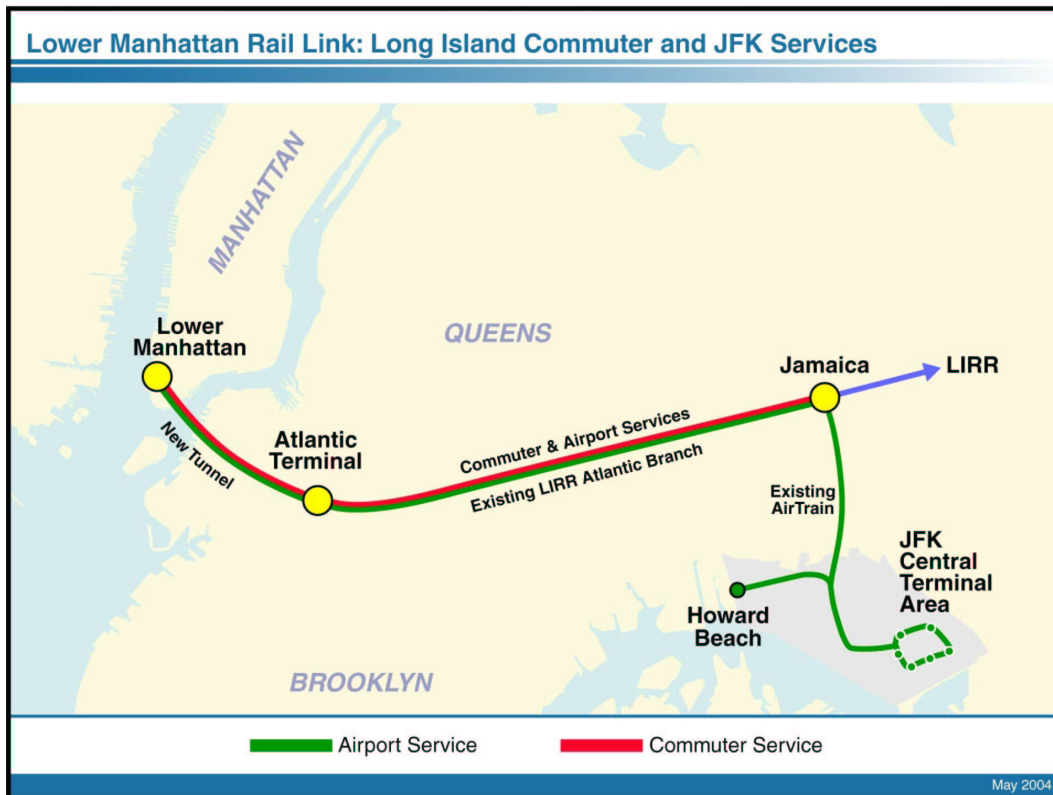


Lower Manhattan Airport and Commuter Access Alternatives Analysis

Final Report

Task 7

LMDC Contract #LMDC-24/F41018/2004



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1. INTRODUCTION

The Lower Manhattan Development Corporation (LMDC) is tasked with the rebuilding and revitalization of Downtown Manhattan, the third largest Central Business District in the United States. This challenge can only be met through a clear vision and a concentrated effort on the part of all stakeholders, community and civic leaders, with the endorsement and sponsorship of all levels of government.

In the aftermath of the devastating September 11, 2001 attacks on the World Trade Center, Governor George E. Pataki and then Mayor Guiliani created the LMDC to lead the effort to rebuild Lower Manhattan and to create a sense of place and a destination that would exceed what existed prior to the destruction. The Governor and the Mayor wanted to create an economic engine that would revitalize Lower Manhattan and move it forward as a 24-hour vibrant and thriving community. Governor Pataki, Mayor Michael Bloomberg and the LMDC recognized early on that the means to a strong economic revitalization of Lower Manhattan is through the implementation of a new rail service, since downtown is so dependent on rail service. Holding a dialogue with a broad range of constituents, the LMDC, the Metropolitan Transportation Authority (MTA), the Port Authority of New York and New Jersey (PANYNJ), and the New York City Economic Development Corporation (EDC) identified improvements in access between Lower Manhattan and Long Island and JFK Airport as a key element in the area's economic recovery. Mayor Bloomberg's December '02 *Vision for Lower Manhattan* offered specific strategies for improved transit access to Lower Manhattan, including a proposal for a Long Island and Jamaica rail link.

Much of the transportation system serving downtown has not been improved for decades. The systems are disjointed and are not user friendly. A number of projects are currently in planning or design, including the Metropolitan Transportation Authority (MTA) Fulton Transit Center and South Ferry Terminal Projects, and the Port Authority of New York and New Jersey's (PANYNJ) Permanent World Trade Center PATH Terminal. These projects will improve the localized transportation infrastructure and will generate additional trips to Lower Manhattan, but they still do not solve one of Downtown's long standing problems: direct access to the labor pool of Long Island and the lack of a one seat ride to JFK International Airport.

Despite the connection provided via the NYC Transit and PATH systems, Lower Manhattan does not have the advantage of direct commuter rail access to suburban markets or to the region's major airports. In order for Lower Manhattan to develop and maintain a competitive edge in business markets, this type of service must be provided. Major business tenants in Lower Manhattan must be assured that new links from Lower Manhattan to Brooklyn, Long Island and JFK Airport will be complete within a decade. A direct link to the airport will ensure that Lower Manhattan continues to compete with other global economic centers such as London, Berlin and Tokyo.

In fulfilling its responsibility of planning for the development and revitalization of Lower Manhattan, LMDC, in cooperation with the Metropolitan Transportation Authority, the Port Authority of New York and New Jersey, and the New York City Economic Development Corporation undertook a transportation study to identify a feasible rail link that will (1) serve Long Island commuters by creating a direct connection between Lower Manhattan and the Long Island Rail Road's Jamaica Station, and (2) serve JFK International Airport passengers by improving the connection between Lower Manhattan and JFK International Airport.

The LMDC and its study partners, MTA, PANYNJ and the EDC have completed an eight-month study that investigated the feasibility of creating new commuter service from Jamaica and new airport service from JFK to Lower Manhattan. The purpose of this report is to document the process for the *Lower Manhattan Airport and Commuter Access Alternatives Analysis* and identify options for further evaluation.

The study recommends two options, from a Long List of Alternatives, for further analysis. The options are differentiated by their East River crossings, a New Tunnel alternative would construct a tunnel under the East River and a Montague Street Tunnel alternative would run in the existing MTA-NYCT's Montague Street Tunnel, currently serving the M and R subway trains. Both options use the same alignment, the LIRR's Atlantic Avenue Branch, from Jamaica Center/JFK to Brooklyn with JFK/AirTrain service connecting to the Atlantic Branch at Jamaica Center. Both alternatives, in order to access Lower Manhattan, break out of the Atlantic Avenue Branch Tunnel prior to the Atlantic Avenue Terminal, one connecting to a new tunnel and the other to the Montague Street Tunnel.

As first articulated by New York State Governor George E. Pataki on May 5, 2004, the New Tunnel alternative is the recommended alignment option for this study. It is the conclusion of this study that both the New Tunnel and Montague Street Tunnel alternatives should be closely evaluated in the Environmental Impact Statement (EIS) phase.

2. PURPOSE AND NEED & GOALS AND OBJECTIVES

The following statement defines the purpose and need for the project and was used to guide the development and the screening of alternatives:

Lower Manhattan's status as the world's financial capital and the nation's third largest central business district (CBD) must be bolstered. During the prosperous 1990's, Lower Manhattan's share of office employment decreased and the events of September 11th, 2001 further exacerbated this downward economic trend, with employers relocating businesses outside Lower Manhattan. Lower Manhattan's ability to compete with international and regional markets can be improved through direct connections to commuter markets and the region's airports.

With the increased focus on the revitalization of Downtown, there are signs that it is rebounding. The rebuilding efforts and transportation projects such as the permanent PATH station and the Fulton Street Transit Center have been critical to businesses staying, expanding and relocating in Lower Manhattan. At the same time there are ongoing efforts to evaluate ways of transforming Lower Manhattan into a 24/7 mixed use – business, residential, cultural and retail – community. Effective transportation will have an important role in ensuring the vitality of all aspects of Downtown commerce and life.

However, unlike other leading CBDs, Lower Manhattan is not served by direct commuter rail service from the east, limiting access to critical communities, and Downtown's transportation network has not been updated in more than half a century. Transit access to the airport is indirect and can be inconvenient while vehicular access to the airports from Lower Manhattan is time-consuming, unreliable, and often expensive. At the same time, Downtown's draw as a domestic and international tourist destination has increased. Direct commuter rail and airport access are critical to ensure Lower Manhattan's continued viability as the financial capital of the world and the country's third largest CBD.

