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FINAL STANDARDS, CLASSIFICATION, AND DESIGNATION OF LINES OF CLASS I RAILROADS IN THE UNITED STATES

A REPORT
BY
THE SECRETARY OF TRANSPORTATION

VOLUME I

Submitted in Accordance with Section 503 of the
Railroad Revitalization and Regulatory Reform
Act of 1976 (P.L. 94-210)

U.S. DEPARTMENT OF TRANSPORTATION

JANUARY 19, 1977

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VOLUME II

Final Line Designations of the Class I Railroad Network Structure

EXECUTIVE SUMMARY

This report follows a thorough public review of the Preliminary Standards Classification and Designation of Lines of Class I Railroads in the United States published by the Department on August 3, 1976, pursuant to Section 503 of the Railroad Revitalization and Regulatory Reform Act of 1976 (P.L. 94-210) (the Act). The review process was conducted by the Rail Services Planning Office of the Interstate Commerce Commission which culminated in their publication of an Evaluation Report of the Secretary of Transportation's Preliminary Classification and Designation of Rail Lines. This Evaluation Report along with the public testimony elicited at the hearings was considered by the Department in preparation of this Final Report.

The Rail Transportation Improvement Act of 1976 (RTIA), enacted October 19, 1976, (P.L. 94-555) contains two amendments affecting the Section 503 Final Report. It extends, in Section 216(b), the deadline for publication of the final Section 503 report from January 30, 1977 to May 1, 1977. Despite this change, the Department is releasing the Report close to the original statutory schedule to permit an appropriate additional measure of public scrutiny. (The detailed description of the process for further public comment can be found in Chapter 4.) In addition, Section 211 of the RTIA amends Section 505(a) of the Act so as to eliminate the requirement of Section 505(a)(2) that this study's completion be a prerequisite to the Department's providing financial assistance for facilities rehabilitation and improvement.

In attempting to incorporate the public's concerns into this report, the Department was confronted by conflicts between goals espoused by different members of the public, between goals of the public and those of the Act, and by misconceptions as to the content, purpose, and role of the Section 503 report.

In the "Declaration of Policy" (Section 101(b)) Congress establishes as a purpose and goal of the Act the development of a stable, private sector rail system. In carrying out the mission of the Act a delicate balance is to be struck among the needs of carriers, shippers and the public. In the hearings and written submissions it was recognized that a private sector industry should be encouraged, and yet many commentators espoused a planning cycle

that entailed removing major policy decisions from control of the industry. Hence the States sought a larger role for their individual rail plans, and communities sought to be insured of service even though it was not necessarily profitable to the carrier. In particular the Department's consolidation strategy was criticized because it was perceived as lessening both local service and competition.

The Department has attempted to reconcile or explain these apparent inconsistencies with the purpose and goals of the Act. The Final Report hopefully reflects the best judgment of the public and the Federal Government. More importantly, both the public and the Government recognize the report as merely a benchmark in a continuing planning process dedicated to produce an optimum classification and designation process. The Department provides ample opportunity for continued public participation. Volume I of the Final Report establishes five standards for the classification of the Class I rail system: (1) density, (2) service to major markets, (3) appropriate levels of capacity, (4) national defense, and (5) line potentially subject to abandonment under statutory and ICC procedures.

There are three basic modifications in the final standards as compared with the preliminary. First, neither the final density standard nor any other standard, for the reasons described in Chapter 2, includes any consideration of passenger traffic. Second, the defense-essential standard has been totally revised; rather than focusing on branchlines which provide access from defense installations to the mainline network, it now reflects defense needs for a national network of interconnected high-density mainlines. Finally, in response to a principal recommendation of the Rail Services Planning Office, because of the implicit classification established by the Act's modification of the Interstate Commerce Act's provisions dealing with the abandonment of rail lines and the discontinuance of rail service, this Report sets forth a classification standard based on those revised provisions.

The final standards have been applied to classify the rail system into six distinct categories embracing both mainlines and branchlines. All rail lines have been designated into these categories. The designation process significantly parallels the one recommended in the Preliminary Report. The major exception is that lines falling in Corridors of Excess Capacity in the Preliminary Report have been also designated into the normal density categories in which they fall; thus they bear a dual designation. This alleviates a general

public concern that such lines would be placed in a limbo situation with regard to private or federal financial investment and other private development activities. Corridors are re-named "Corridors of Consolidation Potential" (CCP).

The Report then describes the process used to designate the individual line segments comprising the approximately 193,500 mile Class I rail system, resulting in the designation of lines by category shown in the table below.

CATEGORY TITLE	CATEGORY DESCRIPTION	PERCENT OF DESIGNATED ROUTE-MILES OF CLASS I RAIL NETWORKS
1. A Mainline	. 20 million or more gross ton-miles per mile per year ("gross tons")	20.9
	. Major Transportation Zone connectivity	.7
	. National Defense essential mainline requirements	4.4
2. B Mainline	. Less than 20 million gross tons but at least 5 million	25.2
3. CCP Lines*	. A duplicative status for through line located in the Preliminary Report under the former category, Potential A Mainline, and located in a Corridor of Consolidation Potential. These lines are also designated separately under the appropriate Mainline or Branchline Categories.	9.7**
4. A Branchlines	. Less than 5 million gross tons but at least 1 million	21.3
5. B Branchline	. Less than 1 million gross tons	27.6
6. ICC Study Line*	. Lines potentially subject to abandonment currently being evaluated by the ICC.	NA***

* In an unusual case, a branchline could fall into the Corridor of Consolidation Potential. Similarly, a mainline could find itself falling into the ICC Study Line category, however, these instances would be minimal.

** Inasmuch as lines in this Category are designated twice, this percentage should not be considered in calculating the total percentage.

*** No route-mile percentage shown because the identification of these lines is pending before the ICC.

The process results in a prioritizing of rail lines which can serve as a guideline for future investment in track, and, from an initial standpoint, begins to depict those portions of the rail system most important to the flow of interstate commerce. The process, which is continuous in nature, should further aid railroad management with future decisions regarding investment, operations, and facilities rationalization, lead to safer operations, and furnish a useful tool to both federal and state planning agencies.

Volume II contains a national map of rail lines designated by category along with maps of individual line designations by state. Unlike Volume I, Volume II is clearly an interim report, a final version of which will be published on May 1, 1977. Interim Volume II does not accompany this report, but will be available in February, 1977.

CHAPTER I

INTRODUCTION

One year ago, railroad companies comprising more than 15 percent of the route miles of the Class I rail system in the United States were in bankruptcy, and, for the first time since industry-wide data have been collected, the entire rail industry experienced a net operating loss in the first quarter of 1975.1/ For calendar year 1975, the industry's return on investment was a meager 1.2 percent. While industry financial performance data for all of 1976, to be released subsequent to this Report, should reflect a somewhat better year, return on investment probably has not increased significantly. This view is based on the fact that the data for the first three quarters of 1976 showed a continuing unsatisfactory rate of return of 1.15 percent.

Since the mid 1950's, earnings of the rail industry have been less than adequate. This earnings shortfall has undermined the industry's ability to replace worn out assets and advance technologically and resulted in lowered standards of efficiency and service to the public. At the same time, the railroads remain the number one common carrier mode in terms of freight ton miles (see Table 1), although this amount is one half of the market share enjoyed by the railroads in 1930.

Table 1. -- Volume of U.S. Intercity Freight -- 1975

	Ton Miles	Percent of Freight Moved
Railroads	761 billion	37.0
Trucks (common carriers)	441 billion	21.4
Great Lakes	108 billion	5.2
Inland Waterways	235 billion	11.4
Oil Pipelines	510 billion	24.8
Air	4 billion	.2
TOTAL		100.0

SOURCE: Association of American Railroads.

Allowing the railroads to continue to deteriorate financially and physically would result in more serious safety and service problems, with some railroads being unable to continue operations. The Rail-

road Revitalization and Regulatory Reform Act of 1976 ("the Act") was enacted to avert such problems by revitalizing the industry within a private sector framework.

The Nature and Anticipated Use of the 503 Report

Title V of the Act both establishes a short-term program of financial assistance for railroads (Sections 505 and 511) and requires the Secretary of Transportation ("the Secretary") to conduct two studies. (The text of Title V of the Act can be found in its entirety in Appendix 1.) The first study -- required under Section 503 and the subject of this report -- is intended to develop a framework for classifying the lines of U.S. Class I railroads into categories of mainlines and branchlines and to designate each line segment of the Class I system into its appropriate category within that framework. The second study, a study of rail industry capital needs over the period 1976-1985, is required under Section 504 of the Act. It is due for release at a later date.

This final report under Section 503 completes a statutorily-prescribed process with three principal steps. The first step was the publication of a preliminary report on August 3, 1976. Following its release the Rail Services Planning Office ("the Office") of the Interstate Commerce Commission ("the Commission") conducted public hearings on the preliminary standards, classification, and designations, and submitted to the Secretary on December 1, 1976, a report containing its conclusions and recommendations.

This Report is the third step in the process. Although the Rail Transportation Improvement Act of 1976 (RTIA) extended the deadline for the Final Report from January 30, 1977, to May 1, 1977, Volume I of the Report is being issued close to the original statutory schedule. One reason for the earlier release is to permit an appropriate additional measure of public scrutiny to that required under the Act. Secondly, following extensive coordination with the Office, the work on Volume I has been completed by the Federal Railroad Administration under the capable direction of Administrator Asaph H. Hall. Since Mr. Hall's resignation is effective January 20, it is appropriate to issue this completed portion of the Report now rather than simply wait for the date mandated by the statute. Although Volume I is published as a Final Report, it can be revised if any significant correctible deficiencies are made known to the Department in time for revision by May 1, 1977. In contrast, Volume II, which will be issued shortly as an Interim Report, contains maps reflecting the actual category designation of each line segment. Although a substantial number of technical corrections to Volume II were submitted to the Department following issuance of its Preliminary Report, it was not possible in the time available to incorporate all of them or to explain the reason for not incorporating them to the submittors. Consequently, the public will receive additional time to assure that proposed technical corrections to Volume II are properly considered, as indicated in Chapter 4.

In contrast to the Section 504 study, which looks to the future of the rail system, the 503 report provides a snap-shot of the U.S. Class I rail system as it is today. The 503 report, therefore, is not concerned with the rail system as it was, as it will be, or as someone might wish to see it. Its intent, rather, is to develop a reasonable framework for viewing the rail system in its current configuration and to depict and describe the system in terms of that framework. Obviously, since the rail system -- and our knowledge and understanding of it -- evolves in response to the flow of time and events, both the adequacy of the analytical framework for the 503 report and the currency and accuracy of the designations of rail lines within that framework must be periodically reexamined. The significance of this fact is that even though Volume I of this report is, for statutory purposes, a "final" report within the meaning of Section 503, it is not and cannot be the "final" look at a rail system which does not stand still.

The Section 503 Final Report will serve several purposes. Under Section 503 as originally enacted, the final report was a pre-requisite to the purchase by the Federal Government of redeemable preference shares under Section 505(a)(2) for the rehabilitation and improvement of rail facilities. While the RTIA amended the Act to eliminate this requirement, the Section 503 report will still play an important role -- along with other information required in the regulations for financial assistance under Sections 505 and 511 -- as input to decision making for making investments in track.

The 503 Report must also be considered in the Section 504 Capital Needs Study, under with the Secretary is required to make legislative recommendations to the Congress as to the amount and form of financial assistance, if any, which the Federal Government should provide to the rail industry. Further, although not directly linked in the Act, the Report will provide invaluable aid in conducting the comprehensive multipart study of the American rail system assigned to the Secretary under Section 901 of the Act. Specifically, it should dovetail closely with those parts of the Section 901 study that examine physical restructuring and corporate realignment of the industry. Its content should be most helpful to that study in estimating the potential savings in the cost of rehabilitating the United States railway system were rehabilitation to be limited to those portions which are critical to interstate commerce or national defense. This Report also should aid railroad management in reaching future decisions regarding investments, operations, and facilities rationalization, should lead to safer operations, and should provide both federal and state regulatory and planning agencies with a useful tool.

Key Problem: Deterioration of Fixed Plant

One of the key problems that Title V addresses is a dilemma faced by all but the most financially healthy roads -- deterioration of fixed plant. A deficient track structure plays havoc with road and switching operations and undermines both the quality of service and inflates its cost.

Many elements -- including equipment utilization, labor agreements and operating practices -- contribute to determining rail efficiency, service quality, and profitability. Among such factors, the costs and utility of the track structure are of vital, although not necessarily of dominant, importance.2/ But the quality and utilization of the track structure have a pervasive impact on all other service and cost elements. Good track is essential to the operation of safe, high-quality, and efficient railroad service. Many railroads have been unable to maintain their track adequately, and therefore have suffered declining levels of efficiency and loss of traffic with major -- often devastating -- effects on profitability.

Of the major, multi-commodity transportation modes, only railroads own essentially all the fixed facilities needed to conduct their transportation business. In fact, railroads are usually known as much for their specific facilities and routes as they are for the trains that the particular carrier operates. The full ownership of the plant causes the cost of operation of that plant to be highly fixed relative to their competitors who pay either a user charge that is not necessarily compensatory, as in trucking, or no user charge at all, as in inland water transport.

The present railway mainline structure has changed relatively little since the 1920's when the railroads moved fully three-fourths of all common carrier intercity freight and passenger traffic. It makes little sense from an investment standpoint for the railroads or the Government to sponsor rehabilitation projects which do not recognize the changes in the market for rail service.

Estimates of the costs to rebuild mainline tracks alone have been substantial -- far in excess of the financial authorizations under the Act.3/ With investment requirements running at anticipated high levels, the critical problem for the Federal Government and railroad industry is to determine where to invest in fixed plant

to allow sufficient earnings generation to cover the cost of the capital expended. Without sufficient traffic volumes, earnings will not be sufficient to pay back the investment. The Section 503 report assists in making that determination.

Explanation of Terms

Before proceeding further, it is necessary to define and explain certain key terms. The following list is limited and excludes terminology which has been repeatedly defined in other documents, such as the Act, the RTIA, and the Regional Rail Reorganization Act of 1973, and especially reports produced therefrom, such as the Preliminary System Plan and Final System Plan of the United States Railway Association ("USRA"):

(1) Classification is the process of establishing categories of rail lines.

(2) Standards are criteria used in the classification process to determine the categories of rail lines.

(3) Categories are divisions within a system of classification of rail lines.

(4) Designation is the process of evaluating the characteristics of a rail line and of assigning it, based on that evaluation, into a specific category or categories.

(5) Mainlines are rail lines which incur a relatively high density of freight usage, which are essential for providing rail service to major markets, or which are required to provide a connected mainline network for the movement of defense-related shipments. (See sidebar for future explanation of terms (5) and (6)).

(6) Branchlines are all rail lines other than mainlines.

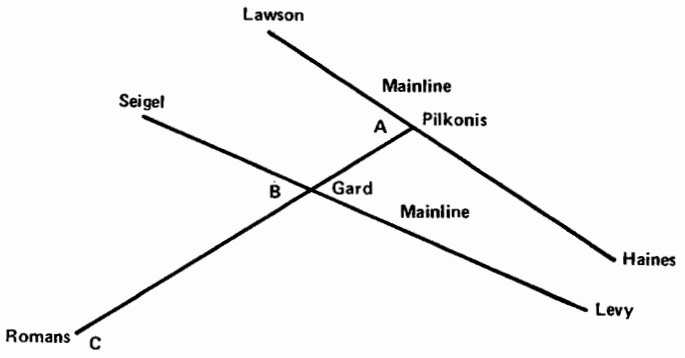
The Distinction Between Mainlines and Branchlines

While Section 503 of the Act requires branchline as well as mainline categories, there is no generally accepted definition of either term. What one carrier designates as a branchline may display the traffic character of a line designated as a mainline on another railroad. Further, many railroad designations are rooted in history, reflecting

the merger of companies of varying system profile. For example, one of the most heavily used lines in the nation -- the former Penn Central (now ConRail) through route between Perryville, Md., and Enola Yard at Harrisburg, Pa. -- is known as the Columbia and Port Deposit Branch.

The Department considered denoting stub-ended lines as branches and through lines connecting at both ends as mainlines. This method, however, posed a number of both practical and theoretical dilemmas. First, it is difficult if not fruitless, to attempt to define rigorously the bounds of a branchline. For example, in an instance where a stub-end branchline intersects two mainlines (see illustration), would the branchline be defined as A to C, or B to C with A to B being a through line and, therefore, a mainline?

Second, it would appear that a stub-end line that originated or terminated large amounts of rail commerce for the nation (e.g., a line serving a mine) would be classified unrealistically as a branchline. In these circumstances, the only rational method to create meaningful categories for mainlines and branchlines is to classify them, as the statute directs, in terms of their level of usage as measured in gross tons, and taking into account the other appropriate factors described in Chapter 3. Therefore, for purposes of this Report, branchlines are those lines which carry lighter density traffic, whether they are stub-ended lines, low-density through lines, or lines which connect two through routes.



Development of Standards

In setting standards for classification to be used in designating rail lines the Department of Transportation ("the Department") believes that two characteristics are essential. First each standard must be objective. Each of the standards proposed by the Department is based upon firm empirical data, which can be verified by interested parties. For this reason, standards cannot be developed meaningfully on the basis of traffic forecasts, since such projections are subjective and based on assumptions.

In addition to meeting the test of objectivity, the standards must be capable of uniform application. Any interested party should be able to apply the standards and arrive at substantially the same answer. The Department believes that it has produced standards that meet the test of uniformity of application. The first four standards shown below were developed and reviewed in the preliminary report. The fifth standard is new and is added at the suggestion of the Office. In addition, required modifications were made to the preliminary standards, as explained in Chapter 3.

(1) Density. The density of traffic on a line, or level of usage measured in gross tons moved on the line, is a measurable indicator of activity of that line.

(2) Service to Major Markets. Analysis of the origin and termination of rail traffic shows those markets with the greatest demand for rail freight service and shows movement of freight between markets. Lines which are important to connect major markets can be clearly identified.

(3) Appropriate Levels of Capacity. For healthy competition to occur among railroads in particular market areas, the volume of rail traffic should be sufficient to require relatively high use of fixed plant capacity. Historical changes in demand have often caused carriers that were in the past in healthy competition in various markets to lose traffic, and thus to have more capacity in those markets than they can economically support. This standard will identify traffic corridors served by more than two carriers on mainline through routes where the level of rail traffic does not justify the existing level of capacity of main-line facilities.

(4) National Defense. Certain mainlines are essential to the through movement of defense-related shipments. Consideration of these lines or alternative routes is implicit in the Act.

(5) ICC Study Lines. The Act requires carriers to prepare system diagram maps in which they must designate, by April 29, 1977, lines "potentially subject to abandonment" as defined by the Commission. The Commission has developed criteria for designations under the proceeding in Ex Parte No. 274 (Sub. No. 2), which addresses abandonment of railroad lines and discontinuance of service. The Commission has issued implementing regulations (49 CFR 1121) under which carriers must divide light density lines into certain categories. These standards are hereby incorporated into this Report under this category.

For the purposes of this Report, the Department carefully considered, but decided not to adopt, two other potential standards -- namely, the economic viability of particular rail lines and the effect of passenger traffic.

The language of Section 503(b) indicates that the importance of each rail line (a) to the economic viability of the owning carrier, and (b) to the probable economic viability of connecting carriers should be considered along with the level of usage. Accordingly, the Department requested each carrier to comment both on low density lines where traffic density does not fairly reflect economic viability and on lines of other carriers that have significant impact on its corporate viability. Roughly half of the carriers thought that density itself produced a good measure of economic viability or importance of lines to their railroad. Others concluded that exceptions existed, and a few thought that all their lines, regardless of density, were important to their economic viability. Little was submitted that documented the contribution of individual lines to economic viability; that which was submitted showed little consistency among carriers. Because the resulting information lacked uniformity and there is not any other methodology available to gather uniform data on these factors, the Department determined that it is not feasible to use an economic viability standard as part of any system for classifying and designating individual rail line segments. In reaching this decision, as set forth in the Preliminary Report, it was noted that the industry maintains neither a revenue and cost accounting system nor a cost allocation system based upon route

segments. In fact, the deficiency of the accounting system is specifically addressed in Section 307 of the Act, which directs the Commission to revise the uniform cost and accounting system by June 30, 1977. When this system is finally developed and applied by the individual carriers, it then may be possible to update this Report with additional standards of classification. The update process is described in Chapter 4.

As for passenger traffic, the Department developed a preliminary standard based on the number of passenger trains per day moving over a line. The public hearings conducted by the Office brought forth significant testimony disagreeing with the standard based on frequency of trains, but no clear and generally acceptable substitute standard was proposed, and the Department could develop none. For this reason, and because a completely distinct and separate method for determining the status of passenger lines has been developed over the past six years under the Rail Passenger Service Act, as amended, it was decided that the passenger aspect of the density standard described in the Preliminary Report should be eliminated from this Report. This matter will be more fully discussed in Chapter 2.

