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Edwin H. Folk, Jr.

June 4, 1954

RAILROAD PROBLEMS IN URBAN PLANNING

A THESIS

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the Faculty of the Graduate Division

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Master of City Planning

By

Edwin H. Folk, Jr.

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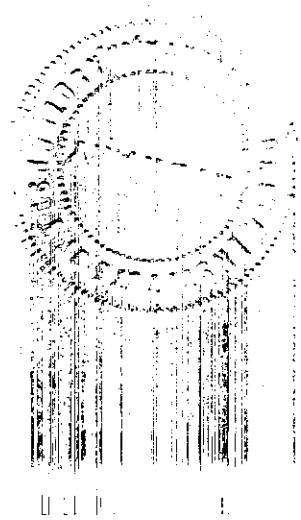

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Edwin H. Folk, Jr.

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INTRODUCTION

> All too little consideration has been given by urban planners to the problem of railroad transportation within our cities. Too frequently the present facilities have been accepted as fixed and community plans have been adapted to them. In the future it is to be hoped that a more comprehensive attitude may be taken by the authorities most directly responsible for the long-range development of cities.[1]

One of the most critical problems facing modern urban planners is the provision of an adequate transportation system for the future city. The very existence of the city depends upon its ability to offer rapid, cheap, and efficient interchange of goods and provide means of moving people to and from their work. But planners have sometimes neglected the railroads in planning transportation systems and have devoted their time to the development of expressways, major street systems, trucking terminals, transit and parking plans, waterfront developments, airport and heliport proposals. Yet the railways remain the basic freight carrier in the country, and, in some cities, are important carriers of long distance and commuter passenger traffic. A planning program which neglects the railroads cannot be considered comprehensive because it does not deal with an important user of urban land and also will not recognize the effects of the railroads upon the physical and economic life of the city.

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[1] Ernest W. Williams, "Railroad Transportation in Urban Development," Report of the Urban Planning Conferences under the Auspices of Johns Hopkins University, Baltimore, The John Hopkins Press, 1944, p. 44.

A lack of understanding of the railroads and their problems may have discouraged some planners who might otherwise have wished to prepare railroad plans. As railroads are privately-owned businesses operating over their own rights-of-way, planners usually have little control over their actions, and the railroads are usually prohibited from receiving aid from public works programs in the construction of private facilities. Rail lines and facilities represent a tremendous outlay of capital[2] and too often the extent of this investment has led planners to believe that the urban rail pattern is "fixed" and that little can be done to change it. The tremendous technological advances in transportation may have led some to believe that the railroads will soon become obsolete and that long-range plans for improving urban rail patterns and operations are only a waste of money which might be better used in other studies.

The purpose of this study is to present a survey of those aspects of rail transportation which might be of value to the planner and suggest guides which might be followed in developing railroad planning programs. To do this, the following problems will be considered:

1. What is the probable future role of the railroad industry in the American transportation picture?

2. What are the elements of the urban rail pattern and what

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[2] Estimated at about $23 billion by the Interstate Commerce Commission and as high as about $29 billion by the Association of American Railroads.

changes can be foreseen in the physical nature and operation of railways?

3. Which methods have been used by planners in the past in studying and planning urban rail patterns?

4. How can the planner evolve a program of preparing railroad plans which have some chance of producing desirable results?

As the body of planning literature and experience in dealing with rail transportation is small, this study cannot pretend to answer all questions involved in railroad planning and it cannot deal with every aspect of urban rail systems in detail. Rather this study is intended to serve as a source of suggestions to planners attempting to evolve their own methods of meeting local rail planning problems. Some of the conclusions of this study are based upon conjecture rather than experience since many of the theories of railroad planning are still untested in practice. This thesis is presented in the hope that it will serve as a basis for further research and that it may offer suggestions and warnings to those who attempt to prepare railroad studies and plans.

CHAPTER I

RAILROADS AND THE CITY

The Railroads as Transportation

Railroads have long been the most important part of the American transportation system. (See Fig. 1). While other forms of transport have developed greatly in recent years and have succeeded in diverting much of the rail freight and passenger business, the railroads still offer the most comprehensive system of providing freight service, and despite the inroads of their competition, every indication is that rails will continue to carry the bulk of heavy industrial goods and long-distance freight traffic.

The railroad is a true common carrier. "It is the only nation-wide system of transportation which holds itself out to move all types of freight between any points to which service is maintained." [1] Many trucking companies serve as common carriers as do the airlines, pipelines, and some barge lines, but the bulk of truck and waterway traffic is handled by contract carriers or by private carriers hauling their own products and raw materials. Almost without exception the railroads

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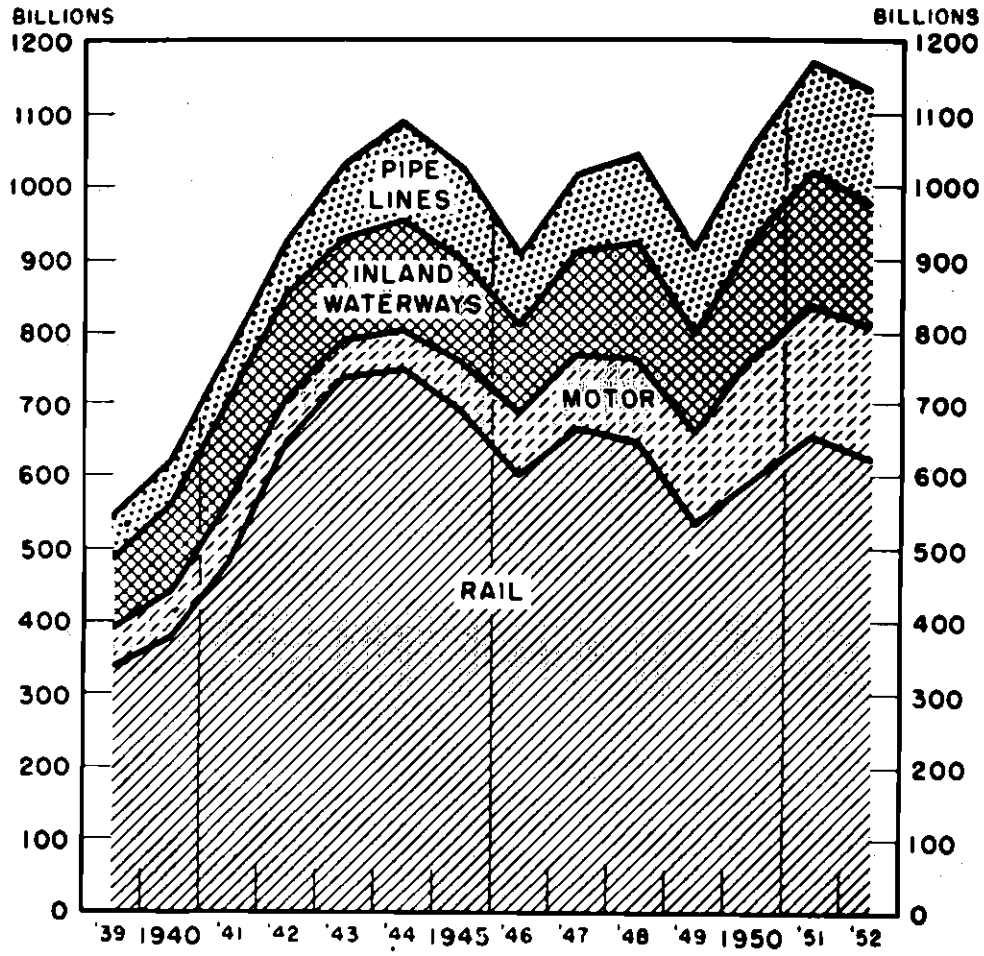
[1] Williams, op. cit., p. 38.



Air was 12 million (0.002 percent) in 1939 and 414 million (0.037 percent) in 1952.

April 5, 1954 RAILWAY AGE 16

Fig. 1

Intercity Ton-Miles by Carriers--1939-1952

(From statistics developed by the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission.)

serve as common carriers handling any type of goods at stated rates.

Railroad Characteristics

Economic advantages.--Transportation is closely tied to the general business activity of the country. Today transportation volumes have reached an all-time high and every indication is that transport systems will continue to expand with the growing economy. But the various forms of transportation will not develop to the same extent. The railroads, in particular, seem to have reached their peak of physical expansion and are today receding in relative importance as other types of carriers develop. The capital expense of constructing new lines and facilities and changes in the economy inhibit any great expansion of the rail network and many unprofitable lines and services are being abandoned. Railroads are also losing business to other forms of transport which are better suited to handle special segments of freight and passenger traffic. But the railways are well-suited to the carrying of large quantities of goods between important points, and in such movements, they can be expected to remain the chief carrier.

Disadvantages in low-density traffic.--In the past railroads handled substantially all freight in the country except that carried on the Great Lakes and rivers. In many types of service rail shipment was expensive and inefficient and such business was lost to trucks and waterlines when those systems assumed an important role in transportation. Since the unit of rail freight movement is the car, loads of less than 20 or 30

tons present loading problems to the carrier and less-than-carload shipments are generally unprofitable. Diesel engines today operate in multiple units and pull trains of more than one hundred cars. Terminal costs are relatively higher for short hauls than long hauls and time spent in terminals may often exceed the entire over-the-rail time on short hauls. Although the railroads are today attempting to improve terminal operations through modern facilities and handling methods, there is little chance that they can hope to match truck rates or service on short-haul shipments.

> (Railways) are, to a considerable extent, absorbed in the performance of services which probably can be more economically performed by other types of transport agency. Moreover the carriers have made little effort until recently to adjust their rate policies toward a recognition of the fact that the basic field of rail transport is in mass transportation. Its future lies in its continuance as the principal agency for internal heavy freight movement.[2]

Relation to Other Transport Agencies

Transportation service in the United States is performed primarily by privately owned for-hire carriers. All such agencies have from time-to-time received assistance from federal, state, and local governments in developing and promoting their business and building lines and terminal facilities. Today the promotion of waterway, airline, and highway transportation by federal agencies has resulted in

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[2] National Resources Planning Board, Transportation and National Policy, Washington, Government Printing Office, May, 1942, p. 67.

the diversion of much traffic which formerly travelled by rail as the other forms of transportation can often provide faster service at a lower cost to the shipper. Present developments in transportation may to a certain degree indicate not only the inherent advantages of other forms of transportation but also governmental policies which may make shipper costs represent only a part of the total shipping costs.

The trucking industry.--In intercity movements trucks have offered severe competition to the railroads, specially in the shipment of high-rated freight. Trucks are particularly well-suited to the movement of such goods over short distances as their terminal operations are fast and simple when compared with rail terminals. Trucks also offer flexibility in size of shipments and in the areas served because they can be loaded and unloaded without special facilities and can reach any area located on a street or highway.

Industries and business have found that the truck can serve their own transportation needs and many of them have established their individual trucking systems to carry their own products and raw materials. The costs of such operations have been relatively low as the company can obtain the benefits of service tailored to its own needs and the profits of such operations are kept within the company. Also such operations avoid the federal transportation tax.

Contract carriers, hauling special shipments at rates agreed to by the shipper, also represent a sizeable part of the trucking industry.

As the capital requirements for entering the trucking business are relatively small, many truckers are small operators who own only one or two tractors and haul trailers owned by industries or trucking lines. Many truck shipments, requiring special equipment, such as trailers for automobiles, fruits, or livestock may result in long empty backhauls as such movements are largely originated at one point and terminated throughout other areas.

While the trucks seem inherently capable of handling small, short-distance movements most economically, large capacity trailers have drawn off some of the railroads' bulk business. Motor carriers probably will not capture a large portion of the heavy-freight business but will rather confine their operations to hauling merchandise and other small shipments for distances of less than 500 miles. Trucks will continue to expand their livestock and agricultural products business since their speed and flexibility will probably provide better service than can be provided by rail.

Waterways.--The Inland Waterways System and the Great Lakes System today handle about 15 per cent of the total intercity freight movements. Most river traffic is carried on large barges propelled by towboats. These barges are capable of carrying large quantities of bulk items such as oil, coal, ores, and grains. In mass shipments in which speed is not an essential factor, water carriers can probably perform the service at a lower cost than any other transport agency.

The advantages offered the shipper in lower rates are sometimes balanced by the difficulties involved in water movements. Terminal operations are complex and the expense of constructing and operating terminals is so great that only large industries or public agencies can afford to maintain them except at high-density points. Less-than-barge-load shipments offer much the same problem to the water carrier that less-than-carload shipments present the railroads, as the carrying unit is large and loading methods are still relatively primitive. Large industries have purchased their own floating equipment or have contracted with carriers for volume shipments of raw materials and manufactured items, but common carrier service is still relatively undeveloped on the inland waterways.

