

Metropolitan Growth and Metropolitan Travel Patterns

FRANK W. HERRING, Deputy Director for Comprehensive Planning, The Port of New York Authority

This paper describes briefly the nature of growth of the New York metropolitan region, particularly the dispersing tendencies and the forces behind them, and traces the changing patterns of travel behavior to these forces. The paper emphasizes the need to study travel and traffic data in considerable detail to avoid being misled by aggregate statistics. The general conclusions are (a) Central Business District employment is relatively stable, while growth in employment is taking place in outlying areas, (b) population growth is taking place in outlying areas and at low land-use density, (c) growth in journey-to-work travel is no longer focused on the Central Business District, but rather is characterized by inter-suburban travel, reverse commuting and the like, and (d) changes in traffic behavior during recent years are primarily responses to metropolitan growth patterns and are not to be construed as irrational or perverse behavior. Although the paper deals with travel phenomena in the New York metropolitan area, the data presented are in terms of detailed observations of trans-Hudson travel.

●THE preliminary returns from the 1960 census of population have thrown the spotlight of national publicity on the drastic reshaping of the American metropolis. One after another, the reports come in that the central city has lost population, whereas the surrounding areas have grown at a striking rate. There are few exceptions among the older cities.

Much the same phenomenon can be observed in the changing locational patterns of business and industry. Statistics on employment also show strong increases in newly developed areas and virtual stability or even declines in the older, traditional employment centers.

The urban fabric is thinning out, all over the United States. Although the rate of increase of urban population has been striking, the rate of growth of urban area is greater still.

Changes in travel behavior observed during the years since the end of the war reflect these changes perfectly. The purpose of this paper is to demonstrate their close relationship, at least for the metropolitan area of New York and northern New Jersey.

Marking the decade's changes on the basis of how many people live within a city's corporate limits can be somewhat misleading. Some central cities, like Boston and Newark, are tightly confined within relatively restricted boundaries that were set many decades ago and have been filled up for years. Others, like Los Angeles, have city limits set far out and include within them a larger amount of area as yet unsettled.

A closer examination of population changes within the New York metropolitan region reveals losses in the older and more closely settled portions, whether inside the central city or outside it. Thus Elizabeth, Perth Amboy, Passaic, and Montclair, as well as Manhattan, Brooklyn, Bronx, Newark and Jersey City have lost population. On the other hand, Queens County, within the New York City municipal jurisdiction, has

grown. The metropolitan growth pattern seems to be one of population attrition in the older, more closely settled areas and the extension of population into hitherto open areas not encumbered by old street patterns and obsolescent facilities, where there is plenty of room to spread out.

Table 1 presents the population figures for the 22 counties comprising the metropolitan area as defined by the New York Regional Plan Association. It is to be noted that the counties of New York (Manhattan), Kings (Brooklyn), Bronx, Queens and Richmond are the five boroughs of New York City; that Hudson County in New Jersey contains the old Cities of Jersey City, Bayonne, Hoboken, and Weehawken; and that Essex County, also in New Jersey, contains the City of Newark as well as a number of smaller suburban communities.

A more detailed picture of where the population losses have occurred is shown in Figure 1. The limited data now available on areas smaller than municipalities support the view that it is the older areas that have lost population.

Metropolitan employment has also been growing rapidly in the outlying, newer areas. Unfortunately, statistics are not available to permit an analysis of the trends of employment within each of the New York City boroughs, but estimates have been made for the city as a whole and they suggest approximate stability. Table 2 presents the Regional Plan Association's estimates made in 1956 of regional employment, county by county, for 1948 and 1955 (1).

TABLE 1
POPULATION OF NEW YORK METROPOLITAN REGION
(In Thousands)

Area	1950	1960	Changes 1950 to 1960
Entire region	13,951	16,114	+2,163
Central-core counties			
Kings (Brooklyn)	2,738	2,627	- 111
New York (Manhattan)	1,960	1,698	- 262
Queens	1,551	1,810	+ 259
Bronx	1,451	1,425	- 26
Hudson	648	607	- 41
Inner-ring counties			
Nassau	673	1,300	+ 627
Essex	906	920	+ 14
Westchester	626	809	+ 183
Bergen	539	779	+ 240
Union	398	503	+ 105
Passaic	337	404	+ 67
Richmond (Staten Island)	192	222	+ 30
Outer-ring counties			
Fairfield	504	649	+ 145
Suffolk	276	667	+ 391
Middlesex	265	432	+ 167
Monmouth	225	333	+ 108
Morris	165	260	+ 95
Orange	152	182	+ 30
Dutchess	137	175	+ 38
Somerset	99	143	+ 44
Rockland	89	137	+ 48
Putnam	20	32	+ 12