The Classification and Designation Process

To classify the rail system into categories as mandated under Section 503(b), the Department utilized the five standards listed above. This classification process produced the following Categories: (1) A mainlines, (2) B mainlines, (3) Corridor of Consolidation Potential (applying to both (1) and (2)) mainlines), (4) A branchlines, (5) B branchlines, and (6) ICC Study branchlines. Categories (1), (2), (4), and (5) resulted from the application of the density standard, with category (1) also reflecting application of the service to major markets standard and the defense-essential lines standard. Category (3) was formulated after reviewing the preliminary standard addressing appropriate levels of capacity, and category (6) from the standard for lines "potentially subject to abandonment" as defined by the Commission in 49 CFR 1121, in accordance with Section 802 of the Act. A detailed explanation of the categories is found in Chapter 4.

In this Report, each rail line in the data submitted by the carriers is designated into one of four categories -- A mainline, B mainline, A branchline, and B branchline. In addition, certain lines designated as A and B mainlines are also designated into category (3) as lines in corridors of consolidation potential. No lines are currently designated into category (6), ICC Study branchlines, since the railroads have yet to submit their lists of such lines to the Commission

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under 49 CFR 1121. Designated lines are identified on state maps in Volume II and coded according to railroad, category, and density. The designation process is described more fully in Chapter 4.

One matter regarding designations deserves special comment. The classification and designation procedure deals with railroad data and conditions current as of December 31, 1975.4/ The dynamic nature of American industry which transportation serves must be taken into consideration; consequently, future contingencies which cannot now be foreseen could impact designations made in this report. For example:

(1) The opening or closing of industries or mines furnishing the bulk of a rail line's traffic. An obvious example is the likelihood, confirmed by several rail companies, that lines in the emerging low-sulphur coal-originating areas of the eastern Rocky Mountain slope currently rated low in traffic density will, within a decade, require upgrading to heavy-duty capability in order to handle the production of new mines.

(2) The impact on significant segments of rail traffic of new competitors, such as coal slurry pipelines, whose economic viability and market strength is as yet untested. There is no economic experience from which to forecast the effect on rail line densities of long-distance pipelines serving multiple producers and consumers, such as are being proposed for construction between the northwest-central coal producing area and the midwest.

(3) The effects of the implementation of the Final System Plan in the northeast, which began less than a year ago. The Plan changed many historic relationships between carriers, and provided different, new routings to shippers. As shippers take advantage of new direct routing opportunities, competitive relationships evolve, and carriers exploit the operating opportunities available to them, it is expected, for example, that ConRail and Delaware and Hudson traffic flows will continue to change, and that even the flows of the Norfolk and Western and Chessie will be significantly affected.

To provide for future update of this Report, the Department is establishing an informal procedure to permit parties to submit technical corrections of line designations on a continuous basis. A more formal procedure is established to periodically review the entire classification and designation process. Procedures therefor are explained in Chapter 4.

Footnotes

1/ The Interstate Commerce Commission defines a Class I railroad as one with annual revenues of $10 million or more.

2/ Maintenance-of-way expense represents about 20 percent of operating costs.

3/ The Secretary will make recommendations as to the amounts needed to rebuild or rehabilitate facilities, including track, under Section 504, the Capital Needs Study.

4/ For those railroads affected by the Northeast reorganization, density figures for 1976 were also considered.

CHAPTER 2

ANALYSIS AND RESPONSE TO PRINCIPAL PUBLIC COMMENTARY ON THE PRELIMINARY REPORT

Section 503(c) of the Act directed the Office to conduct hearings throughout the Nation to offer the public an opportunity to express its views of the Secretary's preliminary report. The Office held hearings in 26 major cities within areas where the report was anticipated to have the greatest impact, and the public was afforded the opportunity to submit written statements directly to the Office. The Office submitted to the Federal Railroad Administration ("FRA") transcripts of the public hearings and written statements submitted by the public as soon as they became available, and representatives of FRA attended nearly all of the public hearings to observe firsthand the comments and attitude of the responding public. Therefore, the Department was able to begin its analysis of the public process prior to December 1, 1976, when the Office issued its Evaluation Report of the Secretary of Transportation's Preliminary Classification and Designation of Rail Lines ("Evaluation Report"). Furthermore, during the development of the Final Report, the staff of the FRA met on several occasions with the staff of the Office to discuss the findings developed from the public hearings and the principal issues which those hearings raised. The Office's principal recommendations are summarized on page 5 of the Evaluation Report FRA concurs with the Office that they are -- with the exception of one omission -- the primary issues raised during the public process; the omitted issue -- economic viability -- is added to the Department's commentary and it will be discussed separately at the conclusion of this Chapter. In addressing these issues in this Report, the format followed will be essentially the same as in the Evaluation Report.

In the attempt to accommodate the public's concerns, the Department was confronted by conflicts between goals espoused by different members of the public, between the goals of the public and those of the Act, and by misconceptions as to the content, purpose, and role of the 503 Report. An excellent example of an issue on which there was substantial inconsistency in the public commentary was that of maintaining the rail industry in the private sector.

In the "Declaration of Policy" (Section 101(b)) Congress establishes as an overriding purpose of the Act the development of a financially sound, private sector rail system. But much of the public commentary, while generally supporting the notion of a rail industry in the private sector, espoused a planning process for the rail system that would remove from management control a significant number of major corporate policy decisions. Specifically, many States sought a larger role for their individual rail plans, and communities sought to be insured of service regardless of whether it was profitable to the carrier. Because of the Department's need to resolve such conflicts in viewpoints, it might appear in certain areas that little attention was given to specific arguments advanced by the public. That most certainly was not the case.

The discussion which follows is in response to the points made in the Principal Recommendations section of the Office's Evaluation Report, in the order therein set forth.

The Statutory Mandate

The Office made four recommendations under this heading, all of which illuminate the fact that the Office's view of the statute's requirements are somewhat different than the Department's. The first point made by the Office was that the rail lines designated as essential should result in a unified interstate rail system. Section 503(b)(1) of the Act states that the rail lines of the class I railroads should be classified into at least three categories of main and branch rail lines "according to the degree to which they are essential to the rail transportation system." Thus, two things are clear from the Department's point of view: first, there is not -- in contrast to the Office's apparent belief -- any single category of rail lines which can be deemed as "essential" when compared to any other category of lines; there is, rather, a prescription to establish a set of categories which reflect a hierarchy; and second, neither is there any requirement to develop a category the constituent rail lines of which create or result in "a unified interstate rail system."

Notwithstanding the Department's views concerning the statute's requirements, certain changes were made in the Department's preliminary standards which resulted in the interconnection of the principal elements of the Category A Mainlines so that they do now constitute a unified set of rail line segments. The Department stresses, however, that it does not regard these interconnected line segments as the "essential unified interstate rail system."

The Office's second point under this heading addresses those lines designated in the Preliminary Report into the category of Potential A Mainlines based upon the standard of appropriate levels of capacity. The Office states that the Department "should give definite designations to all rail lines essential to the development of an interstate rail system." While reemphasizing that it was not the purpose of Section 503 to create a unified interstate rail system, the Department does recognize that there was considerable public concern voiced about the indefiniteness associated with a line's designation as a Category Potential A Mainline. Therefore, in order to alleviate the concern that the possibility of Federal financial assistance to such lines would be either denied or delayed, each line segment in a Corridor of Consolidation Potential will receive two designations: one based on its rating on standards other than appropriate levels of capacity, and another based upon that standard alone. To the extent that such a process contributes to the interconnection of Category A Mainline rail line segments, it is fortuitous.

A third suggestion contained under the heading of The Statutory Mandate urges establishment of minimum roadway maintenance standards for lines in the highest classification. The Department believes that this Report is not the appropriate place for establishing maintenance standards. As applications for financial assistance are approved under Section 511 of the Act, terms and conditions will be attached to the financing agreement which will require specific maintenance levels on an individual basis for those facilities to be rehabilitated or improved with federal assistance.

The Office's fourth suggestion requests FRA to take advantage of the three month deadline estension provided by the RTIA to revise the preliminary standards for classification and designations along the lines suggested in the Evaluation Report. The Department's posture with respect to this subject was explained in the preceding Chapter.

Federal Policy

The Office argues that federal policy considerations such as long-range funding and consolidation of railroads are embodied in the Preliminary Report and that these policy incursions confuse the Congressional intent which is to develop first a rail system based upon essentiality criteria and then to adopt later appropriate policy positions.

It is the Department's view, as explained in the discussion, that the Office misinterprets the legislative intent concerning essentiality. The Office bases its reasoning on the amendment to the Act contained in Section 505(b)(2).1/ By following a tortuous route (page 14 of the Evaluation Report) the Office construes the RTIA amendment to read new meaning into the Congressional purpose for conducting the Section 503 study. The Office confuses the guideline of essentiality associated with the financial program for issuance of redeemable preference shares under Section 505, with the statutory directive for preparation of this Report. There is no statutory requirement that the Secretary identify "essential rail lines" or an "essential rail system" for this study, but rather a set of categories reflecting a hierarchy of importance. Thus, lines falling into categories other than the highest are not automatically "non-essential" as frequently asserted by the Office.

The classification and designation process is only one consideration of many by which the Department must evaluate applications for redeemable preference share financing.2/ It should be made clear that policy for funding the program of interim financial assistance under the Act is not determined in the Section 503 Report but in the Rules and Regulations for the Section 505 and 511 financial programs even though the later utilizes some concepts from the former to develop a funding policy. The long-range policy for providing federal assistance will be determined by Congressional action flowing from the Capital Needs Study for the railroad industry required in Section 504.

Criticism of the Department's rail consolidation policy and its suggested application in the Report is equally without merit. Clearly the Congressional declaration of policy in Section 101(a) supports economically justified railroad restructuring. The Office suggests delay of railroad restructuring until completion of consolidation studies under Section 901 of the Act. The Office appears to lean heavily on the federal government rather than the railroad industry as the architect of industry restructuring, and implies that the industry is probably not capable of redesigning itself. The Department does not agree. Restructuring should be accomplished primarily by the industry -- or at least attempted by the industry -- prior to government intervention. The fact that Congress requests restructuring studies under one section of the Act does not derogate its policy that free enterprise solutions to railroad problems be sought.

Finally, it must be made clear that consolidation policy in this Report is suggested at an appropriate step within the analytical process and not before it. It was during the analytical process the problem of excess capacity became evident, with the result that 11 Corridors of Excess Capacity were determined. A policy that attempts to rationalize that excess is a logical next step. It is worth noting that even though the Office is critical of the Department's inclusion of consolidation policy in its Preliminary Report, it nevertheless on page 15 of its Evaluation Report inconsistently exhorts the Department to expand its rationalization methodology to embrace all other railroad operations where consolidation potential exists.

Public Participation

In essence, the Office calls for full participation by the public assuming a continuing classification and designation process and suggests rule making proceedings for this purpose. It especially urges a mechanism under which railroads, states, and other interested parties can petition for changes in designations and express their views during the entire planning process.

The Office's conclusion that the classification and designation process should be a continuous one and one under which the public is provided the fullest opportunity to participate is endorsed by the Department. To this end, the Department is providing a relatively simple-to-follow informal process for petitioners seeking modifications in designations.

For public input not limited to designations alone, the Department will within three years review the classification process, including the standards and categories, and will provide an opportunity for public comment. Details with respect to public participation for both the technical corrections and the classification and designation review are described in Chapter 4.

Methodology

Under this section, the Office lists six specific recommendations to add, modify, or delete methodologies followed in the Preliminary Report. Each suggestion is enumerated below and discussed in the order presented in the Evaluation Report.

(1) The "A" and "B" mainline classifications should be replaced with "System Essential" and "Carrier Essential" categories.

The Department cannot agree with this recommendation. The operative language in Section 503 is that "the Secretary shall develop and publish . . . the . . . standards for classification, in at least three categories, of main and branch lines according to the degree to which they are essential to the rail transportation system." (Emphasis supplied.) Thus, to adopt "System Essential" as the title of the most essential category of lines would imply -- in contrast to the explicit direction of Section 503 of the Act -- that lines in all other categories are not essential to the system in any degree, which is not the case. The error would even be worsened if, as the Office suggests, the "B Mainline" category were replaced by a "Carrier Essential" category. Section 503 does not address itself to -- nor, for that matter, does the Act as a whole -- the financial viability of individual railroad companies. There may indeed be lines that are critical to holding a carrier together -- perhaps even literally tying together two of its major markets -- but such a line may be only one of three or even more lines in a corridor and therefore would not warrant rehabilitation based on importance to a national system. An additional problem with this proposed category is that few, if any, carriers consider even limited portions of their plants as "non-essential." The degree of subjectivity in such a classification would be boundless; it would be impossible to develop any objective, measurable standard as a basis for this proposed category.

(2) The "Corridor of Excess Capacity" concept should not be used in developing the final designations; however, after all essential lines are designated, those with "consolidation potential" should be identified.

This approach is substantially adopted in the Final Report. Lines designated in the "Potential A Mainline" category in the Preliminary Report are, in this Final Report, designated into an appropriate category based on the standards other than appropriate levels of capacity. After this is completed, the lines will again be designated into a new mainline category titled, "Corridor of Consolidation Potential ("CCP's") in lieu of Category Potential A Mainlines. These lines thus receive a dual designation and are so depicted on the national railroad network map in Volume II of this Report. These corridors reflect areas with the greatest consolidation potential and the Department urges the railroads operating therein to promptly initiate consolidation activities. There is no condition precedent, however, that only consolidation projects will receive approval for federal assistance. Consequently, the concern expressed by the public that federal assistance for these lines will be either delayed or precluded, thereby retarding potential industry development, should be alleviated.

It should be noted that top priority is proposed to be assigned to applications for preference share financing which include consolidation projects leading to more efficient operations, produce savings, enhance the carriers' marketing opportunities, or promote competition where warranted. The Office demonstrates that there are other areas outside of CCP's where railroad operations can be successfully consolidated and urges the Department to pursue each and every one of these opportunities.

The Department adopts the Office's definition of consolidation potential, agrees that feasible consolidation opportunities should be considered wherever they exist, and, in fact, urged the industry, in Appendix 1 of the Preliminary Report, to carry out appropriate consolidation projects both within and outside Corridors of Excess Capacity.3/ However, the Department believes that it is neither desirable nor feasible to explore all consolidation potential possibilities for purposes of this Report. Outside of the corridors identified where excess capacity can be called a system-level problem, the identification of consolidation opportunities should be addressed in the context of individual applications for financial assistance. Therefore, the new category, "Corridors of Consolidation Potential," will include only those lines designated as Potential A Mainlines in the Preliminary Report. Accordingly, consolidations outside the corridors are encouraged, and this is reflected in the Department's assignment of top priority for federal financial assistance through the purchase of preference shares to projects achieving consolidation. Further attention will be given to the issue of consolidation potential in the Department's Section 504 and 901 studies.

The methodology used by the Department to determine the existence of excess capacity within certain corridors is challenged by the Office and by some railroads operating in those corridors. The criticism centers upon both the manner in which capacity was determined by the Department's use of the Parametric Analysis of Railway Lines Capacity (See Appendix A of the Evaluation Report) and the failure to consider adequately peak line loadings which are not adequately reflected in the Department's use of average line density. Since the Corridors of Excess Capacity concept is essentially retained in this Report with a change of name and with modified application, special comment is here warranted.

Prompted by the issues raised, the Department modified the analysis of capacity in two ways. First, to respond to criticism that the assumptions used in determining capacities in the Preliminary Report were not realistic, the parametric analysis was recalibrated using, for the analysis of each line, operational assumptions provided by the owning carrier. Second, in response to a specific suggestion from the Office, the actual capacity of each line was compared to the actual density at the most restrictive (bottleneck) segment on the line. Both of these additional analyses determined higher levels of capacity in all of the corridors than was indicated in the Preliminary Report. The details of these analyses can be found in Appendix 3.

As for the impact of peak traffic upon average line density, it can be accommodated in two ways: first, under the Department's methodology, a 50 percent excess capacity allowance was incorporated in the estimation formula; and second, in Corridors of Consolidation Potential peak or seasonal traffic movements at levels exceeding the 50 percent capacity margin can be carried over those lines which are downgraded in the corridor. Use of these lines for local traffic or occasional seasonal movements should not require significant rehabilitation efforts.

The Office further contends that significant consolidation with major marketing initiatives will not be proposed by railroads. The Department is sympathetic to the concern behind this contention because, if true, the public could be precluded from obtaining any of the service improvements that would result from modernization of industry structure that Congress anticipated in the RRRR Act.

However, it is clear that Congress hoped the industry would take advantage of the new merger procedures in the RRRR Act, and that this would result from private enterprise initiative, because Congress made the provisions voluntary -- a "carrot," not a "stick" -- and gave only limited powers to the Secretary to help the industry in its efforts.

Clearly, the private carriers ought to be given the clear opportunity and the first chance to modernize the industry, and improve service to the public, on their own. The Office offers only their suspicion that the railroads will fail to act without evidence to that effect.

However, should the industry fail to avail themselves of the advantageous provisions of the RRRR Act, the Office should

recognize that the studies provided for under Sections 401 and 901 allow the case for restructure to be made, and, if necessary, legislation for a more forceful restructuring mechanism can be proposed. The basic difference between the Office's position and the Department is that the Department believes the industry should have the first opportunity to plan its future.

(3) Branch lines designated by the railroads as "potentially subject to abandonment" in their system diagram maps should be incorporated by reference in DOT's final designations of branch lines.

The Department adopts this recommendation to create a new category for lines which will be designated by the carriers as "potentially subject to abandonment" under standards developed by the Commission. These standards and designations are incorporated by reference in this Final Report in a manner discussed in the succeeding chapters.

(4) Terminal operations should be considered in identifying lines with "consolidation potential."

By highlighting in the Preliminary Report Corridors of Excess Capacity as principal areas where the railroad industry should consider restructuring, it was not the Department's intention to ignore the importance or complexity of terminal operations within the corridors. As the Evaluation Report clearly demonstrates (Table 3, page 35) the traffic density in terminal areas may be greater than the intercity average line density shown in the Preliminary Report. In addition, other complications -- such as commuter operations -- and the sheer magnitude of certain terminal operations -- such as the Chicago Terminal -- raise serious technical problems with respect to consolidation. The existence of terminal congestion and physical problems by themselves, however, should not deter the industry from seeking benefits occasioned by consolidation in the corridors identified. The Department is acutely aware of the terminal problems and is engaged in an intensive study thereof under Section 901(2) of the Act. In the meantime, however, the railroad industry is in the best position to resolve redundancy or congestion problems in the corridors -- whether they be line-haul or terminal.

Clearly, the evidence of the past indicates that the industry can obtain terminal improvements, significant operating cost savings, and enhance the quality of rail freight service, simultaneously. Even at Chicago, which the Office uses to conclude that "rationalization of these corridors will be

almost totally dependent upon the ability of the individual carriers to more to, from, and through the major terminals," dramatic terminal consolidation coupled with corridor consolidation has occurred. Merger of the former Pennsylvania and New York Central railroad systems has already led to consolidation of interchange traffic through New York Central facilities, and use of the former Pennsylvania facilities only for TOFC. In addition, the United States Railway Association ("USRA") Final System Plan led to consolidation of the former Erie Lackawanna traffic -- over 20 MGT per mile -- onto the New York Central as well, and much of the Erie Lackawanna mainline has been abandoned or subsidized. Few consolidations will involve densities of the magnitude experienced here. The ultimate consolidation of all these facilities is now underway under ConRail. This has led to improved routings and connections for all rail users in the Northeast and Midwest.

Over a period of years a number of railroads operating in and through the St. Louis railroad terminal area have either closed yards or have experienced significant changes in the use of certain facilities. This has mainly been due to changes in operations and traffic flows, attempts to avoid congestion, and the avoidance of antiquated facilities. For example the Burlington Northern and the Terminal Railroad Association of St. Louis have consolidated facilities. Under the Norfolk and Western takeover of the Nickel Plate and Wabash Railroads, certain facilities were combined. The Louisville and Nashville takeover of the Monon also resulted in some facility changes.

The concept underlying Corridors of Excess Capacity, or Corridors of Consolidation Potential, does not imply that route consolidation requires terminal-to-terminal consolidation of traffic. The extent of the physical combination is dictated by the service improvements and cost savings to the participating carriers. Railroads are not urged to consummate consolidations which prove impractical. The Department simply urges carriers to examine those areas where consolidation potential appears greatest.

(5) Traffic projections should be considered in line designations where market changes can be foreseen.

In developing a system of classification the Department determined that it was not feasible to use projections of

traffic either for establishing the set of categories or for making specific line designations. The Evaluation Report reflected public criticism of this approach, saying:

> "Historical data was seen as a poor standard of future essentiality because it ignores new business and because undue reliance on it could retard economic growth and development. Respondents repeatedly stressed that a preoccupation with history would place the rail industry in a poor position to capture traffic from increased production of agricultural commodities, the exploitation of coal resources, and industrial development . . . .
>
> "It was pointed out that projections are commonly employed in making business decisions and are also routinely relied on by the government in funding other transportation modes." (p. 10)

Upon consideration of all commentary on this point, the Department believes that it is more appropriate and accurate to designate lines based upon historical and current data than upon projections of future traffic growth. There are two basic reasons for this conclusion.

