

# RAIL AND RAIL-TRUCK TERMINALS: AN OPPORTUNITY IN URBAN TRANSPORTATION PLANNING

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The evolution of rail piggyback service as well as the debate on interstate rail operations and plant are topics extensively covered by other authors. This paper examines the rail plant and traffic trends in city areas. The 4,800-square mile Chicago region is used as a case study for railroads in urban markets. The location of railroad piggyback facilities is the principal topic covered since it is the author's hypothesis that the modernization of urban railplant can best be planned by the conscious implementation of stronger intermodal rail services and government policies toward such services.

•IN the last 15 years the nation's railroads have witnessed an unmistakable trend away from the general-purpose boxcar and toward intermodal service. Boxcar loading decreased some 48.5 percent, but in the same period trailer-on-flatcar (piggyback) loading increased 418 percent, so that in 1973 2.7 million trailers and containers were hauled by U.S. railroads (1).

Railroad executives appear to view these new traffic trends with mixed feelings. Boxcars are still being purchased in order to supply the on-line shippers with the transport medium they have traditionally required. While equipment purchases are also being made for intermodal trade, the executives are nervous as to the contribution to net income made by the intermodal tariff schedules. And, although the railroads appear to realize that their competitors are for the most part the trucking industry, there still exists a fear that the intermodal traffic salesman will ultimately take traffic away from the boxcar. The importance of that erosion lies in the heavy equipment investment in the traditional fleet (521,294 boxcars) and the physical plant that the industry maintains to serve the traditional traffic.

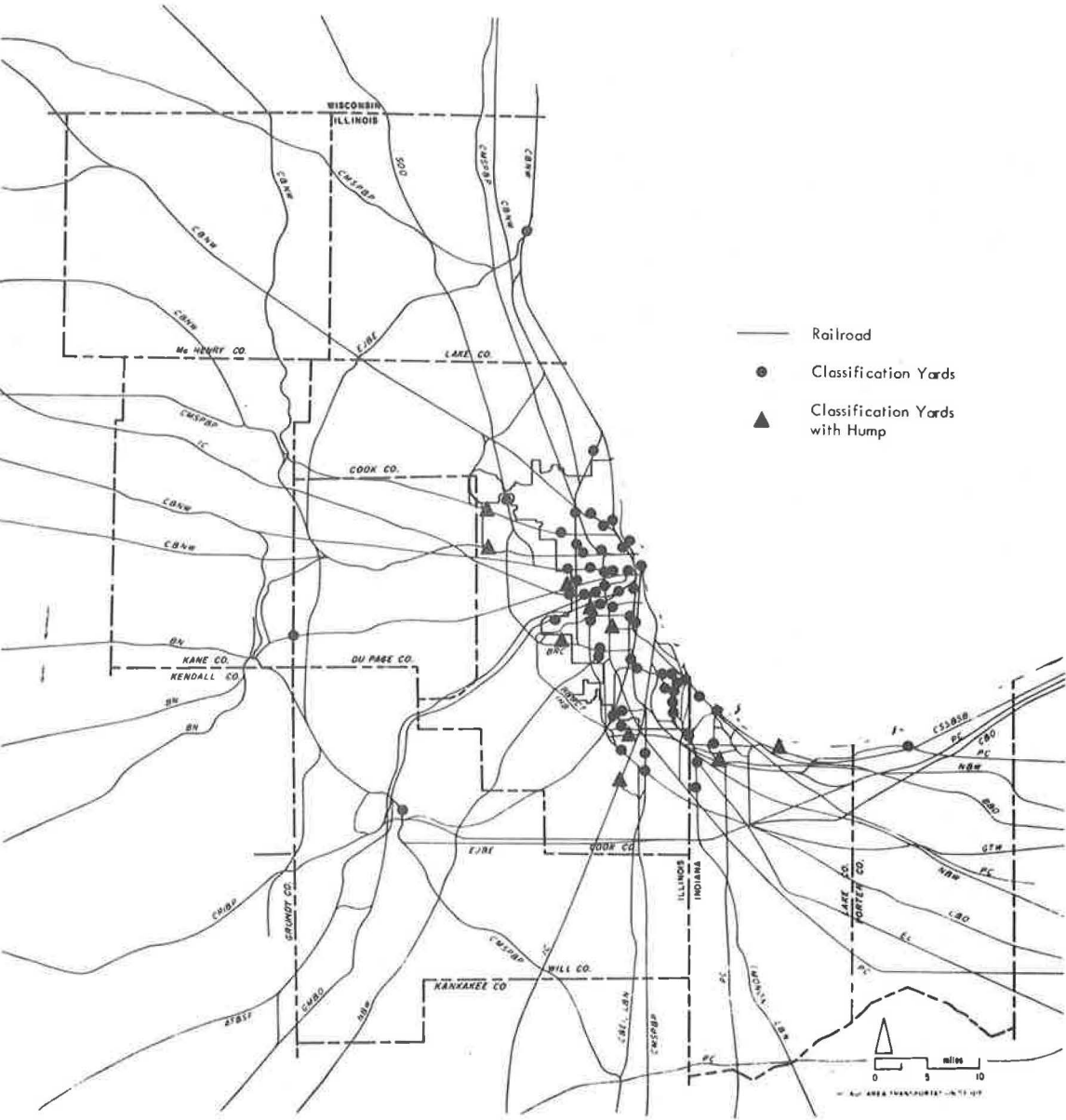
## CHICAGO AREA PLANT AND GENERAL TRENDS