AREAS WHICH LOST POPULATION BETWEEN 1950 - 1960

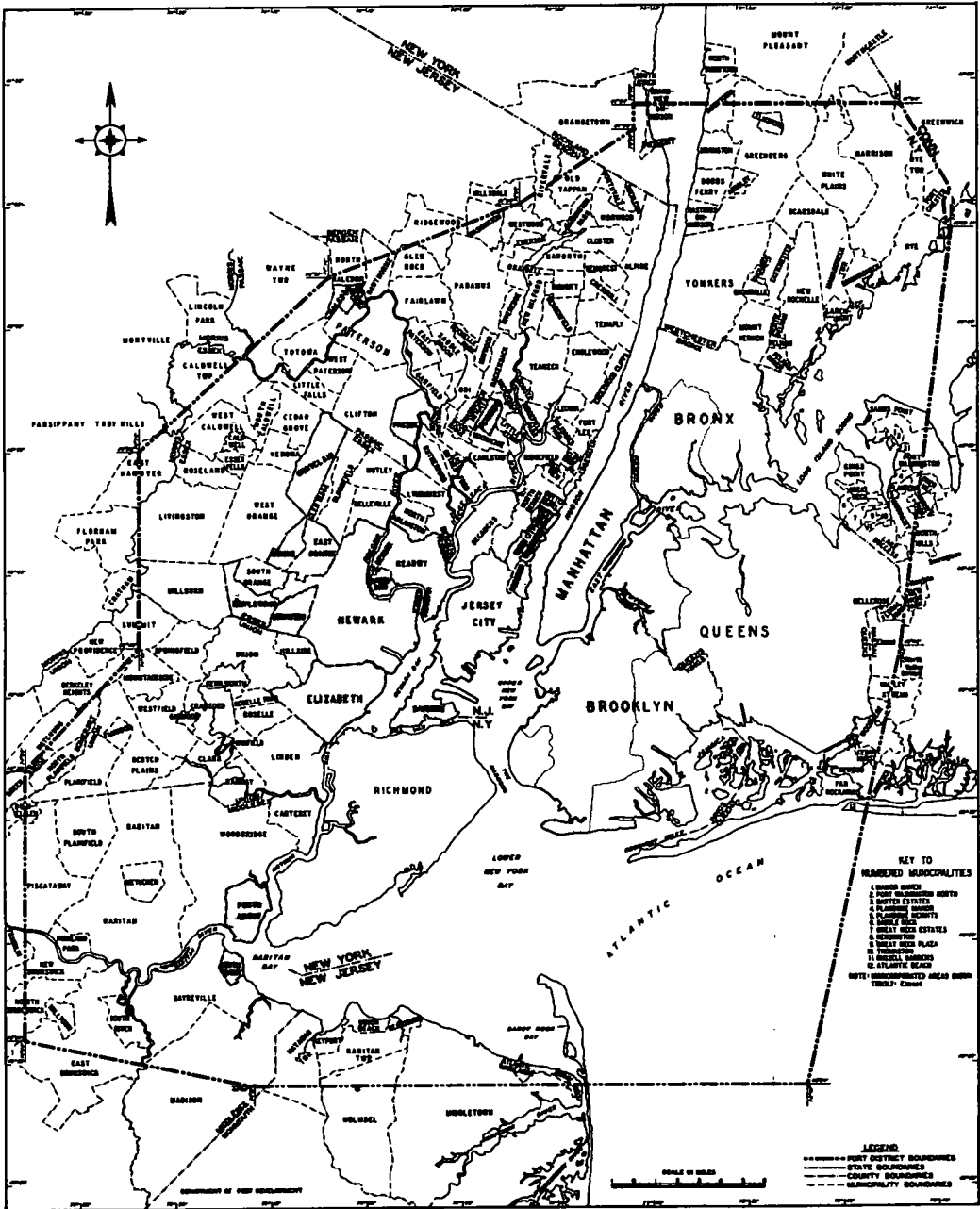


Figure 1. Municipalities within the Port of New York Authority District.

Decentralizing influences have been operative for a long while; they are firmly based on technological advance. Only recently have they come into full flower and brought attention to problems considered new.

When the energy of falling water was the principal source of industrial power, mill sites were limited in number and while the transmission of power had to rely on steel shafting, there was little choice as to where the machinery was to be erected. This

TABLE 2
EMPLOYMENT IN THE NEW YORK
METROPOLITAN REGION
(In Thousands)

Area	1948	1955
Entire region	5,910	6,273
New York City	3,871	3,839
Hudson	267	247
Nassau	147	295
Essex	375	366
Westchester	189	243
Bergen	136	199
Union	143	178
Passaic	144	149
Fairfield	213	235
Suffolk	70	109
Middlesex	99	115
Monmouth	60	70
Morris	41	53
Orange	47	51
Dutchess-Putnam	54	63
Somerset	33	33
Rockland	21	28

restraint on the choice of location was characteristic of all industrial activity about a century ago. Steam power lifted these severe restrictions. Power could be generated at any location, subject only to the economic limitations of fuel transport and to the adequacy of condensing water. Cities could expand in industrial activity and in geographic extent. When electric power came along, together with central-station generation, the transformer and high-voltage transmission, most of the remaining limitations on industry's locational choices were removed. Power-using activities could be sited almost anywhere, at least as far as power considerations were concerned.

