

# APPLE CORRIDOR

An Affordable High Speed Rail Link  
between  
Grand Central Terminal and Kennedy International Airport  
incorporating:  
LIRR Access to Manhattan's East Side  
Kennedy to Jamaica LIRR Link  
Convenient Regional Connections  
Express Midtown-Rockaways Link

Prepared for

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## I. The APPLE CORRIDOR

Imagine boarding a fast, comfortable airport train at Grand Central Terminal in Manhattan. Twenty-one minutes later the APPLE CORRIDOR train would make the first of six stops in the central terminal area at Kennedy International Airport. A few steps away would be your airline check-in counter. Compare this with the current uncertainty of a forty-five minute to one hour and forty-five minute rush hour taxi trip from Manhattan to the airport, on New York City's legendary, overcrowded highways.

Or imagine walking across the platform at the LIRR Jamaica train station (a familiar routine for LIRR commuters) and boarding an airport train that will take you to your terminal or workplace at Kennedy Airport.

Or imagine reaching Kennedy Airport from any subway or commuter rail station in the New York-New Jersey-Connecticut metropolitan region, with only one or two transfers, and using a single, reasonably-priced regionwide ticket.

Or imagine boarding a Long Island-bound regional express train at Grand Central Terminal only a short walk from the many offices on Manhattan's East Side. Contrast this with the inconvenient and time consuming walk or subway ride to Penn Station or Long Island City to reach LIRR trains.

Or imagine taking a train from the Aqueduct/Ozone Park/South Ozone Park area, or making a cross platform transfer from a Rockaway train, and reaching Midtown Manhattan in fifteen minutes, instead of forty-five minutes on the subway.

Unaffordable dreams? Not at all, with a "value engineering", consensus building and private sector involvement approach to capital investment. This report, prepared for the Committee for Better Transit (CBT), describes a plan for making these dreams a reality. CBT believes that trains could be operating by the turn of the century if the Mayor and the Governor would give their blessings to this plan and if a private firm were engaged to design and build, and perhaps operate and maintain, the APPLE CORRIDOR.

## Some Guidelines:

- o To complete the plan as quickly as possible, and at an affordable cost, only simple, basic plan elements would be constructed initially. Additional incremental features would come later if their costs are justified by the added benefits they provide. This is the essence of “value engineering”.
- o Creative financing would allow the plan to proceed without new revenue sources, other than the existing Passenger Facility Charge -- the three dollar tax levied against each enplaning airline passenger. No additional City or State funds would be required, at the outset, for the basic plan.
- o A sense of urgency would be needed to bring about cooperation among key affected public agencies, and business, labor and community interests. The overall goal of the APPLE CORRIDOR -- to link Manhattan's East Side with Kennedy International Airport -- needs to be recognized as crucial to the survival of the City and the Region as the epicenter of global commerce and international cooperation.

The overall plan, shown in Figure 1, would contain the following elements:

- o In Manhattan, the lower deck of the 63rd St. tunnel, completed over twenty years ago, would be connected to existing trackage in Grand Central terminal.
- o In Long Island City, the lower deck would be connected to existing LIRR trackage heading east to Woodside and Jamaica.
- o The disused Rockaway Beach Branch of the LIRR from Rego Park to Aqueduct would be restored for service.
- o The on-airport rail line from Aqueduct to Kennedy Airport's Central Terminal Area would be constructed to compatible "regional rail" standards.
- o A new track connection would be built at Woodhaven Junction to allow direct Airport to Jamaica trains.

## II. Reaching Consensus on a “Preferred Alternative”

CBT proposes the APPLE CORRIDOR as a first phase solution to the intractable airport access problem. With two airports in New York City, and over a thousand miles of standard gage railroad and subway track in place there are countless possible plans for airport access. CBT suggests that a good starting point for an “affordable” access plan would be to keep the plan as simple as possible and to make the maximum use of existing resources. The plan should incorporate state-of-the-art, industry-accepted transit operating practices, rather than current regional transit agency norms. Each affected community and constituency should be invited to participate in the access plan decision-making process early on, before final commitments are made.

Several key issues are discussed in more detail in this report. However, three important general concerns should be addressed at the outset, as part of a consensus building effort:

### (1) Why invest substantial sums of money in rail links to the airports?

New York City’s two airports are almost totally motor vehicle dependent. Over the past fifty years highway agencies located the region’s express highways to serve the airports. The airport operator -- the Port Authority of NY & NJ -- constructed large parking facilities and complex access roads at the airports to facilitate auto access for passengers and employees.

But with the continuing growth of commercial aviation and the increase in auto use throughout the region, this complete dependence on motor vehicular access has resulted in serious traffic congestion problems. Expansion of roadways leading to the airports is virtually impossible, making further addition of on-airport roadways pointless.

Furthermore, this excessive motor vehicle dependence causes many other problems for the region -- unacceptable levels of air and noise pollution, large numbers of injuries and deaths from traffic accidents and enormous amounts of space consumed by the motor vehicle. With less than half of the City’s households having cars, and given the transit dependent nature of the extraordinarily dense Manhattan business district, a rail transit alternative to the motor vehicle is clearly needed for access to the airports.

## (2) Why focus on Kennedy first?

Kennedy International Airport is far larger in land area than LaGuardia Airport. Kennedy has four runways compared to LGA's two. Kennedy's runways can accommodate the largest aircraft, used on long international and trans-continental flights. LGA's limited footprint contributes to its widely recognized safety problems. Little room is available for maneuvering from runways to gates. In severe winter weather de-icing must be done at the gates, instead of immediately before take-off near the runways. Proposed runway extensions into LI Sound cause difficult environmental problems. Landing patterns in bad weather impose severe noise burdens on neighboring communities.

LGA's limited space also restricts its ability to handle air cargo or provide for aircraft maintenance. These activities can be better located at Kennedy. Not surprisingly, Kennedy is by far the larger workplace location, with 37,400 employees compared to LGA's 9,200.

It is the busier airport as well, with 28.8 million annual passengers compared to 20.7 million for LGA. During the evening peak hour (5pm-6pm) 58 flights, with 9,200 seats are scheduled to depart Kennedy. During this same period LGA handles only 33 flights with 3,700 seats.

LGA's primary advantage is its closeness to Manhattan. Business travelers from cities in the Midwest and south find this attractive. Distances from East Midtown to LGA are 7.5 miles compared 15.5 miles to Kennedy. The trip to Kennedy is over more congested roads as well, leading to far greater travel times.

But Kennedy is NYC's link to the rest of the world. For NYC to remain competitive, it must offer its international visitors a first class link to the center of the city. An important benefit of a high quality rail link to Kennedy is that it will facilitate "hubbing" of flights. Transfer between international and domestic carriers will be enhanced if more domestic flights were offered from Kennedy. Airlines would find it to their economic advantage to shift a significant portion of LGA's flights to Kennedy if CBT's APPLE CORRIDOR plan, with its superior access to Manhattan, were put into operation. In the longer term an LGA access solution will be needed.

### (3) Why is a direct connection to Manhattan so important?

In contrast to most American cities, in NYC office buildings, hotels, theaters and cultural institutions are much more concentrated in the core -- the Manhattan business district. New York maintains its global dominance in the arts, communications and finance because of the compact nature of its central business district. Not surprisingly, a large fraction of air passengers arriving at Kennedy and LGA are traveling to Manhattan.

It is important for NYC to treat its visitors well. Asking travelers to make multiple transfers en route from the airport to their destinations in the city center is not in NYC's long term economic interest. Airport links that require transfers, like Paris' Orly, have not been successful. While direct rail service to multiple destinations throughout the region would be desirable, it would not be affordable. The region's rail system is focused on the region's core, and by linking the airports to major terminals in Manhattan a comprehensive regional airport access system emerges.

### III. Key features and future options

A variety of detailed concerns about the APPLE CORRIDOR's key features are identified and addressed in the pages that follow.

#### (1) Queens routing

CBT's APPLE CORRIDOR routing through Queens is shown in Figure 2. Instead of the Port Authority's elevated guideway over the Van Wyck Expressway from Jamaica to Kennedy, CBT proposes to restore service on the unused Rockaway Beach Branch, from its junction with the LIRR Mainline at Rego Park to Aqueduct Race Track. This line is a precious city-owned asset, complete with structures and embankments, that is almost on a straight line from Grand Central to Kennedy. New track and signaling would be installed. Structures would be rehabilitated where needed and a new bridge, with adequate vertical clearance for intermodal freight trains, would be built over the LIRR Montauk Branch. Parking for the Forest Park Crescent apartments, now temporarily occupying a portion of the right of way, would be relocated nearby.

Restoring service on this line, not used since 1962, will increase noise levels for an estimated 2,000 nearby dwelling units. Residents are justifiably

concerned. Mitigation measures are essential and would include construction of sound barriers and use of new, quieter rolling stock on airport trains. Property owners could also be compensated for the installation of double pane windows and central air conditioning. Careful attention to detail in the community consultation process could result in carving out a host of neighborhood parks from the wide right of way.

At Woodhaven, Junction the APPLE CORRIDOR crosses the Brooklyn Branch of the LIRR which is in a tunnel under Atlantic Avenue. A double track connection would be built in the southeast quadrant of this junction permitting direct trains from Kennedy to the Jamaica LIRR Station and the Jamaica Center business district. This connection would be similar to the existing, but unused, connection in the southwest quadrant. The new connection would require some property acquisition, including relocation of two or three small industrial operations. Provision for eventual restoration of the southwest connection would be made, when plans are completed for extending LIRR service to Lower Manhattan. At the Jamaica LIRR Station airport trains could use the same trackage as LIRR trains permitting a convenient cross-platform transfer. The subway would be only two levels down. Airport trains could be serviced at the recently completed LIRR Hillside Maintenance Shops only a short distance east of the station.

South of Woodhaven Junction the Rockaway Beach Branch widens to four tracks. At Liberty Avenue the subway enters the right of way. The APPLE CORRIDOR plan calls for shifting the subway to the two westernmost track beds, leaving room for the two airport tracks. North of Conduit Blvd., near the Aqueduct Racetrack, a new cross-platform transfer station with the "A" train subway would be constructed, as shown in Figure 3. Brooklyn and Lower Manhattan-bound APPLE CORRIDOR airport passengers would make a convenient transfer to the subway at this location. And Midtown-bound passengers from the Rockaway Beach peninsula could also transfer from the subway to high speed APPLE CORRIDOR trains to Grand Central.

