

Transportation Planning in Metropolitan Areas

EDWARD G. WETZEL
Highway Planning Engineer
The Port of New York Authority
New York City

A glance into the history of our early American cities reveals that they were developed at crossroads where routes of commerce crossed and where goods could be bought, sold or traded. The crossroads that prospered into towns and increasingly larger communities were those to which people could best transport their goods. The better the transportation, the greater the development of the town providing, of course, the area for the transfer of goods from person to person or from one mode of transportation to another is adequate and, conversely, the greater the development of the community the greater the need for improved transportation.

The economic life blood of any city or urban area is dependent upon the adequacy of the transportation and terminal facilities to provide for the smooth flow of trade and commerce and accessibility to the surrounding trade area. As increasing trade develops, new industries are drawn to the area, business develops, and the economy rises as a larger percentage of the population is employed in work directly related to the area. These visual signs of an improved economy put a tremendous burden on the transportation facilities that serve the central business district and expanding urban area, not only by demand on the existing facilities but also by limiting the area for development of new transportation facilities. Many of the greatest cities of today owe their very existence to their strategic location in regard to transportation.

The trend of public demand for transportation has changed the meaning of the word "urban". The city is no longer a single, central business district surrounded by a residential and/or industrial area, but is an agglomeration of several smaller business areas or communities. The central business district is more sensitive to the public demand for transportation than any other part of the urban community. It is the trading area of a city. It furnishes services and goods and its importance is dependent on the quality and character

of the services and goods and the number of people who can conveniently avail themselves of these.

To understand what is happening to our cities and metropolitan areas and what we must look forward to in our transportation planning, it is important that we examine the trend of public demand for transportation in several respects. First, the relative preference for each type of transport, that is, the automobile vs. the bus or train. Second, indications of local or regional geographic shifts of population as industries, commercial establishments, and housing move out from the old "city center" into the urban outskirts or surrounding suburban areas.

Before the age of the private car, people depended on rail transportation and lived as close as possible to a railroad station. Many such rail centers, expanding with growing population, industries and business, became the "core" of most of our larger urban areas of today. As the economic growth continued, local roads extended to interstate arteries. With an increasing mileage in a network of local roads, expressways and parkways, new territories in undeveloped areas were opened up without the benefit of rail service. The increasing use of the private automobile has accelerated the movement of people away from the congested areas producing an entirely new concept of city planning and creating new transportation problems.

Since the early 20's or the beginning of this "motor age", metropolitan areas have been growing steadily, though outside the central business district, on the edges of the urban areas and in suburban communities. Industries along with the development of residential and commercial centers have sought new locations remote from the central business district to gain cheaper land improved surroundings and reduced taxes. Industrial and commercial expansion demands greater land area for horizontal rather than the conventional vertical type development.

Population growth and shift to these outlying communities has resulted in a rapid growth of large single and multiple unit housing developments. The shifts in population produce changes in the character of the cities. Outlying suburban areas of our cities are growing more rapidly than the central business districts which in many cases themselves are actually shrinking in population. This decentralization of population results in the increasing use of private cars or public transit to travel from home to work, business or shopping.

The population increases, however, have not resulted in proportionate increase in use of public transit. People seem to prefer their own cars to any form of mass transportation when conditions permit

their use. Thus, Los Angeles, a great metropolitan area, is dependent almost entirely on motor vehicles. There are three times as many automobiles per capita in Los Angeles as there are in New York City.

CHANGES IN TRANSPORT DESIRES

Our normal work week is five days where it used to be five and one-half or six. More time is available for recreation and travel creating demand for new and larger recreational areas dependent on highway access. Since we would hardly look forward to a week-end of recreational travel by bus or rail the private car is the answer to this desire.

The changes in the character of the metropolitan area—from a single central business district, for instance, to a series of smaller commercial and residential communities; from dense populated centers to sprawling suburban areas, is symbolic of the changing desires of the people. The highway and traffic engineer must develop a better understanding of the causes of these population shifts and measure the effect of such changes upon the traffic pattern of our highway system if we are to increase the efficiency of these systems.