Oil and natural gas pipelines.--Pipelines have been developed largely by private capital and today they are continually extending their lines and opening new areas. As additional sources of oil and gas are tapped, new lines and terminals are constructed to tie-in with existing systems. At present petroleum pipelines carry about 14 per cent of the national freight tonnage. New technological methods are being developed to expand the operations of pipelines from the hauling of only petroleum products to the shipment of solids such as coal suspended in water or oil. This possibility represents a threat to rail business. Natural gas pipelines have reduced rail shipments of fuel by providing a new form of power to replace coal and oil which were formerly carried by rail. Pipelines will probably

continue to expand their business and, as new methods of shipment are developed, they will handle even larger segments of the national freight.

Airways.--Despite glowing predictions of air freight movement by proponents of air transport, such shipments as yet represent only a small part of the total freight traffic. Air transport is still too expensive to permit the shipment of anything but expensive lightweight goods in which speed is an essential factor. Though the armed forces have used air cargo carriers with some success under difficult conditions, planes are still unable to carry sufficient loads to make air transport economic for general freight movements. Research on better types of cargo-carrying planes is being conducted by civilian and military agencies, but there is no evidence that planes in the near future will be able to compete with surface and water carriers for general freight business.

Passenger Business

Today about 85 per cent of the total intercity passenger movement is carried by private automobiles. The railroads, which were once the chief passenger carrier, now face the prospect of a continued decline in passenger business in long-haul, short-haul, and commutation service. Airlines and buses are taking over large portions of the railroad passenger business which has not already been taken by the private automobile.

Unprofitable passenger operations.--Revenues from rail passenger service represents about 10 percent of the railroads' total operating revenues, but much of the service is provided at a loss to the carrier. Many lines are not, however, interested in leaving the passenger business because they feel that such service provides a good medium for fostering better public relations. Also some of the passenger service losses are offset by revenues from express and postal service provided in conjunction with passenger operations. In evaluating passenger business, the railroad officials feel that they could provide comfortable, convenient service on heavy-density lines if they were permitted to abandon light-density operations which might better be handled by buses or private automobiles.

Improvements in passenger service.--In attempting to recapture lost business and develop new passenger travel, railroads are offering luxury coach service on streamlined trains at reasonable fares. On high-density lines such promotional activities have produced profitable passenger operations. Improvements in light-weight passenger cars and the flexibility of service on low-density lines have reduced the costs of passenger operations and made it more attractive to the public. Rail carriers feel that any future they may have in passenger business will depend upon their ability to offer dependable services, a fast and comfortable ride at reasonable fares.

Transportation in the Future

Future transportation requirements will probably continue to grow. As industry moves closer to sources of raw materials and power supplies, some of the present bulk hauling of ores and fuels may be affected, but industrial expansion to meet the needs of a growing population will more than overcome such transportation losses. Intercity passenger travel will continue its spectacular growth experienced since the development of the automobile. In all forms of transport new facilities and operational methods will be required to meet the greater demand for service.

Division of freight traffic.--Under present conditions of federal regulation, the railroads will probably continue to lose business to their competition. They will be forced to concentrate on their mainline, long-haul bulk business and will probably abandon many of their branch lines and low-volume lines. Motor carriers will expand their high-rated short-haul business and water carriers will probably handle larger portions of the bulk-item business. Airlines will not seriously compete for general freight business until planes are developed to carry heavy payloads at low costs.

Transport coordination.--To take advantage of the economic operations of each type of carrier, greater attempts will be made to coordinate shipments and move goods by the most economical means. In many cases such movements will be made by several carriers. Joint rail-water-

truck movements will probably play a more important role in the future transportation than they do today. In coordinating their movements with other agencies, the railroads may be able to hold large parts of freight traffic which they might otherwise lose. Railways themselves are today taking advantage of the flexibility of the truck and are in some cases replacing unprofitable branch line service with truck service. In this manner they can still handle the traffic and avoid losses from unprofitable rail service.

Passenger traffic.--Passenger common carriers -- airlines, buses, and railways -- will continue to feel the increased competition of the automobile. While rail passenger volumes still represent a sizeable portion of the railway income source, the actual volume of passenger traffic is declining. Special attention to luxury service will produce a profitable future business and provide some of the needed vacation travel. But business travel will be taken over by air carriers if they can offer competitive fares for faster service. While the railways will continue to handle large passenger volumes, they will continue to lose relatively in importance to the automobile and airlines.

Railroads and Government

Government Regulation of Transportation

The federal government exercises through the Interstate Commerce Commission and other agencies virtually all-inclusive regulatory

powers over interstate transport agencies while the states retain the power to regulate intrastate carriers. The Interstate Commerce Commission is specifically charged with the responsibility of regulating all interstate for-hire carriers in domestic service except the airlines which are regulated by the Civil Aeronautics Board and natural gas pipelines which are regulated by the Federal Power Commission.

Control of rates and fares.--Control of the rates and fares which a carrier may charge permits the Commission to protect the interests of the carriers and the public. This authority also is used to control carrier profits. In exercising this power, the Commission generally allows a carrier to publish rates for a given service and acts as a referee if the rates are challenged as to their lawfulness. The power to establish rates and fares also includes the right to approve schedules, rules and regulations for providing a given service.

Other regulatory powers.--Other important regulatory powers of the Commission include the requirement of standard methods of accounting and billing, requirement of practices and installation of devices designed to improve the safety of rail operations. The Interstate Commerce Commission also approves the issuance of rail securities and changes in the physical rail pattern. Under emergency conditions (determined by the Commission itself) that agency has the power to require the joint-use of rail facilities and diversionary routing of rail and rail-water movements and provide rules for compensation of facility owners

in cases in which the roads involved cannot reach fair agreements on payments and rentals.

National Transportation Policy

Transportation Act of 1940.--In the preamble to the Transportation Act of 1940, Congress stated its national transportation policy:

> It is hereby declared to be the national transportation policy of the Congress to provide for fair and impartial regulation of all modes of transportation subject to the provisions of this Act, so administered as to recognize and preserve the inherent advantages of each; to promote safe, adequate, economical, and efficient service and foster sound economic conditions in transportation and among the several carriers; to encourage the establishment and maintenance of reasonable charges for transportation services, without unjust discriminations, undue preferences or advantages, or unfair or destructive competitive practices; to cooperate with the several States and the duly authorized officials thereof; and to encourage fair wages and equitable working conditions;--all to the end of developing, coordinating, and preserving a national transportation system by water, highway, and rail, as well as other means, adequate to meet the needs of the Commerce of the United States, of the Postal Service, and of the National Defense. All of the provisions of this Act shall be administered and enforced with a view to carrying out the above declaration of policy.[3]

But after stating the principle of fair regulation and coordination of all forms of transport, Congress maintained the division of authority to regulate the carriers and left the control of aviation and natural gas pipelines to agencies other than the Interstate Commerce Commission. Instead of attempting to coordinate regulation, the Transportation Act

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[3]P. L. No. 785 (76th Congress-Ch. 722-3d Session) (S. 2009) in Laws Relating to Interstate and Foreign Commerce, Washington, G. P. O., 1953, pp. 387-388.

of 1940 has left many regulatory and promotional functions to agencies which have little opportunity or desire to coordinate their efforts in producing a coordinated system of transportation in which all forms of transport are called upon to supply services based upon their "inherent advantages."

Transport Coordination.--Under the provisions of transportation laws, the Interstate Commerce Commission may establish rates in the public interest for joint water-rail movements when requested to do so by the carriers or shippers. But the establishment of joint air-rail or truck-rail rates is permissive rather than mandatory and such joint rates are virtually non-existent. The Commission has, in practice, violated the stated principles of Congressional policy by refusing to establish more rates designed to promote transport coordination.

Railroads' Attitudes toward Government

Railroad executives today recognize the importance of regulation by the federal government. In many cases individual railroads have been protected because the Interstate Commerce Commission has forced larger roads to abandon unfair competitive practices. Often the Interstate Commerce Commission has sided with the railroads in establishing regulations of motor and water carriers, and it has sometimes been accused of being a "railroad" agency.

"Discrimination against railways."--Although they accept the principle of regulation, railroads feel that many of the present governmental pro-

motional and regulatory policies favor other carriers. Special resentment is aimed at Congress and its policy of developing the nation's waterways. Proponents of railways feel that the shipper costs of water transportation do not represent the true economic cost of such service as the water carrier must provide only his barges and tugs to operate on government built and maintained traffic lanes. Motor carriers, it is believed, receive a public subsidy as they, too, operate on roads maintained by public funds and do not have to pay direct user charges for running on public roads. Although many railroads have in the past received substantial subsidies from the government in land grants, they believe that the promotional activities of national, state, and local governments have served to divert much traffic which they could handle most economically.

Taxation.[4]--Railroad economists feel that federal, state, and local taxation policies are highly discriminatory against the railroads. As the railways own and operate their own lines and facilities as well as rolling equipment, they are subject to ad valorem taxes on all elements of their system. Of all other carriers, only pipelines have to pay taxes on their rights-of-way as trucks and water carriers operate over publicly maintained roads and waterways. The railroads feel that they are

[4]For an interesting discussion of the railroads' attitude on taxation see Railroad Committee for the Study of Transportation, Transportation in America, Washington, Association of American Railroads, 1947, pp. 270 ff.

forced to reflect the cost of these taxes in higher rates and fares while competitors can charge rates which may not reflect the total cost of transportation in their user-charges. In addition, because of the effects of the Railway Labor Acts, the railroads pay higher payroll taxes than any other transportation agency. In 1952 the total tax bill for Class I railroads[5] was $1,261,741,356, or about 11.9 per cent of total railroad operating revenues.[6]

Today all transportation agencies object to the special federal transportation taxes of 10 per cent for passenger travel and three per cent for freight shipments. "The objections to these taxes are principally that they divert traffic to private means of transportation and thus add to for-hire carriers' difficulties, and that they discriminate against the long-distance shipper or traveler."[7] This tax is a special problem facing all common and contract carriers in their attempts to develop business and is especially burdensome to the railroads in their attempt to lower passenger service deficits through increasing traffic volumes.

A unified transport agency.--Railways are the chief proponents of unifying all federal transport regulatory powers under one agency. The

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[5]Class I railroads are those having a yearly operating revenue of more than $1,000,000.

[6] Eastern Railroad Presidents Conference, A Year Book of Railroad Information, 1953 Edition, New York, 1953, p. 60.

[7]Interstate Commerce Commission, 67th Annual Report, Nov. 2, 1953, Washington, Government Printing Office, 1954, p. 17.

present division of authority among the Interstate Commerce Commission, the Civil Aeronautics Board, the Federal Power Commission, and other agencies has magnified the problems of transport coordination and the development of a true national transportation system. To take advantage of the services offered by different transport agencies, decisions of joint rates and facilities and policies of coordination should be handled by one body which can weigh the advantages and disadvantages of all carriers in performing special services. Although the railroads desire coordinated regulation from selfish motives (the feeling that any agency might favor the railways' point-of-view) there can be little doubt that a unified transportation agency would assure better service to shippers and fairer regulation of the carriers.

Railroads in Urban Areas

History of Urban Rail Pattern

Early development. --The history of urban development in the United States is largely the history of the nation's transportation systems. The earliest cities -- New York, Philadelphia, Charleston, and others -- were primarily seaports which shipped agricultural products grown in the hinterlands and distributed manufactured products from abroad. Other important cities were located on navigable rivers at break-bulk points. But following the 1830's and the development of the railroads, both the location and internal patterns of cities changed to meet the

requirements and opportunities offered by the new transport medium. As the railroads extended into undeveloped areas, they were forced to provide service and terminal facilities which gave impetus to the creation and growth of such inland cities as Indianapolis, Chattanooga, Atlanta, and Denver.

In these new cities business and industry tended to locate at the center of rail activity, and the railroad station was often the hub of the city. In older cities, the railroads built lines to serve existing warehouses, industry, business and docks. Here they attempted to find central locations for passenger and freight terminals, but often because of high land costs or built-up areas, rail facilities were forced to accept less than ideal sites.

Development of the automobile.--Since railroads were essential to the development of heavy industry, large parts of the railroad rights-of-way became clogged with spurs and sidings serving industries located beside the mainlines, near the center of the city. While centrally located rail facilities were convenient in pre-automobile days, the rapid development of the automobile and the growth of cities soon created serious congestion problems. Large areas of tracks, yards, and terminals became real barriers to urban development and caused serious delays and inconvenience in both rail and vehicular traffic movements.