When face-to-face contact, or the written document carried by private or public messenger, were the only means of intercommunication, city men could not safely afford to be far apart. Urban activity had to take place within a restricted area, and the amount of activity that a single community could carry on had severe limitations. Spatial extent and city form were limited by what communication could accomplish. The telephone, teletypewriter, radio and tele-

vision have changed that. Locational choices for business and industry again have been greatly extended.

The same story can be told of the influence of advancing transport technology. Each step along the way of providing more mobility to the individual has widened the choice of location, of residence, of work place, of leisure-time activity. The steam railroad, the electric streetcar, the motor vehicle, the airplane and the helicopter have extended the range within which cooperative activity can take place. Not only has the feasible journey-to-work radius been greatly extended, but intercommunity relationships have been strengthened, and cooperative activity now can encompass a great region containing many individual urban communities. The railroads freed industry from its need to locate at tidewater or on a navigable river or canal, and permitted inland sites to be used productively. The motor truck has opened up additional areas and industry can now use sites not formerly accessible for the movement of goods.

As advances in the technology of power, communication and transportation have permitted dispersal of industrial establishments, technical advances in production methods have caused manufacturing to seek new sites. More extensive mechanization, heavier machinery, and horizontal assembly methods have called for one-story, ground-level industrial architecture, with its great appetite for acreage. Suitable sites at tolerable costs can be found in the urban outskirts but not so easily in the older, closely developed areas. Indeed, in some instances the horizontal dimensions alone preclude accommodation within the traditional city street pattern. In others, the time and expense involved in assembling the land required from a great number of owners of small parcels has swung the balance of choice toward locations in areas not so encumbered.

Also, the desire of the growing family for living accommodations with plenty of elbow room, encouraged by national housing policy conducive to home ownership, has led to a booming period of single-family, suburban housing development, occupying land extensively rather than intensively.

Retailing also has shown a tendency to follow the new metropolitan population to the suburbs. With department stores, specialty shops and professional offices, suburban shopping centers have become much more than neighborhood facilities for convenience

shopping; they are evolving into subregional commercial areas. The goods-handling aspects of wholesaling have also sought outlying locations, following the big industrial customers, and splitting off from the transaction aspects in the process.

In brief, there has been a 100-yr history of expansion outward, of growth in urban area outpacing growth in urban population, moderately at first but with a rapidly widening lead during recent years. And there is virtually no evidence of any reversal of the trend toward rapid territorial expansion of the metropolitan mass.

Profound changes have also taken place in the pattern of metropolitan travel, reflecting the changes in urban form and structure.

Although the daily tidal flow of workers from peripheral home to central work place in the morning and back in the evening is still of commanding magnitude, it is not growing in proportion to metropolitan population, or employment, or economic activity. Indeed, in many places it is not growing at all. There is evidence in the New York area that travel into the Central Business District (CBD)—Manhattan south of Central Park—is declining slightly.

Every eight years since 1932 the Regional Plan Association, with the cooperation of state, municipal and other private agencies has made surveys of the amount of travel into that area, from all points of the compass, by all modes of transportation. The Association's report on the 1956 survey (2) shows that the total number of travelers into the CBD between the hours of 7 and 10 a. m. had declined by nearly 9 percent since 1948. Of course, the number traveling during those hours cannot be equated completely with the number of CBD workers and there are undoubtedly other factors of change to be explored, but the magnitude of the change, 146,000, seems large enough to warrant the inference that there has been some decline in the number employed in the CBD. Moreover, the 24-hr total of hub-bound travelers declined somewhat more strongly, by 375,000 in the 8-yr interval, or some 10.2 percent of the 1948 level.

It is to be observed at this point that it was largely to serve the hub-bound travel that the common-carrier transportation lines were established. They still command the dominant position in accommodating this component of the New York metropolitan region's daily travel, accounting for 87.7 percent of the rush-hour traffic into the CBD.

Although the travel generated by the metropolitan center shows these signs of weakness, other components of urban travel are mounting steadily. "Reverse" commuting and travel between outlying points on weekdays and Saturday, Sunday and holiday travel all show significant growth trends. Together, they more than compensate for the weakness of central core generation.

These growing components of metropolitan travel are not well served by common-carrier transportation. The automobile has clearly captured the leisure-time travel, because of its convenience, its economy for family travel and the wide scatter of leisure-time destinations. Weekday travel between outlying points follows a great multitude of paths, rather than channeling into a few, and route densities are seldom great enough to warrant public transportation. Reverse commuting, from central home to outlying work place, presents scheduling difficulties greater than those involved in serving travelers who want to arrive at a common destination at the conventional work-starting time. Moreover, many of the new suburban employment centers are not on the common-carrier routes.

