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Fort Point Channel: Maglev Transit Hub and South Station Expansion Master Plan

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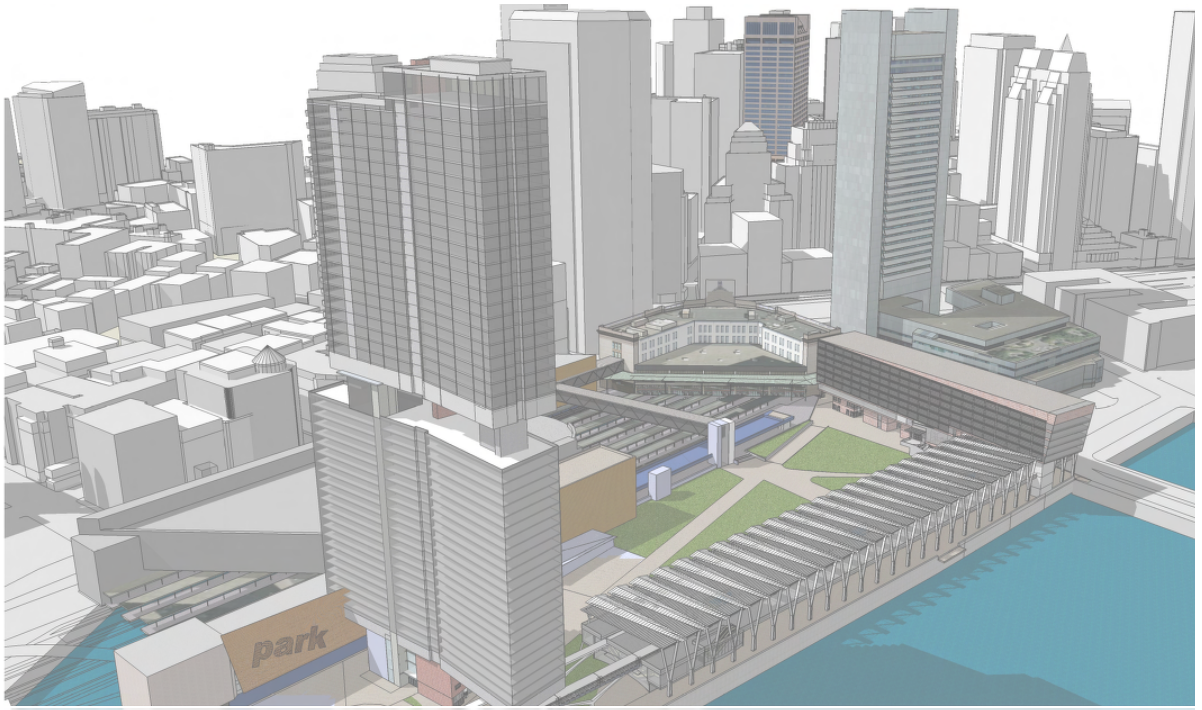

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fort point channel

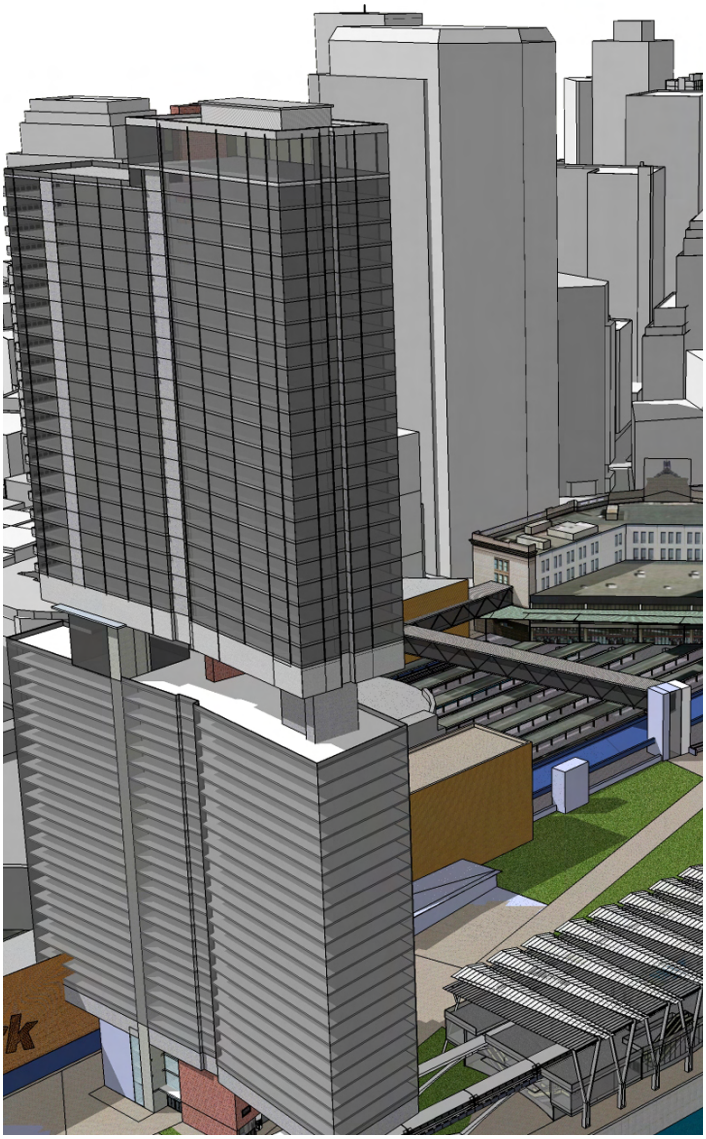
maglev transit hub and south station expansion master plan

This project entails the design of a Magnetic Levitation (or 'maglev') transportation hub that interacts with the urban environment of Boston, becoming a modern terminal for this new form of travel as well as a threshold into the heart of the city. Included is the focus on the junction of many scales of transportation (i.e., maglev, train, metro, bus, pedestrian…) currently present at South Station, while stimulating a community with many levels of commercial development and social interventions.

A key focus to the project will be promoting the space in a way that will encourage riders and promote the economical and ecological benefits to this mode of travel. Magnetic levitation transportation is very new and currently exists only in a few cities worldwide; however, because of the minimal pollution, extreme speeds of the trains, cost efficiency, and ecological benefits, there has been strong interest in them in the U.S. Using these trains would easily create a way to link cities rapidly, while being ecological and economical.

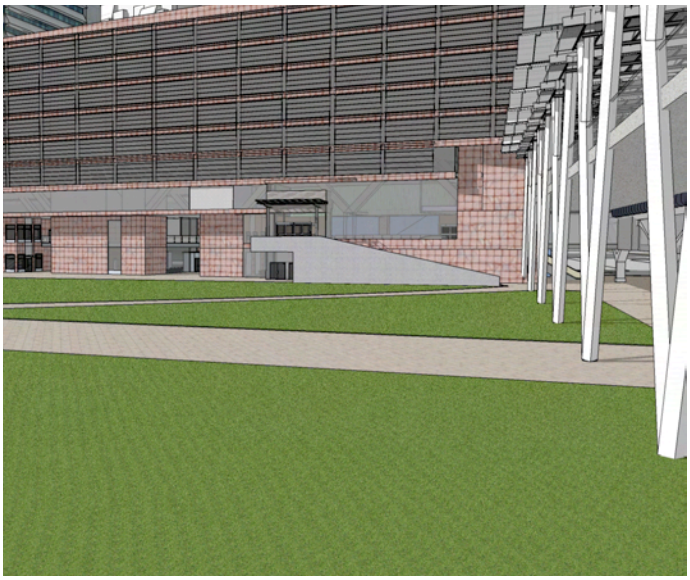
An increase in riders drawn to this district in Boston will require a new level of accommodation through added commercial and social spaces on many scales in the waterfront site. Among these, the master plan include the re-allocation and addition of office space in the form of mid and hi-rise buildings, a hotel, restaurants/cafes, retail, an active waterfront that engages a new Harbor Walk Master Plan and a new green urban plaza.

directory



"it will be very, very important to ensure that stations do not turn into airports – which many people describe these days as being supermarkets with planes parked in the parking lot!"

Nicholas Grimshaw



introduction

project title + problem statement

FORT POINT CHANNEL STATION

magnetic levitation transportation hub and south station expansion master plan

This project entails the design of a Magnetic Levitation (or 'maglev') transportation hub, which will interact with an urban community, acting as a modern terminal for this new form of transportation as well as a threshold from into the heart of the city. Included would be a focus on the junction of many scales of transportation (i.e., maglev, train, metro, bus, pedestrian…), while stimulating a community with many levels of commercial development and social interventions.

Representing the spirit of the city, a large-scale transportation hub holds the responsibility of expressing a regional image and essence of the district. This project will act as the city's entry, as passengers from Washington, Philadelphia, and New York migrate through it.

Train travel is a cultural phenomenon that literally spanned the nation in a vigorous furry. The art of

movement is one that has always been designed and expressed in an explicit way. The ability to move at inhuman speeds is an experience that is worthy of praise and recognition. The industrial revolution sparked and ignition, which enhanced this notion at an unforeseen rate, and inspired a building type. The transit hub was a beacon of elegance and an experience for the privileged. The large spans of cathedrals were triumphed by the expansive structural volumes created in railway stations.

Built out of necessity, these grand scaled spaces devolved an essence and quality, which is very difficult to see today. In the United States, rail lines have fallen beneath the highways and air traffic linking the cities. The beauty and ease of train travel is a generation gone. Transit terminals are spaces now built solely for necessity and not for beauty.

Nicholas Grimshaw said, "it will be very, very important to ensure that stations do not turn into airports – which many people describe these days as being supermarkets with planes parked in the parking lot!" [2]

What is travel? It is motion, movement, circulation, and connection. A station needs embody these very principles. A key focus to the project will be promoting the space in a way that will encourage riders and promote the economical and ecological benefits to this mode of travel. Magnetic levitation transportation is very new and currently exists only in a few cities worldwide; however, because of the minimal pollution, extreme speeds of the trains, cost efficiency, and ecological benefits, there has been strong interest in them in the U.S. Using these trains would easily create a way to link cities rapidly, while being ecological and economical.

With a properly functioning, low fossil fuel consuming, high-speed transportation, an increase in train trips along the east coast corridor will be seen. A new station type focused on circulation will be needed and designed to accommodate the movement of this influx of people. The dynamic elements of circulation will be a strong theme, not only through the various modes of transportation but for the journey of the individual. The disorientation of quick changes in scale can be overwhelming to travelers and visitors; therefore, it is the role of the terminal complex is to break this transition into a manageable experience.

Bringing people to this location could easily stimulate the development of an underused district within the city. A rise in the number of people in an area will require a new level of adaptation for them through commercial and social spaces on many scales. This project will investigate the options of mid-rise office spaces in conjunction with other cultural institutions and commercial opportunities.

project statement

This project will be a design investigation focused on the program, circulation, services, and overall development needed to activate a new form of transportation. This terminal will have to address the issues involved with bringing people from a significant distance to a new location at rapid speeds, and incorporating the needs of an age where not only data can be transported instantly, but people can as well. In studying the train station or transportation terminal as an architectural type, there will need to be a deep investigation of social requirements and circulation functions while creating a hub for different modes of transportation.

The development of this network of maglev trains has already been significantly investigated, and currently there are several projects commencing throughout the nation. The largest proposed network includes the east coast corridor, linking Atlanta to Boston. Boston, being a city where history meets the future through many forms of media, is a great city to evoke a hub for high-speed travel.[3]

Currently acting as the 'end of the line' for Amtrak service along the east coast, Boston is in a pivotal location in the nation, serving as the capital of New England. Locating this new transportation hub here will promote travel to the small cities in Massachusetts, Rhode Island, and Connecticut, as well as providing an even faster link to New York City.

problem themes
architectural intentions

circulation

From pedestrian to train, this project will study the interaction of movement and how people will be able to change modes of transportation seamlessly within one larger scheme. Travel involves the constant changing of scale, which can be confusing and tiresome on a traveler; a well-designed terminal should address this and help with orientation and wayfinding to ease these stresses. A clear, concise circulation makes a journey more effortless and therefore more successful and rewarding.

environmental

Noise Emission:
Compared with other transport systems, maglev is extremely quiet. At speeds up to 155 mph, the maglev travels almost soundlessly through cities and metropolitan areas. Owing to its non-contact levitation and propulsion technology, noise emissions of the super-speed system at speeds above 155mph are mainly caused by aerodynamic noise.

CO2 Emission:
Lower energy consumption for maglev also means lower CO2 emission. The CO2 emission depends on the primary energy consumption -- the method and raw materials used to generate the energy - and how it is distributed.

Land Consumption:
Maglev requires the lowest amount of space and land for the guideway infrastructure and related facilities in comparison with other surface transportation systems. The

problem themes
architectural intentions

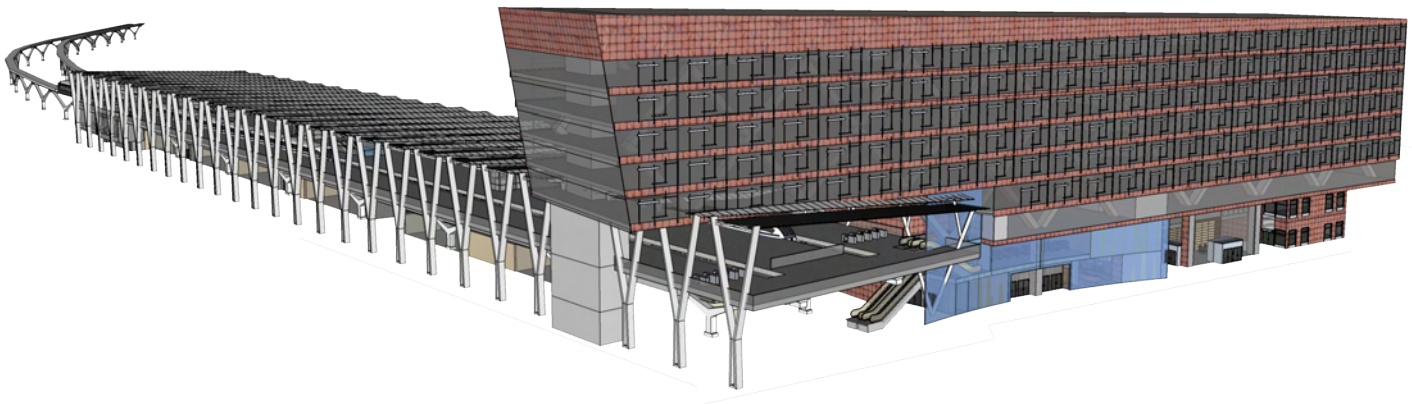
space required for standard, elevated, double track guideway for the maglev is approximately 6.9 square feet per foot length. The space required for standard, at-grade, double track is approximately 39.4 square feet per foot length. An access road along the guideway is not required after construction has been completed - neither for safety reasons nor for maintenance of the guideway. The land can therefore be returned to its original condition.

urban impact

As it is a space and destination within a city, a station needs to function as a threshold from the outside world. Although representative of the regional architecture, it should be a symbol for the city, giving those who enter a taste of where they are.

commercial stimulation

Using this new hub of traffic to bring people into the city, a new mid-rise tower of commercial space will be a way for the client to finance the project and initiate a commercial zone in a weak neighborhood of an urban environment. This has been seen in many projects throughout history; for instance, the original World Trade Center used the massive office towers to generate the rent to revive the trade industry in New York through the Port Authority. Before that, the builders of Grand Central sold off the newly desirable real estate along Park Avenue for a high price to fund the large project.



SITE

BOSTON, MASSACHUSETTS: the facts

- Capital of Massachusetts and the largest city in the state (as well as all of New England)
- Considered the economic and cultural center of the entire region
- Estimated population in 2008 of 616,535, making it the 23rd largest in the nation
    - Greater Boston, a substantially larger metropolitan area, is home to 4.4 million people and the 10th largest metropolitan area in the country.
- Boston is the fourth most densely populated city in the country not a part of a larger city's metropolitan area
- United States Census Bureau claims that the city has a total area of 89.6 square miles
    - 48.4 square miles of it is land
    - 41.2 square miles (46.0%) of it is water
- Boston's official elevation, as measured at Logan International Airport, is 19 feet (5.8 m) above sea level.
- The city was the home of several firsts, including the first subway system in the United States

THE CITY
neighborhoods/demographics

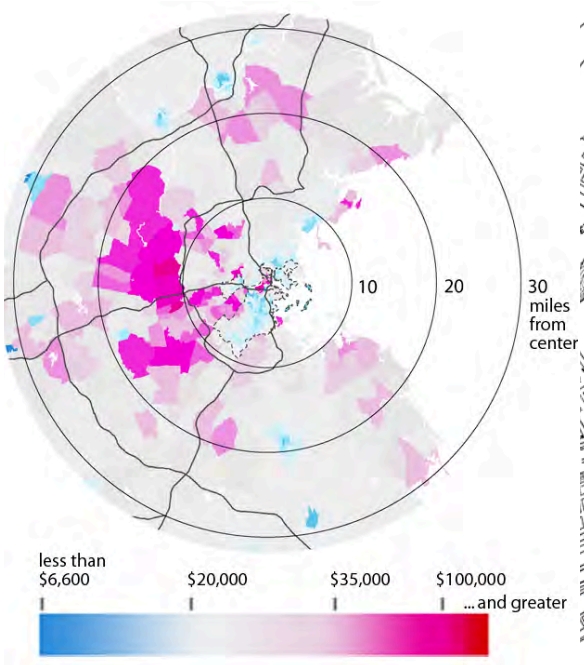
Boston developed into many clear districts divided by geography, growth, and uses. The downtown area and immediate surroundings consist mostly of low-rise brick or stone buildings, with older buildings in the Federal style. Several of these buildings mix in with modern high-rises, notably in the Financial District, Government Center, the South Boston waterfront, and Back Bay, which includes many prominent landmarks such as the Boston Public Library, Christian Science Center, Copley Square, Newbury Street, and New England's two tallest buildings: the John Hancock Tower and the Prudential Center.

Along with downtown, the geography of South Boston was particularly impacted by the Central Artery/Tunnel (CA/T) Project (also known as the "Big Dig"). The unstable reclaimed land in South Boston posed special problems for the project's tunnels. In the downtown area, the CA/T Project allowed for the removal of the unsightly elevated Central Artery and the incorporation of new green spaces and open areas. This project finally came to completion in 2008, after a 12-year process. One of the most expensive projects in US history, the project was estimated at $2.8 billion in 1985; however, over $14.6 billion had been spent in federal and state tax dollars as of 2006.

Boston Common, located near the Financial District and Beacon Hill, is the oldest public park in the U.S. Along with the adjacent Boston Public Garden, it is part of the Emerald Necklace, a string of parks designed by Frederick Law Olmsted to encircle the city. Franklin Park, which is also part of the Emerald Necklace, is the city's largest park and houses a zoo. Another major park is the Esplanade located along the banks of the Charles River. Others are scattered throughout the

left:
Family income map for great Boston area according to the 2000 census.

right:
Map of the Boston peninsula in the late 1800's



city, with the primary parks and beaches located near Castle Island, in Charlestown and along the Dorchester, South Boston, and East Boston shorelines.

According to the census of 2000, there were 589,141 people, 239,528 households, and 115,212 families residing in the city.

Boston can grow during the daytime to about 1.2 million, because of suburban residents traveling to the city for work, education, medical purposes, and special events.

There were 239,528 households, out of which:

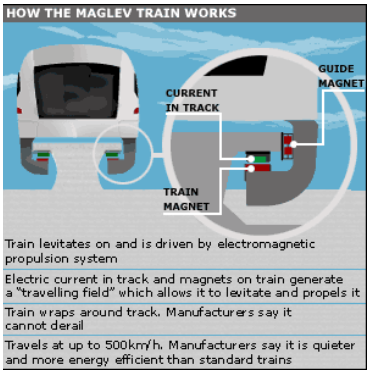
- 22.7% had children under the age of 18 living in them
- 27.4% were married couples living together
- 16.4% had a female householder with no husband present
- 51.9% were non-families

37.1% of all households were made up of individuals and 9.1% had someone living alone who was 65 years of age or older. The average household size was 2.31 and the average family size was 3.17.

- 19.8% under the age of 18
- 16.2% from 18 to 24
- 35.8% from 25 to 44
- 17.8% from 45 to 64
- 10.4% who were 65 years of age or older

The median age was 31 years. For every 100 females, there were 92.8 males. For every 100 females age 18 and over, there were 90.2 males.

The median income for a household in the city was $39,629, and the median income for a family was $44,151. Males had a median income of $37,435 versus $32,421 for females. The per capita income for the city was $23,353. 19.5% of the population and 15.3% of families are below the poverty line. Out of the total population, 25.6% of those under the age of 18 and 18.2% of those 65 and older were living below the poverty line.



transportation

roadways.
Expressways and major arterial roads in and around Boston are laid out with two circumferential expressways: Interstate 495 and Route 128. The circumferential routes are bisected by several radial highways that were planned to start in downtown Boston and proceed outward from the city. In reality, the Central Artery was the only one of these radial expressways that was fully completed. By the early 1990s traffic on the elevated artery was 190,000 vehicles per day, with an accident rate four times the national average for urban interstates. Traffic was bumper-to-bumper for six to eight hours per day, with projections of traffic jams doubling by 2010.

walking and bicycling.
Boston is a compact city, sized right for walking or bicycling and the city has the highest percentage of on-foot commuters of any city in the United States. In 2000, 13.36% of Boston commuters walked to work according to the US Census. Most of the area's cities and towns have standing committees devoted to improvements to the bicycle and pedestrian environment.

Cycling is popular in Boston, for both recreation and commuting. Bicycle paths are marked on some roadways, and several separated paths are available to cyclists. The Minuteman Bikeway and Charles River bike paths are popular with recreational cyclists and tourists. The Southwest Corridor also provides a cycling infrastructure. Many MBTA riders use a bicycle to get to the station.

buses.
The MBTA bus system operates 162 bus routes within the Greater Boston area with a combined ridership of approximately 375,000 one-way trips per day. The basic bus fare is $1.25; monthly commuter passes are available, as are transfers between some bus lines and the subway.

In an effort to provide service intermediate in speed and capacity between subways and buses, the MBTA has begun projects using the Bus Rapid Transit, or BRT, system. The MBTA has one BRT line, the Silver Line, although this operates in two discontinuous sections. The Silver Line operates partially in a dedicated trolleybus tunnel, partially in on-street bus lanes, and partially in general street traffic. Service through the trolleybus tunnel is by hybrid trolleybuses, which operate on diesel power for the rest of the route.

In addition to local bus service and BRT, South Station is a major bus depot for inter-city travel. Many bus lines such as Greyhound and Peter Pan operate from the station. BoltBus and Megabus both provide low-cost service between Boston and their New York hubs.

parking.
The city that sprung up accommodates cars awkwardly; parking comes at a premium throughout the city. Off-street parking spaces have sold for more than $160,000 in Beacon Hill. Understandably, on-street parking is the norm in many sections, and the city created a resident permit-parking program to reserve street space for permanent residents. The cost to obtain a permit is extremely low, however, and the program is overused; permitted spaces remain scarce. Meters city-wide are priced at $1 per hour, and thus metered spaces are often difficult to find.

The number of public parking spaces downtown has been capped since the mid-1970s. Parking spaces in East and South Boston, and the hours that they may be used, also is restricted by state regulation. This is part of the state Department of Environmental Protection's plan, approved by the United States Environmental Protection Agency, to address the non-compliance of the region with the National Ambient Air Quality Standards for ozone.

The MBTA operates several large park and ride facilities on its subway and commuter rail lines, close to major highways, providing access to downtown. While most of these tend to fill up with commuters on weekday mornings, they provide a good place for visitors to leave their cars and see the city without parking hassles on evenings and weekends.

subway.

Boston has the oldest subway system in North America, with the first underground streetcar traffic dating back to 1897. Today the whole subway network is owned and operated by the MBTA. In the early 1960s, Cambridge Seven came up with a circled T to represent such concepts as "transit", "transportation" and "tunnel." Today, Bostonians call their rapid transit network "the T," and its subway is the fourth busiest in the country with daily ridership of 549,000 trips.

The basic one-way fare is $1.70 (or $2.00 if paid in cash). There are four lines in the metropolitan Boston area: the Red Line, Green Line, Orange Line, and Blue Line. The Green Line is actually four different lines; it starts as one and about halfway through the system it splits into four different branches, the B (Boston College), C (Cleveland Circle), D (Riverside) and E (Heath Street) trains. The Red Line splits as well, with southbound trains going either to Braintree or Ashmont.

commuter rail.

In the Boston area, trackage is owned by a mixture of the MBTA and several freight railroads. Commuter rail services are operated by the Massachusetts Bay Commuter Railroad Company (MBCR) under contract to the MBTA, intercity passenger services are operated by Amtrak, and freight services are operated by the various freight railroads. Trackage rights allow trains of one operator to make use of tracks owned by another. The MBTA Commuter Rail system, sometimes known as the Purple Line, brings people from as far away as Worcester and Providence, RI into Boston. There are approximately 125,000 one-way trips on the commuter rail each day. There are two major rail terminals in Boston: North Station and South Station. Commuter rail lines from the North Shore and northwestern suburbs begin and terminate at North Station; lines from the South Shore and the west start and end at South Station.

There is no direct rail connection between North Station and South Station and interchange between the two requires the use of two different subway lines (Red/Orange or Red/Green), although passengers on commuter lines serving Back Bay Station can interchange directly from there to North Station using the Orange line. A North-South Rail Link has been proposed to allow commuter trains to serve both North and South stations, but there are no definite plans to build this.

intercity rail.

Boston is served by four intercity rail services, all operated by Amtrak. The Acela Express and Northeast Regional services both operate on the Northeast Corridor to and from New York City and

Washington. A branch of the Lake Shore Limited service operates to and from Chicago. The Downeaster service operates to and from Portland, Maine. The Northeast Corridor services terminate at South Station, as does the Lake Shore Limited. The Downeaster service terminates at North Station. The Northeast Corridor and Lake Shore Limited services also stop at Back Bay Station. The lack of a direct rail connection between North Station and South Station means that a transfer between stations is required of passengers transferring to and from the Downeaster. Within the Boston area, most Amtrak services operate over commuter rail track owned by the MBTA, which also owns the Northeast Corridor track as far as the Rhode Island state line.

port of boston.

The Port of Boston is a major seaport and the largest port in Massachusetts. It was historically important for the growth of the city and was originally located in what is now the downtown area of the city. Land reclamation and conversion to other uses means that the downtown area no longer handles commercial traffic, although the US Coast Guard maintains a major base there, and it sees considerable ferry and leisure usage.

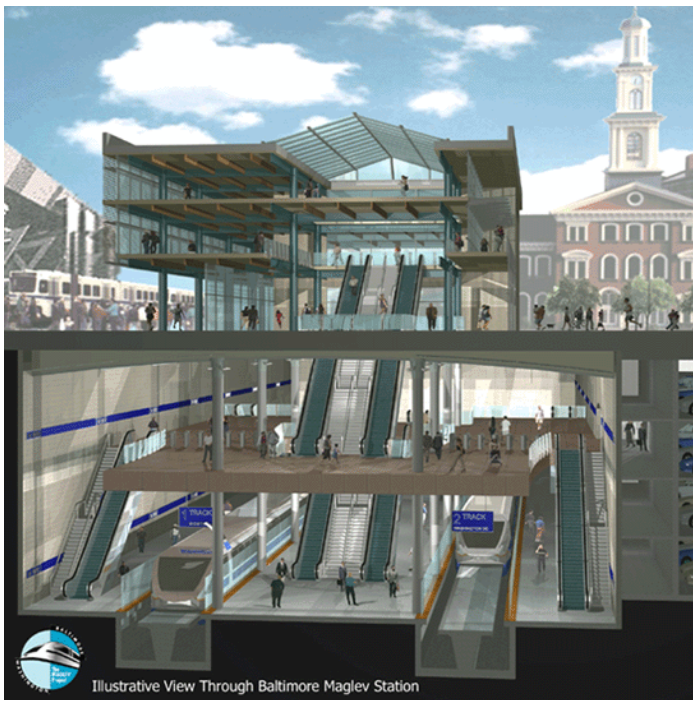
Today the principal cargo handling facilities are located in the Boston neighborhoods of Charlestown, East Boston, and South Boston, and in the neighboring city of Everett. In 2006, the port handled over 14 million metric tons of cargo, including 201,000 container TEUs. Other major forms of cargo processed at the port include petroleum, liquefied natural gas (LNG), automobiles, cement, gypsum, and salt.

The Black Falcon Cruise Terminal is situated in South Boston. During 2006 it served about 208,000 cruise ship passengers from the 81-cruise ship visits that year.

passenger boat services.

The MBTA boat system comprises several ferry routes on Boston Harbor. One of these is an inner harbor service, connecting the downtown waterfront with Boston Navy Yard in Charlestown. The other routes are commuter routes, linking downtown to Hingham, Hull and Quincy. Some commuter services operate via Logan International Airport. Private sector companies under contract to the MBTA operate all services.

Outside the MBTA system, seasonal passenger ferry services operate to the Boston Harbor Islands, to the city of Salem, and to the city of Provincetown on Cape Cod. Water taxis provide on-demand service from various points on the downtown waterfront and from Logan Airport, in particular between the airport and downtown.



aviation.
Boston's principal airport is Logan International Airport, situated in East Boston just across inner Boston Harbor from downtown. It is operated by MassPort and has extensive domestic and international airline service. Logan Airport is linked to downtown by several highway tunnels. The Silver Line bus rapid transit uses these to connect Logan terminals with South Station. There are also shuttle buses between the terminals and the Blue Line Airport station.

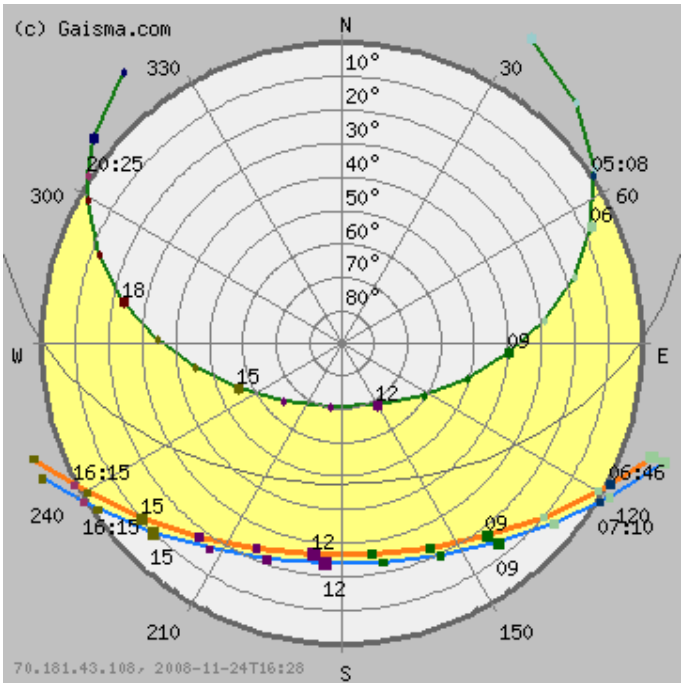
why boston?

As one of the nation's oldest cities, this cultural environment is an ideal hub of activity conducive of encouraging a new form of transportation. The northeast corridor is one of the heaviest traveled thoroughfares in the country, ending in Boston. With a thriving financial and educational background, the city calls for business travelers and intellectuals, in addition to the 16.3 million tourists annually. Subsequently, the travel needs of the 4.4 million people in the metropolitan area must be met.

Boston is a city known for its ability to grow and adapt, while mixing old and new. An exchange of goods and people has been happening in this city for centuries and will continue to increase. There is already a vibrant pedestrian and bicycle friendly attitude in Boston, and a new intercity transit system will only further encourage this. 13.36% of Boston commuters walk to work as it is, and these people will find it easy to add fast intercity travel to their lives.

Geographically, it is already the end of the line for Amtrak and will be a great hub for those traveling to New York and cities south, as well as west to Albany, as they once did.

impacting the nation.
The Transrapid plans currently call for an eastern corridor train, already under construction in Washington, DC and Baltimore. With the success of this project, the line will have plans to expand to Philadelphia, New York, and eventually as far north as Boston. With this integral network in place, intercity transportation will be seamless and faster then ever before. Planes require long waiting times and have weather limitations, and current high-speed trains are unreliable, expensive, and not the fastest means of travel. A new system will eliminate all of those concerns in a more ecological way. Boston will be a great end point for this national movement.



Areal view of the Fort Point Channel District and the Channel itself circa 1900.

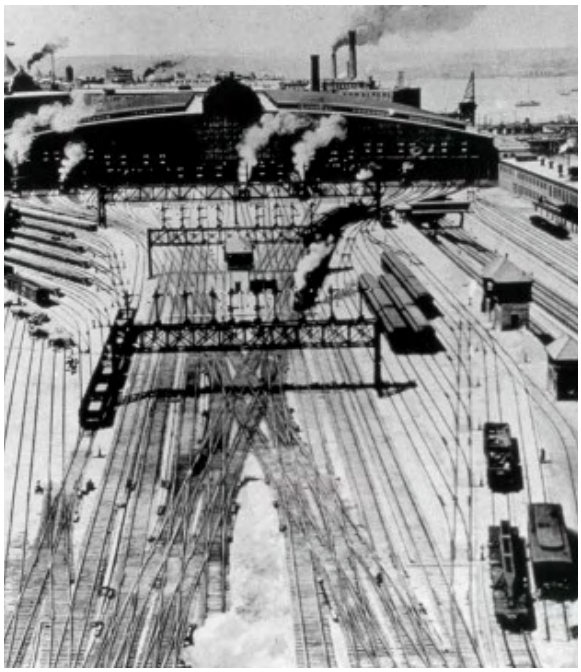
SITE HISTORY
south station

Originally a part of the Boston Harbor, this site was not land until the late 1800's. As Boston grew in population, the physical size of the city grew as well. Where there once were piers and docks, landfill made from rubble from the Boston Fire created a new shoreline. The Fort Point Channel was created to link the industrial area of the city to the harbor. South Station has been located here since 1899.

For over a century, South Station has stood as a lasting symbol, welcoming millions to Boston each year. A Transportation Solution South Station was born back in the late 1890s when it was no longer efficient for each of the five railway companies that serviced Boston to have their own depot. Passengers found it difficult at best, and a nuisance at the least, to carry their baggage between terminals spread from Back Bay to Summer Street. At the turn of the century, Boston wanted to have the newest, most efficient and architecturally grand station in the nation.

The state legislature granted a charter to a new corporation, the Boston Terminal Company, and charged it with constructing and maintaining a union passenger station in the southerly part of the City of Boston.

The Company purchased a 35-acre parcel of land for $9 million. This piece of land,



just minutes from the business district was the perfect setting, having been home to the New England Railroad terminal for years. The City of Boston spent an additional $2 million rerouting streets and utilities and building a 200-foot granite seawall along Fort Point Channel to hold back the tides. After only two years of construction, South Station, the largest railroad station in the world, was ready and the first train left the station in the early morning hours of January 1, l899.

By l913, 38 million passengers, more than New York City's Grand Central Station, were enjoying the convenience and comfort of South Station. The station continued to handle an enormous amount of traffic.
In l945, swollen by GIs returning from World War II, South Station made history, when over 135,000 visitors a day poured into its halls. That's a volume unmatched in any train station. Over the next 15 years, however, the station began to deteriorate, and when the New Haven Railroad declared bankruptcy in l961, the building had little hope.

Thankfully, the Boston Redevelopment Authority stepped in and purchased the building for $6.95 million in l965. The hope was short-lived, however, when the BRA decided to tear the station down, and in fact began demolition in l970. A half-dozen tracks were removed and various portions of the U-shaped structure were closed down and sealed off.

Over the next few years, plans were drawn for the 'New" South Station which included a people-mover in an elevated passageway connecting South Station to Dewey Square, a direct passageway to the MBTA and an indoor sports arena. In l978, the BRA sold the facility to the MBTA for $6.1 million. Six years later, the MBTA embarked on a project to restore the glory of South Station at a cost of $195 million - six times the station's original cost. The rehabilitation of South Station included the rebuilding of the headhouse, reconstruction of 11 station tracks with high-level platforms, and the construction of a new bus terminal and parking garage over the tracks.

The current station is still standing on the corner of Atlantic Avenue and Summer Street, in Dewey Square. The original building serves as a frame for the new, large passenger waiting space. Within the structure, a food court, ticket booths,

commercial space, private lounges, administration, and offices.

The station is a very permeable building, with access from the street, the platforms, and a direct underground connection to the metro system. From Dewey Square, three sets of doors lead pedestrians into an unimpressive, shallow entry space. Here, bank branches, ATMs, and other small commercial spaces provide typical transport terminal oriented services. It is within this space that the underground link joins the 'off-the-street' traffic to funnel under the large clock to the main passenger terminal. From this open, atrium-like space, the public can access the other various functions of the station.

The food court is a large portion of this space, with several fast food venues, and seating space of movable and fixed café tables. This program spills into café carts, café kiosks and newsstands. Flexibility in these spaces allows for and adaptation of the space depending on the time of day.

Materials in and around the site are very varied. It is apparent that the west side of the Fort Point Channel has not been touched or updated, and remains a neighborhood of large brick warehouses. Brick, being one of Boston's most popular building materials is very indicative of the industrial age in which these structures represent. In strong contrast, the east side of the channel has evolved more progressively over time, with the limestone South Station building from 1918, to the neighboring glass and steel office tower representing 1978. Across the street, the Federal Reserve tower is a bold expression of concrete, and the third tallest building in the city. The fusion of these materials makes it clear that Boston is not just the brick city everyone thinks it is, but most certainly an evolution of architectonic expression.


COURT HOUSE
CUSTOM HOUSE
CITY HALL
SOUTH STA.
FORT POINT CHANNEL
COMMERCE
CENTRAL
WATER
ATLANTIC
ESSEX
WASHINGTON
TREMONT
FRANKLIN
AVON
BEDFORD
SUMMER
CONGRESS
BEACH
LINCOLN
UTICA
SOUTH
HARRISON
HUDSON
ALBANY
KNEELAND
ONEIDA
OSWEGO
GENESSEE
ROCHESTER
TROY
MIDWAY
GRANITE
WORMWOOD
MELCHER
RICHARDS

site boundaries

Located on the Fort Point Channel, the proposed site for this Maglev Station Project is the current United States Post Office Annex building as well as 245 Summer Street, the Stone & Webster Building. These properties are directly adjacent to South Station Transportation Center to the west. Dorchester Avenue runs along the east side, as well as the Fort Point Channel. Summer Street creates the Northern boundary of the site and is a large street, which continues across the channel. Nearby neighborhoods include the Leather District, Chinatown, Russian Warf, the Financial District, Fort Point Channel, and the soon to come Seaport Square.

When considering the districts within the city for a potential station, it is easy to consider the existing stations. Boston's South Station has an ideal location, with close proximity to many landmarks, the financial district, government center, and cultural institutions. In addition, the bus terminal and metro link (red and silver lines) are also connected to the station complex. South Station additionally is the hub for commuter rail to the greater Boston metropolitan area.

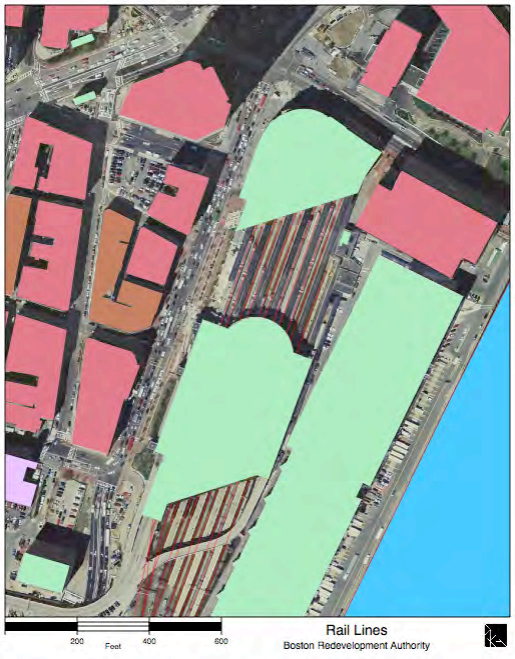
The corner of Dorchester Avenue and Summer Street is currently home to 245 Summer Street, also known as the Stone & Webster Building. The current building, built in 1974, is 14-stories and 867,000 square-feet of rentable space, which is also occupied by owner Fidelity Investments, as well as other companies and organizations such as the United Way of Massachusetts Bay and Architen Landrell.

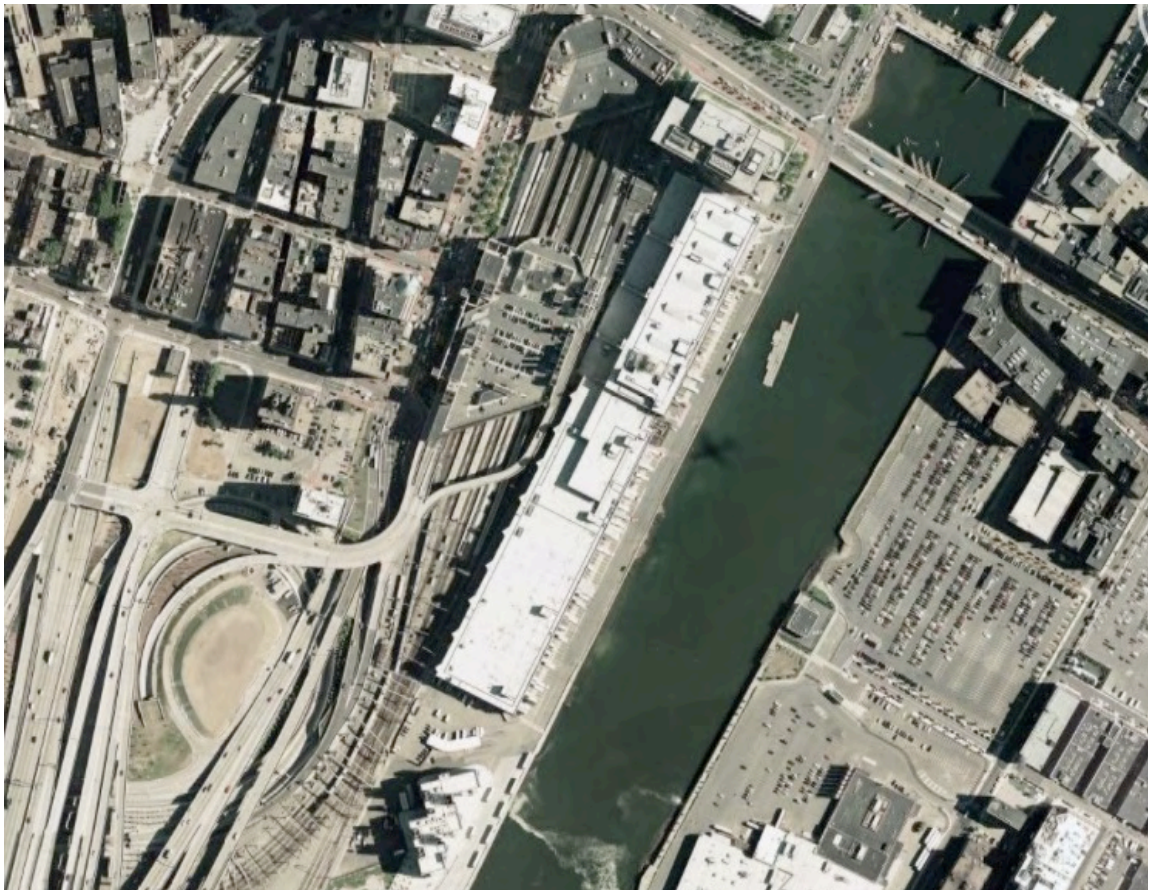
This building is directly adjacent to South Station's commuter platforms and transportation hub. Although the building's northeastern corner has views of the Fort Point Channel and the Boston Harbor beyond, the main entry and street interaction with the building is on the northwest corner, in correspondence with the station. It is here where Pressley Landscape Architects "create(ed) an oasis in the urban environment with a light airy atmosphere that melds inside with outside." This western plaza serves as a front door and public passage into the station.