A number of local buses could also be routed past the Aqueduct transfer station. One example of a routing pattern is shown in Figure 4. Airport employees and Manhattan-bound commuters from Ozone Park and South Ozone Park would find this an attractive station. If the Aqueduct Racetrack were redeveloped into a residential community with neighborhood retail space, the station could become the focal point for this development. If designed with careful attention to community concerns, some airport-related

commercial development could be incorporated, adjacent to the Aqueduct Station.

South of the existing four track rail viaduct across the Belt Parkway the two airport tracks would head east into Kennedy Airport. The two subway tracks would continue south to Howard Beach and the Rockaways.

### Advantages of CBT's Plan Over the PA Plan

The Port Authority's plan, to construct an elevated rail line in the narrow median of a very busy expressway is costly and disruptive. In order to clear overpasses crossing the mostly below-grade highway the guideway would have to be forty-five feet in the air. The PA proposes constructing the substantial footings needed in the median at late night hours. Failure to clear construction equipment before the morning rush hour could lead to substantial traffic delays, especially inconveniencing airport bound travelers and workers. The aerial guideway, designed for light rail or rapid transit loads, would be visually disruptive to the surrounding community. At Jamaica the PA plan calls for a station two levels above the LIRR tracks. To transfer to the subway at that location five levels must be traversed.

The PA plan could be modified to permit direct service to Manhattan by providing a connecting link just west of the station. This viaduct would permit Kennedy-Manhattan trains to bypass the Jamaica Station and operate directly west onto the LIRR Mainline to Penn Station and Grand Central. This route would be only a half mile longer than the Rockaway Beach Line. For Kennedy to Jamaica shuttle trains the elevated line would be about two miles shorter.

CBT favors the Rockaway alignment for several reasons -- it is far less costly to construct, it offers a fast cutoff to Midtown Manhattan for Rockaway and Ozone Park residents as well as airport travelers, and it avoids the potentially disruptive construction required in the highway. These benefits override the obvious negatives -- increased noise for residents living along the disused right of way and some land taking for the Woodhaven Junction connection.

### (2) On airport alignment

The on-airport portion of the APPLE CORRIDOR would generally follow existing Port Authority plans, with two key changes. The airport line would



leave the Rockaway Beach right of way just south of Aqueduct Station, bypassing the Howard Beach Station. And only one en route stop, at Federal Circle, would be provided to serve airport employee concentrations and car rental locations. The station planned for employee parking would not be needed with improved public transit access to the airport.

The airport line would continue under the taxiway and circle the Central Terminal Area, stopping at six stations to serve clusters of terminals. The Port Authority plan calls for a double track loop with island platforms. Enough space is available to extend platforms to handle full length, 600 foot subway trains (or equivalent length intercity rail trains). A minimum curve radius of 350 feet could be achieved with some minor alteration of PA plans. Climbing from under the taxiway to over the airport's internal roadways necessitates a short stretch (approximately 700 feet) of six percent grade. While subway cars, and even Amtrak's Empire Corridor TurboLiners, could negotiate this grade the PA should look at less severe gradients in its final design.

As the PA's design is refined it would be important to reconsider the need for a double track loop. A single track could easily handle the projected peak hour loads. Side platform stations would be simpler and allow ramps directly into terminal buildings. A short stretch of double track could be constructed for operational flexibility, particularly if intercity trains are added at a later stage. But the extra reliability from a full double track loop, given the current performance of modern rail transit cars, may not be worth the substantial added cost. One possible layout is shown in Figure 5. This plan incorporates the PA's two track, island platform to be built into the new International Terminal Building, but otherwise uses side platforms, located 200 to 300 feet closer to the other terminal buildings than in the PA plan.

The Port Authority's original airport access plan, challenging conventional wisdom, called for a unique combination of an on-airport circulator and a high speed trunk line carrier merged into a single system. This important feature avoids a transfer at the airport and is retained in CBT's APPLE CORRIDOR plan. This type of train operation is not without precedent. Figure 6 shows Chicago's one hundred year old elevated "Loop", at the same scale, which functions as a distributor for trunk line rapid transit services. For nearly a century Loop trains made ten intermediate stops as they circled the two mile perimeter taking about ten minutes. Intercity trains from Milwaukee used the Loop as well. Recently the Chicago Transit Authority

began operation of direct trains to Midway Airport from the Loop. The six station loop at Kennedy would be less of a challenge, but the key is to keep station dwell times to acceptable levels.

### (3) Manhattan routing

The APPLE CORRIDOR serves one station directly in Manhattan -- Grand Central Terminal. This is the largest single destination area for airport passengers and is a convenient transfer point to Metro-North trains for service to Westchester and Connecticut. The terminal is a grand entrance for visitors to NYC. Plans for refurbishing this magnificent terminal are well underway. APPLE CORRIDOR trains will provide more potential customers for the extensive new retail space under construction at the terminal. Three of the city's largest hotels connect directly to the terminal concourse.

But Manhattan is a carpet of destinations and many airport travelers will have to transfer to another mode to reach these locations. Passengers with luggage will probably want to take cabs for short trips. With its many exits, and well organized cab lines, the terminal can comfortably handle the added load of airport travelers. Passengers for Penn Station and points in New Jersey could make a same-platform transfer to other LIRR trains at Woodside, arriving in Penn Station only a few minutes later than at Grand Central. Passengers for Lower Manhattan would transfer, across the platform, to the A train at Aqueduct Station. If sufficient demand develops direct Kennedy-Penn Station and Kennedy-Lower Manhattan trains could be operated.

Another proposal for rail access, made by NYC officials, calls for connecting the "N" Train line which runs through the BMT subway in Manhattan directly to LaGuardia Airport and operating special airporter trains starting at City Hall. CBT supports this proposal, in concept, but as a second phase of the airport access plan. If a direct track connection from the 60th St. tunnel under the East River to LIRR and Amtrak trackage at Sunnyside, called for in the City plan, were constructed APPLE CORRIDOR trains from Kennedy could also use this route.

Direct LIRR rail access to Lower Manhattan has been proposed for many years, and is receiving a new hearing. Proponents have suggested a track connection between the BMT subway at Atlantic Avenue and the LIRR Flatbush Terminal in Brooklyn. Trains to Kennedy could use this link, and a

restored Woodhaven Junction connection mentioned earlier, to reduce running times compared to the A train.

These Manhattan route options are shown in Figure 7 along with estimated evening rush hour running times from stations in Manhattan to the first stop on the loop at Kennedy Airport. APPLE CORRIDOR running time from Grand Central would be 21 minutes. A direct train from Penn Station would take 22 minutes. The “A” train running from Lower Manhattan, with a coordinated cross platform transfer at Aqueduct, would take 39 minutes, and from 42nd St. and 8th Avenue, 52 minutes. In later phases, with the BMT connections in place, Kennedy times would drop to 32 minutes from Lower Manhattan or from Times Square.

CBT believes its APPLE CORRIDOR plan linking Grand Central to Kennedy Airport with fast, frequent rail service is the best starting point for airport access. Additional connections and services can be operated in the future, as a truly coordinated regional rail plan evolves.

#### (4) Streamlining the LIRR access link to Grand Central

The key feature of the APPLE CORRIDOR is the completion of LIRR access to Grand Central Terminal. To keep costs down, and to maximize traveler convenience, the plan would use the existing upper level loop of Grand Central with its five platform tracks, as shown schematically in Figure 8. Typical operation would be for LIRR trains to use the four westernmost tracks (nos. 39-42) and their two island platforms (designated T and U). Airport trains would use the fifth track (38) and with its own separate platform (S). This would keep airport travelers out of the way of commuters.

The loop trackage in the terminal would be connected to the completed, but unused, lower level tunnels under 63rd St. that were designed and built for LIRR and airport service. This would require the construction of two 3,000 foot long tunnel segments, mined or bored deep in the rock of Manhattan, from 63rd St. and Second Ave. to 52nd St. and Park Ave. A three percent grade, the current design guideline, would allow the two 63rd St. tunnel tracks to connect to Grand Central upper level loop track leads “J” and “C”. The five terminal tracks and three platforms would be used, without any significant modification. Underrunning third rail would be replaced with LIRR-style overrunning third rail, or alternatively LIRR cars could be equipped

with double-acting third rail shoes. Additional passenger access to the platforms, from the north, is already under construction as part of a Metro-North project.

Currently the LIRR plan, now the subject of detailed planning, calls for a ten track terminal using the Lower Level of the terminal. A three track approach is planned with a “flyunder” just below Metro-North trackage, avoiding conflicts between inbound and outbound moves. The plan requires reframing dozens of columns, excavating the lower level by five feet and underpinning several buildings on Park Avenue including the Lever House. All of these features are extraordinarily costly, and provide little extra value for the dollars invested.

CBT’s plan would provide a high capacity loop system that is operationally similar to PATH’s World Trade Center terminal. The layouts are shown at the same scale in Figure 9. PATH operates trains at a rate of 40 trains per hour during the busiest peak periods. Curves are much tighter at the Trade Center. The Grand Central loop track has a generous 350 foot radius in comparison to PATH’s 115 foot radius. There is no reason why LIRR trains could not operate at 15mph or faster around the loop. The new local-express connection to the Queens Blvd. Subway line now under construction in Long Island City has the same radius curve on its “mainline”. A goal of 30 scheduled trains per hour for the loop is not unreasonable.

Connecting to the upper level loop tracks at Grand Central has several other advantages, besides drastically reducing cost. The upper level is closer to the surface, reducing the climb for commuters and airport passengers. At the south end of the terminal the upper level tracks have ramps that lead directly to the concourse and the street. This popular feature of the much heralded terminal will be especially convenient for airport travelers with luggage that is equipped with wheels. Using the upper level keeps open the option of using the lower level for future extension of Metro-North trains south to Penn Station or Wall Street.