In consequence of these divergent trends, the relative use of common-carrier transportation has declined and that of the automobile has increased. The shift is a direct result of the change in metropolitan form.

The travel that takes place across the Hudson River is an important sample of the region's total travel, and there is a rich body of data describing it in detail for some 35 years. The changes that have taken place in travel behavior during a recent 10-yr period illustrate the effects of the changes that have already occurred in the region's economic geography.

In the 10-yr period, 1948 to 1958, the total number of person-trips across the Hudson River, by all modes of transportation, including long-haul travel, changed very little, from 266.6 million to 276.8 million, an increase of but 10.2 million, or 3.8 percent, while regional population was increasing at the far faster rate of 14 percent and employment at 9 percent. The number of trans-Hudson trips made by automobile

increased greatly, whereas the number made by common carrier—by railroad, ferry and bus—declined correspondingly. The magnitudes of the changes are shown in Figure 2.

These general facts are widely known and have tempted some to the conclusion that the common-carrier loss has been caused by a massive diversion of New Jersey commuters from the railroads to automobiles, a diversion which has been brought about by the encouragement given to automobile travel by the improvements in vehicular facilities for crossing the Hudson River. Although this is a plausible inference from data as gross as those presented in Figure 2, it fails as a satisfactory explanation when the data are analyzed in detail.

Gross statistics can conceal more than they reveal.

The total trans-Hudson travel behavior is a complex mixture of trips having different purposes, different destinations, and different origins, trips made on different days of the week and at different times of the day, and trips made by residents of different parts of the region. It cannot be assumed that the only thing that has changed in recent years is the mode of New Jersey commuter travel. If what has occurred is to be understood, the changes that have taken place in other trip characteristics must be explored also. When trans-Hudson travel volumes are broken down into appropriate components and each component is studied separately, it is found that there have been over-all increases in those categories of travel which the automobile has dominated for a long time, and which are not and probably cannot be adequately served by common carrier. Conversely, there have been over-all declines in those categories which have been and still are the mainstays of the public transportation systems.

Moreover, the railroad passenger traffic volumes shown in Figure 2 are inclusive of long-haul passengers and an unknown, but probably substantial, part of the railroad loss reflects diversions of inter-regional traffic to air travel and long-haul buses.

In the first place, the over-all figures conceal the highly significant differences between what happened to work day travel and to leisure-time travel. Although the total annual trans-Hudson travel volume increased by 10.2 million trips between 1948 and 1958, the number of trips which took place on weekdays rose by only 1.1 million. Trips on Saturdays, Sundays and Holidays, on the other hand, rose by 9.1 million, about 90 percent of the total rise. The gains and losses of the different modes of transportation within the leisure-time travel category are shown in Figure 3.

The rise in automobile travel is striking but not surprising, for private transportation has clearly captured the lead position in intra-regional leisure-time travel. There are many reasons for this, some of which have already been mentioned. Much of the weekend and holiday travel is family travel, for which the automobile offers superior convenience and greater economy than do the common carriers. The automobile permits the traveler to be in command of the times of departure and return, the inclusion of the children and even of their pets adds nothing to the transportation cost, and baggage and miscellaneous paraphernalia create no serious problems. Destinations are widely scattered and there is a correspondingly wide dispersal of

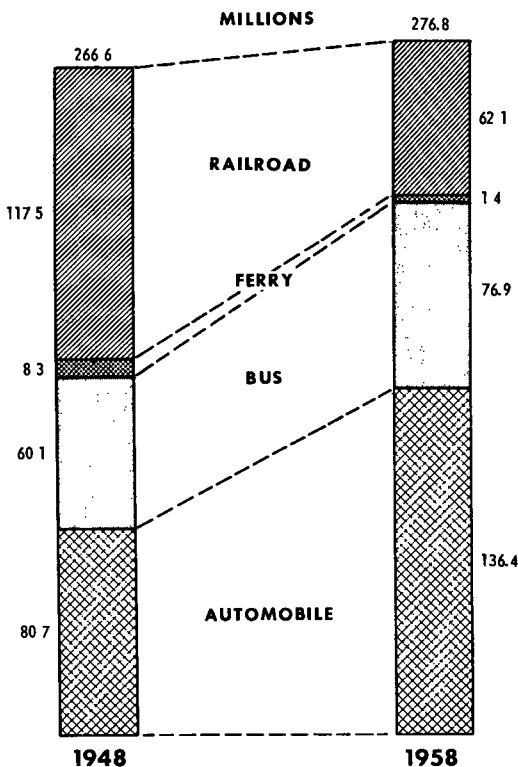


Figure 2. Total annual trans-Hudson trips.

travel paths, a situation not well suited to common-carrier service. Indeed, a large proportion of this component of regional travel cannot be served satisfactorily at all by public transportation.

It must be recognized that much of the 1958 automobile travel in the weekend and holiday category was travel that would not have been undertaken at all if the automobile had not been available, and in that sense was not a diversion from any other form of travel. No doubt some of the 1948 common-carrier travel had been diverted to the automobile by 1958, but the automobile gain is far greater than the common-carrier loss. In any event, commuter traffic is not being considered at all.