The purpose of the Lower Manhattan Airport and Commuter Access Alternatives Analysis is to develop feasible and effective transportation solutions that both improve and complement existing and planned transportation access to Lower Manhattan. The new service must:

- *Improve Rail Travel Between Lower Manhattan Central Business District and Long Island*

- *Improve Rail Travel Between Lower Manhattan Central Business District and JFK International Airport*
- *Promote Economic Development in Lower Manhattan*
- *Achieve Service Implementation by 2013*
- *Develop Feasible and Effective Rail-Based Transportation Alternatives*

Goals and Objectives

Further refinement of the purpose and need statement was completed and resulted in the identification of the following goals and objectives for the project

Goal 1

IMPROVE RAIL TRAVEL BETWEEN LOWER MANHATTAN CENTRAL BUSINESS DISTRICT AND LONG ISLAND (JAMAICA)

- Objectives
- Reduce travel time
 - Reduce, improve or eliminate transfers between modes
 - Improve service reliability
 - Improve service frequency
 - Improve overall passenger experience

Goal 2

IMPROVE RAIL TRAVEL BETWEEN LOWER MANHATTAN CENTRAL BUSINESS DISTRICT AND JFK AIRPORT

- Objectives
- Reduce travel time
 - Reduce, improve or eliminate transfers between modes
 - Improve service reliability
 - Improve service frequency
 - Improve overall passenger experience
 - Provide airport baggage check-in capabilities
 - Provide separate access for commuter and airport services

Goal 3

PROMOTE ECONOMIC DEVELOPMENT IN LOWER MANHATTAN

- Objectives
- Attract and retain businesses for Lower Manhattan
 - Maintain competitiveness with other regional and international business centers
 - Increase commercial and residential property values
 - Increase jobs
 - Offer positive economic return on investment in Lower Manhattan and intermediate hubs
 - Strengthen tourism industry in Lower Manhattan
 - Develop a transportation solution that balances capital and operating costs with commensurate benefits including travel time savings, economic, environmental, and other improvements.

Goal 4

DEVELOP FEASIBLE AND EFFECTIVE RAIL-BASED TRANSPORTATION SOLUTIONS

- Objectives
- Maximize service ridership
 - Create efficient physical interface with existing and planned services
 - Complement existing transit system and mitigate operational impacts
 - Provide effective use of available infrastructure

Goal 5

ACHIEVE SERVICE IMPLEMENTATION BY 2013

- Objectives
- Minimize construction complexity
 - Avoid significant neighborhood and environmental impacts
 - Minimize technological issues
 - Provide ability for phased implementation
 - Complement other rebuilding efforts in Lower Manhattan

3. DEVELOPMENT OF ALTERNATIVES

A Long List of Alternatives was developed in response to the Goals and Objectives. The Long List of Alternatives was generated through an extensive review of previous studies in the region, Management Committee (LMDC, MTA, NYC EDC and PANYNJ) recommendations, and input from an array of key stakeholders/technical experts. During the study, the team met with public officials, including borough presidents and members of congress, while also meeting with a group of technical experts and Lower Manhattan civic groups.

Over forty alternatives were generated and were subject to a rigorous screening process. The Level 1 Long List of Alternatives is presented in the following table:

Table 1: Level 1 Long List of Alternatives

Alt. #	Alt. Name	Alignment Description	East River Crossing
1	JFK AirTrain via Jamaica to Atlantic	Direct service from JFK Airport to Flatbush Avenue Terminal with a stop in Jamaica. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and Flatbush Avenue Terminal. This option may serve as an interim/phasing option for many of the other alternatives. Passengers must transfer at Flatbush Avenue Terminal to NYCT subway for service to Lower Manhattan.	N/A
2	"JFK Direct" AirTrain via Jamaica and New Tunnel	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to a new Downtown Brooklyn station, with service continuing through a new East River Tunnel to a new terminal in Lower Manhattan. This will provide for future connectivity to the Second Avenue Subway Line at Water St. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	New Tunnel

Alt. #	Alt. Name	Alignment Description	East River Crossing
3	JFK via Howard Beach, Atlantic Br. and New Tunnel	Direct service from JFK Airport to Lower Manhattan with a stop in Downtown Brooklyn. AirTrain/hybrid service would be extended through Howard Beach, operating over the NYCT Fulton Line and linking to the Atlantic Branch via the Old Rockaway connection. The service utilizes LIRR's Atlantic Branch between Rockaway Blvd. and the vicinity of Flatbush Avenue Terminal. A new connection would be made to a new Downtown Brooklyn station, with service continuing through a new East River Tunnel to a new terminal in Lower Manhattan. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan. Concurrent commuter service between Jamaica and Lower Manhattan is also provided.	New Tunnel
4	Commuter Rail Service to Lower Manhattan via Atlantic Branch	Service from Jamaica to Lower Manhattan with a stop in Downtown Brooklyn. Commuter service would continue operations from Jamaica, along the Atlantic Branch. A new connection would be made to a new Downtown Brooklyn station, with service continuing through a new East River Tunnel to a new terminal in Lower Manhattan. Airport passengers would transfer at Jamaica for direct service to Lower Manhattan.	New Tunnel
5	JFK AirTrain via Jamaica to Atlantic; Service continues to Lower Manhattan via new tunnel to E Line	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to a new Downtown Brooklyn station, with service continuing through a new East River Tunnel. The tunnel would approach the southern tip of Lower Manhattan and connect with the existing 8 th Avenue Line and the existing WTC station. Service would continue north on the 8 th Avenue Line. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	New Tunnel
6	JFK AirTrain via Jamaica to Atlantic; Service continues to Lower Manhattan via new tunnel to V Line	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to a new Downtown Brooklyn station, with service continuing through a new East River Tunnel. The tunnel would approach the southern tip of Lower Manhattan and connect with the existing 8 th Avenue Line and the existing WTC station. Service would continue north on the 8 th Avenue Line and shift to the 6 th Avenue Line at W. 4 th Street. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	New Tunnel
7	"JFK Direct" AirTrain via Jamaica or Howard Beach to New Tunnel	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to a new Downtown Brooklyn station, with service continuing through a new East River Tunnel to a new terminal in Lower Manhattan. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan. From Lower Manhattan, the airport-bound route would link to the Fulton Line via the Old Rockaway connection, continuing to Howard Beach and JFK Airport. This alternative has connections to the JFK AirTrain at both Howard Beach and Jamaica.	New Tunnel
8	"JFK Direct" AirTrain via Jamaica and New Tunnel to South Ferry	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to a new Downtown Brooklyn station, with service continuing through a new East River Tunnel. The tunnel would approach the southern tip of Lower Manhattan and connect with the existing 7 th Avenue Line and the existing South Ferry and Cortlandt St. stations. Service would continue north on the 7 th Avenue Line. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	New Tunnel
9	JFK AirTrain via Jamaica and 4 th Avenue Line (via Bdwy. or Nassau)	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT 4 th Avenue Line, with a stop in Downtown Brooklyn at the existing Court Street station. The service would continue through the Montague Street Tunnel and connect to either the Broadway or Nassau Lines in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Montague Tunnel