The Chicago railroad plant as currently operated reflects 2 principal design features (Figure 1). The first feature is that there are 39 ways to get into town. Each company has at least 1 entrance right-of-way, and 1 company has 5 entrances. Contrast this situation with the Interstate Highway System, which has only 9 entrance routes to Chicago. Spreading their resources and maintenance expenses over this extensive network is one reason that the Chicago railways are of less than super-railroad standards. The highest Federal Railroad Administration safety track standard of any Chicago line rail route is but Class 4. The majority of the right-of-way is Class 3 or less (2).

The second design feature is the overbuilt network of yards and interchange trackage. Ten hump yards and 126 other yards saturate the region. Their daily capacity ranges from 10 to 5,000+ cars (3). So large is the rail plant that the total acreage owned by the industry makes it the second largest real estate owner in Chicagoland. Yet the industry's land is designed to serve a medium of transport that, if not dying, is certainly stagnant in terms of growth: the boxcar market. The most important question facing the planner interested in a healthy rail system may well be, What railroad plant is needed in an urban area? This question may even supersede the question of light-density rail lines, given the fantastic land values surrounding urban real estate.

The determination of optimum urban rail property depends on the relationship of many variables. However, one of the most pivotal factors is the future position of in-

Figure 1. Existing Chicago region railroad network.



termodal marketing and operations. Is it in the best interest of the community and the rail industry to encourage a mode shift to piggyback from the boxcar? There may only be one answer to that question.

In the last 15 years, Chicago's fastest growing areas for new industry have been in the north and northwest suburbs. This is unfortunate for the boxcar salesman, because Chicago's rail plant is concentrated elsewhere. Although there are no published statistics, it is nevertheless evident from secondary sources that rail siding plants formerly located in the City of Chicago have been relocating to off-rail sites. There are exceptions to this plant siting trend, but the overall trend is obvious. For those railroads that desire access to the off-line shipper, the answer is the truck-rail salesman.

How are Chicago intermodal operations responding to the needs of the off-line shipper? Very well, when the broad statistics are examined. There are 20 piggyback yards in the region (Figure 2). Depending on the source of statistics, the average daily traffic is in the range of 5,500 to 7,000 vans handled. Between 1960 and 1968, 75 percent of Chicago's piggyback yards had annual growths in excess of 10 percent. One quarter of Chicago's carriers exceeded an annual average growth rate of 20 percent during those 8 years. Even while national piggyback growth stagnated in the 1970-1971 period, almost all Chicago rail carriers were maintaining growth in their Chicago loadings; some railroads even continued to maintain annual rates in excess of 20 percent at Chicago.