This tendency toward a new pattern is becoming more evident in the larger urban regions of the United States. A little over a year ago the Regional Plan Association of New York completed a study of trends in commuter transportation in the New York metropolitan region for the two decade period, 1930 to 1950. It was found today, that commuting by rail is less than 20 years ago, and commuting by all means of transport—rail, bus, ferry and private car—is up only about 10 percent, although growth in suburban families has increased 50 percent.

Examining this trend for trans-Hudson passenger movement, the Port Authority Planning Division several years ago made an analysis from records that covered a continuous period of almost four decades.

Between 1911 and 1929, there was an upward trend at a rate approximating the population growth of the New Jersey section of the Port District. Beginning about 1929 and through the next 20 years, trans-Hudson passengers via all modes of travel, followed a downward trend. However, northern New Jersey population continued an upward trend although at a lesser rate than in the previous two decades.

Passenger movements by bus and auto have shown persistent upward trends. On the other hand, ferry pedestrians and railroad passengers have been declining continuously for this same period. Taken as a whole, the trend of interstate passengers has been declining

slightly. While this trend exists for interstate passengers, the trend of total trans-Hudson vehicles has steadily and rapidly moved upward.

Significantly, these shifts among the various modes of travel were particularly pronounced for the private car following the opening of the Port Authority Holland and Lincoln Tunnels and the George Washington Bridge. Subsequently, with the development of new interstate bus routes, New Jersey residents began switching to these buses rather than use the local trolley or bus and ferry ride to their Manhattan destination. Railroad passengers have apparently been shifting to autos and to some extent, buses.

Similarly, in Chicago, the number of people traveling to the central business district has changed little during the past three decades. Results of traffic studies made there revealed that although public transit use has remained more or less constant during the rush hours, there is a decline in the use of the public transit during the mid-day and evening hours. This is another indication of the preference for private cars as a matter of personal convenience when conditions permit.

This shift in mode of travel is reflected throughout the nation in the phenomenal increase in motor vehicle traffic that has occurred during the last decade. Registrations have increased from approximately 35 million at the time we entered World War II to over 53 million vehicles this past year. During this period, motor truck registrations increased from about $6\frac{1}{2}$ million to approximately $9\frac{1}{2}$ million this last year. Ten years ago travel on our country's streets and highways amounted to 333 billion vehicle miles, while during the past year travel was well over 500 billion vehicle miles.

STREET SYSTEMS INADEQUATE

While our manpower and resources were being used to prosecute World War II, our highways and streets remained in status quo. Despite the efforts to improve our neglected highways and build new ones, the tremendous upsurge in vehicular traffic since the war has placed this transportation system in a very serious position. For this system to function properly there must be an adequate system of streets and highways for moving vehicles and a much greater off-street space for the standing and storage of vehicles. When off-street facilities are so inadequate that trucks have to occupy streets, curbs and walks for receipt and delivery of goods, serious congestion and increased costs result. Similarly, without adequate off-street facilities for the private car, the lack of curb parking space or the use of this

space for other purposes, discourages people from shopping or otherwise doing business in the central business district.

The existing street system in most of our cities is totally inadequate for the movement and parking of today's traffic. Most of the streets are relatively narrow, having been laid out prior to the coming of the motor age. Those that are wider, providing for two or three lanes of traffic in each direction, are overloaded due to the tremendous volume of traffic traversing the urban areas. It is doubtful that adequate parking can ever be provided in the central business district for all those who would desire to go there by private car.

Major arterial streets of our cities today serve through traffic wishing to move along rapidly without stopping and local traffic going relatively short distances. Since these streets are usually the main business thoroughfares, local shopping traffic is also attracted to it. With such variation in the type and character of traffic on the inadequate street system of our cities, traffic control is exceedingly difficult and costly and the accident record is usually high.