Alt. #	Alt. Name	Alignment Description	East River Crossing
10	JFK AirTrain via Howard Beach, Atlantic Br. and 4 th Avenue Line (via Bdwy. or Nassau)	Direct service from JFK Airport to Lower Manhattan with a stop in Downtown Brooklyn. AirTrain/hybrid service would be extended through Howard Beach, operating over the NYCT Fulton Line and linking to the Atlantic Branch via the Old Rockaway connection. The service utilizes LIRR's Atlantic Branch between Rockaway Blvd. and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT 4 th Avenue Line, with a stop in Downtown Brooklyn at the existing Court Street station. The service would continue through the Montague Street Tunnel and connect to either the Broadway or Nassau Lines in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan. Concurrent commuter service between Jamaica and Lower Manhattan is also provided.	Montague Tunnel
11	JFK Transfer to Atlantic Branch and 4 th Avenue Line (via Bdwy. or Nassau)	Service from Jamaica to Lower Manhattan with a stop in Downtown Brooklyn. Service would operate over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT 4 th Avenue Line, with a stop in Downtown Brooklyn at the existing Court Street station. The service would continue through the Montague Street Tunnel and connect to either the Broadway or Nassau Lines in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would transfer at Jamaica from AirTrain and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Montague Tunnel
12	JFK AirTrain via Jamaica and Atlantic Branch to Lower Manhattan via 4 th Avenue Line and Montague St. Tunnel; Service continues to Queens via Nassau Line	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT 4 th Avenue Line, with a stop in Downtown Brooklyn at the existing Court Street station. The service would continue through the Montague Street tunnel and connect to the Nassau Line in Manhattan. The service would stop at the Fulton-Broadway/Nassau station and continue to Queens. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan. This service replaces M service through Montague Street Tunnel, providing an additional 7TPH capacity.	Montague Tunnel
13	JFK AirTrain via Howard Beach to Old Rockaway Br. to Atlantic Br. to Lower Manhattan via Montague St. Tunnel; Service continues to 57 th /5 th Avenue via Broadway Line	Direct service from JFK Airport to Lower Manhattan with a stop in Downtown Brooklyn. AirTrain/hybrid service would be extended through Howard Beach, operating over the NYCT Fulton Line and linking to the Atlantic Branch via the Old Rockaway connection. The service utilizes LIRR's Atlantic Branch between Rockaway Blvd. and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT 4 th Avenue Line, with a stop in Downtown Brooklyn at the existing Court Street station. The service would continue through the Montague Street Tunnel and connect to the Broadway Line in Manhattan. The service would stop at the Fulton-Broadway/Nassau station and continue to 57 th Street. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan. LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Montague Tunnel
14	JFK AirTrain via Jamaica and Fulton Line	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT Fulton Line, with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St. Tunnel and connect to the 8 th Avenue Line in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the "C" trains would have to be diverted through the Rutgers Street Tunnel ("F" Line).	Cranberry Tunnel
15	JFK AirTrain via Howard Beach, Atlantic Br. and Fulton Line	Direct service from JFK Airport to Lower Manhattan with a stop in Downtown Brooklyn. AirTrain/hybrid service would be extended through Howard Beach, operating over the NYCT Fulton Line and linking to the Atlantic Branch via the Old Rockaway connection. The service utilizes LIRR's Atlantic Branch between Rockaway Blvd. and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT Fulton Line, with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St Tunnel and connect to the 8 th Avenue Line in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan. LI commuters would have a one-seat ride from Jamaica to Lower Manhattan. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the "C" trains would have to be diverted through the Rutgers Street Tunnel ("F" Line).	Cranberry Tunnel

Alt. #	Alt. Name	Alignment Description	East River Crossing
16	JFK AirTrain via Jamaica and Fulton/Euclid	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and a point where a new connection would be made to the NYCT Fulton Line at Euclid Avenue. The service would continue over the Fulton Line express tracks, with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St Tunnel and connect to the 8 th Avenue Line in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the "C" trains would have to be diverted through the Rutgers Street Tunnel ("F" Line).	Cranberry Tunnel
17	JFK AirTrain via Howard Beach and Fulton Line Express; LI commute via Atlantic Br. and Fulton Line	Direct service from JFK Airport to Lower Manhattan with stop in Downtown Brooklyn. AirTrain/hybrid service connection would be made to the NYCT Fulton Line at Howard Beach. The service would continue over the Fulton Line express tracks, with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St Tunnel and connect to the 8 th Avenue Line in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the "C" trains would have to be diverted through the Rutgers Street Tunnel ("F" Line).	Cranberry Tunnel
18	JFK Transfer to Atlantic Branch and Fulton Line	Service from Jamaica to Lower Manhattan with stop in Downtown Brooklyn. Service would operate over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT Fulton Line, with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St. Tunnel and connect to the 8 th Avenue Line in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would transfer at Jamaica from AirTrain and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the "C" trains would have to be diverted through the Rutgers Street Tunnel ("F" Line).	Cranberry Tunnel
19	JFK AirTrain via Howard Beach to Euclid Avenue via new connection; Continues to Lower Manhattan via Fulton Line and Cranberry St. Tunnel; Service to Port Authority via 6 th /8 th Avenue Line	Direct service from JFK Airport to Lower Manhattan with a stop in Downtown Brooklyn. AirTrain/hybrid service would be extended through Howard Beach, through a new "direct" alignment re-connecting to the Fulton Line at Euclid Avenue. The service continues operation over the NYCT Fulton Line with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St. Tunnel and connect to the 8 th Avenue Line in Manhattan. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan. This alternative does not serve Jamaica and therefore does not improve the trip to Lower Manhattan for LI commuters. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the "C" trains would have to be diverted through the Rutgers Street Tunnel ("F" Line).	Cranberry Tunnel
20	JFK AirTrain to Lower Manhattan via Fulton Line at Ozone Park-Lefferts Blvd Station and Cranberry Street Tunnel; Service to Port Authority via 6 th /8 th Avenue Line	Direct service from JFK Airport to Lower Manhattan with a stop in Downtown Brooklyn. AirTrain/hybrid service would be extended from its Jamaica branch to the Ozone Park/Lefferts Blvd station on the Fulton Line. The service continues operation over the NYCT Fulton Line with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St. Tunnel and connect to the 8 th Avenue Line in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan. This alternative does not serve Jamaica and therefore does not improve the trip to Lower Manhattan for LI commuters. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the "C" trains would have to be diverted through the Rutgers Street Tunnel ("F" Line).	Cranberry Tunnel
21	JFK AirTrain via Howard Beach to Fulton Line to Lower Manhattan via Cranberry St. Tunnel; Service to 57 th St. via 6 th Avenue Line	Direct service from JFK Airport to Lower Manhattan with a stop in Downtown Brooklyn. AirTrain/hybrid service would be extended through Howard Beach, operating over the NYCT Fulton Line with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St. Tunnel, connect to the 8 th Avenue Line in Manhattan and stop at the Fulton-Broadway/Nassau station. The service would shift to the 6 th Avenue Line at W. 4 th Street and terminate at 57 th Street. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan. This alternative does not serve Jamaica and therefore does not improve the trip to Lower Manhattan for LI commuters. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the "C" trains would have to be diverted through the Rutgers Street Tunnel ("F" Line).	Cranberry Tunnel

Alt. #	Alt. Name	Alignment Description	East River Crossing
22	JFK AirTrain via Howard Beach to Fulton Line to Lower Manhattan via Cranberry St. Tunnel; Service to Port Authority via 6 th /8 th Avenue Line	Direct service from JFK Airport to Lower Manhattan with a stop in Downtown Brooklyn. AirTrain/hybrid service would be extended through Howard Beach, operating over the NYCT Fulton Line with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St. Tunnel, connect to the 8 th Avenue Line in Manhattan and stop at the Fulton-Broadway/Nassau station. The service would continue to the Port Authority along the 8 th Avenue Line. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan. This alternative does not serve Jamaica and therefore does not improve the trip to Lower Manhattan for LI commuters. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the “C” trains would have to be diverted through the Rutgers Street Tunnel (“F” Line).	Cranberry Tunnel
23	Commuter Split Service to Lower Manhattan Via Atlantic/Fulton and JFK AirTrain via 4 th Avenue Line	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR’s Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. Two new connections would be made to the NYCT 4 th Avenue Line and the NYCT Fulton Line. The connection to the 4 th Avenue Line would include a stop at the existing Court Street station with service continuing through the Montague Street Tunnel to the Broadway or Nassau Lines in Manhattan. The connection to the Fulton Line would include a stop at the existing Jay St. /Boro Hall station with service continuing through the Cranberry St. Tunnel to the 8 th Avenue Line. Both services would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Cranberry and Montague Tunnels
24	Super Z Service Restructure	Service from Jamaica to Lower Manhattan via the existing Jamaica Express Line. A skip-stop service was assumed with a terminus at Broad Street in Lower Manhattan. Both LI commuters and Airport passengers will have to transfer at Jamaica for the Z train.	Williamsburg Bridge
25	JFK AirTrain via Jamaica and Boro Hall Line	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR’s Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT Boro Hall Line, with a stop in Downtown Brooklyn at the existing Boro Hall station. The service would continue through the Joralemon Tunnel and connect to the Lexington Avenue Line in Manhattan, terminating at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Joralemon Tunnel
26	JFK AirTrain via Jamaica, Atlantic Branch and Rutgers Tunnel	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR’s Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT Culver Line, with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Rutgers Street Tunnel and utilize a new tunnel to terminate in the vicinity of the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Rutgers Street Tunnel
27	JFK Transfer via Jamaica, Atlantic Branch and Rutgers Tunnel	Service from Jamaica to Lower Manhattan with a stop in Downtown Brooklyn. Service would operate over LIRR’s Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT Culver Line, with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Rutgers Street Tunnel and utilize a new tunnel to terminate in the vicinity of the Fulton-Broadway/Nassau station. Airport passengers would transfer at Jamaica from AirTrain and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Rutgers Street Tunnel
28	Commuter Split Service to Lower Manhattan Via Cranberry St. and Rutgers St. Tunnel	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR’s Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT Fulton Line, with a stop in Downtown Brooklyn at the existing Jay St. /Boro Hall station. The service would continue through the Cranberry St. tunnel and connect to the 8 th Avenue Line in Manhattan. The service would terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan. Due to capacity constraints in the Cranberry Street Tunnel (currently operating 27 trains per hour during peak), the “C” trains would have to be diverted through the Rutgers Street Tunnel (“F” Line).	Cranberry Tunnel