In the 1920's rail traffic reached a peak which, with the development of vehicular traffic, threatened to strangle central areas of the

city. To solve this problem, many cities initiated programs of grade-separations and terminal consolidation. In 1925, New York State authorized the issuance of $300,000,000 in bonds to cover the state's share of the cost of eliminating every grade crossing.[8] In many cities plans were made for union passenger terminals, track elevations and construction of viaducts to relieve street and rail congestion.

The Depression of 1929.--The "crash" of 1929 cut deeply into rail traffic volumes. The reduction of rail movements alleviated temporarily the problems of rail congestion and conflicts with vehicular traffic. Many of the projects of the 1920/s were dropped as some of them were no longer justified, and even if still needed, could not be financed when the railroads were in no condition to spend money on capital improvements. Privately-owned railroads were usually unable to benefit from public works expenditures, and, therefore, few needed basic adjustments were made in the urban rail pattern.

Railroads in cities today.--The modern urban rail network is the result of the uncoordinated efforts of individual roads to obtain competitive advantages over other carriers. The first railroads secured the best lands and routes while later roads were forced to construct lines on rougher topography, necessitating heavy grades, cuts, and fills,

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[8] Regional Survey of New York and its Environs, Vol. IV, Transit and Transportation, New York City, 1928, p. 103.

with resultant high operating costs. In many cases, such basic facilities as interchange points were neglected and few efforts were made to provide real public service through coordination.

The rail pattern influences not only the physical but also the economic and social make-up of the city. Rail lines cut through residential areas, tending to blight them and create barriers to future development. Large yards, with their smoke, noise, odors, and disorderly appearance, occupy lands which might better be used for other purposes. Grade crossings present an ever-present source of inconvenience and danger. In central areas, terminals, team tracks, and service facilities have pre-empted valuable lands which might be used for other purposes requiring central locations. In port cities, waterfront areas are highly congested with rails and loading facilities which have become obsolete and wasteful.

The economic effects of a poorly coordinated rail system are felt by all parts of the city as everyone must pay indirectly for high rail service costs. In many instances, cities have been forced to provide facilities for surface transportation when much of the service provided on streets could be handled more efficiently by rail. Duplication of rail facilities in central areas has contributed to commercial and industrial decentralization with its subsequent demand for expensive municipal services to outlying areas.

Elements of the Urban Rail Pattern

The urban rail system consists of lines, terminals, yards, shops, service facilities, and in some cities business offices. The efficiency of operation of these facilities has a direct effect upon the economic well-being of the city, and their location has influenced the entire course of urban development. The planner should be familiar with all of these elements and their role in the rail system.

Lines.--The mainline is the backbone of rail operations. It carries heavy traffic in intercity movements and requires heavy rails and ballast and low grades for high-speed movement of heavy tonnages. Mainlines are often double-tracked or protected by centralized traffic control devices which increase the carrying capacity of a single track by as much as 75 per cent.

Branch lines are secondary tracks serving smaller cities or areas not on the main line of a particular system. Branch lines often serve as connectors with other major lines for interchanging freight. Branches require relatively low grades but since they seldom carry heavy traffic they can be built at lower standards than those required for mainlines.

Lead tracks are constructed by railroads to serve private industrial areas or groups of spur tracks. They are connectors between the mainline and the sidings which are final destinations for freight traffic.

Spurs and sidings are short tracks serving one industry or business. They are paid for by the industry served but the actual construction of such lines is usually done by railroad crews.

Terminals.--Freight terminals are used for the accumulation and distribution of freight shipments. Such terminals often require, in addition to warehouse space, large areas for the storage of rail cars and truck loading space. Since large users of rail freight service generally find the construction of their own terminal facilities profitable, railroad-operated freight terminals handle primarily less-than-carload shipments for smaller industries and businesses.

Railway Express terminals handle small high-rate shipments and are generally located near passenger terminals as express is carried on passenger trains.

Team tracks and yards may be considered terminal facilities. A team track is a railroad-owned common track on which cars are spotted for loading or unloading by the users of that line's freight service. Formerly located in central areas, modern trucks have made outlying locations suitable for team yard operations.

Special terminal facilities may be provided for handling particular types of freight in many cities: stock yards, icing facilities for perishable fruits and vegetables, tank fields for petroleum products, grain elevators, and facilities for coal, lumber, pulpwood. Port cities have, in addition, special areas for handling the interchange of

freight between rails and water carriers.

Passenger terminals are of three basic types: central or major, secondary, and commuter stations. The bulk of intercity passenger movements are handled through central stations which may be owned and operated by one railroad or as a joint facility operated by several roads. Here are located ticket agencies, restaurants, baggage facilities, newsstands, and other facilities designed to promote passenger comfort and convenience. Secondary stations may be located throughout the city to serve special segments of local and intercity passenger traffic. Commuter stations are found only in large metropolitan areas. Because these terminals must handle heavy movements at rush hours and are virtually idle at other times, they are usually constructed to offer easy access to central areas of the city and are not equipped with unnecessary frills.

Yards.--The classification yard is the largest railroad facility, often stretching for several miles and occupying hundreds of acres of relatively flat land. Classification yards are located to serve an entire division or railroad system.

Secondary railroad yards are used for storing idle freight and passenger engines, serving industrial areas, and making up trains.

In most cities, rail yards are located in outlying areas as they require large amounts of land. The depressing effect of large yards on surrounding areas has tended to blight residential areas located

nearby, and though the diesel engine has reduced many nuisances of yard operations, a large classification yard is still not a good neighbor.

Shops and maintenance facilities.--These facilities are not found in every city but are located according to the system needs of each railroad. Shops should present no more of a planning problem than other heavy industries located in the city. The demands of heavy industries for land and rail service generally require that they be located in or near large yards, and they may be considered as a part of the yard problem.

Future Urban Rail Patterns

Dieselization.--The development of the diesel engine and its widespread use (see Fig. 2) are producing drastic changes in rail operations by reducing the number of engines required to perform service and by increasing the loads carried by a train. Service facilities such as coaling stations and watering towers are being eliminated and many shops and roundhouses are no longer needed because the diesel requires less servicing than the old steam-engine. Further improvements in motive power, especially the steam turbine, indicate that even greater shifts in rail facilities will be made in the future to meet changed operating conditions.

Terminal facilities.--Since 1948 the railroads have spent at least

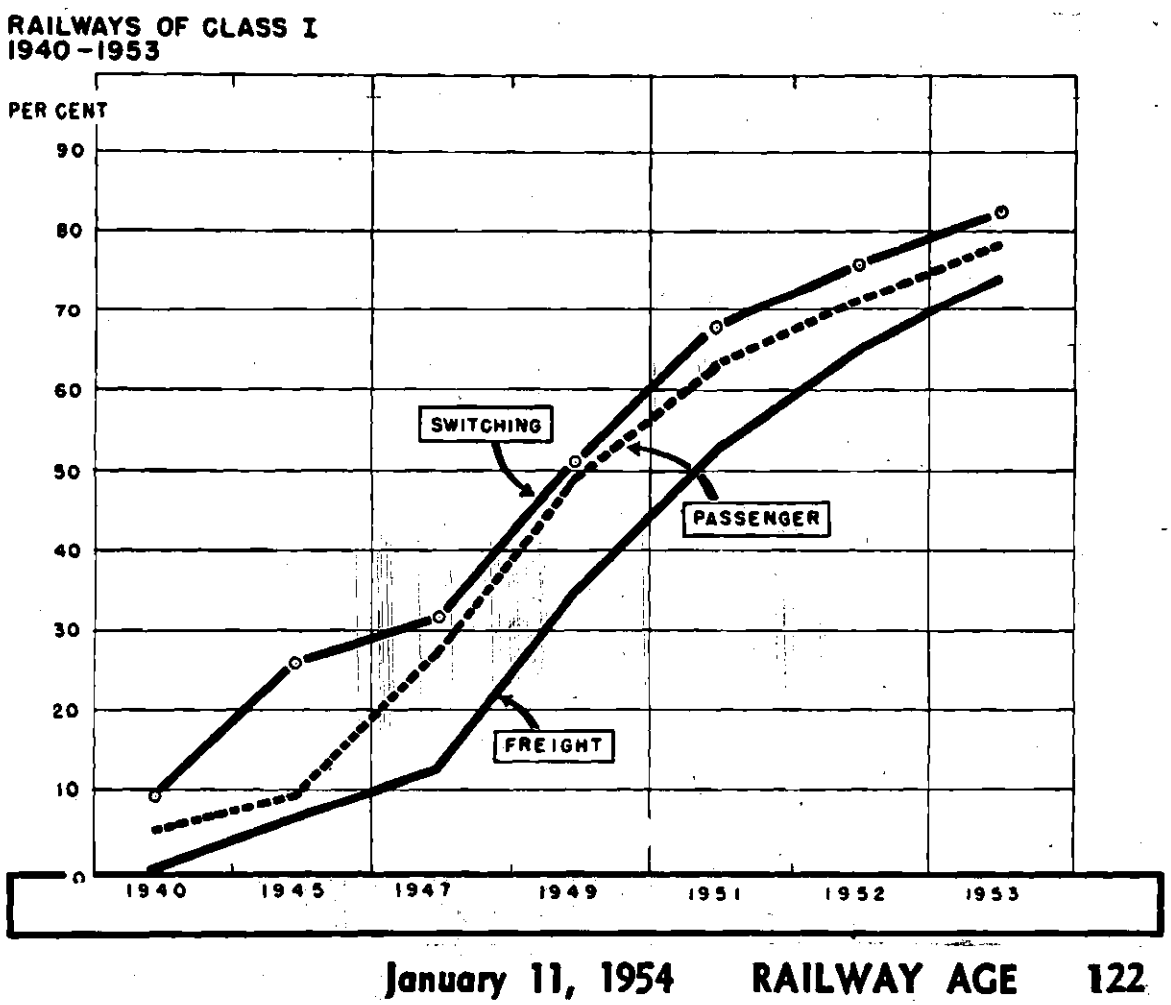

Fig. 2

Proportion of Performance Rendered by Diesel Power

a billion dollars annually for capital improvements. About 30 per cent of this money has been used to expand and modernize yards and construct more efficient terminal facilities.[9] These facilities have been designed to meet the requirements of rail service and to provide adequate space for interchange with trucking movements. In the future more joint terminals can be expected which will serve several railroads and coordinate rail service with other forms of transport. The decline in less-than-carload business and merchandise traffic is forcing many roads to seek methods of combining their service rather than attempting to maintain strict competitive services. This trend in operating procedures will probably produce changes in the physical facilities and should tend to encourage joint-use of freight terminals.

"Piggyback."--One of the most interesting recent developments in transport coordination is "piggybacking"[10] in which truck trailers are loaded on rail flat cars and carried over the rails for shipment to distant cities. This method may have the effect of removing large amounts of truck traffic from congested highways and streets and should result in faster, cheaper service to the user. Special facilities will be required to load and unload the trailers efficiently. Because of the flexibility offered in this service, such facilities may well be located in outlying areas, convenient to the city's major traffic arteries.

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[9]Eastern Railroads Presidents Conference, op. cit., p. 16.

[10]Railway Age, a weekly publication, is currently featuring articles on "piggybacking" in nearly every issue.

At present, the Interstate Commerce Commission is studying "piggyback" operations and will soon establish rates and regulations for conducting the service. If these regulations are suitable to the carriers, "piggybacking" should become more widespread, lessen the problems of less-than-carload shipments and alleviate street and highway congestion.

Abandonment of unprofitable lines and services.--Many parts of the rail network do not today return a reasonable profit to the carriers and in some cases are wholly unprofitable. In attempting to tighten the rail system, many lines will be abandoned, and service curtailed on others. In the city many minor lines handling only light traffic may be abandoned and service maintained on other lines. Operational and maintenance costs could be reduced for the railroads and the city might benefit from such abandonments by using abandoned rights-of-way for streets or other needed purposes.

Industrial decentralization.--As industrial districts are developed in outlying areas, the railroads will have to establish added lines and facilities to provide service. But except in those cases where industry actually deserts central areas, the railroads will be required to retain many of their lines in central areas. In an attempt to gain income from centrally located rights-of-way, railways may continue the practice of selling air-rights over their tracks to allow use of rail lands for business and even industrial purposes. Although build-

ing on air-rights may require expensive construction, the value of central location may outweigh high construction costs.

Grade crossing problems.--Planners should exercise extreme care in preparing plans for future streets and expressway systems to avoid the necessity of extensive grade-separation projects. Increasing vehicular traffic and a continued high level of rail movements will make grade-crossing problems even more acute in the future than they are today. Railroads today are in no financial position to undertake a major portion of the expense of extensive reparation programs even though they might benefit considerably from them.