Although the report card clearly reflects high marks for intermodal sales, rail management is going to face some tough issues. Let us discuss some of the more important of these.

### CHICAGO TRAFFIC FORECASTS

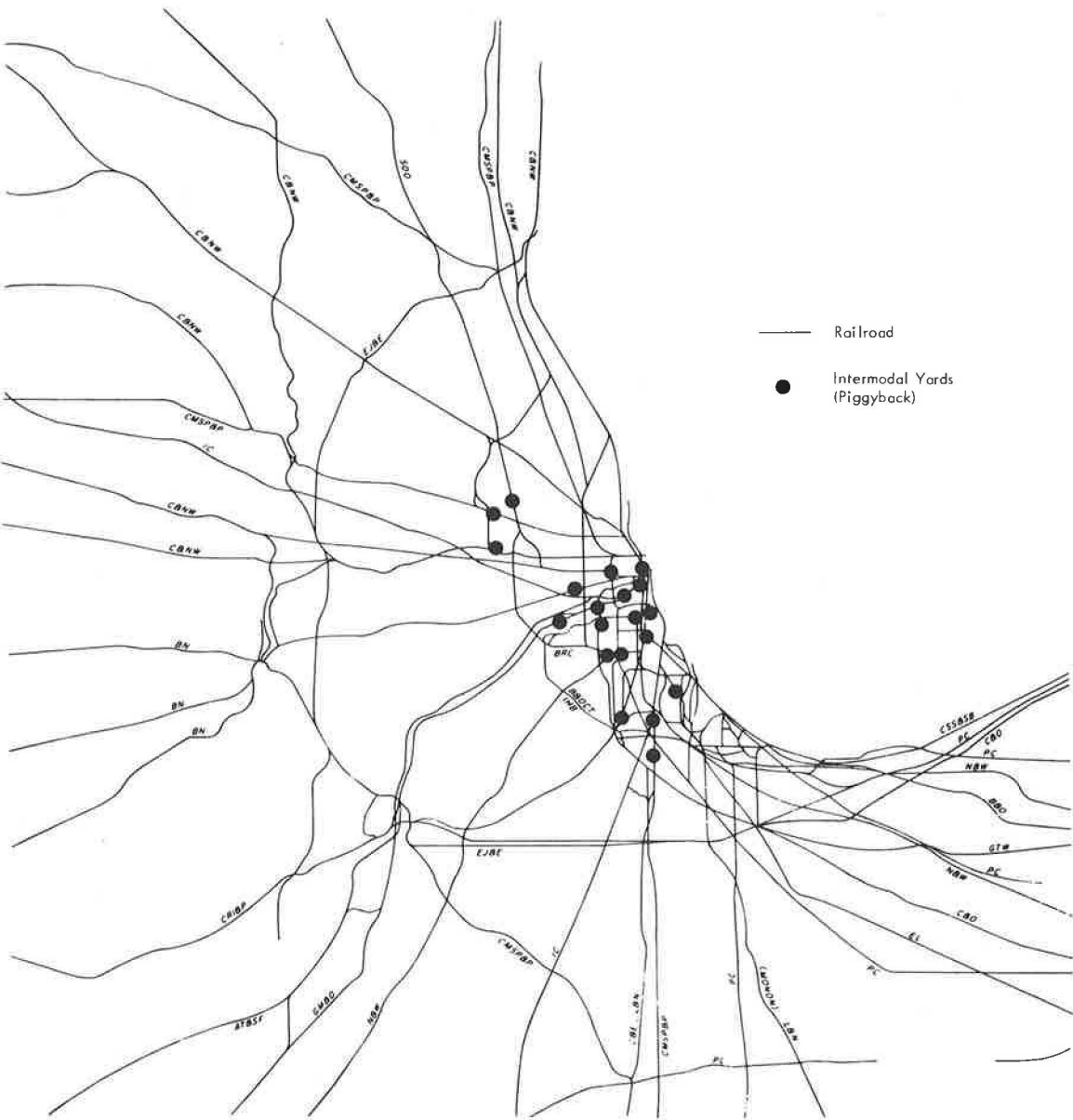
A CATS projection of Chicago-area intermodal traffic indicates that between 14,000 and 20,000 vans per day will be handled by 1990. This would amount to a 350 to 460 percent increase over today's traffic. Although such a volume seems unbelievable, it is nevertheless based on an assumed average annual growth as small as 11 percent through 1975 and 5 percent through 1990 (compounded growth). Thus the resultant estimate recognizes the probable maturing cycle in piggyback growth after 1975. The rate is then assumed to be equivalent to an annual 3 to 4 percent increase in GNP, with the allowance of an additional 1 to 2 percent growth from traffic resulting from new market penetration and mode shifts.