Surveys by the U. S. Bureau of Public Roads in a large number of cities within the United States, have shown that about 50 percent of the vehicular traffic in the downtown or central business district has no business here, but because no through route exists to permit this traffic to avoid the congested area, it is forced to use the old, heavily traveled streets.

Believing that a portion of the traffic using the Port Authority's trans-Hudson bridge and tunnels had origins or destinations other than Manhattan, the Planning Division of the Port Authority conducted an origin and destination survey in 1949, and a repeat survey in 1952. Results of these surveys revealed that only half of the vehicle passengers using the trans-Hudson crossings had origins or destinations in Manhattan. The remainder used the Manhattan streets and expressways only to travel between New Jersey and Westchester, New England and Long Island. Our experience, like that ascertained by the U. S. Bureau of Public Roads surveys, emphasizes the need for by-pass routes for traffic around the central business district rather than forcing it to go through the congested area.

It is unlikely that the remaining half of the trans-Hudson vehicle passengers can ever completely by-pass Manhattan since many who desire to go to Brooklyn or Queens area on Long Island by the shortest distance, will probably continue through Manhattan. However, about one-quarter of this total having origin or destinations north or south of Manhattan, may eventually be diverted by the New York Thruway Bridge now under construction across the Hudson River

north of the George Washington Bridge, and a bridge being considered by the Triborough Bridge and Tunnel Authority across the Narrows of New York Bay between Staten Island and Brooklyn.

To accommodate the rapidly increasing volume of vehicular traffic in any highly concentrated residential, commercial or industrial area, there must be an integrated system of limited access highways or expressways for through, mixed traffic between suburban residential and industrial areas and the business offices and stores in the central business district; parkways to facilitate movement of passenger vehicles between residential communities, the parks and other recreational areas and the outer limits of the business districts; major routes having a limited number of intersections at grade to speed commercial, public transit and private passenger vehicles between and through suburban and central urban areas, and minor streets required for service within each local business or residential community.

One lane of an expressway can deliver enough traffic to keep three or more lanes of a city street busy absorbing it. It is obvious that parking, loading, or unloading on streets which are the main distributing routes from an expressway will cause traffic to back-up onto the expressway. Conversely, with peak traffic in the opposite direction, such impedence to free flow of traffic causes serious traffic jams on the streets approaching the expressway. Hence to afford relief to the congestion, it is highly important to establish adequate off-street terminal facilities near intersections with the arterial routes. Off-street terminals for buses and trucks should include as far as practical, parking lots in conjunction therewith for the common carrier units when not in active use and also supplemental parking lots for private cars.

The competition between passenger cars, trucks and buses for the same street space or curb space at the same time on the usually inadequate streets that wind through the business district of the metropolitan area, is a major element in the downtown traffic congestion. Traffic delays and lack of off-street parking causes financial losses to business in the city center. Business property valuations decline and the city suffers financially.

While most large cities are suffering from this traffic strangulation a few are succeeding in doing something about it. An example is Philadelphia which several months ago (December 1, 1952) established a "no-parking" regulation throughout the central business and shopping district covering 150 city blocks or about 25 miles of streets. Complete impartial and sensible enforcement of this restricted parking ban has resulted, according to "before" and "after" surveys and

checks, in: increased sales and business (the merchants like it); increased use of existing off-street parking facilities and demand for more; increased use of public transit, while at the same time the transit company has reduced running times, delays and accidents, and increased operating speeds; decrease in volume of private autos entering the downtown area while increasing operating speeds of such vehicles; better and easier control of trucks engaged in loading and unloading at the curb; reduction in vehicle accidents and personal injuries; and increased use of "fringe" parking lots at commuter rail stations. "Operation Speedup" in downtown Philadelphia has met with such success and public support that business and civic leaders of that city are currently studying a long-range plan for additional programs to further improve and extend the traffic relief. Other cities including New York, are examining the revised edition of the "Philadelphia Story" which appears to be among the best sellers.