First, it is not the purpose of the 503 Report to determine the basis for future growth in the rail system, but rather to capture a snapshot of what the rail system is today. The Act makes no reference to any measures of future activity nor does the legislative history. In fact, the Act -- as amended by the RTIA -- addresses the issue of future traffic growth in Section 504, not Section 503. As amended, Section 504(b)(A) directs that the Secretary's preliminary financing recommendations be based in part upon "the projected gross national product, the potential demand for rail service and the types of service capable of meeting that potential demand, the potential revenues and costs (including capital costs associated with those revenues), [and] the demand for rail services for which the railroads could compete on an economic basis . . . as projected through December 31, 1985 . . . ." The future prospects for the rail system, therefore, are addressed in the Section 504 study; the Section 503 Report looks at the system as it is, and periodic updates of the designations will be made to insure that, as they occur, actual changes in the status of lines will be reflected.

Second, while it is true as the Office states that "projections are commonly employed in making business decisions and are also routinely relied upon by the government in funding other transportation modes," it is clearly not the intent of the Congress that the Section 503 Report become a compendium of unsupportable projections for all the Class I railroads; the differences in the planning capabilities of the individual class I companies preclude formulation of a coherent system-wide development plan based upon their planning efforts. And as for the government's relationship with the other transportation modes, in every case it involves a governmental infrastructure ownership and planning relationship spanning at least four decades. And that is a type of institutional relationship which it is certainly not the purpose of the Act to create between the rail industry and the federal government. For although, most assuredly, the Act has plowed new ground in terms of the railroad-government institutional relationship, the final determination of that relationship must await the legislative action which flows from the process set in motion by the Act.

(6) Current traffic data should be used in making the final line designations in the Northeast.

The Department has adopted this recommendation. Actual traffic data are used wherever available.

Passenger Service

The Evaluation Report indicates a general public dissatisfaction with the method used in the Preliminary Report for taking into account passenger traffic in the classification and designation of lines. It argues that an arbitrary density threshold measured in numbers of trains is inadequate to reflect the actual importance of the passenger traffic on certain routes and, hence, the importance of the rail line segments to the "essential rail system." To correct this deficiency, the Office suggests that, if the basic classification system put forth in the Preliminary Report is retained in the Final Report, "all intercity passenger routes be classified no lower than 'B Mainlines.'" (p. 30)

After giving due consideration to the Office's recommendation and after evaluating both the public commentary on the handling of passenger operations and the statutory scheme of the Rail Passenger Service Act (RPSA), the Department determines that the standards for classifying the rail system under Section 503 should not in any way reflect a consideration of rail passenger services (although the presence and effect of rail passenger service will always be considered in an application for financial assistance). The reasons for this decision are several.

The principal factor in reaching this decision is that there has evolved under the Rail Passenger Service Act a comprehensive framework for considering the essentiality -- and funding -- of intercity rail passenger services. This framework consists of the basic system of rail passenger services developed by the Department under the RPSA and a variety of legislative additions and modifications to that system; it includes the route and service criteria recently developed by the Board of Directors of Amtrak under statutory mandate; and it establishes a baseline level of track condition which the railroads are legally bound to maintain on the routes over which Amtrak's trains run. In essence, therefore, the lines over which rail passenger services are operated have been "classified and designated" under the provisions of the RPSA and it would only confuse the issue to attempt to develop a hybrid system for passenger services based on both Section 503 and the RPSA.

The specific provisions of Section 503 support this view. Section 503 explicitly refers to two standards -- level of usage as measured in gross ton-miles and economic viability -- neither of which lends itself well to the consideration of passenger service. The difficulties of treating passenger level of usage in terms of train frequency became apparent in the Preliminary Report, and -- all costs considered -- passenger operations as a whole do not make a positive contribution to the economic viability of the railroad industry. Attempts by the Department to develop a satisfactory level-of-usage measure combining both passenger and freight traffic proved unsatisfactory, and using a solely-passenger measure other than train frequency proved unacceptable because of the differing characteristics of various passenger routes.

For purpose of identification, the current rail passenger network is depicted on the rear of the nationwide network map found in Volume II.

Economic Viability

Economic viability as a criterion for classification requires comment, though it was not listed separately in the Office's "Principal Recommendations" discussed above. The Evaluation Report summarized the public's criticism of the Department's explanation in its Preliminary Report that it is currently unable to determine economic viability of railroad line segments. Furthermore, certain of the "principal recommendations" relate to it -- specifically those dealing with the Office's proposed mainline categories of "System Essential" and "Carrier Essential" lines, and the concept of "Corridors of Excess Capacity."

This Report is not intended to create any specific national system of rail lines. However, throughout the public hearing and report process, the general interpretation of Section 503 was that the Department was to apply a strict test of economic viability to each railroad line segment in the

Nation, although public testimony did not suggest a feasible method for performing such a test. The Evaluation Report does not emphasize this point -- it should.

The USRA study experience of measuring economic viability of the bankrupt carriers in the Northeast was probably the most comprehensive in history in terms of both the detail of the data procured and the number of lines analyzed. That effort, however, was directed at determining which rail properties were to be excluded from ConRail -- not at determining the viability of either the mainlines or the high volume feeder system. The focus of concern was the creation of a viable rail system, not the determination of whether each individual line segment was economically viable.

USRA reported its opinion that the ConRail structure thus developed was the best that could be devised at the time, but it acknowledged that it was neither perfect nor permanent:

> "A task so complex as the restructuring of the rail system in the Region must be evolutionary. The American economy owes its essential dynamism to the ability of individual firms to shift, to adjust, to adapt, to give incentives, to test new ideas and new markets and to withdraw from unprofitable ventures. The restructuring plan should be viewed in this light. What is important is that economic forces be allowed to work themselves out within an established framework of fairness and guaranteed continuation of essential services."4/

The essential ingredients of a line specific economic viability test are: (1) accurate segment data, and (2) accurate reve-ue and cost itemizations. However, available revenue and costing methodologies are totally inadequate. The railroads' annual reports to the Commission, for instance, do not break down costs even by operating divisions, much less by individual lines. In response to this lack of the Act Section 307 requires the Commission to improve the Uniform System of Accounts so that more detailed revenue/cost analysis can be performed. Neverthless, it will be some time after a satisfactory revision of the Uniform System of Accounts is completed before sufficient data is available, publicly or otherwise, to conduct such an analysis.

The key point in a discussion of economic viability as a standard is that as long as the railroad industry is in the private sector, viability of the carriers -- not of line segments -- should be the main concern. For the most part, the railroads themselves have no specific measure of the economic viability of their own line segments, except when branch lines are studied for possible abandonment.5/ Indeed, the only thing which can effectively be measured is the viability of the carrier.6/ The Department is especially concerned that appropriate methods for developing and measuring data within the railroad industry be promptly established so that meaningful tests for viability can be conducted.

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Footnotes

1/ The Rail Transportation Improvement Act enacted on September 30, 1976, amends Section 505(b)(2) by requiring the Secretary to accord the highest priority to applications which enhance the ability of the applicant to provide essential services.

2/ Section 505(b)(2) Application and Determination -- The Secretary shall act upon each such application within 6 months after the date on which all required information is received, except as otherwise provided in subsection (a)(2) of this section. The Secretary may approve any such application if he determines that providing the requested financial assistance is in the public interest. When making such a determination, the Secretary shall evaluate and consider (A) the availability of funds from other sources at a cost which is reasonable under principles of prudent railroad financial management in light of the railroad's projected rate of return for the project to be financed and the railroad's rate of return on total capital (represented by the ratio which such carriers net income, including interest on long-term debt, bore to the sum of average shareholder's equity, long-term debt, and accumulated deferred income tax for fiscal year 1975) as determined in accordance with the uniform system of accounts promulgated by the Commission, (B) the interest of the public in supplementing such other funds as may be available in order to increase the total amount of funds available for railroad financing, and (C) the public benefits to be realized from the project to be financed in relation to the public costs of such financing and whether the proposed project will return public benefits sufficient to justify such public costs. Except as provided in the last sentence of this paragraph, the Secretary, in determining the extent to which a project will provide public benefits, shall give the highest priority to projects which will enhance the ability of the applicant carrier or other carriers to provide essential freight services. The Secretary, in granting financial assistance to any applicant shall assign the highest priority, among applications for assistance which would return equal public benefits, to applications for assistance for providing safety improvements and signals, including underpasses or overpasses at railroad crossings at which injury or loss of life has frequently occurred or is likely to occur.

3/ The Office defines consolidation potential as the situation that exists "where two lines cross each other at several points and all of the non-local traffic from one line could be diverted over the other." Evaluation Report, page 40.

4/ USRA, Final System Plan, p. 35.

5/ The railroads will be presenting their system maps of showing lines which are candidates for abandonment. These maps will be available in early 1977, and sufficient time will be provided for adequate public comment.

6/ Section 101(a) of the Act.

CHAPTER 3

FINAL STANDARDS FOR THE CLASSIFICATION OF RAIL LINES

The standards for the classification of the rail system into categories of lines used in this Final Report are based upon the "level of usage measured in gross-ton-miles" and "operational service and other appropriate factors" as required in Section 503(b) of the Act, taking into account the commentary provided by the public during the hearings held by the Office in accordance with Section 503(c) of the Act, commentary which is addressed in detail in Chapter 2.

This process has led the Department generally to confirm the approach used in the development of preliminary standards; that is, that, although the principal standard should be based upon traffic density, considerations of service to major markets must take priority over density where density alone insufficiently reflects the significance of a rail line segment, and in certain parts of the rail system the problem of underutilized fixed plant capacity is so severe that it must be acknowledged regardless of the line densities involved.

Despite this general confirmation of the preliminary standards this Final Report contains three basic modifications in the final, as compared with the preliminary, standards. First, the final standards, for the reasons described in Chapter 2, do not include any consideration of passenger traffic. Second, the defense-essential standard has been totally revised; rather than focusing on branchlines which provide access from defense installations to the mainline network, it now reflects defense needs for a national network of interconnected high-density mainlines. Finally, and as indicated in Chapter 2, because of the implicit classification established by the Act's modification of the statutory provisions under which the Commission decides petitions for the abandonment of rail lines and the discontinuance of rail service, this Report sets forth a classification standard consistent with those revised provisions.

The First Standard: Density

The first standard for the classification of rail lines is both the simplest to apply and the one that serves as the basis for the categories into which the great preponderance of the mileage of

rail lines is designated. The Preliminary Report explained the attributes of utilizing density as a primary standard in the classification process. An examination of the major characteristics of density demonstrated that:

(1) Traffic density is an effective measure of the level of activity on the rail system.

(2) A thorough look at the rail system on the basis of traffic density reveals that a large amount of total rail ton-miles moves on a relatively small portion of the total rail plant and, conversely, that a relatively large portion of the rail plant carries an almost imperceptible level of traffic. Specifically, the Department's analysis indicates that approximately 33 percent of the rail network (about 60,000 route miles) produces less than two percent of the traffic, or the equivalent of about one average-sized train per week. At the other extreme, two-thirds of the rail industry's total ton-miles are produced on approximately one-fifth (about 40,000 miles) of the system.

(3) Since it is not feasible to calculate directly and with accuracy the economic viability of individual rail lines, traffic density--though it is not always completely accurate--is the best available substitute indicator.

(4) The fact that unit maintenance costs tend to decrease per carload as traffic density increases indicates that financial benefits may accrue to the railroads from concentrating traffic onto lines of higher densities.

(5) There is generally a direct correlation between the density of traffic on a rail line and the type of operations conducted over it.

The basis for these conclusions on the value of the density standard was explained in the main text of the Preliminary Report. Since nothing in the public commentary process undermined the basic case for the density standard, supporting material therefor is contained

in Appendix 2 of this Final Report. The remainder of this discussion of density will address the significant points concerning density raised by the Office in its Evaluation Report.

The first point raised by the Office is that density as a standard does not assure "the selection of the best rail routes or the most effective network," since a look at traffic densities over the last five years "often reflects level of maintenance rather than line essentially (sic)." This point has two major facets: (1) whether the standards for classification should reflect sound empirical data or projections of future interest or activity; and (2) the role of "essentiality" in the classification and designation process. Both of these points are addressed in great detail in Chapter 2 of this Report and the Department's position on both is contrary to that of the Office.

The second point the Office raises in respect to density is that focusing strictly on density measured in gross ton-miles "may penalize a carrier for its efficiency." The thrust of this point is that in certain cases lines which carry less than 20 MGT have -- as part of that traffic -- a significantly higher proportion of revenue ton-miles than does the average line with more than 20 MGT. The Office contends, and the Department concurs, that the density standard ought to be adjusted to reflect these cases. Accordingly, the final density standard takes this factor into account in making mainline designations where data on revenue ton-mile density by line segment are available for carriers which exceed by 10 percent or more the average line density efficiency (ratio of net to gross ton-miles) for their district. The details of the Department's analysis of this factor are included in Appendix 2.

The Office's third key comment on density is that the Department itself has recognized that density alone is not sufficient as a standard by adopting another standard -- service to major markets -- as an aid in identifying "the essential rail network." The first response to this point is simply a reiteration

of the Department's earlier described position that what the Act calls for and what the Preliminary Report creates, is a set of categories which reflect a hierarchy of importance for rail lines, and not -- as the Office mistakenly believes -- one category of essential rail lines comprising an interconnected nationwide network of main lines that by definition relegates all other categories of rail lines to the status of nonessential. Looking at the matter from the Department's viewpoint, then, it becomes clear that the other standards used to determine whether a line with less than 20 MGT should nevertheless be designated into the highest category of main line represent factors used to augment the sound -- but admittedly imperfect -- standard of density, and not arbitrary factors for determining whether a line is essential or nonessential.

The Second Standard: Service to Major Markets

The first standard of classification--density--might, at first glance, seem adequate to cover all segments of the rail network. But while density is a good measure of the level of usage of individual lines, it fails to take full account of the impact of individual markets for freight traffic or of the flow between them. Hence, in order to ensure that the system of classification for the rail system is as sound as possible, the Department analyzed all segments of the rail network in regard to the origins and destinations of traffic to assist in developing a standard that would ensure that major traffic centers are served by the highest priority category of mainline.

The analysis was conducted using analytical tools and data developed by the Department for general use in rail system analysis. In connection with previous studies, the Department developed, as a tool for analysis, a system for dividing the continental United States into a total of 486 Transportation Zones. For purposes of this Report it is sufficient to characterize the basis for establishing the respective zones as the optimum means yet found of identifying various groupings of undivided counties with similar transportation requirements. These Transportation Zones were used as a basic unit of analysis in the Department's 1974 report Rail Service In the Midwest and Northeast Region and in USRA's Preliminary System Plan and Final System Plan. The zones are an integral part of the railroad network planning computer model utilized by FRA.

The basic data used in the market service analysis were provided from annual surveys by the Department of the flow of rail freight within the United States. These surveys are carried out by sampling the waybills covering rail carload freight movements. Assessing the relation between the origins and destinations of traffic, as determined by waybill data for 1973, and the Transportation Zones provides the statistical basis for application of the standard for service to major markets in the line-designation process.

According to the 1973 waybill sample, approximately 45 million cars originated, terminated or moved within the 486 traffic centers. The largest zone, Chicago, Ill. accounted for 1.4 million cars; the smallest, Caliente, Nev., accounted for 200 cars. Table 2 gives a breakdown of car activity in Transportation Zones by ranges.

Table 2.—Loaded Cars Originated and Terminated

Range of Loaded Cars	*No. of Zones*	*No. of Cars (millions)*	*Percent of cars*	*Cumulative Cars (millions)*
greater than 150,000	74	25.1	56	25.1
100,000–150,000	49	5.8	13	30.9
75,000–100,000	46	4.0	9	34.9
50,000–75,000	77	4.7	10	39.6
25,000–50,000	101	3.7	8	43.3
10,000–25,000	87	1.5	3	44.8
less than 10,000	52	0.3	1	45.1

SOURCE: FRA Waybill Data, 1973

To determine an appropriate basis for the service to major markets standard, the Transportation Zone analysis was made as follows:

(1) Every zone was checked in order to determine whether it is served by at least one high-density mainline. If so, the zone was eliminated from further analysis.

(2) The remaining zones were divided into two groups: zones generated more than a threshold number of freight carloads per year, in terms of either originations or terminations--identified as "major" zones, and zones of lesser traffic activity.

(3) Zones below the carload threshold were eliminated from further consideration as potential candidates for the requirement of highest category mainline service. For such zones, access lines of a lower priority category are considered adequate.

(4) Zones remaining in the study universe were then subjected to a detailed traffic analysis to determine if they required service by a highest category mainline for intra-zonal access or connectivity between zones.

The Third Standard: Appropriate Levels of Capacity

The fixed right-of-way and its supporting facilities (yards, shops, etc.) represent two challenges to the railroads. First, the relatively fixed costs of ownership and maintenance should be spread over the optimum traffic base to maximize capital efficiency. Secondly, if maintenance of railroad facilities is not adequate, service reliability declines and operating costs increase, which leads to a loss of traffic to other modes.

The area where the failure to meet these challenges has reached critical proportions is in the mid-continent region. An examination of rail traffic performed for the Preliminary Report indicated that eleven major areas, designated as Corridors of Excess Capacity, generally contain most of the route miles of the financially marginal and bankrupt carriers, and a high percentage of the route miles of these carriers are in a physically deteriorated condition. While the CEC's identified do not represent the only areas where fixed plant redundancy, marginal carrier operations, and track deterioration exist, it is within the CEC's where the problem is most pronounced. Because the marginal carriers do not have adequate financial resources to repair their tracks themselves, and because further track deterioration may preclude continued operation, many of the line segments in these CEC's are likely candidates for public assistance. Given the near term prospects for expending public funds, the use of the CEC concept, renamed as Corridor of Consolidation Potential (CCP), will be continued in this Final Report as an appropriate application of the standard addressing appropriate levels of capacity (see Chapter 4 for details). Additional analysis has resulted in the elimination, in this Final Report; of the Kansas City-Fort Worth Corridor, leaving ten corridors where excess capacity poses a significant problem.1/

In determining whether a rail freight market or corridor reveals an imbalance between capacity and traffic, two criteria are used.2/

- Number of competing routes. The corridor has to include more than two competing through routes, each operated by a different company.

. Relation between capacity and density. The corridor has to demonstrate significant excess capacity in comparison to annual density.3/ It should be recognized that a certain level of excess cacity is necessary, given daily and seasonal peaking of traffic and the need to cope with service interruptions, such as derailments and natural disasters. Above a certain level, however, the costs of maintaining excess capacity exceed any potential benefits; in the Department's judgment 50 percent excess capacity represents a conservative standard for defining that level.

The difference between the discussion of appropriate levels of capacity in the Preliminary Report and here is its application. An inference was drawn by the public that consolidation is an abolute prerequisite for approving any federal financial assistance in the identified corridors. This is not the case. The Department's rules and regulations under Title V will control. And while consolidation projects which eliminate excess capacity in CCP's are high in the scale of priorities for assistance, other factors, such as essentiality of service and reasonably prospective traffic, will also influence approval of projects in the corridors.

All lines falling in CEC's in the Preliminary Report were designated solely as Potential A Mainlines. In this Report, in order to reflect the fact that excess capacity is not the only important characteristic of these lines, rail line segments in CCP's are given a dual designation: That is, in addition to a designation based on the appropriate levels of capacity standard, each line segment in a CCP is also designated as appropriate under the other four standards. The primary purpose for retaining the corridor concept in making designations is to call attention to areas the Department believes offer the greatest potential for consolidation.

Railroads with routes situated in Corridors of Consolidation Potential should consider two approaches for tailoring capacity to fit use. First, consolidations and mergers might be entertained. And second, they might enter into joint trackage agreements so that maintenance and rehabilitation funds can be concentrated on fewer lines.

In order for the carriers in CCP's to have the greatest flexibility in resolving route redundancy, all through routes in a given corridor are given equal status in the designation process. Thus, in addressing the problem of over-capacity the carriers can take into account such variables as traffic flows, line condition, line capacity, yard location, curves, grades, financial consideration, and corporate relationships. The Department is cognizant of the

importance of the traffic in these corridors, and urges the carriers to move promptly to resolve the excess capacity problem. The railroads may, pursuant to Section 401 of the Act, meet collectively with the Secretary to discuss and reach agreements regarding this problem.

The Fourth Standard: National Defense

National defense requirements constitute a fourth standard. The Department of Defense has delegated the identification of defense needs and requirements to the Military Traffic Management Command (MTMC), the Department of Defense Single Manager for military traffic, land transportation and common-user ocean terminals. Defense requirements, in addition to being considered under Section 503 of the Act, are considered under Section 901(3) which addresses the cost savings if rehabilitation is limited to the system "essential to interstate commerce or national defense."

MTMC furnished FRA with a one-year record of defense peacetime rail traffic data as the first of several steps required to assure consideration of national defense requirements. In the preliminary 503 report, FRA used that portion of the data related to the movement of battle tanks as a proxy for oversize/overweight defense shipments. FRA classified the branch lines used for these shipments as "defense-essential" and stated an intention to address defense requirements for mainlines in the Section 901(3) report.