## (5) Long Island City Alignment

In Long Island City the APPLE CORRIDOR would require construction of two tracks from the end of the existing lower level of the 63rd St. tunnel at Long Island City to existing LIRR trackage at Harold Tower, as shown schematically in Figure 10. Two 3,000 foot long cut and cover tunnels would be

constructed, one for each track, crossing under Amtrak and LIRR freight trackage at Sunnyside Yard. The two tunnel tracks would connect directly into existing track beds of the LIRR Mainline local tracks. Track layout shown also permits connecting to the Mainline express tracks for flexible operation. Under normal operation most APPLE CORRIDOR trains from the 63rd St. lower level tracks would pass through this connection without changing tracks. Using the local tracks is advantageous because at Rego Park, the restored Rockaway Beach line connects directly with these tracks, keeping costs down.

LIRR bi-level cars and dual mode diesel electric/electric locomotives, now being built to serve non-electrified lines in eastern Long Island cannot use the 63rd St. tunnel, and would operate on the two mainline express tracks from Jamaica, continuing to Penn Station using the 32nd St. tunnels (Lines 1 and 2). Amtrak, and eventually Metro-North Hell Gate trains, would also use these tunnels. At Penn Station, in CBT's plan for early implementation of regional rail, most trains using the 32nd St. tunnels would be through-routed with trains using Amtrak's Hudson River tunnels to New Jersey. This would greatly enhance capacity of Penn Station, while opening up new regional travel possibilities.

Plans for a Long Island City/Sunnyside intermodal transfer station are being developed by MTA. One possible layout is shown in the schematic drawing. Amtrak is developing plans for a flyunder in the eastbound direction, and an upgraded bypass track in the westbound direction, eliminating conflicting moves through this location. These Amtrak tracks are shown in the schematic, though in a simpler, less costly layout. The transfer station shown in the drawing anticipates CBT's Penn Station through-routing plan and simplifies the layout. No significant new trackage is needed, other than a few turnouts. Platforms would be constructed adjacent to the eight existing mainline tracks passing under the Queens Blvd. overpass. An interim access system to these platforms from the overpass could be built at relatively modest cost, with a "grand" station constructed later as part of a redevelopment plan. Many of these features are shown approximately to scale in Figure 11.

The two LIRR Port Washington Branch tracks would connect directly to the 33rd St. tunnels (Lines 3 and 4) to Penn Station. This discrete line, with its own tunnels to Penn Station, would be operated more like a rapid transit line, with frequent service and an integrated fare structure. Port

Washington Line passengers bound for Grand Central, or for Kennedy Airport, would change to APPLE CORRIDOR trains at Woodside.

In the longer term the Port Washington line could be routed through the 60th St. tunnel, as part of a comprehensive restructuring of rail and subway lines. This restructuring would include consideration of the City's proposal for rail access to LaGuardia Airport and local developer aspirations to relocate elevated railroad lines out of Queens Plaza. It would also anticipate operation of Rockaway Beach rapid transit trains on the APPLE CORRIDOR, making several additional stops in Queens and connecting to the 60th St. tunnel. The 60th St. tunnel connection could be made just west of the intermodal transfer station, as shown in Figure 11, to facilitate connections and focus development. This effort could include reconfiguring Woodside into a cross platform transfer station. Another option is to make provision for a future "on-line" station on the 63rd St. lower level line from Grand Central, near Northern Blvd., before it begins its climb to the LIRR Mainline at Sunnyside. These possibilities are worth considering, but they need not be put in the critical path of implementing the initial phase of the APPLE CORRIDOR quickly.

The streamlined APPLE CORRIDOR plan at Long Island City contrasts with the costly and elaborate plan currently being considered by the LIRR in its East Side access plan. The LIRR would build six ramps at LIC instead of two. The other four would lead to the Port Washington Line and to storage tracks at Sunnyside Yard. Though desirable, these feature may not be worth the substantial incremental cost.

## (6) Schedules

APPLE CORRIDOR trains would operate every ten minutes from Grand Central Terminal to Kennedy Airport for 20 hours per day. Running times are shown in Table 1. Airport trains would take 21 minutes to make the 15.2 mile trip from Grand Central to the first of six stops on the airport loop, with intermediate stops at Woodside, Aqueduct and Federal Circle. This is well within the capability of modern regional rail technology. The entire round trip would take 51 minutes. With a nine minute layover at Grand Central, only six train sets would be needed to maintain the basic service. With one person train operation on-board labor costs are quite modest.

Jamaica-Kennedy trains would also operate on ten minute headways. The 7.7 mile run to the first terminal would take 13 minutes. A complete round trip from Jamaica to the airport and back would take 35 minutes. To assure a convenient cross-platform transfer at Jamaica, in each direction, airport trains would use one of the turnback tracks east of the station. Five train sets would be required.

The on-airport loop service would operate every five minutes, requiring only two sets of equipment. A system total of thirteen train sets plus three spares would be required.

As a future option, Amtrak intercity passenger service could also operate from Penn Station to the airport. Frequent high speed TurboLiner-type trains from Albany, Scranton, Allentown, Harrisburg and Atlantic City would be able to serve both Manhattan and the airport increasing their ridership potential. Rather than construct a separate terminal for intercity trains, at least at the outset, these trains could use the airport loop. Typically an arriving intercity train would circle the loop, making up to six stops, and then proceed to a ground level lay up yard located somewhere between Aqueduct and Federal Circle. A departing train would leave the yard, circle the loop stopping to receive passengers and head for Penn Station. This service only makes sense if Amtrak takes steps to minimize dwell time and improve equipment utilization. This is the key to making these services affordable in any event.

## (7) Fares

As a starting point for discussion, fares could be assumed comparable to the LIRR. The airport would fit into Zone 3, the same as Jamaica and Eastern Queens. Manhattan to Airport APPLE CORRIDOR fares would be \$3.75 off peak and \$5.50 peak. A \$117 monthly ticket used at a typical 37 trips per month basis would be \$3.16 per one-way ride. The LIRR presently offers a bus/rail combination ticket for weekly or monthly commuters. This adds \$0.74 per trip for regular monthly users. This combination might be offered to subway/APPLE CORRIDOR transferring passengers at Aqueduct.

But LIRR fares are far too high to attract many NYC riders given the \$1.50 base fare. They will be even less competitive when the MTA eliminates double fares in July 1997. CBT has proposed that affordable unlimited ride passes be offered for time periods of a month, a week, one day or two hours..

These passes would be good for travel on any mode in the city -- rail, subway, bus or ferry. For example, a monthly pass priced at forty times the current \$1.50 base fare -- \$60 per month -- would be a tremendous boon to ridership, citywide. If honored on LIRR trains as CBT proposes, the LIRR would become a true regional rail service.

MTA has been reluctant to offer passes because of its high estimates of revenue loss from its already frequent users. CBT has challenged these estimates. But some revenue loss can be expected. Operating costs would rise for commuter rail service to meet the much larger demand. The APPLE CORRIDOR opens up new East River capacity by the turn of the century with its streamlined 63rd St. tunnel connection to Grand Central permitting the LIRR the opportunity to serve eastern and southern Queens patrons as well as suburban commuters. At the same time, CBT has called for road pricing strategies that would produce revenues for an affordable, vastly improved transit service. The APPLE CORRIDOR is an integral part of this plan. Road pricing, a innovative parking pricing on the airport, could go a long way toward encouraging airport passengers, visitors and employees "to do the right thing" -- use the APPLE CORRIDOR, instead of driving.

## (8) Ridership

Ridership estimates are difficult to make. For this overview a few key assumptions and goals are suggested. Assuming CBT's proposed service and fare levels, one goal would be to attract about three-quarters of the Manhattan-Kennedy market, a large part of which now uses taxis or buses, and about one quarter of the non-Manhattan market, which is primarily auto-based. If the APPLE CORRIDOR is effective in shifting half of current LaGuardia air traffic to Kennedy, because of its vastly improved Manhattan access, a substantial core of ridership can be expected. Using 1993 PA air passenger counts these assumptions produce an APPLE CORRIDOR estimate of 10,200 daily trips from Manhattan and 5,500 daily trips from other origins in the region to Kennedy. In addition, the APPLE CORRIDOR might succeed in attracting about a quarter of the employee trips or about 6,400 trips to the airport. Another 3,000 persons might be attracted to the system as meeters and greeters, accompanying travelers to or from the airport. Not estimated are other airport visitors who might be attracted to the extensive commercial developments planned in new terminal buildings at Kennedy.



The APPLE CORRIDOR provides a fast shortcut for Midtown commuters from the Rockaways, and from the Ozone Park area. If half of the current subway riders from these areas shifted to the new line, about 10,000 more riders to Manhattan could be expected. Even more ridership from these areas could be attracted in the future as travel patterns change, and as development on the Rockaway Peninsula is encouraged by the faster service.

Not including on-airport users, the APPLE CORRIDOR might attract as many as 35,000 passengers each way, or 70,000 total weekday ridership. In addition there would be a shift of as many as half of the LIRR riders from Penn Station to Grand Central with the completion of the 63rd St. lower level tunnel link. Some 50,000 LIRR riders to Penn Station would be attracted to Grand Central. With the new East River capacity, and CBT's proposed regional fare structure riders from Eastern and Southeastern Queens would find the LIRR more attractive than a bus-subway combination. Perhaps another 30,000 of these riders would shift to the LIRR, half of them to Grand Central. Overall, the APPLE CORRIDOR might attract a total of ridership of over 200,000, of which 25% would be airport travelers, making it one of the busiest transit corridors in the U.S..

One concern about attracting large numbers of air passengers to a rail line is the difficulty in handling luggage. With an attractive price, and very frequent service, the APPLE CORRIDOR would be appealing, even to Manhattan travelers who now use taxis or other for hire vehicles. But the possibility of through checked baggage from Grand Central remains difficult because of heightened security due to worries about terrorism. Until this can be overcome, perhaps the best approach is to have extra personnel on hand to help travelers with luggage, with Red Caps at Grand Central and Sky Caps at each of the six on-airport stations. Family and friends would be encouraged to accompany travelers, given the appealing ride and modest fare. For higher income travelers the APPLE CORRIDOR could offer Premium Fare luxury service that would include attendants helping with luggage.

