features a mini-high platform at the northern end of the site. Accessible parking spaces are also proposed in close proximity to the mini-high platform.

A. Train Platform

Three options were studied for the train platform: Full High Platform, Half High Platform, and Mini High Platform. MBTA access representatives prefer the Half High Platform option. The final decision has yet to be determined.

Full High Option

Without re-alignment of tracks, the curvature of the existing tracks limit the viability of full high platform. The resulting gaps between the train and the full high platform option range from 2.1" – 6.0" at the ends of the body where the door are located. The gaps at the middle of the train body range from 6.0" – 10.0". Some of these gap distances are larger than 7.0" maximum allowable distance.

Half High Option

Since the tracks on the north end of the site are straighter, the half high platform will allow six passenger trains to be serviced by a high platform, while the remaining platform shall remain at existing height conditions. In order to mitigate the gaps that are greater than 7 inches, the high platform will need to be extended 200 feet north from the end point of the existing mini high platform.

Mini High Option

A mini platform currently exists on site, but it is located at the farthest north location of the station. As a result, the path of travel is longer than would be desirable for an accessible path. Relocating the mini high further south of the platform closer to accessible parking would be logistically preferable. The additional costs of relocation would need to be considered if this option were pursued.

B. Elevator

All proposed design options provide a 2 car elevator cluster with access to all 6 levels of the parking facility, including access to the Bridge Street (2^{nd}) level.

C. Ramp

All proposed design options incorporate a covered ramp adjacent to an elevated walkway on the east façade of the proposed parking facility. This covered ramp would connect Bridge Street to MBTA bus and rail system services.

7.0 Structural Systems

7.1 Project Understanding

1. The MBTA will be the long-term owner and operator of the new 750 to 900 space parking facility.
2. There are a number of stakeholder groups within the City of Salem and surrounding communities that are taking great interest in the scale and appearance of the parking facility. These stakeholder groups are also interested in the effect the parking facility will have on nearby traffic and site access.
3. A specific construction budget has not been identified for the new parking facility. However, it is Walker's understanding that the project will be constructed in part using a combination of state and federal funds with the remaining construction debt to be serviced using fees generated by the garage.
4. The yearly operational costs and long-term maintenance of the facility will be funded separately by the MBTA operating budgets.
5. The displacement of the existing on-site parking during construction of the new facility will be a significant inconvenience to the population using the rail station and residents of the surrounding neighborhoods. It will be important to minimize the duration of the new parking facility's construction.
6. The existing rail platforms must be kept in service for the duration of the construction process.

The basic project parameters advocate a structural system selection process based on project criteria such as:

- Functional design
- Construction cost/sequence
- System aesthetics
- System durability/anticipated maintenance

7.2 Functional Design

The parking facility is anticipated to serve patrons of the MBTA commuter rail, MBTA employees, and visitors to the adjacent Essex County Trial Court facilities. Parking access and revenue control equipment will be used to collect fees and control access to the facility. Given that the largest of these three patron groups will be the MBTA patron group, it is anticipated that the system for fee collection will incorporate the Charlie Card system in addition to pay-on-foot collection by cash and major credit card. Vehicular access to the proposed parking facility will occur at two locations. One point of access will occur on the ground level of the facility, and the other point will occur at the first or second supported tier of the facility, where a bridge connects to the upper level of Bridge Street at its intersection with Washington Street. Internal vehicular circulation will be provided by ramping located interior to the footprint of the garage. Having two points of vehicular access to the parking facility will both provide increased access options for patrons arriving from a variety of routes and directions.

MBTA parking standards use an 8'-6"′ by 18' parking stall geometry with a 24′ drive-aisle for 90 degree parking. The parking facility will operate using a two-way driving pattern and a 90-degree parking stall. The module width will be the required 60 feet and the vehicle spacing will meet or exceed the MBTA requirements. These parking geometries are recommended for the following reasons:

- Given these parking geometries, the Level of Service (LOS) provided by the design module is LOS B, which is a desirable level due to the large number of transient parkers in the facility. This design will comfortably accommodate a 40% small car and a 60% large car vehicle mix.

- The 60′ module is typical for parking structures using long-span, pre-cast concrete double tees and complies with the current zoning.

- Based on the above and extensive experience nationwide using similar and tighter modules with large vehicle mixes, we recommend the proposed geometries as a comfortable design for this application.

The stairs and the elevator have been located within the facility for more comfortable patron usage. The main stair/elevator tower has been located in the northeast corner for easy access to the track platform. A second major stair element is located on the southeast corner of the facility to serve as egress and to service the pedestrian paths to the adjacent Essex County Trial Courts facilities. A third and secondary stair has been located at the opposite corner of the facility to fulfill emergency egress path requirements.

Passive security features will be incorporated into the design. The enhancement of passive security will be achieved by providing proper illumination for the parking facility at all locations, including general parking areas, the roof level, and stairwells. In addition, lighting will be carefully considered at the perimeter of the parking facility and at public pathways in order to ensure safety. Openness will be enhanced by minimizing hiding places and by providing glazed stairs and a glass-backed elevator towers. Landscaping design and maintenance design are also essential for security. Landscaping should not provide hiding places, and keeping a maintained appearance helps in the overall appearance of security. Graphics and signage are important to eliminate confusion and delay for patrons. Reduction of delay minimizes the time for incidents. The design will also minimize slip/trip hazards. This can be achieved by reducing the need for curbs as much as possible, and assuring an adequate slip resistant surface.

The design will incorporate features that ease maintenance for the parking facility. Three systems for the parking facility require maintenance; these include operational, structural and aesthetic maintenance. Operational maintenance includes such items as the lighting and electrical system, elevator, and mechanical systems. Design of these systems will incorporate maintenance considerations. Structural maintenance is the most expensive for most parking facilities. Durability review will be performed during later phases of design to determine the appropriate durability features for the project. The facility will also be designed to enhance aesthetic maintenance. This includes areas

of landscaping, painting, and general facility appearance. Snow removal and ice control is an important maintenance consideration. Provisions will be considered for incorporation to allow for ease in a blade and dump scenario for the roof level of the parking facility.

7.3 Structural System Options

As the project moves forward with the development of the design concepts, the design team has begun to analyze the various options for structural systems with respect to the project criteria. There are multiple variations/combinations of structural systems in use for the construction of parking structures utilizing post-tensioned concrete, pre-tensioned concrete, conventionally reinforced concrete and structural steel sections. The following is a description and discussion of the predominant systems available for use in the New England area:

- Cast-in-place Post tensioned Concrete (PT) – Post tensioned concrete slab, beam and girders with conventionally reinforced columns
- Cast-in-place Conventional Reinforced Concrete (RC) – Concrete slab (i.e. waffle, flat plate) and columns.
- Pre-cast Pre-stressed Concrete (PC) – Pre-cast priestesses double tees and inverted tee girders supported on conventionally reinforced pre-cast columns, wall panels and spandrels.
- Hybrid - Structural Steel Frame with a concrete deck consisting of one of several systems such as pre-cast double tee beams, post-tensioned concrete slab, or conventionally reinforced concrete slab on metal deck.

Each of these systems presents advantages and disadvantages with respect to addressing this project's design criteria. The following provides Walker comment with respect to each system and the project's design criteria for consideration:

Cast-in-place Post Tensioned (PT)

Photo 1 *University Park at MIT*

1. Functional:
    a. Utilizes long span construction to allow the framing bay to match the parking module.
    b. The flat soffit between beams/girders provides for efficient distribution of lights and signage which facilitates vehicular and pedestrian flow within the facility.
    c. Provides good parking efficiency (SF floor area/car).
2. Construction Sequence/Cost:
    a. Built in place, likely to disrupt all parking at garage site during construction.
    b. The construction of this system will allow for the uninterrupted use of the platform and tracks.
    c. Concept level schedule for the construction of the facility is 14 to 18 months exclusive special site considerations.
3. System performance/aesthetics:
    a. Beams spaced at the column lines for minimal obstructions to light distribution.
    b. Clear headroom from floor to underside of slab, except at beam locations, creates an unobstructed view within deck.
    c. Concrete cover in structural members can be modified to accommodate a fire rating.
    d. Edge beams can provide the code required vehicle barriers and be modified for architectural appearance.

e. Use of moment frames for lateral stability can reduce and in some cases eliminate the need for interior shear wall elements

4. System Durability:
   a. The PT tendons put compressive forces into the slabs and beams which minimizes need for slab jointing and the occurrence of cracking.
   b. Main reinforcing tendons encapsulated in protective sleeves to shield them from corrosive elements.
   c. Limited waterproofing required at congested reinforcing and anchorage locations.

Cast-in-place Conventionally Reinforced (RC)

1. Functional:
   a. Lends itself to short span construction. This requires the placement of columns within the parking module which reduces parking efficiency.
2. Construction Sequence/Cost:
   a. For durability, it is typically necessary to include a comprehensive waterproofing system and built-in measures (i.e. concrete additives, coatings). This can add significant cost.
   b. Entire structure is built in place which is likely to disrupt all parking at garage site during construction.
   c. The construction of this system will allow for the uninterrupted use of the platform and tracks.
   d. Concept level schedule for the construction of the facility is 14 to 18 months exclusive special site considerations.
3. System performance/aesthetics:
   a. In some cases, flat slab (two way) is utilized which provides for minimal obstructions to light distribution. However, short span requires the placement of columns within the parking module that presents obstruction to light and sight lines.
   b. Clear headroom from floor to underside of slab. Creates an unobstructed view (between columns) within deck.
   c. Concrete cover in structural members can be modified to accommodate a fire rating.
   d. Edge beams can provide the code required vehicle barriers and can be modified for architectural appearance.
4. System Durability:
   a. Cracking in the negative moment regions of the slab requires the installation of membranes and other waterproofing/durability measures to protect reinforcement from chloride laden moisture related deterioration.
   b. Monolithic construction can be prone to active cracking. This active cracking promotes moisture intrusion of the slab elements and subsequent corrosion of exposed metal items such as reinforcement and form deck.
   c. Generally requires significant maintenance to repair corrosion induced deterioration and repair worn or failed waterproofing components throughout its service life.