The planner's opportunity.--Today railway executives realize that monopoly of transportation has been broken and that they must cooperate with governmental officials if they are to promote the best interests of the railroads. Realizing that the airlines, waterways, and motor carriers have made serious inroads into their business and that the rails are losing their former competitive position, rail carriers are attempting to find methods of promoting not only their own systems but also the entire rail industry. Such efforts are resulting in greater joint use of facilities, more efficient terminal patterns, extension of trackage rights, reciprocal switching agreements, and pooling of less-than-carload and passenger traffic.

The planner, in dealing with the railroads, should be aware of the changes in attitude of management and should try to work with the

railroads and promote sound urban physical and economic development. Today, with proper guidance and sound study, the planner has opportunity to work with the railroads in the development of a truly coordinated future rail system which will produce benefits for all.

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7. _____, Transport Coordination in the United States, Chicago, Railway Business Association, Nov. 1946. A discussion

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8. National Resources Planning Board, Transportation and National Policy, Washington, Government Printing Office, 1942. The definitive study of the national planning aspects of transportation. Part I, Problems of Transport Policy, should be required reading for anyone interested in the problems of planning transportation systems. This study will lead to a better understanding of the shortcomings of national policies in dealing with transportation agencies and also presents an interesting analysis of the advantages of each form of transport.

9. Railroad Committee for the Study of Transportation, Transportation in America, Washington, Association of American Railroads, 1947. This report is the result of five years of study of transportation problems by railroad officials. While many of the conclusions of the study are biased in favor of the railroads, this work presents good arguments on the need for changes in transport regulation and taxation.

10. Railway Age, Special Issue, Review and Outlook Number, Vol. 136, No. 2, January 11, 1954, a review of rail operations in 1953 with a projection of future prospects of the railroads. A valuable source of information and a picture of the railroads' evaluation of their own problems.

11. _____, Special Issue, Passenger Traffic Issue, Vol. 136, No. 20, May 17, 1954. A survey of passenger traffic and prospects for its development. Includes reports on various railroad attempts to improve passenger service and reduce deficits.

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CHAPTER II

PRESENT RAILROAD PLANNING

History of Railroad Plans

Early neglect.--City planning, as known today, had its American beginnings in the late nineteenth century, but the early planning atmosphere did not encourage the development of comprehensive transportation plans. The chief interest of planners centered on city beautification, the building of impressive structures and parks, and they gave little attention to the community's railways, waterways, and street systems. Where railroads were considered, the planners chief interest seemed to center around the construction of a monumental passenger station to impress visitors to the city.

Some planners and railroad officials did, however, recognize the importance of railroads to urban planning and in 1909, Frederick A. Delano, president of the Wabash Railway Company, presented a paper to the American Institute of Architects, Railway Terminals and Their Relation to City Planning,[1] which attempted to emphasize the need for planning freight terminals to adequately serve the city.

A new planning emphasis.-- After World War I, planning emphasis

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[1]Reprinted in Engineering Record, Vol. 60, No. 25, Dec. 18, 1909.

shifted from city beautification to economic development. The virtual breakdown of the national railroad system under the high wartime traffic volumes focused special attention on terminal problems. Cities, anticipating expansion of railroad business and the need for larger facilities, instituted programs to study the urban rail network and devise plans for its comprehensive development. The new interest in railroad planning was shown in the presentation of planning programs and discussions of terminal problems at national planning conferences. Leading planners of the 1920's devoted much of their time to the development of theories of urban rail planning. Important articles were published in magazines such as Landscape Architecture, Engineering News-Record, and Architect and Engineer.[2]

In 1926, Harland Bartholomew, a pioneer in urban railroad planning, presented a paper, The Place of Railroads in the City Plan,[3] to the National Conference on City Planning. This paper sought to show the relationship between the rail pattern and the structure of the city. To do this the writer analyzed the problem by dealing with the components of freight traffic and facilities, passenger service, grade crossings and separations. Mr. C. F. Loweth, Chief Engineer of the

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[2]See BIBLIOGRAPHY (p. 90) for listings.

[3]In National Conference on City Planning, Planning Problems of Town City and Region, Philadelphia, Wm. Fell, 1929, pp. 115-129, discussion 130-154.

of the Chicago, Milwaukee, and St. Paul Railway, presented the railroad's attitude on the paper and disagreed with Mr. Bartholomew's basic contention that terminal problems were the most difficult and pressing problems facing the railways.

The cities plan.--The most notable effort at long-range transport planning was the establishment of the Port of New York Authority.[4] Through the Interstate Compact of 1921, between New York and New Jersey, the Authority was created and given the power to plan for the development of all transport installations within 25 miles of lower Manhattan. The organization's first duty was the preparation of a comprehensive plan to be submitted to the state legislatures. After approval of the plan, the Authority was given "full power to purchase, construct, lease, and/or operate any terminal or transportation facility within the Port District."[5]

As many of the major headaches in the New York area involved inefficient rail terminals, the chief emphasis of the plan was the reorganization of terminals to eliminate duplication of facilities, circuitous routings, and excessive switching charges. But the railroads refused to cooperate with the Authority and would not relinquish their

[4]Frederick L. Bird's A Study of the Port of New York Authority, New York City, Dun & Bradstreet, Inc., 1949, is a comprehensive study of the beginnings and development of the Authority.

[5]Ibid., p. 9.

competitive advantages. Since the Authority was unable to force compliance with its plans, the accomplishments of the railroad plans were limited to the simplification and coordination of railroad facilities on the New Jersey Shore and the eventual construction in 1932 of Inland Freight Terminal No. 1 to handle less-than-carload freight.

Railroad planning in New York City was continued by the Committee on Regional Plan of New York and its Environs. In its Regional Survey of 1926, intensive studies were made of the physical and operational patterns of the area's rail system. Special emphasis was placed on the inadequacies of passenger terminals and commuter operations. Attention was also given freight transport and the difficulties of terminal operations in the metropolitan area. Recommendations included more extensive electrification of lines, unified management of railroads and the elimination of grade crossings within the metropolitan area. But the plan had little effect on the rail pattern and the city's rail problems have diminished only because of the lessening importance of the railroads which has resulted from the development of motor carriers.

New York was not the only city which planned improvements in its rail pattern: Cincinnati, one of the leading cities in the development of planning, included in its 1920 plan studies of the city's rail systems which eventually led to the construction of the Cincinnati Union Passenger Terminal in 1933; Dayton, Ohio, in 1925 published

a plan for the elimination of grade crossings, although the recommendations of the plan were never effectuated; union passenger terminals were planned and built in several important cities while others constructed viaducts over centrally located rail lines. Often these projects solved only limited aspects of the railroad problem and were not parts of comprehensive planning programs. They served, however, to call public attention to the importance of railway problems. As a result, they not only produced plans for physical improvements but also emphasized the need for further public action in dealing with rail installations.

Federal Recognition of Railroad Problems

Transportation Act of 1920.--In enacting the Transportation Act of 1920, Congress recognized the need for serious study of the economic prospects and operational problems of the railways. One of the requirements of this act was that the Interstate Commerce Commission prepare plans for the consolidation of the various individual railways into regional systems. The Commission appointed Professor W. Z. Ripley of Harvard University to prepare the plans for consolidation. In 1921, the plan was presented in preliminary form for further study. After numerous revisions, the plan was adopted by the Commission as "final" in 1929, but it was again revised in 1932. In 1933, after little had actually happened under the plan, The Com-

mission asked Congress to relieve it of the duty of promoting the consolidation proposals, and since that time, the report has lain virtually untouched.

Coordinator of transport. --The depression of the 1930's cut heavily into rail traffic and temporarily alleviated terminal and operational problems. But the railroads' financial condition was critical. Under the Emergency Transportation Act of 1933, Joseph B. Eastman assumed the role of Coordinator of Transport. His office studied all phases of the railroad problem and after surveying terminal conditions in about 5,000 cities and towns prepared detailed plans for terminal consolidations in eleven cities. In 1936, however, concerted opposition from the railways and railway labor forced the dissolution of the Coordinator's office. Despite assurances from the Association of American Railroads that the studies started by the Coordinator would be completed, apparently the railways made no attempts to carry on the work. Most of the Coordinator's work was issued in mimeographed form only and is not generally available today.[6]

National Resources Planning Board. --After studying special aspects of transportation, the National Resources Planning Board published in 1942 its comprehensive study, Transportation and National Policy,

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[6]National Resources Planning Board, op. cit., pp. 146-149, presents a history and evaluation of the work of the Coordinator's office.

an analysis of the role of governmental action in regulating and promoting transportation. Although this work is not aimed primarily at urban rail problems, it does deal with terminal facilities and their relation to the overall rail system. In addition, it represents an effort to determine the proper role of government in dealing with transport agencies and as such applies directly to local problems.

Value of these studies to the urban planner.--These studies furnish a solid background for the planner who is attempting to deal with local rail problems by giving him a broad picture of national transportation planning. Because the effects of an urban rail system may be felt throughout the region and nation, the planner should be aware of the implications of his plans. The National Resources Planning Board report is particularly valuable for its emphasis upon the inter-relationships between the carriers and the need for transport coordination utilizing the advantages offered by each different transport agency.

Modern Railroad Planning

Principles

In The Place of the Railroad in the City Plan [7] Harland Bartholomew stated his principles for railroad planning: studies of the rail network are dependent upon the general studies of a planning program;

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[7] 18th National Conference on City Planning, op.cit., pp.116 ff.

the separation of through and local rail traffic is a goal to be desired in urban areas; terminal problems represent the largest operational problem of the railroads; the basic consideration in planning passenger facilities is the development of the greatest possible passenger convinience; in most grade separation projects, line relocations will be required. Mr. Bartholomew recognized that each city faces different rail problems and that there is no set formula which can be followed in every city. Another warning in this paper is that the railroad system should be considered as a whole in planning rather than as a series of unrelated lines and facilities.

Local Planning Administration [8] presented both principles and techniques for rail system planning. The principles are:

> (1) good railroad service is a most important factor in the economic life of the city or urban region; (2) unification of railroad facilities within an urban area is essential to adequate and economical railroad service and facilitates orderly community development; (3) a sound transportation system calls for the best possible coordination of the several forms of transport--railroad, water and air transportation facilities, highways, streets and transit facilities; and (4) railroad facilities, like all other transportation facilities, bear important relationships to practically all other elements of community development and should be integrated with them. [9]

An appendix, Suggested Railroad System Studies,[10] proposes

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[8] Local Planning Administration, Second Edition, Chicago, International City Managers' Association, 1948.

[9] Ibid., p. 144.

[10] Ibid., pp. 319-320.

the following program for planning studies: a survey of the development of the urban rail pattern; an inventory of railroad lines, facilities and lands in the city; a written analysis of these facilities, their function and adequacy; volume maps showing passenger and freight movements along different lines; studies of the capacity, operational methods, location, use and routes used in passenger and freight terminals; sources and destinations of freight; studies of the interchange pattern; the possibility of joint use of facilities; and such other studies as may be needed in special conditions.

The chief emphasis in planning theory to date has been upon the unification of terminals and other facilities, joint use of lines, the provision of belt lines to serve industrial freight and through freight movements, the elimination of grade crossings, abandonment of lightly-used installations, and the elimination of unnecessary duplications of facilities. Attention has been given the techniques of plan preparation, but the important field of implementation of plans and programs has been almost untouched by planning theorists.

Recent Study of Railroad Problems

Many recent railroad planning studies have been concerned primarily with general recommendations for improving urban rail patterns. These studies, often prepared as part of the master planning program, are broad surveys of existing physical and operation-

al patterns, problem areas and bottlenecks, and suggestions for general rail system improvements. Such studies usually include proposals for the construction of belt lines to handle freight traffic, programs for grade crossing separations, joint use of terminals, and coordination with other carriers, but the plans represent preliminary proposals rather than sound technical studies of all aspects of the problems.

The study of a local rail system may arise from attempts to solve one major rail problem, or it may be part of a comprehensive survey of municipal problems. In some cases, special aspects of the rail problem may be analyzed without reference to the overall planning needs of the rail system and the city. Such studies will be disregarded in this paper because they seldom serve as useful parts of a comprehensive planning program and represent a tendency which should be avoided by the planner who attempts to consider railroads in their proper relation to other urban problems.