MTMC testimony before the Office indicated that the importance of mainlines to national defense is the strategic value of an integrated and interconnected system, rather than specific route importance. The testimony further stated that the mainline system's capability to provide for the expeditious deployment of defense forces materials and equipment throughout the Nation is of primary importance. Further information was promised to aid FRA in the identification of a national rail network essential to meet the national defense.

On November 30, 1976, MTMC provided the Federal Railroad Administrator with "An Analysis of a Strategic Rail Corridor Network (STRACNET) for National Defense." The STRACNET, which encompasses slightly over 30,000 miles of rail line, is based on an MTMC analysis of defense peacetime rail carload traffic, battle tank rail traffic as an indicator for oversized/overweight clearance routes, potential origins and destinations for wartime contingencies, and consideration

of other factors such as population centers, seaports and airports of embarkation, service to major military installations and defense industries, and transportation centers. STRACNET identified corridors rather than specific lines so as to allow FRA maximum flexibility in designating mainlines required to satisfy defense needs. However MTMC demonstrated and requested that such mainlines be designated as category A Mainlines.

MTMC further stated that the Military service departments are currently preparing a list of defense installations requiring rail service. MTMC indicates it will validate these requirements and furnish FRA with the list of installations requiring rail service. Defense essential branchlines shown in the preliminary report have been temporarily deleted at the request of DOD but they will be provided for incorporation into the report under section 901(3) of the Act.

The Fifth Standard: Lines Potentially Subject To Abandonment

In its Evaluation Report, the Office urges that a group of lines which the Commission may find potentially subject to abandonment be included in the Department's classification and designation process. Section 802 of the Act amends section 1a of the Interstate Commerce Act as follows:

> "(5)(a) Each carrier by railroad subject to this part shall, within 180 days after the date of promulgation of regulations by the Commission pursuant to this section, prepare, submit to the Commission, and publish, a full and complete diagram of the transportation system operated, directly or indirectly, by such carrier. Each such diagram which shall include a detailed description of each line of railroad which is 'potentially subject to abandonment', as such term is defined by the Commission. Such term shall be defined by the Commission by rules and such rules may include standards which vary by region of the Nation and by railroad or group of railroads. Each such diagram shall also identify any line of railroad as to which such carrier plans to submit an application for a certificate of abandonment or discontinuance in accordance with this section. Each such carrier shall submit to the Commission and publish, in accordance with regulations of the Commission, such amendments to such diagram as are necessary to maintain the accuracy of such diagram."

This amendment directs the Commission to develop standards to identify those lines which will be potentially subject to abandonment. The Commission recently issued implementing regulations on this subject

under Ex Parte No. 274 (Sub-No.2), Abandonment of Railroad Lines and Discontinuance of Service.4/

All common carriers by railroad subject to part 1 of the Interstate Commerce Act were made respondents. The Commission explains that the purpose of providing public notice for lines potentially subject to abandonment is to give reasonable notice to shippers and communities who will be affected and provide an opportunity for the government, and the railroad to seek intelligent transportation alternatives or solutions. It should be made clear at the outset that this function falls solely within the jurisdiction of the Commission as mandated by Congress. The 503 report is not an abandonment document. However, in addition to an abandonment evaluation, the Commission's regulations include a rail line classification and designation process that impacts the railroad system. Consequently, it appears logical for the Department, in establishing a comprehensive scheme for classifying and designating all railroad lines of Class I railroads, to develop a system compatible with the classifications and designations devised by the Commission.

FOOTNOTES

1/The detailed analysis of these corridors is set forth in Appendix 3.

2/Since a large number of through routes could conceivably be structured between the major traffic centers which serve as the ends of a corridor, it was necessary to establish a criterion for defining those routes which comprise a corridor. The criterion selected was that any route less than 50 percent longer than the shortest through route between the traffic centers defining the corridor would be included in the analysis of capacity.

3/The Department relied upon the Parametric Line Capacity Analyzer to determine capacity. This model is described in Appendix 3 and the Department's response to the criticisms of the model is located in Chapter 2.

4/This is a joint report of the Commission and the Office, served November 10, 1976. These regulations can be found at 49 CFR 1121.

CHAPTER 4

FINAL CLASSIFICATION OF THE RAIL SYSTEM AND DESIGNATION OF RAIL LINES

The Department is of the opinion that any process for the classification of the Nation's rail system into categories for designation of rail lines should concentrate on directing available resources into those segments of the fixed plant which handle the preponderance of the Nation's rail freight. Continued degradation of maintenance on these lines will have the greatest impact on safety and system efficiency because of the volume of traffic involved.

Therefore, the Department has established the following categories for designation of rail lines:

(1)	A Mainlines	. 20 million or more gross tons . major Transportation Zone connectivity . needed for through movements of defense-related shipments
(2)	B Mainlines	. at least five, but less than 20 million, gross tons
(3)	CCP Lines	. through routes located in Corridors of Consolidation Potential
(4)	A Branchlines	. at least one, but less than 5 million, gross tons
(5)	B Branchlines	. less than 1 million, gross tons
(6)	ICC Study Lines	. any route segment identified by carriers as potentially subject to abandonment under the regulations established by the Commission in conformance with section 802 of the Act.

Explanation of Categories

Mainline Categories

In establishing categories, the basic standard used is density. Based upon the considerations discussed in Chapter 3, two categories of mainline -- A and B -- were established using density as the essential determinant.

Category A Mainline. A line is designated into this category if it meets any of three tests:

1. High Freight Density Test--Does a line carry at least 20 million gross tons per year?

   Based on a review of the traffic density density data submitted by the carriers and the factors discussed in Chapter 3, the Department is establishing a minimum route density of 20 million gross tons as the first threshold for designation of a Category A Mainline. An analysis of the relation of unit maintenance cost to line density (See Appendix 2 -- Density) supports the selection of 20 million gross tons as a major threshold, as does the fact that lines with densities of 20 million gross tons or more comprise about one-fifth of the rail system and produce two-thirds of the ton-miles. Further, if the Category A Mainline threshold were higher than 20 million gross tons, it would eliminate lines serving a significant number of major traffic centers and thereby erode the integrity of the mainline network. Thus, Category A Mainlines generally carry most of the traffic, exhibit the most efficient use of rail route capacity in terms of the unit cost of operation, maintenance, and return on invested capital, and serve--with few exceptions--the major traffic centers. This categorization of primary mainlines does not, of course represent an absolute criterion for requiring any specified level of track rehabilitation. Need for rehabilitation is dependent upon a number of other variables, such as existing condition, service levels, and alternatives available. Such considerations will be addressed fully in the Department's Capital Needs Report, which is required under section 504 of the Act, as amended by the Rail Transportation Improvement Act of 1976 (PL 94-555), and is due, in preliminary form, on August 3, 1977.

2. Service to Major Markets Test--Is a route with a density of less than 20 million gross tons required to provide rail route linkage for Transportation Planning Zones generating at least 75,000 carloads of freight annually?

   As pointed out in Chapter 3, where the density standard does not provide for the designation of a highest category mainline to serve a market generating more than a certain threshold level of traffic, an adjustment to the classification standards is required. The Department's preliminary analysis indicates that a reasonable traffic generation threshold for an individual Transportation Zone is 75,000

freight carloads per year. The application of this threshold covers more than 78 percent of the carloads generated on the rail system and approximately 35 percent of the Transportation Zones. This minimum, in the Department's judgment, provides a reasonable standard for connecting major markets to the mainline system if they are not served, for some reason, by a line meeting the freight density test.

3. National Defense Test--Is a route, which would not be designated Category A Mainline under any other test, required to provide a through rail route of the highest category in corridors designated as essential in the Strategic Rail Corridor Network (STRACNET) for National Defense?

   National defense considerations dictate that there be a through mainline rail route of the highest category in corridors that comprise the STRACNET developed by MTMC, as described in Chapter 3. Thus any line segment not otherwise a Category A Mainline which is needed to complete a through route in any STRACNET corridor is designated as a Category A Mainline.

Category B Mainline. A Category B Mainline is a through or feeder rail route which carries less than 20 million gross tons, but at least 5 million gross tons, annually and which fails to qualify for Category A Mainline status on the basis of either the need to provide service to major markets or considerations of national defense.

The lower density threshold established for this Category is based upon the judgment that it represents the lower bound of the density range in which a line can reasonably be classified as a mainline.

CCP (Corridors of Consolidation Potential) Lines. As discussed fully in Chapter 3 under the standard addressing appropriate levels of capacity, this category is provided for lines making up all through rail routes located in geographic areas of the country defined as Corridors of Consolidation Potential. A Corridor of Consolidation Potential (CCP) is defined as a corridor whose end points are major markets connected by three or more parallel through routes operated by three or more carriers, and in which the practical traffic handling capacity of the combined routes exceeds the actual traffic density (in gross tons of the combined lines) by 50 percent or more. 1/2/ In such a corridor, all through rail lines between major markets, without regard to either their actual densities or any other designation which they may receive, are designated as Category CCP Lines.

The purpose of providing equal status for all lines in CCPs is to avoid prejudgment by the Department of the relative treatment of the competing routes in any rationalization plan by the railroads operating in a CCP. Mergers, consolidations, or coordinations designed to reduce excess route capacity may result in shifts of traffic from one line to another for the purpose of concentrating traffic. An existing line that is currently low-rated in relation to competing routes could be chosen by cooperating rail carriers as a key route in the future due to other considerations. All competing railroads in the corridor have an equal opportunity to demonstrate the respective superiority of their routes and facilities.

Branchline Categories. As discussed previously, there is no consistent historic means of determining which rail lines are branchlines. Consequently, for the purpose of this Report, the term "mainline" refers to all rail routes carrying at least 5 million gross tons and the term "branchline" refers to all other rail routes. Three categories of branchlines have been established:

Category A Branchline -- A rail route handling at least 1.0 but less than 5.0 million gross tons.

Category B Branchline -- A rail route carrying less than 1.0 million gross tons.

ICC Study Line -- Any line designated by a railroad as a potential candidate for abandonment in conformance with regulations issued by the Commission under section 802 of the Act.

This category is for lines, generally light in traffic density, whose future is characterized as uncertain because they are considered by the railroads which operate them to be potentially subject to abandonment.

In order to alert rail users and local communities that they are likely to face attempts by the carriers to abandon service over certain light density branch lines, section 802 of the Act amends the Interstate Commerce Act by adding a new section 1a(5)(a) requiring each rail carrier to prepare, publish, and circulate a diagram of its system specifically identifying lines which are potentially subject to abandonment. The ICC has adopted regulations to implement this requirement through Ex Parte No. 274 (Sub-No. 2): Abandonment of Railroad Lines and Discontinuance of Service, served November 10, 1976. The regulations require each rail carrier to file with the Commission and appropriate State agencies, no later than April 29, 1977, a map diagram of its rail system specifically designating the following line categories:

1. All lines which the carrier will seek to abandon within three years.

2. All lines under study which may be subject to future abandonment attempts.

3. All lines for which an abandonment application is pending before the ICC.

4. All lines being operated under Federal, State or other subsidy provisions.

In order to assure the broadest public notice, the Commission will publish the carriers' initial system diagram maps in the Federal Register, and individual carriers are required to publish newspaper notices at the county level which depict and describe lines in categories 1 through 3 located in such county. Carriers will also be responsible for maintaining the continuing accuracy of their system diagram maps and line categories.

The importance in the line classification and designation process of identifying light density lines which are potentially subject to abandonment requires that they be assigned a distinct category. These lines are assigned to Category ICC Study Lines.

Since their identity must await the official filing of the carriers' initial system diagram maps, there is no way such lines can be specifically identified at this time. The ICC Study Lines category, therefore, will embrace, by reference, those lines described above (ICC categories 1 through 4) as depicted and described in individual carriers' system diagram maps when they are officially filed with the Commission.

It is anticipated that the line classification and designation process will be a flexible and evolving process; revised, updated classification and designation reports will be published periodically. In these reports, the Department will specifically designate as Category ICC Study Lines those route segments identified by the carriers as potentially subject to abandonment.

The Designation of Rail Lines

Each of the identified line segments of the approximately 193,500 route-mile system of class I railroad lines in the continental United States is designated into at least one of the above categories. Each line segment was subjected to individual analysis; the results of that analysis are to be found in Volume II of this Report.3/ Therein, the railroad network structure in each State (except Alaska and Hawaii) is graphically displayed. In cases where structural complexity requires considerable detail, the State network structures are divided.

Coding of Categories

On each of the 132 sector maps appropriate information is provided for each line segment in the rail network. Each line segment is accorded a Line Identification Code (LIC) comprising the initials of the owning railroad company and a sequence number. The full corporate titles of the owning rail companies to which the initials refer are listed in Interim Volume II as is a cross referenced location index. The category of designation is indicated by color coding the individual line segments as follows:

Red--Category A Mainlines

Blue--Category B Mainlines

Brown--Category A Branchlines

Purple--Category B Branchlines

Green--Corridor of Consolidation Potential (affected lines from the four above categories are highlighted in green)

Yellow--Routes operated by Class II railroads (companies earning less than $10 million gross revenues annually) are shown on the maps but not assigned a category. Under the provisions of Section 503, data are not required to be submitted by Class II railroads. Yellow also delineates aggregations of lines in urban areas. These are displayed for structural connectivity.

Note: There is no color designation in the current Volume II for category ICC Study Lines, since none have yet been designated.

Density Identification

In addition to company and link references and designation of category by color on the maps, there is listed in Table 2 of Volume II an illustrative range of density for each line segment as follows:

Key No.	Density Range (in millions of gross tons)
1	less than 1
2	at least 1 but less than 5
3	at least 5 but less than 10
4	at least 10 but less than 20
5	at least 20 but less than 30
6	30 or more

Discussion of National Network Graphics

In order that the user of the report may acquire a comprehensive overview of the relation to the national network of the rail routes in which he is interested, Volume II of the report supplements the sector maps with an enlarged national network map displaying the mainline designations by category.

Line Analysis Process

The step-by-step process of designating each of the route segments in the rail network into a specific category is based on the application of the criteria for each category as they were developed from the classification standards in Chapter 3.

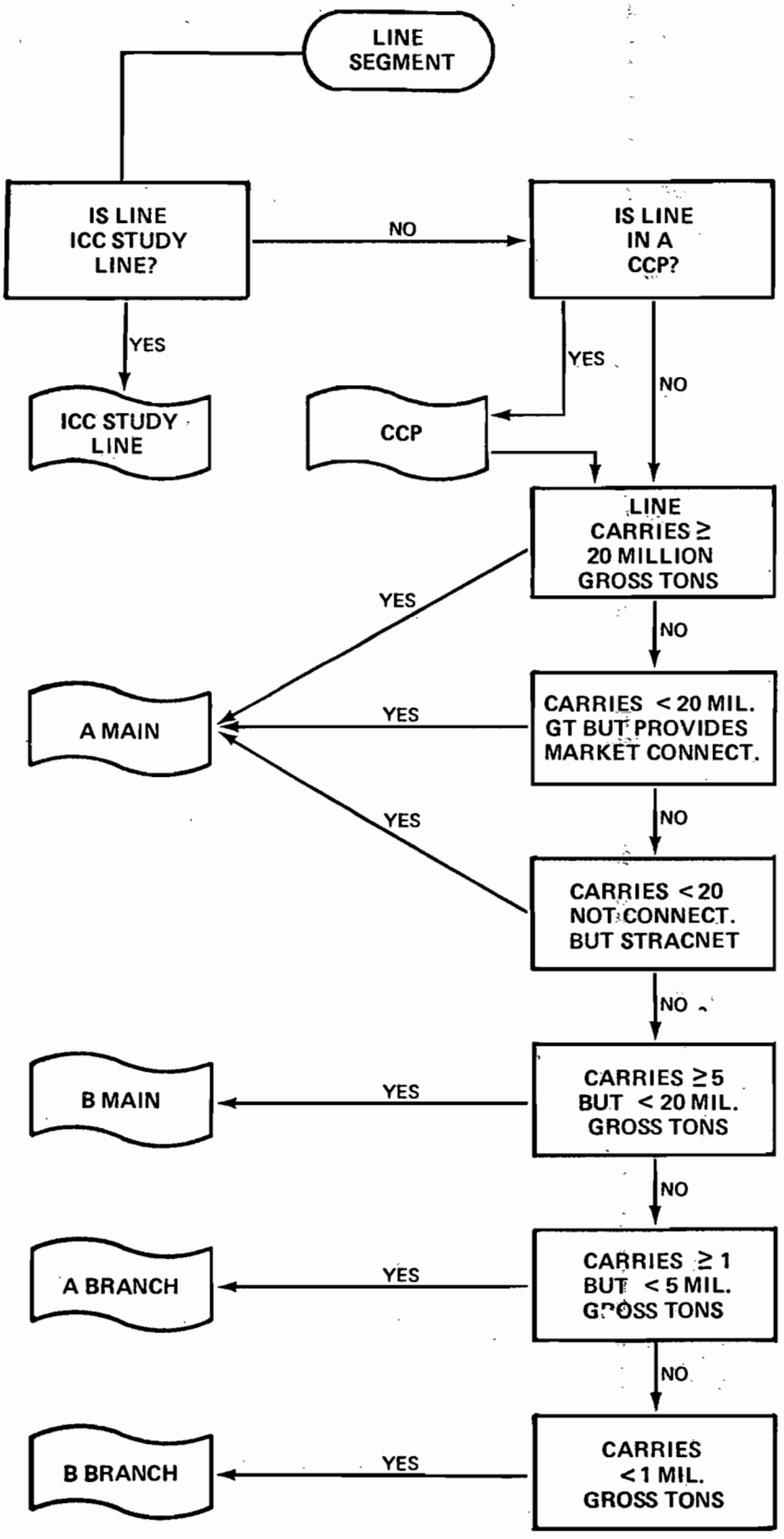
The process of designating line segments was carried forward by applying a uniform progression of what are, in effect, inquiries and responses based on the five standards described. That process is illustrated graphically in Figure 1. It sets forth the following steps in the line evaluation procedure:

Step One: The determination that any route segment is potentially subject to abandonment by a rail carrier reporting to the Commission under the provisions of its regulations issued pursuant to section 802 of the Act is an overriding test which automatically decides the designation of the segment. However, as noted in the preceding summary of the Category, neither the test nor the designation could be applied in this Report because the rail carriers are not required to report their designations to the Commission until a later date. The test and the category will be held in reserve for future adjustment of designations by the Department, and are not reflected in the summary breakdown of the rail network by category below.

Step Two: The next inquiry -- "Is line in a Corridor of Consolidation Potential?" -- is applied to each remaining line segment prior to the more pervasive density standard.

FIGURE 1

THE RAIL LINE SEGMENT DESIGNATION PROCESS



This test is applied as the second step because it potentially affects all rail line segments except those designated as ICC Study Lines. After this step has been completed, each line segment considered -- regardless of whether it was designated as a Category CCP Line -- is examined in the light of the remaining steps in the designation process as described below. This is because the designation into the CCP Line Category is in addition to, and separate from, any designation into a category based on a standard other than appropriate levels of capacity.

Table 3. below summarizes the designation impact of the application of the appropriate levels of capacity standard. The criteria inherent in this category resulted in the identification, in this Report, of 10 Corridors of Consolidation Potential involving the designation of some 18,900 miles of rail line as CCP Lines. The Kansas City--Fort Worth Corridor of Excess Capacity identified in the Preliminary Report has been dropped because, upon more detailed examination, it was determined to have insufficient excess capacity to be so designated. The lines in CCPs are highlighted in green on the National Network Map.