Examination of the make-up of weekday trans-Hudson travel reveals that the increase of 1.1 million between 1948 and 1958 was the result of two divergent trends (Fig. 4). There was an increase of 10.1 million in the number of New York residents crossing the river on weekdays and a decrease of 9.0 million New Jersey residents. (In the discussion that follows, in the interest of simplicity of phrasing, the term "New Jersey residents" is used even though in strict accuracy the term should be "residents of areas west of the Hudson River." It is not known where the trans-Hudson travelers really live, but it is inferred that they live west of the Hudson if they travel eastbound during the morning rush hours or if they travel in automobiles bearing license plates of New Jersey or states to the west of the Hudson. "New Jersey residents," therefore, include all long-haul rail and bus travelers residing west of the Hudson. Rockland County residents traveling by railroad or bus are counted as "New Jersey residents.")

There is a clear reflection of an increase in reverse commuting, New Yorkers working in New Jersey establishments. As will be shown later, it also reflects a decline in the number of New Jersey residents working in New York's CBD.

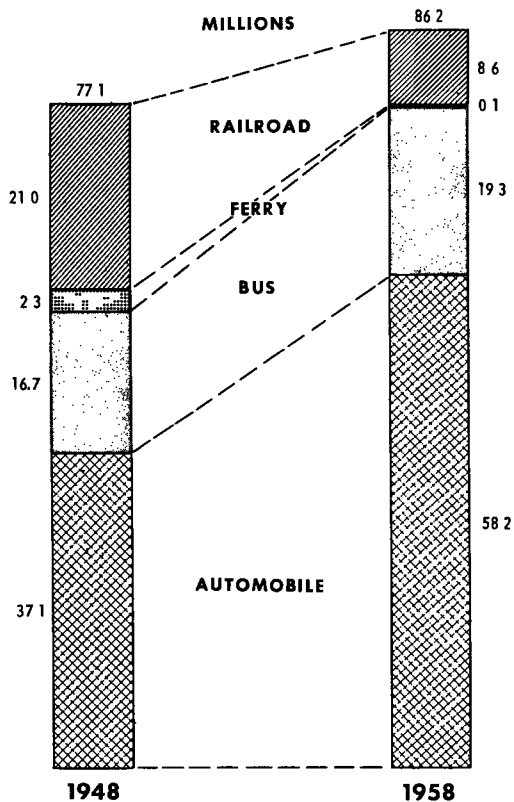


Figure 3. Trips on Saturdays, Sundays and holidays.

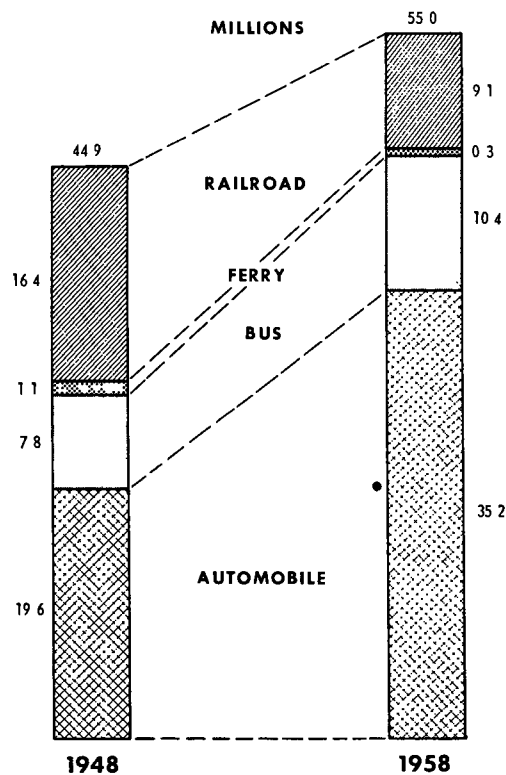


Figure 4. Trips on weekdays, by New York residents.

Despite the rise of 10.1 million, the railroads and ferries lost out in the business of carrying New York residents across the River on weekdays, and the use of automobiles and buses increased. Again, however, the automobile gain was far greater than the common-carrier loss. Much of the rise in automobile use must be attributed to travel that did not take place at all in 1948.

Automobile strength in this travel component is related to the dispersal of New Jersey job sites and of New York worker residences. New Jersey destinations span 180 degrees of the compass and, except for the Bayonne peninsula, travel to them from New York is not inexorably channelized into narrow sectors analogous to Long Island or the Bronx-Westchester peninsula. The weakening of rail travel between 1948 and 1958 may be in response to shifts in the foci of employment from the Jersey City, Hoboken and Newark core areas to more scattered points in outlying New Jersey counties, or to changes in New York residence patterns of New Jersey workers, or to the relative costs of rail travel and car-pool travel, or to a combination of these factors.