It is virtually impossible to judge the technical merits of a plan unless all factors of the local planning program are considered. Because such analysis is beyond the scope of the present study, the following railroad plans and programs will be analyzed to determine the principles of the studies, the methods used, and the results obtained: Cincinnati, Ohio, prepared by the City Plan Commission, J. B. Sullivan, consultant; Davenport, Iowa, prepared for the City

Plan Commission by Harland Bartholomew and Associates; Atlanta, Georgia, prepared by the Metropolitan Planning Commission as a part of its preliminary Regional Land Use Plan, Up Ahead; the transportation planning program of Corpus Christi, Texas, especially the study prepared for the Area Development Committee of the Corpus Christi Chamber of Commerce by Harland Bartholomew and Associates; and the New Orleans, Louisiana, railroad planning program.

Cincinnati, Ohio.--In 1947, the City Planning Commission of Cincinnati published A Plan for Facilitating Rail Freight Movements in the Cincinnati Area.[11] This plan was intended to serve as a preliminary proposal for the elimination of freight-movement congestion in the Cincinnati Terminal Area, the promotion of better use of existing facilities, and for the provision of installations needed to provide better freight service with less interference with planned urban growth. Passenger service problems in Cincinnati were relatively minor, most of them having been solved by the construction of the Union Passenger Terminal in 1933, and they were not considered in the preparation of this study.

Four basic principles serve as the framework upon which proposals are made: 1. the local rail network is an important part of regional and national rail systems; 2. the economic well-being of the city is dependent upon the provision of efficient rail service to business and

[11]Published as one of a series of special reports leading to the preparation of a Master Plan for Cincinnati.

industry; 3. the proper rail pattern for the city is that which will handle expected traffic volumes with a minimum of interference with planned urban development; and 4. the purpose of the plan is to consider not only the purely operational requirements of the railways but also the overall effects of the rail system upon the city.

The methods employed in the Cincinnati study are the analysis of the existing rail pattern and the capacities and functions of all installations, analysis of freight movements and projections of future freight movements, the location and nature of rail congestion or conflict with vehicular traffic, a study of the effects of topography upon local rail locations, the delineation of areas in which rail improvements are feasible, and the costs of projects recommended in the plan.

This plan is modest in that it proposes relatively minor changes in the physical rail pattern, but it does suggest some radical changes in the use of existing installations: the improvement of an existing line to serve as a north-south freight belt line; the construction of a modern railroad bridge over the Ohio River and the elimination of an inadequate, lightly-used bridge; and the joint-use of a modern classification yard. These proposals, accompanied by preliminary estimates of costs and benefits, are apparently the result of careful study of the functions of the local rail network. But no attempts have been made toward effectuating the plan, although it still is part of the Cincinnati

Master Plan.

Davenport, Iowa.--The chief purposes of the Davenport, Iowa, Transportation Plan,[12] prepared by Harland Bartholomew and Associates, are the provision of adequate transportation facilities and the establishment of better relationships among the various transportation installations and with the structure of the city. The railroad section[13] presents an inventory and description of rail lines and facilities, general surveys of grade-crossing problems and industrial locations, and an analysis of traffic volumes on each line. The proposals of this plan range from minor changes in the interchange tracks, the abandonment of a lightly-used line, joint-use of a modern freight terminal and subsequent abandonment of an obsolete freight station, grading separations for all major-street-rail crossings, and the elevation of a major rail line in the central area of the city.

Although the major proposals of this plan have not yet been accomplished, one of the minor proposals has been effectuated and another is now under study. In the First Street area (See "A" in Fig. 3) tracks have been relocated and condensed or removed as part of a street-construction program. At present the abandonment of the Bur-

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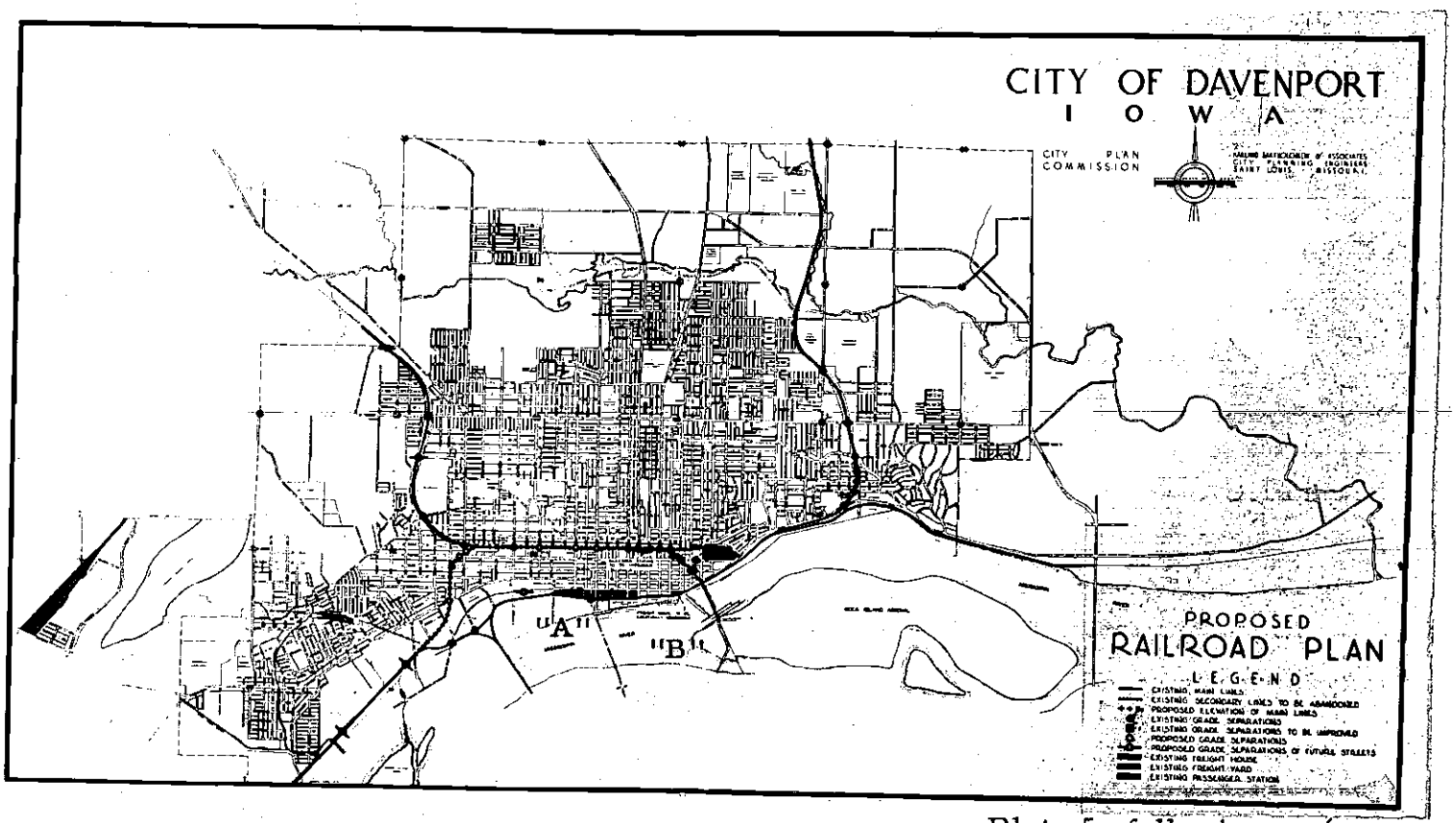
[12]Davenport, Iowa, Transportation and Transit Facilities, Davenport, Iowa, City Plan Commission, June, 1946.

[13]Ibid., pp. 4-7.



--Plate 5, following p. 6.

Fig. 3

Changes in Davenport Railroad Facilities

lington-Rock Island freight house is being studied by the railroads and the Davenport Levee Improvement Commission. When this terminal is finally abandoned, the present occupants will use the Milwaukee Road freight house as suggested in the plan (see "B" in Fib. 3).

Although the Davenport report presents a general survey of local rail problems, it deals with specific projects rather than establishing a broad program for continuing planning. The plan accepts the general location of present lines and facilities as satisfactory and does not attempt to make radical changes in the rail system.

Atlanta, Georgia.--In the Regional Land Use Plan, Up Ahead, the Metropolitan Planning Commission published its proposals for drastic revision of the local rail system.[14] As the Commission is concerned with the development of all parts of the contiguous region, one of the basic proposals of its general planning program has been the decentralization of industry, leaving central areas for business purposes. The effects of the industrial decentralization are seen in all parts of the Commission's transportation planning.

The basic proposal of the plan is the provision of a 60-mile belt line encircling the urbanized area to provide freight service for industry and to serve as a bypass route for through freight traffic. Inter-

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[14]Atlanta, Ga., Up Ahead, Atlanta, Ga., Metropolitan Planning Commission, 1952. Railroad proposals on pp. 33, 35, 52, 71-76.

change yards would be provided at strategic points along the belt line and seven out of ten lines now entering the central areas of the city would be abandoned and freight service provided by trucks. Another proposal is the construction of "badly-needed suburban passenger stations."

Up Ahead presents only planning proposals, but the Economic Supplement to Up Ahead[15] presents the methods and background materials used in the plan's preparation: a study of the city's development as a rail center, a statement of the topographic characteristics of the city which helped establish the original rail routes into the city, and a survey of the operational characteristics of the terminal areas. Several basic problems are noted: obsolete facilities, duplication of lines, slowness of interchange operations, freight movement congestion in central areas of the city, and excessive through freight traffic entering central areas.

While the chief emphasis of the plan is placed upon the provision of adequate physical facilities for handling future freight volumes, the Commission recognizes the tremendous capital outlays required to implement its proposals and suggests that further studies be made of the possibilities of joint operation or public construction of the belt line.

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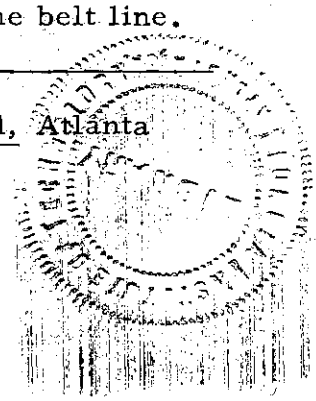
[15] Atlanta, Ga., Economic Supplement to Up Ahead, Atlanta Metropolitan Planning Commission, 1952, pp. 153-168.



It also suggests:

> Fortunately many parts of the belt line as proposed will appear as natural development possibilities for individual railroads, due to the necessity of tying together rapidly growing industrial areas on the periphery of metropolitan Atlanta. Progress of construction will depend wholly upon current needs for such expansion and the amount of capital available to the railroads for such a project. It is difficult to say which parts will be built first but with the rapid development of the circumferential industrial pattern, there is no doubt that at least two-thirds of the belt line will come about naturally without any overall planning to achieve such an end.[16]

On May 29, 1952, at a public hearing on the railroad section of the land use plan, railroad executives attacked the entire project as unreasonable and economically unjustified. The railroads objected to the additional grade separations required by the plan, the abandonment of central lines and the loss of individual railway responsibility which would be entailed in the joint operation of the belt line. As a result of this hearing, the Commission agreed to work with a committee appointed by the railroads to restudy the matter. At a meeting on November 14, 1952, the Commission again met the representatives of the railroads. Although both sides agreed to work together on further plans, no attempts have been made to find new proposals for the future railroad system.

Corpus Christi, Texas.--Planning for the development of a better railroad system in Corpus Christi has been the result of numerous attempts to provide better port facilities in that city. The primary problem in

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[16] Ibid., p. 166.

transport planning is the existence of a bascule bridge which has prevented the efficient use of the ship channel. The replacement of this bridge would involve radical changes in the rail and street system of the city. Several public and private agencies have been engaged in the preparation of comprehensive plans for a coordinated transport system.[17]

The Area Development Committee of the Corpus Christi Chamber of Commerce was requested in 1950 by the city government to consider methods of expediting study of the bridge problem. The committee, seeing that this presented an opportunity for long-range planning, entered into a contract with Harland Bartholomew and Associates for the development of a comprehensive area plan. This plan represents the first attempt to deal with transport problems as part of a comprehensive study of urban problems in Corpus Christi and contains recommendations for extensive modification of the existing rail pattern.

The methods employed in this plan include a general survey of the development of the railways in the city and a line-by-line description of the various roads and their installations; the relation of the railroads to industrial districts; volumes of interchange traffic between the various roads; and an analysis of the operations of the Corpus

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[17] Corpus Christi, Texas, Area Development Plan, Streets, Highways, and Transportation, Corpus Christi, Chamber of Commerce, 1951, pp. 32-51, 62-75.

Christi Terminal Association, a jointly-operated facility serving the port.