The APPLE CORRIDOR connects directly to the nation's rail network. Amtrak supports a limited mail and express capability at present, and might consider the opportunity to enhance its market share with new links to Kennedy Airport. Intermodal rail freight could also reach the airport on this trackage. No U.S. or overseas railroads exploit rail connections to the airport for freight, at present, although some experimentation is beginning in Germany.

## (9) Equipment -- Back to the Future

Acquiring new trains for the APPLE CORRIDOR airport service provides an opportunity to introduce a new concept in train technology. Or more correctly an old one. Arguably the most advanced train equipment ever acquired by the NYC transit system occurred at the depth of the depression, in 1933. Eager to win back new riders from the automobile, rail car manufacturers and railroad and transit operators began to consider new options. The Presidents Conference Committee (PCC), made up of key executives of the then privately-owned transit companies, developed an advanced streetcar design, which eventually became an enormous success. At about the same time rail car builders, like Pullman and the Budd Company, began to produce advanced lightweight "streamliners" for high speed train service. A unique combination of the best of these two technologies was developed by Pullman for the Brooklyn-Manhattan Transit Corp. (BMT).

BMT's new lightweight aluminum train consisted of two identical end units and three intermediate units permanently connected together as an articulated train. Passengers could walk through the train without stepping between cars. As many as nineteen units could be connected to form a single continuous train. Figure 12 shows this train configured in a way that would be useful for APPLE CORRIDOR service. Nine units would form a 298 foot long train, equivalent to a five 60 foot subway cars, or four 85 foot commuter rail cars.

While the BMT cars could serve as a prototype, rail technology has advanced in the last 63 years. Paris, Hong Kong and Copenhagen have new articulated rapid transit trains of advanced design. The MTA's new technology train has many of the propulsion and control features that would be desirable in a new train. The United Aircraft TurboTrain and the PATH car demonstrate that aluminum trains can be both lightweight and strong enough to meet Federal railroad safety standards, which would be specified for the APPLE CORRIDOR. The initial fleet of sixteen prototype trains, capable of eventually running either on the subway or the LIRR, would be a large enough procurement to advance the state of the art, while small enough to allow necessary refinements to take place as the cars are placed in service. They could serve as the precursor to the Transit Authority's plan to purchase 100 new subway cars for the Queens Blvd. Connection.

The interior layout of the original BMT cars is very close to what would be desirable for the APPLE CORRIDOR airport service. The 32 inch wide bi-parting doors lead to a generous holding space which would be convenient for passengers with luggage. Framing this space are three rows of two by two seating at each end. All together a nine-unit train set could seat 320 passengers, while still leaving adequate space for luggage on the floor or in overhead racks.

These trains would be designed to couple together in groups of two to four sets. The APPLE CORRIDOR platforms at Grand Central, originally used by long intercity trains, could handle a four-set, 1,200 foot long train if that were ever needed. In-service coupling of trains en route to form longer units is a way to make more productive use of limited track capacity. While once common in the U.S., few transit properties now use this practice. But it is quite common overseas. Once the initial APPLE CORRIDOR service is established, some experimentation with train coupling could be considered. An obvious candidate would be train service to the Rockaway Peninsula, where the two branches converge and connect with the APPLE CORRIDOR at Aqueduct Station.

#### IV. Creative Financial and Institutional Arrangements

The entire APPLE CORRIDOR project including the streamlined connection to Grand Central Terminal, the restoration of the Rockaway Beach line, the connection to Jamaica at Woodhaven Junction, the on-airport loop at Kennedy and airporter trains will cost an estimated \$1.585 billion if construction could begin in two years. Of this amount, \$739 million is for the LIRR East Side Access. This cost estimate is based on the 1993 MTA plan for the LIRR East Side Terminal, factored downward to reflect the vastly simpler, and therefore less costly, project as described in this paper. The basis for this estimate is described in Table 2. Other costs are estimated in a comparable way and summarized in Table 3. These estimates are for full implementation including planning, engineering, construction management etc.

The Port Authority's plan for rail links to Jamaica and Howard Beach is estimated to cost \$1.1 billion. The PA will advance this capital funding for the project, and repay it from two sources -- the Passenger Facility Charge (PFC) of \$3 collected by the PANYNJ from each enplaning passenger and its

regular capital budget for on-airport improvements. The PFC revenue stream can support about \$700 million in capital improvements.

CBT proposes that the APPLE CORRIDOR be constructed, instead of the current PA plan. This plan will cost \$485 million more than the PA plan, but will include the LIRR Grand Central access project as well. CBT assumes the PA will continue to contribute its \$1.1 billion to this vastly superior plan. The MTA Capital Program, as recently amended, allocates \$50 million for the LIRR East Side project. The remaining \$435 million could come a variety of resources. Federal "new start" transit funds could be sought. Funds now allocated to highway expansion could be reprogrammed. Alternatively, the PA could advance the money, build the entire project and then be reimbursed by the MTA on a trackage rights basis, once service begins early in the next century. The PA could "buy" a twenty percent share in the completed segment of the 63rd St. lower level tunnel which was built for railroad and airport use. This is about the proportion of peak hour capacity that would be used for airport trains in the APPLE CORRIDOR plan. At current prices, this completed tunnel shell may have a replacement value of close to a billion dollars. The MTA could use this \$200 million to reduce its trackage rights fees to an amount that would support the remaining \$235 million to complete the project. This sum could easily be funded from expected increased annual revenues to the LIRR once service begins to the East Side.

The APPLE CORRIDOR would be undertaken as a single cooperative, joint use project. The PA and the MTA would reach an agreement and contract with a third part -- a private vendor -- to design and build the various components of the project. It would organized as an "airport" project, with a projected revenue stream from trackage rights agreements, for its no-airport users. In this way the PA could use its resources, and the PFC funding, to finance the construction cost.

Operating costs are another matter. High fares reduce subsidy requirements but also curtail use. One person train operation requires the cooperation of organized labor. Maintenance agreements with the LIRR or the Transit Authority could avoid the capital and operating costs of a new, separate facility just for airport trains. Mentioned earlier in this report was the basic issue of increasing use of LIRR lines in NYC by including them in an integrated, unlimited ride pass fare structure. A coherent citywide strategy of charging motorists for the costs they impose on the city, and using some

of these revenues to make transit more affordable and attractive, is a sensible strategy. Kennedy access is a good case in point. The PA should consider charging motorists who pay nothing for the use of its elaborate and costly roadways, when passengers are dropped off and cars are not parked, and charging employees for parking space.

The Mayor and the Governor have much to gain by endorsing CBT's APPLE CORRIDOR. The Mayor gains an extraordinary airport rail link at no cost to the city, even as most of its investment in construction activity takes place in the city. The Queens Borough President gains a major boost to its largest industry -- aviation -- restoring Kennedy's competitive edge over Newark Airport. And the Governor can accomplish a great deal -- LIRR East Side access and a direct Manhattan-Kennedy and Jamaica-Kennedy rail links -- with no new outlay of state dollars. Doing more with less is always a good idea, but especially in the current political climate.

We invite the Mayor, the Governor and the Borough President to join us on the inaugural run of the APPLE CORRIDOR, on January 1, 2000.

Table 1 - Distance and Estimated Travel Time

Grand Central - Kennedy International Airport

	Miles	Minutes
Grand Central Terminal	0.0	0
Woodside Station	5.0	7
Aqueduct Station	11.8	15
Federal Circle Station	13.3	18
Terminal One Station	15.2	21
Delta Station	15.4	23
International Station	15.7	25
TWA Station	16.1	27
British/United Station	16.2	28
American Station	16.6	30
Federal Circle Station	18.6	33
Aqueduct Station	20.1	36
Woodside Station	26.9	44
Grand Central Terminal	31.7	51

Jamaica (LIRR) Station - Kennedy International Airport

Jamaica (LIRR) Station	0.0	0
Aqueduct Station	4.3	7
Federal Circle Station	5.8	10
Terminal One Station	7.7	13
Delta Station	7.9	15
International Station	8.2	17
TWA Station	8.6	19
British/United Station	8.7	20
American Station	9.1	22
Federal Circle Station	11.1	25
Aqueduct Station	12.6	28
Jamaica (LIRR) Station	16.9	35

Table 2 - "Affordable" GCT cost estimate  
Based on costs published in STV's 1993 Report

Item	original cost millions	estimated %	new cost millions
contracts: (in July 92 \$)			
at Grand Central			
C-1	199	0%	0
C-2	96	10%	10
C-3	116	95%	111
line equip./track/signals	102	20%	20
station finish	49	5%	3
GCT Total	<u>563</u>		<u>144</u>
at Long Island City			
C-4	77	95%	73
C-5	319	34%	108
line equip./track/signals	131	34%	45
LIC Total	<u>527</u>		<u>226</u>
Total Contract Cost	1,090		370
Contingencies (20%)	<u>218</u>		<u>74</u>
Total with contingencies	1,308		444
Other Costs*	<u>324</u>		<u>110</u>
Total Cost in July 1992	1,632		554
inflation**	<u>545</u>		<u>185</u>
Grand Total	2,177		739

\*includes design 8%, construction management 12%

LIRR supervision & review 4.75% , total "other" 24.75%

\*\* 4.25% compounded annually, assume July 1999 (33.4%)

Note: Contract C-1 is for work south of 52nd St., C-2 is from 52nd to 55th Sts., and C-3 is north and east of 55th St., C-4 if from Northern Blvd. Through Yard A and C-5 is east of Yard A.

Table 3 - Estimated Capital Costs for APPLE CORRIDOR  
(In 1999 \$ - including allowance for design, adm., inflation etc.)