In some cities businesses requiring the use of a large number of trucks are beginning to relocate in areas outside of the downtown area in order to reduce the cost of truck transportation. This trend is noted in the New York metropolitan area with certain large industries establishing their warehouses and distribution centers in the lesser built-up areas of northern and eastern New Jersey where accessibility to existing highways is available. Others are providing off-street truck berths within their own premises. However, without strong zoning laws, such voluntary off-street improvements are not likely to make much of a dent in the traffic congestion. Private or publicly owned and operated off-street truck terminals for the collection, consolidation and distribution of small lot shipments throughout the central business district removes many of the over-the-road type trucks and reduces the congestion on the narrow city streets. The Port Authority, among others, has such a terminal in New York (Manhattan) and in Newark, New Jersey.

PORT OF NEW YORK AUTHORITY

It was such transportation problems inherent to a metropolitan area having a concentration of population, industry and business that became the basis 32 years ago for the Port Compact between the States of New York and New Jersey. This Compact created The Port of New York Authority as the joint agency of these States to plan and develop terminal and transportation facilities on a self-sustaining basis without recourse to the general taxpayer and protect and promote the commerce of the Port District, an area which

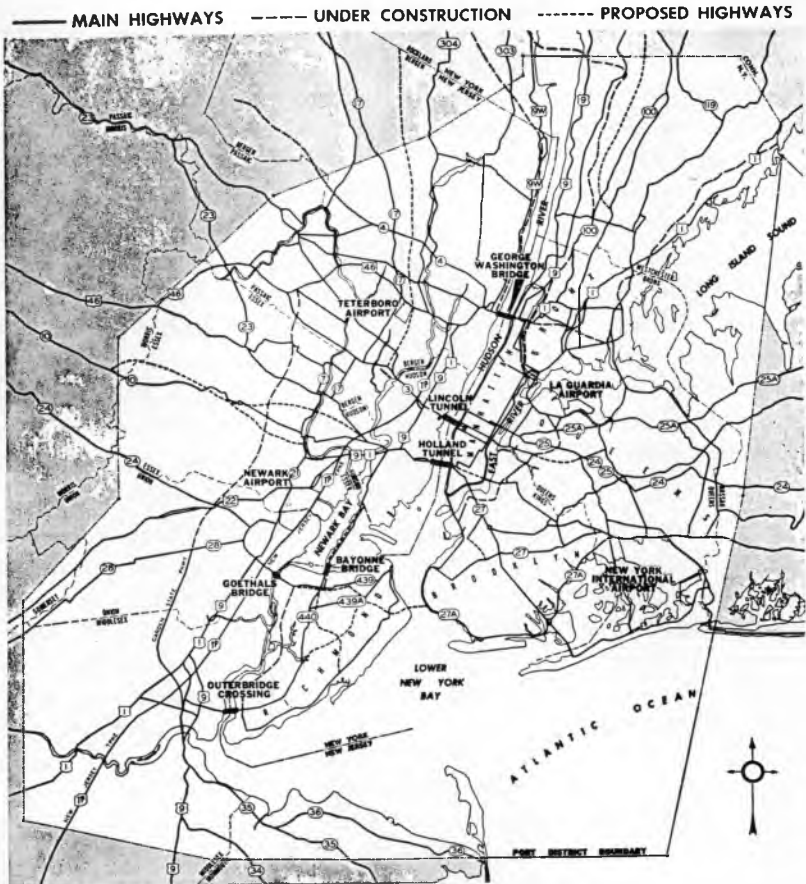


Fig. 1. Regional highway development in the Port of New York Authority district.

embraces southern New York State and northern New Jersey within a 25-mile radius of the Statue of Liberty.

In planning and constructing its interstate vehicular tunnels and bridges the Port Authority has made direct connections to major arterial highways in both States, to provide adequate plazas and interchange areas for the distribution and dispersal of traffic to avoid street bottlenecks and congestion.