The original proposals of the plan included the construction of a new classification yard, freight house, passenger station and freight service facilities for the Southern Pacific Railroad; the construction of a new single-track railroad lift bridge across the upper channel, the abandonment of several tracks and the construction of a joint interchange yard; the extension of the Corpus Christi Terminal Association lines; and the relocation of the Missouri-Pacific Houston-Brownsville line through the city to provide better passenger service. Work programs and the comparative costs of alternative plans are included in the study because the city was obligated to pay for the relocation and reconstruction of the Southern Pacific installations.

This plan has served as a proposal for further study, and the City and County governments, the Navigation District, the Area Development Committee, the State Highway Department, and the Corps of Engineers of the United States Army have restudied the problem since the appearance of this plan. The basic proposals of the railroad section have been retained as the best yet developed in the belief that the long-range aspects of the plan more than outweigh the prospect of savings which could be obtained through less ambitious

programs.[18] Although the plan has not yet been put into effect, the agencies involved in the transportation planning program have agreed to work out arrangements leading to an early realization of the program.

New Orleans, Louisiana.--The most spectacular results of a comprehensive railroad planning program are those of New Orleans.[19] While the most readily apparent feature of the program is the modern Union Passenger Terminal, the entire project requires the expenditure of about $56,000,000 to construct the station and yards to serve it and to eliminate the grade-crossing problems of the city. The dedication of the Union Passenger Terminal on May 1, 1954, is the climax of sixteen years of planning for a better railroad system. (See Fig. 4).

In 1938, the New Orleans Planning Commission faced the problems of traffic congestion compounded by 144 rail-major street grade crossings. As railroad problems represented a major part of the local planning program, a committee representing the eight railroads serving the city, the city government, and local business interests was formed to act as a liasion between the city and the rail-

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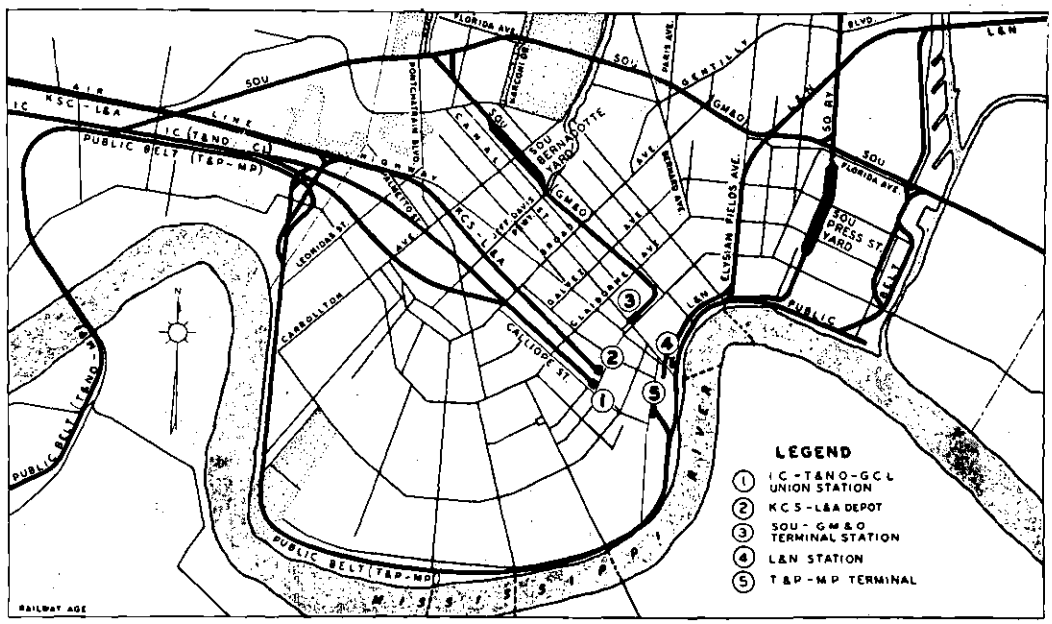
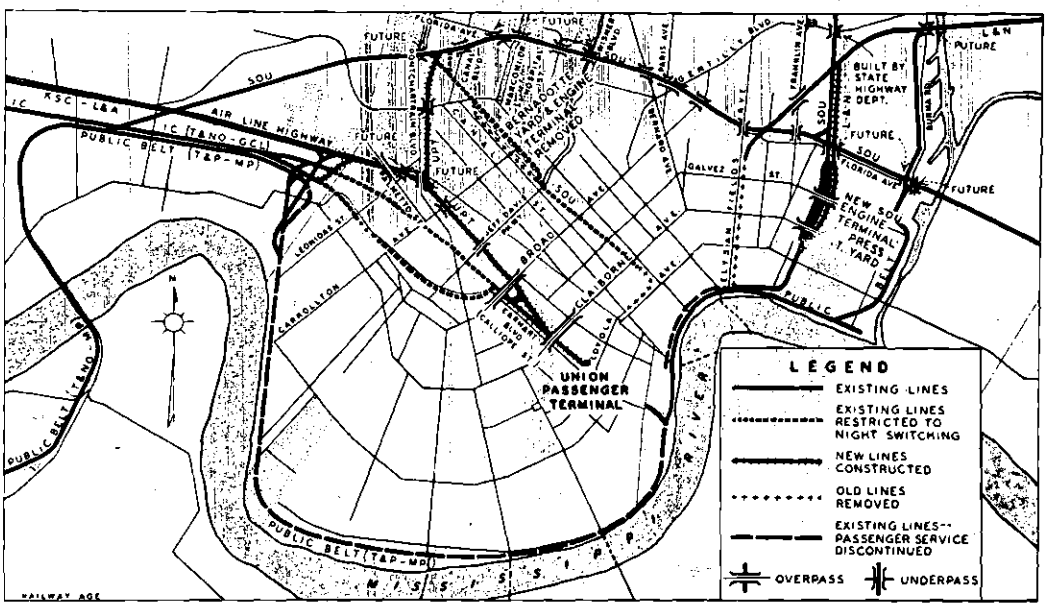
[18] A mimeographed report of March 15, 1954, issued by the Chamber of Commerce of Corpus Christi, reviews the outstanding developments of the transportation planning program.

[19] See Railway Age, Vol. 136, No. 17, pp. 22-33, for discussion of both the planning and railroad aspects of the New Orleans Program.



DOWNTOWN NEW ORLEANS was ringed by main railroad lines, with grade crossings at every turn. This map depicts conditions as they were before the grade crossing elimination-Union Passenger Terminal project started. Railroad passenger trains used five different stations. The platforms of two of these stations crossed important downtown streets, necessitating blocking traffic whenever trains arrived, or were placed for departure. To make matters worse, these stations were busiest when the need for the streets was most acute.



HOW RAIL NETWORK WILL APPEAR when all of the grade separation projects now completed, underway or planned for the future are in service. The new routes being used by the passenger trains of the railroads serving New Orleans are shown, together with the old routes which have been abandoned or restricted to night-time switching. The right of way of the IC's old southbound main line is being used for an extension of Earhart boulevard westward to the city limits, with tracks being relocated alongside the boulevard to provide access for industrial switching.

--Railway Age, April 26, 1954, pp. 22-23

Fig. 4

New Orleans Rail Patterns Before and After the Plan

ways in the study of possible solutions to their common problems. The Planning Commission realized that it had to obtain the cooperation of the railways to solve the city's traffic congestion problems. In developing its program for major streets and expressways, the railroads were consulting on grade-crossing programs. The rail executives, in turn, recognized the impossibility of solving local problems without their participation, and they finally agreed to use a publicly-constructed passenger terminal and to abandon their downtown lines.

The achievements in New Orleans represent the best efforts of the public planning officials and railway executives in attempting to find solutions to common problems. The project has involved large expenditures, but the parties to the program will in the long-run benefit from each expenditure. The city, realizing the inability of the railroads to expend large sums for passenger service improvements, has obtained financing for the construction of the passenger terminal and related yards, while the railroads have assumed the responsibility of retiring the bonds issued. New Orleans is one of the few cities which can point to its railroad planning program with pride.

Shortcomings in Present Railroad Planning

In the plans discussed above and others reviewed in the preparation of this study, the basic approach to the technical problems of railroad plannings has been, with minor variations, the following:

a brief survey of existing railroad operations and installations; a statement of the adequacy of each facility; statements of the need for reroutings, consolidations, grade crossing elimination, and other planning programs. But the plans have, with the exception of the New Orleans program, neglected the necessity of studying means of effectuating the technical proposals. As a result they have generally neither produced physical changes in the rail system nor resulted in more detailed studies of the problems raised in the general survey.

Failure to establish working relationships with railroads. --At the outset of any railroad planning program, the planner should attempt to seek the advice of responsible railroad officials to obtain information on local rail problems and suggestions for their solution. The planning agency must generally rely upon the soundness of its plans and the cooperation of the railroad executives to effectuate its plans because it seldom has the authority needed to force compliance. The most likely way to achieve desired results would seem to lie in the establishment of sound working relationships between the railroads and the public agency and the actual participation of the railways in the planning process. Too often the railroads are confronted at a public hearing with a detailed plan which has been prepared with little help or advice from the railroads themselves. Regardless of the technical merits of the plan, the railroads will be reluctant to accept proposals which have been formulated without their advice.

Reliance upon general principles rather than local needs.--The planning principles -- the promotion of jointly-operated facilities, the provision of belt lines for freight service, grade separation programs, and the reliance of public authorities -- are to deeply ingrained in the planner that he may accept them without question and attempt to apply them to local situations which require other solutions. Sometimes the use of a consultant may magnify this problem as he may be prone to make a quick survey of local problems and to apply a formula or set of general principles to the local problem. Since the preparation of railroad planning programs requires a continuing study of technical and practical problems, the planner should always attempt to identify local problems and to reach solutions tailored to the peculiar needs of the city. A thorough knowledge of all aspects of the rail problem can be gained only through analysis of the local system. Planning results can be expected only when the technical solutions proposed are adequate answers to the peculiarities of the city's rail system.

Costs and benefits.--Considerations of the approximate costs of suggested improvements and the benefits accruing to the public and the railroads should be a part of even the most preliminary planning studies. The economic considerations of a play may in the long-run determine the superiority of one plan over alternative solutions. The establishment of the scale of planning proposals and suggestions for the division

of costs among interested agencies may help remove some of the skepticism of both railroad and public officials and may establish a basis for discussion of the urgency of different aspects of the rail problem.

Artificial political boundaries.--The existence of city limits and state or county lines which limit the jurisdiction of the planning agency often represents a serious matter in all phases of comprehensive planning. This problem is especially serious in the planning of transportation systems since a large portion of the city's traffic problem may originate in outlying areas. Railroad facilities are sometimes located in suburban areas and the planning agency may be unable to make proposals to handle the problems of such installations. The planner should make every attempt to deal with the rail problems of the entire urbanized area because transport problems cut across artificial boundaries. Plans for improvements within the city may be future unless the entire problem is considered and necessary recommendations made to improve parts of the system lying outside the planner's jurisdiction.

Failure to stimulate further study.--General planning surveys of the of the railroad system cannot always be expected to produce immediate changes in the physical pattern of the railways. The recommendations of the survey may require continuing intensive study before they reach the "blue-print" stage. But too often the plan has been adopted by the planning body as part of a master planning program and no attempts have been made to stimulate analysis of the problem it has raised.

Railroad plans can produce desired changes in rail patterns only if greater attention is given to methods for their implementation.

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CHAPTER III

PROPOSALS FOR RAILROAD PLANNING

As transportation is but one of the elements of the modern urban pattern, plans for the development of more efficient transportation systems should be prepared as part of a comprehensive planning program. Railways, highways, waterways, pipelines, and airways are all service industries in that they provide transportation for the basic industry and commerce of the city. Plans for their development cannot be made intelligently until the general pattern, size, and nature of the future city have been determined. Basic planning studies such as the land-use plan, population projections, and economic-base studies should have already established the future character of the city before plans for future transportation are developed. Future population size and distribution will to a great extent set the requirements for passenger service; the type and location of industrial and commercial development will indicate the needs for freight service.

In addition to studies of the city proper, attention should be given to the development of the contiguous region. Many transportation problems are caused by traffic having no local origin or destination. It merely passes through the urban area bound for other points. Clas-

sification yards, service facilities, and terminal installations often handle more through traffic than local traffic. Changes in the industrial, agricultural, or economic nature of the region will be felt by the city's transportation systems, and may require changes in the physical pattern of transport facilities to meet new traffic conditions.