Are these traffic projections for Chicago accurate? It is hard to say. First, the rail industry's own ASTRO Report of 1970 is notable because it lacks a forecast of both piggyback growth and piggyback's share of rail's total market. Thus, the rail industry's own benchmark planning report provides no guide for judging the validity of the CATS projections. Interviews by CATS in late 1970 did indicate, however, that Chicago's intermodal facilities were again experiencing growth rates in the 11 to 30 percent range, thus lending credence to the 1975 target of 11 percent average.

One gauge for measuring piggyback forecasts is the often-quoted estimate that piggyback's share of carloadings could reach 8 to 10 percent by 1975 and up to 20 percent by 1980 (4). On the basis of estimated 1973 business, piggyback carloadings were 6 percent of total carloadings versus 4.7 percent in 1969.

Without an objective traffic projection, it is difficult to anticipate the kinds of plant investment management should be making. In the case of Chicago, is the future of general merchandise or manufactured products traffic going to be 50-50 boxcar and piggyback or 75-25 in favor of the pig flat? Once the mode split is forecast, an accurate appraisal can be made of the type of urban rail plant needed. The more pig traffic, the less the need for conventional rail yards and interconnecting track. Unfortunately, the government has also failed to define the role that piggyback service should play as public policy. The ASTRO Report was mute as to the relative role of intermodal traffic in this decade. Local government bodies have neglected to assess even the current role of piggyback service and terminals. The child seems to be steering the parents.

**Figure 2. Existing Chicago region piggyback network.**



## TERMINAL DESIGN

If the reader can accept the credibility of the CATS intermodal traffic forecast, then one area of impact is terminal design. In 1972, the CATS staff evaluated 3 different intermodal terminal networks that could be in existence in Chicago by 1990. Although these 3 networks do not exhaust the possible configurations, they do illustrate some of the questions facing rail management in the years ahead.

Table 1 gives the average daily trailers to be handled in each Chicago yard for 1970, 1980, and 1990. Alternative A is the existing network of piggyback yards extended to 1990. Alternative B is a modified terminal network with 14 yard sites. Alternative C is a radical proposal with only 9 sites. Alternative C is shown in Figure 3 as part of a 1995 transportation system currently being reviewed by the CATS staff. Alternative D is a fourth proposal that postulates the need for only 3 piggyback yards within the Chicago area.

By 1990, network C would require the handling of up to 2,100 vans per day within each of the 9 yards. Five out of 5 railroad architects and marketing people interviewed by the author indicated that they had no idea of how to design piggyback yards for these estimated traffic volumes and that their companies had no design studies under way to assess such terminal requirements.

One thing is certain: With yard volumes such as these, circus loading is totally obsolete. Yet 5 of Chicago's yards rely solely on this method of handling vans. In 20 years, the nation's rail corporations purchased only about 150 overhead cranes and sideloaders for intermodal use. In 1972 dollars, that is a total national investment of only \$35,000,000 in transfer equipment. Chicago yards account for about 20 percent of this capital investment, with 17 cranes and 13 sideloaders in operation.

How many more cranes will be needed in the forthcoming years and where should they be located? Can the investment in yards and equipment be minimized through joint corporation use of yards? What is the optimum size of a yard, both in terms of trailers handled and real estate? Our studies have not provided answers to each of these questions. However, we have managed to evaluate the consequences of operating a 9-yard intermodal network in the sense that the trailers to be handled per day will require the additional purchase of up to 24 overhead cranes and 28 sideloaders in the next 18 years.