Despite the age of the building, on an upper executive level, a green roof provides

left:
Family income map for great Boston area according to the 2000 census.

right:
Map of the Boston peninsula in the late 1800's





a foreground to views of Boston's harbor and skyline. This is an element of the building, which would be preferable to reinterpret in any additions or new buildings.

At the ground level, a semi-public food court occupies the building. Boston favorites such as Cosi, Qdoba, and Upper Crust provide a dinning service to workers and commuters alike. This ground floor is raised from the grade by a few feet, requiring stairs and ramps at all entrances, creating a semi-segregated zone from the public sidewalk. Besides this sidewalk, there is a covered outdoor passage along Summer Street, which provides shelter from weather for pedestrians, however the clear separation of the public sidewalk and corporate canopy is a confusing condition.

To the south of this office tower, the United States Postal Service occupies a significant portion of Dorchester Avenue, along the Fort Point Channel.

Located at 35 Dorchester Avenue, the USPS is a stark building, which acts as a main center of distribution for Boston. There are plans for this facility to be moved in the near future – leaving this large waterfront building empty.

There is a very clear distinction between public and private space in this building. The public lobby serves as a community post office, with a full store and all the services the post office offers. Additionally, post office boxes, offices, administration, and a passport facility are also accessible to the public. Behind closed doors, the larger southern portion of the building and site are for employees only and not accessible by the public for security reasons. Within the public realm however, there is a hidden indoor pedestrian linkage to the platforms of South Station. Not obvious to the passer-by, but a clearly accessible path cuts through the northern public corridor bringing pedestrians to the mid-point of south station tracks.

ZONING

BOSTON, MASSACHUSETTS: the facts

Zoning District

Zone B-10
Retail Business + Offices Interim Planning Overlay District

- Map 1C

  Leather District and South Station Economic Development Area (as of June 29, 2006)

  Area where PDAs may be permitted
  New Economy Development Area
  Air Rights Development Area – PDA Designation

	As-of-Right Maximum Height	Floor Area Ratio (FAR)
General Area	300'	12
Parcel-to-Parcel Linkage Development Area	465'	14
New Economy Development Area	300'-400'	12-14

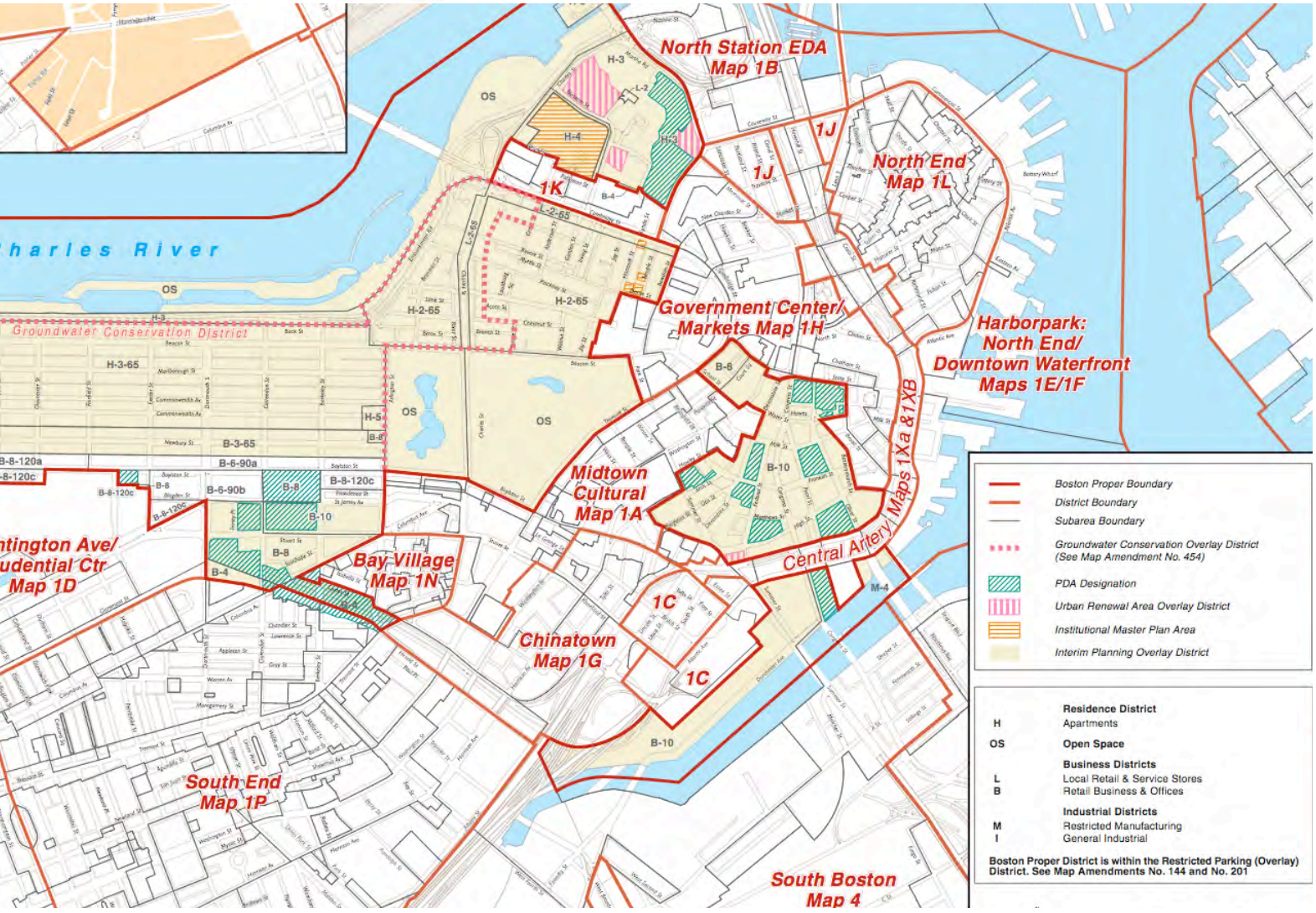
Section 40-7

South Station/Central Artery Area is also in Central Artery Special District and is governed by Article 49, except as provided in Section 49-4, as amended, for the period prior to substantial commencement of work on a given parcel in connection with the Central Artery project. See article 40.

ARTICLE 40

The New Economy Development Area of the South Station Economic Development Area:

The eastern third of the area lies within the South Station Economic Development Area of the zoning code. All development within the New Economy Development Area of the South Station Economic Development Area is subject to specific use, building height and density requirements. The underlying zoning allows for buildings up to 400 feet with FAR of 14 with design review.



SECTION 40-1.
Statement of Purpose, Goals, + Objectives.

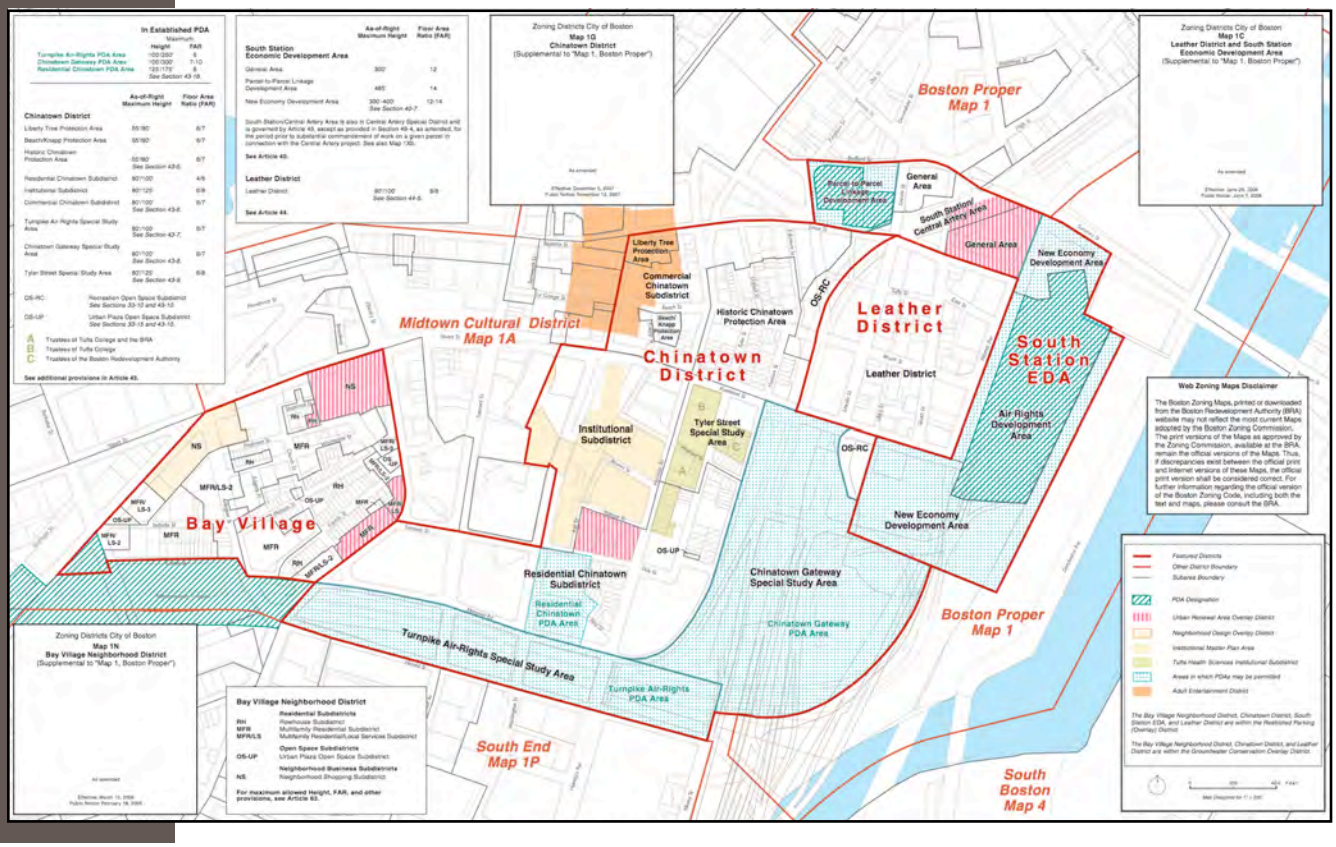
The purpose of this article is to establish the zoning regulations for the comprehensive plan for the South Station Economic Development Area ("EDA") as required by the provisions of the Downtown Interim Planning Overlay District, Article 27D of this code. The goals and objectives of this article, which constitutes the South Station EDA Plan, are to direct downtown development in a way that promotes balanced growth for Boston; to channel growth away from congested areas and toward underutilized sites in the Bedford-Essex corridor and along the Fort Point Channel; to permit redevelopment which provides significant community benefits, in accordance with city land disposition policies; to create a mixed-use district which includes office, retail, hotel, research and development, and biomedical uses; to provide an area of the downtown to enhance the expansion of Boston's biomedical and research and development sectors; to create a complex of facilities and services which will foster economic growth in Boston and throughout the region; to increase the number of jobs in those sectors of the economy likely to employ Boston residents; to promote the creation and incubation of new research and development businesses and uses along with facilities supporting such uses; to create a transition of uses and character between the downtown and Chinatown and Leather Districts; to utilize existing transit centers; and to improve vehicular access to the city by establishing parking facilities near major commuter arteries.

SECTION 40-2.
Recognition of the South Station Economic Development Area Plan.

In accordance with Section 27D-18 of this code, which requires production of comprehensive planning policies, development controls, and design guidelines for Special Study Areas in the Downtown Interim Planning Overlay District, including the South Station area (Special Study Area No. 10), this article serves as the South Station EDA Plan. The Zoning Commission hereby recognizes this article (approved by the Boston Redevelopment Authority on June 29, 1989) as the South Station EDA Plan and also as the general plan for the South Station EDA and as the portion of the general plan for the City of Boston applicable to the South Station EDA. The preparation of the South Station EDA Plan by the Boston Redevelopment Authority is pursuant to Section 70 of Chapter 41 of the General Laws, Section 652 of the Acts of 1960, and Section 3 of Chapter 4 of the Ordinances of 1952.

SECTION 40-3.
Physical Boundaries.

The provisions of this article are applicable only in the South Station EDA. The boundaries of the South Station EDA and Leather District are as shown on a map entitled, "Map 1C South Station Economic Development Area (supplemental to 'Map



1 Boston Proper')" of the series of maps entitled "Zoning Districts City of Boston," as amended.

(As amended on July 31, 1997.)

SECTION 40-4.
Applicability.

This article together with the rest of this code constitutes the zoning regulation for the South Station EDA and applies as *ARTICLE 40 - SOUTH STATION ECONOMIC DEVELOPMENT AREA 4* specified in Section 4-1 regarding the conformity of buildings and land to this code. Application of the provisions of Article 27D to the South Station EDA is rescinded, and the South Station EDA is deleted from the Downtown Interim Planning Overlay District on the effective date of this article. Where conflicts between this article and the rest of this code exist, the provisions of this article shall govern. Except where specifically indicated in this article, the provisions of this article supersede Sections 13-1, 13-2, and 13-4 and Articles 8 and 14 through 24 of this code for the South Station EDA. The provisions of this article, however, are not applicable to the following Proposed Projects, which are governed by the rest of this code.

1. Any Proposed Project for which application to the Inspectional Services Department for a building or use permit has been made prior to the first notice of hearing before the commission for adoption of this article and for which no Zoning Relief is required.

2. Any Proposed Project for which appeal to the Board of Appeal for any Zoning Relief has been made prior to the first notice of hearing before the commission for adoption of this article, provided that such Zoning Relief has been or thereafter is granted by the Board of Appeal pursuant to such appeal.

SECTION 40-4A.
South Station/Central Artery Area.

Notwithstanding any contrary provision of this Article, the South Station/Central Artery Area shall be governed by the applicable use, dimensional, and other requirements of Article 49, Central Artery Special District. In particular, the provisions of Sections 40-5 and 40-12 through 40-14 shall not be applicable to the South Station/Central Artery Area. The Central Artery Special District Plan, as that term is defined in Article 49, shall be part of the general plan for the South Station EDA as it applies to the South Station/Central Artery Area.

(As inserted on June 7, 1991)

SECTION 40-5.
General Building Height and Floor Area Ratio.

Except in the Parcel-to-Parcel Linkage Development Area and the New Economy Development Area, as provided in following sections, a Proposed Project within the South Station EDA is allowed an as-of-right building height of three hundred (300) feet and an as-of-right FAR of twelve (12).

SECTION 40-6.
Building Height and FAR in the Parcel-to-Parcel Linkage Development Area.

Within that portion of the South Station EDA depicted on Map 1C of this code as the "Parcel-to-Parcel Linkage Development Area," a Proposed Project is allowed an as-of-right building height of four hundred sixty-five (465) feet and an as-of-right FAR of fourteen (14).

(As amended on July 31, 1997.)

SECTION 40-7.
Building Height and FAR in the New Economy Development Area.

Within that portion of the South Station EDA depicted on Map 1C of this code as the "New Economy Development Area," a Proposed Project is allowed an as-of-right building height of three hundred (300) feet and an as-of-right FAR of twelve (12); provided that any Proposed Project in the South Station Air Rights Development Sub-Area depicted on Map 1C of this code within the New Economy Area shall have an as-of-right building height of six hundred seventy-eight (678) feet and FAR of ten (10) as determined under Section 40-8(2) if a Development Plan for such Proposed Project has been approved pursuant to Section 3-1A.a and Planned Development Area Review and any other Proposed Project shall have an as-of-right building height of four hundred (400) feet and FAR of fourteen (14) as determined under Section 40-8(2) if a Development Plan for such Proposed Project has been approved pursuant to Section 3-1A.a and Planned Development Area Review.

(As amended on May 9, 1996, July 31, 1997, and June 29, 2006.)

SECTION 40-8.
Establishment of Areas Within Which Planned Development Areas May Be Permitted.

1. PDA Permitted Areas; Review and Approval Requirements. PDAs, as described in Section 3-1A.a, may be established in the Parcel-to- Parcel Linkage Development Area and the New Economy Development Area. The purposes for establishment of PDAs are to establish a more flexible zoning law and encourage large-scale private development on underutilized sites in the South Station EDA. No PDA is permitted within the South Station EDA except within the Parcel-to-Parcel Linkage Development Area and the New Economy Development Area. See Article 80 concerning the applicability of Planned Development Area Review.

2. Planned Development Areas: Use and Dimensional Regulations. A Proposed Project described in a Development Plan shall be in Substantial Accord with the dimensional standards set forth in Section 40-6 (for the Parcel-to-Parcel Linkage Development Area) or 40-7 (for the New Economy Development Area), as applicable. Except where specifically indicated in this article, Section 40-13 (Specific Design Requirements) shall not apply to a Proposed Project described in a Development Plan. For applicable use regulations, see Section 40-12 (South Station Economic Development Area Use Regulations).

SECTION 40-10.
Planned Development Areas: Standards for Development Plan Approval.

For approval standards for Planned Development Area Development Plans, see Section 80C-4 (Standards for Planned Development Area Review Approval).

(As amended on May 9, 1996 and July 31, 1997.)

SECTION 40-11.
Planned Development Areas: Planning and Development Criteria.

The Boston Redevelopment Authority may approve a Development Plan as meeting the requirement of Section 80C-4 (Standards for Planned Development Area Review Approval) for compliance with the applicable planning and development criteria of this article if the Development Plan proposes a plan for development consistent with the goals of the South Station EDA Plan, including one or more of the following: (a) the diversification and expansion of Boston's economy in new areas of economic activity, such as private investment in the research and development of pharmaceutical and biomedical products, in accordance with the provisions of paragraph 1, below, of this section; (b) the provision of public benefits in accordance with Parcel-to-Parcel Linkage program guidelines, in accordance with the provisions of paragraph 2, below, of this section; (c) the creation or retention of job opportunities, in accordance with the provisions of paragraph 3, below, of this section; or (d) the enhancement of intermodal transportation capabilities and transit oriented development, in accordance with the provisions of paragraph 4, below, of this section.

1. Development Plan Approval for Diversification and Expansion of Boston's Economy. The Boston Redevelopment Authority may approve a Development Plan proposing diversification and expansion of Boston's economy if at least fifty percent (50%) of the gross floor area of the Proposed Project is dedicated to or supportive of uses such as, but not limited to, the following: (a) research and development of pharmaceutical and biomedical products; (b) the design, development, fabricating, and testing of instruments for engineering, medical, dental, scientific, optical, or other similar professional use; or (c) other scientific research and development uses, including laboratories and facilities for theoretical, basic, and applied research, product development and testing, prototype fabrication, or production of experimental products prior to preclinical testing. Examples of uses which shall be considered "supportive of" the uses enumerated in subparagraphs (a), (b) and (c) above include, but are not limited to: office space occupied by private entities engaged in such uses, or occupied by governmental entities regulating such uses; hotel, conference, or convention facilities; and educational facilities providing instruction in fields related to such uses.

2. Development Plan Approval for the Provision of Public Benefits in Accordance with Parcel-to-Parcel Linkage Program Guidelines. The Boston Redevelopment Authority may approve a Development Plan proposing provision of public benefits in accordance with Parcel-to-Parcel Linkage program guidelines if: (a) the program guidelines have been approved by the Boston Redevelopment Authority for a site for which the Boston Redevelopment Authority has recommended the tentative designation of a developer, in accordance with the Boston Redevelopment Authority's administrative practice; (b) the program guidelines provide for the participation of community-based organizations in the development; (c) the Proposed Project or the Applicant contributes to a community development fund; and (d) the Applicant provides such other community benefits as may be detailed in the Parcel-to-Parcel Linkage program guidelines, as amended from time to time and as affected by agreements between the Boston\ Redevelopment Authority and the Applicant.

3. Development Plan Approval for the Creation or Retention of Job Opportunities. The Boston Redevelopment Authority may approve a Development Plan proposing creation or retention of job opportunities if it determines that: (a) employment positions in businesses occupying the Proposed Project are newly created in Boston, and are not relocated from other parts of the city; (b) the Development Plan provides for entrepreneurial assistance measures, such as (i) information, outreach, and education programs concerning new business development; (ii) general business planning and management counseling; (iii) technical assistance; and (iv) the establishment of general financing options; or (c) the use proposed will retain jobs in the city or will contribute otherwise to the economic health of the city, from the Development Plan's showing that at least thirty-three percent (33%) of the gross floor area of the Proposed Project will be leased or used by entities identified in the Development Plan.

4. Development Plan Approval for the Enhancement of Intermodal Transportation and Transit-Oriented Development. The Boston Redevelopment Authority may approve a development plan proposing expansion of Boston's economy through commercial or residential development if it determines that (a) intermodal transportation capabilities among rail, bus and subway modes will be enhanced incident to such development, and (b) such development is consistent with the goals of transit-oriented development."

SECTION 40-12.
South Station Economic Development Area Use Regulations.

In the South Station EDA, the use of land and structures is hereby regulated as provided in this section. The provisions of Article 8 apply only as specified in this section, except that Section 8-6 applies. No land or structure shall be erected, used, or arranged or designed to be used, in whole or in part, except in conformity with the provisions of this Section 40-12, or in conformity with the provisions of an approved Development Plan with respect to land or structures located in a PDA.

1. Inclusion of Day Care Facilities. The provisions of this paragraph apply only to Proposed Projects, which exceed one hundred thousand (100,000) square feet of gross floor area. Any Proposed Project having a gross floor area, not including the floor area devoted to Residential Uses, which equals or exceeds one hundred thousand (100,000) square feet shall devote to day care facilities an amount of floor area equal to the amount listed below in Table A of this section. An

Applicant for a Proposed Project subject to the provisions of this paragraph may fulfill its obligations under this paragraph by (a) creating such facilities on-site; or (b) creating such facilities, or causing such facilities to be created elsewhere in the City. Except for Proposed Projects in the Parcel-to-Parcel Linkage Development Area, any Proposed Project subject to the provisions of this section shall devote to on-site day care facilities, of the total amount required to be provided pursuant to Table A, an amount of floor area equal to at least four thousand (4,000) square feet or the minimum required square footage, whichever is less. The provision of day care facilities in accordance with this paragraph shall be in conformity with written regulations to be adopted by the Boston Redevelopment Authority after public notice and hearing. For the purposes of this paragraph, the term "day care facilities" includes the finish, furnishings, and equipment required for use of the floor area for such facilities, to enroll people for care, instruction, or recreation during regular business hours.

TABLE A

Provision of Day Care Facilities

Size of Proposed Project (Gross Square Feet)	Minimum Day Care Faciliti (Gross Square Feet)
100,000 up to 200,000	2% of gross floor area
200,000 up to 500,000	4,000
500,000 up to 1,000,000	8,000
More than 1,000,000	12,000

2. Allowed Uses. No land or structure in the South Station EDA shall be erected, used, or arranged or designed to be used, in whole or in part, for any use except under the provisions of an approved Development Plan for land or structures in a PDA, or Section 40-12.3 and Article 6, Conditional Uses, unless such use is specified in the Development Plan or in this Section 40-12.2. Any use so specified below shall be allowed as a matter of right, subject only to the provisions of this Section 40-12 or, in the case of a PDA, the approved Development Plan.
   b. New Economy Uses. Limited to: basic research; research and development; product development or prototype manufacturing; biomedical technology; pharmaceutical research and development; research and medical laboratories.
   c. Residential Uses. Limited to: multifamily dwelling, artists' live/work space, apartment house, lodging or boarding house, temporary housing shelters, group residence, limited, as defined in clause (22B) of Section 2-1, and any dwelling converted for more families, where structures after conversion will conform to this code. Residential uses include any affordable dwelling units, including but not limited to affordable dwelling units, which are rental units, condominiums, or limited equity share cooperatives.
   d. Restaurant and Entertainment Uses. Limited to: the service or sale of food or drink for on-premises consumption, with or without dancing or entertainment; concert hall; theater, commercial or nonprofit (including motion picture or video theater, but not drive-in theater); art galleries, nonprofit or for profit; provided that uses described in Use Item 38A are forbidden.
   e. Office Uses. Limited to: offices of community groups; business or professional offices; real estate, insurance, or other agency or government office; office building; post office; or bank (other than drive-in bank) or similar establishment. (See also paragraph 2(m) of this section.)
   f. Hotel or motel.
   g. Day care center, family care center, nursery school, kindergarten, elementary or secondary school, or community health center or clinic.
   h. Recreational and Community Uses. Limited to: private grounds for games and sports; other social, recreational, or sports center conducted for profit; private club (including quarters of fraternal or sororal organizations) operated for members only; adult education center or community center building; settlement house; the maintenance and operation of any amusement game machine in a private club, dormitory, fraternity, or sorority house, or similar noncommercial establishment, or in any commercial establishment.
   i. Wholesale Uses. Limited to: office or display or sales space of a wholesale, jobbing, or distributing house; provided that not more than twenty-five percent (25%) of gross floor area devoted to this use is used for assembling, packaging, and storing merchandise.
   j. Service Uses. Limited to: video or film production studio; barber shop; beauty shop; shoe repair shop; self-service laundry; pick-up and delivery station of laundry or dry-cleaner; tailor shop; hand laundry; dry-cleaning shop; framer's studio; caterer's establishment; photographer's studio; printing plant; taxidermist's shop; upholsterer's shop; carpenter's shop; electrician's shop; plumber's shop; radio and television repair shop; funeral home; undertaker's establishment; mortuary; research laboratory; radio or television studio; animal hospital or clinic; or similar use; provided that in laundries and cleaning establishments, only nonflammable solvents are used for cleaning.
   k. Retail Uses. Limited to: store primarily serving the local retail business needs of the neighborhood; artist supply store; grocery store; department store, furniture store, general merchandise mart or other store serving the general retail business needs of a major part of the city, including accessory storage; provided that uses described in Use Item 34A are forbidden.
   l. Institutional Uses. Limited to: college or university granting degrees by authority of the Commonwealth; place of worship, monastery, convent, or parish house; nonprofit library or museum, not accessory to another institutional use; clinic or professional offices accessory to a hospital or sanatorium whether or not on the same lot, provided that such use will occupy interior space being used by the same institution for another institutional use at the time such change is proposed; hospital, sanatorium, convalescent or nursing home, elderly care facility, orphanage, or similar institution not for correctional purposes, whether or not providing custodial care for drug addicts, alcoholics, or mentally ill or mentally deficient persons; clinic or professional offices accessory to a hospital or sanatorium whether or not on the same lot, providing custodial care for drug addicts, alcoholics, or mentally ill or mentally deficient persons; research laboratory.

m. Accessory Uses subject to the limitations and restrictions of Article 10, limited to: conference facilities; auditoria; classrooms; a garage or parking space for occupants, employees, students, and visitors, provided that such use is accessory to a residential use under paragraph 2(b) of this section, a hotel or motel, or a group care residence under paragraph 2(g) of this section; a swimming pool or tennis court; the storage of flammable liquids and gases incidental to a lawful use; the manufacture, assembly, or packaging of products sold on the lot; the maintenance and operation of not more than four amusement game machines accessory to eating and drinking establishments; the keeping of animals, other than households pets, provided that every enclosure is sufficient to prevent a nuisance to any adjacent residences or eleemosynary institutions; the keeping of laboratory animals incidental to a conditional institutional use, provided that all resulting noise, dust, fumes, gases, odors, and refuse matter are effectively confined to the lot or so disposed of as not to be a nuisance or hazard to public health or safety; in educational institutions with more than four hundred (400) full-time students, and in hospitals with more than fifty (50) beds, incidental uses and services ordinarily found in connection therewith and primarily for the patients and staff or students and faculty, when conducted wholly within a building and entered solely from within the building where there is but one building on the lot or from an entrance not directly facing a street or lot line where there is more than one building on a lot, unless accessory to a hospital or sanatorium or clinic which is an allowed use; and any use ancillary to, and ordinarily incident to, a lawful main use, provided that any such use shall be subject to the same restrictions, conditions, limitations, provisos, and safeguards as the use to which it is accessory; the maintenance and operation of an indoor payphone, provided that such use shall be forbidden unless located within a building at least ten (10) feet from an entrance.

ii. For land or structures in a PDA, uses specified in an approved Development Plan, including a parking lot or parking garage or other parking space, whether or not accessory, which would otherwise be a conditionally permitted use under Sections 40-12.3(d) and 40-12.3(m).

1. Conditional Uses. No land or structure in the South Station EDA shall be erected, used, or arranged or designed to be used, in whole or in part, for any use under the provisions of Article 6 unless such use is specified in this Section 40-12.3. The granting of a permit for any use so specified may be authorized conditionally by the Board of Appeal acting under the provisions of Article 6, subject to the regulations set forth in this Section 40-12, or may be allowed by the Zoning Commission in its approval of a Development Plan for a PDA. The continued right to a conditional use granted under Article 6 is dependent upon maintaining the character and extent of operations and structures.

2. Residential Uses. Limited to: temporary dwelling structure, orphanage, and any dwelling converted for more families, provided that, after conversion, any nonconformity as to floor area ratio is no greater than prior to conversion.

3. Group Care Residence, unless otherwise allowed pursuant to paragraph 2(b) of this section.

4. Light Manufacturing Uses, except as allowed in Section 40-12.2(a); kennel or pound.

5. Parking lot or parking garage.

6. Wholesale Uses. Limited to: accessory storage (other than of flammable liquids, gases, and explosives) in roofed structures or office or display or sales space of a wholesale, jobbing, or distributing house where more than twenty-five percent (25%) of gross floor area devoted to this use is used for assembling, packaging, and storing merchandise.

7. Fast Food Restaurant Uses. Limited to: sale over the counter, not wholly incidental to a use listed under paragraph 2(a), 2 (c), or 2(l) of this section, of food or drink prepared on premises for off-premises consumption or for on-premises consumption if, as so sold, such food or drink is ready for take-out.

8. Rental motor vehicle and trailer agency accessory to a hotel or motel, provided that no rental vehicles or trailers are parked on the street and that exterior lighting is arranged to shine downward and away from residences.

9. The change of use of any residence to another use.

10. Transportation Uses. Limited to: bus terminal, bus station, subway station or railroad passenger station, airline shuttle service.

a. Ancillary Uses. Any use on a lot adjacent to, or across the street from, but in the same district as, a lawful use to which it is ancillary and for which it would be a lawful accessory use if it were on the same lot; provided that any such use shall be subject to the same restrictions, conditions, limitations, provisos, and safeguards as the use to which it is ancillary.

b. Institutional Uses. Limited to: fraternity or sorority house or dormitory; trade, professional, or other school; penal or correctional institution; detention home; machine shop or other noisy activity accessory to a school, college, or university, adequately sound-insulated to protect the neighborhood from unnecessary noise; library or museum not conducted for profit and accessory to another institutional use not allowed pursuant to paragraph 2(m) of this section; clinic not accessory to a main use.

c. Service Uses. Check cashing business.

d. Accessory Uses. Limited to: a garage or parking space for occupants, employees, customers, students, and visitors, such use not accessory to a residential use, a hotel or motel, a group care residence, or a dormitory, fraternity, or sorority house.

e. Public Service Uses. Limited to: public service pumping station, sub-station, automatic telephone exchange, telecommunications data distribution center, or outdoor payphone subject to St. 1956, c. 665, s. 2.

f. Storage of dumpsters not accessory or ancillary to a main use, nor used in conjunction with the ongoing operation of a permitted site with explicit legal use and occupancy as a dumpster repair facility, waste hauling contractor yard, or site assigned and licensed solid waste management facility.
   i. Body Art Establishment

g. Forbidden Uses. No land or structure in the South Station EDA shall be erected, used, or arranged or designed to be used, in whole or in part, for any use specified in the Use Item column of Table A of Section 8-7 if such use is not specified in Sections 40-12.2 or 40-12.3 as an allowed or conditional use, except for such uses as may be allowed to be continued as nonconforming uses under the provisions of Article 9.

(As amended on February 22, 1991, September 30, 1993, October 6, 1994,September 20 and November 21, 1996, May 30, 2000, September 18 and October 20, 2000, February 16 and April 9, 2001, and March 15, 2006.)

SECTION 40-13.
Specific Design Requirements.

Proposed Projects within the South Station EDA shall comply with the specific design requirements established in this section. Except as provided in Article 6A, no Zoning Relief shall be granted from the provisions of this section. See Section 80C-9 (Planned Development Area Review: Effect on Applicability of Other Zoning Requirements) and Section 40-8.2 (PDAs: Use and Dimensional Regulations) concerning the applicability of the provisions of this section to Proposed Projects in Planned Development Areas.

1. Street Wall Continuity. The Street Wall of any Proposed Project shall be built:
   a. (a) to be coextensive with at least eighty percent (80%) of the "Existing Building Alignment" of the block on which the Proposed Project fronts, established pursuant to Section 18-2 of this code; or (b) to a depth from the street line equal to that of at least eighty percent (80%) of the Existing Building Alignment of either block adjacent to the block on which the Proposed Project is located, if there is no Existing Building Alignment of such block.

Recesses Above Second Story*

Maximum Depth	Maximum Aggregate Surface Area
Fifteen (15) feet	Twenty percent (20%)

*Recesses do not include windows, which must be indented.

2. Street Wall Height. The "Street Wall Height" of Proposed Projects within the South Station Economic Development Area shall not exceed one hundred twenty-five (125) feet, except as limited further:
   b. (a) along Essex and Lincoln Streets, the Street Wall Height shall not exceed seventy (70) feet; and (b) along Bedford and Kingston Streets, the Street Wall Height shall not exceed one hundred (100) feet. The endwall of a street which is a cul-de-sac does not count as a Street Wall for the purposes of this Section 40-13.
   c. Setback Requirements.
      ii. Sky Plane Setbacks. Other than decorative cornices and other surface ornamentation, every portion of a Proposed Project (including, but not limited to, mechanical equipment) above the Street Wall Height of such Proposed Project shall be set back by not less than the amount of the "Sky Plane Setbacks" established in Table C for the Street Wall Heights and building heights of one hundred fifty-five (155) feet and two hundred ninety-five (295) feet. Portions of a Proposed Project more than one hundred fifty-five (155) feet high should be treated in a manner to create a visually distinctive roof or other termination of the facade of the Proposed Project.

TABLE B

Streets on Which Setbacks are Required

Atlantic Avenue	Kingston Street
Bedford Street	Lincoln Street
Essex Street	

TABLE C

Sky Plane Setbacks
Minimum Depth of Setback from Street Wall

Street	Above Street Wall Height	Above 155' (Total Setback from Street Wall)	Above 295' (Total Setback from Street Wall)
Atlantic Avenue	10'	20'	20'
Bedford Street	25'	50'	100'
Essex Street	5'	5'	15'
Kingston Street	35'	75'	125'
Lincoln Street	5'	5'	15'

The amount of the Sky Plane Setback at various heights for each wall of a building depends on whether the particular wall faces on a street, as identified below in Table B, or on a side lot line. The endwall of a street, which is a cul-de-sac does not count as a Street Wall for the purposes of this Section 40-13.

The Sky Plane Setback provisions established in this paragraph shall not be applicable to the extent that, as a consequence of such provisions, the maximum possible gross floor area for any floor of a Proposed Project would be less than nine thousand (9,000) square feet.

The facade of a building may violate the setback requirements above the two hundred ninety-five (295) foot level, up to a maximum of sixty percent (60%) of total horizontal length of the facade. (As amended on July 31, 1997.)

SECTION 40-14.
Off-Street Loading.

Article 24 governs the provision and design of off-street loading facilities for the use of any structure or land not subject to the provisions of Large Project Review. The provision and design of off-street loading facilities for the use of any structure or land that is subject to Large Project Review shall be determined through such review.(As amended on May 9, 1996.)

SECTION 40-15.
Regulations.

The Boston Redevelopment Authority may promulgate and from time to time amend regulations to administer this article.

SECTION 40-16.
Severability.

The provisions of this article are severable, and if any such provision or provisions shall be held invalid by any decision of any court of competent jurisdiction, such decision shall not impair or otherwise affect any other provision of this article.

Chapter 91. Waterways[3]
Section 14. tidewater

License for structures in or over tide water; conduits or cables under tide water; private or commonwealth tidelands

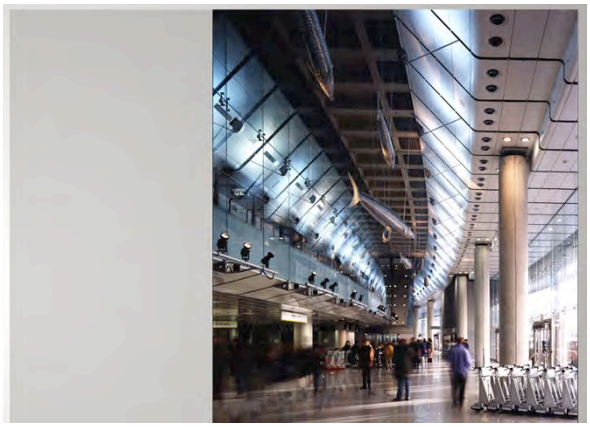
The department may license and prescribe the terms for the construction or extension of a wharf, pier, dam, sea wall, road, bridge or other structure, or for the filling of land or flats, or the driving of piles in or over tide water below high water mark, but not, except as to a structure authorized by law, beyond any established harbor line, nor, unless with the approval of the governor and council, beyond the line of riparian ownership. A license shall not be granted for the construction of a bridge across a river, cove or inlet, except in a location above a bridge, dam or similar structure authorized by law over such tide water, in which no draw actually exists or is required by law, and not then, if objection is made by the aldermen or selectmen of the town where the bridge is to be built.

The said department may license and prescribe the terms for the construction or extension of a pipe line, conduit or cable under tide water beyond any established harbor line; provided, that such pipe line or conduit is entirely imbedded in the soil and does not in any part occupy, or project into such tide water, and provided also that said department may at any time require any pipe line, conduit or cable to be moved or relocated if channel changes or alterations demand the same.

Except as provided in section eighteen, no structures or fill may be licensed on private tidelands or commonwealth tidelands unless such structures or fill are necessary to accommodate a water dependent use; provided that for commonwealth tidelands said structures or fill shall also serve a proper public purpose and that said purpose shall provide a greater public benefit than public detriment to the rights of the public in said lands.

Section 34. establishment of harbor lines

The department of environmental protection may, after hearing the parties interested, prescribe lines in any harbor of the commonwealth and make report thereof to the general court, not later than the next session, for its action, thereon. If such lines are established by the general court as the harbor lines of said harbor, no wharf, pier or other structure shall thereafter be extended into said harbor beyond such lines, except as provided by section fourteen. Notice of the hearing shall be published three weeks successively in a newspaper published in Boston and in one or more published in the county or counties where such harbor lies, the first publication to be at least thirty days before the hearing.



Water Sheet Activation Plan and Harbor Walk
7.1 purpose + overview

The purpose of this section is to establish a framework for a management plan and planning guidelines for watersheet activation. This chapter is for planning purposes and does not provide DEP with guidance in making decisions regarding use and development of tideland areas. The BRA on behalf of the City of Boston will continue to coordinate with regulators, abutters and the proposed Fort Point Channel Operations Board to formalize a Watersheet Management Plan that will provide guidance for management of landside and waterside components of the Watersheet Activation Plan.

Included are various water transportation options, such as ferries and water taxis, as well as other complementary watersheet infrastructure elements to support and stimulate a vibrant mix of watersheet activities within the MHP planning area. The watersheet management plan will be a blueprint for implementation, phasing and ongoing administration of the watersheet activation plan elements described in Chapter 5, The Fort Point Channel Watersheet Activation Plan. The formation of a management and implementation plan also responds to issues and concerns articulated in the Notice to Proceed for the Municipal Harbor Plan process including coordination of uses proposed in the Watersheet Activation Plan with existing water-dependent uses and the proposed water transit terminal and service from 500 Atlantic Avenue.

It should be noted that the actual watersheet components of the activation and management plan framework are described in greater detail than the landside components since the water area between the Harbor Lines is now and will remain in public ownership, while much of the landside area is in private ownership.

The Watersheet Activation Management Plan is one critical element of the blueprint for the development of new uses and public structures that will make the Fort Point Channel a great civic space. New development will provide the funding for most of the components of the Watersheet Plan. The Watersheet

Plan builds upon the extensive public investment of infrastructure in the Fort Point Channel area including the CA/T Project and the MBTA Transitway Project. The management plan framework identifies a range of responsibilities and actions for the coordinated efforts of the public and private sectors. The BRA on behalf of the City will initiate new regulatory and planning measures such as exemptions or revisions to the Harbor Line and establishment of new channels and fairways. The BRA will use the management plan and planning guidelines when reviewing projects subject to Article 80. The management plan will also provide guidance to DEP in making decisions regarding Chapter 91 licenses and establishing baseline requirements for water-related public benefits.