Table 3. -- Corridors of Consolidation Potential

Corridor	Rail Routes	Route Miles 1/	Average Line Density (MGT)	Line Capacity (MGT) 2/	BOTTLENECK CAPACITY 3/ Segment Density(MGT)	Segment Capacity(MGT)
Chicago to Pittsburgh	Baltimore & Ohio	464	35	70	39	70
	Norfolk & Western	451	32	56	61	80
	ConRail (via Cleveland)	449	70	118	70	118
	ConRail (via Ft. Wayne)	438	26	140	70	140
	TOTALS:	1802	163	384	240	408
Chicago to Buffalo	Chesapeake & Ohio	598	7	22	28	22
	ConRail (via Detroit)	530	15	61	21	61
	Norfolk & Western	511	33	63	61	80
	ConRail (via Cleveland)	506	74	118	70	118
	TOTALS:	2145	129	264	180	281
Chicago to Southern Gateways	Baltimore & Ohio (to Cincinnati)	360	37	54	40	54
	Milwaukee Rd (to Louisville)	343	5	9	5	9
	Louisville & Nashville (to Evansville)	296	17	53	21	33
	Louisville & Nashville (to Louisville)	308	8	22	13	22
	ConRail (to Louisville)	304	13	12	9	12
	ConRail (to Cincinnati)	284	15	40	13	40
	Chesapeake & Ohio (to Cincinnati)	299	7	24	9	24
	TOTALS:	2167	102	194	110	194
Chicago to Kansas City	Missouri Pacific	551	18	43	15	43
	Chicago & North Western	544	33	17	13	17
	Norfolk & Western	496	19	17	21	17
	Rock Island	489	18	53	18	53
	Milwaukee Road	483	10	21	10	21
	Burlington Northern	455	22	60	30	72
	Santa Fe	448	42	161	69	183
	Illinois Central Gulf	467	13	11	8	11
	TOTALS:	3933	175	383	184	417

Table 3. -- Corridors of Consolidation Potential (con't)

Dallas/Ft. Worth to Houston	Santa Fe	338	27	46	39	57
	Missouri-Kansas-Texas	322	11	33	12	33
	Rock Island	289	7	28	12	28
	Missouri Pacific	279	16	30	29	43
	Southern Pacific	266	20	14	33	32
	TOTALS:	1494	81	151	125	185
Chicago to Omaha	Burlington Northern	448	35	81	36	81
	Illinois Central Gulf	520	12	18	5	18
	Rock Island	472	19	30	14	30
	Milwaukee Road	467	12	29	29	13
	Chicago & North Western	463	45	75	33	75
	TOTALS:	2370	123	233	117	217
Kansas City/ Omaha to Colorado	Missouri Pacific	618	13	46	12	45
	Santa Fe	600	24	46	22	53
	Union Pacific (from Kansas City)	635	9	30	4	10
	Burlington Northern	544	18	70	21	70
	Rock Island	586	8	22	9	24
	Union Pacific (from Omaha)	561	55	57	51	54
	TOTALS:	3631	127	247	119	257
Chicago to Minneapolis	Rock Island	489	15	17	5	17
	Burlington Northern	435	38	70	27	70
	Soo Line	435	19	38	13	38
	Chicago & North Western	416	19	46	21	46
	Milwaukee Road	404	20	135	18	135
	TOTALS:	2179	111	306	84	306
Chicago to St. Louis	Chicago & North Western	318	33	21	23	21
	Illinois Central Gulf (ex GMO)	273	10	35	6	35
	Missouri Pacific	257	18	54	23	54
	Norfolk & Western	272	13	49	8	49
	Illinois Central Gulf (ex IC)	269	21	46	16	45
	TOTALS:	1389	95	205	76	205
Chicago to Detroit	Chesapeake & Ohio	314	24	22	28	22
	Grand Trunk Western	301	22	56	12	55
	Norfolk & Western	279	9	56	27	55
	ConRail	264	30	61	21	61
	TOTALS:	1158	85	195	88	195

1/Because some of the line segments comprising the through route in Corridors of Consolidation Potential serve as parts of through routes for more than one corridor, the "TOTALS" for each of the individual corridors are not additive.

2/Due to the methodologies employed for calculating line density and line capacity, there are five instances where density exceeds capacity. Density was computed as a weighted (by mileage) average for the entire line, whereas capacity was defined by the constraining link. As a result, the lowest capacity link serves as the throughput capacity without modification, but the lowest density segment is simply one factor in the overall line density.

3/Bottleneck capacity is the segment which is the most restrictive to additional capacity.

Step Three: All lines not designated as ICC Study Lines, but including those that may be accorded the dual designation of CCP Lines, are evaluated on the basis primarily of relative freight traffic density, as modified by considerations of provision for market connectivity and defense essentiality.

Selection of Density in Five-Year Range

Included in the process of designating individual rail lines by category is the selection of the base to be used fo determination of the density level. As set forth in earlier chapters, the major standard for classification of rail lines -- density -- is one of two standards of evaluation in this Report which may take into account trends over a period of time. (The other standard -- potential for abandonment -- is based on the planning of individual rail carriers and may or may not reflect trends.) All other standards are measured against data produced for a single year.

In mandating a full and complete analysis of Class I carriers, Section 503(c) requires the respondent railroads to "indicate the traffic density for the preceding five calendar years on each of the main and branch rail lines of the railroad submitting such analysis." This time-span for measuring the level of usage enables the Department to apply density standards more realistically than by using density data only for 1975, the most recent year available to the carriers at time of submission.

Provision by the carriers of five-year data provides the means of identifying upward and downward trends in line utilization as factors in the appraisal. At the same time, the need for uniform application of quantifiable standards requires that a single density rating be assigned to every candidate rail line.

This Report's preliminary designation of rail lines on the basis of density of use reflects the following procedure in evaluating five-year traffic trends, using as an example a rail line in the upper range of density levels:

(1) If density in 1975 (or in the latest year reported by the railroad) is 20 million gross tons or more, the line is summarily designated as a Category A Mainline, the highest status.

(2) Since calendar year 1975 was a period of relatively depressed rail traffic, routes which would normally qualify for Category A Mainline may fail to have done so in that year. In such instances, a careful examination of density trends in the preceding four years is made -- taking into account the fact that rail traffic was also depressed in 1971. In instances where density shows an upward trend over the preceding four years, or annual density therein averages

higher than the 1975 level, the higher figure is selected as the indicated annual density for initial classification of the line.

(3) Where 1975 density fails to attain the Category A Mainline minimum, and the five-year data show a declining trend, the appropriate lower category is used for designation.

(4) In instances where no dominant trend can be discerned, the highest annual density in the five-year span is used to designate the category for the line.

Sample results of the application of the foregoing evaluation procedure in determining designation of individual lines are illustrated in Table 4. Italicized figures therein show the dominant trend on which density determination is based. This method of determining the indicated annual density for lines from a five-year period is used also in dealing with lines down to the lowest levels of usage reflected in the categories.

Table 4. -- Examples of Line Density Determination For Designation Purposes Using Five-Year Data
(Millions of Gross Ton-Miles Per Mile Per Year)

		1971	1972	1973	1974	1975	Category of Designation
Line A	Increasing Trend	*18*	*21*	*22*	*24*	*18*	A Mainline
Line B	Decreasing Trend	*19*	*22*	*21*	*17*	*15*	B Mainline
Line C	New Traffic in 1975	*15*	*16*	*16*	*17*	*25*	A Mainline
Line D	Increasing Trend	*4*	*6*	*8*	*9*	*4*	B Mainline
Line E	Decreasing Trend	*6*	*7*	*5*	*3*	*3*	A Branchline

Summary of Designations

In addition to the application of criteria in the designation process already described, there were -- as mentioned -- two additional tests applied which reflect service to major markets and defense essentiality. Before describing the results of the freight density designations, it is appropriate to review the results of these tests:

1. Service to Major Markets Test: The 75,000 carloads-a-year screening process identified as "major" a total of 169 Transportation Zones. Of the total, only 12 are not served by Category A Mainlines and, therefore, required further analysis.

   The Zones subjected to detailed analysis are:

   1. Bangor, ME (Zone 1)
   2. Augusta, ME (Zone 2)
   3. Panama City, FL (Zone 259)
   4. Ft. Myers, FL (Zone 255)
   5. Parkersburg, WV (Zone 198)
   6. Escanaba, MI (Zone 166)
   7. Marquette, MI (Zone 167)
   8. Bemidji, MN (Zone 297)
   9. Baton Rouge, LA (Zone 278)
   10. Corpus Christi, TX (Zone 370)
   11. Miami, FL (Zone 258)
   12. West Palm Beach, FL (Zone 256)

   Each of these zones are analyzed in terms of commodities originated or terminated and of the basic traffic flow pattern. A discussion of the detailed results of the analysis of each of the total of 12 zones is set forth in Appendix 4. The net impact of the application of this test on the Category A Mainline System added approximately 1,500 route miles and is indicated on the National Network Map.

2. National Defense Test: A line which is selected by the Department to meet the requirement for a national network of rail corridors essential for national defense as identified in the STRACNET automatically is designated in Category A Mainline if it is not already qualified the basis of freight density alone, as described hereinbefore in the summary of Category A Mainline.

The statistical results of these line designation tests are presented in Table 5. This table is also presented in the interim version of Volume II as is the graphical display of the line designations. Future changes to the line designations will be included in the final version of Volume II.

Table 5. -- Route Mileage Summaries by Line Designation

	Route Mileage (in thousands)		Percent of Total Route Mileage*	
Table 5A -- Mainlines				
Category A Mainlines		50.4		26.0
I High Freight Density Test	40.5		20.9	
II Service To Major Markets Test	1.4		0.7	
III National Defense Test	8.5		4.4	
Category B Mainlines		48.8		25.2
TOTAL		99.2		51.1
Table 5B -- Branchlines				
Category A Branchlines		41.3		21.3
Category B Branchlines		53.5		27.6
TOTAL		94.8		48.9
Table 5C -- Corridors of Consolidation Potential (CCP)		18.9		9.7
Table 5D -- Strategic Rail Corridor Network for National Defense (STRACNET)		32.3		16.7
Table 5E -- ICC Study Lines	N/A		N/A	

*Total Class I Railroad route mileage = 193,500 but does not total due to rounding. Percentages do not total due to rounding.

Provisions for Review and Modification

As pointed out earlier in this Report, the dynamic nature of the rail system and of the related classification and designation processes directed by the Act require periodic re-examination of both the classification and the end-product -- line designations.

Within three years of the date of issuance of this Final Report the Department will undertake a substantive review of the classification process provided therein. This will include fresh appraisal of the definitions of standards and the step-by-step process by which a rail line segment is evaluated. This re-examination of methodology will be carried out separately from the line designation update procedures set forth at the conclusion of this Chapter.

The review by the Department will consider the views of interested parties related to the process and standards established. Written submissions of comments or proposals for substantive changes should be addressed to:

The Federal Railroad Administrator
U.S. Department of Transportation
Washington, D.C. 20590
Reference: Section 503 Report

Where possible, proposals should refer by page and text section heading to specific contents of this Report "Final Standards, Classification and Designation of Lines of Class I Railroads in the United States." Proposals or other expressions of views may be furnished at any time.

Upon completion of its review within the time period noted, the Department will make public distribution of a Preliminary Report of Review, comprising its findings and recommendations for changes in classification methodology, if any. Issuance will set in motion a process of scheduled public hearings by the Office and other means of obtaining public views, similar to those which followed issuance of the original Preliminary Report under Section 503. The public process administered by the Office will be followed by issuance of a Final Report of Review by the Department.

It is anticipated that subsequent Department reviews of methodology and provision for public response will be undertaken at intervals yet to be established.

The Secretary may review classification methodology at any time within the prescribed time interval in response to a proposal submitted to the Federal Railroad Administrator which clearly is a matter of general transportation importance requiring prompt consideration. Should the Secretary's review determine that immediate revision of the classification process is required, issuance of a Preliminary Report of Review and consequent public hearings would follow.

Technical Corrections/Updates

Suggestions for changes in line designations can be forwarded through the use of the correction sheet printed on the inside rear cover of Volume II of the Report. Types of corrections which will be updated upon receipt are:

1. Line abandonments.

2. New line construction.

3. Changes in line density -- especially those which would result in a change in designation category.

Upon receipt of a correction/update sheet, the Department will notify the affected railroad and appropriate state agency of the proposed change and will acknowledge receipt of the change to the party submitting it. The railroad and the state agency will affirm or deny the change and provide supporting documentation as required within 20 days of receipt of notification. The Department will then notify the initiating party of any action taken within 20 days of receipt of railroad or State response.

The Department will publish a notification of line designation changes by Preliminary Line Identification Code in the Federal Register as a means of informing interested parties.

As sufficient designation changes occur, the Department periodically will publish completely updated editions of the line designation maps.

FOOTNOTES

1/Since many through routes could conceivably be structured between the major traffic centers which serve as the ends of a corridor, it was necessary to establish a criterion for defining those routes which comprise a corridor within some reasonable range. The criterion selected was that any route less than 50 percent longer than the shortest through route between the traffic centers defining the corridor would be included in the analysis of capacity. A few exceptions to this text, based on specific share-of-traffic patterns, are explained in Appendix 3.

2/A major market serving as the end of a CCP is either a Transportation Zone generating 75,000 or more carloads of freight per year or a gateway.

FOOTNOTES

3/The edition of Volume II to be issued shortly after publication of this volume is an interim report. The final version of Volume II will be released on or before May 1, 1977, the extended deadline as provided by the RTIA. The issuance of the interim version of Volume II will permit the Department to receive and consider public comments on the accuracy of the designations it contains, through the process described at the end of Chapter 4.

APPENDIX 1

PERTINENT LEGISLATION

The sections of Title V of the Railroad Revitalization and Regulatory Reform Act of 1976 (Public Law 94-210),as amended by the Rail Transportation Improvement Act (Public Law 94-555), directly pertinent to this Final Report are Sections 503, 504 and 505. They are reproduced herewith.

TITLE V -- RAILROAD REHABILITATION AND IMPROVEMENT FINANCING

Classification and Designation of Rail Lines

Sec. 503. (a) TRAFFIC DENSITY ANALYSIS. -- Within 90 days after the date of enactment of this Act, each railroad designated by the Commission as a class I railroad shall prepare and submit to the Secretary a full and complete analysis of the rail system operated by it. Such analysis shall indicate the traffic density for the preceeding 5 calendar years on each of the main and branch rail lines of the railroad submitting such analysis. The requirements of the two preceding sentences shall not apply to any railroad subject to reorganization pursuant to the Regional Rail Reorganization Act of 1973.

(b) PRELIMINARY STANDARDS AND DESIGNATIONS. -- Within 180 days after the date of enactment of this Act, the Secretary shall develop and publish --

(1) the preliminary standards for classification, in at least 3 categories, of main and branch rail lines according to the degree to which they are essential to the rail transportation system; and

(2) the preliminary designations with respect to each main and branch rail line, in accordance with such standards for classification.

The classification of rail lines for purposes of this subsection shall be based on the level of usage measured in gross-ton-miles, the contribution to the economic viability of the railroad which controls such lines, and the contribution of such lines to the probable economic viability of any other railroads which participate in the traffic originating on such lines. In determining "level of usage" and "Probable economic viability", for purposes of such classification, the Secretary shall take into account operational service and other appropriate factors, and he may make reasonable allowance for differences in operation among individual railroads or groups of railroads.

(c) PUBLIC HEARINGS. -- Commencing 30 days after the date of publication of the standards and designations required under subsection (b) of this section, the Office shall conduct public hearings, at representative locations, to solicit comments and receive views on the preliminary standards for classification and on the preliminary designations. The Office shall give

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notice of the date, time, and place of each such hearing, and such notices shall be designed and placed in such manner that all interested parties will have a full and fair opportunity to be heard.

(d) REPORT BY OFFICE. -- Within 120 days after the date of publication of the standards and designations required under subsection (b) of this section, the Office shall submit a report to the Secretary containing its conclusions and recommendations with respect to such preliminary standards for classification and such preliminary designations. This report shall be based on the record which was developed by the Office during the hearings under subsection (c) of this section, as supplemented by such studies as may be undertaken by the Office.

(e) FINAL STANDARDS AND DESIGNATIONS. -- Within 150 days after the date of receipt of the report required under subsection (d) of this section, the Secretary, with the cooperation and assistance of the Office, shall, after giving due consideration to such report, prepare and publish --

(1) the final standards for classification of main and branch rail lines; and

(2) the final designations with respect to each main and branch rail line, in accordance with such standards for classification, including findings to support any material change which is made in a final designation from the corresponding preliminary designation.

Capital Needs Study

Sec. 504. (a) DEFERRED MAINTENANCE STATEMENT. -- Within 180 days after the date of enactment of this Act, each railroad designated by the Commission as a class I railroad (other than a railroad subject to reorganization pursuant to the Regional Rail Reorganization Act of 1973) shall prepare and submit to the Secretary a full and complete statement (1) of such railroad's deferred maintenance and delayed capital expenditures, as of December 31, 1975, and (2) of the projected amounts of appropriate maintenance to be performed and capital expenditures to be made for such railroad's facilities and equipment during each of the years from 1976 through 1985. Each railroad shall

submit such additional information as may be required from it by the Secretary, in connection with his duties under section 503 of this title or under this section, prior to July 1, 1977, including, the projected sources of and uses for the funds required by such railroad for such projected program.

(b) PRELIMINARY FINANCING RECOMMENDATIONS. -- Within 540 days after the date of enactment of this Act, the Secretary, after giving due consideration to (1) the final designations under section 503(e) of this title, (2) the information furnished under subsection (a) of this section, and (3) any other relevant information shall develop, publish and transmit --

(A) to the Congress, preliminary recommendations as to the amount and type of carrier equity and other financing to be effected through the Fund, or through any other funding mechanism, recommended by the Secretary, based upon his view of the rail industry's facilities rehabilitation and improvement needs, the projected gross national product, the potential demand for rail service and the types of service capable of meeting that potential demand, the potential revenues and costs (including capital costs associated with those revenues), the demand for rail services for which the railroads could compete on an economic basis, the probable sources of funding for the capital costs of providing those services and which of those costs must be provided by public financing, as projected through December 31, 1985; and

(B) to the Congress and to the Secretary of the Treasury, preliminary recommendations as to the means by which the Federal share, if any, of such equity and other financing should be provided.

In preparing such recommendations, the Secretary shall specifically consider and evaluate the public benefits and costs which would result from public ownership of railroad rights-of-way.

(c) EVALUATION. -- Within 90 days after the date of publication of the Secretary's preliminary recommendations under subsection (b) of this section, the Secretary of the Treasury shall publish and transmit to the Secretary and to the Congress his evaluation thereof and any recommendations with respect to the matters referred to in subsection (b)(3)(B) of this section.

(d) FINAL RECOMMENDATIONS. -- Within 90 days after the date of receipt of the evaluation, transmitted under subsection (c) of this section, the Secretary shall, after giving due consideration to such recommendations, prepare and transmit to the Congress his final recommendations with respect to the matters referred to in subsection (b) of this section.

Rehabilitation and Improvement Financing

Sec. 505. (a) IN GENERAL. -- Any railroad may apply to the Secretary, following the date of enactment of this Act and in accordance with regulations promulgated by the Secretary, for financial assistance for facilities rehabilitation and improvement financing and for such other financial assistance as may be approved by the Secretary. Any regulations promulgated by the Secretary pursuant to this section shall include specific and detailed standards in accordance with which the Secretary shall conduct the evaluations and made the determinations required in subsection (b)(2) of this section.

(1) for such financial assistance as may be approved by the Secretary; and

(2) for financial assistance for facilities rehabilitation and improvement financing, except that the Secretary shall not act finally on any such application until the date of publication of the final standards and designations under section 503(e) of this title.

(b) APPLICATION AND DETERMINATION. -- (1) Each application for facilities rehabilitation and improvement financing shall set forth --

(A) a description of the proposed facilities rehabilitation and improvement project for which such railroad is seeking financial assistance, and of the current physical condition of such facilities;

(B) the classification of each main and branch rail line included in such project, as determined in accordance with the final standards and designations under section 503(e) of this title;

(C) the track standard under which each such line has been and is being operated and the reasons therefor, and the safety standards and signal requirements necessary under such standard to prevent loss of life and serious accident or injury at grade crossings;

(D) the track standard necessary, in the judgment of such railroad, to provide reliable and competitive freight service (and passenger service, where applicable) over each such line, together with such railroad's recommendations as to (i) the most economical method of improving the physical condition of each such line to meet such track standard, (ii) the cost of providing adequate safety standards and signals, and (iii) an economic analysis of the cost of such improvements in condition and in safety standards and signals;

(E) such railroad's estimate as to the cost of labor and materials, and the date of completion, and its opinion as to the priority to be accorded such portions of the proposed project as are reasonably divisible;

(F) the amount and kind of Federal financial assistance required by such railroad in order to complete the proposed project; and

(G) such other information as the Secretary shall by regulation require to assist him in evaluating such application in accordance with this section or for carrying out the purposes of this title.

(2) The Secretary shall act upon each such application within 6 months after the date on which all required information is received, except as otherwise provided in subsection (a)(2) of this section. The Secretary may approve any such application if he determines that providing the requested financial assistance is in the public interest. When making such a determination, the Secretary shall evaluate and consider (A) the availability of funds from other sources at a cost which is reasonable under principles of prudent railroad financial management in

light of the railroad's projected rate of return for the project to be financed and the railroad's rate of return on total capital (represented by the ratio which such carriers net income, including interest on long-term debt, bore to the sum of average shareholder's equity, long-term debt, and accumulated deferred income tax for fiscal year 1975) as determined in accordance with the uniform system of accounts promulgated by the Commission, (B) the interest of the public in supplementing such other funds as may be available in order to increase the total amount of funds available for railroad financing, and (C) the public benefits to be realized from the project to be financed in relation to the public costs of such financing and whether the proposed project will return public benefits sufficient to justify such public costs. Except as provided in the last sentence of this paragraph, the Secretary, in determining the extent to which a project will provide public benefits, shall give the highest priority to projects which will enhance the ability of the applicant carrier or other carriers to provide essential freight services. The Secretary, in granting financial assistance to any applicant, shall assign the highest priority, among applications for assistance for providing safety improvements and signals, including underpasses or overpasses at railroad crossings at which injury or loss of life has frequently occurred or is likely to occur.

(c) FINANCING AGREEMENT.-- Upon the approval of an application for financial assistance under this section, the Secretary shall promptly enter into an agreement with such railroad to provide financing in such amounts and at such times as is sufficient, in the judgment of the Secretary, to meet the reasonable cost, in whole or in part, of the facilities rehabilitation and improvement project which has been approved, in whole or in part. Each such agreement shall include such terms and conditions as are necessary or appropriate, in the judgment of the Secretary, to assure that the financing will be used only in the manner, and for the purposes, approved by the Secretary.