## TERMINAL LOCATION AND ALTERNATIVE LAND USES

Three factors are paramount in the selection of a piggyback terminal: line-haul train access; access to shippers; and site opportunities. However, with the depressed financial condition of the rail industry, it is obvious that the final decision generally reflects management's attempt to minimize cash expenditures. The results show up in Chicago. Every piggyback yard in the Chicago area is either on a former rail yard with lowered boxcar traffic or at the site of an existing major facility, such as Bensenville or Corwith. In the case of old yards being converted to piggyback operations, management views the land as being already available, taxed, but presently earning no return.

But what of the opportunity cost of this land? Is the railroad decision to use older sites for piggyback in the best interest of railroad earning potential? The answer may be no.

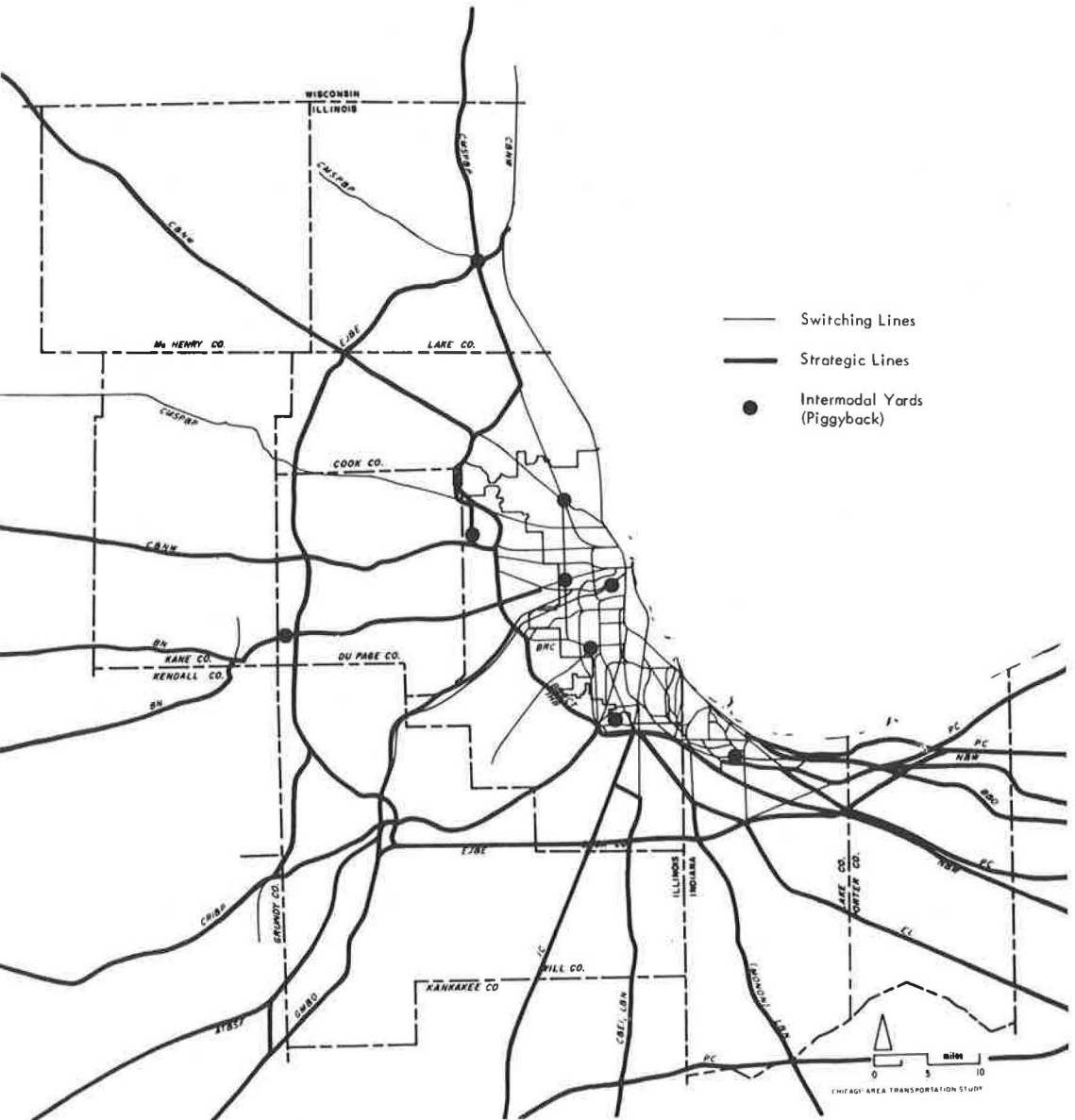
In a 1970 study by CATS, it was apparent that the railroads possess some of the most valuable real estate in Chicagoland (5). Yet only 2 or 3 of Chicago's 16 Class 1 lines have ever investigated the contribution of individual yards to profit or loss of the company. Only 3 railroads have investigated the potential for redevelopment of transportation properties to nontransportation uses. This lack of cost accounting and redevelopment research is incredible when we consider that 38 percent of Chicago's rail yards are underutilized in daily operation. This would indicate the need for a careful economic evaluation of yard needs, particularly since the rail industry averages nearly 60 cents in yard or terminal costs for every \$1.00 spent on mainline operating costs (6).