The inclusion of a watersheet management and implementation planning framework into Phases 1 and 2 of the *Fort Point Channel Municipal Harbor Plan* supports the BRA's efforts to implement the watersheet activation plans for the area. The management program is founded on the base articulated in the *Fort Point Channel Watersheet Activation Plan*, and further expands the recommendations of that plan where appropriate. The management plan is described in terms of the following sections:

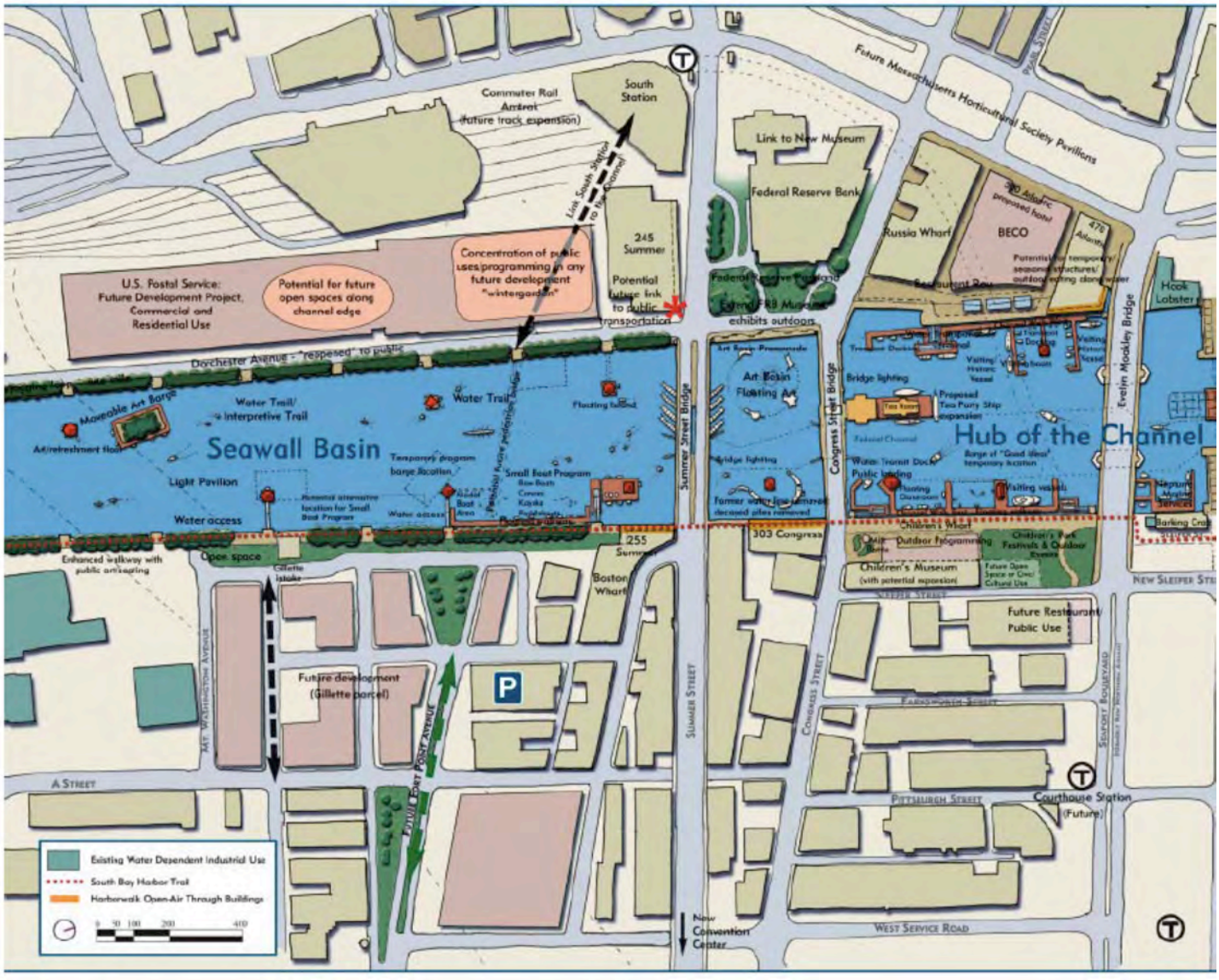
1. Composite Watersheet Activation and Access Implementation Plans
2. Watersheet Activation Plan Guidelines and Component Framework
3. Watersheet Management Plan
4. Watersheet Implementation Phasing Plan

7.1.1. Watersheet activation component framework

The *Fort Point Channel Watersheet Activation Plan* includes various related landside and waterside infrastructure and use components that comprise the framework. The watersheet activation implementation plan is intended to provide a physical definition of the proposed use areas for all public and private watersheet activities as well as for related adjacent landside public realm and private activities. The elements proposed for the different action areas include use zones and guidelines as well as specific project elements.

7.1.2. watersheet activation action plan elements

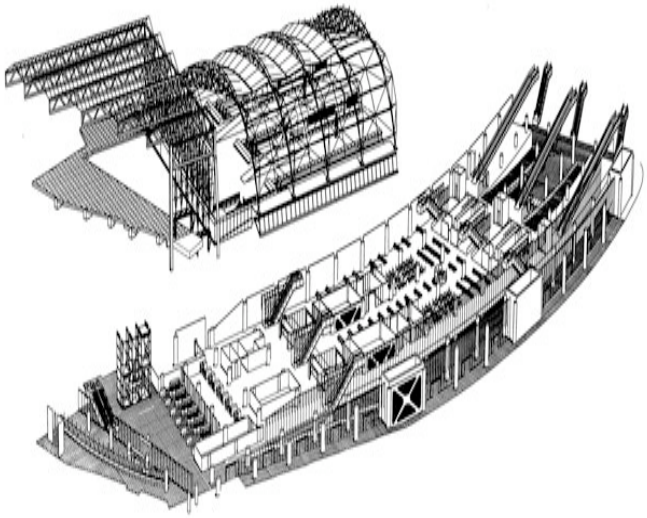
The components of the Watersheet Activation Management Plan are described in terms of the above lists of elements allocated to specific watersheet activity areas. The activation elements are depicted graphically in two composite graphics:

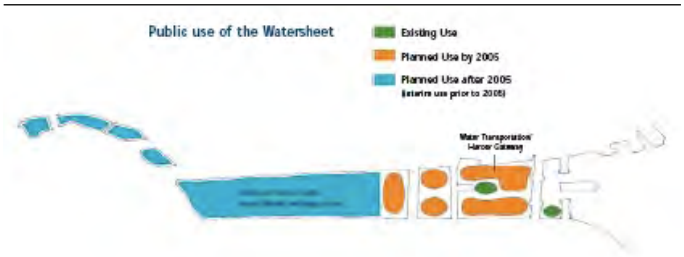


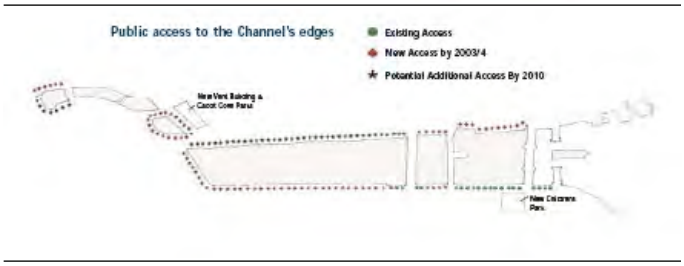
the Watersheet Activation Implementation Plan and the Watersheet Access Plan.

7.2.1. watersheet activation plan goals + guidelines

The watersheet uses and infrastructure described in this section are in response to the planning goals set forth in the *Fort Point Channel Watersheet Activation Plan*. The Channel goals include actions needed on both the watersheet and the landside.







Goals

The *FPCWAP*'s goals can be summarized and amplified as follows:

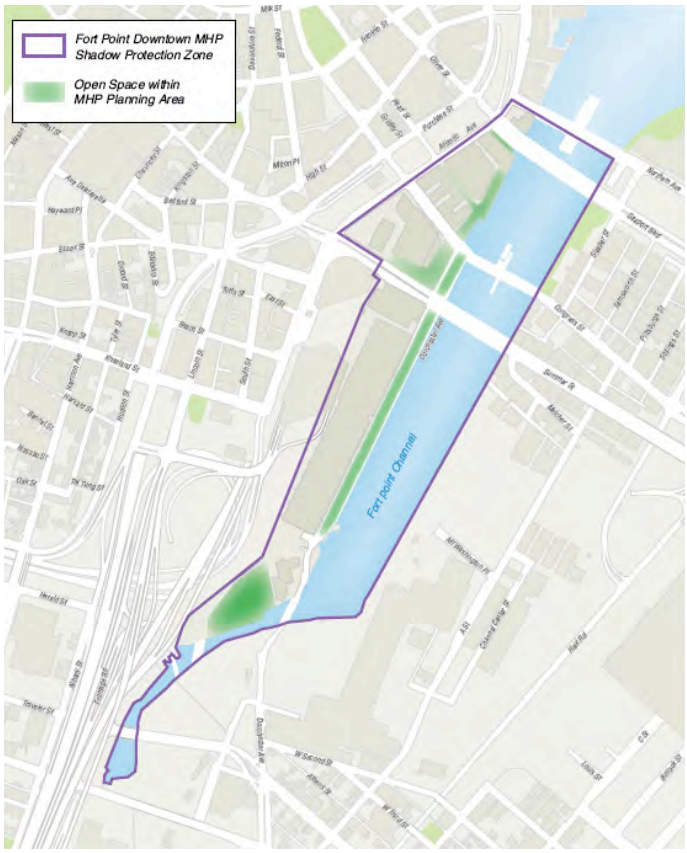
1. Preserve and enhance existing water-dependent uses such as the Gillette Company, Hook Lobster, Neptune Marine Services, and the Boston Tea Party Ship & Museum.
2. Enhance Fort Point Channel for a variety of existing and new water-dependent uses, such as water transportation, recreational boating, and as a safe haven for vessels during coastal storms.
3. Activate the Channel and its edges by creating a special destination to attract the public and generate activity on a year-round basis.
4. Enhance public access by land and by water from all Boston neighborhoods, and from the downtown and South Boston to the Fort Point Channel.
5. Enhance the civic role of the Channel by connecting with other nearby public venues, including the Harborwalk, the planned Rose Kennedy Greenway, Massachusetts Horticulture Society's Garden Under Glass, South Station, Children's Wharf, Moakley Court House/Boston Harbor Islands Discovery Center, the new Convention Center, and the South Bay Harbor Trail.
6. Create land and water connections to existing and planned open spaces within walking distance of the Channel.
7. Preserve and enhance the historic character of the Channel including the historic seawalls, bridges, and the architecture of historic buildings and the Boston Wharf District.

Establish strong connections between the Channel, the Harborwalk, and other downtown and South Boston Waterfront destinations.

Develop a detailed and realistic implementation strategy for the Watersheet Activation Plan.

- particularly in the Seawall Basin. Specific basin areas can be made available for such activities by well thought-out placement of channels, fairways and Harbor Line limits.
- Designated recreational boating areas would be limited to non-powered, self-propelled small vessels such as kayaks, rowing boats, canoes, paddleboats, etc.
- Jet skis, jet boards and other powered personal watercraft would not be permitted in any basin for safety and environmental purposes.
- Harbor wake and speed limits to be strictly enforced for all other powered vessels in recreational boating areas.
- Harbor regulatory management would be the cooperative responsibility of DEP, the Harbormaster, and Coast Guard.
- City and state coordinated review of yearly Chapter 91 section 9A permits.

- Channel interpretive water trail facilities (landings, vessel berthing) and interpretive elements (signage, floating markers) for self-guided or concession excursion tours that include all basins.
- Berthing areas for medium-sized visiting historic, educational and cultural vessels in Hub of
- the Channel Basin (subject to approximately 26-foot low-tide clearance at the Evelyn
- Moakley and Northern Ave. Bridges).
- Identification and protection of areas of environmental and water quality sensitivity and improvement. These areas would be marked on charts of the Channel and noted by signs along the shoreline bulkhead. Included would be such locations as intake structures and CSOs, as well as CA/T Project and Transitway tunnel zones.



Specific Recommended Actions

In order to achieve these activation objectives, the following actions are recommended:
Preparation of a technical definition and use plan for seeking exemptions to or modifying the limits of the Harbor Line which currently coincides with the seawall and wharf line along the edge of the Channel as described in the proposed Municipal Harbor Plan for the Hub of the Channel Basin and Seawall Basin. The City and BRA would be responsible for initiating legislative proceedings. The Fort Point Channel Harbor Line exemptions/modifications would be specific to the basins as shown in Figure 7.4. The Harbor Line exemptions/modifications would allow for approved public water-dependent watersheet uses and would not exceed 100 feet from the shoreline, to insure adequate fairways and vessel navigation space.

1. Guidelines and assigned management/maintenance responsibilities for all public water-based floats and facilities.
2. Preparation of a Fort Point Channel navigation and public realm chart for use by water and land visitors with a description of rules of the road (watersheet/boaters guide).
3. Water quality improvement and monitoring program to be coordinated with appropriate public and private entities.
4. Educational programs to be coordinated with Channel institutions, the Boston Public Schools system, and community-based interpretive programs. 7.2.3. Watersheet Private Use.

Component Descriptions

There is also a set of watersheet uses that would be permitted as privately operated or maintained services for public use. However, such uses as houseboats, offices, or restaurants, and long-term marina slip rentals should be excluded because they effectively privatize the watersheet. The implementation plan would include such privately maintained or operated water-dependent use elements as:

Water intake clear zones for water-dependent businesses to avoid impacts including sediment and turbidity for such businesses as Hook Lobster, Neptune Marine Services, and the Gillette Company. (Locations and watersheet areas to be coordinated with water-dependent businesses.)

Water-dependent business vessel access areas for such businesses as Hook Lobster, Neptune Marine Services, Gillette, Boston Tea Party Ship & Museum. (Locations to be coordinated with water-dependent businesses.)

Floating concession locations for designated water-dependent uses that would be privately operated and maintained, such as boat rentals, fishing support, museum-related activities, and other permitted activities.

Small boat rental concessions and rowing clubs would be located in the Seawall Basin with such uses allowed upstream of the Congress Street Bridge.

Designated recreational boating areas/concessions would be limited to nonpowered, self-propelled small vessels such as kayaks, rowing boats, canoes, sailing dinghies, paddleboats, etc.

Concessions for small boats that can be capsized (sail, canoe, kayak, etc.) would be contingent on water quality and regular monitoring. Small boat safety and rescue would be the responsibility of the respective small boat concessions or rowing clubs.

Marina slip locations for transient vessel rental use, privately maintained and operated for public use.

Marina slip locations for seasonal charter vessel rental use, privately maintained and operated for public use.

Locations for pump-out facilities and other supporting

uses for marinas and visiting vessels.

Berthing locations for visiting historical vessels, floating educational classrooms, and cultural vessels.

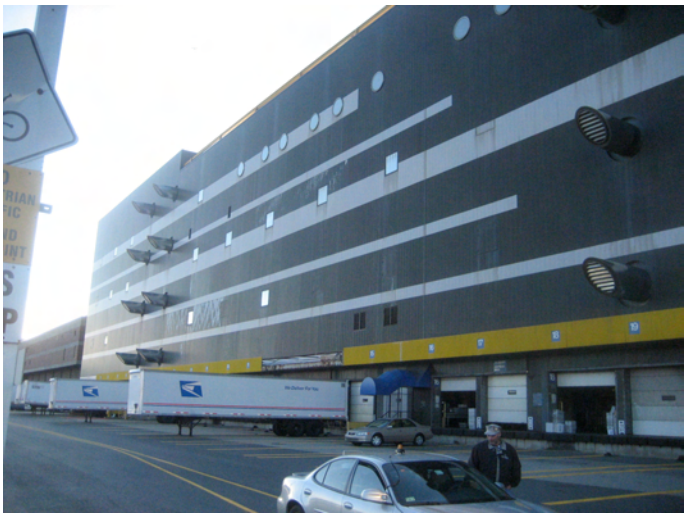
Berthing and tie-up locations for short term private small vessel docking with specified time limits to allow for visits to restaurants, museums, shops and other Channel edge activities.

These locations would be privately maintained and operated for public use on first-come, first-served basis.

Specific Recommended Actions
In order to achieve these activation objectives, the following actions should be undertaken:

Definition of water-dependent business use protection and access areas, including water intake/discharge sites and vessel access points (for existing businesses including Gillette, Hook Lobster, Neptune Marine Services and the Boston Tea Party Ship &Museum, and for any potential future water-dependent business sites).

Marina slip and berthing management guidelines with owner agreements to define and limit slip rental duration, and to encourage the maximum amount of turnover, activation, and public access.



United States Postal Service

Parcel ID	0305365000	
Owner	UNITED STATES POSTAL SERV	
Address	25 DORCHESTER AV	
Property Type	0900	
Building Value	$0.00	
Land Value		$52,061,500.00
Total Value		$52,061,500.00
Lot Size		617794 sq ft
Land Use		Exempt

The City of Boston believes that distinct and unique circumstances apply to the USPS parcel in the planning area and are not recommending any substitutions for future private non-water-dependent development on this site. Recognizing that track expansion is critical to the future viability of South Station and its ability to meet City, State and regional transportation needs, the Executive Office of Transportation and Construction is collaborating with the United States Postal Service to ensure that land is available for track expansion. On July 21, 2000, the Executive Office of Transportation and Construction and the United States Postal Service reached an agreement to address limited capacity at South Station by accommodating four additional tracks and associated platforms on the Postal Service site as part of its future relocation plans.

The EOTC and USPS agreement identifies the potential alignment of the new tracks. The proposed diagonal alignment agreed to by EOTC and USPS is intended to accommodate direct pedestrian access at ground level from South Station to the Fort Point Channel should such a plan be agreed to by all necessary parties. The track expansion will increase capacity at South Station by over 30%. South Station Transportation Center ("SSTC") is owned by the Massachusetts Bay Transportation Authority. SSTC is a major regional transportation terminal serving the Redline, the future Silverline/South Boston Transitway, commuter rail for all services south and west of Boston, Amtrak northeast service and commuter and long distances buses.

SSTC is an *Infrastructure Facility* as described in 310 CMR 9.02. The proposed South Station track expansion plans may be defined as a *Public Service Project* as described in 310 CMR 9.02. The City of Boston anticipates track expansion to be a non water-dependent use project consisting entirely of infrastructure facilities that meet the proper public purpose requirements of 310 CMR 9.31 without the need to tailor the waterways regulations through a municipal harbor plan 310 CMR 9.34.

The City of Boston submitted its Request for Notice to Proceed ("RNTP") for the Fort Point Downtown Waterfront Municipal Harbor Plan in September 2001 with the recommendation of developing a phased municipal harbor planning process. The RNTP identifies a distinct set of planning challenges for the USPS in comparison to the other parcels in the planning area.

The Postal Annex property is approximately 16 acres, over 1/3 of the harbor planning area;

The Postal Annex parcel is isolated from the Fort Point Downtown area by South Station on the west and the Fort Point Channel on the east and south.

The Postal Annex parcel is not integrated into the urban fabric of the Fort Point Downtown planning area, lacking connecting blocks and public vehicular and pedestrian links to South Station and the Fort Point Downtown area.

The Postal Annex parcel lacks up-to-date city planning guidelines and policies

- The city of Boston intends to conduct a master planning process to develop, through community participation:
- Connections to South Station and other forms of public access;
- Open space;
- Appropriate heights;
- A street and block plan; and

- Urban design guidelines.
- City master planning typically precedes harbor planning including efforts in the following neighborhoods: East Boston, South Boston, Charleston Navy Yard and the Fort Point District.

The Notice to Proceed ("NTP") required that the city complete harbor planning for the Fort Point Downtown in two phases. The NTP required that Phase I develop a consistent planning framework that guide planning decisions in both phases. The Fort Point Downtown Municipal Harbor Plan Phase I, approved in October 2002 provides the planning framework for the entire planning are as it relates to:

- Orientation and type of public open spaces;
- Minimum standards for aggregate open space and water-dependent use zones;
- Building heights and massing;
- Method(s) for quantifying impacts of substitute provisions;
- Criteria for offsets to ground level adverse impacts of substitute provisions;
- Amplifications.

The NTP also required that a *detailed discussion addressing the nature, status, and planning implications of proposed South Station expansion per comment letter from EOTC is provide in Phase II.*

During the planning process for Phase II, the BRA invited the MBTA to present South Station track expansion planning. Also, the MBTA is represented through EOTC on the Municipal Harbor Planning Advisory Committee. On February 19 2003 Dan Breen of the MBTA provided a joint presentation with the USPS.

Figure 10-4 identifies the proposed MBTA New Track Zone. Mr. Breen stated that the presentation addressed the extension of track length and the addition of tracks necessary to expand on all traditional rail lines and increase capacity at South Station by over thirty percent.

The USPS presented an estimated schedule for relocation and completion of track expansion. The schedule estimates that the post office would move to a new facility by mid 2007 and allow for track expansion construction to begin in 2007 and to be completed by 2009.

The July 21, 2000 agreement between the Executive Office of Transportation and Construction and the United States Postal Service states that complex and cooperative planning efforts will continue before any binding agreements are reached. The City will continue to work with these parties to forward the plans for South Station expansion.

245 Summer Street[2]

Parcel ID	0305364005
Owner	BDC SUMMER

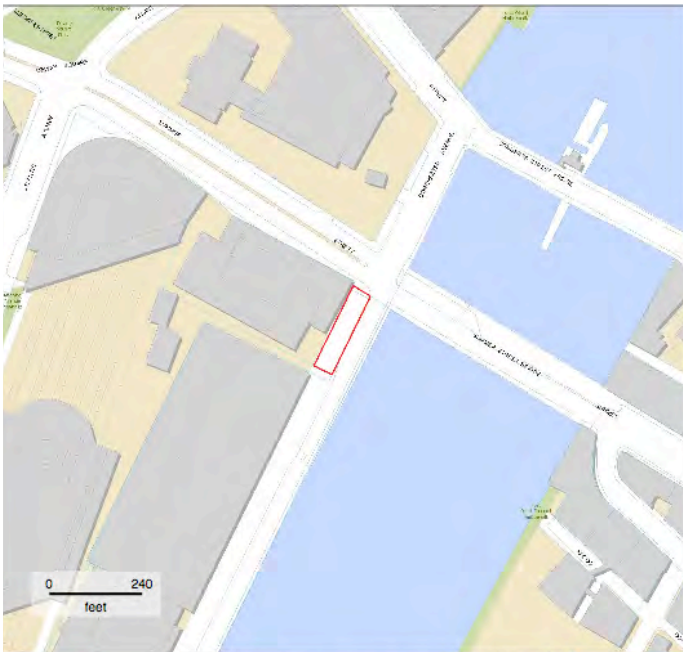

Post Office


Post Office


16
17
18
19
20
21
Doors

Address		245 SUMMER ST
Property Type	0907	
Building Value		$184,857,600.00
Land Value		$50,593,400.00
Total Value		$235,451,000.00
Lot Size		79701 sq ft
Land Use		Exempt - 121A

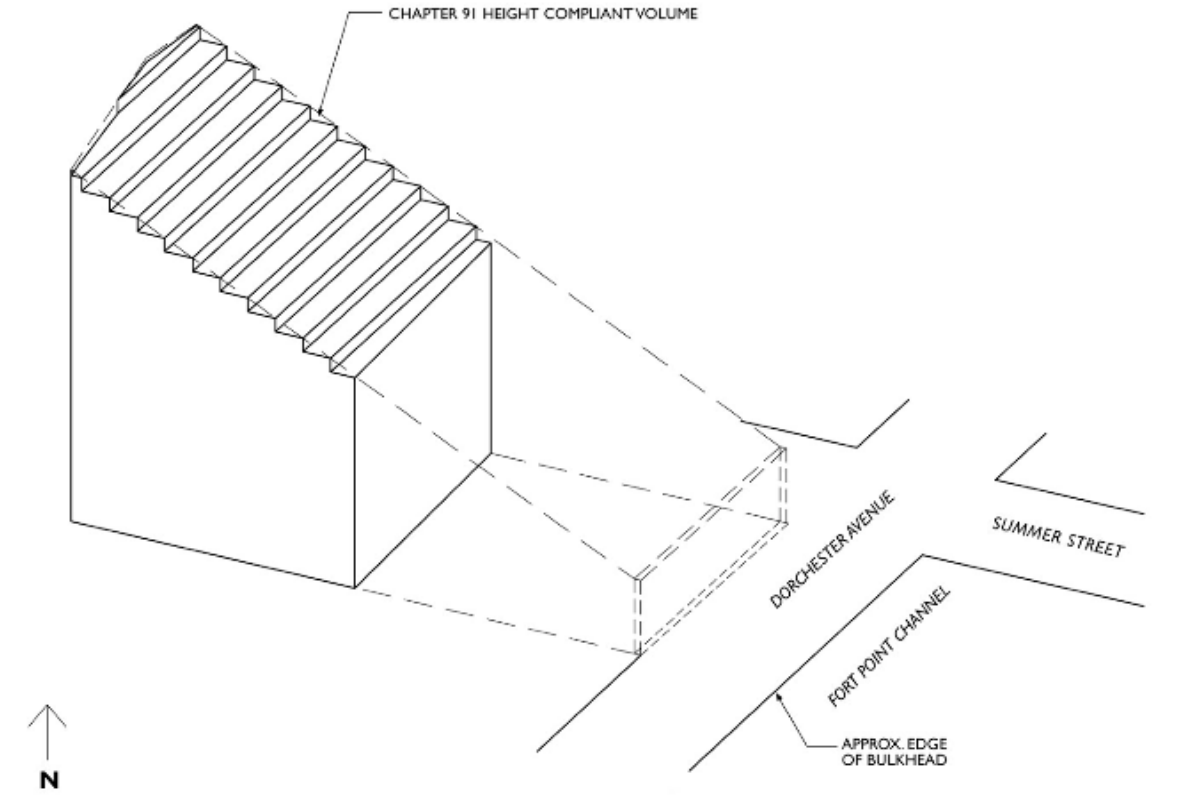
The former Stone & Webster Building, currently owned by Pembroke Realty, an affiliate of Fidelity Investments, is located on the south side of Summer Street between South Station and the Fort Point Channel. It has been and will continue to be used as a commercial office building. Pembroke Realty is proposing improvements to the first floor retail space as well as the creation of an improved connection to South Station. One means of accomplishing these goals under consideration is the incorporation of the existing colonnade into the building, and perhaps adding glass panels along the Summer Street edge of the colonnade to offer greater protection against inclement weather.



Pembroke Realty would like to have destination type retail uses on the first floor, such as restaurants and a food court that will invite the public into the building and down to the Fort Point Channel. The FPCWAP recommends uses including restaurants to activate building edges along the Fort Point Channel. Many existing buildings locate their "back of house uses" including loading docks and trash storage on the Channel side of the buildings, a product of the Channel's past reputation as inaccessible and polluted. One on the goals of the FPCWAP is to redesign existing buildings to front the Channel. The FPCWAP identifies 245 Summer Street/Summer Street sidewalk as a potential location for a future access point down to the subway platforms at South Station. Future development of an area devoted to public open space along the portion of the building adjacent to Fort Point Channel is contemplated to coincide with fit-out of a restaurant at the eastern side of the building. The 245 Summer Street property does not have a water-depend use zone as measured by the Waterways Regulations. The USPS controls the land (formally Dorchester Avenue) in between the building and the Channel.

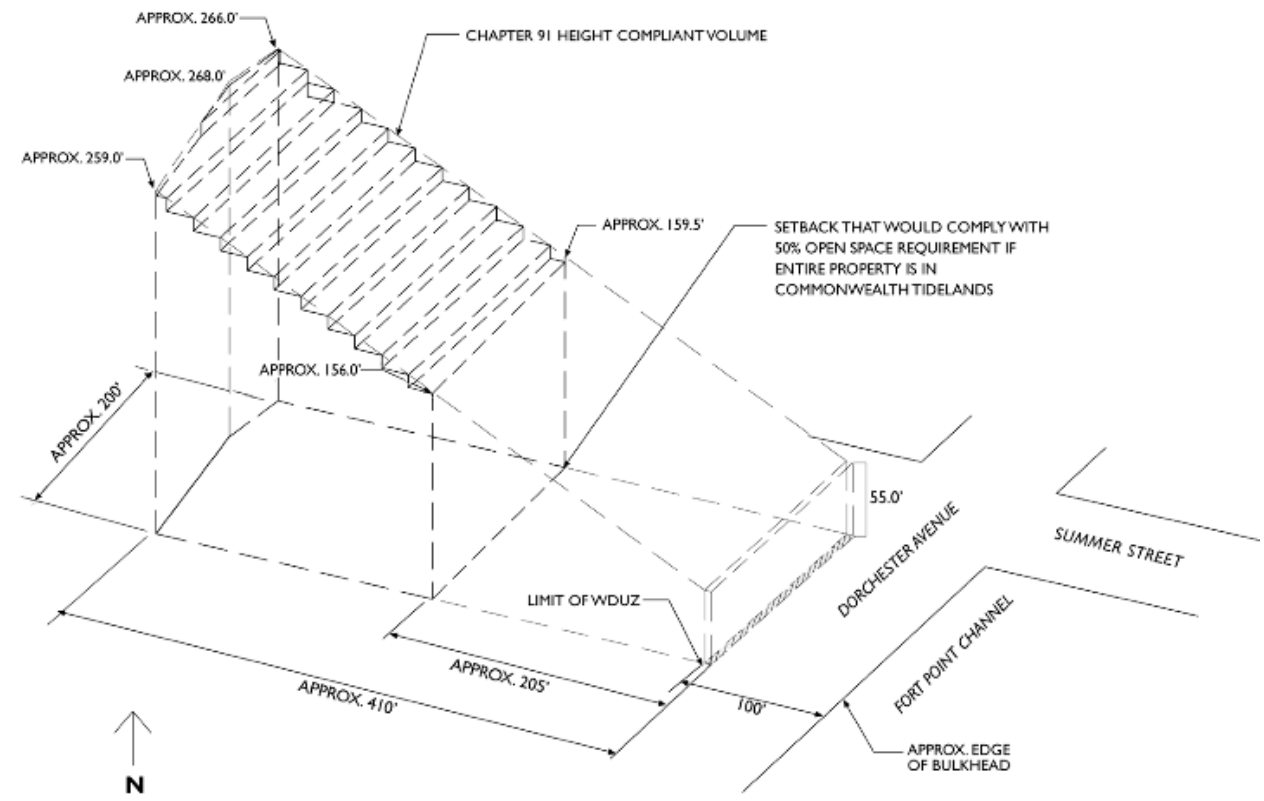
Preliminary planning discussions for activating the USPS property have suggested reopening Dorchester Avenue for vehicular and pedestrian access. Although there appears to be no water-dependent use zone controlled by Pembroke Realty, they have been very active in the City's watersheet activation planning effort. The City welcomes the renewed interest in the building and urges the owner to work with South Station to create more direct and accessible connections to the station platforms and concourse.

No Chapter 91 license currently exists for this building. The new owners may need to apply to DEP for a license or file a Determination of Applicability to determine the extent of Chapter 91 jurisdiction. On the pages to follow are a conceptual Chapter 91 compliant buildout for the property.



245 SUMMER STREET CHAPTER 91 HEIGHT COMPLIANT VOLUME

VOLUME = APPROX. 8,965,552 CU. FT.



245 SUMMER STREET CHAPTER 91 HEIGHT COMPLIANT VOLUME

Guidelines by the Boston Transportation Department for use by the Zoning Board of Appeal[2]

Bicycle Parking

Non-Residential Uses

Any non-residential project shall include a bicycle rack near each public entrance. If the rack is not visible from the sidewalk, a sign directing bicyclists to the parking location shall be posted.

If a parking garage open to the public is part of the project, the garage shall provide bicycle racks in the following quantity: If the project includes retail or entertainment uses, there shall be sufficient space to accommodate one (1) bicycle per ten (10) public automobile spaces or one (1) bicycle per 10,000 square feet of retail or entertainment floor space, whichever number is greater. For other uses, the number of bicycles accommodated shall be as deemed appropriate by BTD.

For projects where a significant number of employees are expected to commute by bicycle, BTD may require a secure bicycle parking area inside the building or in the parking garage.

Standard.
All bicycle parking racks, signs, and secure bicycle parking areas installed per these requirements shall conform to BTD standards.

Service and Loading

Onsite Service/Loading Requirements
Any project subject to or electing to comply with Article 80 Large or Small Project Review should accommodate associated service/loading activity onsite.

Any project seeking to accommodate off-curb loading must submit to the Boston Transportation Department for approval a loading management plan that includes, but is not limited to:

Facilities that have bays, maneuvering areas and appropriate means of vehicular access and egress to and from a street.

Facilities designed to not constitute a nuisance or a hazard or an unreasonable impediment to traffic.

Loading bays that are located entirely on the site that are no less than fourteen (14) feet in width, twenty-five (25) feet in length, and fourteen (14) feet in height, exclusive of maneuvering areas and access drives. (Note: These dimensions are minimums. Actual dimensions will be determined by the Boston Transportation Department in concert with proposed land use, design vehicles, loading operations, etc. as detailed by the proponent's plans.)

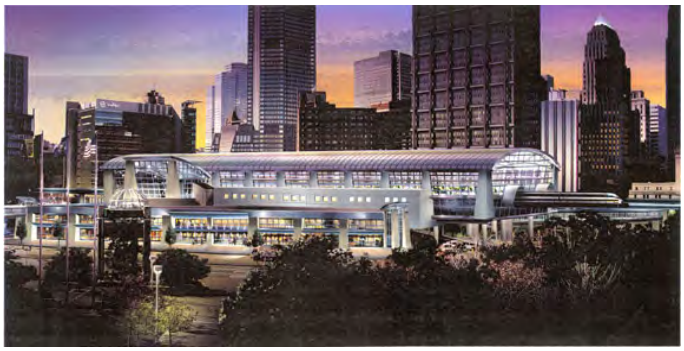
Driveways

Requirements for Curb Ramps with Flared Sides

According to the ADA Accessibility Guidelines, if a curb ramp is located where pedestrians must walk across the ramp, or where it is not protected by handrails or guardrails, it shall have flared sides.
(Architectural Access Board, 521 CMR).

Commercial Driveways – Minimum and Maximum Width
The minimum recommended distance a driveway for commercial use is permitted from an unsignalized or signalized intersection is one-hundred (100) feet.

The minimum two-way operational driveway width for a commercial use is twenty (20) feet. The maximum two-way operational driveway width for a commercial use is twenty-four (24) feet.



Parking Garages and Surface Lots
Parking Garages and Surface Lots with 20 Spaces or Greater

Pedestrian warning devices (eg: signs, noise and light devices, mirrors) should be located at all entrances and exits that intersect pedestrian walkways.

Parking Garages and Surface Lots with 50 Spaces and Greater
Any parking garage or surface lot in excess of fifty (50) spaces must have a management plan approved by the Boston Transportation Department.

Boston Transportation Department – Rules and Regulations
All off-street parking must comply with the Boston Transportation Department's rules and regulations.

Parking Ratios

Onsite Parking Compliance
Any project subject to or electing to comply with Article 80 Large Project Review should accommodate associated parking activity onsite.

Recommended Maximum District-Based Parking Goals and Guidelines
As part of citywide efforts to reduce parking demands and better manage the overall supply, the table below provides a summary of BTD's recommended maximum district-based parking goals and guidelines. This table should be used as guidelines when reviewing proposed projects' parking plans with an understanding that each project is unique.

Transportation Access Plan Agreement (TAPA)

At the discretion of the Zoning Board of Appeal, any project that requires a Transportation Access Plan Agreement (TAPA) should not be approved unless an executed TAPA is provided.

An executed TAPA between the Boston Transportation Department and the developer is required for any project subject to, or electing to, comply with Article 80 Large Project Review. Large Project Review is broadly defined as erecting a structure having a gross floor area of 50,000 or more square feet. Small Project Review is broadly defined as a project adding 20,000 or more square feet or fifteen (15) or more dwelling units*. More detailed definitions can be referred to in Sections 80B-1-2 and Sections 80E-1-2 in

Volume 1 of Boston's Zoning Code and Enabling Act.
Key components of TAPA's include:

Transportation Demand Management (TDM) Measures Implementation of TDM measures can include, but are not limited to:

- Subsidized MBTA Pass programs.
- Membership in the local area Transportation Management Association.
- Bicycle parking areas.
- Priority carshare, vanpool and carpool parking.

Traffic Mitigation Measures Implementation of traffic mitigation measures can include, but are not limited to:

- Pan Tilt Zoom cameras.
- Signal equipment.
- Fiber optic cable.

Traffic Impact Model:

At the discretion of BTD, a computer model needs to be executed in Synchro (most recent version) of projected traffic impacts of proposed transportation projects. The Synchro model output must be calibrated to reflect field operations and provided to BTD on a CD-ROM.

Parking Goals within Boston Proper

PARKING REQUIREMENTS IN EXISTING ZONING PROPOSED

Restricted Parking District
Part of Boston Proper Parking Freeze
Office: Maximum 1/1,500 square feet (Planned Development Area only)
Residential: 0.4-1.0 spaces/unit based on Floor Area Ratio

PARKING RATIO GOALS

Office: 0.4 spaces/1,000 square feet
Hotel: 0.4 spaces/hotel room
Residential: 0.5-1.0 spaces/unit based on housing type

PUBLIC TRANSPORTATION ACCESS

Orange and Red Lines
Commuter rail (South Station)
Express and local MBTA bus routes
Private commuter/shuttle services
Silver Line

MAGLEV TRANSIT

MAGNETIC LEVITATION:
a new form of transit

Only expanding airports or widening highways will not solve America's growing travel problems. Dramatic increases in demand are overwhelming the capacity of America's conventional transportation systems. Building up America's existing transportation systems without investing in new technology solutions can only mean expanded use of those already overloaded modes. When that happens, proven technology fails. That means all Americans suffer from additional congestion, economic loss from missed appointments, reliance on oil, and continued vulnerability to soaring energy costs.

Super fast maglev routes can connect cities to cities, cities to their airports and airports to airports. Once maglev systems are installed along heavily traveled corridors, the traveling public will quickly discover that there is a better way to travel.

In the past, if roads became too crowded, we would simply build wider roads. That led to limited access highways with multiple lanes. Now these highways are again too crowded, but often there is little or no room to expand. For people to leave their automobiles at home, they need to be enticed by a superior and convenient mode of travel.

Congestion is also a problem at our airports. Airlines ordered more planes to service more passengers, forcing airport authorities to build bigger airport terminals to accommodate the increased number of flights. Larger cities were forced to build entirely new airports, often far from city centers. Now, communities that are near airports are resisting the expansion of runway capacity because of the understandable opposition to increased jet engine noise and jet fuel air pollutants.

A maglev network will reduce air traffic, airport and road congestion caused by inter-city travel. With more people using this mode of transportation to travel between cities, airport and highway air and noise pollution will be reduced.

As a result of the highways and airports being overcrowded, people have recently begun to turn to rail transportation with the introduction of faster passenger service. While rail travel is more relaxing, most people still find it too slow. In response to

this increased demand for rail transportation around the country, new high-speed rail initiatives have arisen to explore sites for possible projects.

Magnetic levitation transportation systems will dramatically increase the levels of reliability and safety that were once only a traveler's dream while altering existing concepts of time and distance.

> For instance, imagine traveling from downtown New York to downtown Washington, DC in under two hours - regardless of weather conditions. If you miss your maglev train, you just take the next one fifteen minutes later.

Today, 30% of all domestic flights are 500 miles or less. With a maglev system in place, short distance airline flights can be reduced, thus significantly relieving airport congestion. And those that do fly will probably find themselves being whisked to airports on these virtually silent bullets of efficiency.

Communities near the guideways will continue to prosper, since the elevated maglev systems will not interfere with local road networks and will not pollute or disturb local activities with any appreciable noise. Building maglev guideways around the country will provide the added benefit of jobs for local communities, and with very low environmental impact due to the small footprint of the support piers.[2]

guideways.

Elevated guideways can be built along Interstates, through forests or above cityscapes - all with extremely low environmental impact. Guideways can be integrated - at grade - into existing train terminals or as new layer in transportation infrastructure. The elevated maglev guideways offer a flexible means of linking up with existing downtown mass transportation facilities.

vehicle.
The rapid movement of people is facilitated by computer-controlled trains that leave stations regularly and precisely on time. During rush hours, more trains can easily be scheduled or more cars added to each train (up to ten cars per train) to accommodate the increased number of passengers. Maglev can be expanded to a level where it could safely become a veritable high-speed conveyor belt for passengers - and with maximum comfort.

competitive transportation systems.

airports.

While the federal government doesn't build airports, it does allocate $14 billion every year towards construction to local airport authorities. This doesn't mean that the airports automatically proceed with construction. Community opposition to increased air traffic has stymied several airport construction projects around the country, further aggravating an already bad situation.

> "If we just diverted $2 billion of the airport money annually to rail service, we would free more than enough airport capacity to cover the diversion."
>
> Washington Post, 2001

highways.

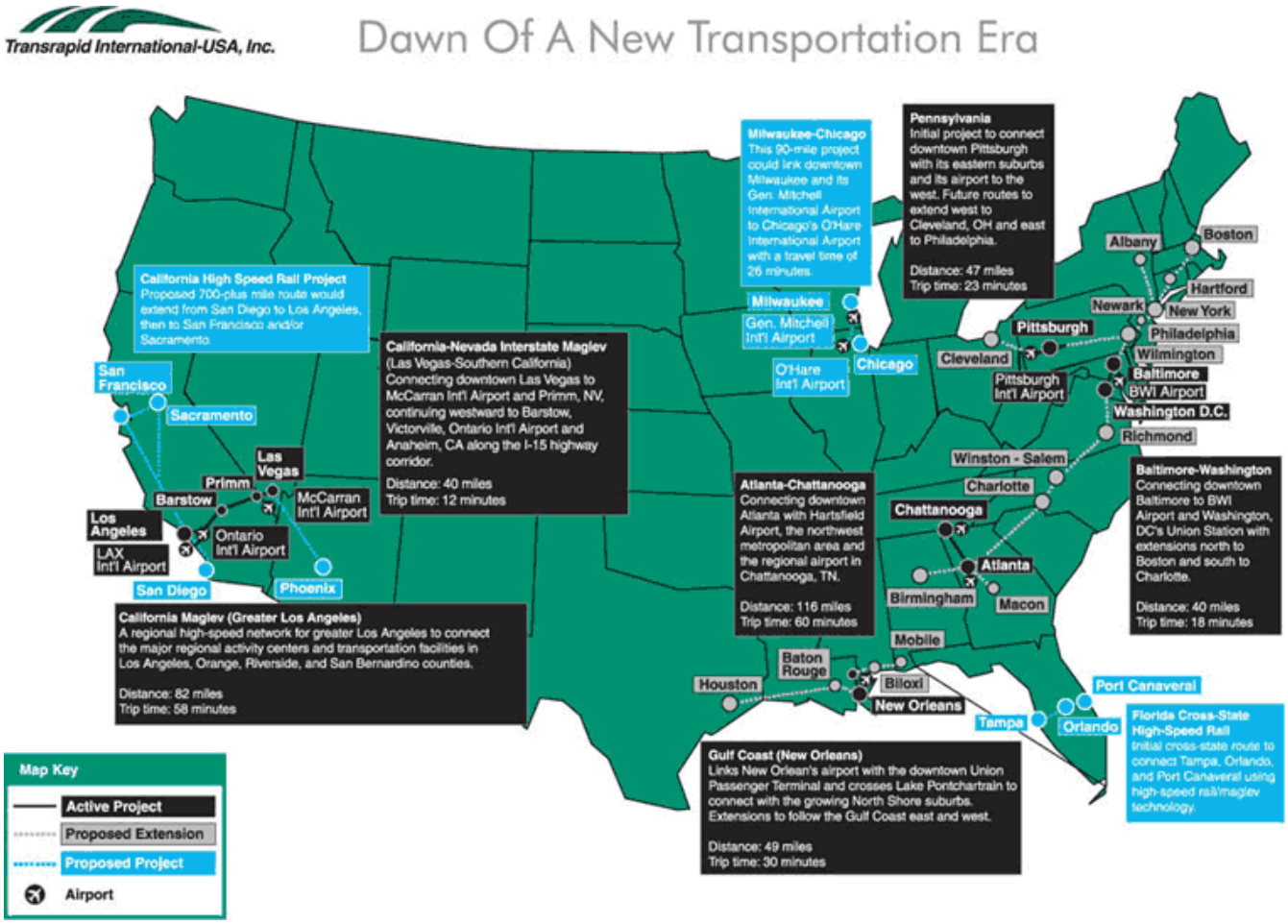
Highways and streets are the largest component of public transportation infrastructure spending with $33 billion spent every year by the federal government toward this segment of the infrastructure.

railroads.