The fact remains that this is a regional travel component on which highway travel, primarily automobile travel, has a strong hold, and it is a growing rather than a declining element.

It was noted previously that the number of New Jersey residents crossing the Hudson River on weekdays had declined by 9.0 million between 1948 and 1958. Even this figure conceals the fact that those destined for Manhattan's CBD declined far more drastically, by 17.8 million. The number going to points outside the CBD, to upper Manhattan and beyond to the north, or to Brooklyn and Queens and beyond to the east, actually rose by 8.8 million.

This non-CBD-oriented travel is another component of the total regional travel which relied heavily on the automobile even in 1948 as is shown by Figure 5. Again, the

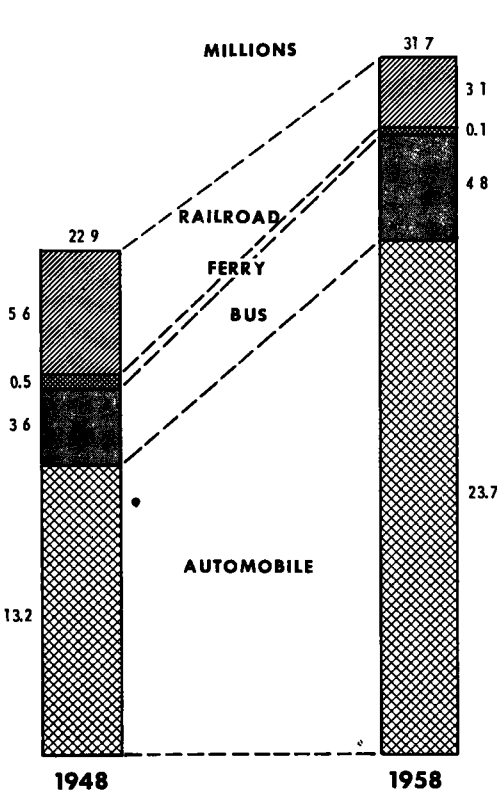


Figure 5. Trips on weekdays, New Jersey residents, to and from non-CBD points.

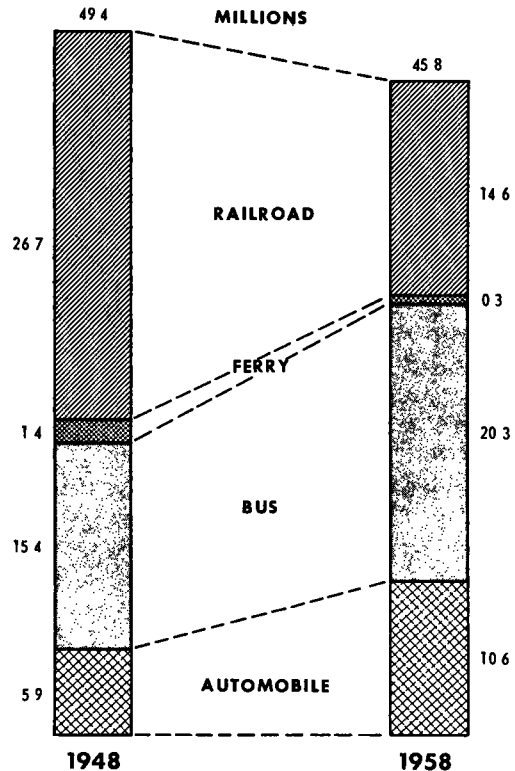


Figure 6. Trips on weekdays, New Jersey residents, to and from CBD, during off hours.

increase in automobile use in the period under scrutiny far outran the drop in common-carrier travel, and most of the automobile increase must be attributed to new travel rather than to diversion.

The travel in this component is in many respects the converse of the travel of New Yorkers to New Jersey destinations. It includes the journey-to-work travel of many New Jersey residents employed in establishments located outside Manhattan's CBD. Its increase is another consequence of the decentralization of commerce and industry that has been taking place.

As previously stated, 17.8 million fewer New Jersey residents traveled on weekdays to Manhattan's CBD in 1958 than in 1948. This is the travel component that the New Jersey commuter railroads were laid out to serve. The drop during the non-rush hours (10 a. m. to 4 p. m. and 7 p. m. to 10 a. m.) was 3.6 million (Fig. 6), a significant, almost 8 percent, decline from the 1948 level, but was far less drastic than the 14.2 million, about 20 percent, drop during the rush hours (7 a. m. to 10 a. m. and 4 p. m. to 7 p. m.) (Fig. 7).

The New Jersey railroads and the Hudson River ferries took the brunt of the losses in both rush-hour and off-hour travel. Automobile travel and bus travel rose. The gain in automobile use, however, and even the gain in automobile and bus travel together, was far less than the railroad and ferry losses. At least 24.7 million of the railroads' loss of 33.2 million passengers in this category was independent of automobile gains and at least 14.3 million was independent of the aggregate rise of both automobiles and buses. After all, there was simply a large decline in the number of daily travelers to Manhattan's CBD. Also, in all probability, the railroads' losses of long-haul travel are heavily concentrated in this weekday, CBD-generated travel component.