Pre-cast Prestressed Concrete (PC)

Photo 2 *Baystate Parking Garage*

1. Functional:
    a. Utilizes long span construction to allow framing bay to match the parking module.
    b. Provides good parking efficiency.
2. Construction Sequence/Cost:
    a. Using a repetitive pattern improves cost efficiency.
    b. Erection may allow some parking to remain in service at different stages of erection.
    c. The construction of this system will allow for the uninterrupted use of the platform and tracks.
    d. Concept level schedule for the construction of the facility is 12 to 16 months exclusive special site considerations.
3. System performance/aesthetics:
    a. Double tee floor members have 30" (+/-) deep stems at roughly 6' centers making the ceiling appear lower.
    b. Way-finding graphics less visible due to tightly spaced tee stems.
    c. Concrete cover in structural members can modified to accommodate a fire rating. Joints between members may require fire rating.
    d. Edge beams (spandrels) can provide the code required vehicle barriers and be modified for architectural appearance.
4. System Durability:
    a. Use of non-corrosive embedment reduces staining and corrosion.
    b. Minimal reinforcing close to the drive surface greatly reduces potential corrosion in slabs.

c. System requires the installation of sealant around individual PC pieces. Can have literally miles of sealant that require replacement at the end of their service life.

Hybrid (HYB)

Photo 3 *Hybrid System*

1. Functional:
   a. This system can utilize both short and long span construction depending on the deck system incorporated into the design. Long span systems allow framing bay to match the parking module.
   b. Long span system provides good parking efficiency. In cases when short-span system is utilized parking efficiency will decrease similarly to the RC system(s) addressed above.
2. Construction Sequence/Cost:
   a. Costs can be significantly affected by which slab system is chosen. Refer to options discussed above.
   b. Erection may allow some parking to remain in service at different stages of erection.
   c. The construction of this system will allow for the uninterrupted use of the platform and tracks.
   d. Concept level schedule for the construction of the facility is 12 to 16 months exclusive special site considerations.
3. System performance/aesthetics:
   a. Use of moment frames and bents for lateral stability can reduce and in some cases eliminate the need for interior shear wall elements
   b. Steel superstructure requires separate vehicle guards.
   c. Steel superstructure requires spray-applied fireproofing to attain a fire rating when one is mandated by construction type code requirements.

d. Exterior architectural treatment may require additional members.
e. Interior aesthetics dependent on chosen floor system. See above systems for discussion.

4. System Durability:
   a. Steel frame must be protected from corrosion, typically by a high performance coating or galvanizing.
      i. High performance coating will require periodic touch-up and re-coating.
      ii. Galvanizing require periodic touch-up at connections and trouble spots.
   b. The durability the floor system varies with the selected system and is discussed in the above options.

7.4 Concept Level Structural System Recommendations

A number of the systems and their variations can be excluded from further consideration based upon their compatibility with the Salem MBTA project parameters and criteria. A brief discussion and justification for these exclusions are as follows:

Cast-in-place Post-tensioned Concrete (PT): Of all the systems presented, this system provides the most favorable characteristics in terms of inherent durability. In addition, its ability to span the width of the average parking module means that it meets or exceeds the ability of the other systems with respect to functional design, aesthetic qualities and system performance. It is however historically the more costly of the systems presented to construct in the northeast market and can take longer to erect on site than some of the other systems presented. As a result it is Walker's recommendation that it be eliminated from consideration for use on this project. It should be noted that in terms of service life cost it is on par with the other systems addressed. Therefore it is recommended that its use be revisited should the facilities service life costs become a governing priority and should the project budget provide for its use.

Photo 4 *University Park at MIT*

Cast-in-place Conventional Reinforced Concrete (RC): This system provides less favorable characteristics in terms of inherent durability than the post-tensioned and pre-tensioned slab systems. In addition, the need to install and then maintain waterproofing/barrier systems makes this structural system less cost efficient with respect to initial construction as well as service life cost. Lastly, the short-span nature of this system lends itself to structures that support other uses (above) in

addition to parking such as plaza construction and occupied building spaces. Walker recommends that this system be eliminated for consideration for use on this project.

Hybrid - Steel Frame with PT Concrete Deck: This system provides much of the same inherent durability characteristics as the all concrete PT system. Walker's design experience indicates that the use of composite steel beams/girders with a PT slab system has been problematic and led to unintended cracking issues. In addition, its construction cost and duration of erection schedule is on par with that of the all concrete PT system. Walker recommends that this system be eliminated for consideration for use on this project.

Photo 5 *Steel Frame with Concrete Deck*

Hybrid – Steel Frame with RC/CIP Slab (with and without form deck): This system provides less favorable characteristics in terms of inherent durability than the post-tensioned and pre-tensioned concrete deck systems. This system can be cost efficient from an initial construction cost standpoint but historically has been shown to perform poorly in the northeast area of the US from a durability standpoint. This can lead to prohibitively high maintenance and repair costs over the service life of the structure. For these reasons it is Walker's recommendation that this group of system(s) be eliminated from consideration for use on this project.

Photo 6 *Steel Frame with RC/CIP Slab*

Upon review it is Walker's opinion that the pre-tensioned pre-cast concrete system(s) are the appropriate choice for the Salem MBTA project when the four main project criteria of functional design, cost, aesthetics and durability are considered and weighted. This means that there are two basic systems still under consideration for this project. They are the all concrete pre-cast system consisting of pre-cast concrete columns, beams and the double tee beam deck system. The second system currently under consideration is the Hybrid system that utilizes the structural steel frame with the pre-cast concrete double tee deck system. Both of the structural systems are comparable with respect to durability characteristics and their ability to accommodate the functional design concepts currently under consideration for use on the Salem MBTA project. Both systems can provide support for the architecture currently proposed for the four functional/architectural garage options currently under consideration. The off-site pre-manufacture of the key structural components can assist in minimizing the overall duration of the on-site construction activities. The final choice of structural system will likely come down to architectural detail, cost and a more detailed schedule estimate. Additional design and stakeholder decisions are required to better define both before further comparison of the systems can be provided. It is anticipated that this direction and information will be available during the design development phase of the project. Further it is anticipated that the final structural system choice will be included in the design development deliverable for the project.

9.0 Construction Cost Estimates

Cost Estimates:

Conceptual cost estimates have been developed for the concept schemes included in this report. Refer to Section 6.0 for concept schemes and Appendix 10.4 for full conceptual cost estimates. Below is a summary and comparison of the concept cost estimates for the appropriate option.

The figures below include a general contractor mark-up of 35%, which in today's market may be reduced. This general contractor mark-up includes general conditions, overhead, profit and bonding.

Parking Garage Summary:

	Concept Option 1	Concept Option 2	Concept Option 2A	Concept Option 3
Site	$ 2,961,000	$ 3,061,000	$ 3,061,000	$ 3,061,000
Garage	$19,730,000	$22,291,000	$20,978,000	$21,155,000
Escalation contingency	$ 2,042,000	$ 2,276,000	$ 2,164,000	$ 2,179,000
Contingency	$ 7,420,000	$ 8,270,000	$ 7,861,000	$ 2,179,000
Bridge to garage	$ 4,450,000			
Escalation contingency	$ 401,000			
Contingency	$ 1,455,000			

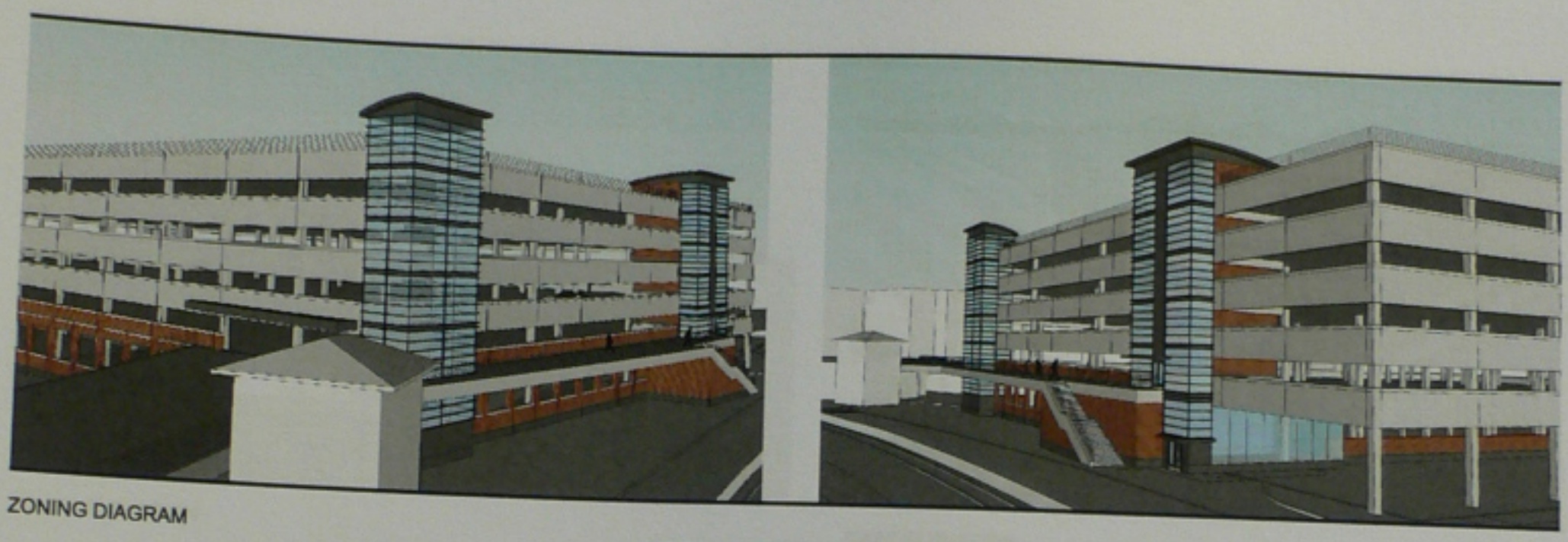
Platform Summary:

	Concept Option 1 – Full High	Concept Option 2 – Half High / Low	Concept Option 3 – Mini High
Site	$ 248,000	$ 228,000	$ 215,000
Platform	$1,656,000	$1,218,000	$ 867,000
Escalation contingency	$ 171,000	$ 130,000	$ 97,000
Contingency	$ 623,000	$ 473,000	$ 354,000

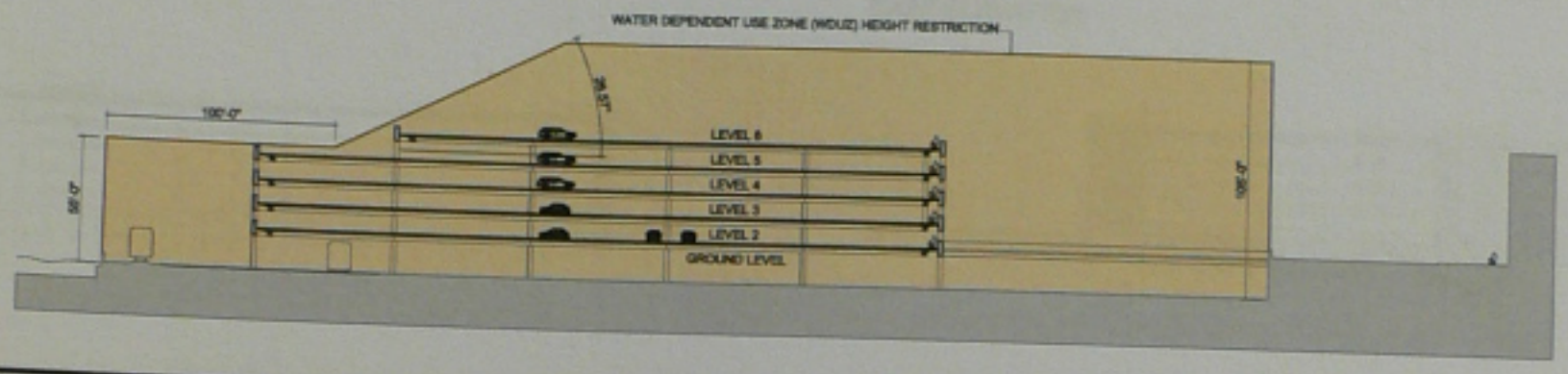
As shown in the summaries above, an escalation has been carried to represent the possibility of inflation from today's cost to the mid point of construction. As the project develops, this percentage will be reduced.

The contingency shown above includes a 30% overall contingency. This contingency is to allow for uncertainties that are typical at the concept design stage of the project. As the project moves into schematic design and is further developed, the contingency percentage will be reduced because the construction scope will be further defined. The key items that contribute to the contingency are unforeseen site conditions, exterior treatments, and design development.

Project cost, including soft cost (owner cost, design cost, etc.) are not included in this cost estimate and would require input from the MBTA.

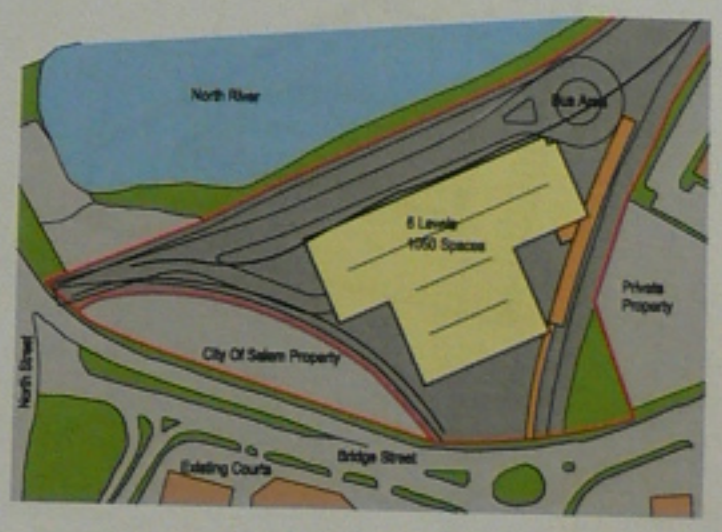


ZONING DIAGRAM



NORTHWEST ENTRY

SOUTHWEST ENTRY



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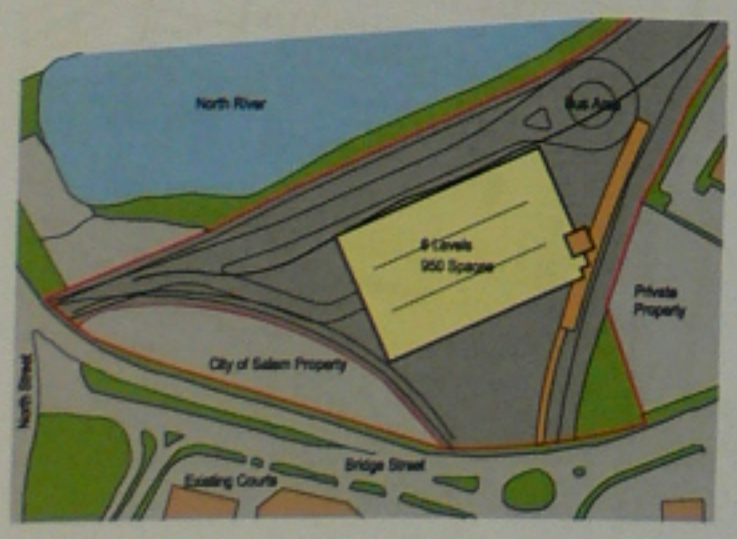

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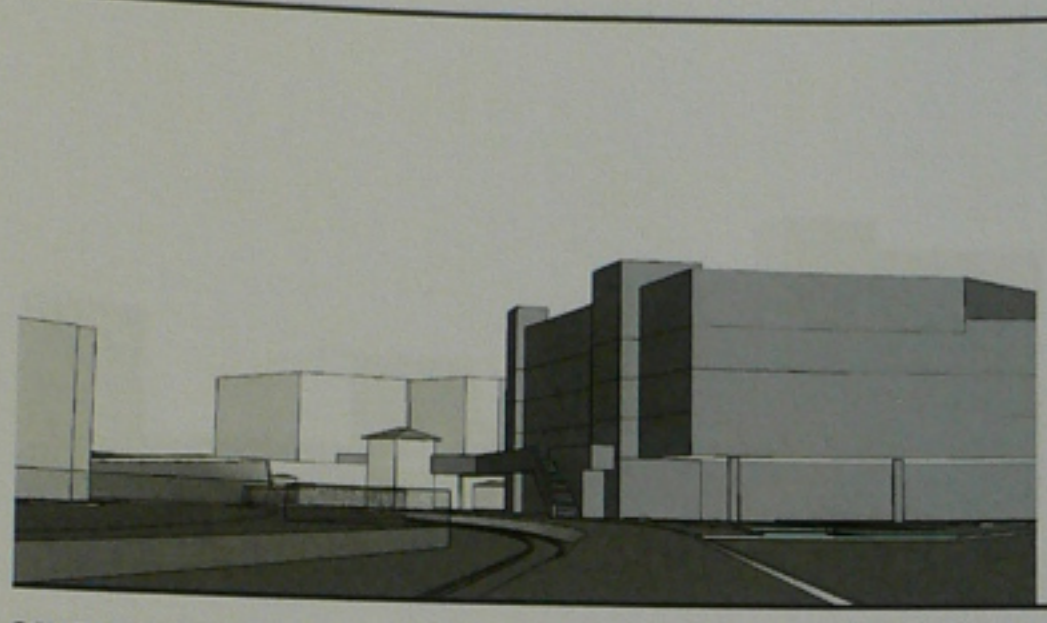

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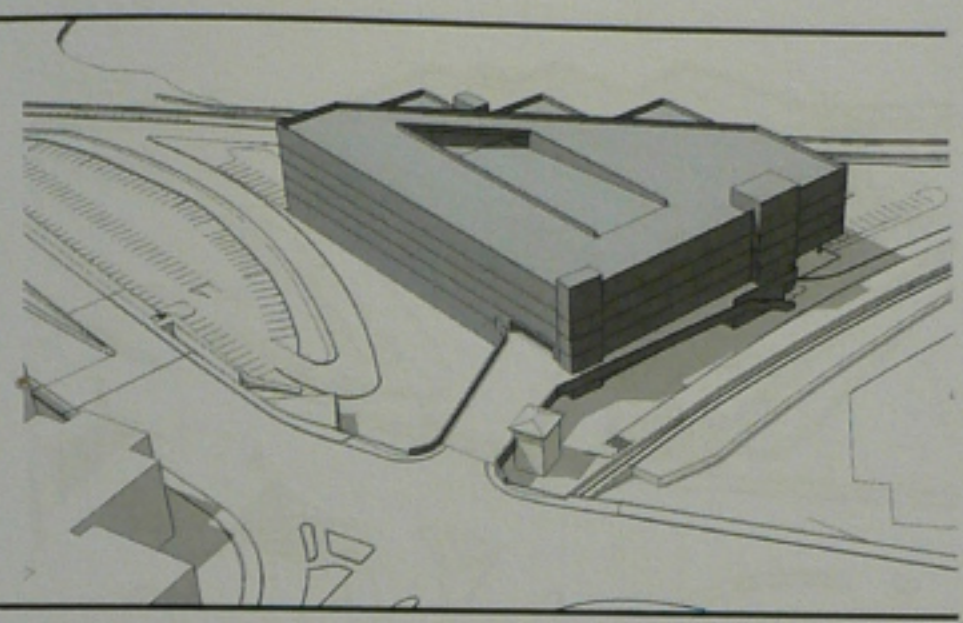