According to the US Department of Transportation's latest figures, ridership of heavy rail has been climbing faster than of any other mode of public transportation. Pressure is mounting on Congress to appropriate more funds for this mode of transportation. Unfortunately, railroad infrastructure assistance is presently lagging far behind other modes of transportation, with Amtrak only receiving $361 million per year in assistance.

a new transportation era.

The U.S. Maglev Deployment Program was created by Congress in the Transportation Equity Act (TEA21) of 1998. Since then, Transrapid International-USA, Inc. has been working around the country to deliver the safest high-speed ground transportation system ever developed. Multiple public and private projects are already underway. There are three projects nationwide:



Baltimore-Washington Maglev Project connects the two downtown areas, including a stop at BWI Airport. Eventually, extensions would continue north to *Boston* and south to Atlanta.

Pennsylvania Maglev Project connects Pittsburgh International Airport with downtown and its eastern suburbs. Plans are also being made to extend the line eastward to Philadelphia and westward to Cleveland and beyond.

Atlanta – Chattanooga Maglev Project is studying routes to relieve massive automobile congestion. The system would connect Atlanta Hartsfield International Airport with downtown and the northern suburbs, with an extension to Chattanooga. The Project is also planning to expand this corridor to Nashville, Macon and Savannah .

In the West, there are several proposed routes designed to relieve that region's traffic problems.

California-Nevada Interstate Maglev Project is planning to build a 269-mile maglev corridor connecting Las Vegas with Ontario International Airport and Anaheim, California .

In the Los Angeles metropolitan area, the Southern California Association of Governments (SCAG) is examining an east-west commuter corridor connecting Los Angeles with Covina and Ontario .

creating jobs.

A benefit to pursuing our innovative transportation solution is that these projects, and others like them, will add a tremendous boost to American industrial development and provide many American workers with employment opportunities for years to come.

Construction of the maglev guideways alone, with miles of prefabricated steel and concrete beams and thousands of support piers, will provide significant long-term opportunities for U.S. manufacturers of steel, concrete, power cables, hardware, software and electronics. When completed, the network will serve many destinations with little substantial disruption to neighboring communities.

Direct high-speed high-volume access to airports, city centers and suburban mass transit stations, makes maglev the only system capable of keeping journey times short and energy consumption low, even with intermediate stops. It is capable of traveling through densely populated areas at speeds of up to 120 miles per hour without noticeably disturbing the inhabitants. These system advantages are of crucial importance in densely populated regions such as the Northeast corridor, where additional strains on people and the environment should be avoided. As maglev systems become operational around the world, more and more regions will pursue this high-speed alternative to eliminate congestion.

technology.

A maglev system will provide:

frictionless, non-contact, non-wearing trains

high-speed regional traffic at 125 to 220 mph, to super-speed intercity traffic at speeds of up to 310 mph

faster acceleration - faster braking
high grade-climbing ability (10 and vehicle tilting (12 degrees) allowing for more flexible route alignments

no on-board propulsion motor

low weight vehicles enable high energy efficiency

quieter operation at all speeds than any other surface transportation system

low operating and maintenance costs

lower maintenance costs due to the absence of moving parts for levitation, propulsion and guidance

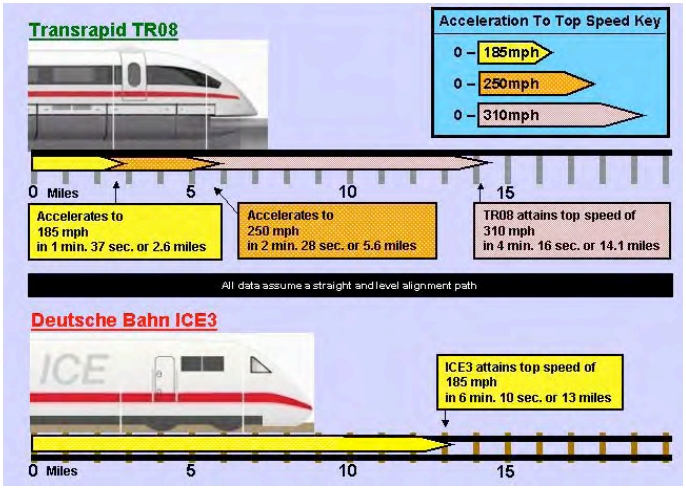
modular electronics allow for rapid replacement of parts, reducing vehicle downtime

The maglev system is a high-speed, track-bound, frictionless transportation system for passengers and high-value cargo. The non-contact technology of the maglev system, using electromagnets instead of mechanical components, overcomes, for the first time, the technical and economic limitations of wheel-on-rail technology.

In operation, the maglev is quieter, more cost-efficient, and consumes less energy than a railroad system. It is virtually impossible to derail and is comfortable at all speeds. The elevated guideway consumes less space than a traditional railbed and has the flexibility to be aligned along the existing landscape. The maglev system has no wheels, axles, or overhead power transmission wires; it does not roll on wheels, it levitates. The wheels and rails of the railroad are replaced by non-contact, electromagnetic support, guidance, and propulsion systems.

speed.

Modern high-speed railroads generally run at speeds of up to 185 mph on specially designed routes. The non-contact levitation, guidance and propulsion technology of the Transrapid system allow cost-effective operation at considerably higher speeds (310 mph). Consequently, for medium and long distances (up to about 500 miles), maglev trip times are much shorter than for high-speed rail and more similar to airplane travel.



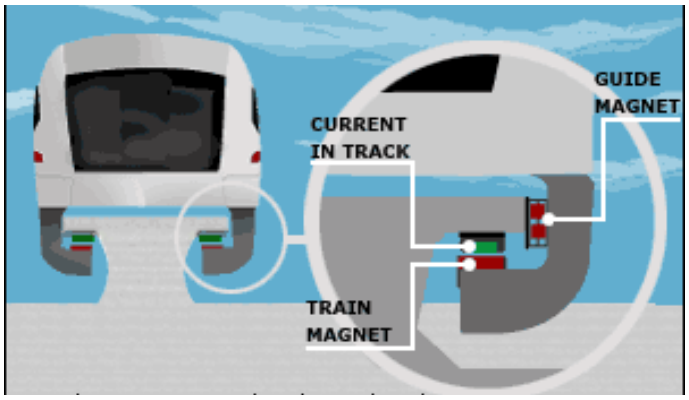
support + guidance system.

The non-contact support and guidance systems of maglev trains function according to the principles of electromechanical levitation. They uses the attractive forces between the electronically controlled electromagnets in the vehicle and the ferromagnetic reaction rails on the underside of the guideway. The support magnets pull the vehicle up to the guideway from below while the guidance magnets keep it laterally in line. The support and guidance magnets are arranged on both sides along the entire length of the vehicle.

A highly reliable, fully redundant electronic control system ensures that the vehicle levitates at an average distance of approximately 3/8 of an inch from its guideway. The distance between the top of the guideway and the underside of the vehicle during levitation is 6 inches, enabling the vehicle to levitate over small objects or a layer of snow.

propulsion system.

The synchronous long-stator linear motor of the Transrapid maglev is used both for propulsion and braking. The function of this non-contact system is analogous to the principle of a rotating electric motor whose stator is cut open and stretched along both sides of the guideway. Instead of a rotary magnetic field, the motor generates an electromagnetic traveling field. The support magnets in the vehicle function as the rotor (excitation portion) of the electric motor.



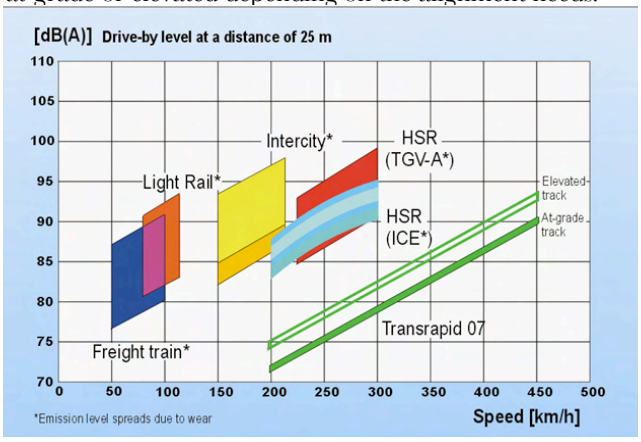
By supplying alternating current to the three-phase motor winding, the electromagnetic traveling field is generated, moving the vehicle. The speed can be continuously regulated from standstill to full operating speed by varying the frequency of the alternating current. If the direction of the traveling field is reversed, the motor brakes the vehicle, again without any contact.

The primary component of the propulsion system is installed in the guideway, and vehicles do not need o carry the entire motor power that must be sized for the peak requirements, as is the case with other technologies. All vehicle power, including that used for support and guidance systems, is supplied, without contact, via the linear generators integrated into the support magnets. In the event of a power failure, energy is supplied from on-board batteries that are charged by the linear generators during normal travel. Because there is no track contact during operation, the interior passenger cabin is extremely quiet and the ride smooth.

passenger comfort.

Passing other maglev vehicles or going through tunnels at high speed will not cause passenger discomfort because the vehicles are pressure-sealed. No seat belts are required because the entire trip is computer controlled to be smooth while accelerating, cruising and braking - regardless of the weather.

To achieve the best possible ride comfort, the requirements of the guideway in terms of fabrication, equipment, availability, and service life are especially stringent. The single- or double-track guideway of the maglev system consists of individual guideway beams made of steel or concrete in standard lengths ranging from 20.3 ft - 203.4 ft. The guideway can be installed at-grade or elevated depending on the alignment needs.



noise.

Compared with other transport systems, maglev systems are extremely quiet. At speeds up to 155 mph, the maglev travels almost soundlessly through cities and metropolitan areas. The pass-by noise levels of maglev have been measured at the full-scale Transrapid Test Facility (TVE) in Germany. The levels for an elevated guideway compare favorably with other rail systems, while for at-grade guideway maglev noise levels are even lower.

guideways.

elevated guideway.

An elevated guideway is especially appropriate in areas that should not be separated for ecological or agricultural reasons and/or where the new line should not block existing traffic routes. Variable column heights of up to 65 ft. and standard beam spans of up to 203 ft. allow flexible adaptation of the guideway to the topography. Elevated guideways are mounted on small foundations with columns architecturally suited to the surrounding infrastructure. In areas with poor soil conditions, elevated guideways can also be utilized near to the ground (without columns) which is often more economical than using at-grade guideways with continuous foundations.

The use of elevated guideways causes little or no disturbance to the original landscape. Consequently there is practically no impact on ground and surface water.

at-grade guideway.

The guideway is installed at-grade mainly where it can be co-located with existing traffic routes (roads, railroads) as well as in tunnels and on primary civil structures such as bridges and stations. Specific features are the standard beam spans of 20.3 ft. and heights of 4.1 ft - 11.5 ft. At-grade guideways are mounted on continuous foundations and are typically fenced-in to improve safety.

switches.

The maglev changes tracks using bendable steel switches. They consist of continuous steel box beams with lengths between 256 ft. - 486 ft., which are elastically bent by means of electromagnetic setting drives. Operation is electronically controlled and safeguarded.

Bendable switches can be designed as two-way or three-way switches, either at-grade or elevated. In the straight position, a vehicle can cross the switch without speed restrictions. In the turnout position, speed is limited to 125 mph (high speed switch) or 62 mph (low speed switch).

In parking and maintenance facilities, tracks can be changed using a transfer table. These tables operate by laterally moving a straight length of guideway (with the vehicle sitting stationary on top) to access multiple parallel tracks.

route alignment parameters.

Two features of the maglev system allow it to have extremely favorable route alignment parameters. These are the active

guidance of the vehicle along the guideway and the propulsion system (motor) in the guideway. These innovative system features allow gradients of 10-percent to be climbed (as opposed to 4-percent gradients for conventional railroads) and curves with tight radii and banking of up to 12-degrees to be traveled without difficulty.

interconnection with other transportation modes.

For maximum convenience and customer satisfaction, maglev stations are always interconnected with other available transportation modes (rail, road, air). They are multi-modal in nature, conveniently located for passenger and service access, and allow simple transfer to other modes of travel. Depending on the station and its location, these other modes may include long distance rail, suburban/light rail, buses, taxis, subways, private cars, and/or airplanes. Integrating maglev service into the overall transportation network provides maximum benefits and transportation performance to the traveling public.

Public acceptance and economic viability of the maglev system depend on the accessibility of its stations. Therefore, when planning a route, care is taken to ensure close proximity to all available systems, not just to roads. Effective relief of road traffic can only be realized if drivers can conveniently transfer to the maglev system for reaching their destination. This requires quick, reliable and economical access to major roads and the availability of sufficient park-and-ride facilities.

safety.

Despite the high speeds of up to 310 mph, you are safer on board the maglev train than in any other means of transportation. The vehicles are not subject to derailment because they wrap around the guideways. Since grade crossings are eliminated, no other types of vehicles can obstruct the guideway. Collisions between Transrapid vehicles are also ruled out due to the technical layout of the system and the progressive section-by-section switching of the guideway motor.

Additionally, the section of the long-stator linear motor in which the vehicle is moving is only switched on as the vehicle passes.

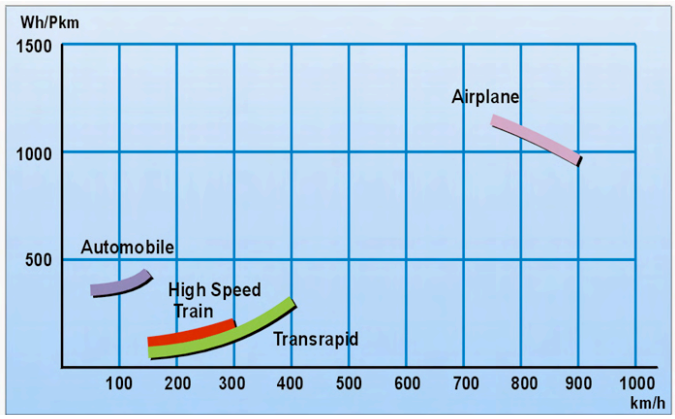
With regard to fire protection, the maglev meets the highest requirements of the relevant standards. There are no fuels or combustible materials on board. Only materials that are non-flammable, poor conductors of heat, burn-through-proof, and heatproof are used in the vehicles. As an additional safety precaution, fireproof doors separate vehicle sections.

passive protection equipment to prevent damage to the guideway structure and violation of the vehicle's clearance envelope, automatic inspection of the guideway,

protection of the passengers during boarding and exit in the stations by means of platform doors and gap bridges between doorways and station platforms.

Even if the power from the public grid fails while the vehicle is running, only the propulsion system is lost. The vehicle levitation and guidance systems and all on-board equipment are supplied from on-board batteries, so the vehicle continues to levitate and move forward with its existing momentum. If the next station is too far away, the vehicle will be automatically braked to a stop at the next available auxiliary stopping area. These "safe stopping areas" are planned in advance for this purpose along the route so that convenient access is provided for evacuation services, should they be required.

Even in the rare case of a significant technical failure in the maglev system, the vehicle will always be brought to a stop automatically at an auxiliary stopping area. If a fire is reported, the vehicle also automatically stops at the next auxiliary stopping area as a precaution. If necessary, passengers may be quickly and conveniently evacuated there.



environmental compatibility.

The introduction of a new transportation system such as maglev makes the most sense when it also possesses ecological advantages and contributes to a reduction in pollution caused by other forms of transportation.

- no rolling or propulsion noise due to the non-contact technology
- no combustion exhaust gases or other pollutants emitted along the route
- independent of primary energy source
- low land consumption of the elevated and at-grade guideways
- elevated guideway does not divide landscape, developed structures, or biological habitats
- elevated guideway does not impair game movements and the at-grade guideway allows passage for amphibians and small animals
- few embankments and cuttings result in minimal disruption of the landscape
- flexibility of guideway design allows system to adapt to topography with minimal disruption

energy consumption.

The favorable energy consumption figures of the maglev system are a result of several design features:

- modern power electronics
- avoiding electromechanical energy conversion that uses friction-based elements for propulsion
- off-board power supply
- a high-efficiency synchronous long-stator motor
- powering of the guideway in sections
- low-mass vehicles (approximately 0.5 metric ton per seat)
- low running resistance (approx. 0.2 kN per seat) at 250 mph

When compared over equivalent distances, the specific primary energy consumption of automobiles is three times higher and modern airplanes five times higher than maglev.

CO2 emission.

Lower energy consumption for maglev also means lower CO2 emission. The CO2 emission depends on the primary energy consumption -- the method and raw materials used to generate the energy -- and how it is distributed.

land consumption.

Maglev requires the lowest amount of space and land for the guideway infrastructure and related facilities in comparison with other surface transportation systems. The space required for standard, elevated, double track guideway for the maglev including substations and wayside equipment is approximately 6.9 square feet per foot length.

The space required for standard, at-grade, double track guideway including substations and wayside equipment is approximately 39.4 square feet per foot length.

An access road along the guideway is not required after construction has been completed - neither for safety reasons nor for maintenance of the guideway and wayside equipment. The land can therefore be returned to its original condition.

vibration.

When maglev passes by, vibrations are transmitted from the guideway into the ground via the foundations. In Germany, these vibrations are subject to the Federal Emission Control Act. Measurements at the TVE have shown that at a distance of 82 ft. from the guideway and a vehicle speed of 155 mph (a typical top speed in urban areas) vibrations are below the "threshold of feeling" for human beings. At a distance of 164 ft. from the guideway, no vibration is perceivable at any speed.

weather influences.

A tremendous advantage of all high-speed track-bound transportation systems is that they are relatively unaffected by the weather. It's non-contact technology functions even under extreme weather conditions. The propulsion components are protected underneath the guideway from snow and ice build-up. If more snow or ice collects on the guideway than the specifications allow, a special vehicle can clear the guideway. Clearing is made easier by the smooth upper surface of the guideway.

Crosswinds and gusts have little effect on maglev vehicles because of its active control and lateral guidance systems. Wind speeds of up to 67 mph have no effect on operations at all. At the TVE, it has been shown that the vehicle operates without difficulty at speeds up to 220 mph with wind gusts up to 94 mph.

transrapid.

All project activities in the US are conducted through, Transrapid International-USA, Inc., located in Washington, D.C. TRI-USA was created to support the Maglev Deployment Program and to respond to the enthusiastic U.S. market for the Transrapid technology. TRI-USA enjoys exclusive rights to the Transrapid technology in the United States. In addition to project management and associated work, TRI-USA actively works with the public and private sectors at the national, regional, and local levels.

U.S. DISTRIBUTION, PROJECT SUPPORT, MARKETING, SALES, AND PUBLIC INFORMATION

U.S. Distribution, Marketing, Sales, and Public Information

Transrapid International-USA, Inc.
601 Pennsylvania Ave, NW
North Building
Washington, DC 20004

Telephone: (202) 969-1100

international project.

Asia
Pudong International Airport to downtown Shanghai (Revenue Service early 2004)

Australia
Airport connections
Interconnecting eastern city travel

Europe

Airport connections
Interconnecting midrange travel between cities
City loop and feed to subway and rail terminals
Munich Airport connector

North America

Northeast Corridor intercity travel
Airport connections
Interconnecting midrange travel between cities
City loop and subway/light rail feeds

South America

Airport connections
Interconnecting midrange travel between cities
City loop and subway/light rail feeds

Transrapid International-USA, Inc.

System Features	Maglev Transrapid	High Speed Rail (ICE 3)
Technology		
Vehicle	Non-contact, Electromagnetic Levitation and Guidance, Attractive Principle, 10 mm (3/8 in.) Gap (nominal)	Steel Wheel on Rail
Propulsion	Synchronous Longstator Linear Motor Mounted on Guideway	Asynchronous AC Motors in Power Cars
Energy Supply	Public Network (i.e. 110 kV, 50/60 Hz) or Internal Railroad Network (16 2/3 Hz)	AC 15 kV/25 kV, DC 1,5 kV/3,0 kV
Operation Control System	Fully Automated Communication and Control System, Digital Radio Transmission, Driver optional	Automatic Train Control (LZB), Driver required
Performance		
Speed		
Design Speed	550 km/h (340 mph)	330 km/h (205 mph)
Operating Speeds		
Rural	500 km/h (310 mph)	300 km/h (185 mph)
Urban	250 km/h (155 mph)	100 km/h (60 mph)

System Features	Maglev Transrapid		High Speed Rail (ICE 3)	
Performance				
Acceleration Performance	Time	Distance	Time	Distance
0-100 km/h (60 mph)	31 s	424 m (1,391 ft.)		
0-200 km/h (125 mph)	61 s	1,700 m (5,577 ft.)	140 s	4,400 m (14,436 ft.)
0-300 km/h (185 mph)	97 s	4,200 m (13,780 ft.)	370 s	20,900 m (68,570 ft.)
0-400 km/h (250 mph)	148 s	9,100 m (29,856 ft.)		
0-500 km/h (310 mph)	256 s	22,700 m (74,475 ft.)		
	Data depend on propulsion layout			
Braking Performance	Time	Distance	Time	Distance
100-0 km/h (60 mph)	30 s	415 m (1,362 ft.)		
200-0 km/h (125 mph)	59 s	1,576 m (5,171 ft.)	79 s	2,184 m (7,165 ft.)
300-0 km/h (185 mph)	88 s	3,906 m (12,815 ft.)	119 s	4,956 m (16,260 ft.)
400-0 km/h (250 mph)	117 s	6,725 m (22,064 ft.)		
500-0 km/h (310 mph)	147 s	10,475 m (33,367 ft.)		
	Data depend on propulsion layout		*Data refer to service braking modus*	
Example Trip Times				
Airport Connector (40 km) (25 mi)	10 min. (No intermediate stop)			
City Connector (300 km) (185 mi)	53 min. (One 2 min. intermediate stop)			
Long Distance (800 km) (500 mi)	115 min. (Two 2 min. intermediate stops)			

System Features	Maglev Transrapid			High Speed Rail (ICE 3)	
Performance					
Energy Consumption	Specific Energy Consumption (Secondary Energy)				
Constant Speed of					
300 km/h (185 mph)	--			50 Wh/Plkm	
430 km/h (265 mph)	55 Wh/Plkm			--	
	Data refer to a 5 section train, 446 seats			*Data refer to a 8 section train, 415 seats*	
Standard Speed Profile with Maximum Speed of				ICE 1	ICE 3
200 km/h (125 mph)	30 Wh/Plkm			39 Wh/Plkm	36 Wh/Plkm
250 km/h (155 mph)	36 Wh/Plkm			49 Wh/Plkm	46 Wh/Plkm
300 km/h (185 mph)	44 Wh/Plkm			61 Wh/Plkm	58 Wh/Plkm
400 km/h (250 mph)	63 Wh/Plkm			--	--
Power Requirement at Constant Speed of	Train Sections				
	2	6	10		
200 km/h (125 mph)	0.9 MW	2.2 MW	3.6 MW		
300 km/h (185 mph)	2.2 MW	5.0 MW	7.9 MW		
400 km/h (250 mph)	4.4 MW	10.3 MW	16.1 MW		
500 km/h (310 mph)	8.2 MW	18.7 MW	--		

System Features	Maglev Transrapid	High Speed Rail (ICE 3)
Standard Operating Conditions		
Temperature	-25° C (-77° F) up to +40° C (104° F) (standard version) -25° C (-77° F) up to +45° C (113° F) (special version)	
Wind / Continuous Gusts	Normal Operation up to 125 km/h (78 mph), Construction Stability up to 215 km/h (134 mph)	
Snow	10 cm (4 in.) on Deck Plate	
Ice	Up to 10 mm (3/8 in.) on Deck Plate, up to 5 mm (3/16 in.) on Guidance Rails and Stator Packs	
Features		
Environmental Impact	Low	Medium - High
Space Requirements	Low - Medium	Medium - High
Safety	Safest Mass Transportation System Available	

System Features		Maglev Transrapid					High Speed Rail (ICE 3)	
Trains								
Train Configuration		End Section			Middle Section		Driving Trailer / End Car	Trailer Car
Train Size		2			0 - 8		2	6
Section Length		26.99 m (88.5 ft.)			24.77 m (81.3 ft.)		25.68 m (84.3 ft.)	24.78 m (81.3 ft.)
Section Width		3.70 m (12.1 ft.)			3.70 m (12.1 ft.)		2.95 m (9.7 ft.)	2.95 m (9.7 ft.)
Section Height		4.16 m (13.6 ft.)			4.16 m (13.6 ft.)		3.84 m (12.6 ft.)	3.84 m (12.6 ft.)
Payload / Section	Passenger	10.3 t			13.9 t			
	Cargo	14.0 t			17.5 t			
	Freight *(1)*	24 t			30 t			
Seats / Section		62 - 92			84 - 126			
Floor Space / Section		70 m_ (753 ft._)			77 m_ (829 ft._)			
Weight / Seat		500 - 700 kg (1100 - 1540 lb.)			400 - 600 kg (880 - 1320 lb.)		approx. 920 to 1000 kg (2030 to 2200 lb.)	
Capacity								
Number of Sections		2	4	6	8	10	8	
Passenger Seats (high density)		184	436	688	940	1192	408 to 418	
Passenger Seats (low density)		124	292	460	628	796		
Passengers / Cargo		28 t	63 t	98 t	133 t	168 t		
Freight		60 t	120 t	180 t	240 t	300 t		

(1) Special vehicle, system layout, and guideway

System Features	Maglev Transrapid		High Speed Rail (ICE 3)	
Track / Guideway				
Vertical Radii	Minimum	530 m (1749 ft.)		
	Crest	Sag	Crest	Sag
200 km/h	5,145 m (16,880 ft.)	2,575 m (8,448 ft.)	16,000 m (52,493 ft.)	14,000 m (45,932 ft.)
300 km/h	11,575 m (37,976 ft.)	5,790 m (18,996 ft.)	--	--
400 km/h	20,575 m (67,503 ft.)	10,290 m (33,760 ft.)	--	--
500 km/h	32,150 m (105,479 ft.)	16,070 m (52,723 ft.)	--	--
Ride Comfort				
Max. Longitudinal Acceleration	1.5 m/s_ (4.9 ft./s_)			
Max. Lateral Acceleration	1.5 m/s_ (4.9 ft./s_)		1.0 m/s_ (3.3 ft./ s_) Passenger Traffic 0.85 m/s_ (2.8 ft./s_) Mixed Traffic with Freight	
Max. Vertical Acceleration	Crest 0.6 m/s_ (2.0 ft./s_)	Sag 1.2 m/s_ (3.9 ft./s_)	Crest 0.2 m/s_ (0.7 ft./s_)	Sag 0.2 m/s_ (0.7 ft./ s_)
Example Route Data				
Foundation Area, Double Track	Elevated 1.5 m_/m (4.9 ft._/ft.)	At-grade 11.8 m_/m (38.7 ft._/ft.)	At-grade 13.7 m_/m (44.9 ft._/ft.)	
Total Ground Area, Double Track	Standard Case 12.0 m_/m (39.4 ft._/ft.)	Mountainous Region 22.8 m_/m (74.8 ft._/ft.)	Average for new rail lines 31.2 m_/m (102.4 ft._/ft.)	
Earthworks, During Construction, Double Track (w/o Tunnels)	Elevated 13,700 m_/m (16,385 cy/y)	At-grade 47,200 m_/m (56,451 cy/y)	Average for new rail lines 201,878 m_/m (241,444 cy/y)	

System Features	Maglev Transrapid			High Speed Rail (ICE 3)	
Track / Guideway					
Guideway Styles (Beam Material)	Steel, Concrete, Hybrid				
Guideway Types	Type I (Elevated)	Type II (Elevated)	Type III (At-grade)		
Gradient height (Top of Guideway)	2.2 - 20.0 m (7.2 - 65.6 ft.)	2.2 - 20.0 m (7.2 - 65.6 ft.)	1.35 - 3.5 m (4.4 - 11.5 ft.)		
Beam Height (Cross Section)	2.0 m (6.6 ft.)	1.0 m (3.3 ft.)	0.4 m (1.3 ft.)		
Standard Configuration	Double Span	Double Span	Double Span		
Standard Beam Length	62 m (203 ft.)	25 m (82 ft.)	6.2 m (20 ft.)		
Primary Application Areas	Rural, Urban	Rural, Urban	Bridges, Tunnels, Stations		
Tunnel profile	Single Track	39 m_ (420 ft._) (<300 km/h) (185 mph)	70 m_ (753 ft._) (<400 km/h) (250 mph)	Single Track	56 m_ (603 ft._)
	Double Track	78 m_ (840 ft._) (<300 km/h) (185 mph)	--	Double Track	88 m_ (947 ft._) 92 m_ (990 ft._) *(2)*
Primary Structures (Bridges)	Used for Gradient Heights > 20 m (66 ft.) and Span Widths > 37 m (121 ft.)				
Switches					
Construction	Bending Beam Switch with Electromechanical Setting Drives			Standard Railroad Switch with Electromechanical Actuation	
Length / Turn-out Speed	75 m / 100 km/h (246 ft. / 60 mph)			64 m / 100 km/h (210 ft./ 60 mph) or 92 m / 130 km/h (302 ft./ 80 mph)	
	150 m / 200 km/h (492 ft. / 124 mph)			147 m / 200 km/h (482 ft./ 124 mph)	

(2) Frankfurt – Cologne HSR line (300 km/h (185 mph) max. operating speed)

current maglev projects

Baltimore-Washington Maglev

The project has 3 locations for stations: Washington, D.C., BWI Airport and downtown Baltimore. The proposed station sites meet complex criteria for pedestrian and vehicular access and intermodal connectivity. A ridership and cost benefit analysis will be initiated during the DEIS phase to evaluate the merits of an additional station at the Capital Beltway, I-495 near the District of Columbia.

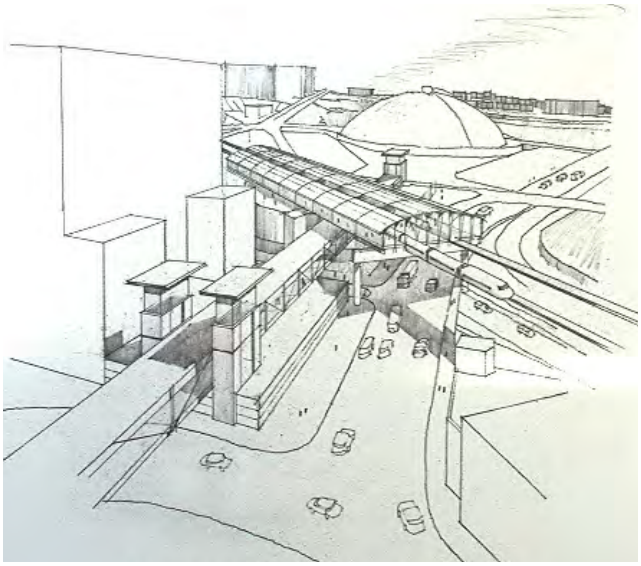
The typical Maglev station consists of five principal elements: the ticketing concourse, the platforms and train guideway approaches, the station parking facilities, intermodal facilities, and associated commercial development. These building elements address arrival and orientation, ticketing, waiting, access to the platforms, management of the stations, concessions and connections to other modes of transportation. All stations will have a concourse that comfortably accommodates the passengers of two trains loading and unloading simultaneously. The station concourses are typically on street level, while the level of the platform is dependent on the elevation of the guideway approach. The stations will be designed to accommodate a 5-section Maglev train, allowing for expansion of the system without modification of the stations.

Pennsylvania Maglev Project

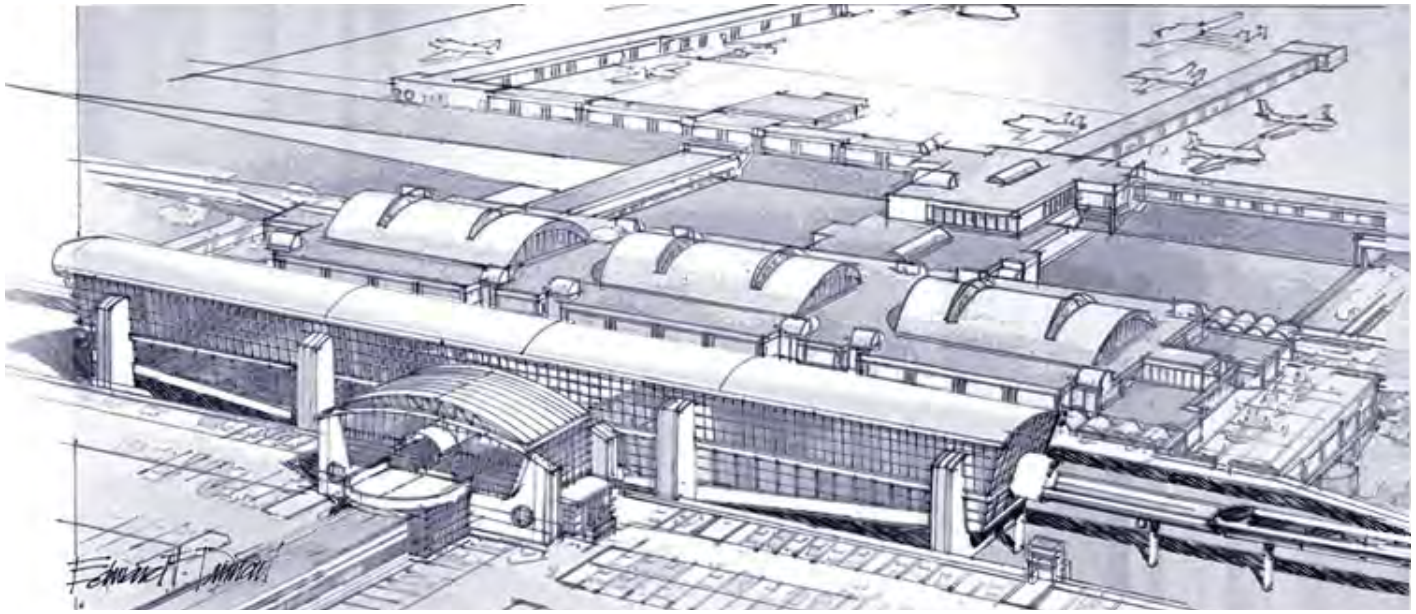
The Pennsylvania High-Speed Maglev Project corridor extends from the Pittsburgh International Airport to Greensburg, with intermediate stops in downtown Pittsburgh and Monroeville. This initial project will serve a population of approximately 2.4 million people in the Pittsburgh metropolitan area.

As the central focus of the passenger station, the stopping station will typically include access to a multi-level parking garage; parking facilities for associated public transportation; customer amenities that may include shopping, auto service, rental car facilities and day care centers for those using the maglev system.

The station will support Intermodal access to the maglev system from private automobile, public transit, taxi, limousine service, car rentals, and special airline interface at the airport location.




Illustrative View Through Baltimore Maglev Station
Cho Benn
Holback +
Associates



PROGRAM

PROGRAM: outline

station.

What is travel? It is motion, movement, circulation, and connection. A station should embody these very principles.

The program for this project includes many spaces and services along with the overall master development of the neighborhood. The main space involved is the main terminal and subsequent concourses, which accommodate the tracks and boarding area for the trains. Additionally, the project will need to encompass a large commuter-parking garage in conjunction with a *Zipcar* facility. Although the city of Boston has a large bus depot at the nearby South Station, this project will act as a local bus interface hub for South Boston. With more research, a link to one of the nearby metro lines would be a desirable addition to the project, allowing for a rapid link to the main fabric of the entire city and surrounding communities. A more master-planning component to the project would include a mid-rise office tower and subsequent commercial spaces and renovations to the station to promote commercial growth in the neighborhood. Any supplementary cultural and social facilities would be a great addition to the community's fabric into which this station would be weaving.

site size.

Located at the corner of Summer Street and Dorchester Avenue, the current size of the site is approximately 512,000 square feet (11.7 acres) including both the United States Post Office building and 245 Summer Street.

post office annex building

building footprint 376,500 square feet

The U.S. Postal Annex contains several connected buildings on approximately 429,237 square feet of land, all of which is filled tidelands. The Postal Annex buildings are 96 feet high and almost 2,000 feet long.

- 245 summer street

building footprint 59,800 square feet

This site consists of a 12-story, 154-foot office building located entirely on filled tidelands, and contains approximately 81,958 square feet of land area.

proposed building program.

Station:

-	Ticket Purchasing	3,000
-	Ticket Collection	1,000
-	Information Booth	1,000
-	Security Check Point	2,000
-	Lounge	
	o pre-entry	25,000
	o departures	65,000
	o arrivals	40,000
-	Café	1,500
-	Kiosks	3,000
-	Platform	100,000
-	Administrative	28,000
	Sub-Total	271,500

Commercial:

-	Restaurant	3,500
-	Retail	18,500
-	Bank	900
-	Post Office	900
-	Day Care	20,000
-	News/Books	8,000
-	Gallery	20,000
	Sub-Total	71,800

Transit:

-	Parking (100 spaces)	20,000
-	Bicycle storage	2,000
-	Taxi stands	800
-	Water taxi stand	400
-	Bus drop-off	
	Sub-Total	23,200

Links:

-	Pedestrian Bridge	
-	Red/Silver Line Connection	20,000
-	South Station Link	6,000
-	Bus Terminal Link	10,000
	Sub-Total	36,000

Offices:

-	Security	2,000
-	Lobby	10,500
-	Food Court	20,000
-	Rentable Office Space	840,000
-	Services	10,000
	Sub-Total	882,500

Landscape:

- HarborWalk
- Green spaces
- Green roof/Terraces

Service/Facilities:

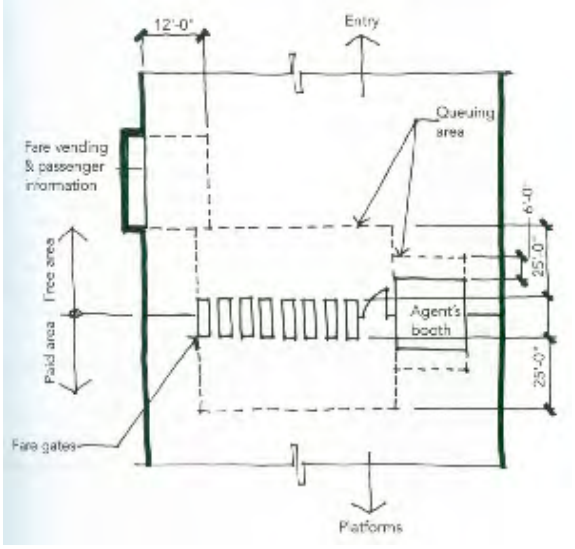
- Bathrooms	10,000
- Security	500
- Station electrical services	3,500
- Station Operations	2,200
- Staff spaces	10,000
- Janitorial	1,200
- Mechanical	10,000
- Fire Protection	1,000
- Communications	1,000
- Maintenance	600
Sub-Total	40,000
Total	1,325,000
CIRCULATION (20%)	270,000
TOTAL	**1,595,000 sq. ft.**

station services.

ticketing.

Ticket counters should be easily accessible to all forms of access, especially pedestrian. In the modern world, electronic ticket kiosks are the most popular way to acquire a ticket. The use of these machines should be integral and easy to find, without being in the way of the main circulation. Ticketing space should be within the pre-entry lounge, accessed before passing through the fare collection area.

The ticketing office provides an opportunity to create an attractive architectural element near the station entry. Proper placement and viewing distances, however, will allow ticketing offices to contribute to security design. Ticketing office staff act as more then salespersons, they can provide customer service and security assistance as well.



fare collection.

Fare collection equipment in a transit station creates two conflicting demands on the station architecture. First, the equipment layout has to accommodate bidirectional traffic, as busy stations in peak periods have large numbers of passengers entering the exiting. Second, there must be enough equipment to meet demand, and it cannot be placed so that it interrupts passenger flows into and out of the station.

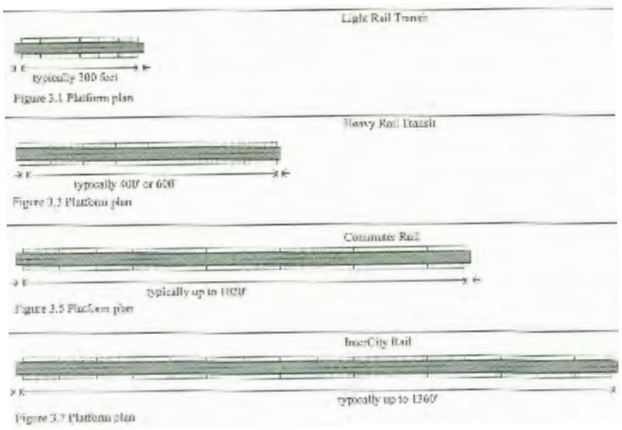
This station will run the entire eastern corridor, and therefore it requires a distance-based fare system. Fare barriers should be located to prevent queuing problems. It is necessary to avoid placing a barrio array entry point too near the exit from a vertical circulation element, as this may result in a safety hazard. It can also cause problems to place the barrier array too close to fare vending machines, which can result in queue overlap and confusion.

Passengers entering and exiting the transit station naturally flow in a right-hand direction. As a rule of thumb, signage should encourage a right-hand flow through the barriers. Center gates are typically bidirectional and switched throughout the day depending on the dominant traffic flow.

Accessible barriers are typically placed at one end of a barrier array. If the barrier array is attached to a ticketing or information kiosk, the accessible barriers are placed on the end nearest to the kiosk. Place elevators near the accessible barriers to prevent a counter flow across the normal traffic flow.

lounges.

These spaces are where passengers will spend most of their time while at the station. Although these trains, once integrated into the larger network, will run frequently and not require significant wait times. These lounges will cater to the modern traveler, and their use of cell phones, pda's, and laptops. Seating areas and comfortable lighting will be the main focus for these spaces.



platforms.

The main terminal space revolves around the biggest component of the station program; the track. Although most high-speed/intercity rail platforms are up to 1360 feet in length, due to the faster travel time with maglev trains, the vehicle length can be shorter. Appropriate track length for this

type of train is around 1000 feet, a driving factor on the orientation of the station.