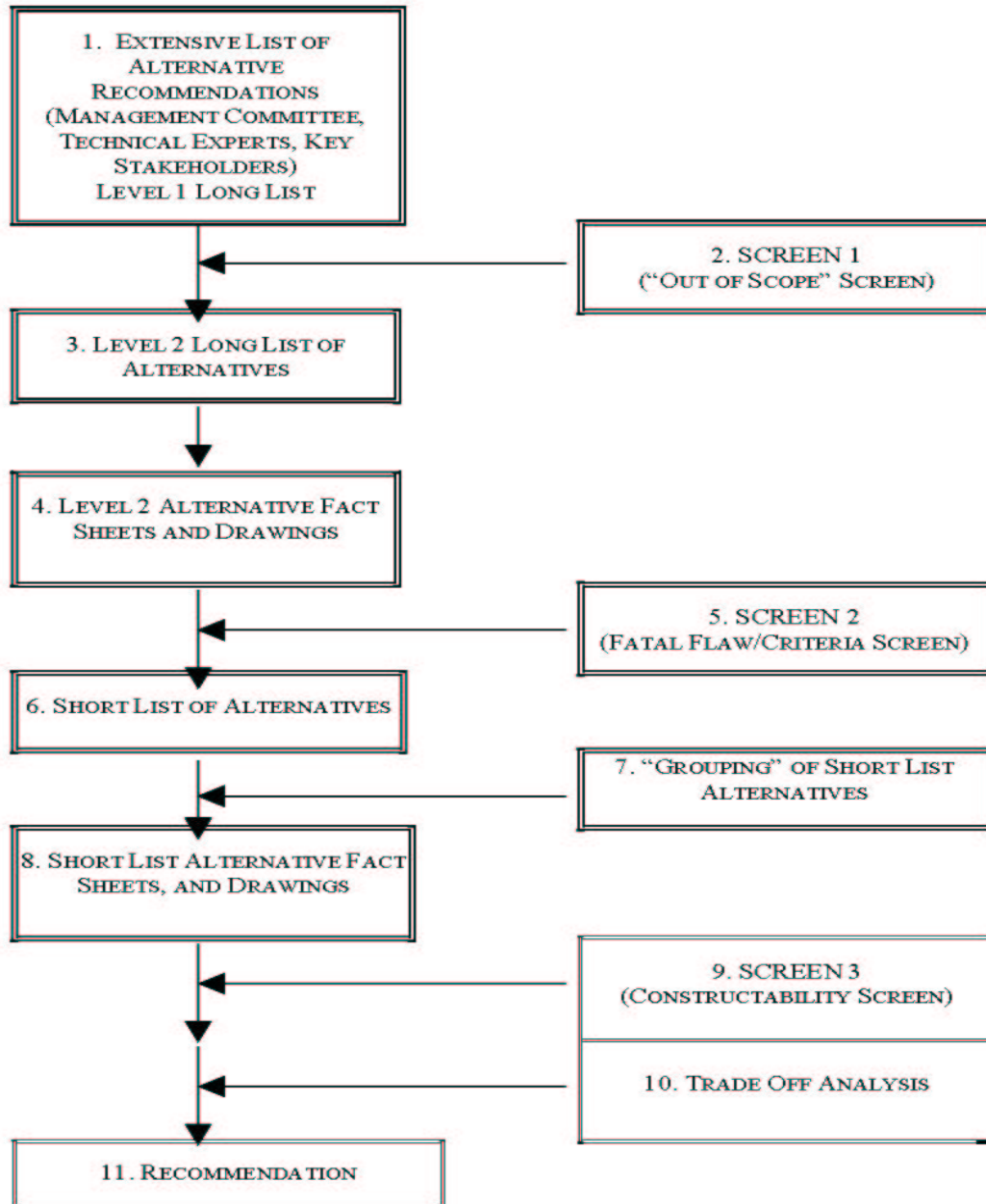
Alt. #	Alt. Name	Alignment Description	East River Crossing
29	JFK AirTrain via Jamaica, Atlantic Branch and Clark Street Tunnel	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT 2/3 lines, with a stop in Downtown Brooklyn at the existing Nevins Street station. The service would continue through the Clark Street Tunnel and terminate at the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Clark Street Tunnel
30	JFK AirTrain via Jamaica, Atlantic Branch and Manhattan Bridge	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Downtown Brooklyn. AirTrain/hybrid service would be extended through Jamaica, operating over LIRR's Atlantic Branch between Jamaica and the vicinity of Flatbush Avenue Terminal. A new connection would be made to the NYCT Manhattan Bridge lines, with a stop in Downtown Brooklyn at the existing DeKalb Ave. station. The service would continue over the Manhattan Bridge and a new alignment would be constructed to allow the service to terminate in the vicinity of the Fulton-Broadway/Nassau station. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Manhattan Bridge
31	Atlantic Branch Connection to Super Z Service at East New York	Service from Jamaica operating over LIRR's Atlantic Branch between Jamaica and East New York where a new connection would be made to the NYCT Jamaica Line. The service would continue via the existing Jamaica Express Line. A skip-stop service is assumed with a terminus at Broad Street in Lower Manhattan. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan.	Williamsburg Bridge
32	JFK AirTrain via Jamaica, Montauk Branch and 63 rd St. Tunnel. GCT service w/ new tunnel to Lower Manhattan	Direct service from JFK Airport to Lower Manhattan with stops in Jamaica and Midtown (GCT). AirTrain/hybrid service would be extended through Jamaica and connect to LIRR Montauk Branch. Service would continue through a new tunnel connection to the 63 rd Street Tunnel and to Grand Central Terminal, using the new East Side Access connection. After stopping at GCT, trains would continue south through a new tunnel to a new terminal in Lower Manhattan. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan via Midtown and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan via Midtown.	63 rd Street Tunnel
33	LIRR service from Jamaica to GCT via 63 rd St tunnel to Second Avenue Tunnel to Lower Manhattan	Service from Jamaica to Lower Manhattan with a stop in Midtown (GCT). Service would operate from Jamaica and continue via LIRR Main Line. Service would continue through the 63 rd Street Tunnel to Grand Central Terminal, using the new East Side Access connection. After stopping at GCT, trains would connect to the proposed Second Avenue Subway tunnel and terminate at the proposed terminal in Hanover Square. Airport passengers would transfer at Jamaica from AirTrain and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan via Midtown.	63 rd Street Tunnel
34	LIRR service from Jamaica to GCT via 63 rd St. Tunnel to Lex. Avenue tunnel to Lower Manhattan. Continue to Flatbush Avenue Terminal via new connection	Service from Jamaica to Lower Manhattan with a stop in Midtown (GCT). Service would operate from Jamaica and continue via LIRR Main Line. Service would continue through the 63 rd Street Tunnel to Grand Central Terminal, using the new East Side Access connection. After stopping at GCT, trains would connect to the Lexington Avenue Line for service to Lower Manhattan. Service would continue to Downtown Brooklyn (Flatbush Avenue Terminal) via a new tunnel under the East River.	63 rd Street Tunnel / New Tunnel
35	LIRR service from Jamaica to Penn Station to Lower Manhattan via new tunnel	Service from Jamaica to Lower Manhattan with a stop in Midtown (Penn Station New York (PSNY)). Service would operate from Jamaica and continue via LIRR Main Line to PSNY. Service would continue south through a new tunnel to a new terminal in Lower Manhattan. Airport passengers would transfer at Jamaica from AirTrain and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan via Midtown.	LIRR East River Tunnels
36	LIRR service from Jamaica to Penn Station. Service continues to Lower Manhattan via the Broadway / 7 th Avenue Line	Service from Jamaica to Lower Manhattan with a stop in Midtown (PSNY). Service would operate from Jamaica and continue via LIRR Main Line to PSNY. Service would connect to the NYCT 7 th Avenue Line and continue south to Lower Manhattan. Airport passengers would transfer at Jamaica from AirTrain and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan via Midtown.	LIRR East River Tunnels
37	LIRR service from Jamaica to Penn Station. Service continues to Lower Manhattan via the 8 th Avenue Line	Service from Jamaica to Lower Manhattan with a stop in Midtown (PSNY). Service would operate from Jamaica and continue via LIRR Main Line to PSNY. Service would connect to the NYCT 8 th Avenue Line and continue south to Lower Manhattan. Airport passengers would transfer at Jamaica from AirTrain and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan via Midtown.	LIRR East River Tunnels