For example, to facilitate traffic at the Lincoln Tunnel approaches connecting midtown Manhattan with New Jersey, the Port Authority constructed in New Jersey a two-mile, six-lane depressed roadway through the Palisades at Union City and Weehawken to connect with New Jersey Route 3 and U. S. 1; a three-quarter mile elevated structure between the toll plaza and this depressed roadway; and

additional connections to the local highway and street system in Weehawken. Just a little over a year ago, the Port Authority completed the construction of an interchange connection with the New Jersey Turnpike and ramps between Route 3 and the Lincoln Tunnel-Turnpike connection. On the New York side, an over-sized plaza, including a six-lane, north-south street was built to disperse traffic to six crosstown streets and three north-south avenues. With the construction of the third tube of the Lincoln Tunnel now under way providing two additional underriver lanes, additional sub-surface connections are to be constructed in mid-Manhattan to connect with three more crosstown streets and to give better access to the west side express highway and the one-way Ninth and Tenth Avenues.

Prior to the development and plans for the construction of the George Washington Bridge, many attempts had been made over a long period of years to bridge the Hudson River by various interested private companies. The bridge plans themselves were indeed far-reaching at that time. They ranged all the way from a pier-type structure to a combination cantilever and suspension bridge with provision for up to twenty lanes of vehicular traffic on the upper level and twelve tracks for rapid transit on the lower level. It seems that the failure of these earlier organizations to successfully bridge the Hudson River was due primarily to the inability to finance such a project. With the volume of traffic on our streets and highways today it is difficult to imagine how it would be possible to handle the dispersal of 20 lanes of vehicular traffic along with the rapid transit in any concentrated, built-up area.

At the direction of the Governors of New York and New Jersey, the Port Authority began preliminary studies in 1925 for the construction of a trans-Hudson bridge connecting upper Manhattan with Fort Lee, New Jersey. The final location of the George Washington Bridge was established on the basis of a thorough survey of existing and prospective traffic conditions. It was found that there had been a considerable population shift to northern Manhattan, the Bronx, and to northern New Jersey. The prospect of the bridge stimulated tremendous activities in the development of the area. Real estate values increased in this area indicating a measure of the economic benefits that would result from the construction of this Hudson River crossing. Work was started on the bridge in 1928 and it was opened to traffic in 1931. At that time only six lanes were placed in operation. However, early in 1947 two additional lanes were completed and opened to traffic making a total now of eight lanes with provision for operating five of the eight in the direction of peak traffic flow.



Fig. 2. New exit ramp under construction (foreground) will connect George Washington Bridge with Henry Hudson Parkway, eliminating present circuitous route and traffic grade crossing.

Continued growth of Hudson River traffic and the need for additional distributor connections have made it necessary for the Port Authority to provide additional ramps and interchanges on both sides of the river. On the New Jersey side, the bridge plaza was widened and expanded to connect with multi-lane arterial State Route 4 and U. S. 46. A further expansion has become necessary with the result that we now have under construction extensive toll plaza and ramps connecting the bridge with the Palisades Interstate Parkway also under construction.

On the New York side, the George Washington Bridge is connected by two tunnels across upper Manhattan with an elaborate interchange as part of the Cross-Bronx Expressway presently under construction by the New York State Department of Public Works and the city. At the present time the Port Authority, Triborough Bridge and Tunnel Authority and New York City, are jointly constructing an additional ramp over Riverside Drive between the Bridge and Henry Hudson Parkway to provide a more direct route for Bridge traffic destined to downtown Manhattan.