A Program for Transportation Planning

Policy decisions.--Before attempting to plan specific transportation facilities, the planning agency should attempt to gain an understanding of the operations, prospects, and peculiar advantages of each transport agency. Comparative costs and flexibility of service, interference with other urban functions, and space requirements should be used as bases for determining transportation policies and establishing the role that each carrier is to play in a coordinated urban transportation system.

In the policy-making stage every attempt should be made to establish sound working relationships with responsible officials of each carrier. In many cases the officials will be able to help the planner develop plans and policies by presenting the possibilities offered by each form of transport. Their willingness to cooperate in the preliminary planning stages may indicate the degree of cooperation which can be expected in the future.

The role of each carrier.--In preparing a program to meet future transport needs, the planning agency should determine the peculiar abilities of each form of transport to perform special services; the comparative shipper and public costs of such service; the adequacy of the present system to serve future needs and the amount of physical modification required to perform efficient future service; possibilities of coordination with other forms of transport; and technological advances which may change physical and operational characteristics.

After these factors have been considered, the planner should be able to analyze the special problems of railroads, street systems, air service, waterways, and other forms of transport serving the city. Since the transportation requirements of each city are different, no definite order can be established for carrying out individual studies. A general guide might be: the first study should promise the best chance for action. The planner cannot afford to waste time and money preparing plans which may never be used.

The Railroad Plan

Regardless of the form a final report or plan may take, a comprehensive study of the railroad system consists of two distinct parts: a general survey of present facilities and services and future needs; and detailed plans for future action. In handling these two elements as different aspects of the same problem, the planning agency should

be able to determine at an early stage the possibilities for progress, and in so doing establish the degree of detail required for useful plans. At every stage of his work, the planner should ask himself two questions: "What are the prospects for effectuating this plan?" and "Are there other studies which might produce better returns for the city?"

The Railroad Survey

The basic elements of the railroad survey are: an inventory of existing railway lines and facilities; an analysis of the physical and operational patterns; the identification of special problems, the establishment of the scale of needed revisions; the preparation of preliminary planning proposals to solve rail problems; and a study of means of effectuating the planning program. The survey may be only the beginning of a comprehensive rail planning program, or it may be the only railroad study prepared by the planning agency if rail problems are not serious enough to warrant furthur study or if limited planning budgets require that the study be dropped in favor of more pressing projects. In any case, the study should be prepared carefully as it is a basis for more-detailed study by public and private agencies interested in local rail problems.

Inventory of existing facilities.--Information on the location, capacity, age, and efficiency of all parts of the rail network is the foundation of

the rail planning program. The planner should obtain from the railroads maps of all existing and proposed installations together with estimates of their adequacy for present and expected future traffic. In presenting this information on a map, the planner should decide whether specific areas should be indicated or whether symbols will present a sufficient picture of the facilities. Detailed maps of complicated areas should be obtained as a basis for later studies that may be required to solve problems in these areas. Particular attention should be given the location of interchange tracks and the relation of classification yards to terminals and other facilities because the locations of these facilities are carefully planned by the railroads to entail the smallest possible operating costs.

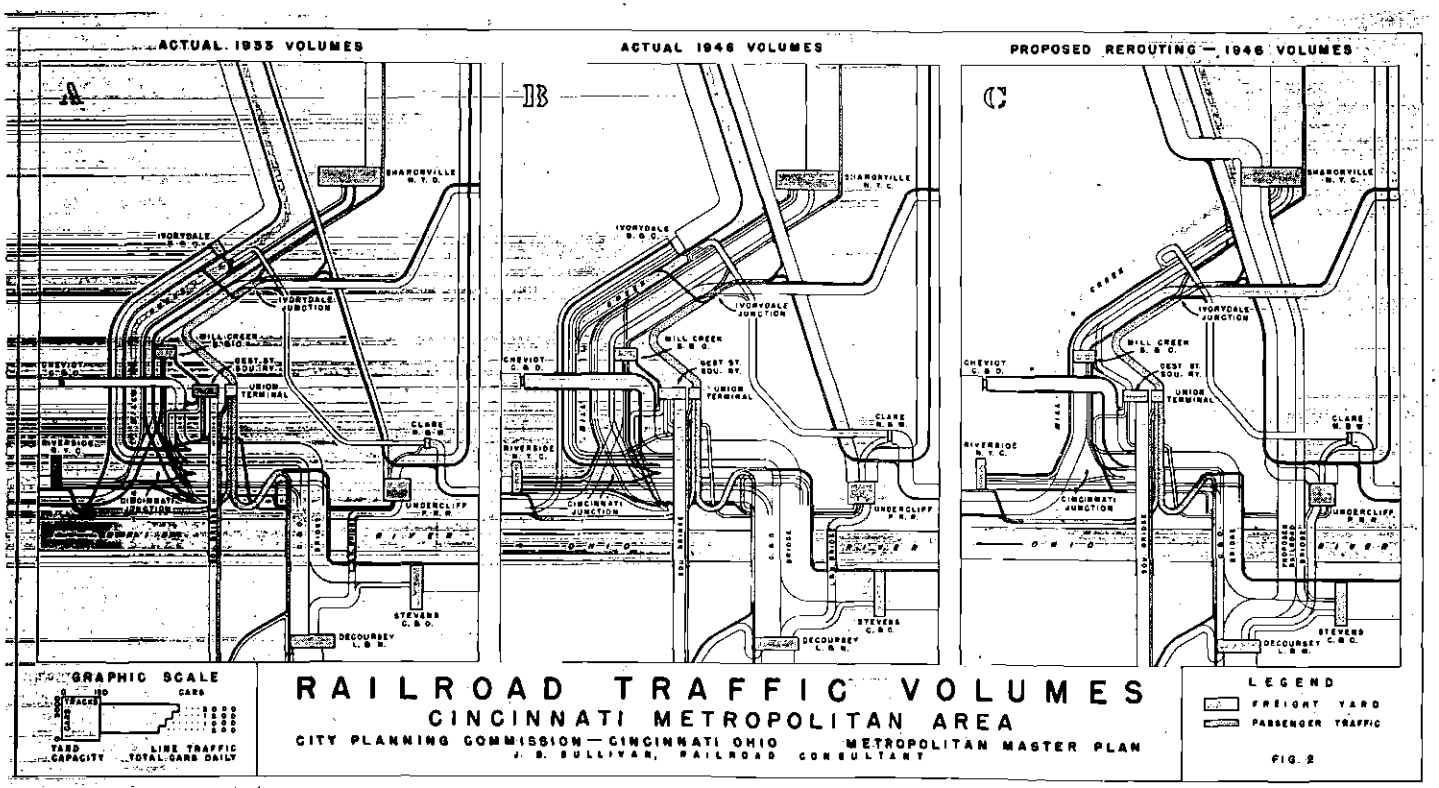
Physical and operational patterns. --After the inventory has been completed, the planner should establish the relationships between the different rail systems operating in the community. Interchange routes, joint facilities, reciprocal switching agreements, and traffic volumes handled in all areas must be evaluated in relation to the problems of each system and to the overall urban rail system. The best sources of information on the operational aspects of rail installations are the railroad employees who are most directly affected by operational problems. Top executives are often unaware of small but difficult problems, but they should be consulted to obtain permission to work directly with operating personnel. All information developed in the study should be

made available to the executives.

The relative importance of different lines and facilities may be readily seen in traffic flow diagrams. (See Fig. 5). In compiling data for the preparation of such diagrams, both the number of trains using each line and the number of cars moved should be considered since either of these indices may be deceptive unless both are considered together. Such a diagram should indicate those lines which are basic to the rail pattern and those which act only as minor adjuncts. Congestion, circuitous routings, and lightly-used lines are clearly shown in the flow diagram.

During the preparation of this study uneconomic railroad practices and the relative competitive positions of the various roads may become apparent. While many of the problems will be beyond the scope of the planning program, an understanding of them will be useful as back-ground material for dealing with the officials. Problems of railroad labor, taxes, and shortage of capital may never appear in a plan or proposal; but they will help establish in the planner's mind an idea of the railroads' own problems.

Identification of special problems.--From the general study special local problems will become apparent: the age and adequacy of terminals, grade crossing problems, congestion of lines and installations, availability of special facilities for handling bulk products, service to



--From A Plan for Facilitating Rail Freight Movements in the Cincinnati Area, pp. 5-6.

Fig. 5

A Flow Diagram of Rail Car Movements

existing and proposed commercial and industrial areas, blighting effects of railways on residential districts, the need for bypassing through rail traffic, and many other problems may be critical in different cities. At this stage in the planning program no more than preliminary proposals should be developed for the solution of these problems as working plans would require much more-detailed study. Special attention should, however, be given the urgency of each problem and priorities should be established for further work.

Scale of planning program.--At this point the planner should be able to set the scale of programs required to produce an efficient rail system. Because any changes in the physical rail pattern involve capital expenditures, the planner should consider the costs of a program of rebuilding or revising the rail system. Any attempt to avoid cost considerations may leave the planner open to criticism from the railroads and public officials and may jeopardize the entire rail planning program.

Preliminary planning proposals.--Preliminary plans for solving rail problems should be prepared as bases for discussion and further study. Such plans might include proposals for joint terminals, grade-crossing separation programs, the construction of belt lines, and any other projects which give promise of solving local problems. These proposals, however, should not be accepted as final determinations but as steps in preparing more-detailed plans. Although these plans are the result of serious study, the planning agency should not expect rail

executives to agree with all suggestions. Rather, plans should be used to summarize present planning thinking and to serve as the basis for discussion to bring out new thinking on the problems involved.

Proposals for plan effectuation.--The planning survey should attempt to establish sound working relationships with all parties interested in railroad planning. Part of the study should be an investigation of the means used in other cities to effectuate plans to determine the applicability of such procedures to local problems. Special attention should be given the experience of other cities employing transport councils, railroad committees, or quasi-public authorities as agencies for handling detailed planning and the effectuation of such plans.

Relation of railroads to urban development.--The planning agency should seek to establish the effects of railroads upon all segments of urban development. Rail service is often required in industrial areas but it may also contribute directly and indirectly to street congestion, grade-crossing problems, and blighted commercial and residential areas. Coal-burning engines still pour clouds of smoke over surrounding areas in many cities, and the noise and depressing appearance of yards and shops have an inhibiting influence on otherwise sound areas. A careful study of the effects of railways on surrounding lands should not only determine the causes of the problems but should also suggest means of utilizing lands adjacent to rail facilities and of arresting the

harmful effects and nuisances of rail operations.[1] The recommendations of every special study should be analyzed to determine the possible effects which such proposals may have on adjacent lands.[2] In some cases, such determinations will indicate the superiority of one proposal over another when both might present equally feasible solutions to purely operational problems.

Use of survey. --The general railroad survey is not a final plan and should not be used as such. It is rather a preliminary proposal which requires further study before it could be adopted as a basis for action. In setting the goals of local railroad planning the survey should indicate the roles public and private agencies should play in its effectuation. Using the survey as a guide, private and public officials may be able to work out detailed plans under the supervision of the planning agency should that agency be unable to carry out the detailed planning program.

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[1]The American Public Health Association in An Appraisal Method for Measuring the Quality of Housing, Part III, Appraisal of Neighborhood Environment, New York City, American Public Health Association, 1950, has attempted to establish objective standards to determine the effects of railroads on residential areas. A study of this work should give the planner some excellent ideas of the effects of railroads on residential areas and may offer suggestions for studying other land uses. See especially pp. 64-65 and pp. 124-127.

[2]See City Planning Commission of Cincinnati, op. cit., pp. 10-19.

Detailed Railroad Plans

Detailed railroad plans analyze in greater depth the recommendations of the preliminary survey and present specific programs for improving urban rail conditions. The survey has established the problems and recommended courses of action; detailed plans reexamine the premises of the survey and make concrete proposals for the location, size, costs, and operations of needed changes. Detailed plans for special facilities and services consider technical and practical difficulties and suggest means of overcoming these problems.

Before attempting to solve special problems, the planner should reexamine the general premises of the railroad survey in the light of changes in the land use plan, population projections, the zoning ordinance, and other parts of the comprehensive planning program. The effect of these changes upon railroad proposals should be evaluated and revisions made where necessary. Looking to the future needs of the city, the planner should then outline a program of studies required for the development of better rail service. In scheduling studies the planning director should tailor the railroad program to the overall planning program to insure the efficient use of his staff.

Special Technical Studies

Studies of special local rail problems constitute the most complex part of a railroad planning program. Each city faces different

rail problems and must adopt its own methods for handling them. But some problems are widespread. An analysis of the elements of the more common problems and techniques used to study and solve these problems may be a valuable guide to the planner who is attempting to investigate local planning problems.