Piggybacking can provide an opportunity to reduce the need for yards because the over-the-road distribution of trailers eliminates the need for intermediate yarding and thus the need for such yards. The irony of today's situation is that the railroads are planning their intermodal terminals in the older inefficient traditional carloading yards,

Table 1. Average number of vans handled daily in each Chicago piggyback yard for 4 yard networks and 2 CATS traffic projections.

Year	Network A	Network B	Network C	Network D
1980	201	287	447	1,340
2000	432 to 571	617 to 815	961 to 1,268	2,883 to 3,805
2020	705 to 930	1,007 to 1,328	1,566 to 2,066	4,697 to 6,198

Figure 3. Alternative satellite network of rail piggyback yards.



and these yards are often in the central city where the potential for nontransportation redevelopment is often the greatest. The trade-off is one of minimizing land acquisition costs for suburban TOFC and COFC facilities versus maximizing long-term income from redevelopment of excess urban plant. The railroads appear to be missing a chance for long-term financial growth. In a study of 96 Chicagoland freight yards, Corbett estimated the value of 2,767 acres of urban property to be \$115 million (7). If the railroads were to participate in the redevelopment of such property, rather than simply reap the benefit of capital gains from the sale, the profit potential could be even greater. A shift in piggyback traffic could increase the prospects for such redevelopment.

#### TERMINAL LOCATION AND ACCESS TO SHIPPERS

The most often voiced argument for locating piggyback yards in the central city is "that is where the shippers are located". However, that point is subject to debate. Spurred by low land costs, the Interstate Highway program, and the migration of population, industry has been locating plants in suburban areas since the end of World War II. In fact, a recent Chicago survey indicates that nearly 86 percent of Chicago's prime potential industrial acreage is located in the outer suburbs, and even today 57 percent of the organized industrial districts or industrial parks are found in the outer suburbs (8).

A second justification for central city location of intermodal yards is that such sites are easily reached by the shipper. At first glance this would seem a reasonable argument, given the pickup and delivery function performed by trucks. However, two operational facts combine to work against such central sites. First, cutoff times and train arrival times tend to cluster about the urban area's rush-hour traffic periods. Second, the weakest points in the urban expressway system are the central city road links as they approach the central business areas. This is where traffic really slows to a crawl, and the decision to locate a facility that will place additional loads of 300 to 700 trailers on already saturated roads is certainly not in the best interest of the public, the shipper, or the railroad.

There are alternatives to downtown piggyback yards. The best bet may prove to be a location on a circumferential freeway from which trailers can be distributed in all directions while minimizing traffic conflicts on weak expressway links.