Approximately two years ago the Port Authority completed and turned over to the New Jersey Highway Department a new four-lane

viaduct in Jersey City to improve the connection between the Holland Tunnel and the Pulaski Skyway, U. S. 9, a major New Jersey arterial route, and at the same time relieve congestion that had existed on the local Jersey City streets and the original two-way viaduct. This new facility is used for westbound traffic while the older viaduct is used for eastbound traffic into Manhattan. The City of New York has plans for the eventual construction of a crosstown elevated expressway that would connect the Holland Tunnel and the West Side Highway with the Manhattan and Williamsburg Bridges across the East River.

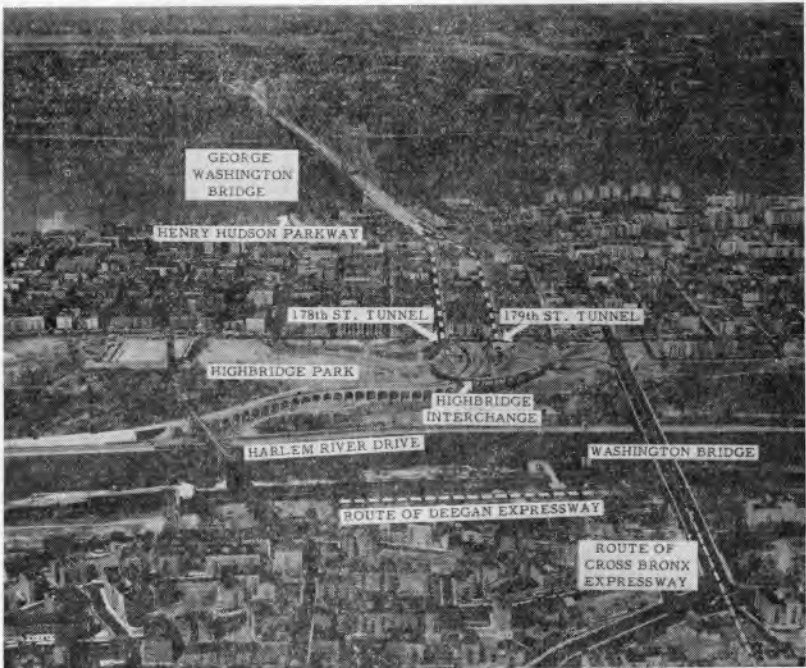


Fig. 3. Aerial view of upper Manhattan in vicinity of George Washington Bridge showing two traffic tunnels provided by Port Authority to connect George Washington Bridge with Highbridge Interchange, Harlem River Drive and Cross-Bronx Expressway.

Through the years, improvements of highway systems in New York and New Jersey and the bridge and tunnel crossings between the two States greatly increased the amount of bus and truck traffic destined to urban centers in the port region. To help relieve the intolerable street congestion created by this heavy burden of buses and trucks, the Port Authority after considerable study and planning began

construction of a bus terminal in mid-Manhattan near the Lincoln Tunnel. This \$24,000,000 structure, completed in December 1950, is a unique combination of a terminal for interstate bus lines and a roof parking area for private cars, all connected by direct ramps to the plaza of the Lincoln Tunnel. Thus, the great bulk of interstate passenger travel by commuter buses between New York and New Jersey, which makes up 85 per cent of the total daily interstate bus movements, is removed from Manhattan streets. There are over 5,000 such bus movements daily accommodating some 130,000 bus passengers. In addition, the roof of the terminal provides approximately 450 spaces for private car parking. Areas beneath the ramps provide parking space for approximately 135 buses in off-peak hours.

The Port Authority embarked on a program of establishing truck freight terminals as early as 1932 with the opening of a Union Railroad Freight Terminal on the west side of Manhattan. It serves as a consolidation point for less-carload rail freight shipments for movement over one or more of the eight trunk line railroads using the terminal. The Port Authority restricts its role to that of the terminal landlord, leasing platform and truck berths to the railroads for their operation through a joint agent responsible to representatives of the eight participating railroads. The upper floors, equipped with truck elevators, provide space for small commercial tenants and the Port Authority central offices.