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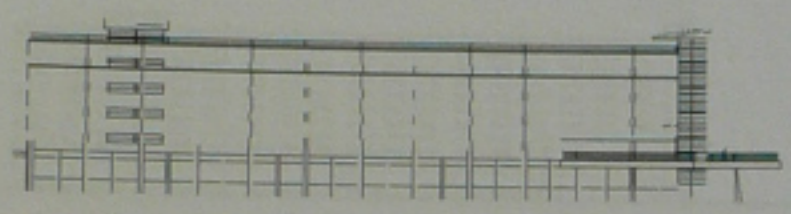
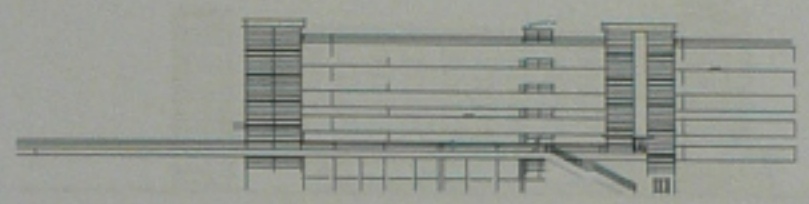


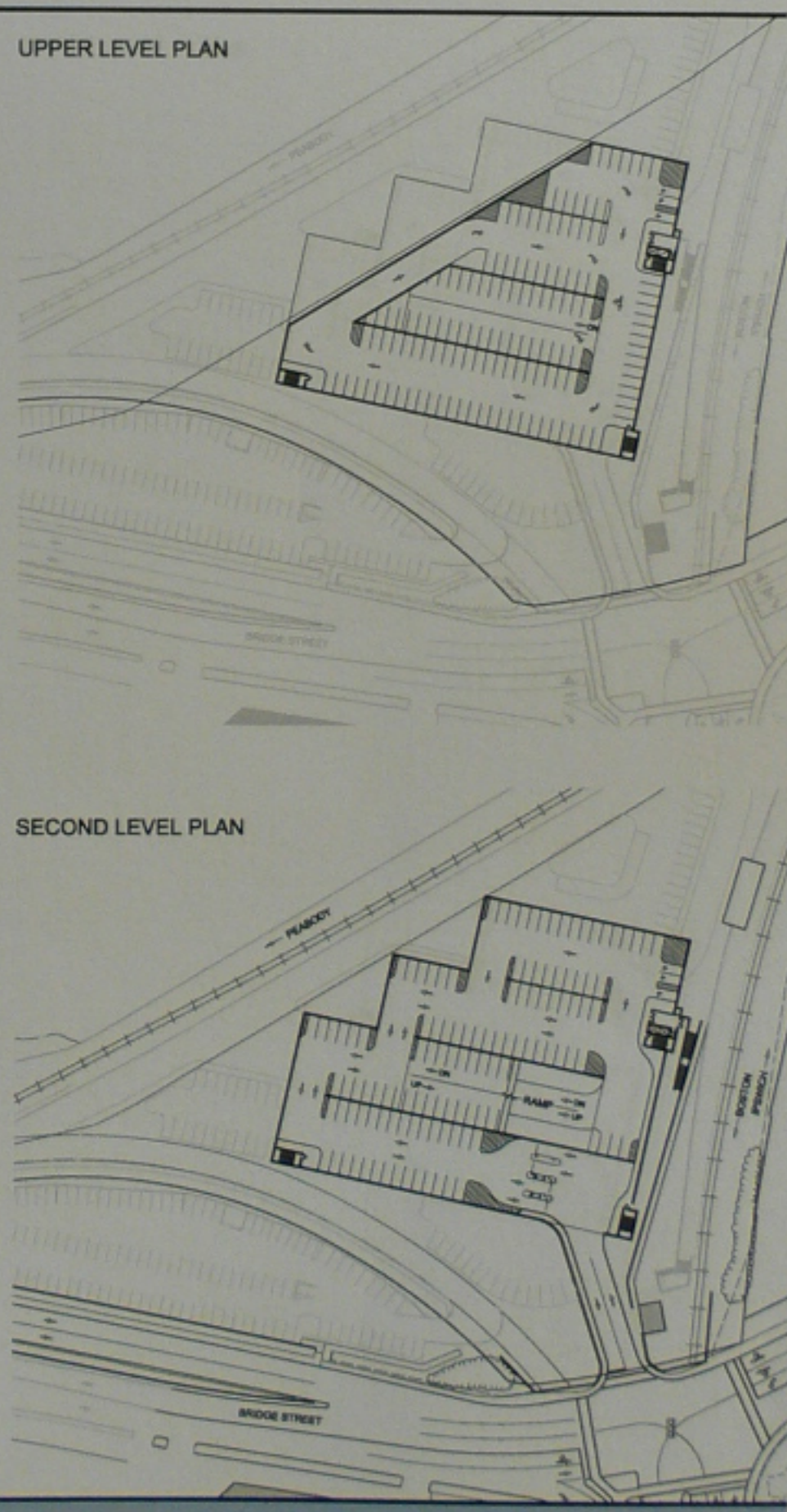


GROUND LEVEL PLAN

PEDESTRIANS
VEHICLES
BUSES
TRAINS

PROPOSED PARKING:	922
EXISTING PARKING:	342
NET ADDITIONAL PARKING:	580

UPPER LEVEL PLAN

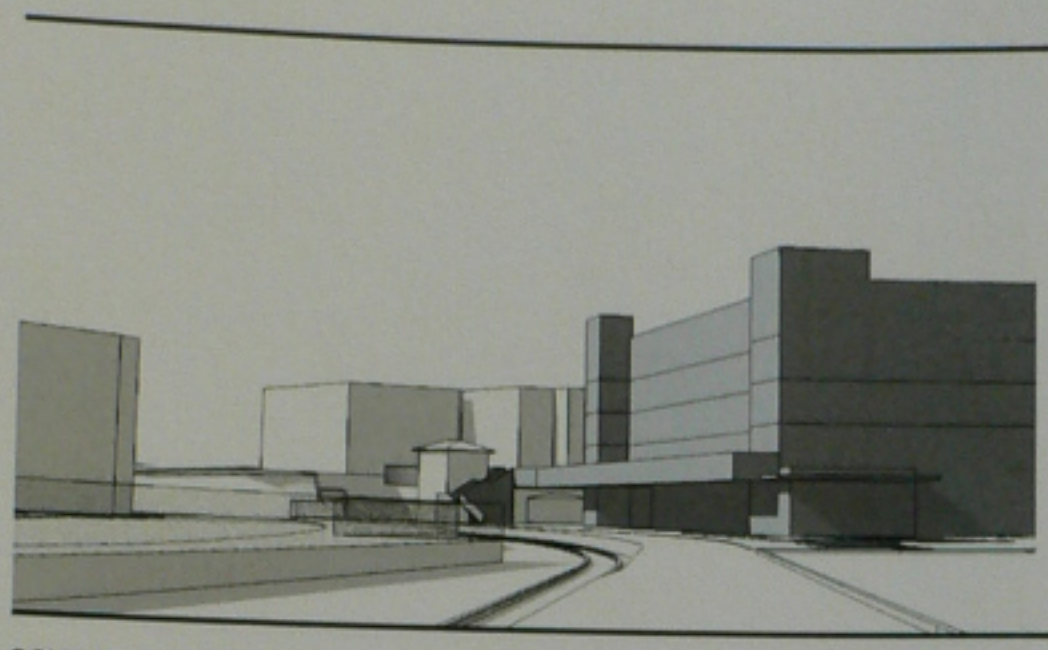


SECOND LEVEL PLAN

MBTA Commuter Rail Station
Salem, Massachusetts

Option 1
August 5, 2009 - DRAFT

AECOM



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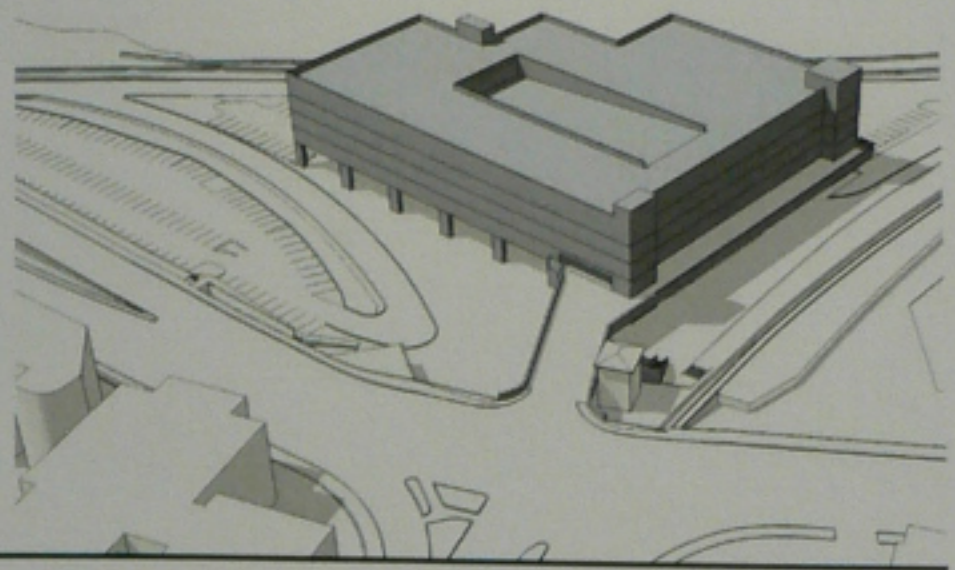