A second concept of shipper access involves a metropolitan piggyback network whereby satellite intermodal yards are interconnected by railroad shuttle (Figure 3). This would further reduce the use of the urban roadway for the interchange of trailers, and might shorten the length of road run for distribution of trailers to local shippers. A special study of this concept of interconnected satellite piggyback terminals is under way by CATS, and the results should be available soon.

Although the question of piggyback terminal location in relationship to potential urban area shippers has never been fully evaluated, a special study of the location of common carrier motor terminals has been completed. The analysis indicated that an optimum theoretical point for such terminals has been shifting westward in Chicago between 1956 and 1970. Since Class 1 and 2 common carriers of general freight have some similarities in marketing with rail piggyback companies, the results of this work should prove interesting to rail executives. In essence, the shift of the optimum terminal location point is related to the shift in urban commercial and industrial land use; the availability of land; and the completion of the local expressway system, link by link, time period by time period. The optimum location for such Class 1 and 2 carrier terminals now appears to be in western central Cook County, near the Tri-State Tollway. This is approximately 9 miles from downtown Chicago.

#### GET THE TRACKS OUT OF TOWN

It is unfortunate that most previous experiences in joint government-railroad urban planning start with the premise that rail facilities should be removed from the downtown area. Government generally avoids the positive affirmation that the rail industry's economic vitality is important to the well-being of the public community it serves. Rather, government officials concentrate attention on the issues of land redevelopment



and grade separations. The public orientation toward improved transportation for the community is generally assumed to be a direct benefit to the railroads. The absurdity of this public attitude is best illustrated by viewing the variables that supposedly justify government construction of ports, waterways, airports, and highways. When compared together, it is absolutely clear that the public benefits for increased speed, "safety", and reduced congestion is an identical measure of benefit, be the system a highway or a railway. The historical evolution of our country's "inconsistent transportation policy" is the real reason for government laxity in supporting transportation improvements in the rail industry. The railroad's unrealistic appraisal of laissez-faire market conditions has in the past served to justify the government's inconsistent policies.

The importance of these theories is this author's hypothesis that the rail industry suffers from a communications gap between itself and the general public as represented by government officials. Perhaps if piggyback yards were publicly owned like ports, this communications gap would be eliminated. A more practical solution is for the rail executives and public works managers to jointly evaluate projects before they are built. This communications issue is the essence of the term, multimodal planning. Unless the gap is bridged, a balanced urban transport system will continue to be only a politely expressed phrase. And the rail industry's potential contribution to intermodal transportation will be artificially constrained.

### SUMMARY

Reviewing the rail industry's plan for creating a super railroad, the ASTRO Report, leads to the conclusion that the industry is falling behind in its rejuvenation program. In 3 years it has purchased only 63 percent of its car needs and 66 percent of its locomotives and met only 44 percent of its programmed capital expenditures for road and structures (9). The improvement in industry net income and rate-of-return is hardly encouraging. It is impossible to accurately measure industry progress in its intermodal program because the industry has no stated intermodal program.

The stakes are high. For the community, they represent land redevelopment, improved speed and reliability of service, and reduction of congestion on inner-city expressway links. Rail labor would benefit from more jobs, because the 100-car train is not a characteristic of piggyback service. Rail companies would benefit by being able to compete more effectively with the trucks and recapture a share of the profitable manufactured and food-products traffic lost in the past. With a shift from boxcar to piggyback the industry could participate in the multimillion-dollar land-redevelopment market as it simultaneously rationalizes its plant.

What is lacking is a catalyst for decision. A few railroads are heavily committed to intermodal services, but the industry does not portray a united front. The Federal Railroad Administration has sponsored some research on the subject of intermodal potential, but the results have not been widely distributed. The Interstate Commerce Commission's position on intermodal traffic and specifically mode shift is at best confused. Most states are overly concerned about the loss of traditional rail services, while the local governments desire the tax revenue but decry the physical and aesthetic presence of rail and train.

A group decision to foster intermodal service and mode shift could prove to be the most revolutionary transportation innovation of the 1970s. Who will make that decision?

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