In 1949 and 1950, the Port Authority completed two more truck facilities—the New York and Newark Union Motor Truck Terminals, designed as union freight stations to provide for the consolidated handling of mixed merchandise (less-than-truckload) freight at substantially lower costs and with a good measure of traffic relief to the city streets. Features of both terminals include a total of 300 recessed or off-street berths for truck loading and unloading, ample platform space for the sorting and consolidation of freight, mechanical conveyor systems to facilitate movement of the freight along the platform, together with a modern communications system and other mechanical freight handling devices. Ample truck parking areas, truck maintenance and repair and fueling facilities are also provided within the terminal site. During the initial period of the New York Union Motor Truck Terminal operation, the Port Authority provided all platform handling services—loading, unloading and transfer, re-coopering and city dispatching. The terminal has been reorganized and last month began terminal operations under arrangements which closely resemble those applying at the Port Authority's Union Railroad Freight Terminal. The Newark Terminal is under lease to the United

States Air Force for the processing of automotive equipment for export under the Mutual Defense Assistance Program. When the Newark Terminal completes its role in the present emergency, it will be made available as a union, consolidated facility for the interchange of over-the-road, less-than-truckload freight.

In carrying out its marine terminal program, the Port Authority in a lease agreement with the City of Newark, N. J., negotiated in 1947, assumed responsibility for the development of Newark's marine terminal, known as Port Newark. Pier sheds with sufficient space within themselves to accommodate over-the-road trucks without interference with cargo handling have already been provided at this terminal. Port Newark's commerce has more than doubled as have the pay-rolls and resulting economic benefits to the region.

After years of study and several proposals made at the request of the City of Hoboken, N. J., the Port Authority completed negotiations October 1, 1952, with Hoboken for a 50-year lease to modernize and operate the Marine Terminal which had been under jurisdiction of the Federal Government since after World War I. Plans call for

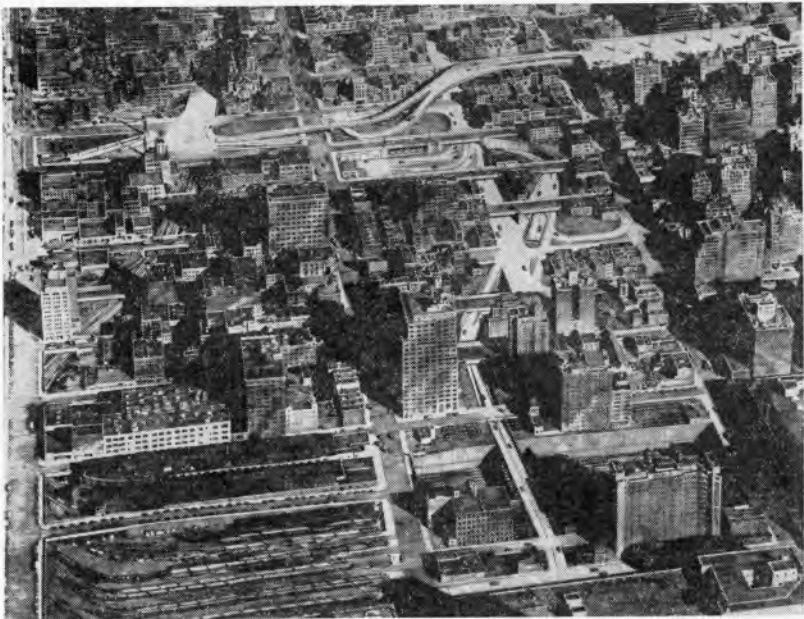


Fig. 4. Artist's conception of new sub-surface approaches to connect the present Lincoln Tunnel and third tube, now under construction, with Manhattan streets. Also shown is Port Authority bus terminal (upper right) with ramp connection to existing tunnel plaza.