Alt. #	Alt. Name	Alignment Description	East River Crossing
38	JFK AirTrain via Howard Beach to Old Rockaway Br. to N/R Line to 60 th St. Tunnel; Broadway Line to Lower Manhattan.	Direct service from JFK Airport to Lower Manhattan via Midtown. AirTrain/hybrid service would be extended through Howard Beach, operating over the NYCT Fulton Line and linking to the Old Rockaway connection. A new connection would be made to the NYCT Queens Blvd. Line, continuing through the 60 th Street Tunnel to the Broadway Line to Lower Manhattan. Airport passengers would have a one-seat ride from JFK Airport to Lower Manhattan via Midtown and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan via Midtown.	60 th Street Tunnel
39	JFK AirTrain via Howard Beach to Old Rockaway Br. to N/R Line to 63 rd St. Tunnel; Broadway Line to Lower Manhattan.	Direct service from JFK Airport to Lower Manhattan via Midtown. AirTrain/hybrid service would be extended through Howard Beach, operating over the NYCT Fulton Line and linking to the Old Rockaway connection. A new connection would be made to the NYCT Queens Blvd. Line, continuing through the 63 rd Street Tunnel to the Broadway Line to Lower Manhattan. Airport passengers would have a one-seat ride from Airport to Lower Manhattan via Midtown and LI commuters would have a one-seat ride from Jamaica to Lower Manhattan via Midtown.	63 rd Street Tunnel
40	JFK Ferry to East and West Sides of Lower Manhattan	Airport passengers would board a people mover or bus service from the terminals to the ferry dock. High-speed ferry service would operate from JFK Airport to Pier 11 and the World Financial Center.	-
41	Super A Express NYCT Subway Service	Revised service plan to allow "super express" service on the NYCT A Line between Howard Beach and Chambers Street with stops at Jay St. /Borough Hall and Broadway-Nassau.	Cranberry Tunnel
42	RPA's MetroLink	New service from Grand Central Terminal to Water Street and JFK Airport via Second Avenue and the Atlantic Branch. This service would run express on the proposed Second Avenue Line from GCT to Water Street with a stop at 34 th Street. It would continue through a new East River Tunnel to connect to the converted Atlantic Branch at Flatbush Avenue Terminal and then run express to a connection with the JFK AirTrain.	New Tunnel

4. ALTERNATIVE SCREENING

In order to make the Long List of Alternatives responsive to the project Goals and Objectives, the alternatives were screened to a more focused list through the application of a developed set of criteria. This technique was used to reduce the range of solutions to a smaller list for more detailed analysis. At each stage of the evaluation more specific criteria were used to screen the remaining alternatives.

Figure 1: Alternative Development and Screening Process



SCREEN 1: OUT OF SCOPE DETERMINATION

The scope of the *Lower Manhattan Airport and Commuter Access Alternatives Analysis* focuses on rail-based transportation alternatives that improve travel between the Lower Manhattan Central Business District and Long Island and JFK International Airport. The study goals and objectives confirm the priorities of improving travel to Lower Manhattan and promoting the economic development of Downtown. Alternative alignments that do not directly serve Lower Manhattan from Queens by rail were deemed to not address the scope and purpose of the study. The most direct routes are through Brooklyn. Therefore, any alternatives that would access Lower Manhattan by first serving Midtown Manhattan were considered out-of-scope and were eliminated from further study. Alternatives that use modes other than rail were considered as interim options.

The application of Screen 1 to the Level 1 Long List of Alternatives resulted in the elimination of nine alternatives determined to be out of scope. The following table documents the reason each alternative was eliminated from further study.

Table 2: Screen 1 Eliminated Alternatives

Alt. #	Alt. Name	Reason for Elimination
32	JFK AirTrain via Jamaica, Montauk Branch and 63 rd St. Tunnel. GCT service w/ new tunnel to Lower Manhattan	Does not directly serve Lower Manhattan (serves Midtown en route to Lower Manhattan)
33	LIRR service from Jamaica to GCT via 63 rd St. Tunnel to Second Avenue Tunnel to Lower Manhattan	Does not directly serve Lower Manhattan (serves Midtown en route to Lower Manhattan)
34	LIRR service from Jamaica to GCT via 63 rd St. tunnel to Lex. Avenue tunnel to Lower Manhattan. Continue to Flatbush Avenue Terminal via new connection	Does not directly serve Lower Manhattan (serves Midtown en route to Lower Manhattan)
35	LIRR service from Jamaica to Penn Station to Lower Manhattan via new tunnel	Does not directly serve Lower Manhattan (serves Midtown en route to Lower Manhattan)
36	LIRR service from Jamaica to Penn Station. Service continues to Lower Manhattan via the Broadway / 7 th Avenue Line	Does not directly serve Lower Manhattan (serves Midtown en route to Lower Manhattan)
37	LIRR service from Jamaica to Penn Station. Service continues to Lower Manhattan via the 8 th Avenue Line	Does not directly serve Lower Manhattan (serves Midtown en route to Lower Manhattan)
38	JFK AirTrain via Howard Beach to Old Rockaway Br. to N/R Line to 60 th St. Tunnel; Broadway Line to Lower Manhattan	Does not directly serve Lower Manhattan (serves Midtown en route to Lower Manhattan)
39	JFK AirTrain via Howard Beach to Old Rockaway Br. to N/R Line to 63 rd St. Tunnel; Broadway Line to Lower Manhattan	Does not directly serve Lower Manhattan (serves Midtown en route to Lower Manhattan)
40	JFK Ferry to East and West Sides of Lower Manhattan	Non-rail mode; will be included in list of interim options

SCREEN 2: FATAL FLAW CRITERIA SCREEN

The following criteria were established as a Fatal Flaw Screen and applied to the alternatives as Screen 2.

- A. Competitive commuter travel time (must be less than 30 minutes - Jamaica to LM)
- B. Competitive airport travel time (must be less than 44 minutes - JFK to LM)
- C. Service frequency/capacity (must be more than 12 trains/hour during peak period)
- D. Operational compatibility/impacts
- E. Access to major trip generators in Lower Manhattan, Brooklyn and Jamaica
- F. Number of transfers required
- G. Constructability
- H. Effective use of existing infrastructure
- I. Positive economic return on investment and cost factors
- J. Vehicle compatibility
- K. Environmental/community impacts
- L. Operational by 2013

Each alternative was screened against individual criteria and assigned a rating of 1-5 (5 being the best and 1 the worst) where generally:

- 1=Fatally flawed (do not consider further)
- 3=Uncertain (potential issue)
- 5=Not fatally flawed (appears feasible)

Any alternative that received a score of “1” (Fatally Flawed) for any criteria was automatically eliminated from further study.

The following table documents the reasons alternatives were fatally flawed and eliminated from further study.

Table 3: Screen 2 Eliminated Alternatives

Alt. #	Alt. Name	Reason for Elimination
1	JFK AirTrain via Jamaica to Atlantic	<i>Access/Does not serve Lower Manhattan; will be included in list of partial options</i>
6	JFK AirTrain via Jamaica to Atlantic; Service continues to Lower Manhattan via new tunnel to V Line	<i>Service Frequency/Operational Compatibility/ Use of the W. 4th Street interlocking would not allow NYCT to maintain the current service plan</i>
7	“JFK Direct” AirTrain via Jamaica or Howard Beach to New Tunnel	<i>Low Score/This alternative received the lowest score of the New Tunnel options, reflecting the operational issues of running AirTrain service through Jamaica and Howard Beach.</i>
8	"JFK Direct" AirTrain via Jamaica and New Tunnel to South Ferry	<i>Operational Compatibility/Extension of AirTrain service will only be compatible with NYCT B-Division service, therefore cannot connect into the 7th Avenue A-Division Line</i>
9	JFK AirTrain via Jamaica and 4 th Avenue Line (via Bdwy. or Nassau)	<i>Service Frequency/Montague Street Tunnel is currently operating trains at a level that does not support twelve additional trains per hour for commuter and Airport service.</i>
10	JFK AirTrain via Howard Beach, Atlantic Br. and 4 th Avenue Line (via Bdwy. or Nassau)	<i>Service Frequency/Montague Street Tunnel is currently operating trains at a level that does not support twelve additional trains per hour for commuter and Airport service.</i>
11	JFK Transfer to Atlantic Branch and 4 th Avenue Line (via Bdwy. or Nassau)	<i>Service Frequency/Montague Street Tunnel is currently operating trains at a level that does not support twelve additional trains per hour for commuter and Airport service.</i>