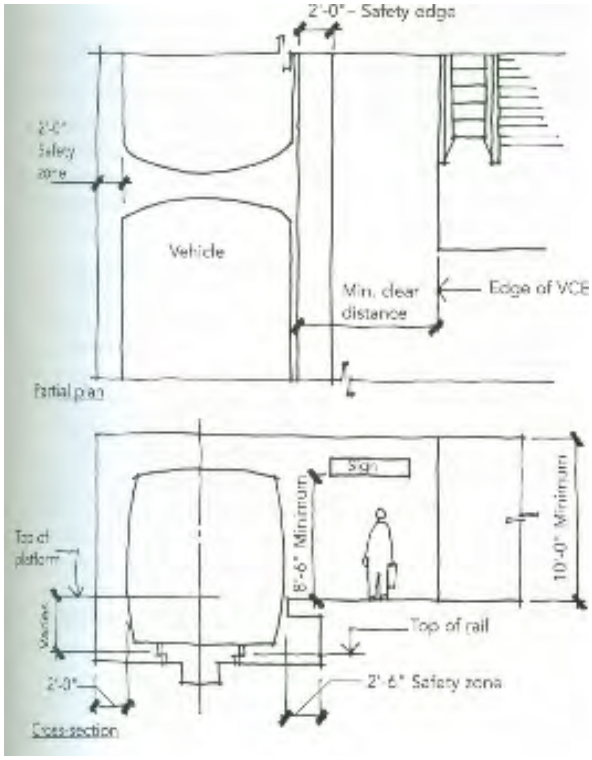
With two possible transit lines converging in this station, there is the need for four tracks. Considering as well the fact that this is the end station, trains arriving will eventually be trains departing in the opposing direction, and therefore there is no distinct in or outbound direction. For the reason, each track should have platform on either side.

Platform widths should be a minimum of 30 feet to accommodate the traffic flow for the ridership. Seating, trashcans, vending services, advertising space, and other functions will also occupy this space. Additionally, vertical circulation to bring passengers to the platform level is a key component and space occupier in this station type.

Passengers require 10 sq. ft. per person on platforms and have an average walking speed of 200 ft. per minute.

parking.

The main concept behind a maglev station is to bring people to and from city centers with ease while being economical and ecological. Therefore, hosting a large parking garage in the center of the city would suggest that travelers will be adding to the congestion of traffic on the nearby highways, rather then helping to alleviate it. For this reason, a small, neat, and concise parking area will be used for handicapped, zipcar, and carpool parking. This area of the city already has a number of parking garages with a high price tag, and by not having one on site, patrons will be forced to use public transportation which is already in place and connected to the station and its commercial space. The few parking spaces left will fit into the overall design and be attractive, rather then an eyesore.



Zipcars have been a new from of semi-public transportation, and used in many urban environments. These vehicles should be celebrated and easily accessible to the members of the community and travelers. In conjunction with the parking, a bus hub of sorts will need to accommodate the local buses and become a place from which routes can begin and end.

office/commercial.

As the neighboring communities develop their residential and commercial real estate, this district will do the same. In response to the new high-rise planned for over the tracks of South Station, just across the Channel, a mid-rise office tower will be designed to accommodate 20 stories of rentable space. The massing of the project will help shape the skyline of Boston, and address the drastic scale change from one side of the Channel to the other.

day care.

Any project having a gross floor area, not including the floor area devoted to Residential Uses, which equals or exceeds one hundred thousand (100,000) square feet shall devote to day care facilities an amount of floor area equal to the amount listed below in Table A.

The term "day care facilities" includes the finish, furnishings, and equipment required for use of the floor area for such facilities, to enroll people for care, instruction, or recreation during regular business hours.

TABLE A

Provision of Day Care Facilities

Size of Proposed Project (Gross Square Feet)	Minimum Day Care Faciliti (Gross Square Feet)
100,000 up to 200,000	2% of gross floor area
200,000 up to 500,000	4,000
500,000 up to 1,000,000	8,000
More than 1,000,000	12,000

restaurant/café.

An integral portion of any transit facility is the access to food. Be it vending machines or a food court, travelers often use transit stations to rest before, after, or between trips and use food to help regain energy. This station will require at least one café within the main passenger lounge space, as well as at least one restaurant either within or before the fare control. Adding these spaces will draw other people to the site besides travelers and keep the site activity high. In this urban area near the financial district and other newly developing neighborhoods, restaurants will increase the cultural integrity and overall sense of style in the station complex.

In the attached office tower, a new food court service should be included to replace the one, which currently exists. Located at 245 Summer Street, several food venders currently occupy the ground floor and this should service space should consider the current uses and circulation when implementing a new one.

cultural institutions.

Although the nearby neighborhood of Seaport Square is the home to the Institute of Contemporary Art, and is proposing several street scale art instillations and gallery spaces, the arts are great installations to bring people to a site. When the neighborhood transformed from being industrialized, many artistic people used the large spaces as a work/live environment; therefore, keeping that tradition alive in some form would be a great way to spark life and interest in this location through all hours of the day.

T connection.

The site is located a short distance from the red and sliver T-lines, therefore creating a clear and convenient link to them is vital. It is important that passengers of the maglev can easily funnel into the subway system and arrive at their final destination without ever leaving going outside.

circulation.

In public spaces, the primary goal of the circulation systems is to move passengers efficiently to their destinations. Goals to achieve when planning circulation are:

- minimize travel distances
- minimize the number of horizontal and vertical transitions
- make the circulation corridor direct
- separate opposite passenger flows when possible
- make destinations visible and clear (see wayfinding)

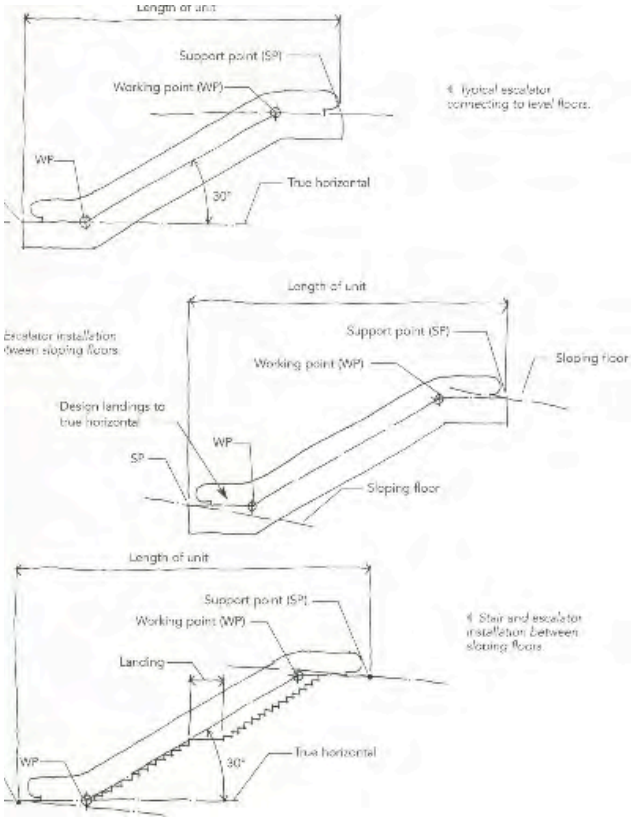
The circulation system is defined initially by the station type and second by the fare collection/ticketing system. Efficient passenger movement:

- natural orientation to the surrounding area
- design of vertical circulation elements to meet demand and maintenance requirements
- adequate queuing in front of all vertical circulation elements (stairs, elevators, escalators)

- no overlap of queues
- no reverse changes in direction, whenever possible
- no cross flows
- an orderly hierarchy of decision points, so that procedures needed to be followed when using the station, such as purchasing a ticket or reaching the correct platform, are readily apparent

Vertical circulation is a key component of a transit facility. Platforms are separated by the tracks, and ability to access them is given from under or overpasses. Escalators and elevators are the workhorses for moving passengers safely and quickly through underground and elevated stations.

Stairs are a significant component of any carefully thought-out passenger circulation plan. They are critical, reliable elements in the plan. Working in tandem with escalators and elevators, they provide the balance inherent in a reliable system.



escalators.

Escalators are available in several widths; the typical 40 in. unit is designed to handle at least 3000 people per hour. They are the most effective mechanical devices for moving large numbers of people quickly between levels in a station. Escalators should be grouped in pairs with stairs to facilitate reverse movements during peak flows, continued circulation during breakdowns, and routine maintenance. They require 30 ft. of queuing and floor space, measured from the upper and lower escalator working points, clear to any obstructions.

elevators.

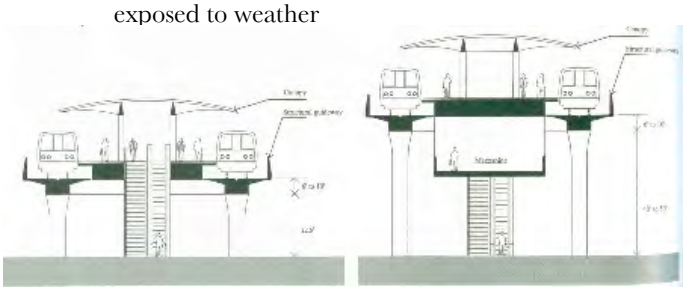
Most transit authorities have been reluctant to provide more than one elevator from street level to mezzanine or platform levels because of cost, maintenance, and security concerns. All stations should have at least two elevators providing vertical access between each two levels of a station. This is to ensure redundancy, so that in the event of equipment failure or scheduled repair there is a backup elevator.

station types.

aerial stations.

Elevated tracks require stations to be raised above ground level and typically services and secondary spaces are below. Vertical circulation is a key component.

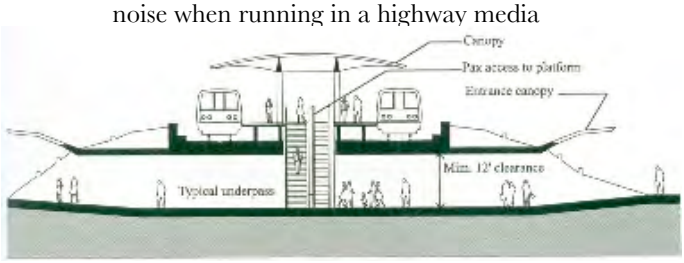
- requires canopy over platform
- relevant to system using an aerial guideway structure
- potentially no need for mechanical ventilation
- Fare collection and entry at street level or mezzanine below platforms
- must maintain adequate clearances above street level
- guideway structure and canopy help define the form and image of the station
- passengers and vertical circulation elements may be exposed to weather

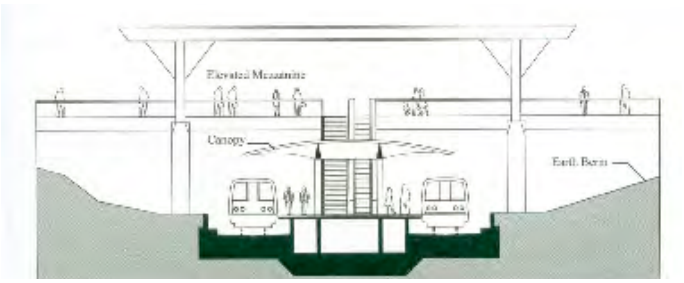


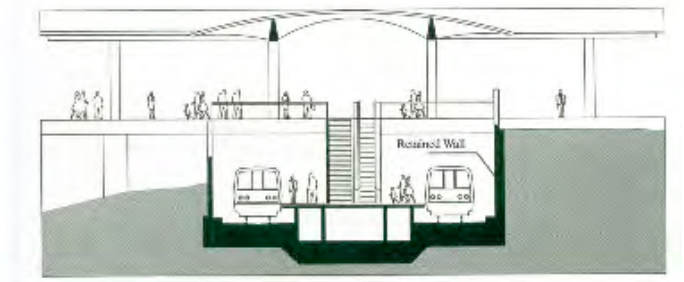
at-grade stations.

Tracks at grade are the most typical in traditional rail situations. This brings problems when accessing the several tracks, with under or overpasses. Depending on the site, an underground tunnel could be created, or bridges can cross above.

- requires canopy over platform and pedestrian bridge or tunnel
- works best in low-volume passenger systems where track crossing is permitted
- significant visual and physical impact in urban running
- canopy and wind shelters help define the form and image of the station
- requires passenger protection against vehicles and noise when running in a highway media

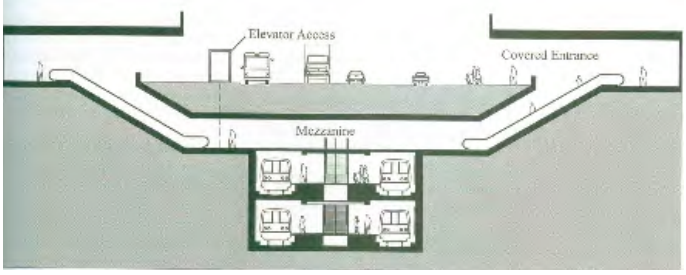




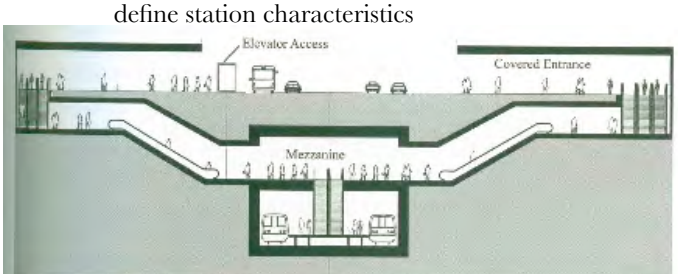


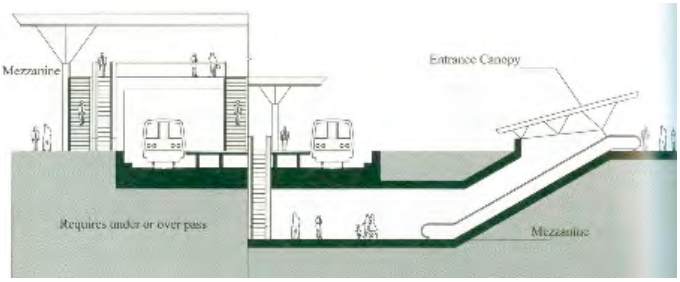
subterranean stations.

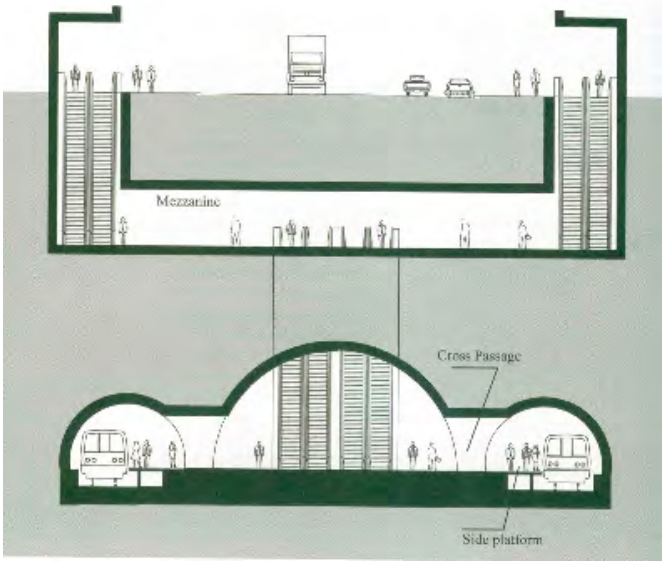
In several urban conditions, trains and subways are located below ground. This allows for easy links above trains and the ability to access the station from both sides of a busy street without pedestrians crossing them.

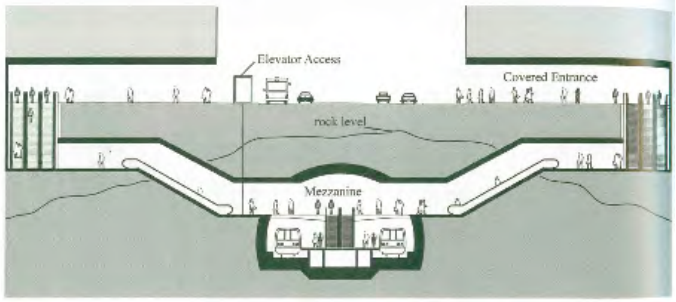


- Dependent on vertical circulation
- fare collection and entry at street level or mezzanine above platforms
- mechanical ventilation and artificial lighting required
- typically located in earth below street right-of-way
- least visual and physical impact in urban environment
- requires life safety systems and emergency exiting provisions
- street-level entrances become major visual focus points
- facilitates strong expression of structure and helps define station characteristics



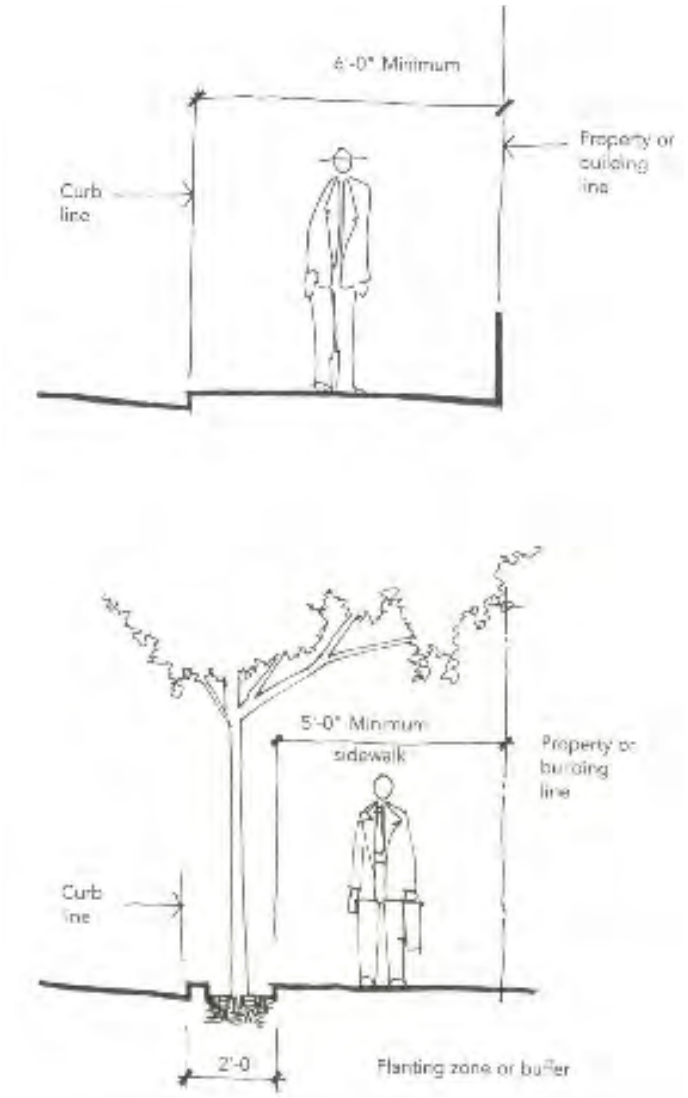






STATION

STATION:
station requirements

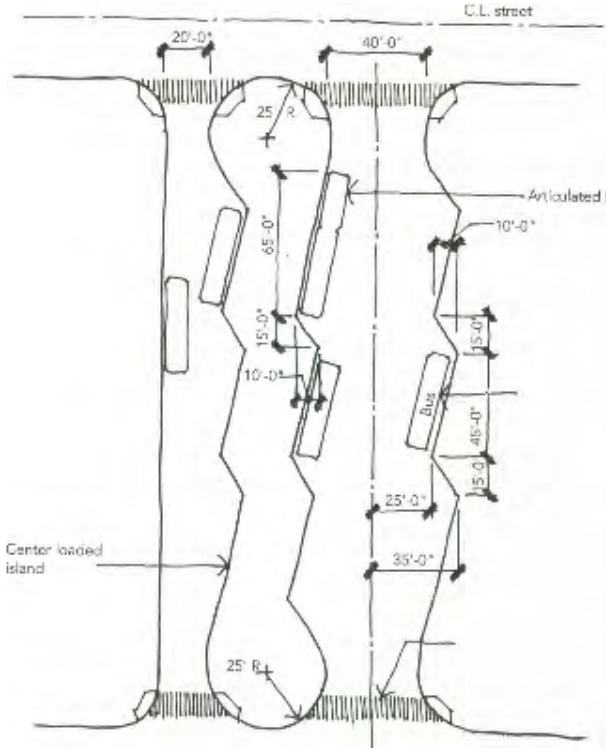


pedestrians.

- Sidewalks in station area should be a minimum of 6ft.
- Special attention for dual functioning sidewalks (i.e. bicycles, trees, and larger crowds)
- Crosswalks help move people and should be a strong visual director
- Pedestrian bridges should comfortably fit two people wide (min. 11 ft. wide)
- Ramps can not exceed 1:12 ratio

buses.

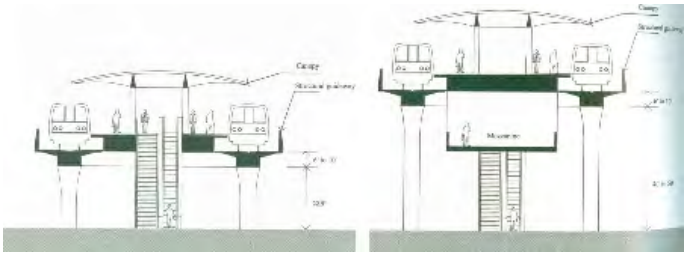
- Minimum clearance between road + overhead obstruction - 14.5'
- Turnouts - 50' long (min)
- Saw-tooth plan is an efficient use of bus space
- Center and side loaded bays may be combined
- Adding covered waiting areas make bus travel more inviting
- Typical bus length - 42' and width - 10'
- Radius for buses must be considered to ease traffic
- Curbside bus stop - 14' wide sidewalk(min.)
- Pedestrian access needs to minimally interact with vehicular moment while fully attending the bus stop



platform.

- Main function = SAFE CIRCULATION
- Create waiting spaces away from loading and unloading passengers
- Vertical access points should be situated to encourage balanced vehicle loading/unloading
- Minimal visual obstructions for both train and passenger safety
- Main platform area should not contain any ancillary functions (i.e., vending or concessions)
- Platform height ~ floor should be level with vehicle floor
- Minimum overhead clearance ~ 8.5'
- Platform length for maglev train - 1000 feet

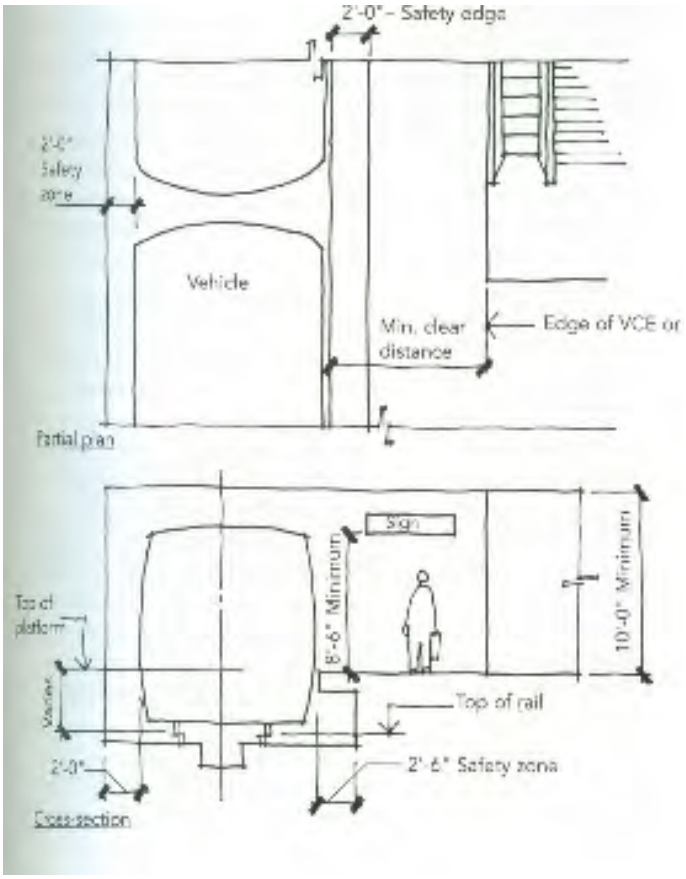
- Average width of 8 to 11'
  Must maintain 2' of safety edge
- Platform circulation (min. width of wheel chair)
- 1' buffer from any interior obstruction (i.e., vertical circulation, ticket machine,…)
- Additional service space (if needed)



platform service.

- Waiting areas and seating on the platform
- Lighting is important to create a safe environment
- Minimal vertical transitions
- Location of ticketing machines
- Consider needs of commuters: Carrying briefcase/laptop bag, need for café/coffee/newspaper, seamless transition from car/bus to train, poor weather shelter

Modern effects - Cell Phone, PDA, Laptop



fare collection.

Fare Vending Machines -

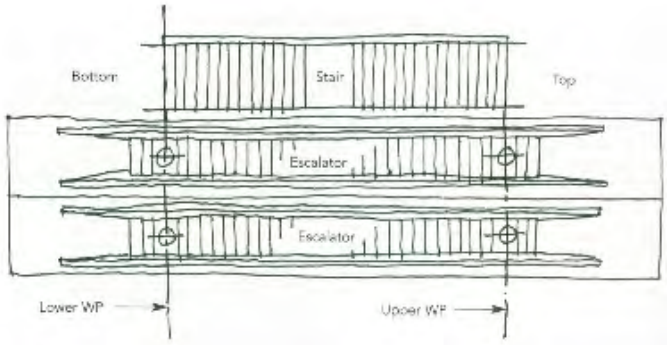
- Often the size of an ATM machine - let passengers pay for their fares with cash or credit and select from the various menus depending on the needs of the passenger
- Must be placed in well-lit areas to give customers a sense of security while handling their money
- Provide purchasing space - area out of the way of main circulation as to not impede with traffic

Ticketing Office –

- Typically sell an agency's entire spectrum of fare media and usually accept all forms of payment
- Opportunity for an attractive architectural design
- Add sense of security and provide a landmark for disoriented passengers

Stairs.

- Vertical rise between levels should not exceed 12'
- Located along the normal and direct path of passenger circulation
- Should be paired with escalators to facilitate efficient movement
- Minimum width – 5'
- Circulation traffic space at top and bottom of stair should be a minimum of 8'
- Minimum headroom of 10'



escalators.

- Where vertical rise between levels exceeds 12'
- Should be paired with at least one set of stairs
- Located along the normal and direct path of passenger circulation
- Minimum width – 2'
- Circulation traffic space at top and bottom of stair should be a minimum of 30' to allow people to queue into escalator
- Minimum headroom of 10'
- Consideration should be given to servicing and replacing escalators

elevators.

- Necessary for multi-level stations to allow handicapped passengers access to the platform and other station functions
- Should be conveniently located for all customers
- Elevators at street level should be located to minimize their visual impact on adjacent structures

- Minimum cab size – 51" deep by 80" wide with a 36 in. center door
- Minimum queuing space is equal to 1.5 times the depth of the car or 10'
- Elevator landings should be easily accessed by station circulation yet not interrupt the flow of traffic
- Platform level elevators should not open in the direction of the platform edge

ADA.

- Sloped sidewalk – 1:20 maximum slope
- Ramp – 1:12 slope (with rail)
- Minimum 36" route
- Surface textures along accessible routes must be stable, firm, and slip resistant
- Accessible means of egress from platform
- Platform width – 36" min with 60" for passing space
- All non-train facing platform edges must be protected with guardrail
- Waiting areas should provide spaces for wheelchairs

circulation.

- Natural orientation to the surrounding area
- Design of vertical circulation elements to meet demand and maintenance requirements
- Adequate queuing in front of all vertical circulation elements (stairs, elevators, escalators)
- No overlap of queues
- No reverse changes in direction, whenever possible
- No cross flows
- An orderly hierarchy of decision points, so that procedures needed to be followed when using the station, such as purchasing a ticket or reaching the correct platform, are readily apparent

mezzanine level.

Intermediate space for passenger transition often used to house many functions of a station away from the platform. Also used to give passengers perpendicular access to platforms.

Advantages:

- Allow for additional waiting space within visual connection of platform
- Add additional levels of interest
- Can help merge the linkage over the tracks with station functions
- Link to surrounding buildings on many levels

Disadvantages:

- Add to vertical circulation which make navigating a station more difficult
- Overpowering for neighborhood

GRADIENT OF LAND USE INTENSITY

	Relative Level of Development Intensity
¼ mile radius	Higher density, mixed land use including office, retail, and service businesses, residential, and compatible community facilities
¼–½ mile radius	Medium density, mixed land use including office, retail, and service businesses, residential, and compatible community facilities
½–1½ mile radius	Development intensity is likely to vary, relative to the development that surrounds the overall station area. Mixed, medium-density land use may continue in support of the neighborhood/ring area, and lower-density development, including retail and service businesses serving larger markets, may occur.

INTENSITY OF LAND USE AND TRANSPORTATION RELATIONSHIP

Residential Use	Commercial Use	Transportation Compatibility
15+ units/acre	50+ employees/acre	Supports rail or other high-capacity service
7–14 units/acre	40+ employees/acre	Supports local bus service
1–6 units/acre	2+ employees/acre	Supports cars, carpools, and vanpools

Adapted with permission from New Jersey Transit.

MINIMUM HOUSING DENSITY AND FLOOR AREA RATIO BY STATION ACTIVITY LEVEL

ACTIVITY LEVEL	RESIDENTIAL GROSS DENSITY (units per acre)			NONRESIDENTIAL GROSS DENSITY (floor area ratio)		
	Core	Neighborhood	Range (0–½ mile)	Core	Neighborhood	Range (0–½ mile) (avg. empl/acre)
1*	10	4	10–4 (7)	0.3	0.15	.30–.15 (24)
2	15	7	15–7 (11)	0.5	0.20	.50–.20 (36)
3	22	10	22–10 (16)	0.7	0.25	.70–.25 (52)
4	45	15	45–15	1.0	0.30	1.0–.30 (113)

*Activity Level 1 in the Triangle Fixed Guideway Study (TFGS) includes residential and nonresidential densities for regional transit system station areas.

Source: Triangle Transit Authority Triangle Fixed Guideway Study (TFGS), Phase III Report, 1995.

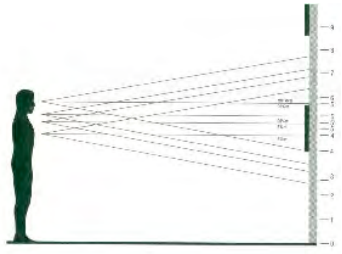
WAYFINDING

WAYFINDING:
visual circulation

The ability to orient oneself and navigate through places is a fundamental human requirement. A sense of security and confidence comes with the ability to recognize routes to safety or where to get help. Without this, people are reluctant to explore an area or to wander far from known locations. Comfort and convenience are heavily dependent on the legibility that information systems provide to users attempting to find their way.

For example, knowing the most expeditious route in today's fast-paced society depends on a person's sense of control, competence, anxiety, stress, and awareness. While passengers are determining their route in a transit station, they must be able to recognize their locations while evaluating alternative services, activities, and destinations. When this works, they are less fearful because their destination options are clear. An effective information system for wayfinding provides the following:

- the ability to effectively determine one's location and orient oneself within a facility
- the ability to determine possible destinations and opportunities within a facility
- the ability to confidently establish a plan of action and choose a route to a desired destination



components.[2]

No single characteristic makes a space legible for wayfinding in a transit station. Instead, all parts of the facility work together to determine the ease or difficulty passengers will have in finding their way around. Signs are simple band-aids for the passenger's natural wayfinding ability within a facility.

They are located and used to supplement other visual cues in the built environment, to assist in gaining access to or exiting a facility, to define the most efficient use of a facility, and to provide information about the facility when it is too complex to be conveyed by the architecture or when other sources of information in the space are insufficient or unreliable for all potential user groups.

Other sources for wayfinding information include the following:

- facility layout
- visual landmarks
- terminology and graphics
- key architectural elements
- directories
- maps and brochures
- directions given by staff

signage and graphics.

Signage systems are divided into sign types that display various types of messages. The types are commonly grouped into directional, informational, identification, and regulatory signs. A hierarchy of message importance is developed within each type of sign. The purpose is to logically sort the messages displayed by geographical location, importance off service or a building's functional needs.

A standard nomenclature is developed for each of the destinations and services to be accessed by the public. The hierarchical structure of the system is then applied to the architectural program. Consistency and redundancy of display

locations, sizes, color, layout of message units, and type style make for an easily read and comprehended information system that complements the experience of the user.

Coordinated systems of signage and graphics are necessary for users to comprehend complex urban environments. Effective signing results in better circulation and traffic control, more efficient use of facilities and services, improved appearances, and a better public image. The wayfinding knowledge of the public can be augmented through the proper use of interior and exterior graphics on directional, informational, identification, and regulatory signs and by developing directories and guides, color-coding, and other orientation devices.

A thorough, successful signage and graphics program will reduce ambiguity, message overload, and visual clutter. It will establish clear paths of movement and facilitate the comprehensive of the functions and uses of a space. It will improve legibility and communications while paying careful attention to the cumulative effects of signs and information in the facility. A comprehensive signage and graphics program will prescribe design standards. It will also provide detailed instructions for uniform and consistent applications of the various components. Conceptually, wayfinding design must both generally address the facility or the system and specifically address unique conditions at specific locations or decision points.

Architectural features and the aesthetics of the environment must be taken into consideration when applying a comprehensive signage philosophy. As the designer applies his or her principles of wayfinding, the design process should pay particular attention to the public's natural wayfinding ability.

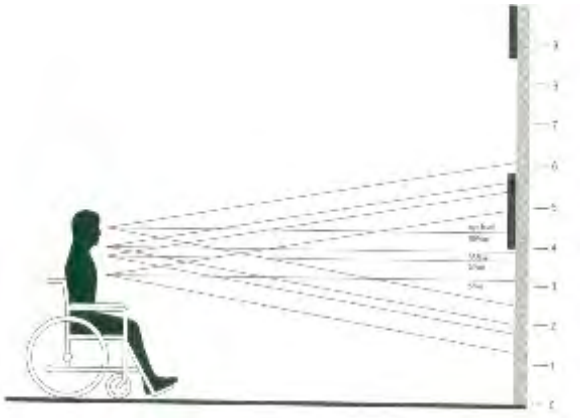
the blind.

Blind travelers have to rely on auditory and tactile cues; only in rare circumstances can they use olfactory or heat perception. All of the senses compensating for sight are generally less informative, less reliable, and less efficient. Nothing replaces sight in gaining a global understanding of the environment or in perceiving distance cues, which are so important for wayfinding.

In transit facilities, it is now common practice to used grooved floor treatments for those blind occupants with canes. Intersections, stairs, turns, and other conditions have specific indication and groove patterns to indicate these conditions.

ADA +wayfinding.

The rules resulting from the requirements of the ADA are very detailed and should be reviewed carefully by facility owners, operators, tenants, and design/ engineering consultants. Wheelchair patrons have a different visual perspective and therefore should have the same ability to see signage and other wayfinding tools as non-handicapped patrons.



common wayfinding symbols.

site specific symbols.

MBTA Logo for all commuter and subway transportation

Amtrak Trains

Greyhound Buses

Silverline bus route

Acela Club – VIP Lounge

Transrapid International

Institute of Contemporary Art

Boston Children's Museum

South Station

information directory

zipcar

advertising

Rail travel delivers high pedestrian volume on a daily basis, which is an audience that is growing at a rate of 10% per year. Rail users are affluent and influential with varied backgrounds.

In designing a new station allows for the incorporation of advertising space in conjunction with the circulation of passengers.

Using empty space to provide advertising opportunity is a great way to fund rail travel and station maintenance while reaching a broad demographic. Besides the traditional means, now outdoor digital formats are available with Transvision - huge LED screens allows for up to the minute news and weather.

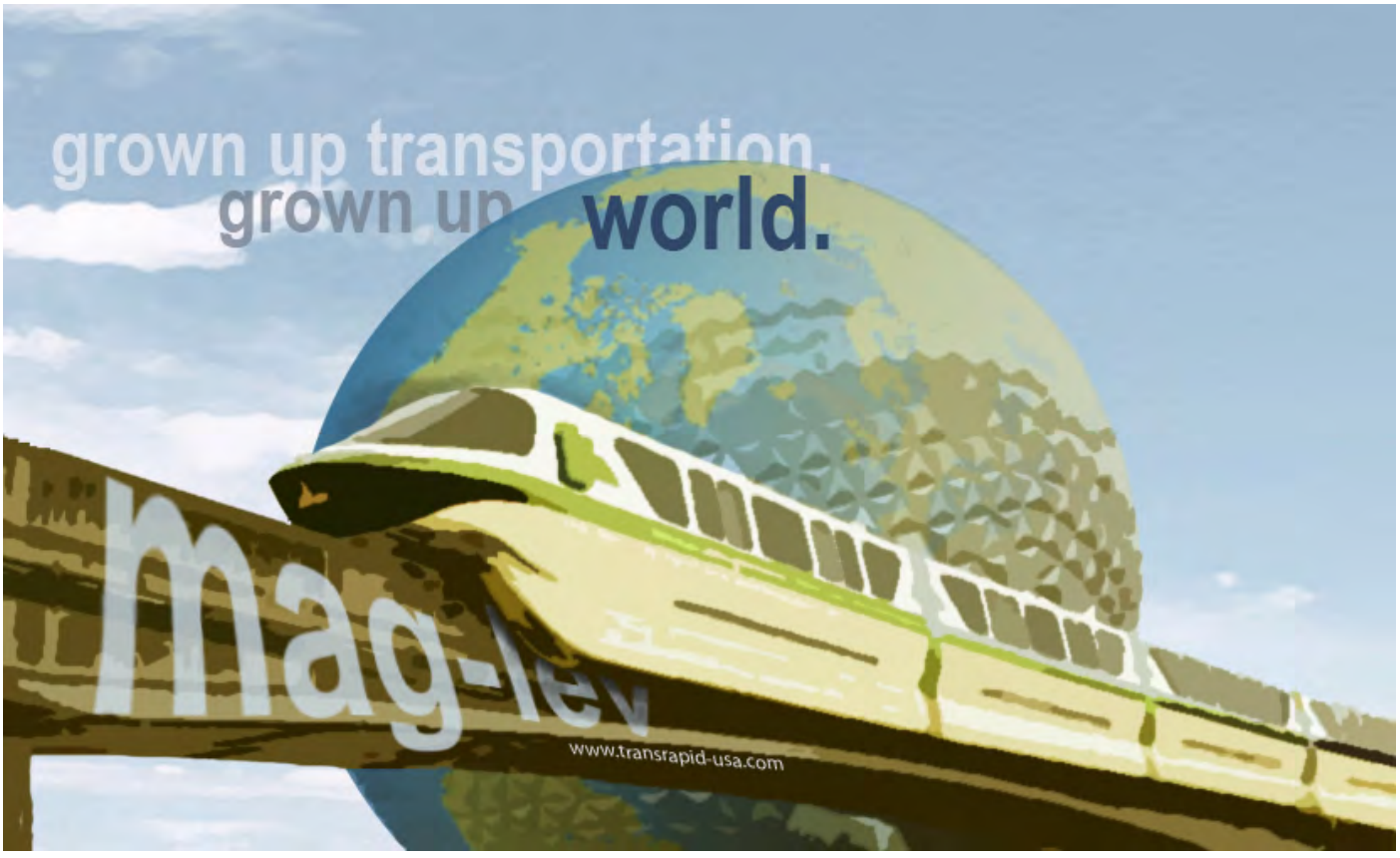
Other opportunities that would be available that would also target the commuters are Ad Gates. As opposed to having one or a number of posters on a platform, you could target all people as they enter or leave the station, thereby giving your message a greater impact.

<u>elevator, stairway + escalator.</u>

If looking for a captive audience, one effective way of promoting a business will be an elevator, stairway and escalator panels. This allows commuters to capture a message with around 30 seconds to a minute whilst riding the escalator. Additionally, placing a number of panels on the same escalator run can create a story.

cross track.

There are a number of opportunities on the cross track (opposite side of the platform) including a new innovation– cross track projection. Twelve feet high digital images can be projected on the wall opposite the platform. The technology will expand to 150 screens along the busiest stations. This will allow commutes to watch the latest film releases on giant screens while waiting for their trains.

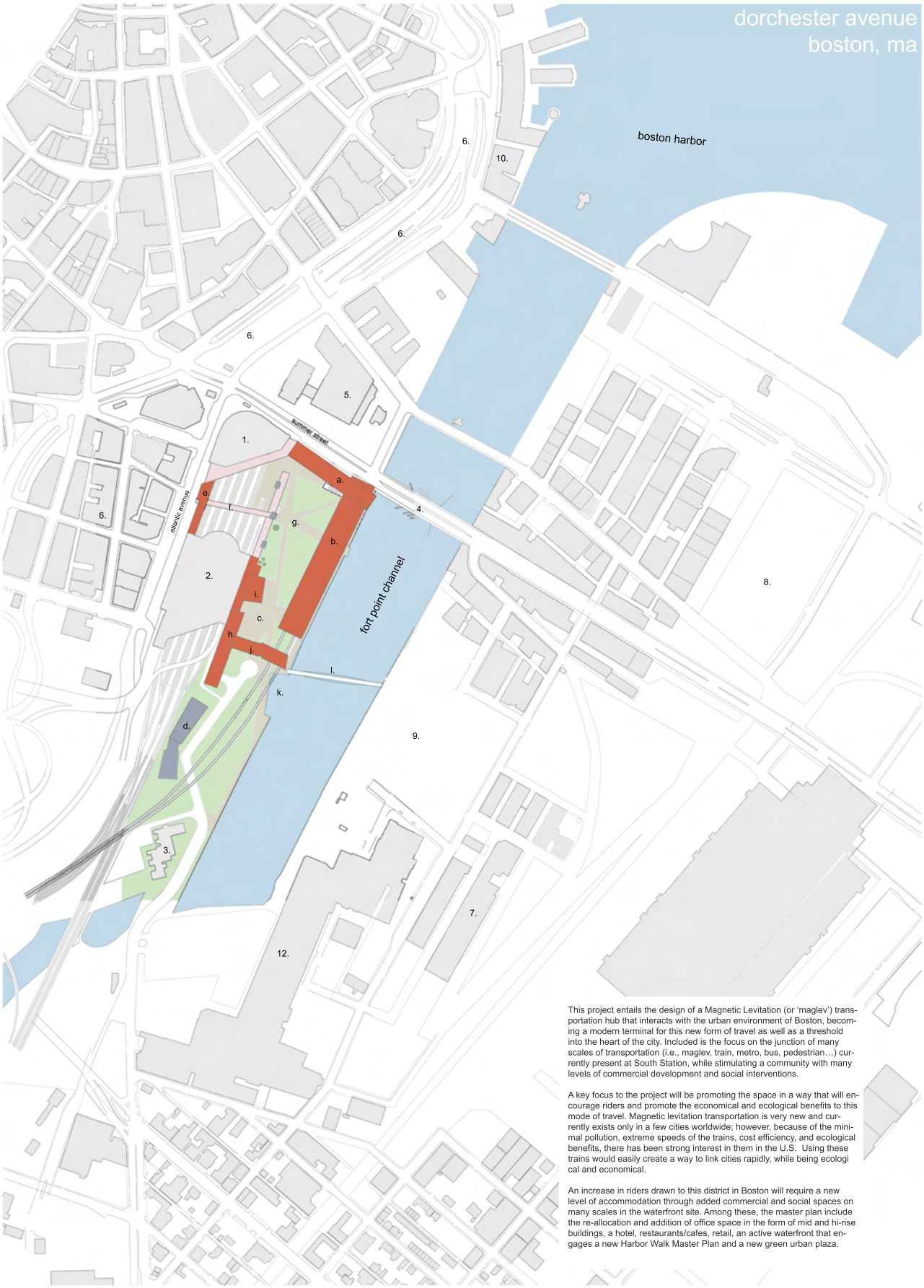


fort point channel

maglev transit hub and south station expansion master plan

the DESIGN

dorchester avenue
boston, ma



This project entails the design of a Magnetic Levitation (or 'maglev') transportation hub that interacts with the urban environment of Boston, becoming a modern terminal for this new form of travel as well as a threshold into the heart of the city. Included is the focus on the junction of many scales of transportation (i.e., maglev, train, metro, bus, pedestrian…) currently present at South Station, while stimulating a community with many levels of commercial development and social interventions.