Grand Central Terminal Access (See Table 1) 739

Restore Abandoned Rockaway Beach Branch (Rego Park to Aqueduct)

- restore 4.2 miles of double track railroad @ \$8 million per mile  
= \$34 million
- replace bridge over Montauk Line = \$10 million
- relocate parking spaces at Forest Park Crescent = \$2 million
- install sound barrier along 2 miles of route = \$2 million
- provide resources for property owners to install double pane windows and central air conditioning to reduce noise - 2,000 housing units @ \$5,000 per housing unit = \$10 million
- relocate Aqueduct Station and provide for cross platform transfer to subway = \$20 million
- subtotal \$78 million

Woodhaven Junction

- construct new track connection in southeast quadrant for Kennedy to Jamaica service, including purchase of right of way \$100 million

Total off-airport cost \$907

Rolling stock - special airporter cars

- 16 9-unit 298 foot long articulated trains sets @ \$8 million = \$128

Total cost including equipment \$1,035

Total cost of PA access plan \$1.1 billion, less the following items:

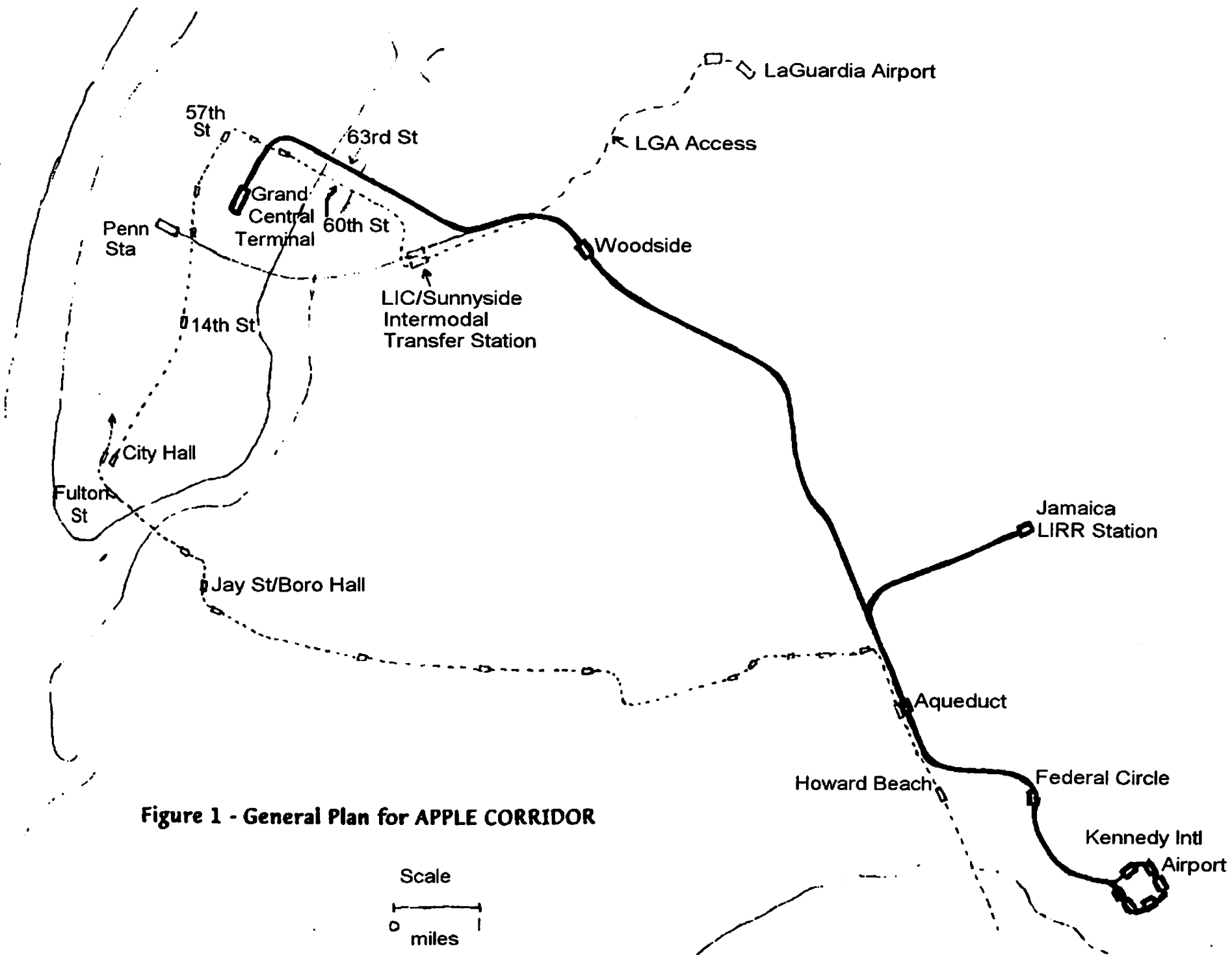
station at Jamaica LIRR, 3 miles of elevated guideway in median of Van Wyck

Expressway, Howard Beach and Employee park ride stations, rolling stock, maintenance facility. Savings = \$550 million

Net PA cost = \$550 million

Total GCT access and airport cost = \$1,585 billion





**Figure 1 - General Plan for APPLE CORRIDOR**

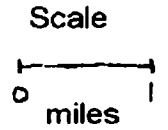
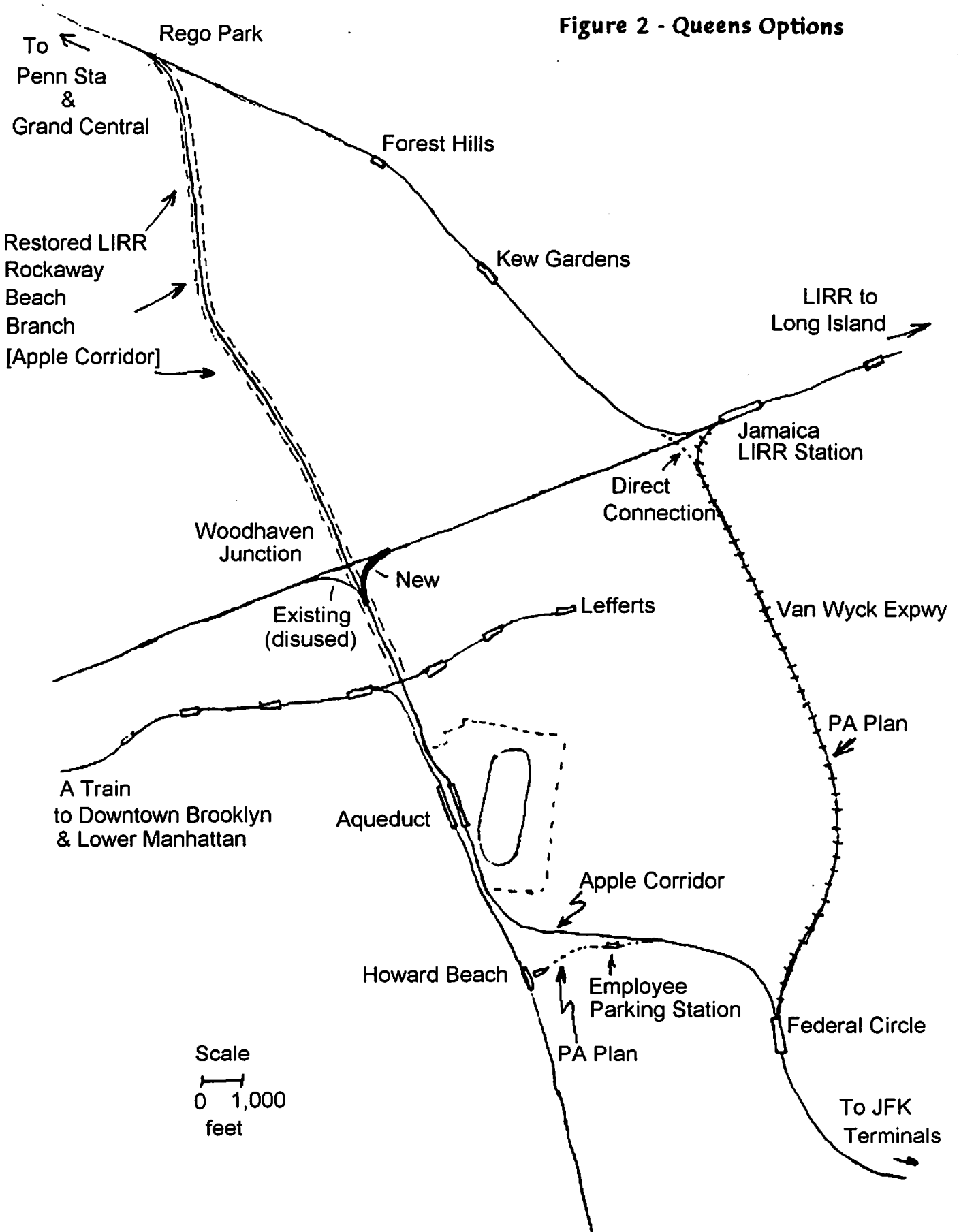


Figure 2 - Queens Options



A Train  
to Brooklyn &  
Manhattan  
←

APPLE CORRIDOR  
to Penn Sta  
Grand Central  
Jamaica LIRR  
↑

New Aqueduct Station

North Conduit Sta.  
(to be relocated)