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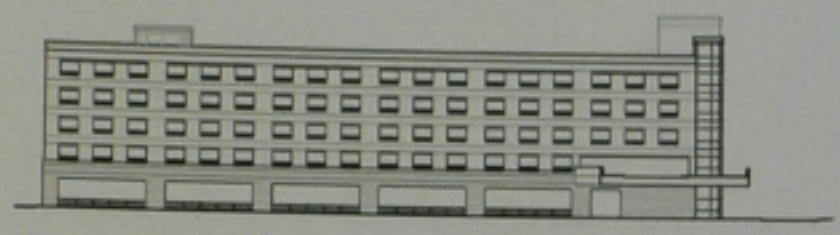
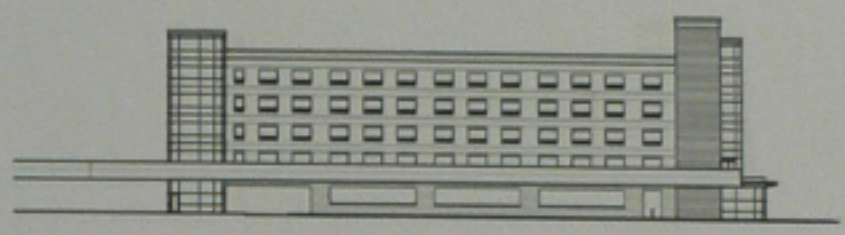
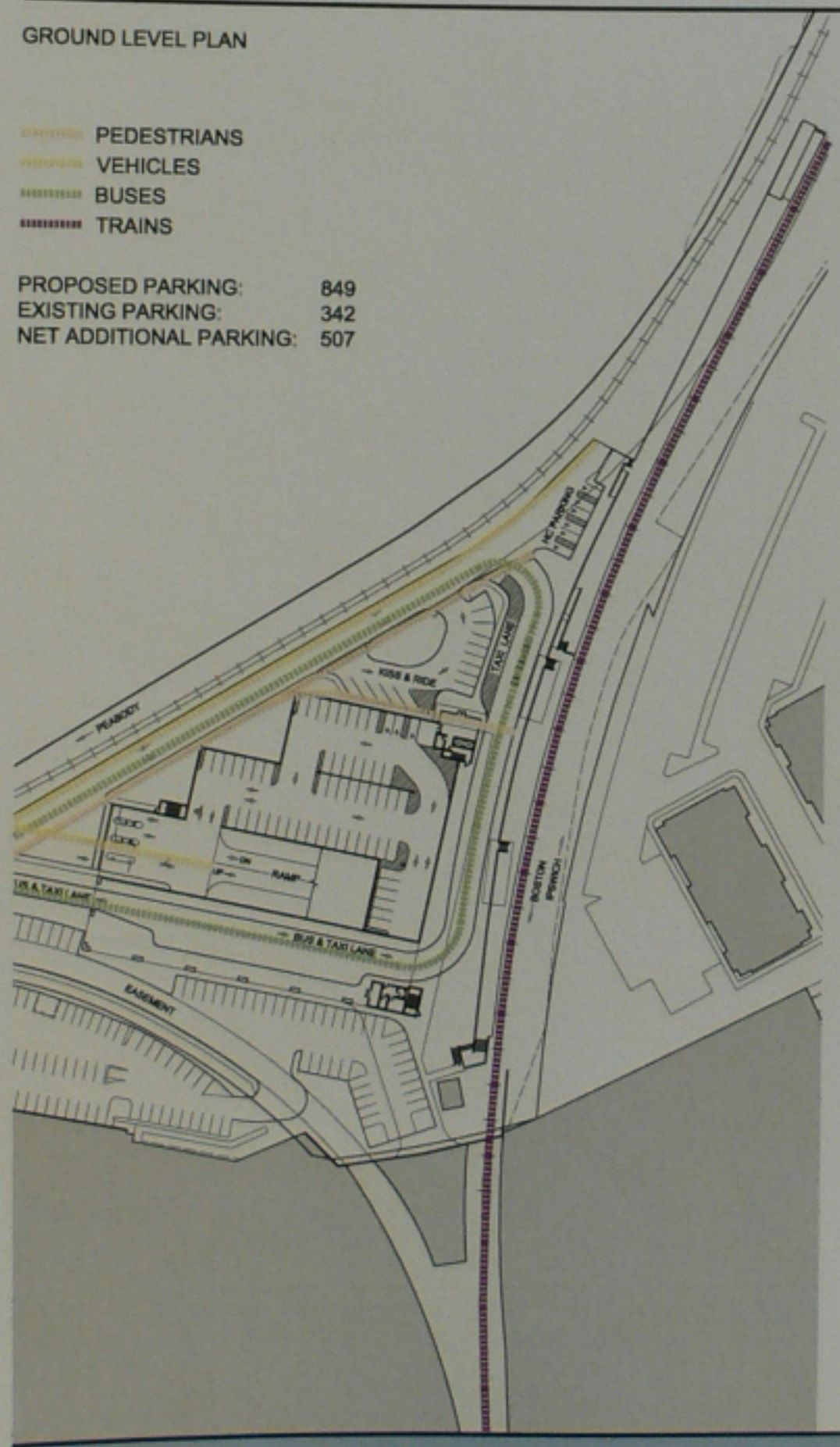