A key focus to the project will be promoting the space in a way that will encourage riders and promote the economical and ecological benefits to this mode of travel. Magnetic levitation transportation is very new and currently exists only in a few cities worldwide; however, because of the minimal pollution, extreme speeds of the trains, cost efficiency, and ecological benefits, there has been strong interest in them in the U.S. Using these trains would easily create a way to link cities rapidly, while being ecologi cal and economical.

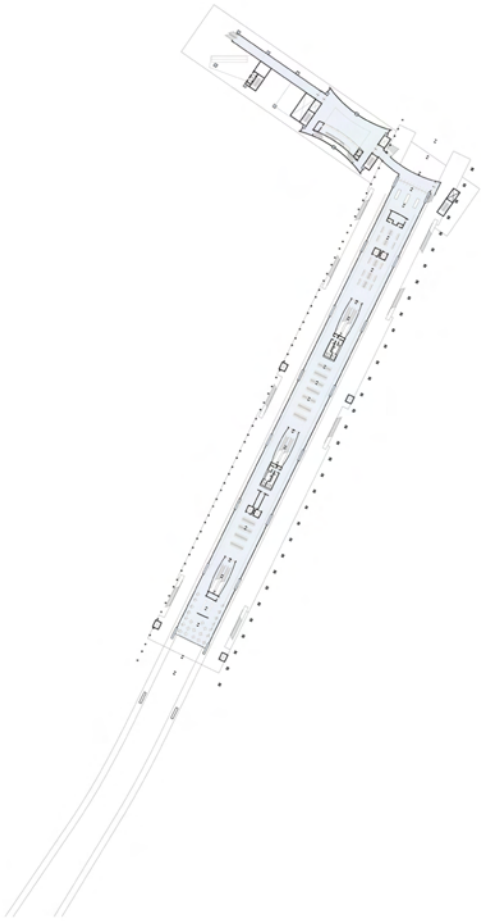
An increase in riders drawn to this district in Boston will require a new level of accommodation through added commercial and social spaces on many scales in the waterfront site. Among these, the master plan include the re-allocation and addition of office space in the form of mid and hi-rise buildings, a hotel, restaurants/cafes, retail, an active waterfront that engages a new Harbor Walk Master Plan and a new green urban plaza.

1. south station 2. bus depot 3. tunnel vent house 5. federal reserve 6. kennedy greenway 6. leather district 7. channel centre 8. future seaport square developement
9. future fort point channel district 10. russian wharf 11. convention center 12. gillette factory 13. summer street bridge 14. intercontinental hotel

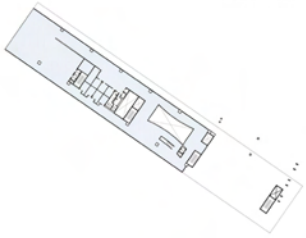
a. maglv station/office space b. station platform c. restaurant plaza d. future mixed use building e. additional station facilities f. leather district connection
g. station green h. parking structure i. restaurant j. hotel/office tower k. accesible waterfront l. fort point channel pedestrian bridge

station plans

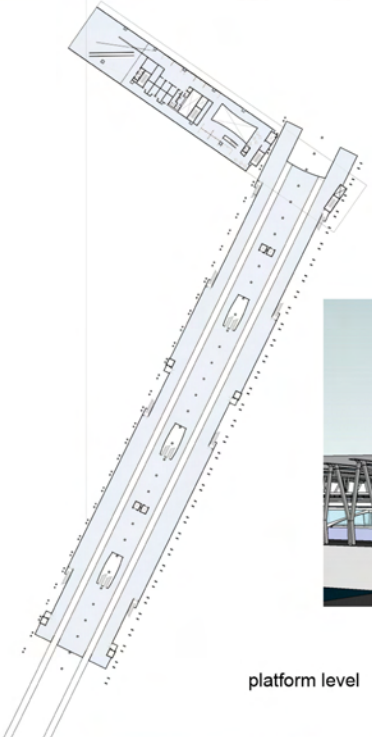
ground level 1’-0” = 1/64”



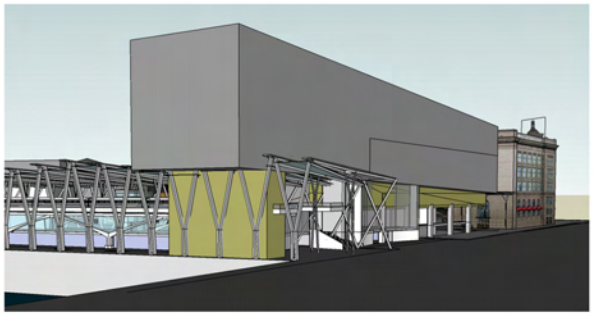
mezzanine level 1’-0” = 1/64”

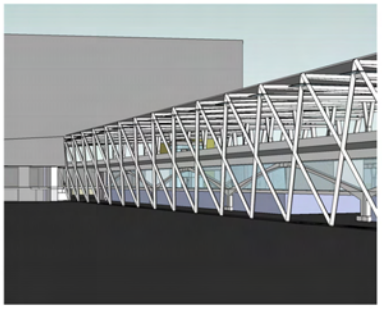


leasable office level 1’-0” = 1/64”

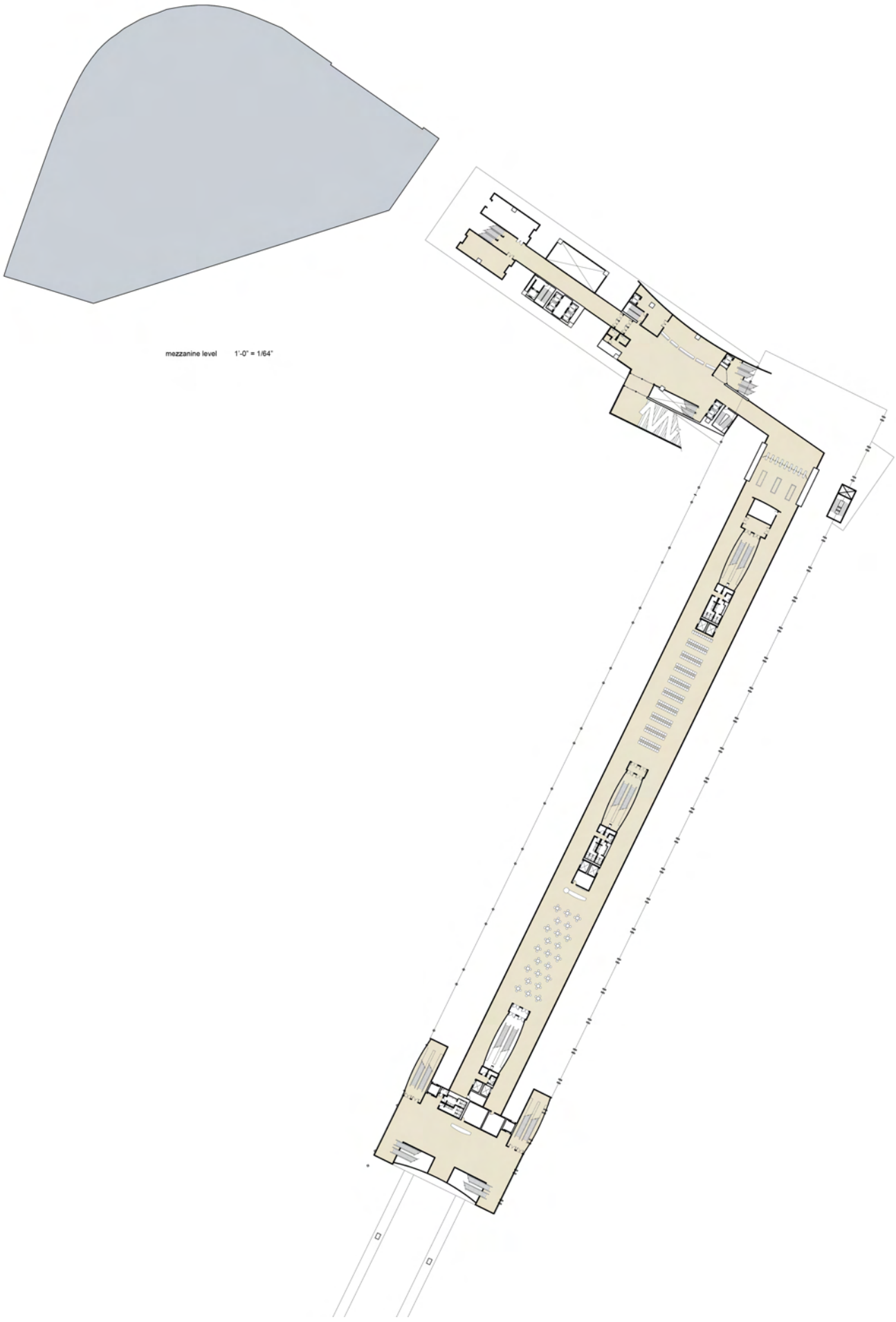


platform level 1’-0” = 1/64”



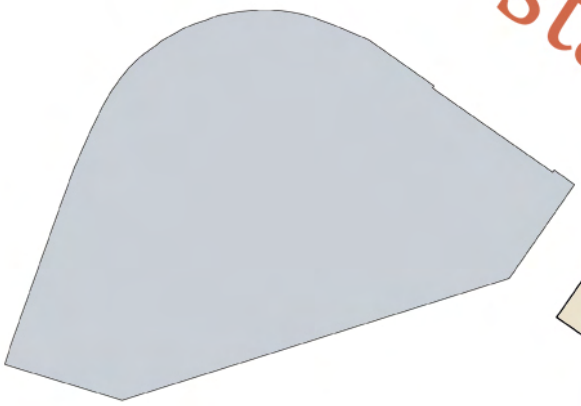


station plans

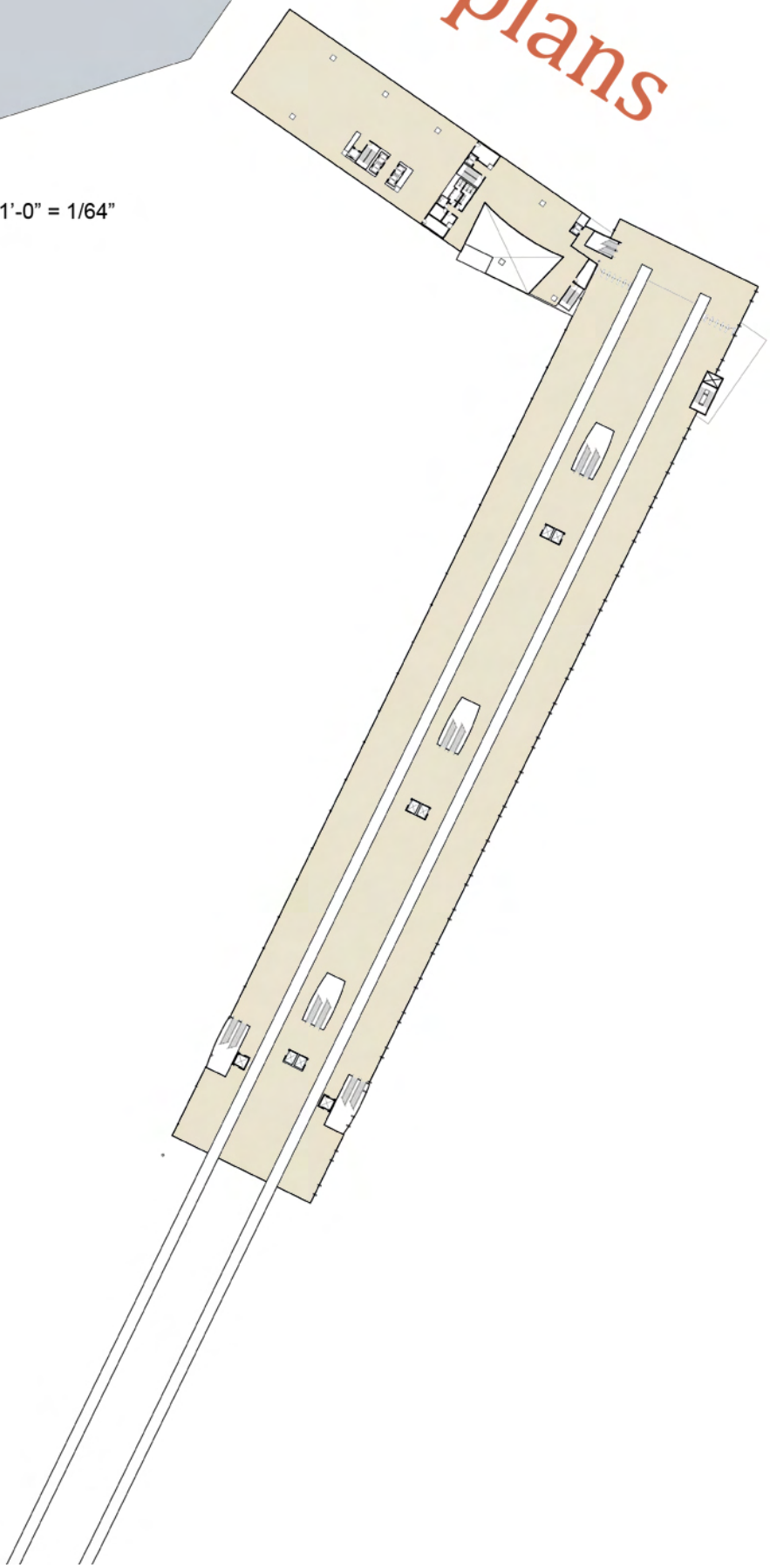


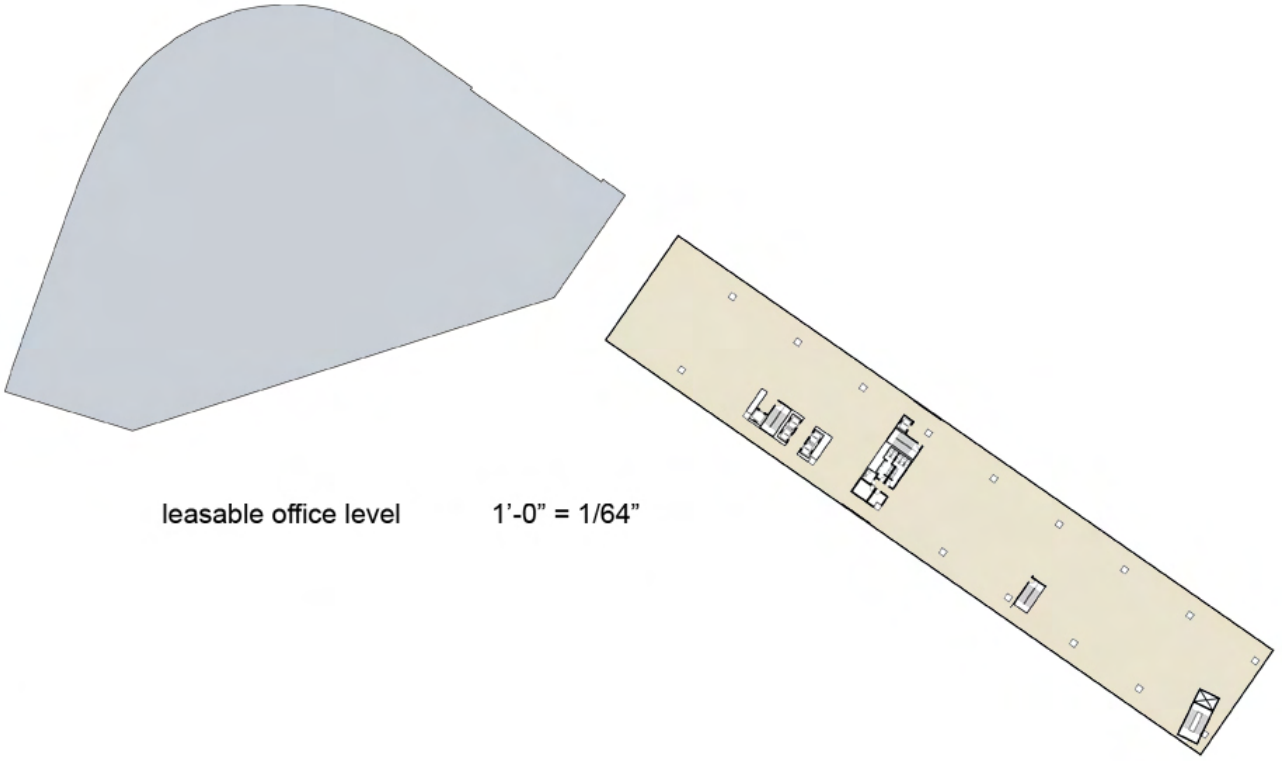
mezzanine level 1'-0" = 1/64"

station plans

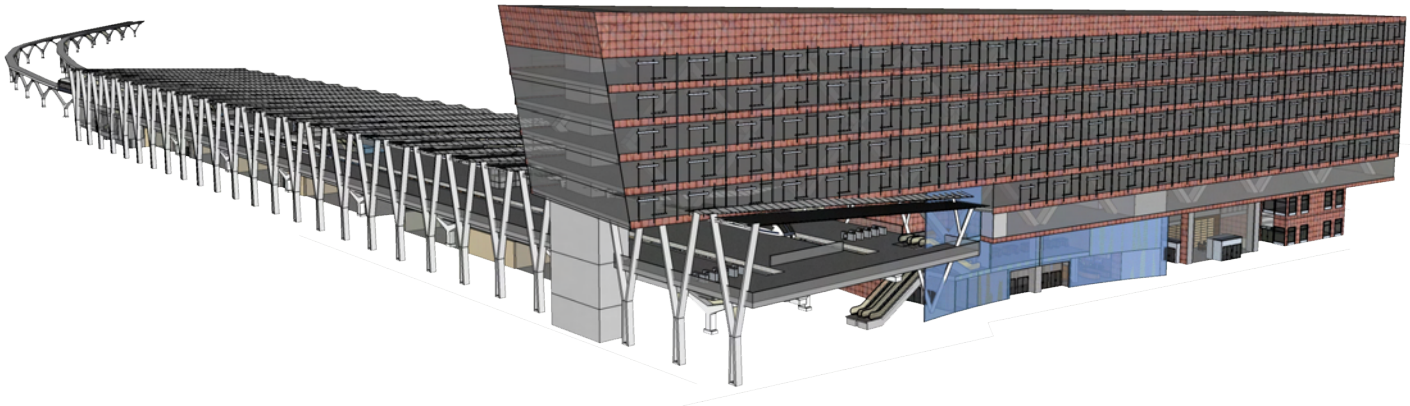


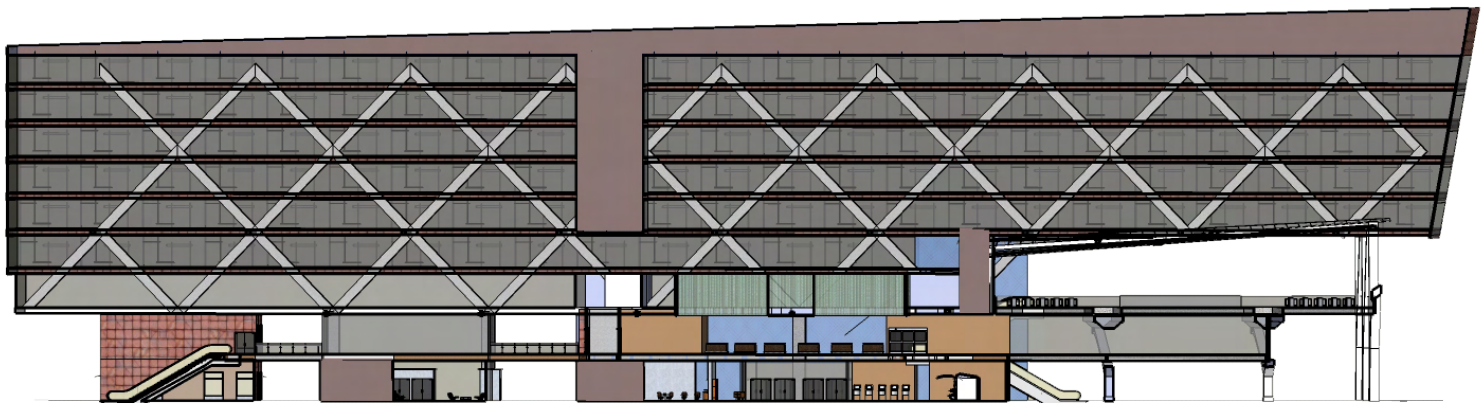
platform level 1’-0” = 1/64”

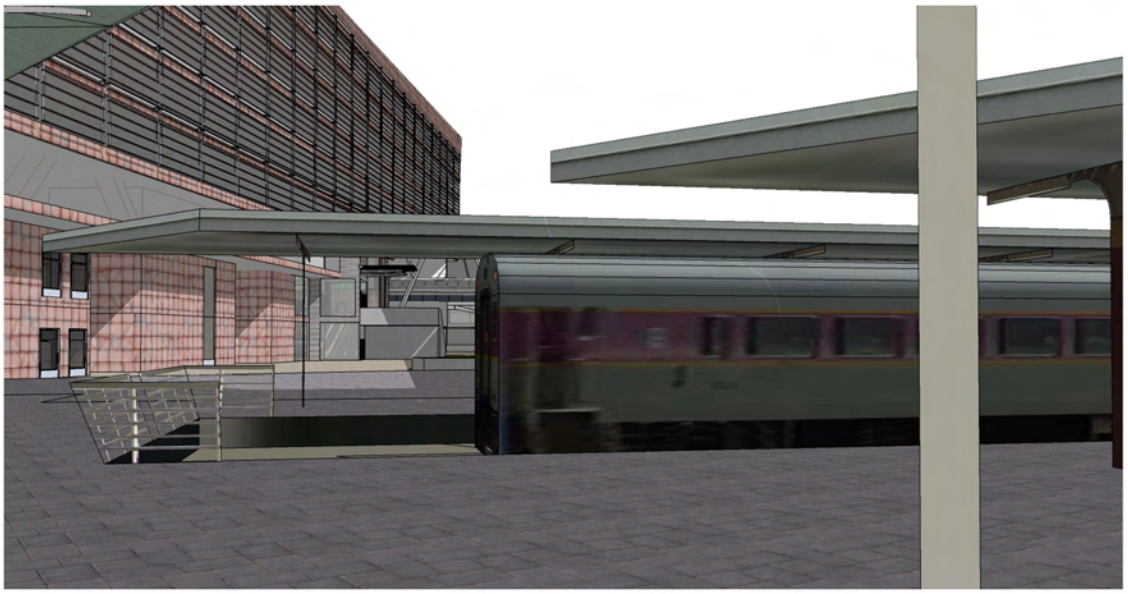


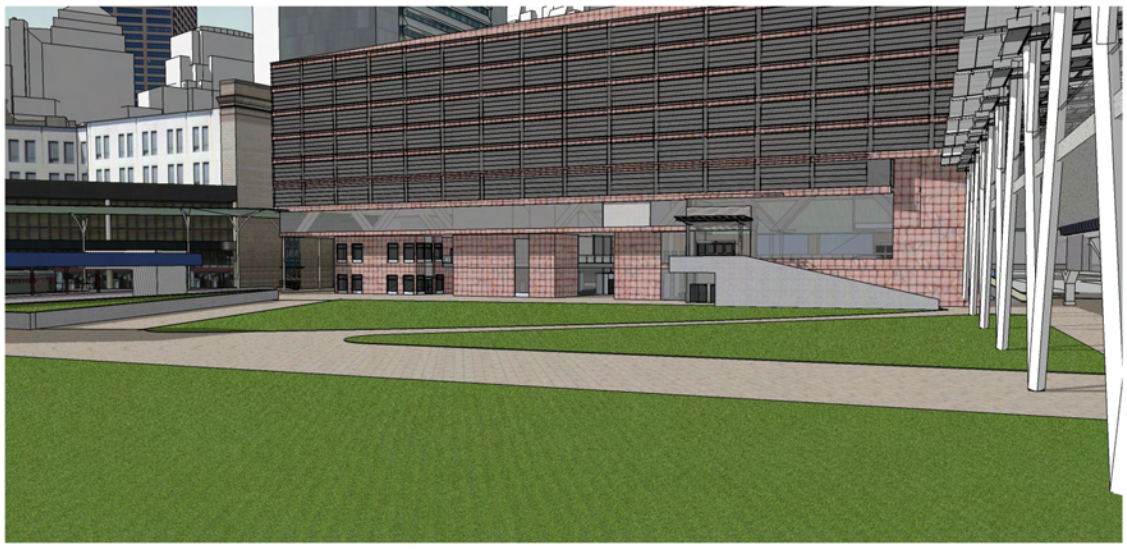


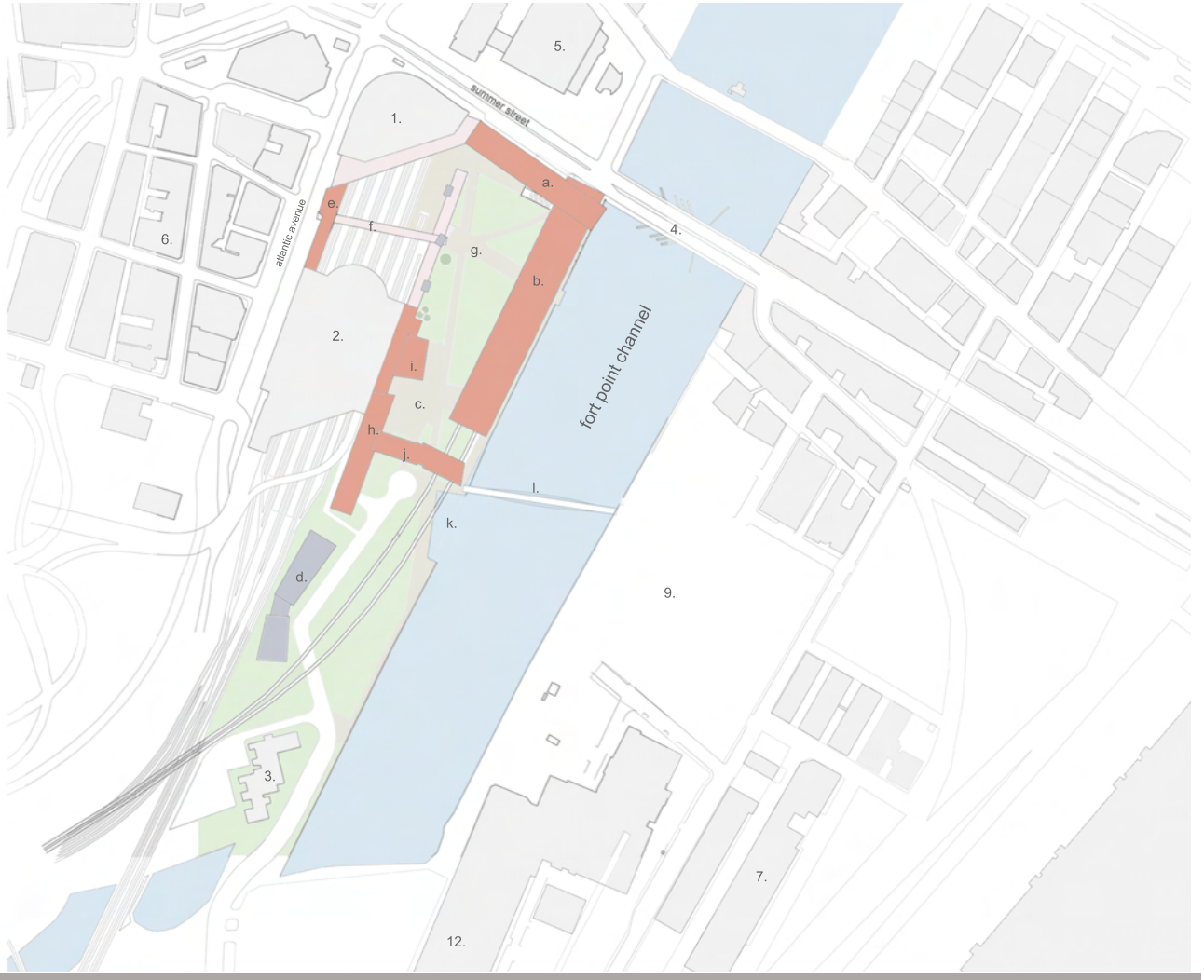
leasable office level 1’-0” = 1/64”










summer street
atlantic avenue
fort point channel
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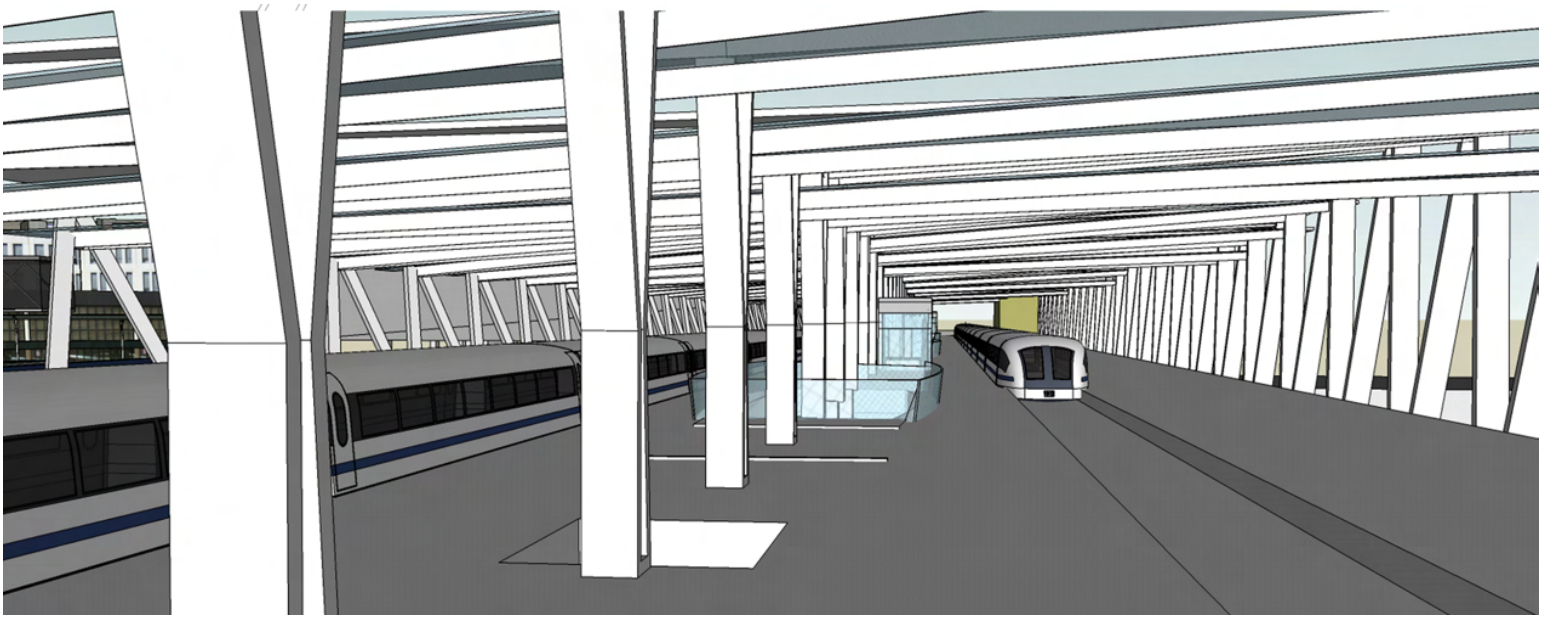
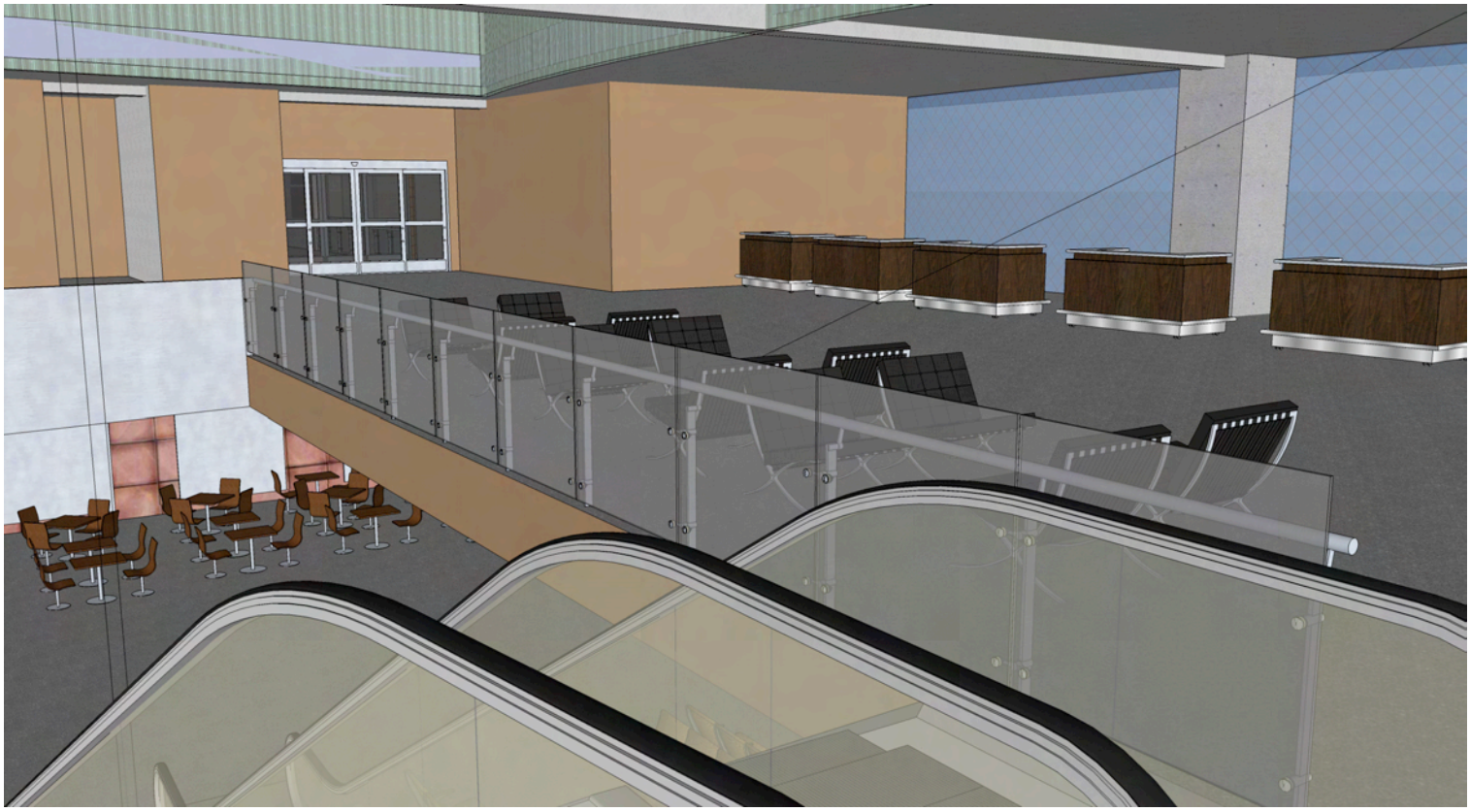
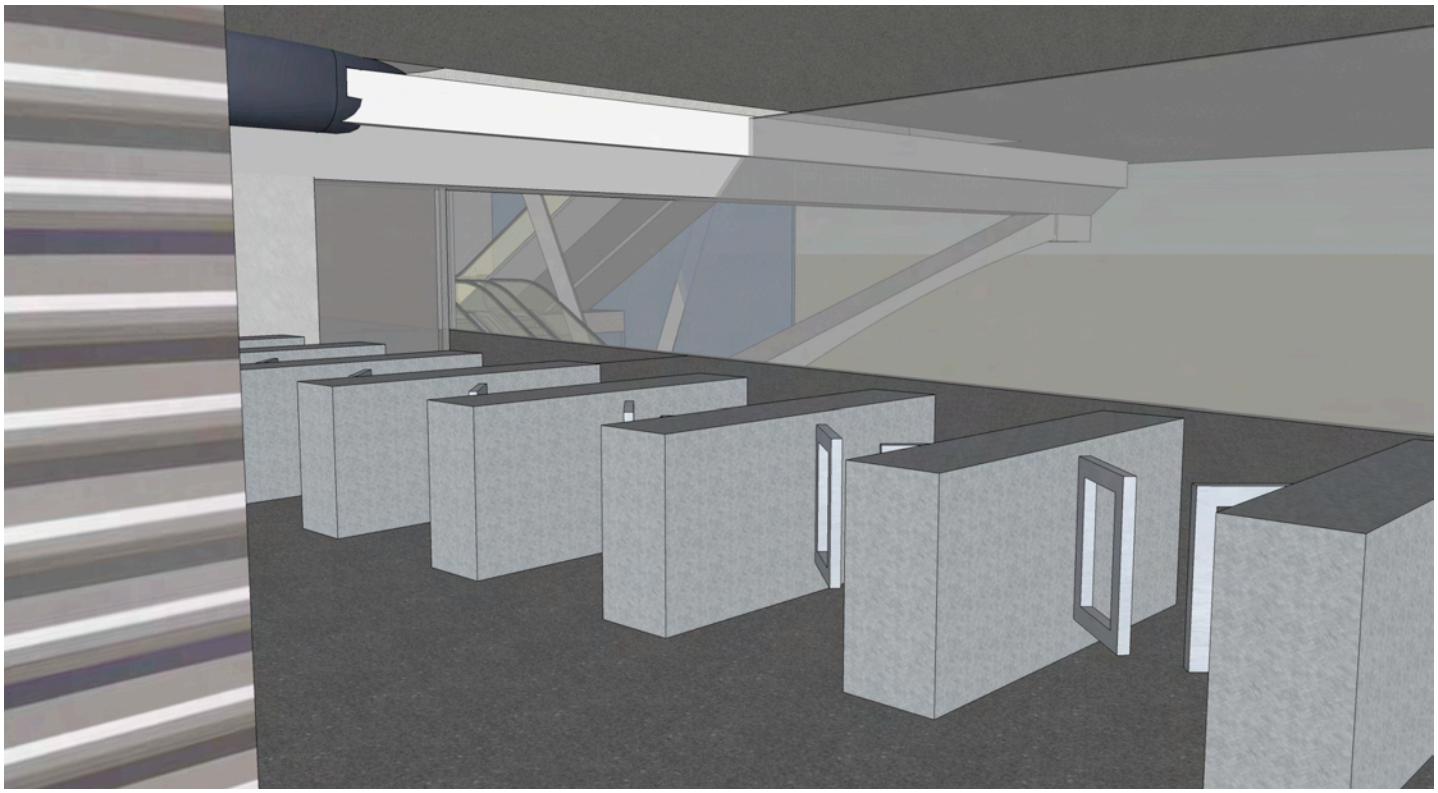
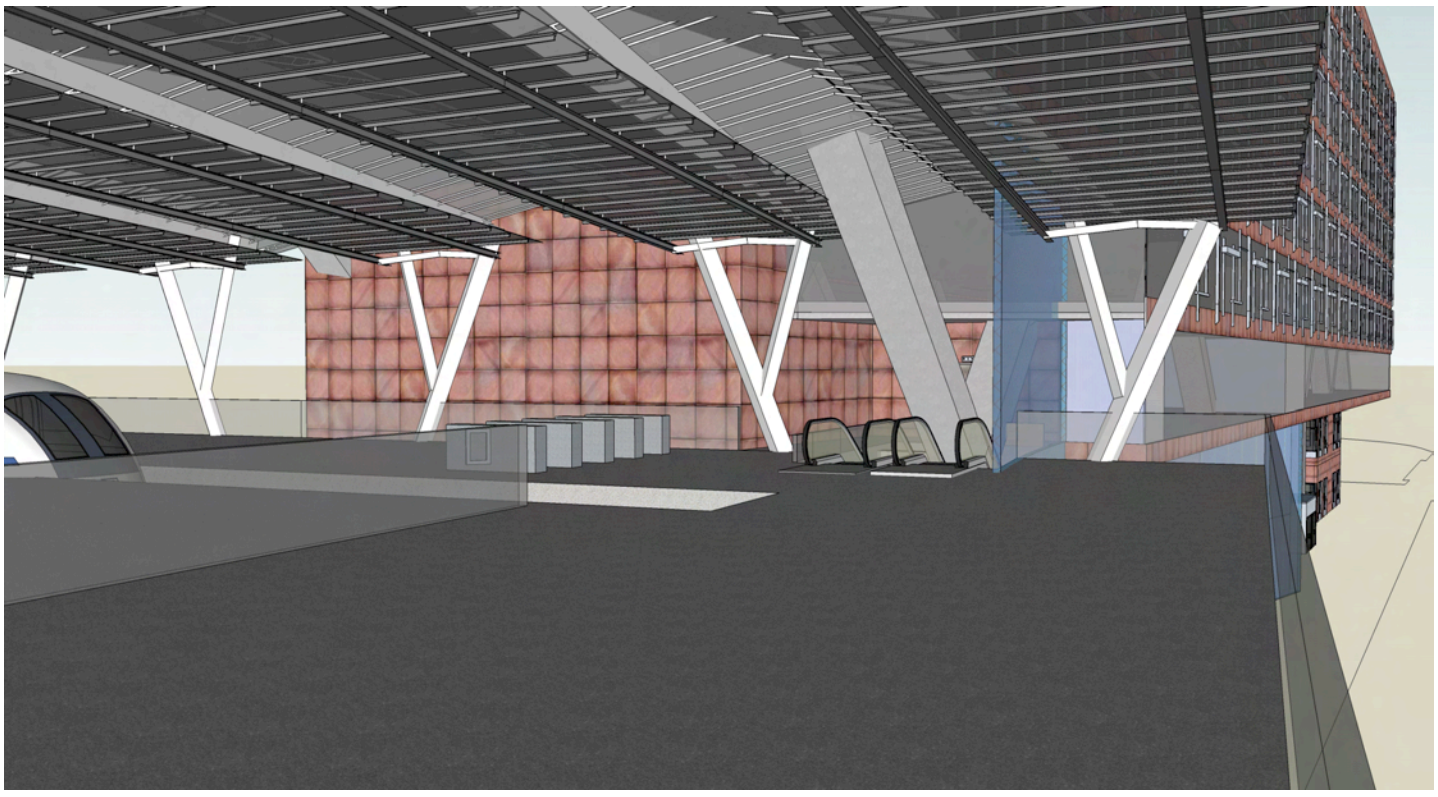
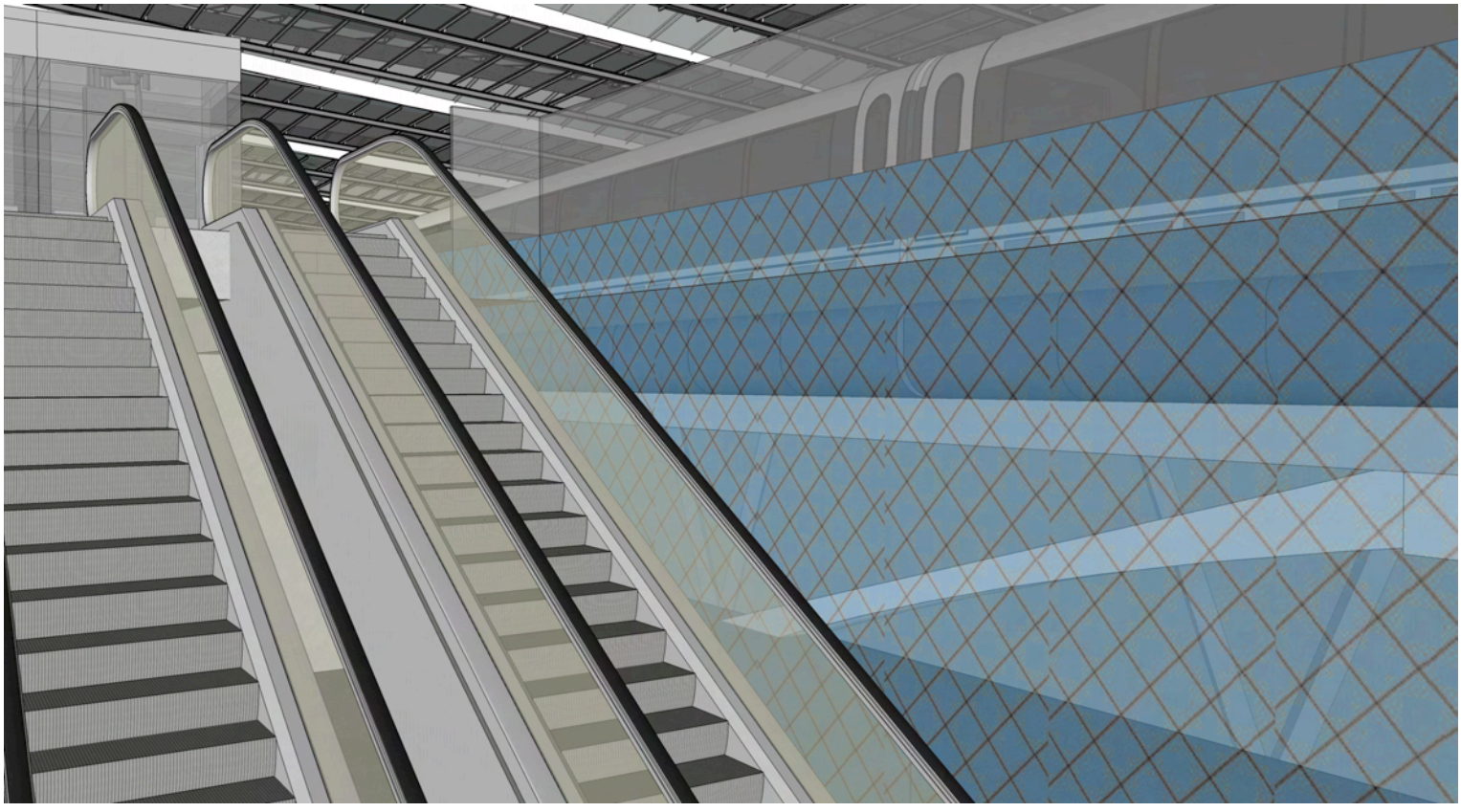