Belt Parkway

To Kennedy Intl. Airport  
→

Howard Beach  
Station

To the  
ROCKAWAYS  
↓

Figure 3 - Aqueduct Cross Platform Transfer

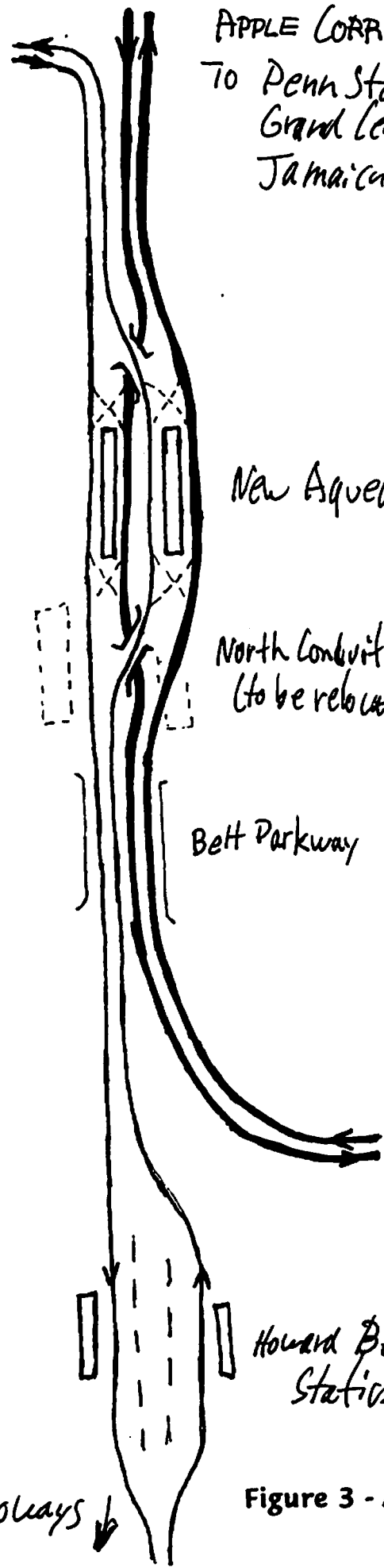


Figure 4 - Feeder Bus Lines to Aqueduct Station

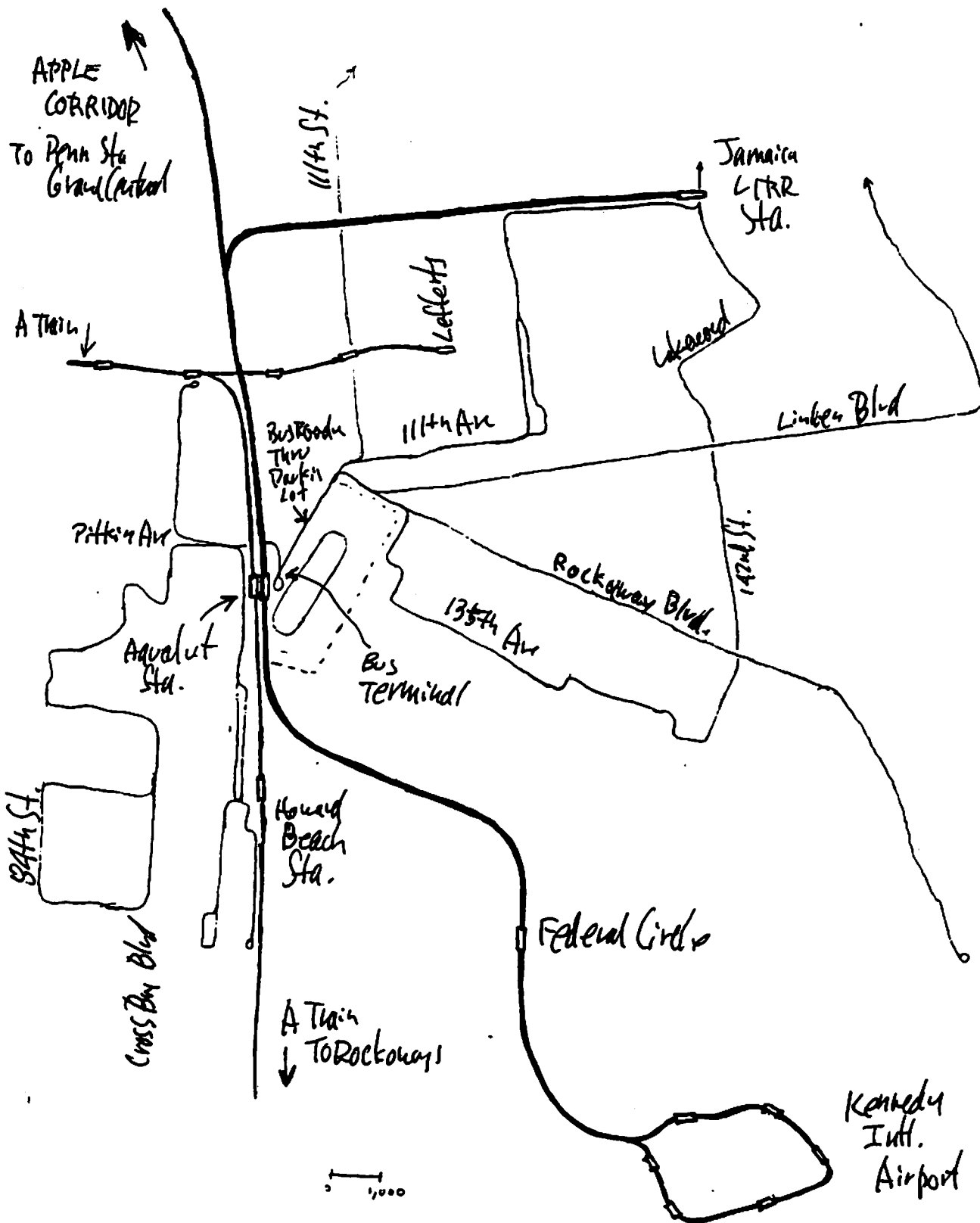
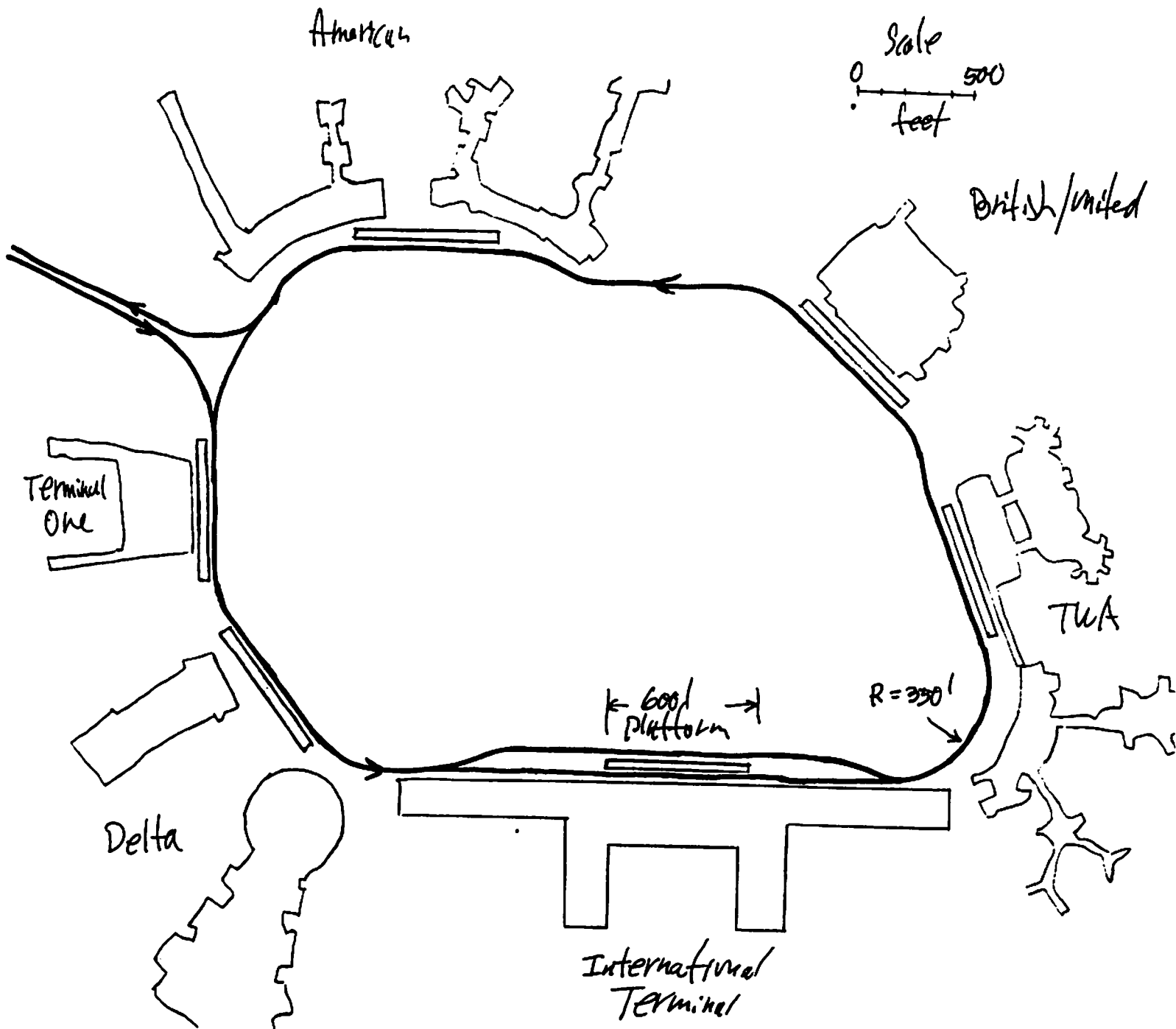


Figure 5 - Layout at Central Terminal Area  
Kennedy International Airport



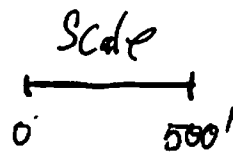
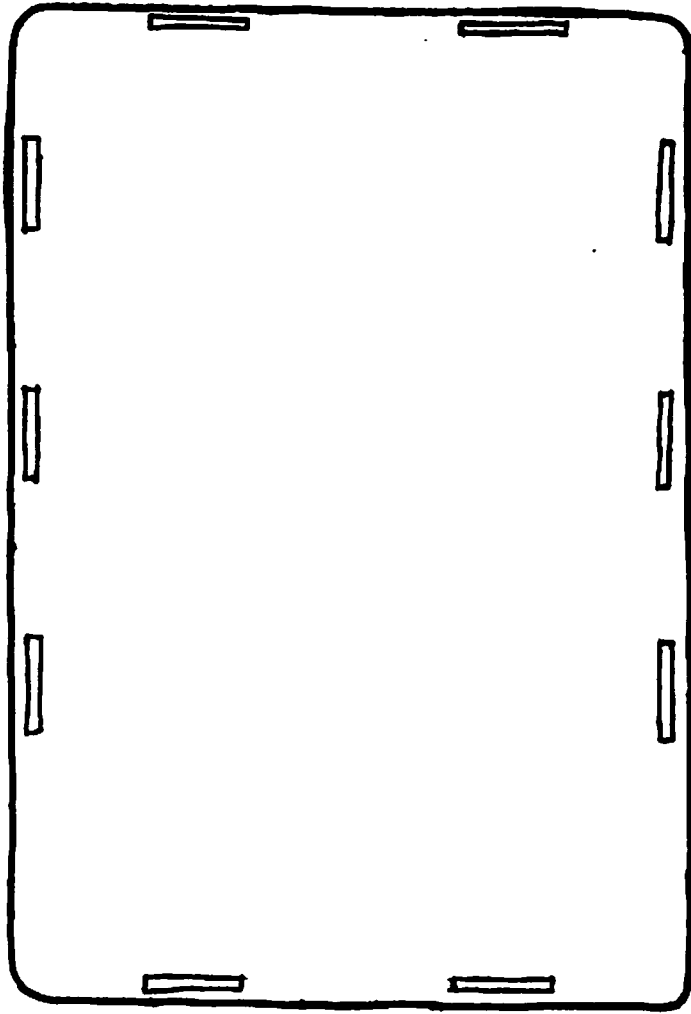