(d) AUTHORIZATION. -- (1) In the case of a railroad other than a railroad in reorganization under section 77 of the Bankruptcy Act, financing pursuant to this section shall be in the form of purchase by the Secretary of redeemable preference shares at par. Such shares shall be specifically issued for such purpose in accordance with the terms and conditions set forth in section 506 of this title.

(2)(A) In the case of a railroad in reorganization under section 77 of the Bankruptcy Act, the Secretary, in order to provide financing pursuant to this section, may agree to purchase redeemable preference shares of such railroad at par as part of a plan of reorganization of such railroad approved by the court having jurisdiction over the reorganization of such railroad. Such shares shall be specifically issued in accordance with the terms and conditions set forth in section 506 of this title.

(B) The Secretary, in order to provide financing pursuant to this section, may also purchase certificates issued under section 77(c)(3) of the Bankruptcy Act by a trustee of a railroad in reorganization and approved by the reorganization court, under such terms and conditions as may be approved by the Secretary and the reorganization court. In purchasing such trustee certificates or at any time thereafter, the Secretary may agree with the trustee of such railroad in reorganization, subject to the approval of the reorganization court, to exchange such certificates for redeemable preference shares issued, in accordance with the terms and conditions set forth in section 506 of this title, in connection with a plan of reorganization approved by the reorganization court. No certificate shall be purchased under this section unless and until the Secretary makes a finding in writing that --

(i) such certificates cannot otherwise be sold at a reasonable rate of interest;

(ii) the project to be financed can reasonably be expected to be maintained as part of a financially self-sustaining railroad system; and

(iii) the probable value of the assets of the railroad in the event of liquidation provides reasonable protection to the United States.

(3) The total par value of the redeemable preference shares and the amount of trustee certificates which the Secretary may purchase from the proceeds received from the issuance and sale of Fund anticipation notes shall not exceed $600,000,000. Not more than $100,000,000 of such proceeds may be used to purchase trustee certificates.

(e) FUTURE PURCHASES OF REDEEMABLE PREFERENCE SHARES. -- The total par value of the redeemable, preference shares which the Secretary may purchase under this title after September 30, 1978, shall be determined by the Congress following the receipt by the Congress of the Secretary's recommendations as to the scope and sources of funding of the Fund or any recommended alternative financing mechanism, as submitted pursuant to section 504 of this title, except that --

(1) the amount of the Secretary's investment in redeemable preference shares in any fiscal year (out of proceeds other than those derived through the issuance and sale of Fund anticipation notes) shall not, when added to the amount of his prior investment in such shares, exceed 200 percent of the aggregate principal amount of the Fund bonds which (A) have been issued by the Secretary prior to such fiscal year, and (B) are projected to be issued by the Secretary through the end of such fiscal year; and

(2) neither redemptions of Fund bonds nor their payment at scheduled maturity shall have any bearing on the limitation in paragraph (1) of this subsection.

APPENDIX 2

DENSITY

This appendix examines several key factors which were considered by the Department in establishing the density standards. The initial section explains the present density structure of the Nation's railroad system. The second section discusses the critical relationship between density and maintenance-of-way costs. Next, theoretical examples are developed which show that substantial cost savings can be achieved through the aggregation of scattered flows. Finally, several actual railroad examples are examined to test the practical application of the theories developed.

Functional Definition of Density

Density is measured in gross ton-miles per mile of line per year -- referred to as "gross tons". It includes the net tons of freight combined with the cars to carry it, the locomotives to pull it, nonrevenue equipment and empty car movements.

Present Density Structure

In 1974 the railroads generated approximately two trillion gross ton miles on a national Class I rail system encompassing approximately 193,500 route miles. The "average" mile of track in the United States therefore produced 10 million gross tons. This equates to above five average-size trains per day. These averages, however, are very misleading when viewed by themselves.

If the actual distribution of total gross ton miles versus the mileage upon which it is generated is examined (see Figure 1), it becomes readily apparent that large segments of the system on the low density end carry an almost imperceptible level of traffic. Almost one-third of the rail mileage carries only one percent of the total gross ton miles. At the other end of the scale, about 20 percent of the rail mileage carries fully two-thirds of the total rail traffic of the Nation. When one considers the declining financial condition of the industry, together with the continuing deterioration of track, it becomes very apparent that limited resources are being stretched too far.

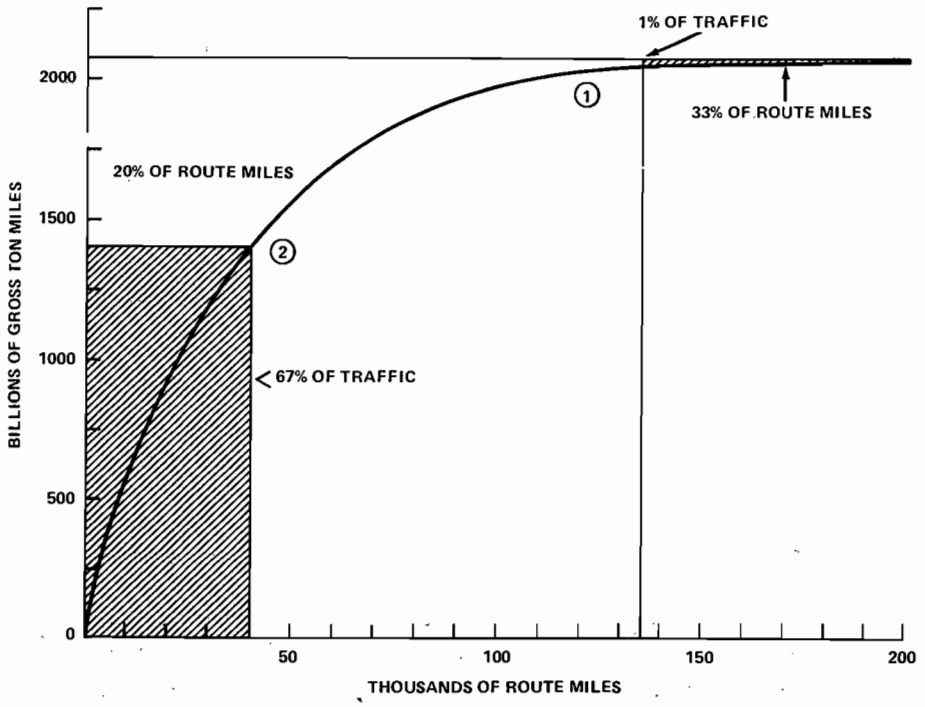
For example, the Northeastern bankrupts had about 38% of their route miles in the lowest density category (B Branch line) at the beginning of 1976. Contrasting this to profitable carriers, only 13% of the route miles for those carriers earning 6% or more return on the average net investment in 1974 are in the B branch line category. Statistical analyses have shown a high level of correlation of low density to poorer operating efficiency factors such as the operating ratio.

In terms of rail operations, when traffic density is less than 1 million gross tons, it generally signifies a line which can only

support a local peddler freight with once-per-day service or even less. The local train provides the slowest service to customers, since it must do all switching chores at both ends of the route as well as in between.

FIGURE 1

A CORRELATION OF RAIL FREIGHT CARRIED AND ROUTE MILES FOR CLASS I RAILROAD LINES IN THE UNITED STATES



As traffic builds, specialization of trains is possible. At the next level of density, up to 5 million gross tons, enough traffic exists to run higher frequency with some trains stopping only at intermediate yards and major shippers. Building traffic further justifies yards with greater classification specialization and higher throughput. Classifications can be made for more distant destinations, thus allowing many intermediate yards to be completely bypassed.

Gross ton miles is not, of course, a perfect index of viability. The actual viability of a railroad is dependent upon many things -- equipment utilization, labor agreements, and operating, marketing and financial practices. These parameters are not always directly reflected in the gross tons produced by a particular line.

As the Office noted, net ton miles is a better measure of use as compared to gross ton miles (page 2a), if available. However, many railroads do not keep segment data by net tons, and the marginal improvement that this would add to the analysis makes the burden of an entirely new data system of doubtful value. By comparing

aggregate gross ton to net ton ratios for each railroad, a reasonable measure of the carrier's revenue efficiency can be established.

As shown in Table 1 , several carriers have performed markedly above the district averages for gross to net tons. For those carriers 10% or more above the 20 million gross ton average for the district, an analysis was performed to determine what, if any, impact higher efficiency would have on the mainline designation. This indicated that certain routes of three carriers, the Duluth, Missable and Iron Range, Elgin, Joliet and Eastern, and Soo Line, would meet the density test for a higher classification.

Based on most statistical measures, the Soo would not appear to be doing especially well. Its average gross tons per track mile (4.3 million) are below the industry average (6.3 million), and the carrier has 30% of its lines in the B Branchline category. However, the Soo is a consistent money maker and has made a higher than average return on its investment in the last two years.

Return on Investment

	1974	1975
Soo Line	5.3	4.5
All Class I Railroads	2.7	1.2

One key measure that differentiates the Soo and others with higher than average earnings is the ratio of gross tons to net tons. In this regard, the Soo's ratio of new tons to gross tons is 22% less than the Western regional average (1:1.89 vs. 1:2.42). This measure indicates that, for given train movements, the Soo is carrying 28% more revenue freight than the average achieved in the Western region overall.

Under the preliminary standards, the Soo Line had two segments which met the 20 MGT level for a category A Mainline: The Chicago-Neenah, Wisconsin line, in the Chicago-Minneapolis CEC, and the Brotten-Glenwood, Minnesota segment. By considering the efficiency of the Soo's gross to net ton relationship, two other segments rate an A Mainline designation on density: The St. Paul-Brooten segment and the Neenah-Owen, Wisconsin segment.

The Elgin, Joliet and Eastern, a belt railroad around Chicago, gains an additional 19 miles of "A" Mainline between Matteson and Joliet.

For the Missabe, its line between Iron Junction and Two Harbors via Allen Junction would move into the A Mainline category on the basis of density. This line was designated an A Mainline in the Preliminary Report under the service to major markets standard, so this does not change the line designation -- only the standard applied.

Table 1. -- Class I Railroads exceeding the Average Gross to Net Ton ratios for their District by 10% or more

	Ratio-Gross Tons To Net Tons (Percentage improvement)	Equivalent In Gross Tons	Impact on "A" Main-line Designation
Eastern District Average	2.25	20	--
Bessemer & Lake Erie	1.89(19)	24	None
Central RR of N.J.	2.04(10)	22	None/ConRail
Chesapeake & Ohio	1.93(17)	23	None
Chicago & Eastern Illinois	2.04(10)	22	None
Elgin, Jolet & Eastern	2.04(10)	22	added 19 miles
Missouri Illinois	2.02(11)	22	None
Monongahela	1.64(37)	27	None
Pittsburgh & Lake Erie	1.77(27)	25	None
Reading	2.05(10)	22	None/ConRail
Western Maryland	1.89(19)	24	None
Southern District Average	2.20	20	--
Atlanta & West Point	1.93(14)	23	None
Clinchfield	1.94(14)	23	None
Georgia R.R.	1.87(18)	24	None
Western RR of Alabama	1.90(16)	23	None
Western District Average	2.42	20	--
Colorado & Southern	1.98(22)	24	None
Duluth Missable & Iron Range	1.78(36)	27	None
Duluth Winnipeg & Pacific	1.99(22)	24	None
Fort Worth & Denver	2.16(12)	22	None
Kansas City Southern	2.14(13)	23	None
Missouri, Pacific	2.15(13)	23	None
Soo Line	1.89(28)	26	added 239 miles
Toledo, Peoria & Western	2.17(12)	22	None

Cost of Maintenance as Related to Density

For average track, the cost of maintenance is roughly divided between a fixed cost and a variable cost based on the movement of traffic. 1/ This cost equation recognizes decreasing unit costs as tonnage increases and therefore makes it attractive to operate heavy traffic levels over few lines rather than light traffic levels on a dispersed system.

In discussing the relationship of traffic density and maintenance costs, two key facts have been identified:

1. The unit cost of maintaining a rail line on a normalized basis increases as the density falls. 2/ The low maintenance costs cited for some low-density lines reflect the fact that maintenance is being deferred and the lines will ultimately become inoperable.

2. Considerable maintenance expense can be saved by combining traffic flows over parallel lines into a more limited route structure.

These conclusions are drawn from recent work on track maintenance costs completed for the Federal Railroad Administration.

Since the industry's costs are heavily tied to its facilities, its performance is more closely associated with the cyclical ups and downs in the economy than other modes whose costs are more variable. Because profits, even in the best of times, were not adequate, many railroads have not been able to survive economic downturns. At one point in the 1930's, one-third of all rail mileage was owned by carriers in reorganization. Then World War II brought traffic levels that produced profits that not only pulled most carriers out of bankruptcy, but also allowed significant investment to be put into plant and equipment rehabilitation and improvement. From 1933 to 1953 the carriers installed 86% of the ties and 48% of the rail in track on December 31, 1975, a rate of replacement indicative of a 24 year tie life and a 48 year rail life.

Increasing competition and the downturns in the economic cycle brought the post-war rehabilitation surge to an end by the early 1950's. Much of today's problem of deteriorated right-of-way facilities began at this point since subsequent earnings were inadequate to provide the necessary funding for facility improvements except for a few of the strongest carriers.

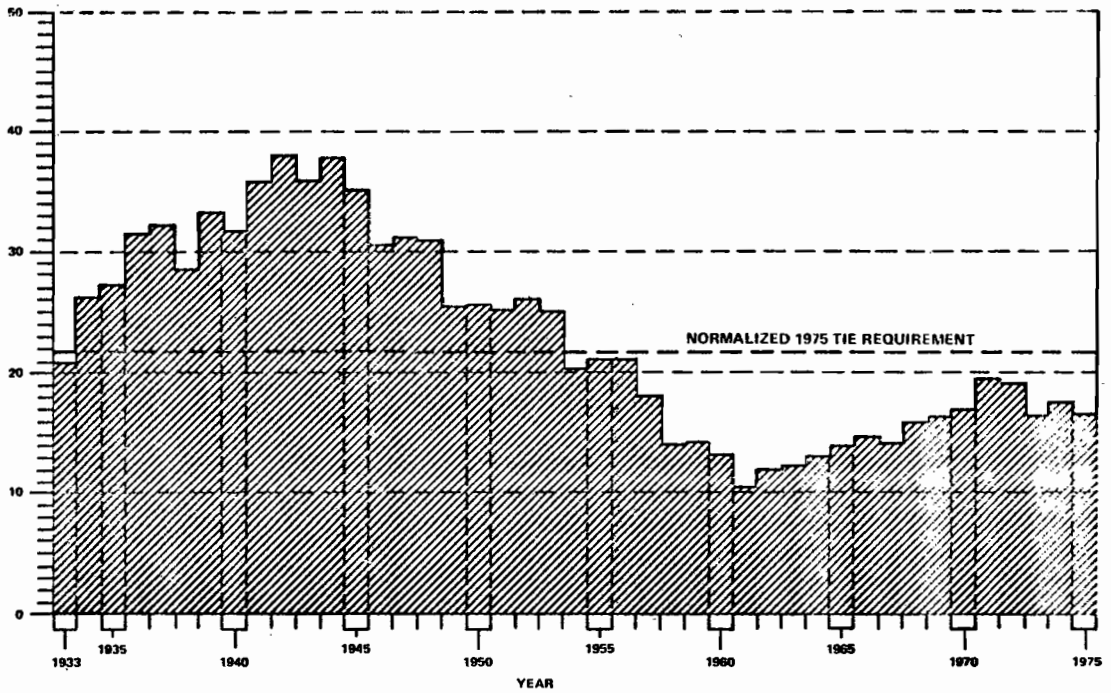
Figures 2 and 3 illustrate the tie and rail shortfalls for Class I railroads which have generally concided with the economic ups and downs. Since 1953, however, tie and new rail replacements have failed

to keep pace with normal requirements, even during the better years for the industry. This phenomenon was not restricted to the Eastern bankrupts, and can be found in the Western and Southern regions also.

This problem of deferred maintenance and the resulting decline in the quality of the track structure reached a critical stage on many of the bankrupt carriers in the Northeast and Midwest region. The impact on service quality and efficiency was so great that only the provision of substantial Federal financial assistance could reverse the trend. The problem is also reaching an acute stage on many of the Midwestern granger railroads. Even some lines of "strong" solvent carriers suffer from maintenance deferrals, although the impact on their service quality and efficiency is not serious at this time. The trends, however, indicate that the problem is growing and could reach a critical point in the not too distant future.

The deferral of maintenance on many lines represents a necessary economic response to declining levels of demand. Not all (perhaps not even a majority) of those lines with serious maintenance deficiencies should be rebuilt. The challenge to both private sector and government-assisted financing is to identify those lines which still provide potentially economic or socially necessary services and to concentrate available funding, material, and manpower on rehabilitating them.

FIGURE 2



U.S. CLASS I RAILROADS
(exclusive of Conrail)
TIE INSTALLATIONS AND TIE
REQUIREMENTS
1933–1975

Thomas K. Dyer, Inc.
Lexington, Ma.

FIGURE 3

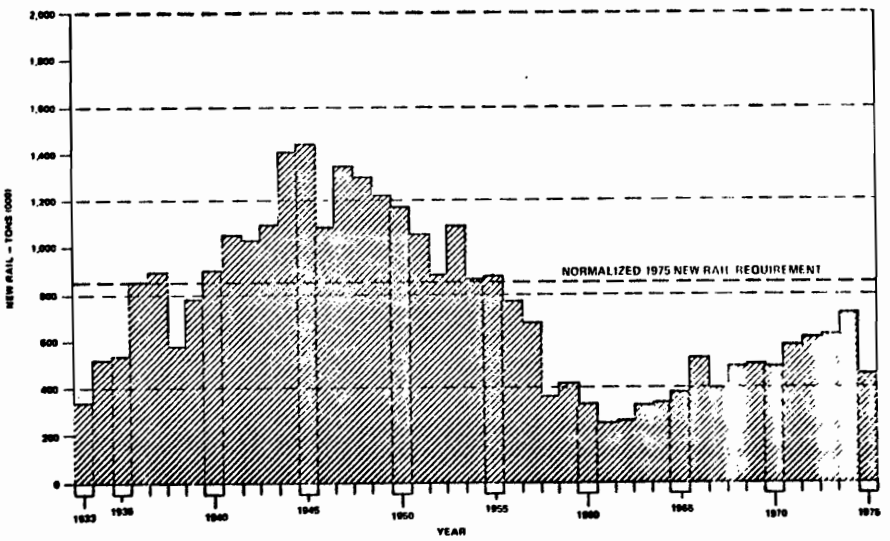


Figure 4 illustrates the major track components and the variables which affect the cost of maintaining the track. It is subjected to an extremely wide range of natural and traffic-imposed forces and exhibits a cost pattern based on these variants. Rail, for example, may last 20-30 years in a straight and level stretch where traffic is not too heavy. But with sharp curves, steep grades and heavy traffic, it could require renewal in less than two years (Figure 5). Furthermore, new rail laid upon poor ties and ballast can be ruined in a matter of days by moderate traffic levels due to poor support.

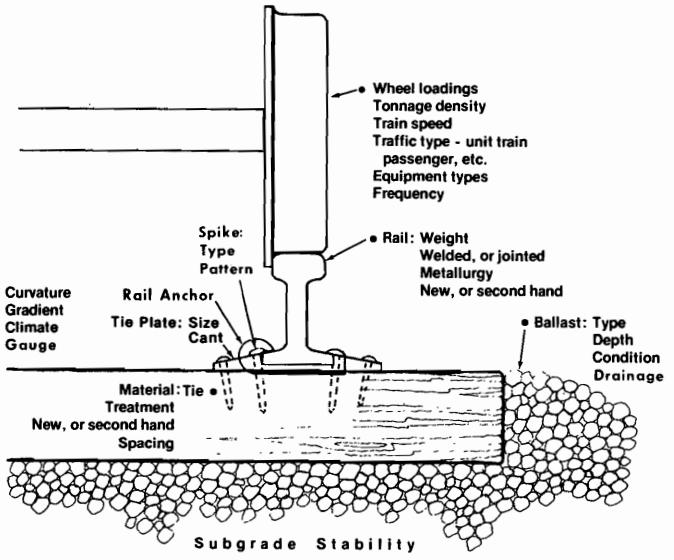
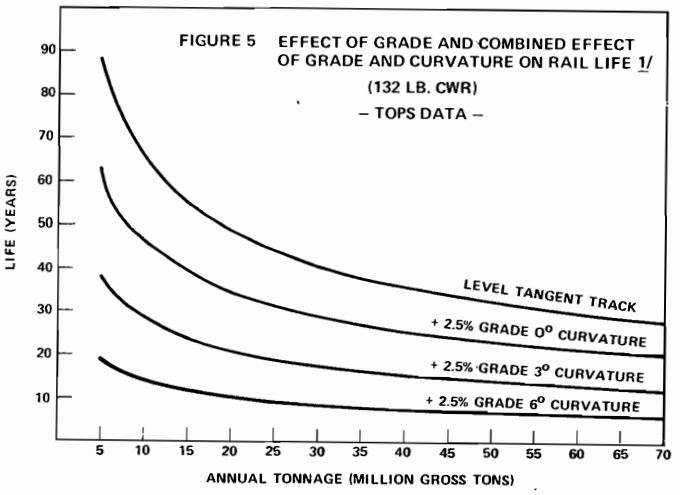


FIGURE 4 Factors Affecting Roadway.