When references are made to "diversion" of travel from one form of transportation to another over a period of 10 years, it is important to bear in mind the fact that some of the 1948 travelers were no longer traveling at all 10 years later, and some of those traveling in 1958 had been too young to be traveling across the Hudson in 1948. Also, of those who traveled in both years, many had changed residence location, or job location, or both. The rise in bus use, for example, may be related to a northeasterly shift of Manhattan's employment foci that has taken place since the war. Other data (3) show that the majority of the passengers arriving at the Port Authority's bus terminal, in the midtown area, during the morning are destined for midtown points, a large share of them east of Fifth Avenue. The bus terminal is a more convenient Manhattan arrival point for these commuters than are the more southerly Manhattan terminals of most of the commuting railroads.

After all the shifts and losses had taken place, the common carriers still occupied a strongly dominant position in serving the New Jersey traveler to Manhattan's CBD on weekdays (Table 3).

Although the term "commuter" is infrequently defined, it usually connotes

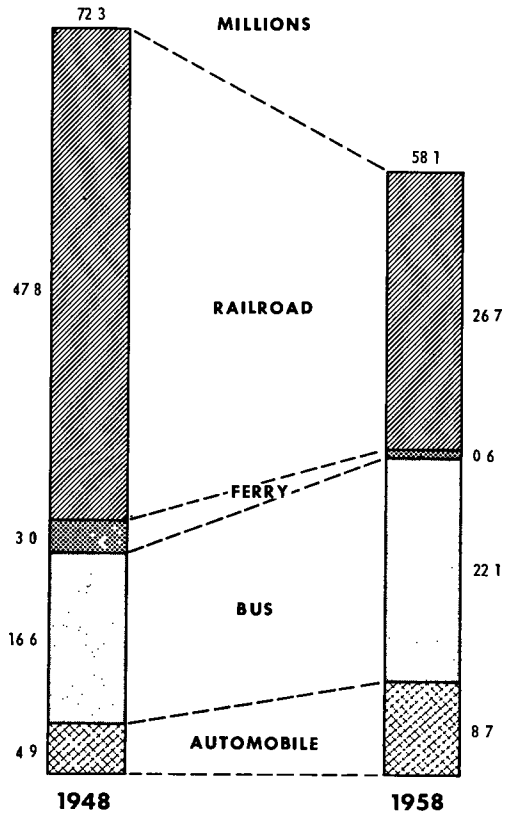


Figure 7. Trips on weekdays, New Jersey residents, to and from CBD, during rush hours.

the morning rush-hour traveler to the CBD. If that definition is accepted for the purposes of this discussion, it is plain that a great preponderance of New Jersey commuters, 85 percent of them, rely on mass transportation. But Manhattan's CBD is extensive and its various sub-areas show different degrees of reliance on the different forms of mass transportation. In southernmost Manhattan, which the New Jersey commuting railroads were originally designed to serve, and which they still serve with great convenience, the dominant position of the commuting railroads is undisputed. For the northernmost portion of the CBD, from 34th Street to 59th Street, the bus, because of midtown terminal location, has more than one-half of the commuter business. In the area between, where only the Pennsylvania Railroad has an advantage, and that only for west-side destinations, the two forms of mass transportation are in competition.

Changes in the use of trans-Hudson transportation facilities have been a consequence of changes in the locations of population and of industry and commerce, both inside and outside the central core of the metropolis. New Jersey job opportunities have been increasing faster than New Jersey population, employment in all the non-core areas has been increasing faster than population. Manhattan's CBD employment has remained relatively stationary as to total magnitude but there has been a northeasterly shift in its geographic distribution. Population increase has been largely confined to the outskirts, and it has occupied new residential areas developed at relatively low density. Many suburban residents have found suburban jobs. Mass transportation is performing much the same task it has always performed, carrying workers to and from the metropolitan area's central core, but that task has become a proportionately smaller share of the region's total transportation task. The other travel components, widely dispersed over both space and time, are less well served by mass transportation, and as they are of growing magnitudes, individual transportation is becoming of growing importance.

TABLE 3
1958 TRANS-HUDSON TRAVELERS

	TOTAL TRAVELERS (MILLIONS)	PER CENT OF TOTAL		
		BY AUTO	BY BUS	BY RAIL (PLUS FERRY PEDESTRIANS)
ANNUAL TOTAL	276.8	49.3	27.8	22.9
SATURDAYS, SUNDAYS AND HOLIDAYS	86.2	67.5	22.4	10.1
WEEK DAYS	190.6	41.0	30.2	28.8
NEW YORK RESIDENTS	55.0	64.0	18.9	17.1
NEW JERSEY RESIDENTS	135.6	31.7	34.8	33.5
TO POINTS OTHER THAN CBD	31.7	74.8	15.1	10.1
TO CBD	103.9	18.6	40.8	40.6
DURING OFF HOURS	45.8	23.1	44.3	32.6
DURING RUSH HOURS	58.1	15.0	38.0	47.0
TO UPPER CBD (34TH - 59TH)	24.7	15.4	57.5	27.1
TO MIDDLE CBD (HOUSTON - 34TH)	13.5	20.7	34.1	45.2
TO LOWER CBD (BATTERY - HOUSTON)	19.9	10.6	16.6	72.8