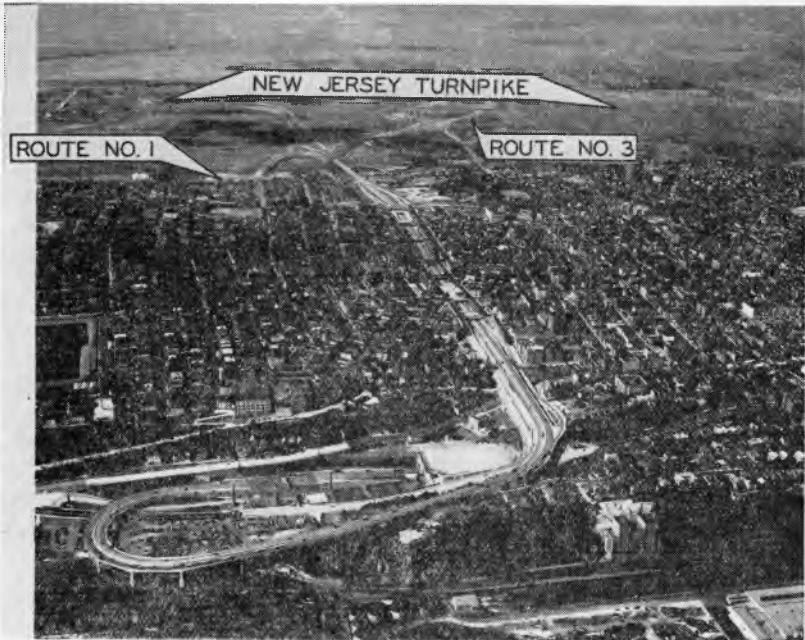


Fig. 5. Limited access connection, built by the Port Authority at a cost of 17 million dollars, between Lincoln Tunnel and New Jersey Turnpike and state routes 1 and 3.

eventual demolition of the deteriorated and obsolete existing narrow piers and construction of modern piers of adequate width to permit easy access for trucks and ample space for loading and unloading of ships' cargo within the piers.

In the Port Authority's study and proposal for development of the municipally owned waterfront and piers of New York City prepared in 1948 at the request of the Mayor, it was found that one of the outstanding problems in connection with this waterfront modernization was and still is—traffic congestion.

The pier system of the New York City waterfront was originally designed to give a maximum frontage on the water for the accommodation of the ships, railroad lighters and carfloats. The older piers were narrow with no provision for large trucks and tractor trailers to load and unload inside the pier shed. Others designed for passenger use have only a narrow gangway for trucks to gain entrance and no space to back in at the inshore end for unloading.

With truck access onto the piers extremely limited, the marginal way or street along the front of the pier is used for parking, loading, and unloading of cargo for the piers as well as for moving traffic. Such

conditions, typical of most of the older port areas, contribute to street congestion and costly traffic delays, and adversely affect the operation of the port.

A marine terminal rapidly becomes obsolete unless it is designed so that it has adequate space on the land side for receipt and delivery of freight and passengers without congestion.

I have reviewed the Port Authority's planning and development of a number of major transportation and terminal projects in the metropolitan Port District to draw a parallel to the interrelationship of the transportation problems and needs (whether by highway, rail, water or air) in any large urban area. The insatiable demand of the American people to go from here to there when they so desire has created a revolution in transportation. Increasing availability and use of private cars and public transit is changing the whole urban pattern. Modern highway and terminal facilities are essential to meet the demands of the motor age in which we now live.

An urban highway system is inefficient without a network of local service roads, major thoroughfares, expressways and parkways and convenient access to off-street terminals. Bridges and tunnels fail to function adequately unless linked properly with arterial streets and highways. Motor vehicle terminals become obsolete if provision for receipt and delivery of goods and passengers causes traffic congestion and hazards to pedestrians.

Extensive metropolitan area traffic studies are necessary to furnish the basis for comprehensive urban transportation planning. Close coordination in these studies and planning between Federal, State and local bodies and other agencies having a primary responsibility in transportation, is vitally necessary if the end result is to be a comprehensive overall transportation system geared to the requirements of the urban area.