Alt. #	Alt. Name	Reason for Elimination
13	JFK AirTrain via Howard Beach to Old Rockaway Br. to Atlantic Br. to Lower Manhattan via Montague Street Tunnel; Service continues to 57 th St./5 th Avenue via Broadway Line	<i>Service Frequency</i> /Montague Street Tunnel is currently operating trains at a level that does not support twelve additional trains per hour for commuter and Airport service.
16	JFK AirTrain via Jamaica and Fulton/Euclid	<i>Travel Time</i> /Travel time from Jamaica to Lower Manhattan exceeds 30 minutes
17	JFK AirTrain via Howard Beach and Fulton Line Express; LI commute via Atlantic Branch and Fulton Line	<i>Travel Time</i> /Travel time from JFK Airport to Lower Manhattan exceeds current condition of 49 minutes
19	JFK AirTrain via Howard Beach to Euclid Avenue via new connection; continues to Lower Manhattan via Fulton Line and Cranberry St. Tunnel; Service to Port Authority via 6 th /8 th Avenue Line	<i>Transfer</i> /Does not serve Long Island commuter market
20	JFK AirTrain to Lower Manhattan via Fulton Line at Ozone Park-Lefferts Blvd station and Cranberry Street Tunnel; Service to Port Authority via 6 th /8 th Avenue Line	<i>Transfer</i> /Does not serve Long Island commuter market
21	JFK AirTrain via Howard Beach to Fulton Line to Lower Manhattan via Cranberry St. Tunnel; Service to 57 th St. via 6 th Avenue Line	<i>Transfer</i> /Does not serve Long Island commuter market
22	JFK AirTrain via Howard Beach to Fulton Line to Lower Manhattan via Cranberry St. Tunnel; Service to Port Authority via 6 th /8 th Avenue Line	<i>Transfer</i> /Does not serve Long Island commuter market
24	Super Z Service Restructure	<i>Service Frequency</i> /Williamsburg Bridge does not provide minimum capacity of twelve trains/hour <i>Travel Time</i> /Travel time from JFK Airport to Lower Manhattan exceeds current condition of 49 minutes
25	JFK AirTrain via Jamaica and Boro Hall Line	<i>Service Frequency</i> /Joralemon Tunnel and Lexington Avenue Line do not provide minimum capacity of twelve trains/hour <i>Operational Compatibility</i> /Extension of AirTrain service will only be compatible with NYCT B-Division service, therefore cannot connect into the Lex. Ave.-Division Line
26	JFK AirTrain via Jamaica, Atlantic Branch and Rutgers Tunnel	<i>Travel Time</i> /Travel time from Jamaica to Lower Manhattan exceeds 30 minutes
27	JFK Transfer via Jamaica, Atlantic Branch and Rutgers Tunnel	<i>Travel Time</i> /Travel time from Jamaica to Lower Manhattan exceeds 30 minutes
29	JFK AirTrain via Jamaica, Atlantic Branch and Clark Street Tunnel	<i>Operational Compatibility</i> /Extension of AirTrain service will only be compatible with NYCT B-Division service, therefore cannot connect into the 2/3 Clark Street Tunnel A division lines
30	JFK AirTrain via Jamaica, Atlantic Branch and Manhattan Bridge	<i>Operational Compatibility</i> /Extension of AirTrain service will only be compatible with NYCT B-Division service
31	Atlantic Branch Connection to Super Z Service at East New York	<i>Service Frequency</i> /Williamsburg Bridge does not provide minimum capacity of twelve trains/hour <i>Travel Time</i> /Travel time from JFK Airport to Lower Manhattan exceeds current condition of 49 minutes
41	Super A Express NYCT Subway Service	<i>Transfer</i> /Does not serve Long Island commuter market

Alt. #	Alt. Name	Reason for Elimination
		<i>Travel Time</i> /Travel time from JFK Airport to Lower Manhattan exceeds current condition of 49 minutes
42	RPA's MetroLink	<i>Operational by 2013</i> /This alternative requires the completion of the proposed Second Avenue Subway Line which will not be completed by 2013

Screen 2 eliminated all but ten alternatives from further analysis.

SCREEN 3: REQUIREMENTS SCREEN

Table 4: Ten Remaining Alternatives

Alt. #	Alternative Name	East River Crossing
2	"JFK Direct" AirTrain via Jamaica and New Tunnel	New Tunnel
3	JFK via Howard Beach, Atlantic Br. and New Tunnel	New Tunnel
4	Commuter Rail Service to Lower Manhattan via Atlantic Branch	New Tunnel
5	JFK AirTrain via Jamaica to Atlantic; Service continues to Lower Manhattan via new tunnel to E Line	New Tunnel
12	JFK AirTrain via Jamaica and Atlantic Branch to Lower Manhattan via 4 th Avenue Line and Montague St. Tunnel; Service continues to Queens via Nassau Line	Montague Tunnel
14	JFK AirTrain via Jamaica and Fulton Line	Cranberry Tunnel
15	JFK AirTrain via Howard Beach, Atlantic Br and Fulton Line	Cranberry Tunnel
18	JFK Transfer to Atlantic Branch and Fulton Line	Cranberry Tunnel
23	Commuter Split Service to Lower Manhattan Via Atlantic/Fulton and JFK AirTrain via 4 th Avenue Line	Cranberry and Montague Tunnels
28	Commuter Split Service to Lower Manhattan Via Cranberry St. and Rutgers St. Tunnel	Cranberry Tunnel

The remaining ten alternatives all operate on the LIRR Atlantic Branch. Each of the ten alternatives was grouped by their common East River Crossings as shown in the following table; i.e. all the New Tunnel alternatives became Group 1.

Table 5: Short List Alternative Groups

New Short List Alt. #	New Alternative Name	East River Crossing	Description
1	JFK service via Jamaica or Howard Beach, Atlantic Branch and New Tunnel	New Tunnel	Airport and LI Commuter Service utilizes the Atlantic Branch, a new tunnel connection east of Flatbush Avenue Terminal to a new East River tunnel crossing to a Lower Manhattan terminal.
2	JFK service via Jamaica, Atlantic Branch and Montague St. Tunnel with NYCT M Line service replacement	Montague Tunnel	Airport and LI Commuter Service utilizes the Atlantic Branch, a new tunnel connection east of Flatbush Avenue Terminal to the Montague St. Tunnel to the Fulton Street Complex and/or Cortlandt Street Station
3	JFK and commuter service via Jamaica or Howard Beach, Atlantic Branch and	Cranberry Tunnel	Airport and LI Commuter Service utilizes the Atlantic Branch, a new tunnel connection east of Flatbush Avenue Terminal to the A/C Line to Lower

New Short List Alt. #	New Alternative Name	East River Crossing	Description
	Cranberry Tunnel		Manhattan. The C service is diverted to the F Line through a new connection to the Rutgers Street Tunnel. The Lower Manhattan terminal will be in the vicinity of the Fulton Street Transit Center.
4	JFK and commuter service via Jamaica or Howard Beach, Atlantic Branch and Montague St. and Cranberry St. Tunnels	Montague Tunnel & Cranberry Tunnel	Airport and LI Commuter Service utilizes the Atlantic Branch, a new tunnel connection east of Flatbush Avenue Terminal to the A/C Line (Cranberry Street Tunnel) for the commuter/airport service and a connection to the M Line (Montague Street Tunnel) for the airport/commuter service.

5. “CONSTRUCTABILITY” ANALYSIS

In order to further evaluate the remaining alternatives detailed engineering, operational, ridership and cost data were developed for each alternative. Development of the alignment engineering revealed difficulties constructing the alternatives that connected to the Cranberry Street Tunnel. These alternatives failed to meet the “requirements” established by the study goals and objectives. Screen 3 resulted in the elimination of two of the short list alternatives. The results are presented in the following table.