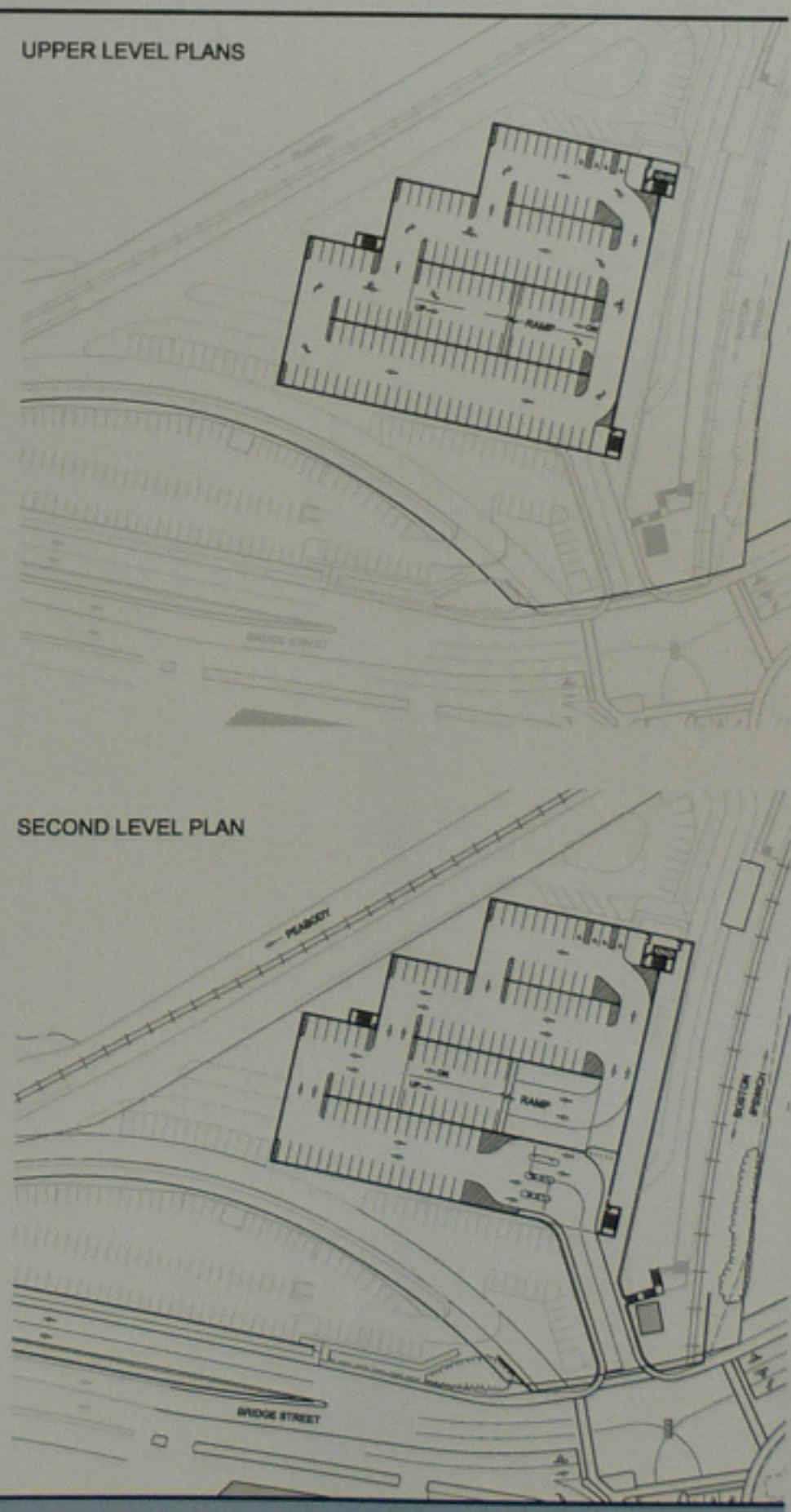
GROUND LEVEL PLAN

PEDESTRIANS
VEHICLES
BUSES
TRAINS

PROPOSED PARKING:	849
EXISTING PARKING:	342
NET ADDITIONAL PARKING:	507



UPPER LEVEL PLANS

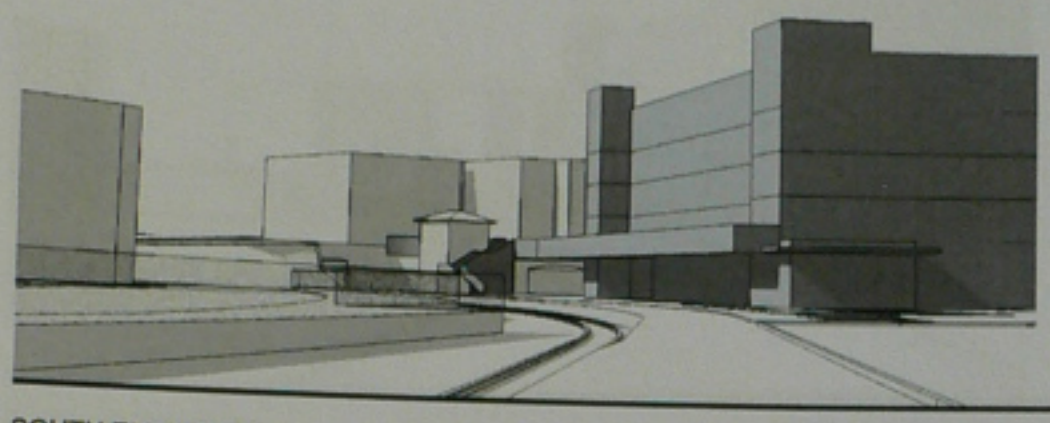


SECOND LEVEL PLAN

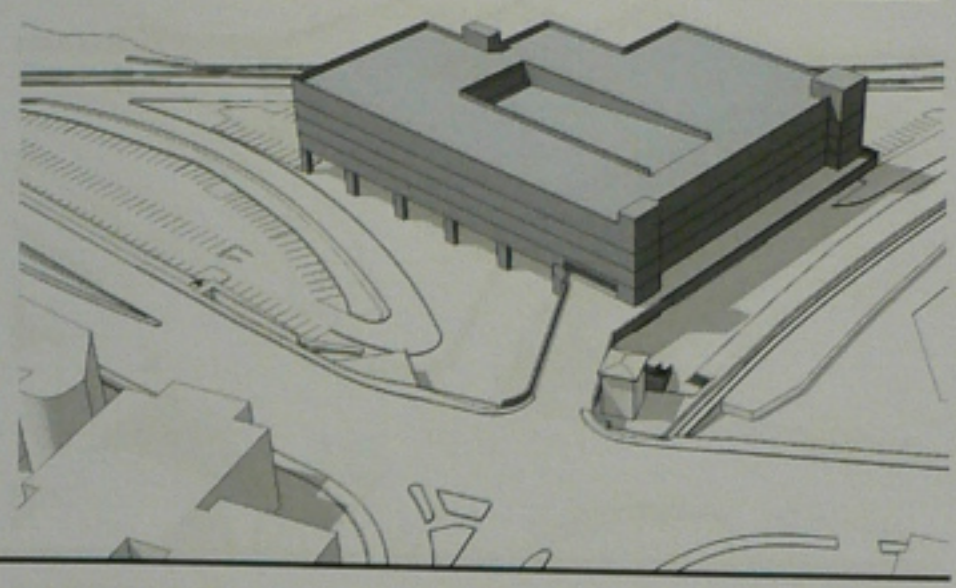
MBTA Commuter Rail Station
Salem, Massachusetts