Freight Terminals

The location and operation of freight terminals present problems to both railroad executives and urban planners. The freight house is seldom the final destination of a shipment but a point at which freight is transferred from one medium of transportation to another. In cities motor vehicles are generally used to move shipments from the rail terminal to the consignee, and when terminals are located in built-up areas with inadequate space for truck loading and parking, trucks must use city streets, thereby adding to congestion problems. If a city is served by more than one railway, each road may maintain one or more terminals to serve its own patrons.

Elements of the terminal problem.--An adequate system of freight terminals is one which permits economic rail operations, adequate service to shipping public, and a minimum of interference with urban development. Modern rail operations require facilities for less-than-carload shipments, express and freight forwarder service, team tracks for carload shipments, and in the future will need facilities to

handle "piggyback" traffic. The locational requirements of each type of facility can be determined through a study of the users of each service and the distances and costs of delivering goods to the user's door.

Although planners have generally felt that the best interests of the city and users of freight service would best be served by joint terminal facilities, local situations may indicate other solutions. The following factors should be considered before specific proposals are made for handling freight terminals:

1. the present adequacy of facilities to handle present and future traffic;

2. the relation of facilities to present and future commercial and industrial development;

3. the relation of facilities to major streets and highways;

4. the possibility of modernizing existing terminals through the use of advanced methods of loading and storing freight.

5. the effects of changing operational methods and technological advances upon terminal requirements;

6. the willingness of the railroads to cooperate in the construction and operation of joint facilities.

Determining local needs.--The planner should obtain data on the use of each facility to ascertain the adequacy of existing terminals and the need for future expansion of facilities. The costs of terminal operations should be studied to indicate uneconomic practices which re-

sult in excessive charges to users of freight service. The relation of the terminal to users of freight service may be determined by a study of bills of lading. Such an analysis will indicate those areas which require freight service and, if the distances between terminals and users are excessive, may suggest more appropriate locations. Excessive trucking distances may add to provide terminals which are near the shippers.

The space requirements for truck loading and rail car storage should be studied as present locations may entail an uneconomic use of lands which might better be devoted to commercial or industrial developments. Team tracks and "piggyback" installations require relatively large areas of level land. The flexibility of the motor truck makes possible the location of such facilities in outlying areas where land costs are low and where truck movements will cause a minimum of street congestion.

Problems of joint facilities.--While planners generally accept joint facilities as the most efficient method of solving local terminal problems, railroad officials are often less than enthusiastic over such proposals. Each railroad is jealous of its real and imagined competitive advantages over other roads and it resents any effort to eliminate these advantages. Rail freight officials also dislike the prospect of turning over their business to an agency over which they have no direct control. But if a system of joint-facilities offers the possibility of

Support by railway officials may be secured for such a project. In any case, the realization of a program for joint railroad terminals will require continuing study of the details of constructing and operating such facilities.

Passenger service

Although the railroads are losing substantial portions of their passenger business, many cities still depend upon the rails for long distance and commuter service. In New York and Chicago, commuter services provide an efficient method of bringing large numbers of people from their homes in the suburbs to the employment centers of the city. Important business and recreational centers handle large volumes of intercity rail passengers.

Planning problems.--In handling passenger service as part of a planning program, the planner should first determine the future need for rail passenger service in his city. Such determinations should be made from a study of the future size and location of the population of the city, the development of other means of transportation and the general activities in the city which will require the movement of people. He should then attempt to gain an understanding of the passenger operations of the railroads serving the city to determine the effects that special promotional activities might have on local passenger service. Finally

the planner should consider the adequacy of present passenger terminals in providing efficient, convenient, and comfortable service to passengers, and adequate space for the storage and servicing of passenger equipment.

Union passenger terminals. --The best justification for recommending unification of terminals is not the provision of convenience for passengers but the elimination of unnecessary lines and facilities which add to urban congestion and traffic problems. The New Orleans Union Passenger Terminal was justified primarily on this basis rather than on the ground of passenger convenience.[3] This approach represents sound planning policy. As passenger service is unprofitable for the railroads, any expensive modifications of the terminal system will probably have to be financed by public moneys. The railways will generally agree to pay rentals for the use of publicly-financed union stations but they will not make large capital expenditures on passenger installations.

Commutation service. --Commutation service today may be characterized as unprofitable, uncomfortable, and inconvenient. Public action and possibly subsidies will be required to improve the financial condition of many commuter operations to secure better service to passengers. Good commutation service requires: central terminals to handle heavy peak-hour passenger loads; adequate suburban stations, fast, frequent schedule, and the use of equipment and installations at off-hours to reduce the overhead of idle equipment. In order to

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[3] See above, pp. 54-56.

provide such service at reasonable fares, public ownership of the lines or subsidization of privately-owned lines may be required.

Line Abandonments, Relocations, Extensions.

Changes in the location of terminals or other rail installations frequently involve line abandonments, relocations, or extensions. Often in the normal course of rail operation, lines must be extended to serve new areas or must be abandoned when their operation is no longer profitable and their service no longer needed.

Planning considerations.--The planner must consider the operational aspects of each line and he should also determine the effects of each route upon adjacent urban development. If certain areas are adversely affected by operationally unimportant lines, studies should be made for their relocation or for the provision of service by other means of transportation or on different tracks. In all such cases studies should be made to determine the costs of such changes and the benefits accruing to the different parts of the city and the railroads.

Sometimes a railroad might wish to abandon a line which is at present producing little revenue. But if such a line represents an important element of the future rail pattern, the planner should attempt to secure the retention of the line as it would be extremely difficult to find a new right-of-way once a line has been abandoned. Likewise, new rail leads might be needed to serve areas due for in-

dustrial development, but a shortage of capital may prevent a railroad from constructing the needed line. A public authority with power to construct needed lines and facilities might be able to build such additions and lease them to private operators.

All projects of line abandonment, relocation, and extension must be economically justified if public expenditures are indicated. In addition, particular attention should be given the possible effects of the change on urban development and special plans prepared for the use of lands made available for new purposes. The function of each line as part of a coordinated rail network and the effects of the line on surrounding urban development will determine the course of action which should be taken by the planner

Grade Crossing Problems[4]

The planning approach to grade crossing problems has advanced greatly from the early attitude that all grade crossings should be separated or eliminated. Today greater emphasis is placed upon problems of traffic movement than upon the hazards of highway-railroad grade crossings because modern signals and protective devices can eliminate

[4]The material in this section is taken largely from The Railway - Highway Grade Crossing Problem, by Kenneth A. Beggs, Stanford, California, Stanford Research Institute, 1952. This is the most comprehensive study of the economic principles of grade-crossing maintenance, elimination, protection, and separation and it should be in the library of every transportation planner.

all preventable accidents. There is serious question of the economic feasibility of attempting to prevent accidents caused by carelessness or neglect.

Planning considerations.--Each grade crossing within the planning area should be economically justified through a study of vehicular, rail, and pedestrian use to determine the need for a crossing. Many existing crossings will prove unnecessary and means may be indicated for their elimination. In analyzing the problems and use of each crossing, the planner should determine those crossings which require immediate action and plans for protection or separation. Of special importance are the economic losses of time caused by rail and vehicular interference.

Costs and benefits.--Any program of grade crossing elimination, protection, and separation must include studies of the costs and benefits of each project. One of the most basic parts of the plan is the distribution of costs and benefits accruing to each interest. No attempts should be made to set-up a "fixed-percentage" basis for the allocations of costs because each project will benefit the various parties in different degrees.

Justification of each project.--The preparation of grade crossing improvement programs should reject entirely the "principle" that all major streets should be separated from railways at crossings. The proposed major street plan, the number of problem crossings, the cost of im-

provements, the possibility of obtaining substantial railroad participation, the density of rail and street traffic, and public policies for handling grade crossings should be the determinants of the planning program rather than a reliance upon a generality which may be totally inapplicable in a local situation. These determinations should be used to set the scale of elimination programs, and the speed with which such programs should be carried out.

Other Special Problems

Belt lines. -- In cities handling large volumes of through freight movements, belt lines are often suggested as bypasses to remove all possible traffic from central areas and eliminate the need for numerous lines in the heart of the city. While the belt line offers a sensible approach to problems of rail congestion and interchanges between lines, many railroads oppose their development fearing they might adversely affect that road's competitive position. In determining the need for belt lines the planner should make careful studies of the amount of traffic entering the urban area which is of a through nature and has no local origin or destination. The costs of providing a belt line should be compared with the savings which could be realized through its operation. As the belt line represents a large capital outlay, a public authority might be needed to construct the line which could then be operated as a public project or through lease to the various railroads serving the city.

Classification yards.--In some cities, present rail yards are poorly located in relation to the needs of the railroad and the city. In such cases, every attempt should be made to find new areas in which large yards could be located to provide more economical rail operations and offer less interference with desired urban growth. In preparing plans for the relocation of yards, the planner should attempt to serve as an advisor to railroad engineers who determine the specific location and character of the various facilities required for efficient rail operations.

Other studies of rail rates and fares, interchange operations, reciprocal switching agreements, and special terminal facilities are generally beyond the scope of the planning agency, but in some cities they may represent problems of great importance. In such cases, the planner should attempt to encourage the study of the problems by those best qualified to do so. In the final analysis, no problem is beyond the realm of the planning program if it influences other elements of the city, because the planner's task is to discover the problems of his city, analyze them, and make or obtain proposals for their solution.

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(In addition to those references cited following Chapter II, pp. 61-63, the following studies may be of value to the planner:)

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CHAPTER IV

SUMMARY

Because transportation is a basic element of the modern city, planning for the development of an integrated transportation system represents a major challenge to the urban planner. The existence of the city depends largely upon its ability to provide efficient systems for the movement of people and goods. In freight service the railroads are the chief carrier of long-distance bulk traffic and despite technological advances which have made waterways, airlines, motor carriers, and pipelines major competitors for freight business, the railways will continue to handle a major portion of industrial and bulk freight. The importance of the railroads as a passenger carriers will continue to decline in the face of increasing use of the private automobile. The railways are attempting to concentrate on long-distance and heavy density passenger service in an attempt to lower the deficits which have been incurred in the operation of low-density passenger service.

Transportation requirements are directly affected by the general economic activity of the country. Today transportation needs are increasing with the growing national population and more extensive industrial development. New lines and facilities will be needed to meet the requirements of heavier traffic and the urban planner is today in

a position to see that these installations conform with the desired future urban pattern.

Railroad installations including lines, terminals, yards, shops, and offices are large users of urban land. The pattern of such facilities has developed largely without plan as a result of the attempts of individual railroads to secure competitive advantages over other roads. The present rail network may contain unneeded duplications of terminals, lines, and yards, many of which are obsolete and poorly located in relation to the other elements of the city. Terminal problems represent a major difficulty for the railroad executive and the planner as inefficient terminals have been responsible for the diversion of much high-rated freight to motor carriers and have contributed to urban congestion. When the railways recognize the seriousness of the problems facing the entire industry they will probably work together to produce more efficient operations through the use of jointly-operated facilities and lines to simplify terminal operations, reduce costs, and alleviate rail congestion and conflict with the proper development of the city.

Early planners were little interested in developing comprehensive railroad plans but concentrated on monumental passenger terminals designed to impress visitors to the city. More recently, leading planners have advanced "principles" for the development of comprehensive railroad plans. Unfortunately, many of these principles will not solve local problems. Too much attention has been given the

technical aspects of railroad planning and too little emphasis has been placed upon the development of better working relationships with the railroads which may be needed to implement the proposals of a planning program. As a result, existing railroad plans have seldom produced needed rail modifications, and in many cases, well-prepared plans have not even stimulated further discussion and study of local rail planning problems.

The development of a comprehensive program of railroad planning is a complicated, time-consuming procedure which requires the cooperation of the planner, the railroad executive, and the public official. The chief elements of such a program are:

1. General determinations of the future size, composition, and character of the city to provide a framework of future transportation requirements of the city and region.

2. Establishment of a transportation policy to set the role that each transport agency is to play.

3. Development of a railroad survey consisting of an inventory and analysis of the existing rail pattern, the identification of special problems and the establishment of the scale of revisions needed to produce a coordinated system, the preparation of preliminary plans to serve as a basis for discussion and further study, and the determination of the best methods of implementing the proposals of the program.

4. Preparation of detailed plans to solve the most critical local railroad problems.

The goal of the planner in dealing with railroad problems should not be the preparation of a package plan but the development of a continuing program of planning to provide a system which will meet the needs of the future city. A flexible program, which can be modified to take advantage of technological advances and the expert advice of railroad engineers, offers a real hope of producing a vital rail network which can handle traffic efficiently and provide good service with a minimum of interference with the other urban activities.

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