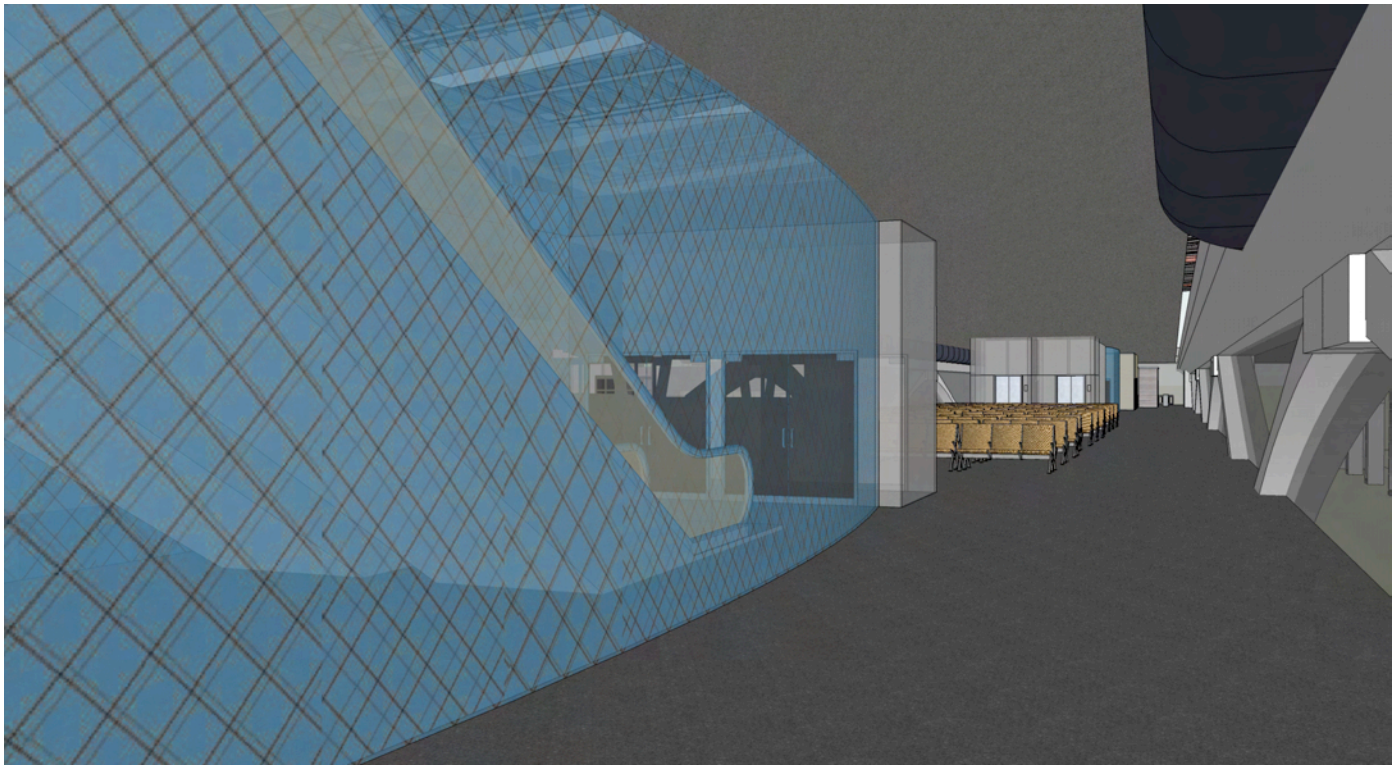
...interiors

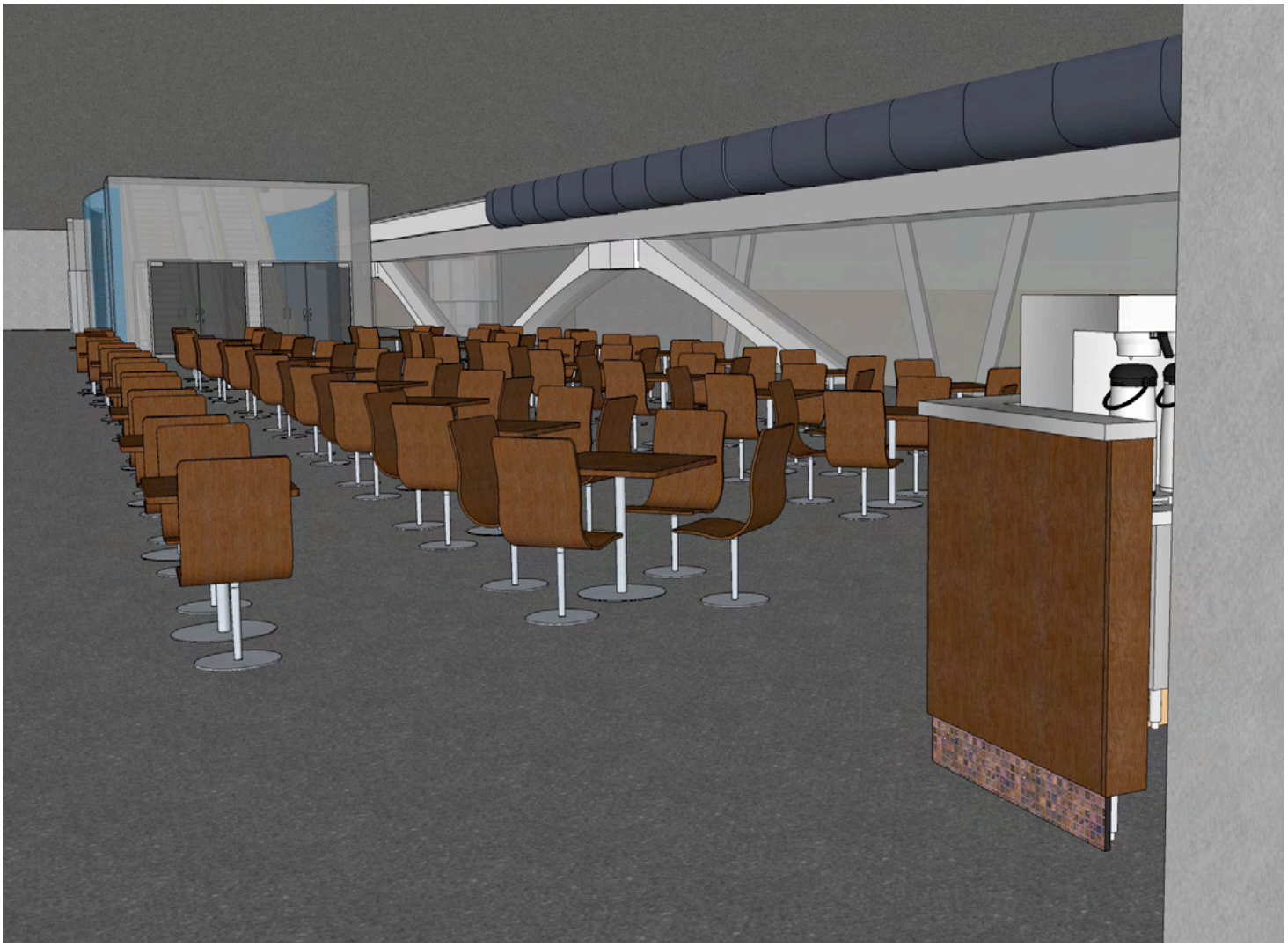


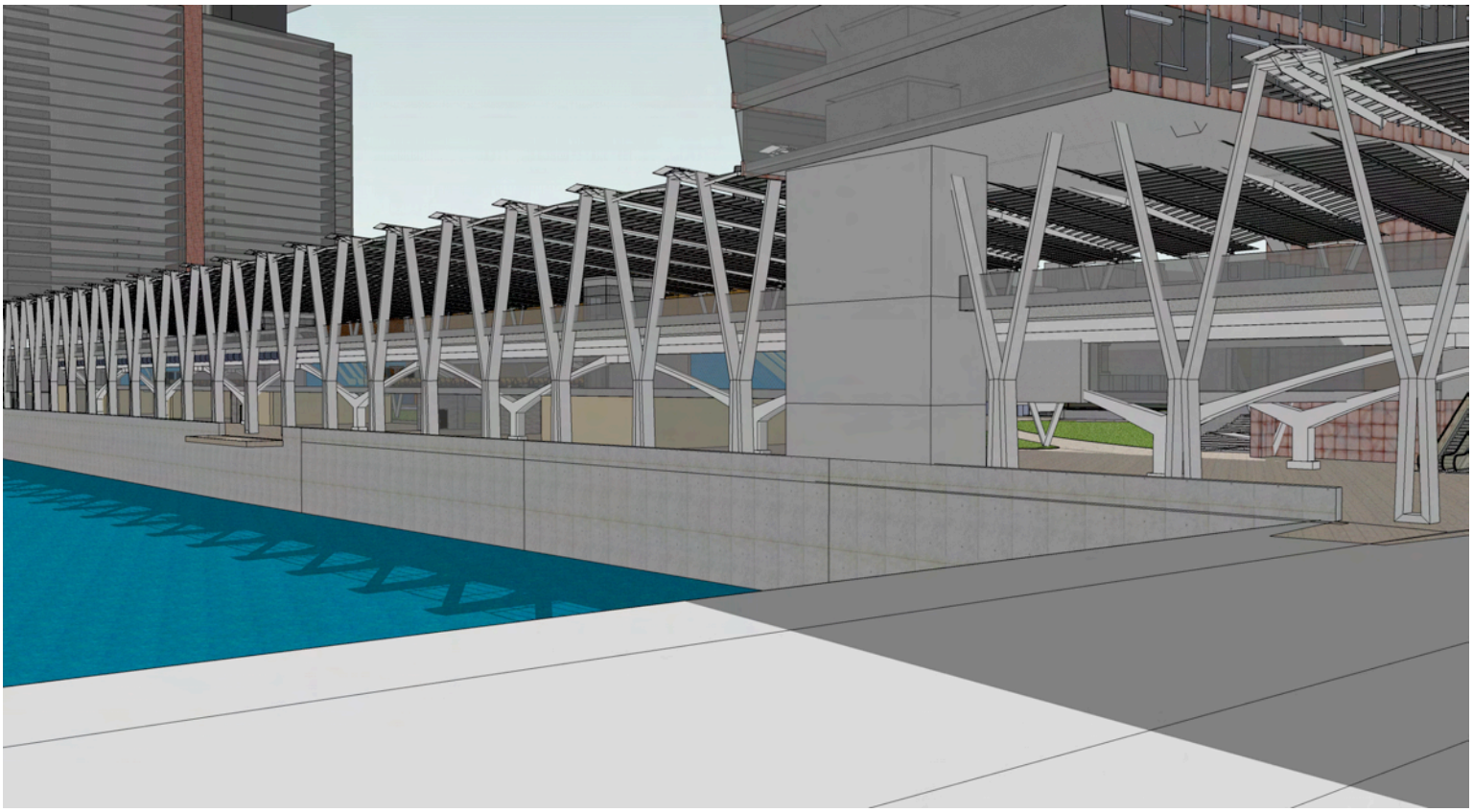




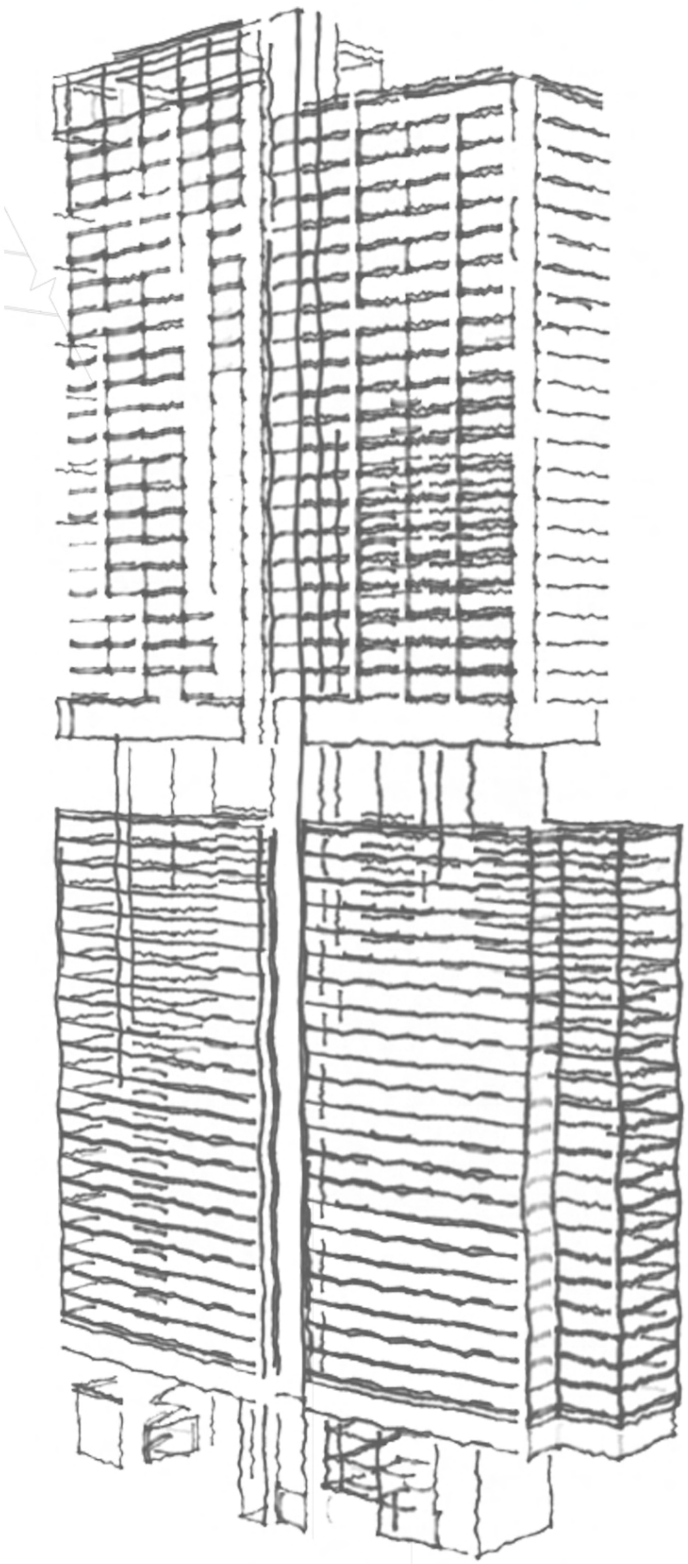


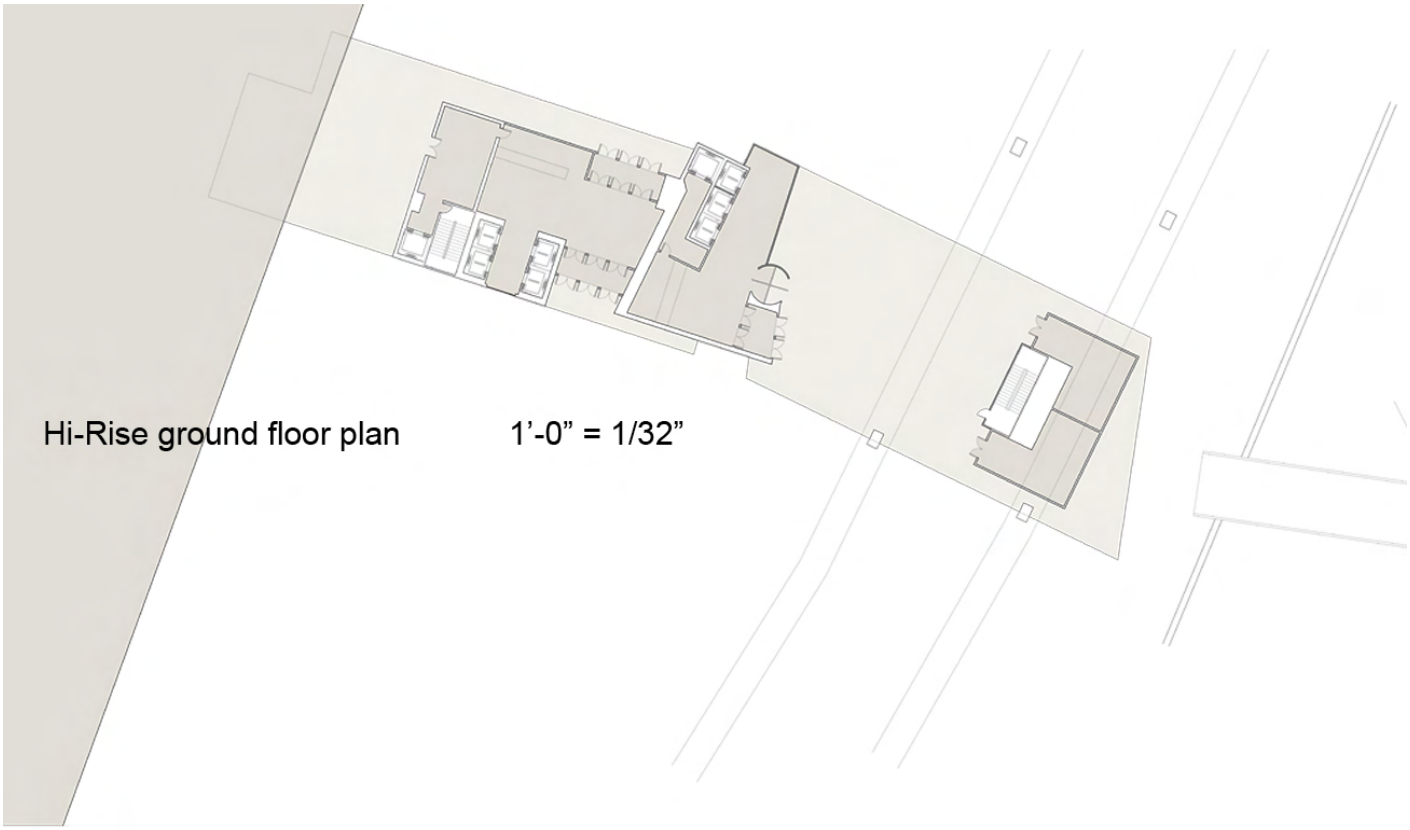




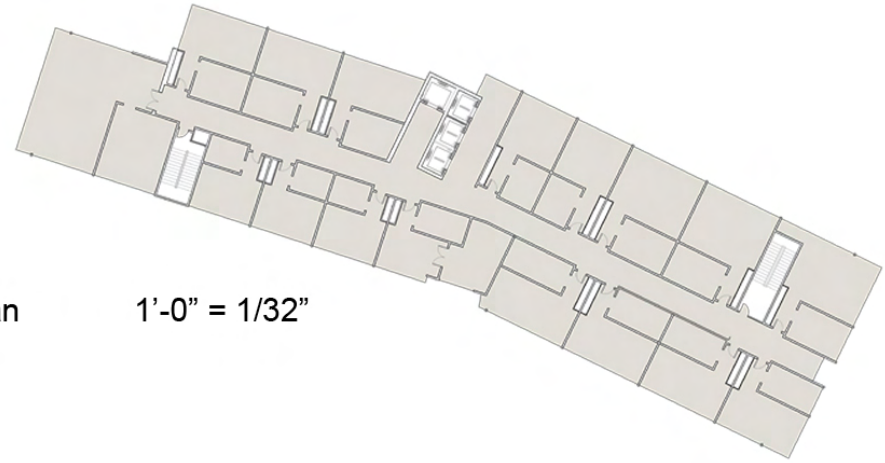


office/hotel tower

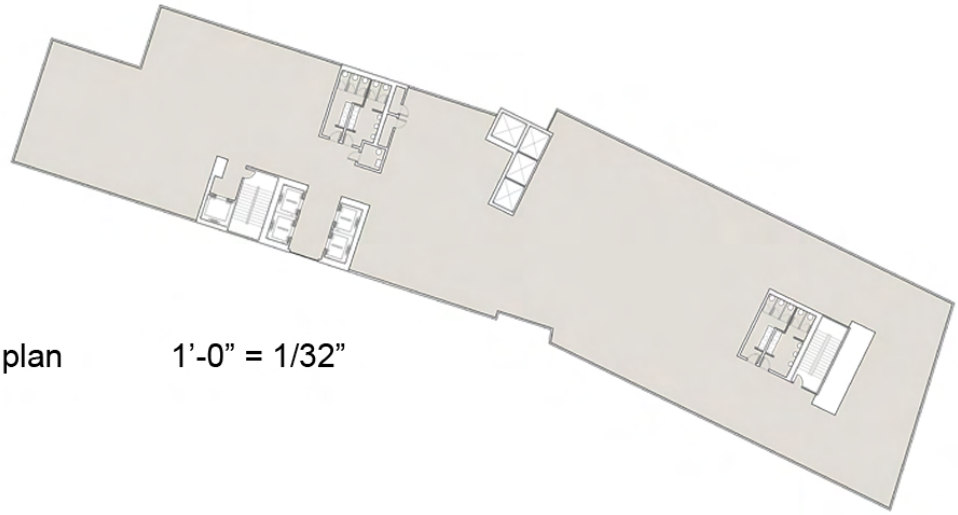




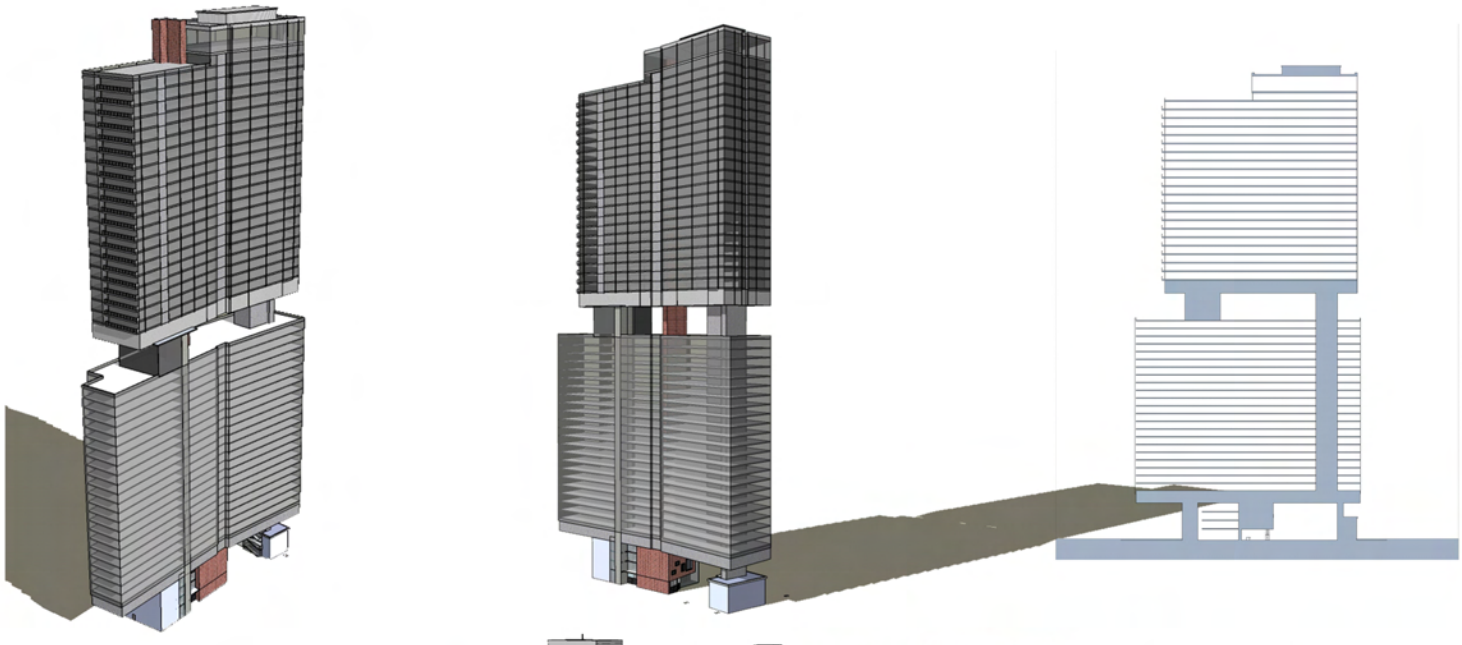
Hi-Rise ground floor plan 1’-0” = 1/32”

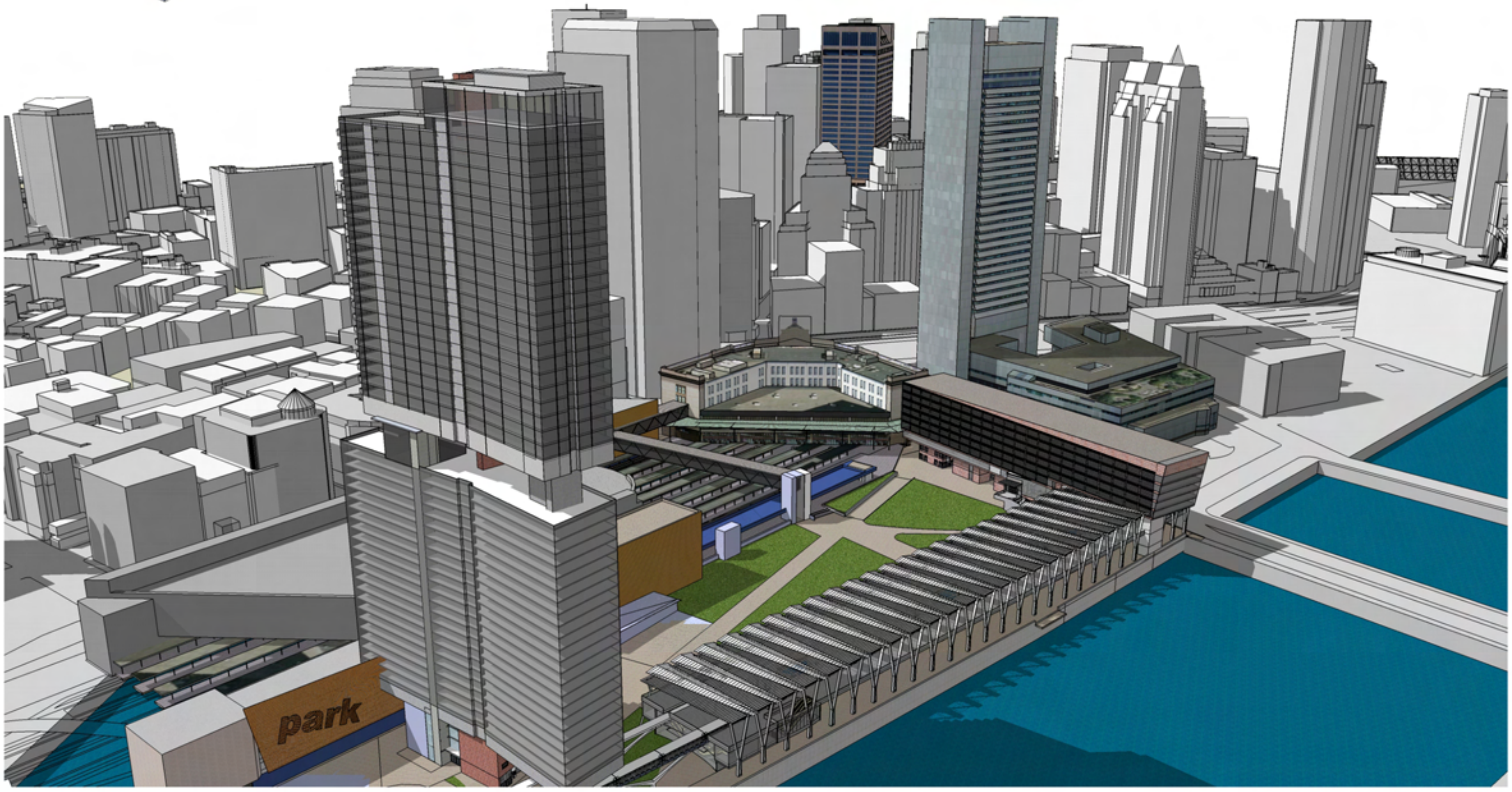


typical hotel floor plan 1’-0” = 1/32”

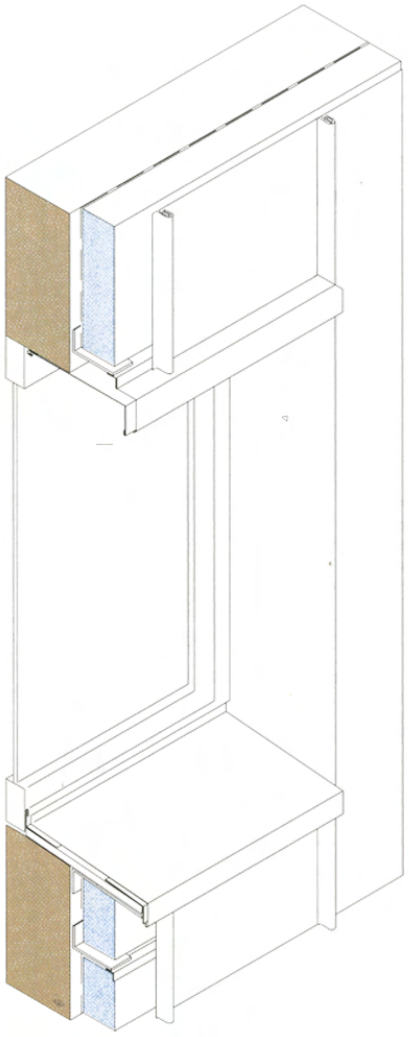


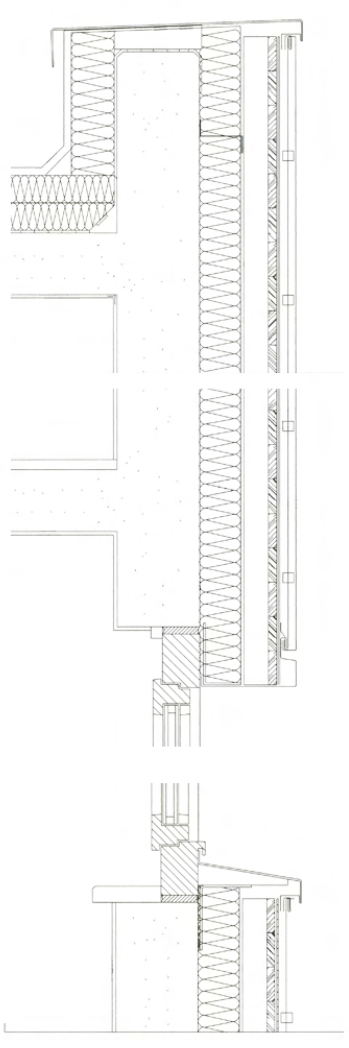
typical office floor plan 1’-0” = 1/32”

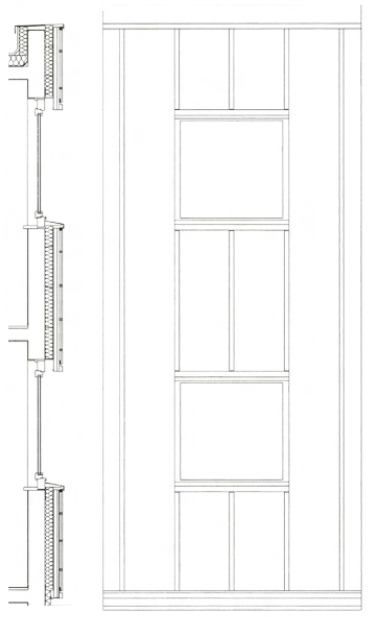


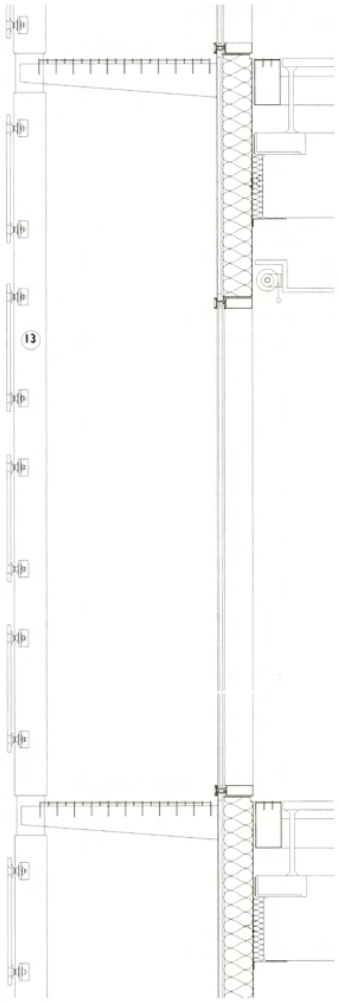

park

wall detail





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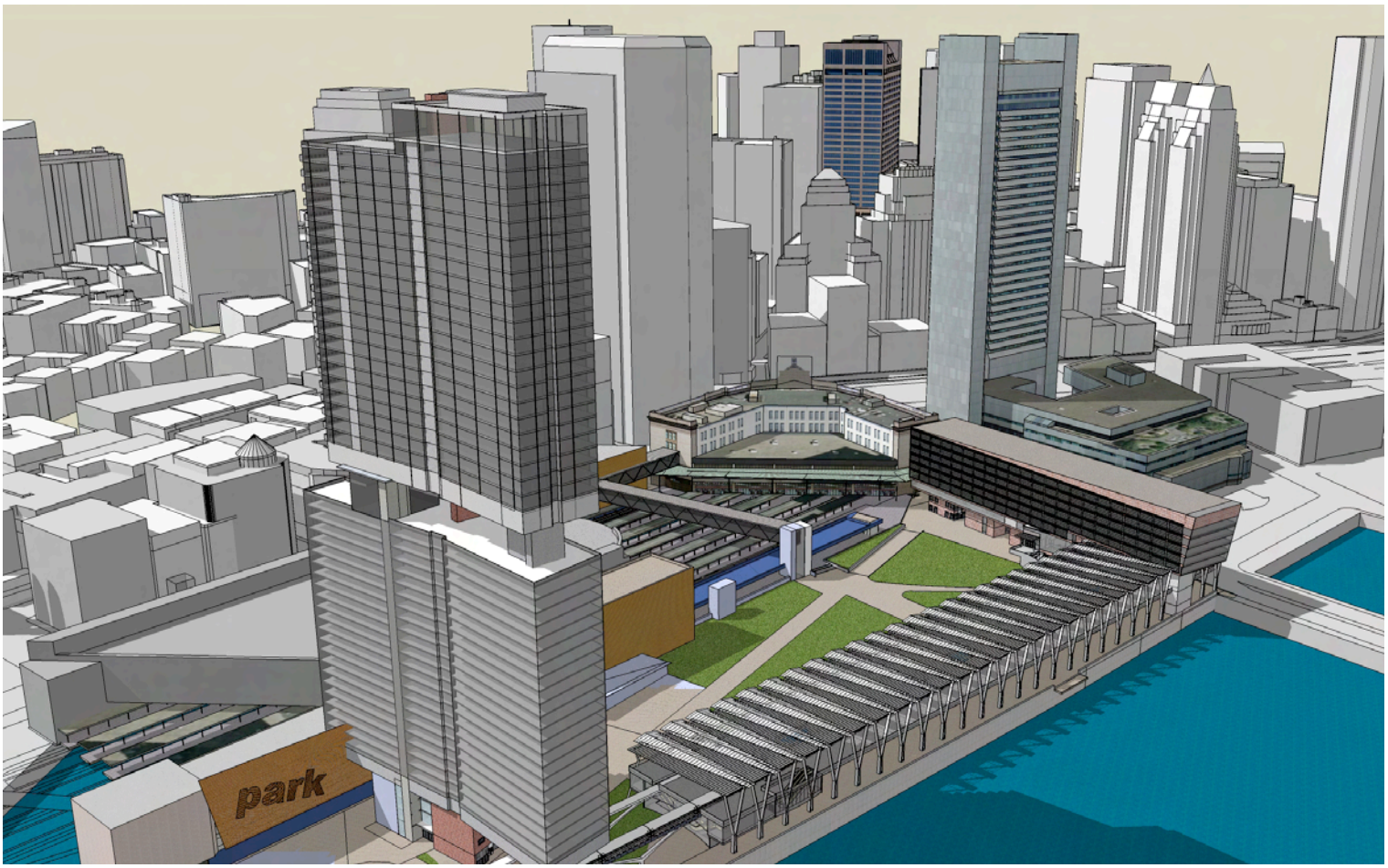
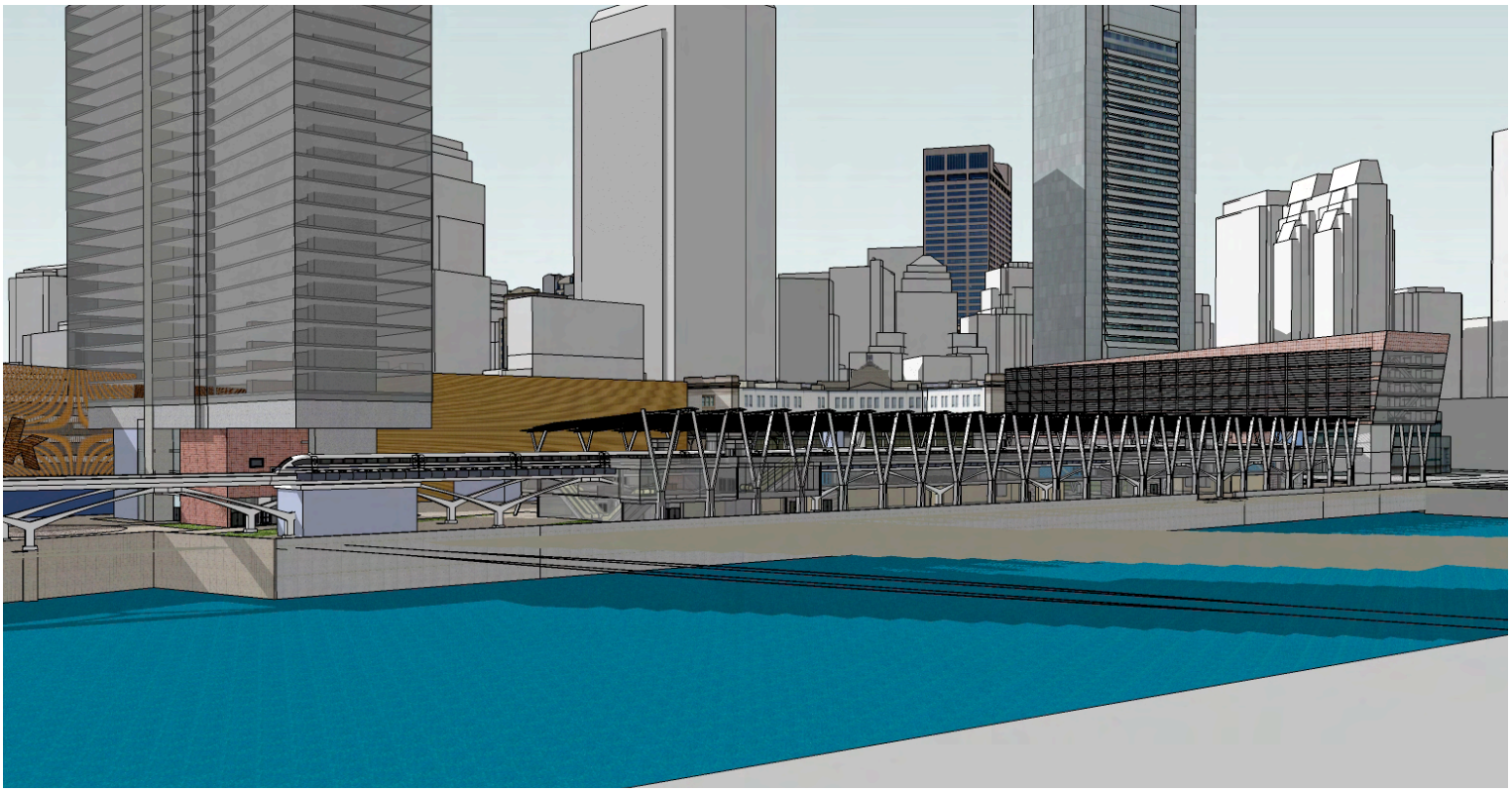

park



PRECEDENTS

Program:	**Large scale subway hub**
Client:	**MTA, New York City Transit**
Size:	**366,000 sq. ft. 275,000 riders daily**
Date Built:	**Under construction**
Architect:	**Grimshaw Architects**
Engineer:	**Arup**
Cost:	**$750 million**

fulton st transit center

new york, ny

The Fulton Street complex is one of the busiest underground interchanges in the New York City subway system. The project is anticipated to handle an average of 275,000 passengers daily.