Option 2
August 5, 2009 - DRAFT

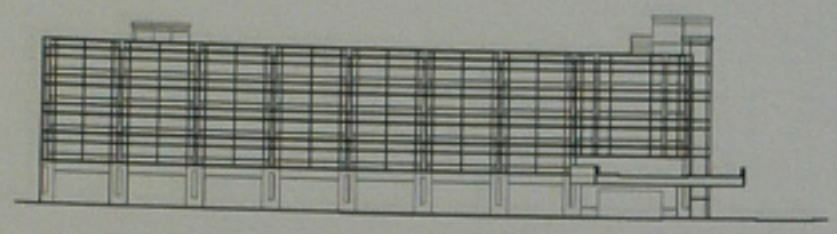
AECOM

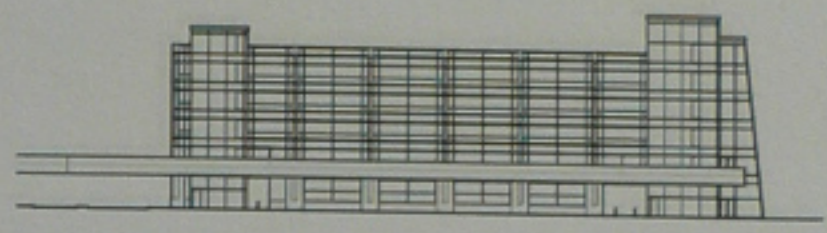


SOUTH ELEVATION



EAST ELEVATION

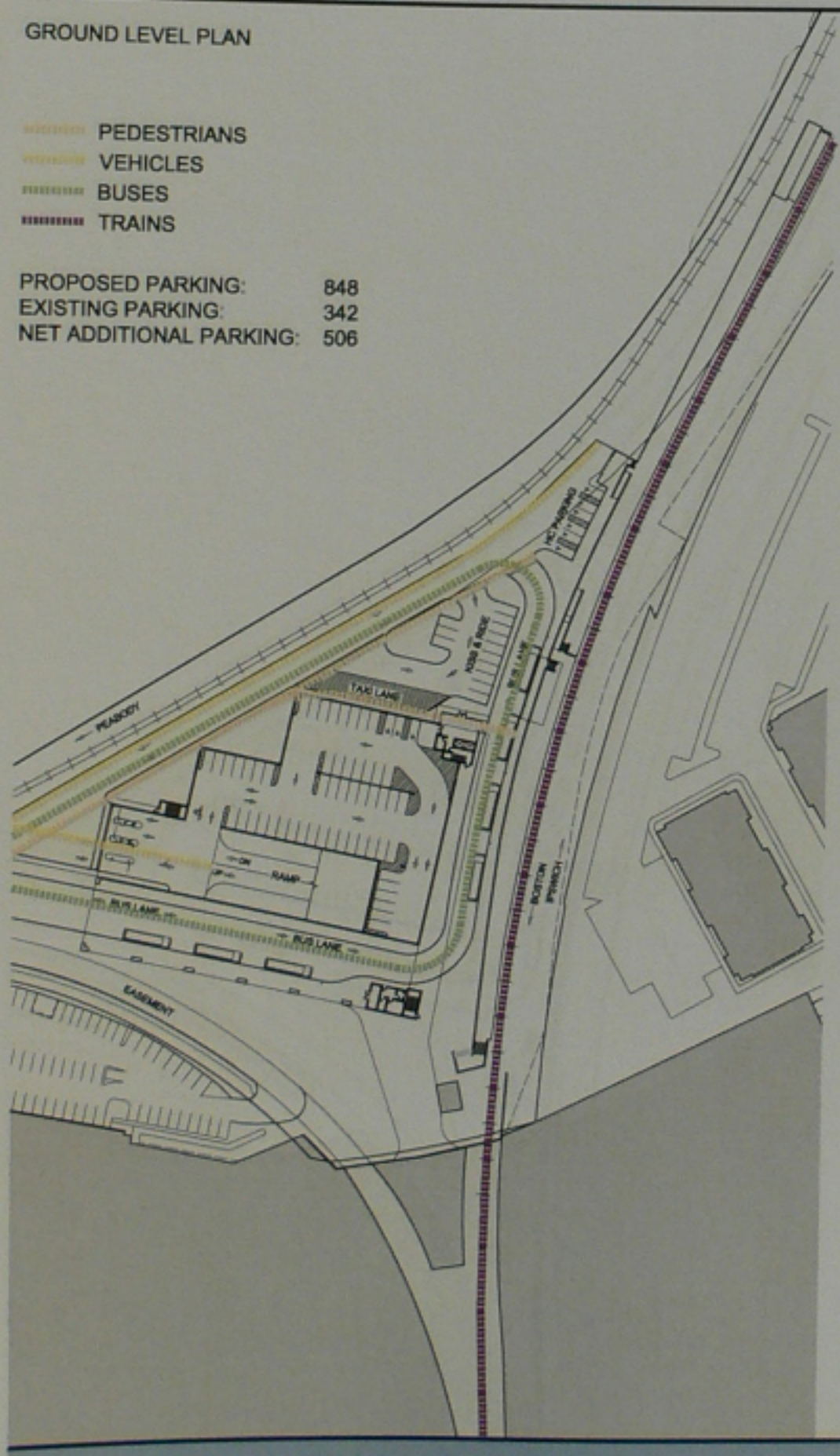




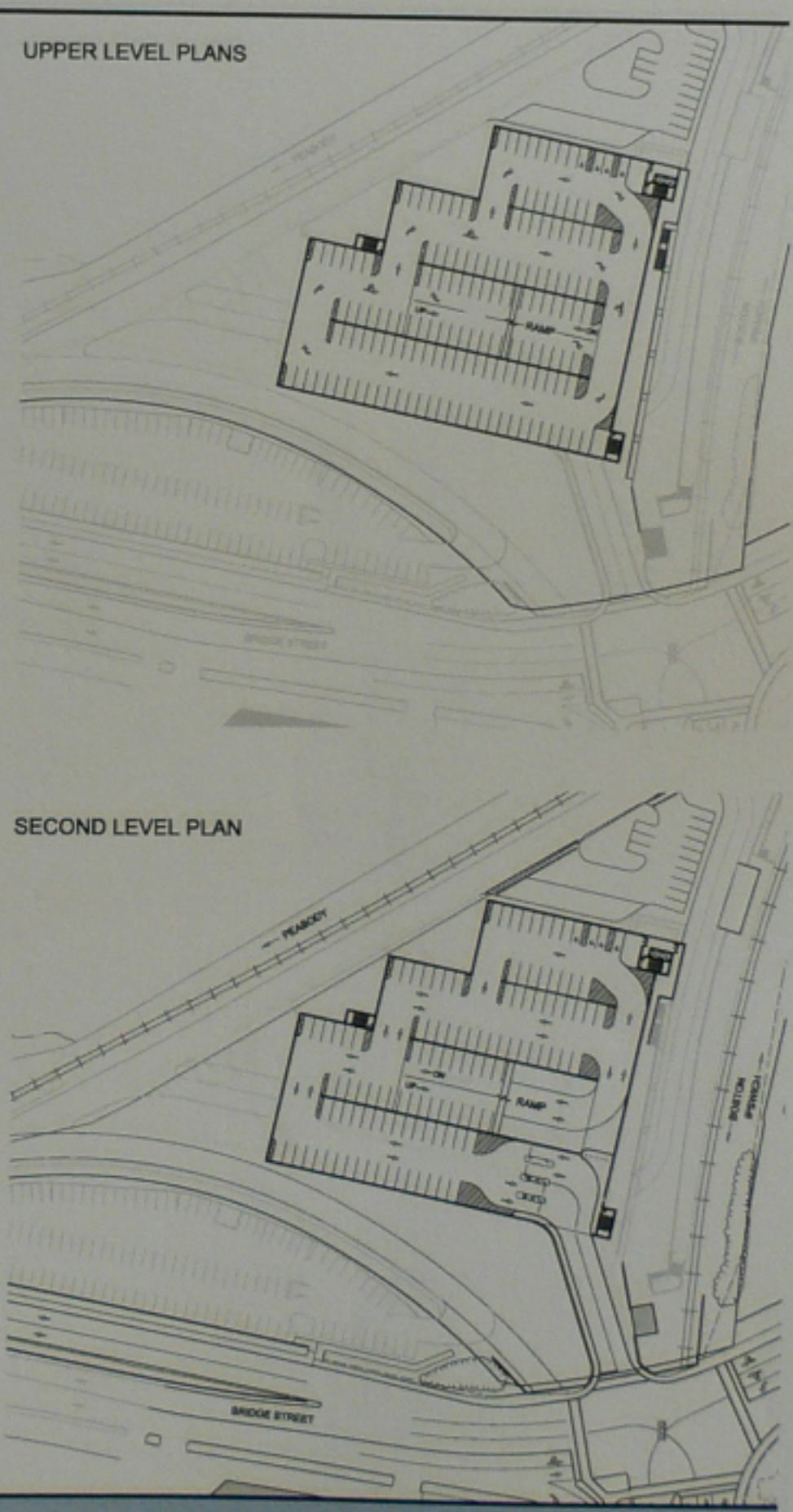
GROUND LEVEL PLAN

PEDESTRIANS
VEHICLES
BUSES
TRAINS

PROPOSED PARKING: 848
EXISTING PARKING: 342
NET ADDITIONAL PARKING: 506



UPPER LEVEL PLANS



SECOND LEVEL PLAN

MBTA Commuter Rail Station
Salem, Massachusetts

Option 2A
August 7, 2009 - DRAFT

AECOM

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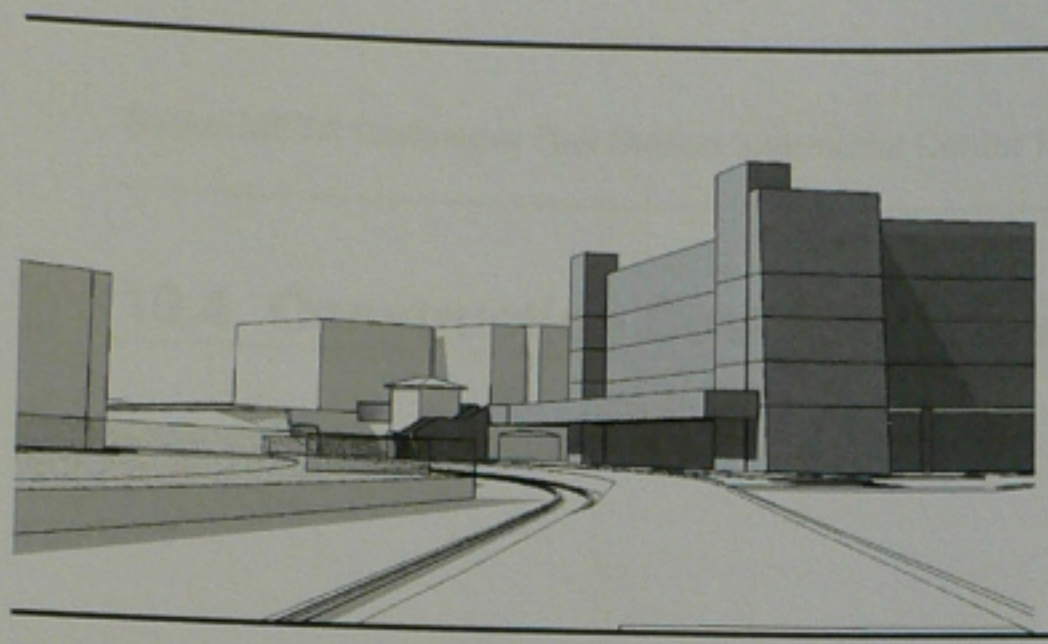
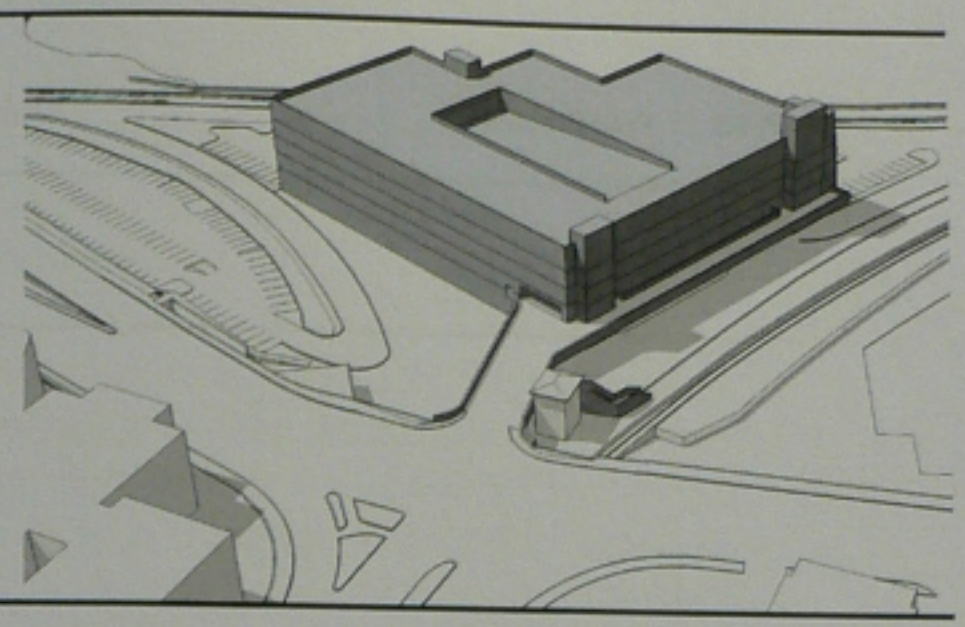


SOUTH ELEVATION



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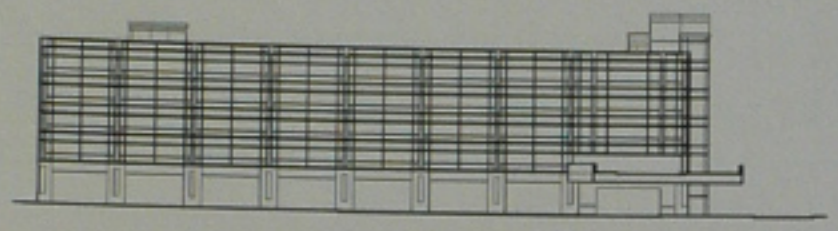
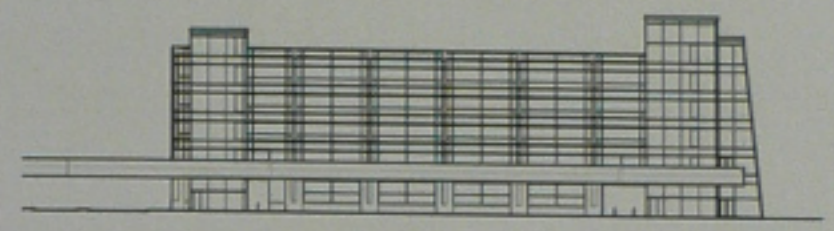
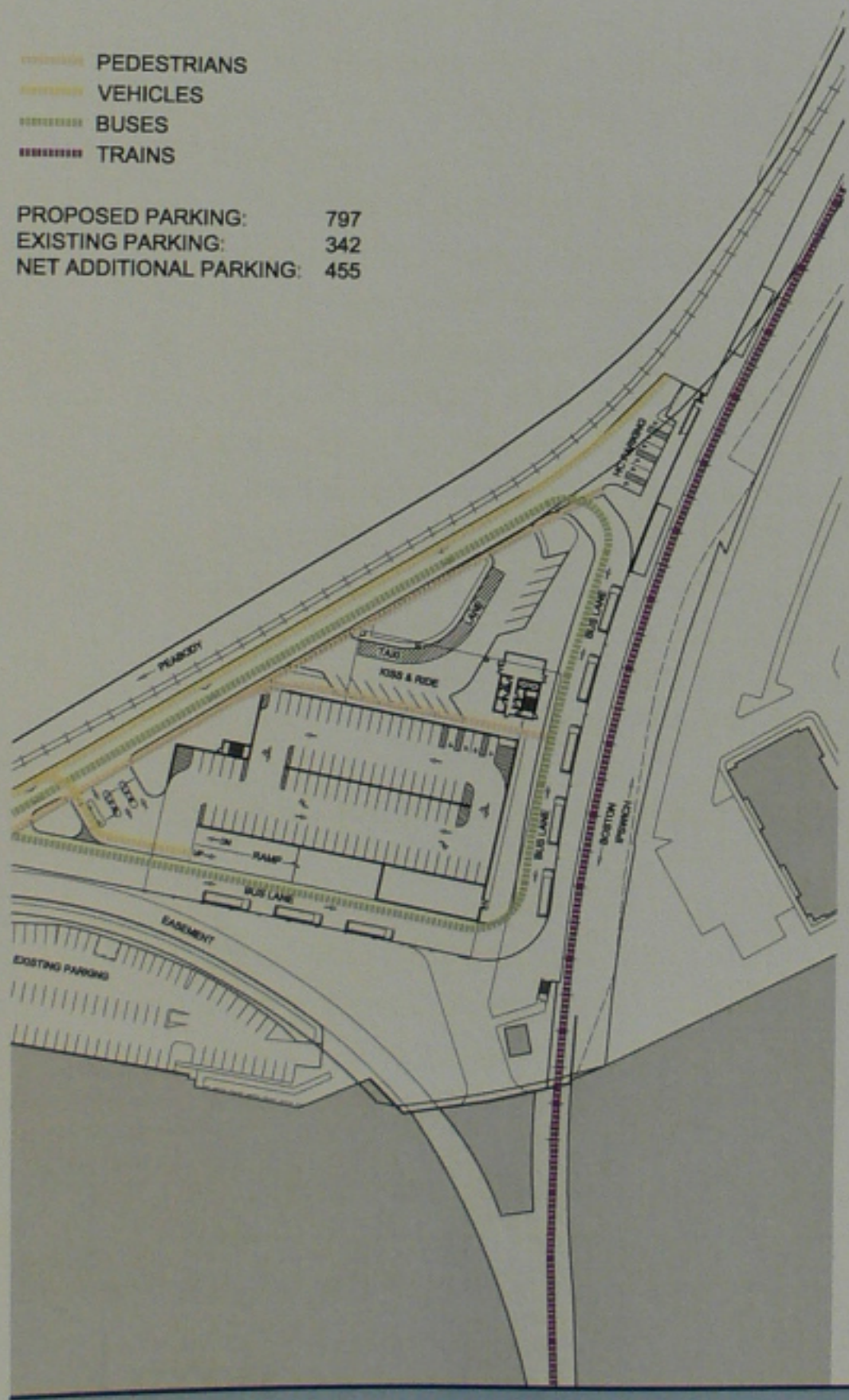