Unfortunately, a detailed analysis of this sort cannot be made of the travel across the East River, or across 59th Street, the eastern and northern limits of the CBD. The detailed, necessary data do not exist. Travel across both boundaries is dominated by the city subways and bus lines and the New York City Transit Authority has no occasion for making routine counts of their passengers en route. There are data on railroad passengers into Grand Central Station from the north, and into Pennsylvania Station from the east, and vehicular flow data are available for the toll bridges and tunnels, but the free bridges and Manhattan's north-south avenues are blind spots.

Trans-Hudson travel has some distinctive features of its own, which makes it not wholly like the travel across the East River or across the Harlem River or across the Bronx-Westchester or the Queens-Nassau borders. All sections of the region are not growing as exact duplicates of each other, and the changes in Manhattan's CBD have different impacts on the linkages with different parts of the region. Nevertheless, the main features of trans-Hudson travel changes are consistent with the findings of the Regional Plan Association's study of the changes that took place between 1948 and 1956 in travel into Manhattan's CBD, the study referred to earlier. There was a drop in the number of persons entering the CBD on a weekday from all sectors, except from the northeast. The fall-off in the numbers coming from the north, across 60th Street, and from the east, across the East River, was somewhat greater proportionately than the drop in the number crossing the Hudson. All forms of mass transportation suffered losses. Automobile travel gained. Even after their losses, however, the public transportation systems in 1956 still accounted for 87.7 percent of those entering the CBD during the rush hours.

Important conclusions can be drawn from detailed analysis of recent changes in travel behavior.

First, the decline in use of mass transportation facilities and the rise in the use of the automobile are parallel phenomena rather than cause and effect. Mass transportation patronage has not declined because automobile use has increased. The decline of one and the increase of the other result from a common cause, the changes in form and structure of the metropolis. These changes, in turn, are linked to advancing technology of power, production, communication and transportation.

Second, common carrier transportation and private transportation are not properly to be considered as simple alternatives. Each has its appropriate role to play in serving the travel requirements of the metropolis. For travel volumes that are concentrated, in both space and time, like rush-hour travel to the CBD, public transportation serves best and has a natural dominance. For travel that is dispersed, either over a multitude of paths or over many hours of the day, private transportation is the principal mode. For most trips in this category the traveler has no other practicable choice.

Just as the travel trends of the recent past have been the consequences of the evolving metropolitan configuration, the transportation tasks of the future will be determined by the evolving form and structure of the Region. If public policy is to intervene it must find appropriate ways to influence the metropolitan growth pattern.

Decentralization does not need to become sheer scatter. If the future suburban landscape is to be peppered with homes and factories and warehouses and stores without any strong spatial organization, with no concentrations of work places or residences, it can be expected that there will be continuing decline in the use of mass transportation, for there will be no strong generating points of either origin or destination, and travel routes will be so thin that individual transportation will be the only kind practicable. If new work sites should be clustered, however, there would be the possibility that at least a few routes would build up enough traffic density, from residence area to employment area, to warrant the establishment of bus service. Employment clusters may have to be large enough to account for 5,000 to 10,000 workers, which means industrial concentration instead of scattered factories, to make bus transportation practicable for the journey to work. If residential areas are also more distinct, if they form clear clusters of homes, and if each cluster accommodates a large enough population in an area that is not too extensive, the opportunities for mass travel will be further increased.

Perhaps such an ordering of the manner in which the newly urbanized land is to be used can be brought about by the use of the tools now available to the planners. Perhaps new tools for land-use control will have to be devised. Perhaps new authority will have to be granted to planning bodies to permit them to be effective in such a task. The fact is that there is little experience today, and not even much theoretical doctrine, to guide planning bodies in their endeavors.

The transportation facilities that will be built during the coming decade, particularly the interstate expressways, will themselves exert a powerful influence on metropolitan growth patterns. Interchange locations will tend to identify the areas in which new development can be expected. Expressway design to facilitate the operation of buses can encourage mass transportation. Although understanding of the precise effects of new highways on land development is less than desired, there is no doubt that highway planning can be used as a tool in guiding metropolitan growth. It is imperative that the highway planners and the land-use planners learn more about how the tool can be used, and that they collaborate in using it to the maximum of its potentialities.

REFERENCES

1. Regional Plan Association, "People, Jobs and Land, 1955-1975." Bull. 87 (June 1957).
2. Regional Plan Association, "Hub-Bound Travel." Bull. 91.
3. Metropolitan Rapid Transit Survey, "Deleuw Report."