The previous overview is confirmed by empirical studies on the subject and their applications. Two studies on the matter are considered here. One was conducted by TOPS On-line Services, Inc. for the Federal Railroad Administration, while the other was done by Thomas K. Dyer, Inc. for the United States Railway Association. 3/ The TOPS study is based largely on Southern Pacific's experience, while the Dyer work examined the Northeastern railroads. 4/ Each study has demonstrated the same general trend, although in varying absolute values. The Dyer work was done in what has been traditionally a high-cost region of the country. Taken together the analysis begins to bracket the question of the importance of density to maintenance-of-way expenses. Both illustrate that the cost of maintenance increases as the tonnage over the track increases (assuming other variables remain about equal), but at a decreasing rate. This is illustrated in Figure 6.

An examination of the data summarized in Figure 7 reveals that two breakpoints are important in terms of the effects of density on maintenance costs. First, on the high side of the density scale, although unit economics continue to increase, the rate of increase begins to flatten out at 20 million gross tons. At the lower end of the scale, some taper begins at 10 million gross tons, while a severe change occurs at around 5 million tons. The unit costs of maintenance decline rapidly with density until the 20-million-gross-ton level is reached. Beyond that, unit costs flatten out with some slightly increasing economies by the TOPS report. (The Dyer study did not examine rail lines with density greater than 35 MGT Figure 8).

This categorization of primary mainline does not, of course, represent an absolute criterion for requiring any specified level of track rehabilitation. Need for rehabilitation is dependent upon a number of other variables, such as existing condition, service levels, and available alternatives. Such considerations will be

fully addressed in the Department's Capital Needs Report required under Section 504 of the Act and due January 30, 1977.

FIGURE 6
COMPARISON OF ANNUAL TRACK MAINTENANCE COST BEHAVIOR - DYER AND ROADWAY STUDY

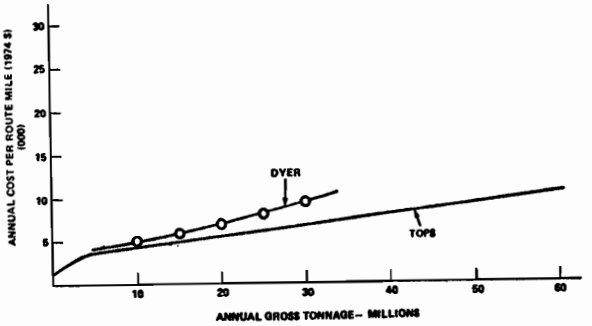


FIGURE 7
Comparison of Unit Track Maintenance Costs - Dyer and Roadway Study

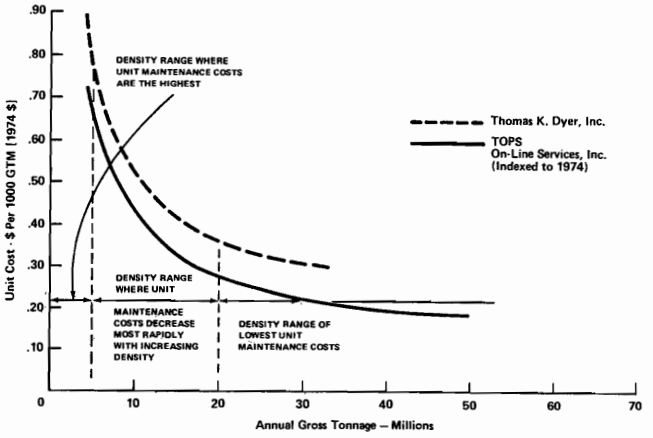
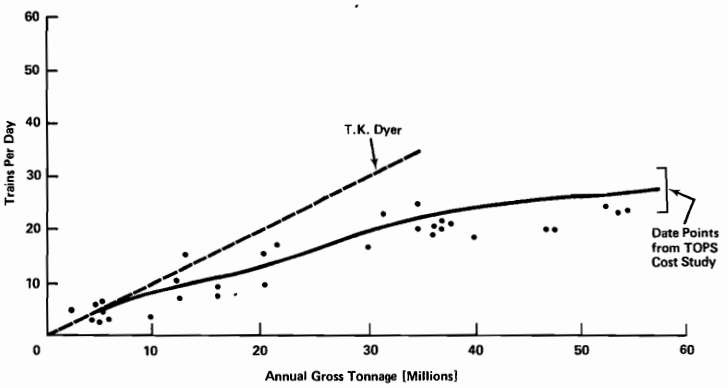


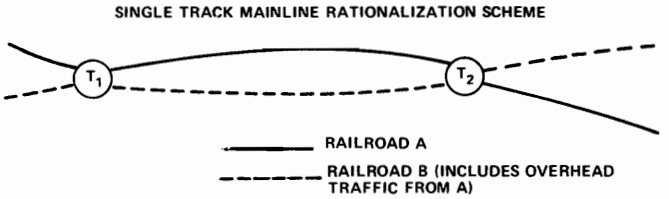
FIGURE 8
Trains Per Day as a Function of Annual Tonnage



The implications of both studies can be applied to specific operating situations. The following illustrates several hypothetical examples and then applies the formulas to some specific examples of rail consolidations -- Southern Pacific and Western Pacific in Nevada and the Western Maryland and Baltimore and Ohio in Maryland and Pennsylvania.

Theoretical Example of Analytical Results

The following expanded example illustrates the available options. To illustrate the analytical results, assume two essentially parallel lines with equal density. Two decisions are possible. Downgrading one for only local service requirements, or if no local service is needed, abandon one line. All traffic would then be moved over the surviving line between the common junction points.



Example A. Current Density (Base Case)

Maintenance-of-Way Costs per mile (000) and Traffic Density (Millions of Gross Tons) - Single Track, Signalled Lines.

	Cost	Density	Cost	Density	Cost	Density	Cost	Density
Railroad A	$10	5	$12	10	$15	20	$18	30
Railroad B	10	5	12	10	15	20	18	30
Totals	$20	10	$24	20	$30	40	$36	60

Example B. Downgrade one parallel line

Maintenance-of-Way Costs per mile (000) and Traffic Density (Millions of Gross Tons) - Single Track, Signalled Lines.

	Cost	Density	Cost	Density	Cost	Density	Cost	Density
Railroad A	$ 5	1	$ 5	1	$ 5	1	$ 5	1
Railroad B	11.5	9	15	19	21	39	28	59
Totals	$11.6	10	$20	20	$26	40	$33	60
Savings made from Base Case	$ 3.5		$ 4		$ 4		$ 3	

Example C. Abandon one parallel line

Maintenance-of-Way Costs per mile (000) and Traffic Density (Millions of Gross Tons) - Single Track, Signalled Lines

	Cost	Density	Cost	Density	Cost	Density	Cost	Density
Railroad A	$ 0	0	$ 0	0	$ 0	0	$ 0	0
Railroad B	12	10	15	20	22	40	29	60
Totals	$12	10	$15	20	$22	40	$29	60
Savings made from a Basic Case	$ 8		$ 9		$ 8		$ 7	

This typifies many cases found today throughout the railroad industry. Most of these situations involve parallel routes where the average densities are at the lower end of the spectrum, making traffic transfers less difficult to implement.

On the other hand, downgrading or eliminating parallel routes each with 20 million or more gross tons would likely be counterproductive since additional track capacity would probably need to be constructed. In this instance, the investment could not be justified on maintenance savings, and total maintenance costs would probably increase.

Practical Application of Line Consolidation

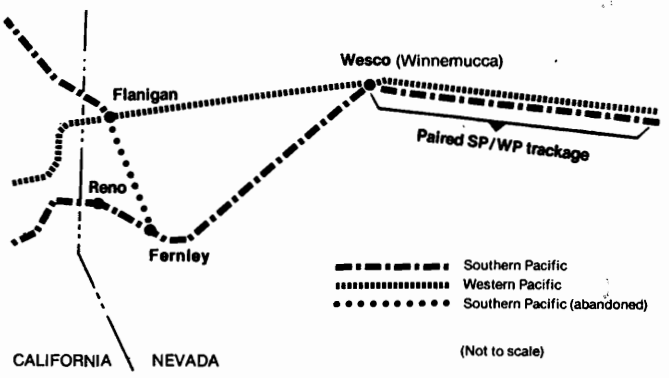
1. Southern Pacific between Flanigan and Winnemucca, Nevada.

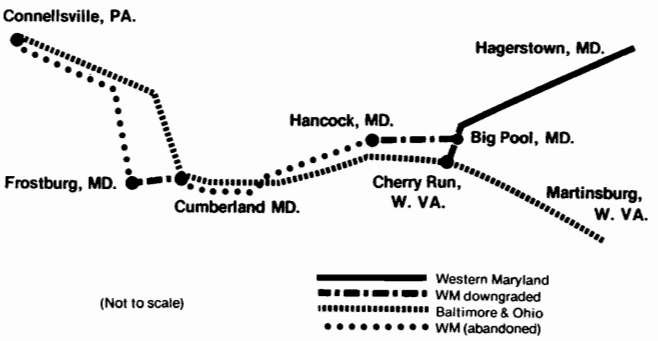
Several years ago, the Southern Pacific abandoned its own line between Flanigan and Fernly, Nevada, and gained use of the Western Pacific line between Flanigan and Weso (Winnemucca). This consolidation not only allowed the SP to drop 58 miles of line extending through the Nevada desert, but shortened the circuity for SP trains between Flanigan and Weso by 50 miles, or 24 percent. The projected savings 5/ in the first year of joint operation were over $700,000, shared equally between the SP and WP (See diagram below).

Current savings from maintenance-of-way expenses are estimated to be $0.6 million annually when the SP cost decreases are offset against the increased costs on the WP route. Savings in operating costs for the shorter routing as well as the elimination of rehabilitation cost for the abandoned segment have not been updated to account for the inflationary impact of the post-abandonment years. One time capital costs were incurred to improve the connection at Flanigan; however, the abandoned line was in poor condition and would have required rehabilitation costs considerably higher than the connection.

2. Western Maryland between Big Pool, Maryland, and Connellsville, Pennsylvania.

As part of the consolidation of the Western Maryland into the Chessie System, approximately 150 miles of closely parallel lines, often separated only by a river, between Big Pool (Cherry Run, West Virginia) and Connellsville, Pennsylvania - have been either abandoned or downgraded by shifting former WM traffic to the Baltimore and Ohio route.





Estimated net annual savings in maintenance (1974 dollars) are over $0.9 million when compared to independent operation of each line. 5/

Saving by WM ----------	$1,431,000
Additional B&O Expenses --------	512,000
	$ 919,000

Paired Trackage

The previous discussion has concerned itself with the consolidation of underutilized lines. However, a few lines are now at capacity or could be with a relatively modest increase in traffic. Capacity constraints are generally found on single track segments with centralized traffic control signal systems. Additional capacity can be built into these lines, but not without constructing additional track--a relatively costly investment, given the financial resources of most railroads.

However, through cooperative ventures, two or more railroads can share parallel lines to create a multiple track operation. Two notable examples are the paired trackage agreements between Winnemucca and Wells, Nevada, and Denver and Pueblo, Colorado.

Between Winnemucca and Wells, the Southern Pacific and Western Pacific each own a single track, but all eastbound traffic uses the Western Pacific line, while trains heading west use the Southern Pacific. If these railroads did not share the other's facilities, the WP line would be at capacity. As it is the paired trackage operation allows considerable train operating flexibility, a reasonable level of utilization and a future growth capability for both roads.

The case in Colorado is similar to the SP/WP arrangement, except that three carriers (the Rio Grande, Santa Fe, and Colorado and Southern) use a mostly double track route. One track is owned by the Santa Fe and the other by the Rio Grande, while the C&S has trackage rights. At the current traffic levels, no one carrier has enough traffic to

generate adequate utilization of even a single track, CTC line. However, the combination of three carriers' traffic greatly enhances the density over this segment.

The opportunities for paired trackage do not exist everywhere, but where they do, they represent the lowest cost method to expand capacity and increase operating flexibility.

Summary

To summarize the preceeding discussion, several points relating to line density are pertinent:

1. Large amounts of traffic move on a rather small amount of the total rail plant.

2. Increasing line density leads to a decrease in unit costs for track maintenance.

3. Additional concentration of traffic on major mainlines to gain both cost and service benefits appears both feasible and desirable.

FOOTNOTES

1/ For average track, median costs are associated with subgrade stability, ballast, ties, track inspection, rail wear, lining, and surfacing.

2/ Track is maintained on a normalized basis when one-half of the useful life of the track components remain.

3/ Procedures for Analyzing the Economic Costs of Railroad Roadway for Pricing Purposes, Final Report, January 1976.

4/ Trackage Rights Study, Thomas K. Dyer, June 1975.

5/ Based upon the Trackage Rights Study methodology.

APPENDIX 3

CORRIDOR OF CONSOLIDATION POTENTIAL

Throughout the northeastern and granger regions of the country a critical problem confronting the rail industry is underutilization of facilities. The bankruptcy of the northeastern roads brought the light density branch line side of the issue into clearer focus, but, because of the higher costs associated with the mainline facilities, a thorough investigation must now be undertaken of this area.

As discussed in the previous Appendix, railroad costs are of a highly fixed nature due to the private ownership of roadway. Since railroad costs are directly related to capacity, which must accommodate traffic peaking, while revenues are associated with density, it is essential that an appropriate equilibrium between capacity and density is maintained. Consequently, quantification of the disparity between capacity and density is crucial to an assessment of the degree to which mainline facilities are under-utilized and some costs needlessly incurred. Socially and economically unjustified investments in mainline facilities exist most frequently in freight corridors where available traffic does not require more than two mainline routes. However, in many areas excess capacity develops, with the result that realizable benefits are not provided, and in fact service deterioration sets in.

In the Department's judgment the following criteria define a corridor of consolidation potential:

(1) The corridor is served by three or more mainline through routes providing through service.

(2) The total capacity of the mainline through routes exceeds their annual density by at least 50 percent.

(3) A mainline through route is included when it is less than 50 percent longer than the shortest through route.

The Parametric Line Capacity Analyzer 1/

To handle the capacity side of the analysis, the FRA utilized the Parametric Line Capacity Analyzer, a tool developed for the FRA in 1973, which is based upon a minimum-level-of-service (MLS) concept of capacity. USRA also used the Analyzer during development of the Final System Plan.

The MLS capacity has b-en defined for analysis as: the volume of trains at which a statistically significant (less than 5 percent) number of "critical" trains will exceed some maximum acceptable trip time over the

line. "Critical" trains are those which have been determined, by examination of the lines being analyzed, as most likely to constrain capacity. These will vary somewhat from line to line, depending upon the characteristics of the line being analyzed. How critical trains are determined and what a maximum acceptable trip time is will be discussed later.

Determination of the capacity of a line, once a "maximum acceptable trip time for critical trains" has been defined, is done using a parametric analysis of physical and operating characteristics of the line. The parametric analysis was prepared using a train dispatching simulation, to analyze a wide range of rail line physical and operating characteristics. Both the train dispatching simulation and the parametric analysis have been validated on a number of actual rail line operations and found to be quite accurate at their relative levels of capabilities. The parametric analysis can be considered to be accurate within 20 percent.

Determining Critical Trains and Defining Maximum Acceptable Trip Time

The MLS determination of capacity requires that critical trains be identified and a maximum acceptable trip time for these trains be defined in order to identify line capacity. Using the MLS concept, it is possible that several capacities can be determined for the same line and operation depending upon which trains are thought to be critical. It is also possible to change the capacity by changing the maximum acceptable trip time. For most lines the constraints are obvious. For some lines it is necessary to analyze the line with several sets of constraints to determine which is most reasonable. Conditions creating these problems can be categorized.

For most lines the overriding constraint is getting the lowest priority through trains over the line without "outlawing" (exceeding the hours of service limitation). The critical trains are generally the through freights which make set-outs and pick-ups at intermediate yards (leaving cars or picking up cars for local switching or for other through trains). Such trains are usually given lower priority than major freights and are usually heavier and slower than others (except unit trains which do not usually stop between crew changes). These critical trains usually require the most time to cover a subdivision (between crew changes). The maximum acceptable trip time then becomes 12 hours minus the terminal time for the crew.

Terminal time consists of the time for the crew to pick up its train, to make a brake test, if necessary, and to tie up the train when arriving at the terminating yard. It also includes the time lost by a crew between its calling time and the time the train is ready for the crew. Crews are called to go on duty at a time the crew clerk estimates will be optimum overall. He attempts to minimize crew waiting time, but he also does not want to have the train waiting for the crew to arrive. Analysis of actual

data indicates that total terminal time is about 2 hours in most cases, except where one or both crew change points are at major yards, in which case two and one-half hours are consumed in the terminals. The remaining time (9.5 to 10 hours) then becomes the maximum acceptable trip time.

Freight crews are paid on a combination mileage and time basis. The crews receive a full day's pay for anything up to 100 miles or eight hours. If either limit is exceeded, the additional time or mileage is prorated, so that a crew running either 150 miles or 12 hours, or both, would receive one and one-half day's pay. A crew running only 100 miles, but requiring 12 hours, would receive one and one-half day's pay, although only producing one day's mileage. Thus, it is more economical, between 100 and 150 miles, to prorate the maximum acceptable trip time by the length of the run, such that the trip time plus terminal time is proportional to the mileage.

For crew runs less than 100 miles, crews will still receive at least 8 hours pay. Most main line operations with crew runs which are substantially less than 100 miles can expect to turn most crews within the 12-hour limit, i.e., have them make a round trip to reduce crew costs. In these cases, the critical trains are not necessarily those which make set-outs and pick-ups, since they can consume 8 hours in one direction without incurring any additional crew costs. The critical trains are those which must make it over the line in less than 6 hours (including crew terminal time) so that crews can be returned without outlawing. Analysis indicates that capacity is substantially lower with the round-trip criteria, even with higher priority trains, than with the working through freights.

The above factors are critical for defining capacity. In some cases it is still possible for them to be invalid. A few lines have been observed to be operating above their calculated capacity. In virtually every case, the railroad was accepting a substantial number of recrew operations. It has not been determined if the railroads involved have made an economic decision to operate this way. On other lines the capacity indicated by this analysis is considerably greater than could probably be realized under the railroads' existing operations. The reason is not that the railroad is operating the line poorly, but that the level of service implied by the high capacity operation would be so much lower than that now provided, that trip times of important high priority freights would be severely degraded. In addition, because the constraining link is used to determine route capacity over the full corridor length, there are a few cases where actual annual density exceeds the analyzer line capacity calculation. In these cases, apparently the carrier has applied operating techniques in other portions of the route to overcome congestion in the constraining link. This approach is consistent with the Department's attempt to be conservative on all line capacity analysis.

Parametric Analysis Characteristics and Assumptions

The parametric analysis is a simplified procedure for estimating line capacity. Its primary purpose is to make preliminary estimates of line capacity for analysis such as these, for examinations of a wide range of options for line changes before more detailed studies are performed, or for similar purposes. It cannot be as accurate as other more detailed (but time consuming techniques) especially when pushed beyond its design limits. Therefore, the following section describes the characteristics of the parametric analysis: the parameters for which it is designed, the ranges of parameters, and the assumptions about the parameters used in this analysis.

General Response Characteristics

The parametric analysis consists of two basic relationships. The first relates average delay per train to line characteristics and traffic volume. The second determines capacity as a function of maximum acceptable delay, and average delay per train. These two relationships are used together to determine capacity of any particular line segment.

Two characteristics of the first relationship should be appreciated to understand the nature of the parametric analysis and its limitations. First, the average dispatching delay (as distinct from planned work stops) a train can expect to receive when traversing a line is assumed to increase in direct proportion to the number of trains per day over the line. This has been found to be true over a wide range of values; however, some obvious limitations occur. If the line is so short and traffic levels so low that each train can get over the line before another starts, no interference occurs. If traffic levels are so high that a breakdown of flow occurs, delays will be much higher than estimated. The latter will only occur, however, when physical capacity is less than capacity constrained by other causes as discussed before. Thus, the proportional delay assumption is fairly accurate for almost all lines.

The second characteristic which applies to the average delay relationship is that capacity-affecting factors are approximately additive rather than multiplicative. However, it should be noted that the amount of capacity added by a given factor is not necessarily uniform over the range of values for that factor. For example, an addition of 10 percent double track is far more important on a line that is almost all double track than it is on a line that is almost all single track.

The relationship between maximum trip time and average dispatching delay, which determines MLS capacity, is a squared relationship; maximum trip time increases as the square of the average delay (above some minimum trip time). Since maximum trip time is given when trying to estimate

capacity, the average delay at capacity (i.e., maximum acceptable average delay) becomes a square root function of maximum acceptable trip time. The relationship used to calculate capacity is:

$$C = \frac{A_c}{K} \quad x \quad \frac{100}{L}$$

where:

C = capacity of a line segment in trains per day,
A_c = average delay per train at capacity,
K = the delay characteristic of the line, and
L = the length of the line.