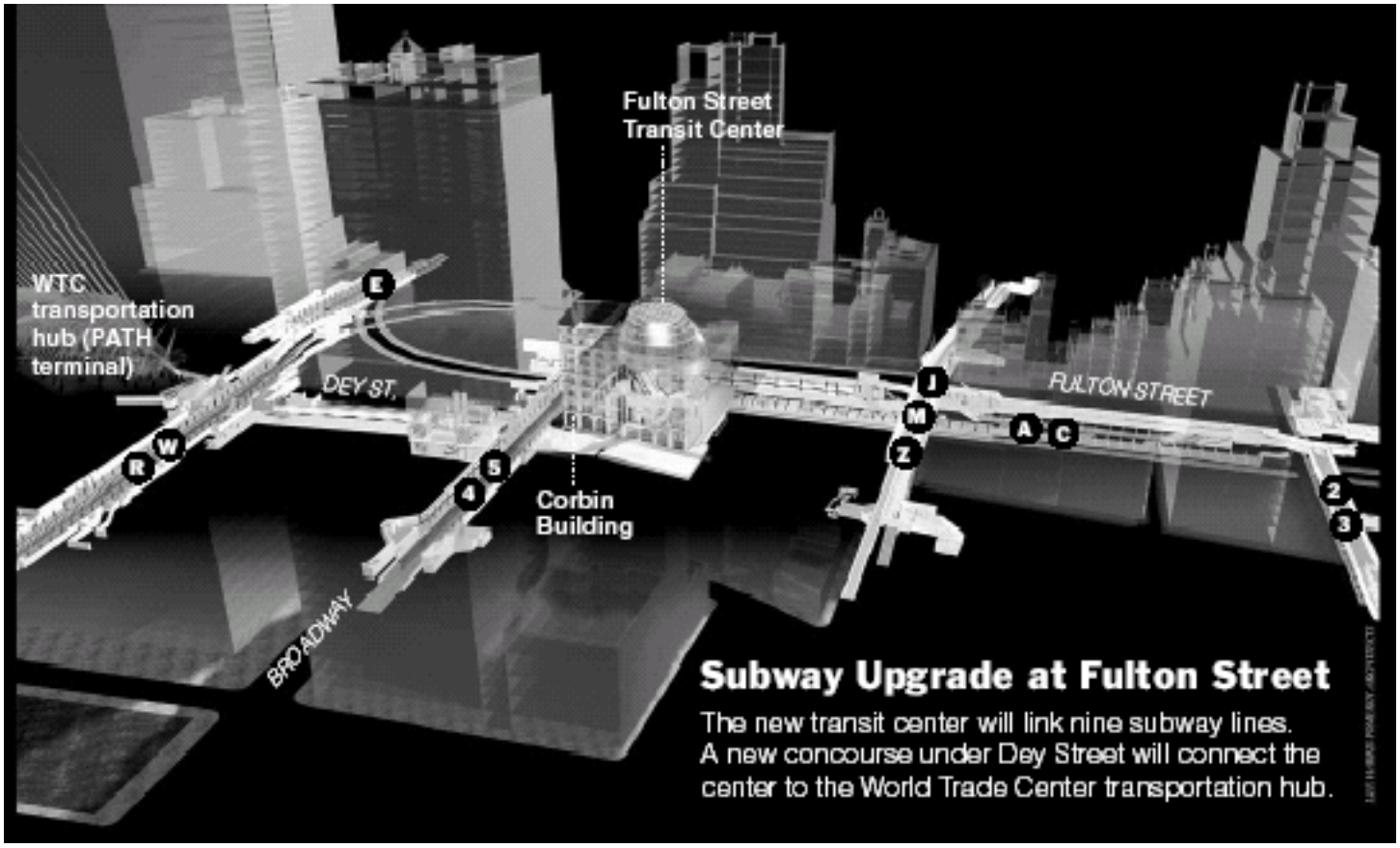
It is planned to include station rehabilitations, new underground passageways, and an above-ground station entrance building at the intersection of Fulton Street and Broadway in New York City, above several existing stations. The project is intended to improve access to and connections between 12 MTA subway services stopping at Manhattan's Fulton Street, PATH service and the World Trade Center station in Lower Manhattan.

Work to reconfigure the maze of ramps and passageways within the station itself includes the new Dey Street Pedestrian Concourse that will be built under Broadway and westward below Dey Street. The concourse will have its own "headhouse" (entrance) on the southwest corner of Broadway and Dey. The much-anticipated pedestrian link, about 29 feet in width, will connect Fulton Center trains with the R/W line at Cortlandt Street and the World Trade Center transportation

hub -- home to the PATH and, possibly, a direct rail line to regional airports.

MTA crews are also working to open up corridors between subway lines and build new entrances -- helping to reduce platform crowding and train congestion. New mezzanine-to-platform stairways are now operational on the 2/3 Fulton Street line, and new entrances to the south end of the 4/5 platform opened at Broadway at Maiden Lane and Liberty Street.

The Transit Center is organized around a civic scale space at its core. This atrium is topped with a glass Oculus to the sky and defined by a hyperbolic parabaloid cable-net, developed in partnership with artist James Carpenter. The cable structure supports a filigree metal inner reflector geometrically optimized to capture and distribute year round daylight and sunlight to the deepest levels of the terminal. The planning of the building is organized to streamline the transfer of passengers around the central space, providing an intuitive means of wayfinding. Surrounding the atrium, a 50-foot-high glazed entrance pavilion maintains the urban street wall providing space for retail amenities.


Fulton Street
Transit Center
WTC
transportation
hub (PATH
terminal)
DEY ST.
FULTON STREET
Corbin
Building
BROADWAY
E
R
W
4
5
J
M
Z
A
C
2
3
Subway Upgrade at Fulton Street
The new transit center will link nine subway lines.
A new concourse under Dey Street will connect the
center to the World Trade Center transportation hub.

Program:	**Commuter Train terminal**
Date Built:	**1903-1913**
Architect:	**Reed and Stem and Warren and Wetmore Alfred T. Fellheimer - head designer**
Cost:	**$80 million (roughly $2 billion in today's $)**

grand central station

new york, ny

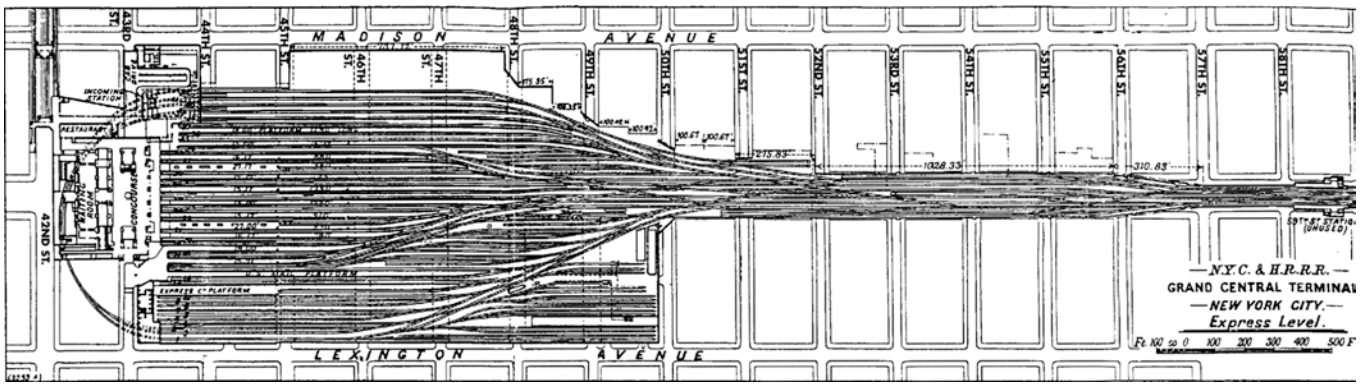
In order to accommodate ever-growing rail traffic into the restricted Midtown area, William J. Wilgus, chief engineer of the New York Central Railroad took advantage of the recent electrification technology to propose a novel scheme: a bi-level station below ground.

Arriving trains would go underground under Park Avenue, and proceed to an upper-level incoming station if they were mainline trains, or to a lower-level platform if they were suburban trains. In addition, turning loops within the station itself obviated complicated switching moves to bring back the trains to the coach yards for servicing. Departing mainline trains reversed into upper-level platforms in the conventional way.

Burying electric trains underground brought an additional advantage to the railroads: the ability to sell above-ground air rights over the tracks and platforms for real-estate development. With time, all the area around Grand Central saw prestigious apartment and office buildings being erected, which

turned the area into the most desirable commercial office district of Manhattan.

The terminal also did away with bifurcating Park Avenue by introducing a "circumferential elevated driveway" that allowed Park Avenue traffic to traverse around the building and over 42nd Street without encumbering nearby streets. The building was also designed to be able to eventually reconnect both segments of 43rd Street by going through the concourse if the City of New York demanded it.



Program:	**Western Concourse addition for International Train travel**
Client:	**Network Rail Infrastructure, Ltd.**
Size:	**190,000 sq. ft. 70,000 riders daily**
Date Built:	**Under construction (finished 2011)**
Architect:	**John McAslan & Partners**
Engineer:	**Arup**
Cost:	**$530 million**

king's cross station

london, uk

This rail project is designed to improve passenger facilities, rationalize operational activities and considerably increase retail opportunities at the station. Major remodeling at King's Cross will optimize facilities, improve links with the Underground, and streamline taxi and bus connections. The scheme includes the reinstatement of the original Victorian main façade, and a new western concourse with a dramatic wave-form canopy.

The creation of a pure, semi circular form is both rational and potentially beautiful. The internal planning, with the fixed location of the escalators and the retail provision, mean that the potential spatial experience of this spectacular volume will be diminished.

Program:	**International Train travel**
Client:	**British Railways Board - European Passenger Services**
Size:	**645,835 sq. ft.**
Date Built:	**1993 (use ended 2007)**
Architect:	**Grimshaw Architects**
Engineer:	**YRM Anthony Hunt Associates Cass Hayward & Partners**
Cost:	**$215 million**

waterloo international

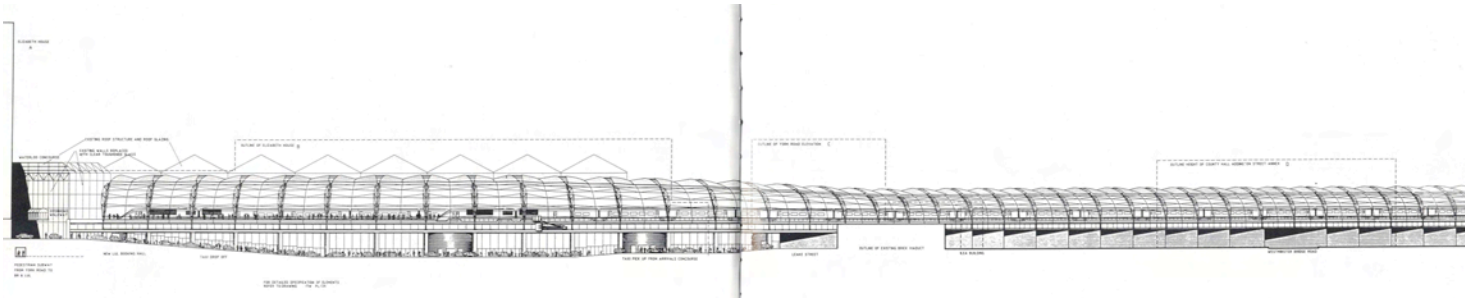
london, uk

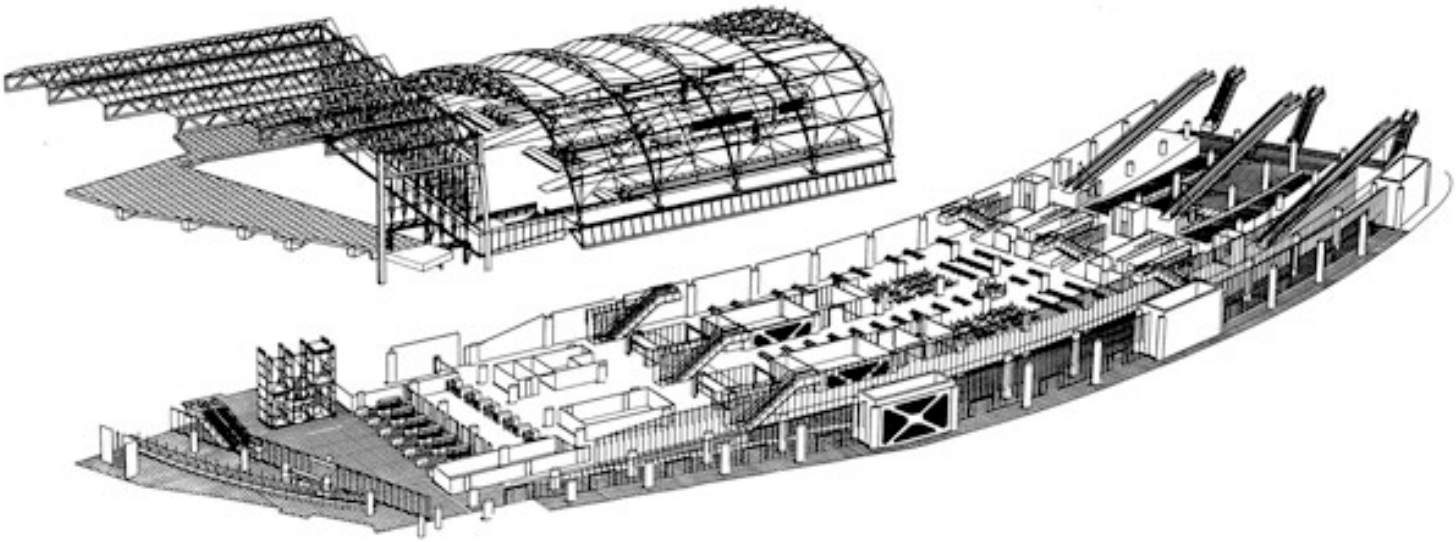
The International Terminal Waterloo is a multi-faceted transport interchange that copes with the demands of 15 million international rail passengers per year. The project built a streamlined terminal, on a constrained central London site, through which passengers could pass quickly and efficiently. The result was a monument to the new railway age by the advent of cross-channel rail travel in Britain.

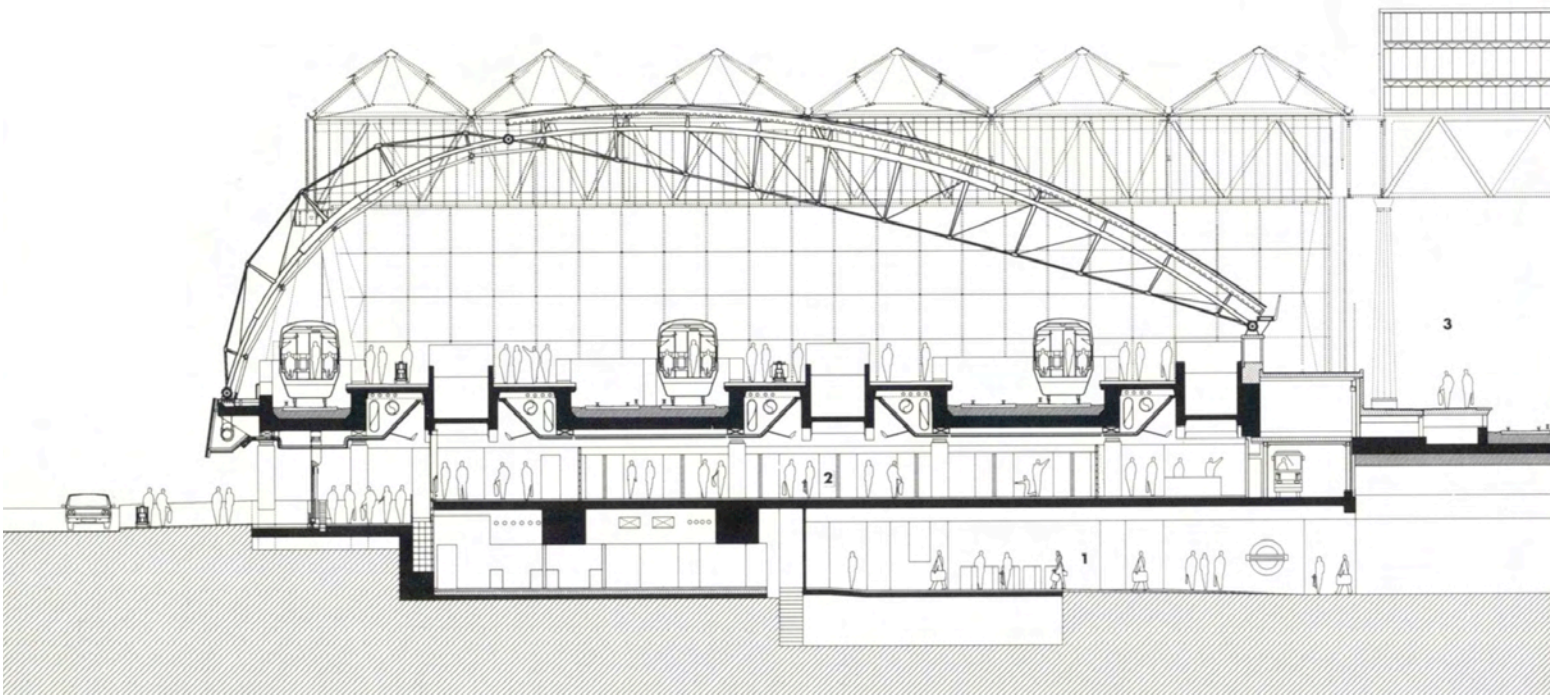
The roof form responds to the dictates of the site, specifically to the west where the roof must rise more steeply in order to accommodate the height of the trains. This western side is clad in glass, providing arriving passengers with an impressive view of Westminster and passers-by with a panorama of the Eurostar Trains.

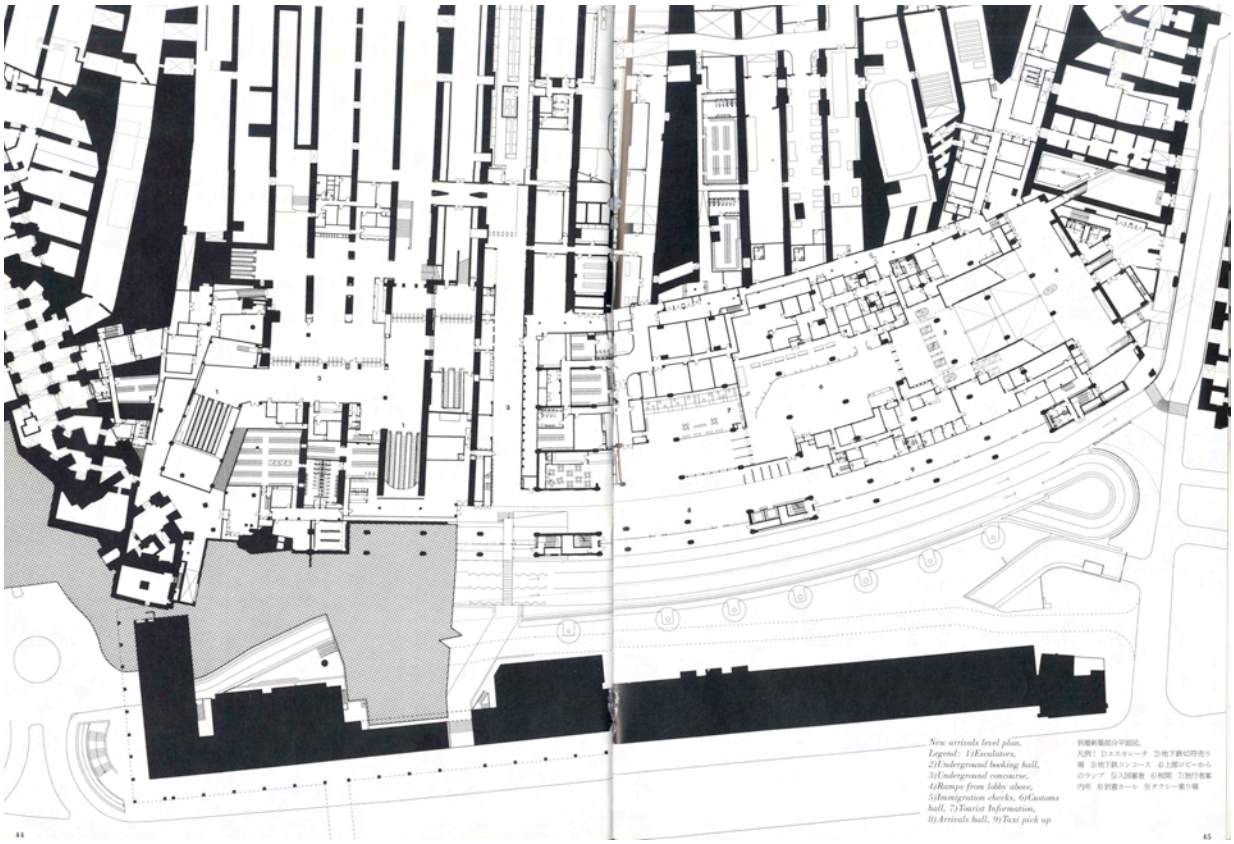
The roof is the architectural focus of the Terminal but almost 90% of the project is concerned with work carried out underground. This comprises a two-story viaduct that supports the platforms and incorporates two floors of passenger facilities. Departures and arrivals, a basement parking garage, and the brick vaults underneath the mainline station.

Departures and arrivals are assigned a level each to encourage a single direction of passenger movement on each floor. For all customers, there is a clear, linear progression from their point of arrival in the terminal to their point of exit.



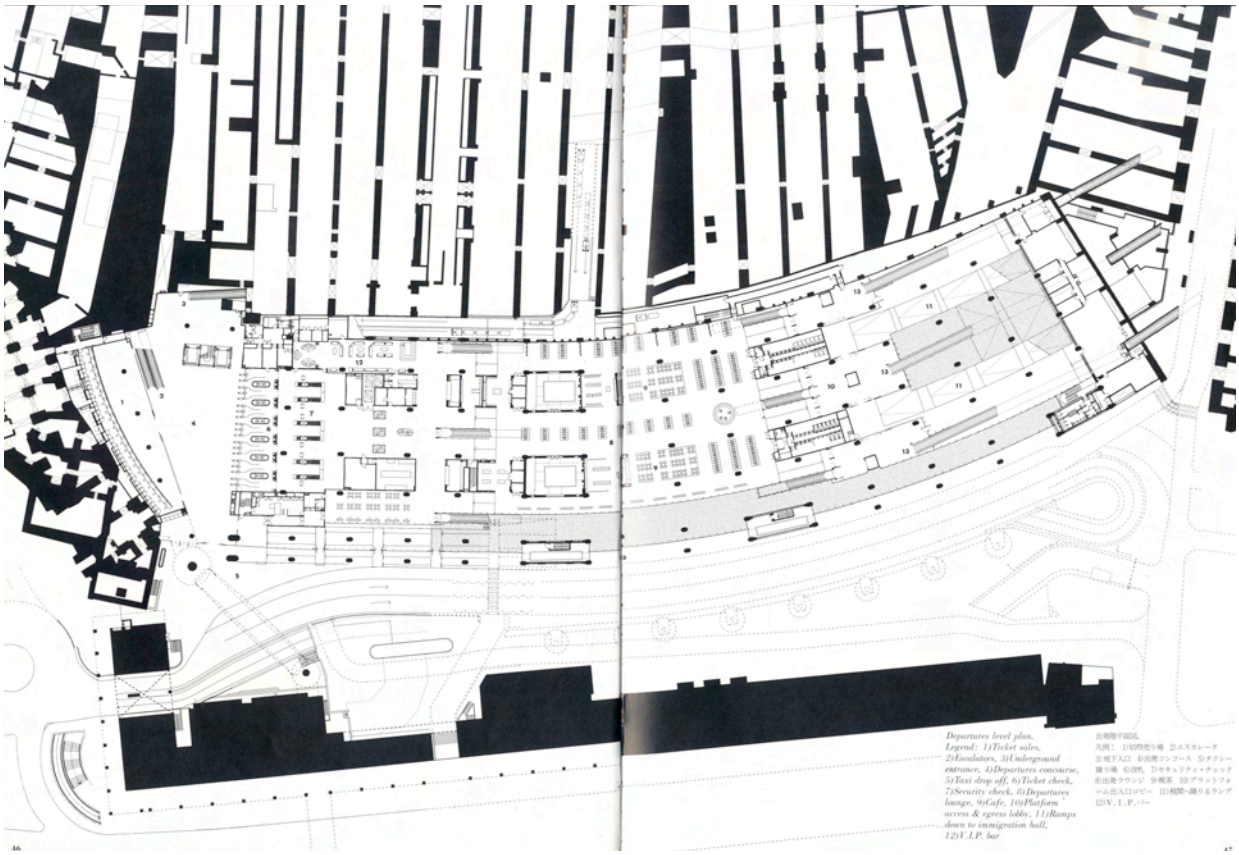






New arrivals level plan.
Legend: 1)Escalators, 2)Underground booking hall, 3)Underground concourse, 4)Ramps from lobby above, 5)Immigration checks, 6)Customs hall, 7)Tourist Information, 8)Arrivals hall, 9)Taxi pick up

到着新築部分平面図。
凡例：①エスカレータ ②地下鉄切符売り場 ③地下鉄コンコース ④上部ロビーからのランプ ⑤入国審査 ⑥税関 ⑦旅行者案内所 ⑧到着ホール ⑨タクシー乗り場



Departures level plan.
Legend: 1)Ticket sales, 2)Escalators, 3)Underground entrance, 4)Departures concourse, 5)Taxi drop off, 6)Ticket check, 7)Security check, 8)Departures lounge, 9)Cafe, 10)Platform access & egress lobby, 11)Ramps down to immigration hall, 12)V.I.P. bar

出発階平面図。
凡例：①切符売り場 ②エスカレータ ③地下入口 ④出発コンコース ⑤タクシー降り場 ⑥改札 ⑦セキュリティ・チェック ⑧出発ラウンジ ⑨喫茶 ⑩プラットフォーム出入口ロビー ⑪税関へ降りるランプ ⑫V.I.P.バー


20b 20c
21b 22b 21c 22c
23b 24b 23c 24c

Program:	Wind powered transit
Date Built:	unbuilt
Architect:	Arrowstreet

wind train project

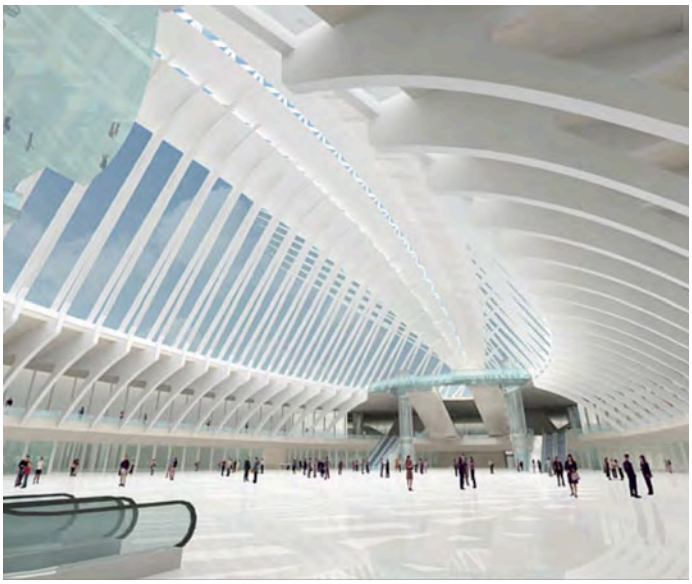
boston, ma

Arrowstreet developed the concept of a "wind train" from the imperative to reduce our regional impact on global warming. Massachusetts power plants generate 22 percent of the greenhouse gas emissions in the state; vehicles contribute 32 percent. The WindTrain addresses both sources simultaneously, offsetting CO2 production by providing 1,000 MW of power generation capacity through wind turbines located along Route 128 and 93 in Massachusetts, and by linking all existing commuter rail links from the City of Boston with a transit loop-connecting the spokes with the wheel.

The project suggests a vision for the ubiquitous interstate infrastructure in the U.S. and offers opportunities to generate renewable energy across the country without adversely impacting undisturbed land and residential neighborhoods.

Arrowstreet is a multidisciplinary design firm based in Somerville, MA. Since 1961, the firm's designs have been based on a unique approach: look beyond traditional architectural and planning concerns into the underlying political, economic, and social issues which affect the success of a project.

Program:	**Commuter train hub**
Client:	**Port Authority NY/NJ**
Size:	**800,000 sq. ft. 200,000 commuters**
Date Built:	**under construction**
Architect:	**Santiago Calatrava**



wtc PATH station

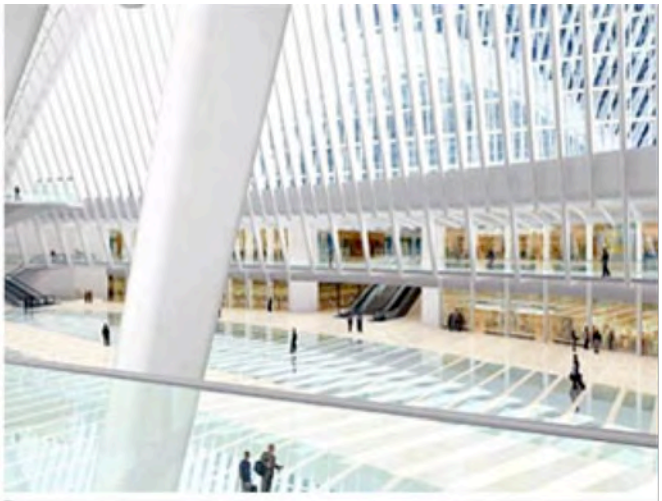
new york, ny

The World Trade Center Transportation Hub will restore and greatly enhance the level of services that existed prior to September 11, 2001.

Comparable in size to Grand Central Station, the new hub will serve more than 200,000 daily commuters, along with millions of annual visitors to the World Trade Center and Memorial. The Hub will feature advanced signal systems, state-of-the-art fare collection equipment, and climate-controlled platforms and mezzanines with superior lighting and finishes.

The Hub's new concourse will connect commuters and visitors to transit connections, unsurpassed retail opportunities and other destinations, including the World Financial Center and Winter Garden.

Designed by internationally acclaimed architect Santiago Calatrava, the Hub's design will seamlessly fuse state-of-the-art transportation and retail facilities in a design destined to become iconic.



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GLOSSARY

GLOSSARY: terms and phrases

transit terms.

- **accessibility** – the extent to which facilities are barrier free and usable by persons with disabilities, including wheelchair users
- **american public transportation association (APTA)** – the nonprofit trade association representing the public transit industry., APTA members include more then 400 public transit systems, as well as state and local departments of transportation and planning agencies, manufactures and suppliers of transit equipment, consultants, contractors, and universities
- **americans with disabilities act of 1990 (ADA)** – a civil rights law passed by congress in 1990 that makes it illegal to discriminate against people with disabilities in employment, services, provided by state and local governments, public and private transportation, public accommodations, and telecommunications
- **capital costs** – costs of long-term assets of a public transit system, such as property, buildings, vehicles, etc.
- **commuter** – a person who travels regularly between home and work or school
- **corridor** – a broad geographical band that follows a general direction flow, connecting major sources of trips that may contain a number of streets, highways, and transit route alignments
- **department of transportation (DOT)** – the cabinet level department of the federal government that is responsible administration of federal transportation programs, including public transportation, highways, railroads, air transportation, shipping, and the Coast Guard (also exists on the state level)
- **intermodal** – those issues or activities that involve or affect more then one mode of transportation, including transportation connections, choices and cooperation and coordination of various modes
- **magnetic levitation (maglev)** – a rail transportation system with exclusive right-of-way, which is propelled along a fixed guideway system by the attraction or repulsion of magnets on the rails and under the cars
- **public transportation** – transportation by bus, rail or other conveyance, either publicly or privately owned, which provides to the public general or special services on a regular and continuing basis
- **rail, commuter** – railroad local and regional passenger trains operations between a central city, its suburbs and/ or another central city
- **rail, high-speed** – a rail transportation system with exclusive rights-of-way serves densely traveled corridors at speeds of 124 mph or great
- **ridership** – the number or riders taken by people using a public transportation system in a given time period

article 40.

- **applicant** - any person or entity having a legal or equitable interest in a Proposed Project subject to the provisions of this article, as set forth in Section 40-4, or the authorized agent of any such person or entity.
- **proposed project** - the substantial demolition, erection, or extension of any structure or part thereof, or the change of use of any structure or land, for which the Applicant is required to obtain a building or use permit. A Proposed Project may proceed in phases, and may include more than one building, structure, or use.
- **south station economic development area plan** – the comprehensive plan, adopted by the Boston Redevelopment Authority pursuant to Chapter 652 of the Acts of 1960, Section 3 of Chapter 4 of the Ordinances of 1952, and Section 27D-18 of this code, which sets forth the planning policies, development controls, and design guidelines for the South Station Economic Development Area.
- **street wall** - the exterior wall or portion of the exterior wall of a Proposed Project that faces a street on which such Proposed Project is located, and is below the Street Wall Height, determined pursuant to Section 40-13.
- **substantial accord** - with respect to building height, that the vertical distance from grade to the top of the structure of the last occupied floor of a Proposed Project shall not exceed the specified height limit for the applicable district or sub-district by more than fifteen (15) feet.
- **zoning relief** - any zoning variance, exception, conditional use permit, interim planning permit, or zoning map or text change, or any other relief granted by the Zoning Commission or the Board of Appeal.

chapter 91. waterways

- **Boston harbor** - that part of Boston harbor lying westerly and inside of a line drawn between Point Allerton on the south and the southerly end of Point Shirley on the north.

- **department** - the department of environmental protection; provided, however, that in sections two, two A, three, four, five, six, seven, eight, nine, nine A, ten, eleven, eighteen A, twenty-five, twenty-seven, twenty-nine, twenty-nine A, thirty-one, thirty-two, thirty-three, thirty-six, thirty-seven, thirty-eight, thirty-nine, forty, forty-one, forty-two, forty-three, forty-five, forty-six, forty-seven, forty-eight, forty-nine, forty-nine A and fifty, the word "Department" shall mean the department of conservation and recreation.

- **secretary** - the secretary of the executive office of energy and environmental affairs.

- **structure(s)** - shall include pipe lines, wires and cables, and all words used in connection with "structure" or "structures" shall mean and include their appropriate equivalent as applied to pipe lines, wires and cables.

- **substantial change in use** - a use for a continuous period of at least one year of ten per cent or more of the surface area of the authorized or licensed premises or structures for a purpose unrelated to the authorized or licensed use or activity.

- **substantial structural alteration** - a change in the dimensions of a principal building or structure which increases by more than ten per cent the height or ground coverage of the building or structure specified in the authorization or license, or an increase by more than ten per cent of the surface area of the fill specified in the authorization or license.

- **tidelands** - present and former submerged lands and tidal flats lying below the mean high water mark.

- **tidelands, commonwealth** - tidelands held by the commonwealth in trust for the benefit of the public or held by another party by license or grant of the commonwealth subject to an express or implied condition subsequent that it be used for a public purpose.

- **tidelands, landlocked** - filled tidelands, which on January 1, 1984 were entirely separated by a public way or interconnected public ways from any flowed tidelands, except for any portion of such filled tidelands that are presently located: (a) within 250 feet of the high water mark of flowed tidelands; or (b) within any designated port area under the Massachusetts coastal zone management program. For the purposes of this definition, a public way may also be a landlocked tideland, except for any portion thereof, which is presently within 250 feet of the high water mark of flowed tidelands.

- **tidelands, private** - tidelands held by a private party subject to an easement of the public for the purposes of navigation and free fishing and fowling and of passing freely over and through the water.

- **water-dependent uses** - those uses and facilities which require direct access to, or location in, marine or tidal waters and which therefore cannot be located inland, including but not limited to: marinas, recreational uses, navigational and commercial fishing and boating facilities, water-based recreational uses, navigation aids, basins, and channels, industrial uses dependent upon waterborne transportation or requiring large volumes of cooling or process water which cannot reasonably be located or operated at an inland site.

310 CMR: department of environmental protection.

- **abutter** - the owner of land which shares, along the water's edge, a common boundary or corner with a project site, as well as the owner of land which lies within 50 feet across a water body from such site. Ownership shall be determined according to the records of the local tax assessors office.

- **accessory use** - a use determined to be accessory to a water-dependent use, in accordance with the provisions of 310 CMR 9.12(3).

- **area of critical environmental concern (ACEC)** - an area which has been so designated by the Secretary pursuant to 301 CMR 12.00.

- **base flood elevation** - the maximum elevation of flood water, including wave heights if any, which will theoretically result from the statistical 100-year frequency storm. Said elevation shall be determined by reference to the most recently available flood profile data prepared for the municipality within which the work is proposed under the National Flood Insurance Program, currently administered by FEMA; and in accordance with Wetlands Protection Act regulations at 310 CMR 10.57.

- **boatyards** - a facility whose function is the construction, repair, or maintenance of boats, which may include provisions for boat storage and docking while awaiting service.

- **boston waterfront decision** - the decision of the Massachusetts Supreme Judicial Court in Boston Waterfront Development Corporation vs. Commonwealth, 378 Mass. 629, 393 N.E.2d 356 (1979).

- **channel** - a navigable route for the passage of vessels, established by customary use or under the authority of federal, state, or municipal law.

- **costal processes** - natural forces which can modify coastal lands and waters through the action of wind, waves, tides, currents, or ice.

- **costal zone** - means that area subject to the CZM Program and defined in 301 CMR 20.03 and 20.99.

- **DCR** - the Department of Conservation and Recreation.

- **department** - the Department of Environmental Protection (DEP).

- **DPA master plan** - the component of a municipal harbor plan pertaining to lands and waters of a DPA within the municipality. Such master plan or portion thereof shall take effect under 310 CMR 9.00 only upon written approval by the Secretary in accordance with 301 CMR 23.00 and any associated written guidelines of CZM.

- **EOEEA** - the Executive Office of Energy and Environmental Affairs.

- **infrastructure facility** - a facility which produces, delivers, or otherwise provides electric, gas, water, sewage, transportation, or telecommunication services to the public.

- **municipal harbor plan** - a document (in words, maps, illustrations, and other media of communication) setting forth, among other things: a community's objectives, standards, and policies for guiding public and private utilization of land and water bodies within a defined harbor or other waterway planning area; and an implementation program which specifies the legal and institutional arrangements, financial strategies, and other measures that will be taken to achieve the desired sequence, patterns, and characteristics of development and other human activities within the harbor area. Such plan shall take effect under 310 CMR 9.00 only upon written approval by the Secretary, provided that said plan approval is issued in accordance with 301 CMR 23.00 and any associated written guidelines of CZM.

- **project** - means any work, action, conduct, alteration, change of use, or other activity subject to the jurisdiction of the Department under M.G.L. c. 91, in accordance with the provisions of 310 CMR 9.03 through 9.05, which is the subject of a license or permit application.

- **project site** - the area owned, controlled, or proposed for development by the applicant in which a project will occur and which is subject to the geographic jurisdiction of the Department, as specified in 310 CMR 9.04.

- **public way** - a road, street, or highway for vehicular use open to the public at large and for which a public agency is responsible for maintenance and repair.

- **structure** - any man-made object which is intended to remain in place in, on, over, or under tidelands, Great Ponds, or other waterways. Structure shall include, but is not limited to, any pier, wharf, dam, seawall, weir, boom, breakwater, bulkhead, riprap, revetment, jetty, piles (including mooring piles), line, groin, road, causeway, culvert, bridge, building, parking lot, cable, pipe, pipeline, conduit, tunnel, wire, or pile-held or other permanently fixed float, barge, vessel or aquaculture gear. Structure does not include any mooring, float, or raft which has been authorized by annual permit of a harbormaster, in accordance with M.G.L. c. 91, § 10A and with 310 CMR 9.07; nor any weir, pound net, or fish trap which has been authorized in tidewater by permit of the municipal official and approved by the Department and the Division of Marine Fisheries, in accordance with M.G.L. c. 130, § 29. Any such mooring, float, raft, weir, pound net, or fish trap, which has not been so authorized shall be considered a structure under 310 CMR 9.00.

- **substantial structure alteration** - a change in the dimensions of a principal building or structure which increases by more than 10% the height or ground coverage of the building or structure specified in the authorization or license, or an increase by more than 10% of the surface area of the fill specified in the authorization or license.

- **waterway** - any area of water and associated submerged land or tidal flat lying below the high water mark of any navigable river or stream, any Great Pond, or any portion of the Atlantic Ocean within the Commonwealth, which is subject to 310 CMR 9.04.