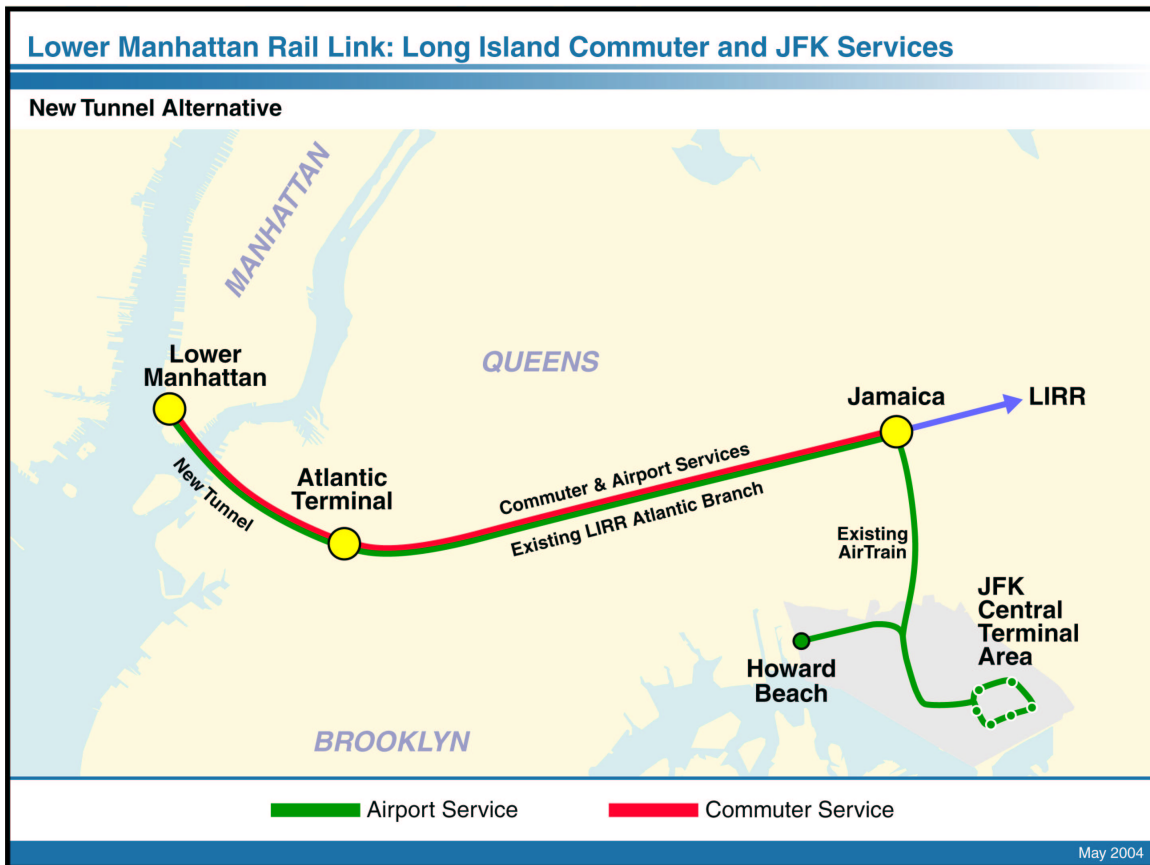
Table 6: Screen 3 Eliminated Alternatives

Alt. #	Alternative Name	East River Crossing	Reason for Elimination
3	JFK and Commuter Service via Jamaica, Atlantic Branch and Cranberry Tunnel	Cranberry Tunnel	This alternative does not meet Goals 4 and 5. The constructability review found that the Cranberry St. Tunnel alternative involving a breakout for a new station cannot be constructed. Because there is virtually no construction access and no clearance to construct a support wall, the new tunnel and station below Fulton Street is impractical to build in the soil and groundwater conditions that exist below the existing A/C subway tunnel and station.
4	JFK and Commuter Service via Jamaica, Atlantic Branch and Cranberry St. and Montague St. Tunnels	Montague/ Cranberry Tunnels	This alternative will be eliminated from further study for the same reason as Alternative 3 (above).

6. “TRADEOFF” ANALYSIS

The two remaining options, the New Tunnel alternative (Figure 2) and the Montague Street Tunnel alternative (Figure 3), underwent further detailed engineering, constructability, operations, ridership, environmental and cost analyses. The alternatives are differentiated by their access to Lower Manhattan and use of new versus existing tunnels. However they have common alignments along the Atlantic Avenue Branch to the LIRR Jamaica Center and JFK.

Figure 2: New Tunnel Alternative



ALTERNATIVE 1: NEW TUNNEL

This alternative proposes the construction of a new tunnel under the East River to provide new commuter and airport service from Jamaica and JFK Airport respectively to Lower Manhattan. Because the majority of this alternative is new tunnel construction, there are many viable options as to its specific alignment and operating characteristics:

- The new tunnel beneath the East River can cross east-west from Downtown Brooklyn to the vicinity of Liberty Street or it can approach Lower Manhattan from the south in a northerly direction in the vicinity of South Ferry.
- The north-south configuration can provide opportunities for future connections to NYCT subway lines to Midtown and Brooklyn, i.e. the Eighth Avenue A/C/E and 2nd Ave. Lines.
- Direct airport service can be routed through Jamaica or Howard Beach.
- Airport service can extend from the JFK AirTrain system or can be provided through transfer at Jamaica and/or Howard Beach.
- New York City Transit, Port Authority, Long Island Rail Road or an independent third-party may operate the service.
- Traditional vehicles or new "hybrid" vehicles may be operated on the alignment.

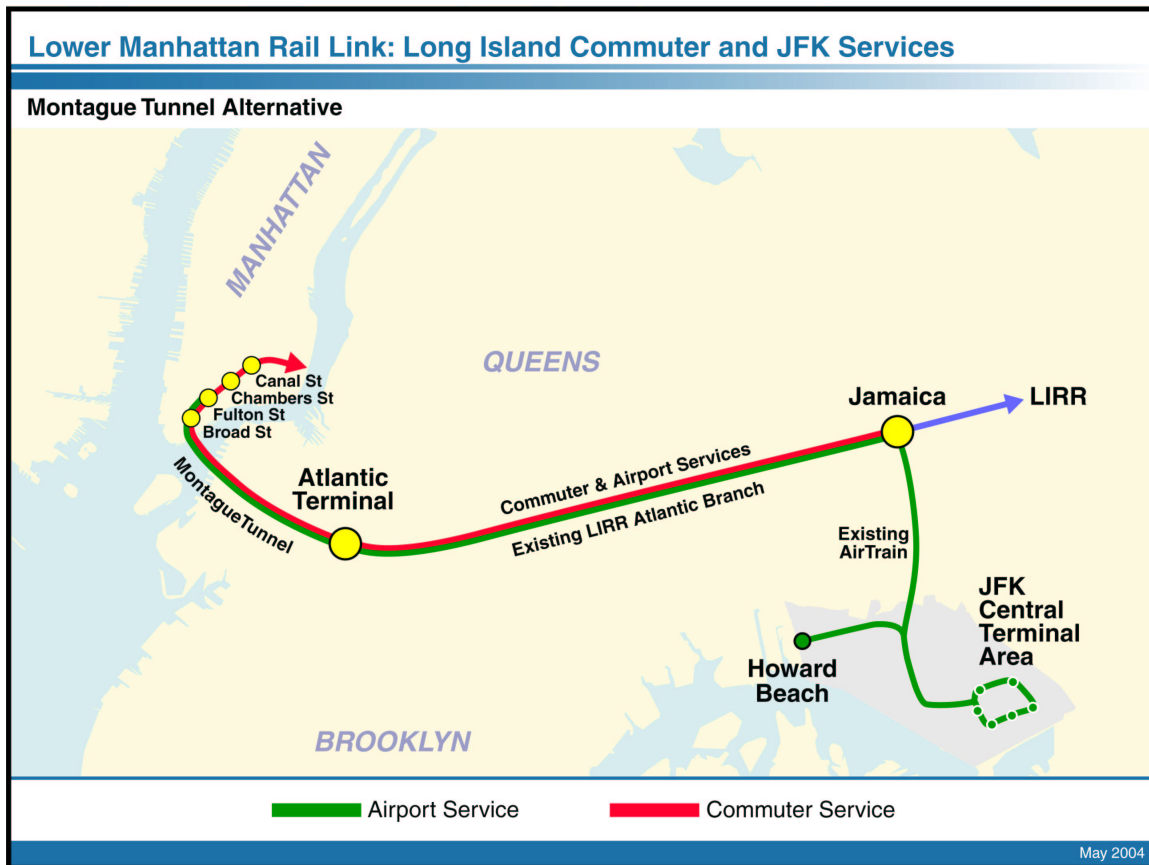
A summary of the New Tunnel Alternative characteristics is presented in the following table:

Table 7: New Tunnel Alternative Characteristics

Cost	Approximately \$6 Billion
Operational by 2013	
Commuter Service	
Travel time (Jamaica-Fulton) <i>Current = 36 min</i>	21 to 22 minutes
Frequency	At least every 6 minutes (10 trains per hour)
Number of stops between Jamaica and Fulton	3 (East New York, Nostrand Ave., Atlantic Ave.)
Lower Manhattan station location	Connection to WTC-Fulton Street Complex
Daily Ridership	Up to 100,000
Future connections to larger transit system	Potential for connection to Second Avenue Subway or E Train (not yet studied)
Airport Service	
One seat ride possible?	Yes
Frequency	Every 15 minutes (4 trains per hour)
Travel time <i>Current = 55 min</i>	36 minutes
Number of stops between Jamaica and Fulton	1 (Atlantic Avenue)
Terminal location	Connection to WTC-Fulton Street Complex
Potential for baggage handling?	Yes
Daily Ridership	4,000-6,000
Future connections to existing infrastructure	Potential for connection to midtown on existing lines via E (not yet studied)

- **Time Savings:** The proposed operating times from Jamaica to Lower Manhattan will be up to 15 minutes shorter than experienced today. Approximately 100,000 daily customers will experience this substantial time savings. In addition, the times savings from the airport will be nearly twenty minutes faster than the current alternatives which include black car and taxi.
- **JFK One-Seat Ride:** The new tunnel option provides a no-transfer trip between the on-airport stops of the existing AirTrain system and a new terminal in Lower Manhattan. Air passengers will board the train at the airport and will not need to leave their seats until they arrive in Lower Manhattan. The Lower Manhattan terminal has the potential to offer airport-style amenities including baggage handling.
- **NYC Transit Connections:** The new tunnel will add capacity to the regional transit network. The tunnel could be engineered to facilitate the eventual extension of the Second Avenue Subway to Brooklyn. Another potential connection to the transit system is to the E Train.
- **No Negative Impact on Existing Transit Riders:** The service using the new tunnel will not adversely impact existing subway riders. In fact, the new service will help to decongest existing transit lines (such as the 2/3 and 1/9 from Penn Station). The service will also provide additional commuter/transit service to residents of Brooklyn and Queens.