Figure 6 - Chicago Elevated Loop

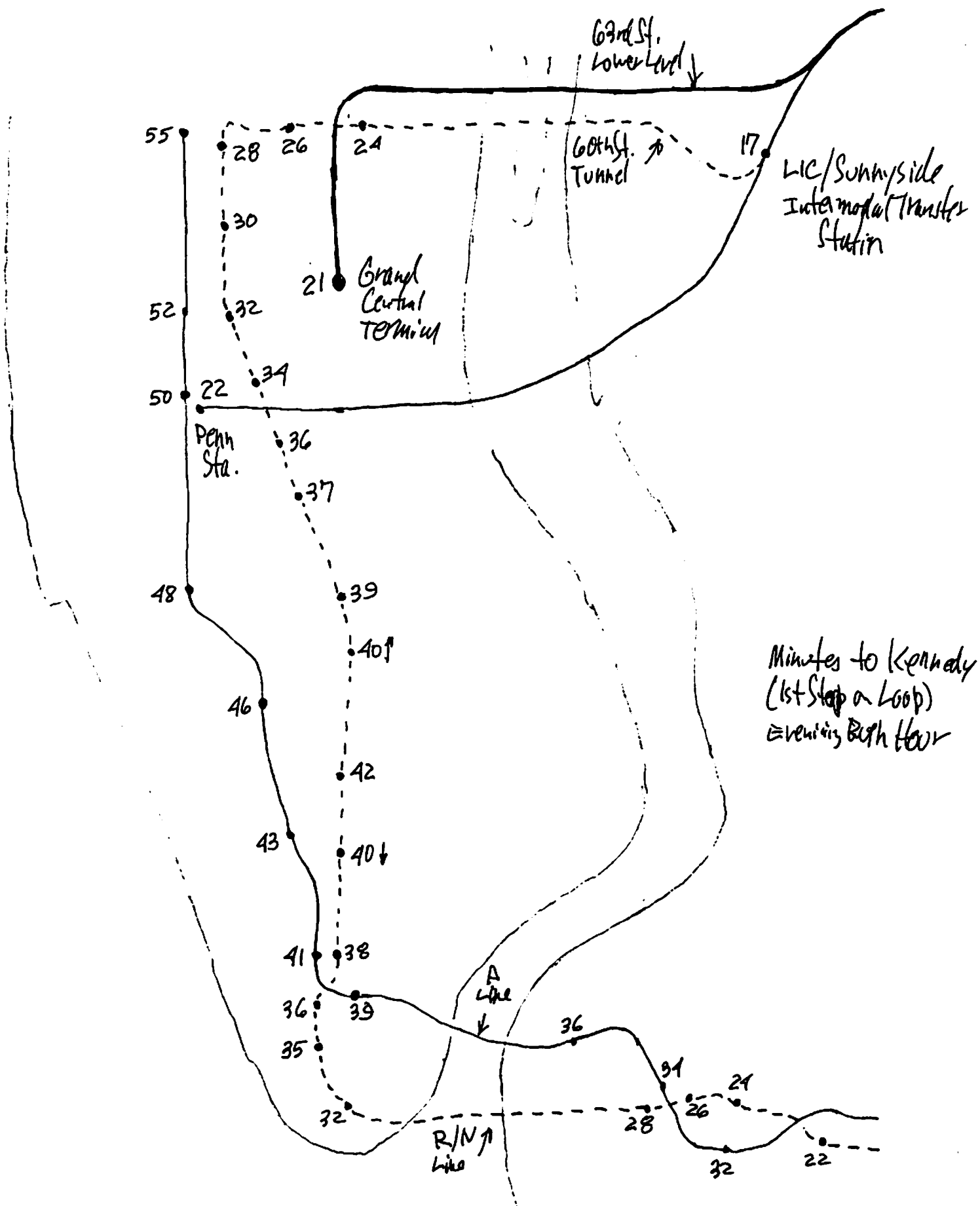


Figure 7 - Manhattan Distribution Options

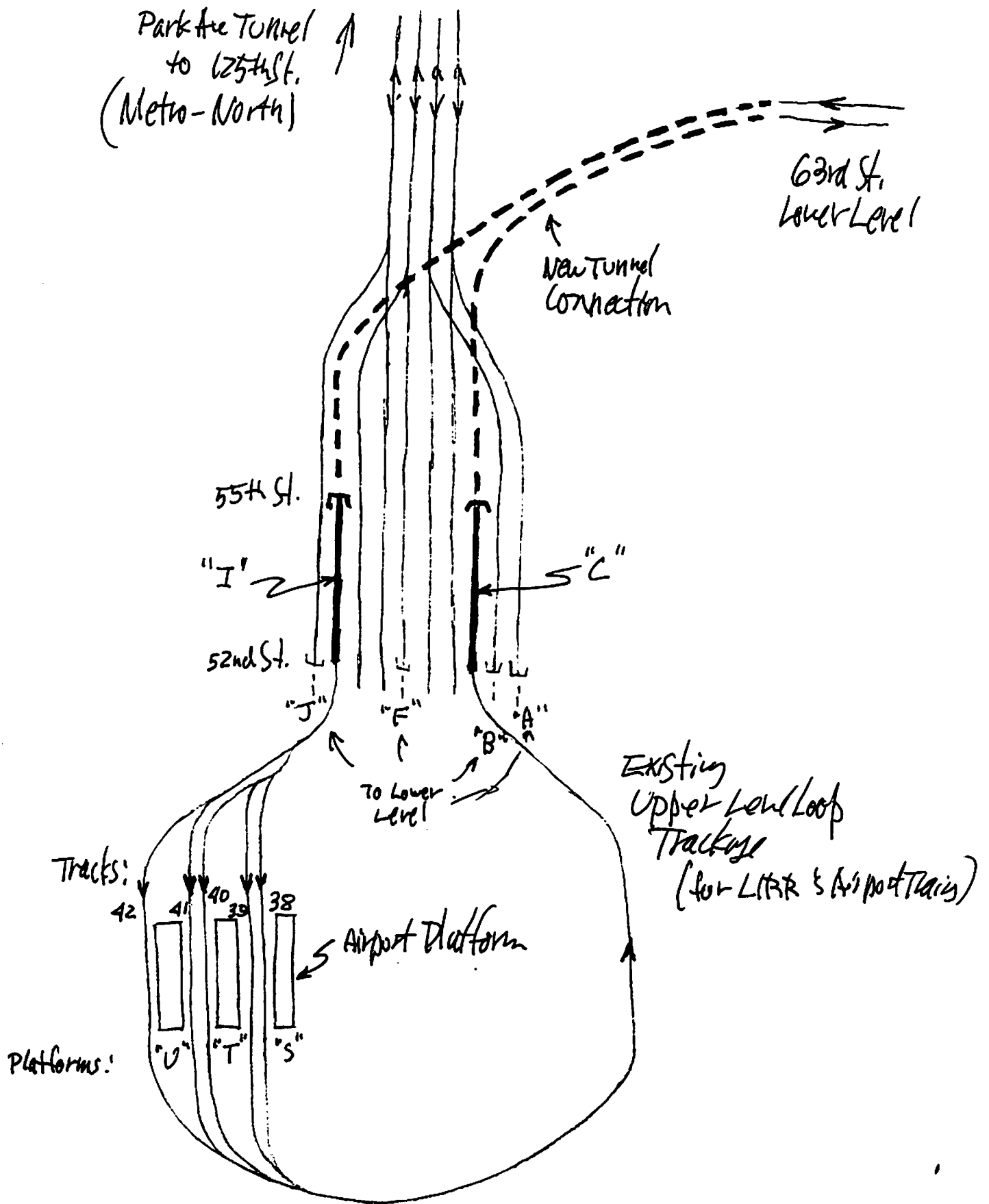


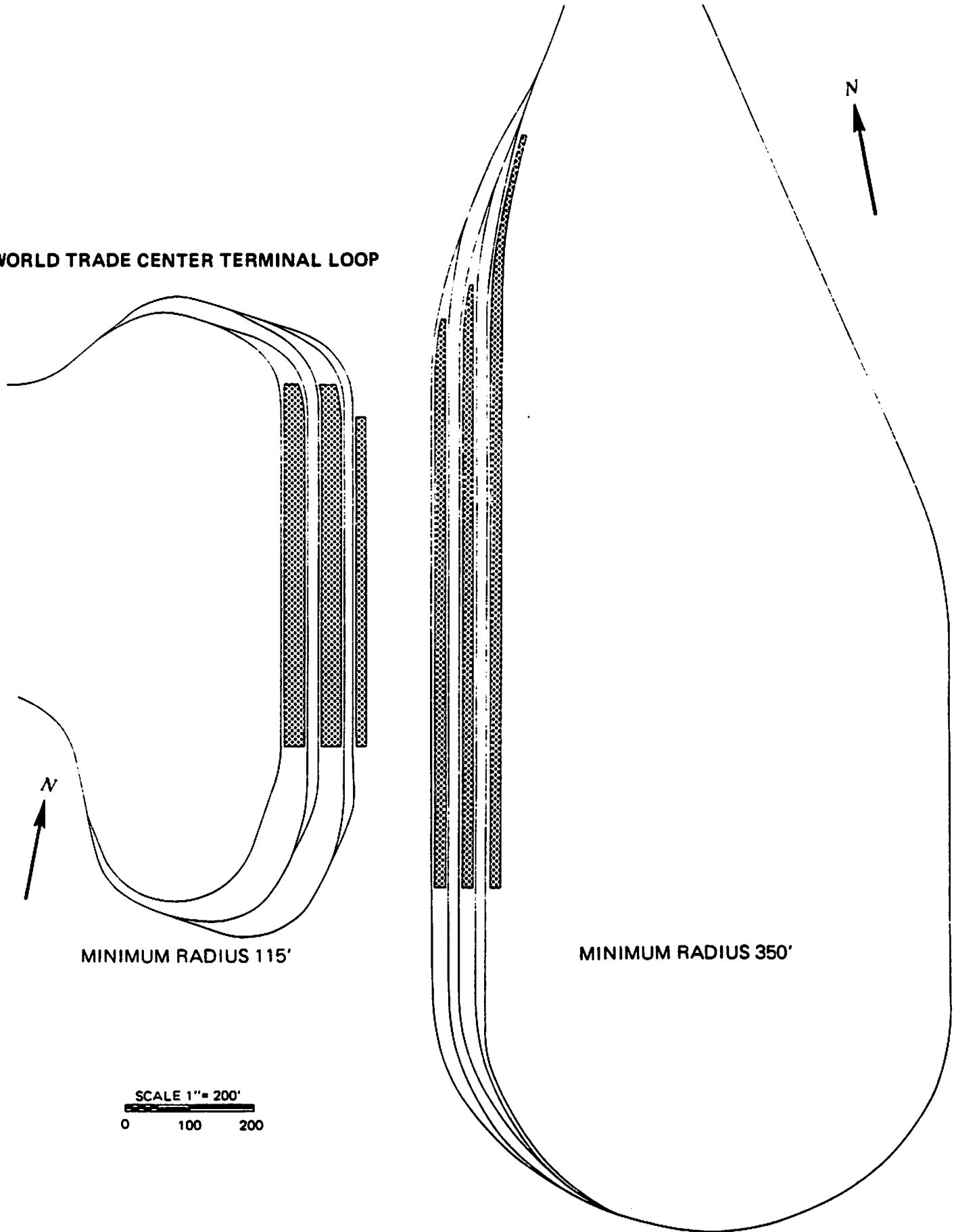
Figure 8 - GCT Track Diagram



**Figure 9 - Comparison of GCT and WTC Terminal Loops**

**GRAND CENTRAL TERMINAL LOOP**

**WORLD