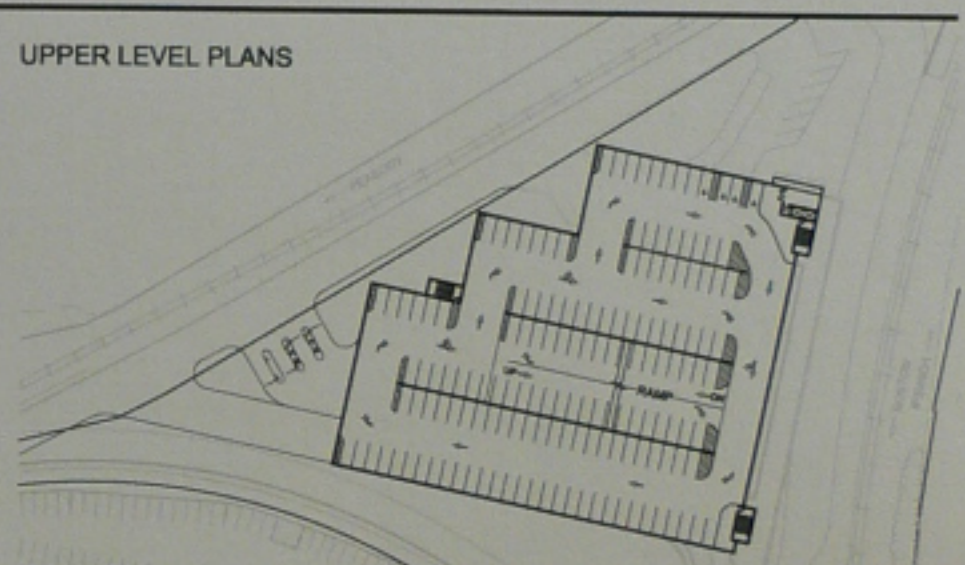
GROUND LEVEL PLAN

PEDESTRIANS
VEHICLES
BUSES
TRAINS

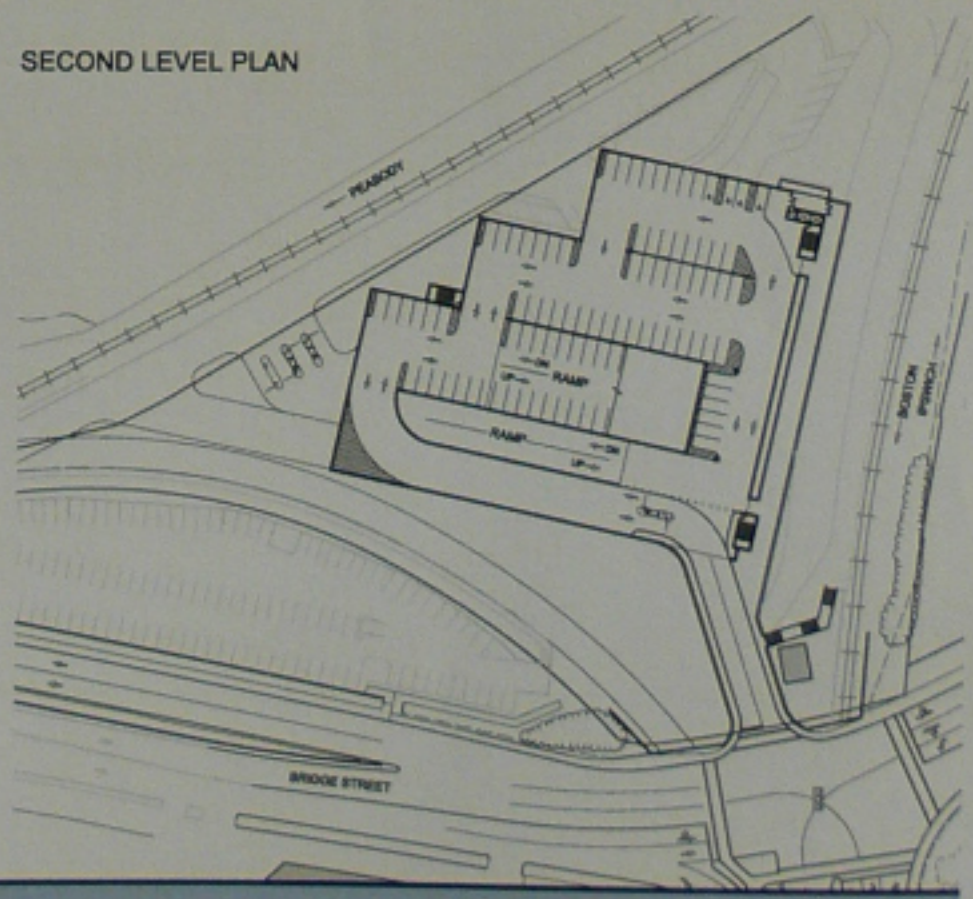
PROPOSED PARKING:	797
EXISTING PARKING:	342
NET ADDITIONAL PARKING:	455



UPPER LEVEL PLANS



SECOND LEVEL PLAN



MBTA Commuter Rail Station
Salem, Massachusetts

Option 3
August 5, 2009 - DRAFT

AECOM

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MEMORANDUM

REVIEW DRAFT

Date 16 August 2009

Project Salem Garage

To Mayor Kimberly Driscoll
Lynn Duncan

From Larry Spang

Subject Salem Garage – Review of MBTA Studies

Kim and Lynn,

I have reviewed the drawings provided by the MBTA for the proposed and have the following observations and suggestions. Overall, the studies present a good exploration of the design issues under consideration and are a good start to the project.

Please feel free to call if you have questions or would like to discuss further; otherwise I look forward to meeting with the Working Group on Tuesday.

Planning:

As illustrated in AECOM alternate entry studies, it is difficult to fit the garage and its associated access drives into the awkwardly shaped site. Assuming the City's long term goal is to encourage additional development of the City owned lot along Bridge Street, the siting illustrated in Options 1-3 appears to support that goal. A couple of observations:

1. Although difficult to judge from these drawings, it appears that the garage is set back approximately 140 to 150 feet from the retaining wall along Bridge Street. This space should be sufficient to allow future development of the City owned lot.

2. The setback requires a long (approx. 120') bridge to the 2nd floor entry. The appearance and security of the underside of the bridge should be given some consideration, particularly as it impacts patron's perceptions of security when waiting on the adjacent platform.

3. The MBTA's approach to the platform location and height should be resolved to help inform the planning decisions, particularly as it affects the location of the stairs down from Bridge Street.

4. Pedestrian access needs to be given more consideration and higher priortiy. I'm not sure how residents of the Federal Street and North Salem neighborhoods are expected to walk to the station other than crossing multiple parking lots and access drives.

REVIEW DRAFT

The design of the garage is least developed, which is appropriate for this phase of the project. It's going to be a large building with a lot of precast, so we will want to pay particular attention to how the building is massed and detailed.

It appears the general strategy will be to articulate the base of the garage with brick and the stair towers with glass. We may want to call their attention to the Derby Street garage as a successful example. A couple of comments:

1. We should request that the MBTA and AECOM provide examples of well designed garages that could be precedents for the Salem Garage, particularly if the garages have been constructed by the MBTA.

2. Views of the garage from Washington Street and North Street should be studied in addition to the view from the Bridge St. bypass which has been started.

3. Consideration should be given to how the existing historic signal tower will be integrated into the design. As noted in AECOM's permitting analysis, the structure is on the National Register so will likely require some consideration.

4. The articulated openings shown in Option 2 are likely to be the most respectful to Salem's historical context, but are also likely to be potentially too expensive for large portions of the façade. Mixing the articulated areas with the precast is likely to be more realistic for the project budget.

5. The rear of the garage facing the river may have a setback to meet the Ch. 91 height restriction. We may want to encourage this as a way to soften the view of the building from the North Street neighborhood.

6. The MBTA should explore opportunities for canopies, signage and lighting to help soften the bulk of the building. These should be considered early in the design process so they are integrated into the overall building design.

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