Figure 3: Montague Street Tunnel Alternative



ALTERNATIVE 2: MONTAGUE STREET TUNNEL

This alternative utilizes the existing Montague Street Tunnel to provide new commuter service from Jamaica to Lower Manhattan. The utilization of the Montague Street Tunnel for direct service from JFK Airport to Lower Manhattan is under review¹. Under the Montague Street Tunnel alternative, the new commuter service replaces M service from DeKalb Ave. to Metropolitan Ave. The W service replaces M service in South Brooklyn by extending service from Whitehall to Bay Pkwy. in Brooklyn, eliminating ridership impacts.

- Commuters destined for Downtown Brooklyn may disembark at the new Atlantic Avenue station, or the existing DeKalb Ave., Lawrence St. or Court St. stations.
- Commuters destined for Lower Manhattan may disembark at any of the existing Nassau Line stations including Broad St., Fulton St., Chambers St. and Canal Street.

¹ Due to potential capacity and operational constraints, tradeoffs would likely be required between Airport Service and Commuter service to achieve desired directness, frequency, and reliability. More study is required on this point

A summary of the Montague Street Tunnel alternative characteristics is presented in the following table.

Table 8: Montague Street Tunnel Characteristics

Cost	\$3.5 to 4.5 Billion ²
Operational by 2013	
Commuter Service	
Travel time (Jamaica-Fulton St.) <i>Current = 36 min</i>	31 minutes
Frequency	Every 6 minutes (10 trains per hour)
Number of stops between Jamaica and Fulton	7
Lower Manhattan station location	Broad St., Fulton St., Chambers St., Canal St.
Daily Ridership	Approximately 80,000
Future connections to larger transit system	Serves existing subway stations in Brooklyn and Manhattan
Airport Service ³	
One seat ride possible?	Yes
Frequency	Up to 4 trains per hour Note: Service will be subject to variability of the transit system.
Travel time <i>Current = 55 min</i>	42 minutes
Number of stops between Jamaica and Fulton	1 (Atlantic Avenue)
Potential for baggage handling?	No
Daily Ridership	To be Determined

- **Convenience:** Using the existing M Line, this option would make stops at four existing Lower Manhattan subway stations (Broad St., Fulton St., Chambers Street, and Canal St.).
- **Cost Savings:** Although the Montague Street Tunnel alternative does not have the flexibility or capacity potential of the New Tunnel alternative, it may be less expensive to construct. The approximately 30,000 daily rush hour commuters (at least 80,000 over the course of the day) using this service will save about six minutes over the current travel times, while the airport customers will save substantially more.
- **Airport Service:** The one-seat-ride airport service to Lower Manhattan would use the R/W Broadway Line and designate airport service areas in existing stations. Other variants of this alternative need to be explored in the next phase.

² This Montague alternative does not include an Airport Terminal in Manhattan; therefore the project cost does not include Airport Terminal construction costs. Airport service will operate at existing stations. However if a Manhattan Airport Terminal is preferred, cost would rise appropriately.

³ Due to potential capacity and operational constraints, tradeoffs would likely be required between Airport Service and Commuter service to achieve desired directness, frequency, and reliability. More study is required on this point.

Comparison of Alternatives

A tradeoff analysis was conducted which focused on the key differences between the two alternatives across quantitative and qualitative perspectives. Both alternatives could provide improved service from Long Island, Brooklyn and JFK Airport to Lower Manhattan. The quantitative and qualitative analyses show that each of the alternatives have varying degrees of effectiveness and fulfill some needs better than others. The primary differences between the alternatives fall into four categories:

- Travel Time and Ridership
- Impacts to Existing Transit System
- Capital Costs vs. Future Benefits; and
- Airport Service Potential.

Travel Time and Ridership

The travel time from Jamaica to Lower Manhattan is almost ten minutes faster with the New Tunnel alternative when compared to the Montague Street Tunnel alternative. Because Montague Street Tunnel trains must “fit” into slots between existing services, the running time is significantly slower. The travel time differential directly impacts the commuter ridership potential of the two alternatives. It was estimated that the New Tunnel alternative would carry about 20% more riders than the Montague Street Tunnel alternative.

Impacts to Existing Transit System

Both the New Tunnel and Montague Street Tunnel alternatives potentially connect to the existing JFK AirTrain system to the east and breakout from the existing Atlantic Branch to the west. The impacts/benefits in this segment are common to both alternatives. Beyond those two connection points, the New Tunnel option is an independent system that would have no physical or operational impacts to the existing transit system. The Montague Street Tunnel alternative, as designed, physically connects to the NYCT 4th Avenue Line in Brooklyn between Pacific St. and DeKalb Ave. stations. During construction, some modifications to the 4th Avenue Line services on nights and weekends would be required. Once construction is complete, the new commuter service would operate with the existing R and W services through the shared Montague Street Tunnel. Operational analysis has shown that the Montague Street Tunnel has sufficient capacity to run three services (one more than currently) with minimal impact to overall travel time. The addition of two new services -- both the airport service and commuter service -- potentially reduces reliability and adds to the overall travel time. This point requires further study. Unlike the New Tunnel alternative, the reliability of the new commuter service from Jamaica to Lower Manhattan can be impacted by service delays on the existing NYCT subway lines it shares trackage with.

Capital Cost vs. Future Benefits

The capital cost of the New Tunnel alternative is greater than the Montague Street Tunnel alternative. This is a logical result since the Montague Street Tunnel alternative utilizes significantly more existing trackage than the New Tunnel option. The disbenefit of utilizing existing tunnel capacity is that it limits the ability to run more service in the future. The Montague Street Tunnel alternative has been designed to utilize all remaining capacity in the

tunnel (ten trains per hour), with a lack of clarity about the ability to create additional capacity. The New Tunnel option service plan would operate a total of 4 airport and 10 commuter trains per hour in the peak periods. This quantity of service is well within the new tunnel's capacity because the tunnel provides the future opportunity to operate 30+ trains per hour, allowing for increased commuter/airport service or for new services to be introduced. The New Tunnel option also provides the ability to connect to the Second Avenue Subway Line or the Eighth Avenue (E) Line in Lower Manhattan.

Airport Service Potential

The New Tunnel alternative allows for and has been designed to provide a premium one-seat ride from JFK Airport to Lower Manhattan. The New Tunnel provides ample capacity to allow four airport trains per hour to service Brooklyn and Lower Manhattan in the peak periods. It also creates a new Lower Manhattan airport terminal with baggage handling capabilities, modern facilities, and direct connections to the World Trade Center and Fulton Street Transit Center. Current analysis of the Montague Street Tunnel alternative allows for a total of only ten added trains per hour. Further analysis must be conducted to determine whether airport service can be supported through the Montague Street Tunnel with the current and proposed future services. Tradeoffs would be required between airport service and commuter service to achieve desired directness, frequency, and reliability.

7. RECOMMENDATIONS

The New Tunnel alternative has many more advantages than the Montague Street Tunnel alternative, despite the higher cost. The New Tunnel alternative is the recommended alignment option for this study. The study has also proven that the Montague Street Tunnel alternative is feasible for improved commuter service and potentially for airport service. It is the conclusion and recommendation of this study that both the New Tunnel and Montague Street Tunnel alternatives be closely evaluated in the next Environmental Impact Statement (EIS) phase.

8. NEXT STEPS AND IMPLEMENTATION

The project's immediate next step is to begin the formal environmental review process, which the involved agencies will initiate this summer and which will require approximately two years to complete. Preliminary engineering, planning and design will continue until approximately 2007, when construction will begin. The new service will be built and operational by 2013.