TRADE CENTER TERMINAL LOOP**



**MINIMUM RADIUS 115'**

**MINIMUM RADIUS 350'**

**SCALE 1" = 200'**  
0 100 200

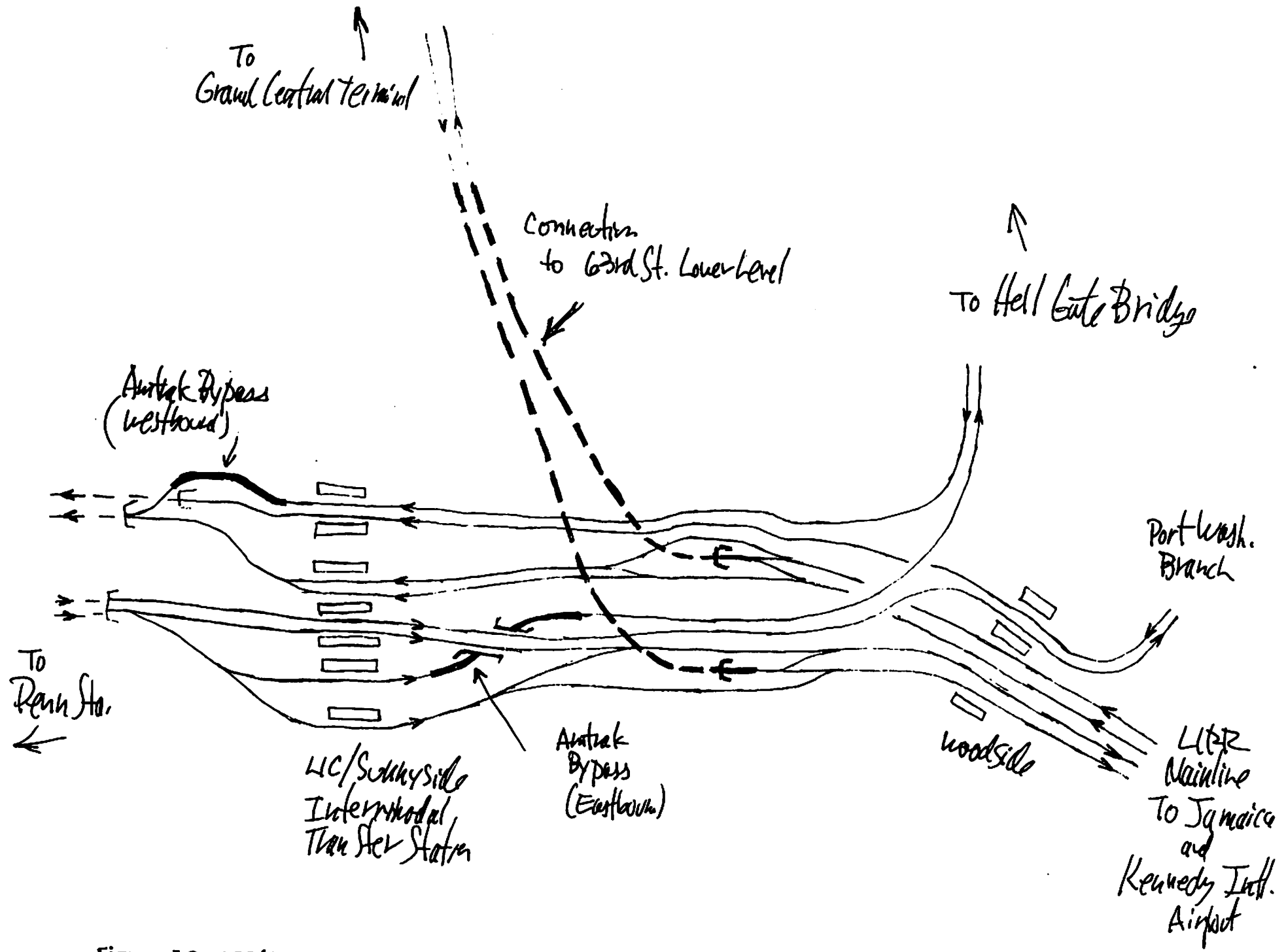


Figure 10 - LIC/Sunnyside Track Diagram

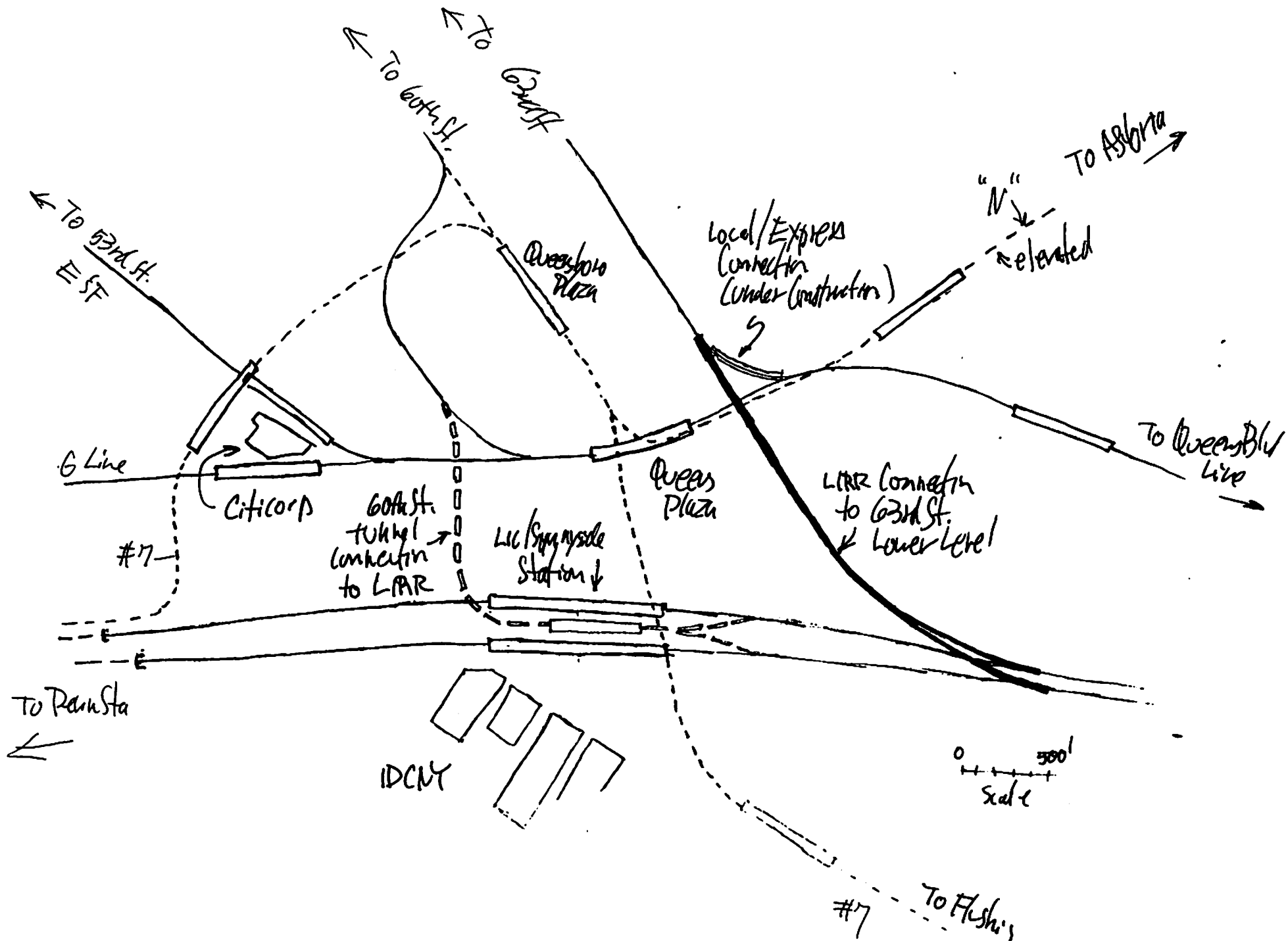


Figure 11 - LIC/Sunnyside - General Plan

Figure 12 - Nine-Unit Articulated Airporter Trains