The value for A_c is determined from the maximum acceptable trip time and other factors such as speed, and scheduled delays. The K value is the average amount of dispatching delay each train can expect to receive for each additional train on the line. For example, if K = 0.05, and 20 trains are operated each day, then each train will average 0.05 x 20 or 1.00 hours of dispatching delay. If 21 trains are operated, then each train will be delayed about 1.05 hours. Note that total delay increases as the square of the number of trains, from 20 hours (20 x 1.00) to 22.05 hours (21 x 1.05). The K values are normalized for a 100 mile line; thus the 100/L is an adjustment for the specific length of line.

Assumptions for Corridor Analyses

Two sets of assumptions will be described; those affecting K and those affecting A_c. The K value is specific to a line and the way it is operated and, in effect, represents the rate at which service deteriorates with increasing traffic. The characteristics which determine K are:

Average running speed;
Siding or crossover spacing;
Signal spacing;
Train length;
Uniformity of train speeds;
Directional imbalance of traffic;
Proportion of multiple track;
Train priorities;
Uniformity of siding spacing;
Peaking of traffic; and
Occurrence of incidents (interlocking delays, signal & equipment failures, pull aparts, detector readings, etc.).

Characteristics which affect A_c are:
Crew districts (length of run);
Scheduled stops (work, brake cooling, helpers);
Interlocking delays, other incidents;
Average running speed;
Terminal delays (crew call, wait for train, signoff times); and
Single or double track.

For the calculation of capacity in the Preliminary Report, the assumptions were developed from railroad operating timetables. Since then, these assumptions have been reviewed by the railroad owning each line in each corridor. This has resulted in a new capacity result in most cases and is reflected in the tables for each corridor.

Some factors are important to both values, and are only discussed once below.

Primary Assumptions

Since the purpose of this analysis is to examine the potential for reducing the number of main lines, several basic assumptions were guided by this purpose. No major improvements in line facilities (additional trackage, curve straightening, grade crossing elimination, etc.) were anticipated, although it was assumed that substandard track would be brought up to timetable speeds. Train departures would be adjusted to maximize the use of the line. Trains would be powered adequately, again to maximize use of the line.

Average Running Speed and Uniformity of Speeds

Average running speed was computed from timetable speed limits, with specific allowances for permanent slow orders and a general allowance for grades, except where specific heavy grades (greater than 1.0%) were identified. With potential consolidations of lines, it was assumed that all trains would be powered sufficiently to minimize the impact of slow speeds. Trains were assumed to be powered to maintain a reasonably uniform mix of train speeds. A power-to-weight ratio of 1.5 horsepower per ton was assumed, except for mountainous areas, where 2.0 horsepower per ton was assumed.

Train Priorities

Trains were assumed to have a reasonable mix of priorities, however, since train speeds were reasonably uniform, no specific provisions were made for passenger trains. Other studies have shown that giving passenger trains absolute priority may consume a capacity equivalent to four freight trains for each passenger train. Where significant speed differences occur, passenger trains may consume even greater quantities of capacity.

Train Lengths

Train lengths were assumed to be constrained such that all trains could fit into 90 percent of the sidings. Trains longer than most sidings have a severe

effect on line capacity. Throughput, in terms of cars per day, was then limited to the number of trains per day times the maximum train length. Increasing train length would reduce car throughput since the number of trains which could be handled would decrease faster than the length of trains would increase. Longer trains also have a higher rate of incidents which also further reduces capacity.

Peaking and Directional Imbalance of Traffic

It was assumed that no significant imbalances or peaks in traffic occurred. Since the purpose of the analysis is to examine potential reduction in duplicate lines, rescheduling some trains would be necessary to maximize use of the line. This does not imply completely uniform dispatching only that no major imbalances occur.

Occurrence of Incidents

"Incidents" includes a large number of types of occurrences which delay trains. Any type of unplanned delay on a line other than that due to traffic on the line falls into this category. These include:

- Cross traffic at interlockings;
- Signal failures;
- Air brake failures;
- Pull aparts (coupling failures);
- Locomotive failures;
- Hot boxes (axle bearing failures);
- Dragging equipment;
- Hot box and dragging equipment detector failures;
- Accidents; and
- Train stallings on grades.

The rate at which these occur and their duration are important factors in delay to not only the trains affected, but also other trains which may be impacted by the delay of the affected trains. The rate described in the "Parametric Analysis of Railway Line Capacity" was used. This is typical for many actual rail lines observed and constitutes one failure of an average duration of about 30 minutes per 540 train miles. Interlocking delays were included separately in the determination of A_c. Ten minutes were added to the time of the critical train for each interlocking up to 20 minutes.

Crew Districts

Crew districts were determined by consulting the railroads. For those cases where several length crew runs were involved, the most common one was used. Where junctions of two routes are involved, and through crews operated both ways, two capacities might result. The lower of the two was used in determining controlling capacity.

Scheduled Stops

The critical trains were defined as those doing work along the way. Working freights were assumed to do set-outs and pick-ups of 45 minute duration each at half the yards on a line. No more than 90 minutes of work would be performed by any through train, it was assumed. Additional time for helpers and brake cooling on steep grades was allowed if necessary.

Terminal delays were based upon actual observations of several railroads. Terminal delay consists of crew call time, train assembly and brake test time (if necessary) and signoff time. Crew call time is due to the fact that when road crews are called, it may not be clear when the train will be ready to depart. Two hours notification of the crew are usually required before they must be at work. If the train is originating, the crew often must pick up its locomotives, couple to the train, and make a brake test before departing the yard. If the train is a relay train (continuing through with only a crew change), the crew must be ready well before the train arrives at the crew change point. When leaving the train, a crew may have to remove the locomotive and run to the engine house, or be shuttled by highway to the crew quarters. On the average, this non-running time consumes two hours if both terminals of the crew run are at small yards, and two-and-a-half hours if a major yard is involved at either end.

Availability of Capacity

The capacity calculated in this analysis must be allocated to all the uses which must be made of the line. In addition to through freights, a number of other uses compete for the limited capacity. The list of uses includes:

- Through freights;
- Way (local) freights which service industries along the line;
- Passengers (which may consume four or more units of capacity each);
- Switchers operating near yards along the line;
- Work trains and equipment for maintaining the line; and
- Hi-rail or other on-rail inspection vehicles.

In addition, major disruptions of services such as washouts or major accidents can remove a line from service for several days. Recovery from such catastrophes can usually be made within the physical capabilities of a line if a MLS concept is used to define capacity.

The model allows rigorous examination of route capacity by separating each route into a number of discrete sections on the basis of crew change points, major junctions, changes from single to double track (or vice-versa) and points of major physical characteristic changes. Consequently, the model

submits a separate capacity for each segment of the route. FRA, on the other hand, assessed the capacity for each segment of the entire route by seeking the bottleneck link and designating the line capacity on that basis. Therefore, in every instance the capacity of a particular line and corridor is stated by the FRA in the most conservative fashion, which subsequently understates the degree to which various rights-of-way are underutilized.

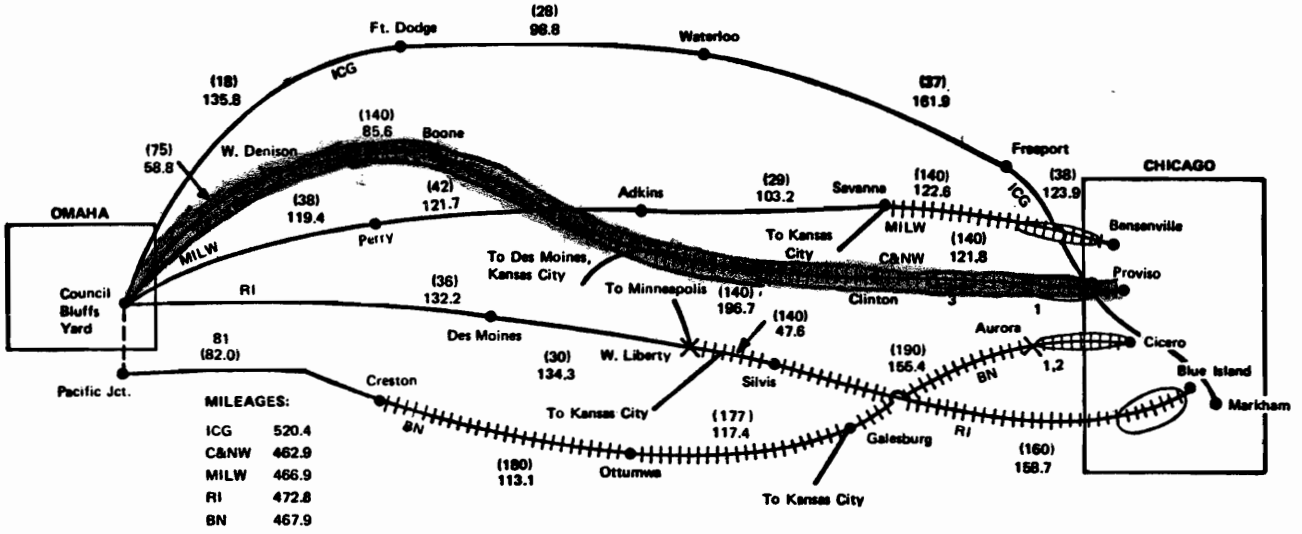
Typical Example of a Corridor of Consolidation Potential

The railroad route between Chicago and the Omaha Gateway is marked by redundant service provided by five Class I railroads. (See map.) The shortest of the lines, 463 miles, is run by the Chicago and North Western (CNW), and the longest, 520 miles, belongs to the Illinois Central Gulf. Between those extreme lengths are the Chicago, Milwaukee, St. Paul and Pacific (MILW), Chicago, Rock Island and Pacific (CRIP), and the Chicago and North Western (CNW).

Assessing the five lines between Chicago and Omaha is done by an examination of three categories. First, physical plant, track and signal systems, indicate the railroad's degree of modernization. Second, factors such as line length and transit time suggest the service level for shippers. Finally, density indicates the tonnage presently handled by the road. With these elements in mind, a short analysis of the five lines follows.

The Burlington Northern with 83 percent double track and 62 percent centralized traffic control (CTC), has the highest capacity of the railroads in question. On the average the five routes have 42 percent CTC and 43 percent double track, but there is a great disparity between these averages and the individual railroad's statistics. Obviously, the BN is considerably above averages but it is the only railroad in that category. The Milwaukee, CNW, and CRIP are above average in only one category, while only the ICG is below average in both.

CHICAGO-OMAHA CORRIDOR



LEGEND:

- Section or subsection primarily double track
- Section or subsection primarily single track
- Crew change point (analysis section boundary)
- Major change in traffic demand (rail junction), track configuration, or physical line characteristics (analysis subsection boundary)
- (83) Section or subsection line capacity, Millions of gross tons
- 142.2 Section or subsection length, miles

NOTES:

1. Commuter traffic
2. >3 tracks, 30.9 miles
3. 4 tracks, 2.1 miles

Table 1. -- The Chicago-Omaha Corridor

Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT)
Burlington Northern	448	35	81	36	81
Illinois Central Gulf	520	12	18	5	18
Rock Island	472	19	30	14	30
Milwaukee Road	467	12	29	29	13
Chicago & North Western	463	45	75	33	75
TOTALS:	2370	123	233	117	217

1/Due to the methodologies employed for calculating line density and line capacity, there are five instances where density exceeds capacity. Density was computed as a weighted (by mileage) average for the entire line, whereas capacity was defined by the constraining link. As a result, the lowest capacity link serves as the throughput capacity without modification, but the lowest density segment is simply one factor in the overall line density.

2/Bottleneck capacity is the segment which is most restrictive to additional capacity.

Density statistics are perhaps the most significant figures cited in this report (Table 1). Among these lines, the highest density line is the CNW, with over 40 million gross tons per route mile and the lowest is the MILW and ICG with 12 million GTM. These statistics suggest that there is unused capacity on all of these lines.

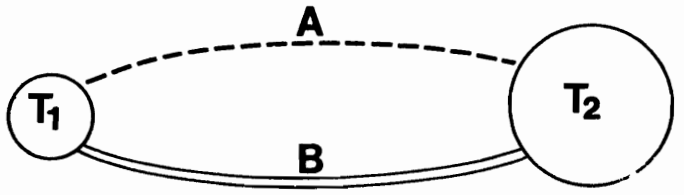
Cost of Rebuilding

A cursory examination of the rebuilding requirements was made for the Chicago-Omaha Corridor. These results show that while rationalization of the rail system will reduce maintenance costs per ton mile, the reduction in rehabilitation costs for a rationalized network will have a far greater impact on the railroad industry's finances. Without rationalization, a substantial amount of deteriorated track will have to be rebuilt. In cases of multiple lines with excess capacity, there is often one or more lines in good condition competing with one or more in bad condition. By transferring through traffic to the better line(s), the ones in poor condition, but is gradually accumulating deferred maintenance and rehabilitation costs of 10 percent or less of that required for a high-density mainline.

This applies also in regard to the case where two (or more) competing lines between traffic centers are in bad condition. Moving all but local service to one upgraded route could make the capital expenditure economically sound. A hypothetical example is illustrated in Figure 1.

Railroad A is single track and carries 10 million gross tons, while Railroad B is double track and carries 30 million gross tons, far below the capacity of either line. Twenty years ago Railroad A was a 60-mile-per-hour railroad, but now has many 10-mile-per-hour slow orders due to earnings inadequate to maintain its plant. Railroad B is in good condition, but is gradually accumulating deferred maintenance. The average cost to rehabilitate the lines back into top condition is $250,000 per route mile for A and $100,000 per route mile for B. Since it is 200 miles between terminals, total cost would be $50 million for A and $20 million for B.

FIGURE 1

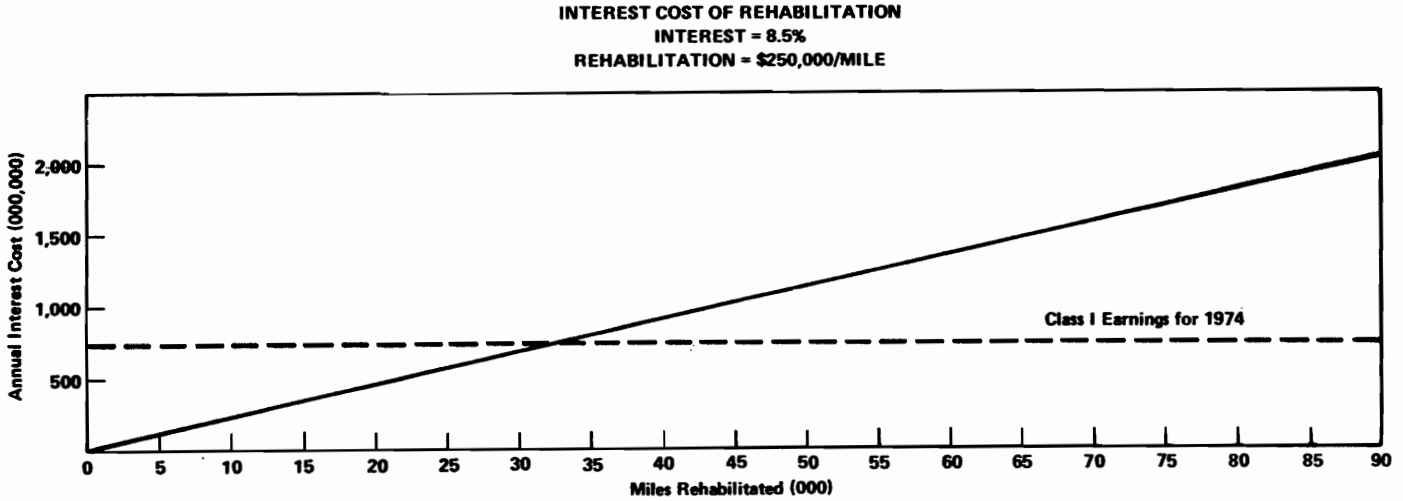


Concentrating A's through trains into B would cut total rehabilitation costs from $70 million to $28 million, assuming A was put in good condition for a light-density line. This would increase B's traffic by 30 percent and add additional revenues from the trackage rights agreement to allow a higher maintenance budget. Moving the through traffic off of A would cut maintenance costs on A by two-thirds, producing a savings that would outweigh the incremental maintenance required on B by about $600,000 annually.

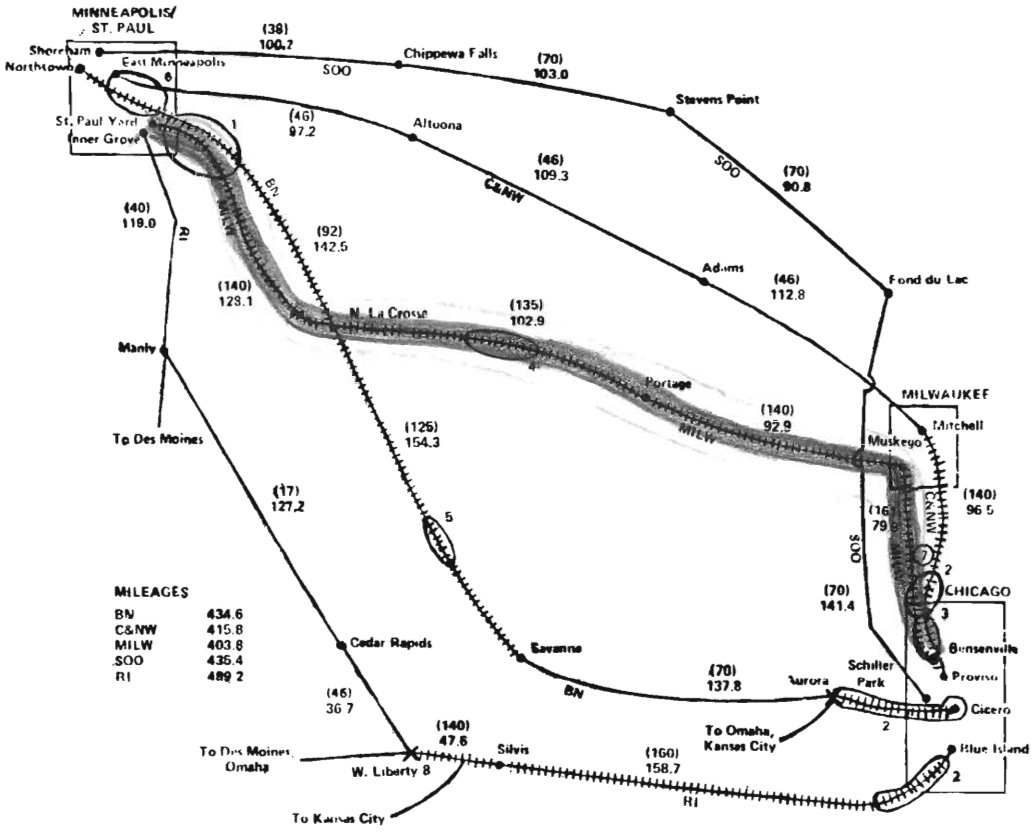
The FRA has estimated that on the average $250,000 is required to rebuild a mile of very poor track into a 60 mph, heavy duty line. The interest expense alone, assuming the approximate current rate of 8 1/2 percent, would be higher than the maintenance expense per mile for any line with a traffic density of less than 35 million gross tons (Figure 2). Since most lighter density lines generally have an accumulation of deferred maintenance, itself an indicator of inadequate earnings, it is highly unlikely that any additional financial burden, such as debt service incurred for rehabilitation, could be met from operations.

The other Corridor of Consolidation Potential are defined and discussed in the remainder of this appendix.

FIGURE 2



CHICAGO—MINNEAPOLIS CORRIDOR



LEGEND:

- Section or subsection primarily double track
- Section or subsection primarily single track
- Crew change point (analysis section boundary)
- X Major change in traffic demand (rail junction), track configuration, or physical line characteristics (analysis subsection boundary)
- (61) Section or subsection line capacity, million of gross tons
- 142.2 Section or subsection length, miles

NOTES:

1. Joint trackage, BN and MILW, 19.2 miles, paired track
2. Commuter traffic
3. MILW trackage rights on C&NW, 10.1 miles, double track
4. C&NW trackage rights on MILW, 13.0 miles, 2.7 miles single track, 10.3 miles double track
5. BN trackage rights on ICG, 12.5 miles, double track
6. C&NW operates over BN to East Minneapolis, 10.5 miles, double track
7. Crew assumed to make round trip in 12 hours
8. Capacity constrained by Silvis Des Moines crew district

Table 2. -- The Chicago-Minneapolis Corridor

Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT)
Rock Island	489	15	17	5	17
Burlington Northern	435	38	70	27	70
Soo Line	435	19	38	13	38
Chicago & North Western	416	19	46	21	46
Milwaukee Road	404	20	135	18	135
TOTALS:	2179	111	306	84	306

1/See footnote, Table 1.

2/See footnote, Table 1.

The Chicago to Minneapolis corridor is served by five through routes operated by five Class I railroads. The shortest route is offered by the Milwaukee Road (404 miles), the longest by the Rock Island (489 miles), and altogether the five routes account for 2,171 route miles. Total density on the five lines is about 110 MGT's, whereas capacity is at least 2.5 times that amount. Assuming all the traffic is through freight, it could be handled by two roads.

CHICAGO—ST. LOUIS CORRIDOR

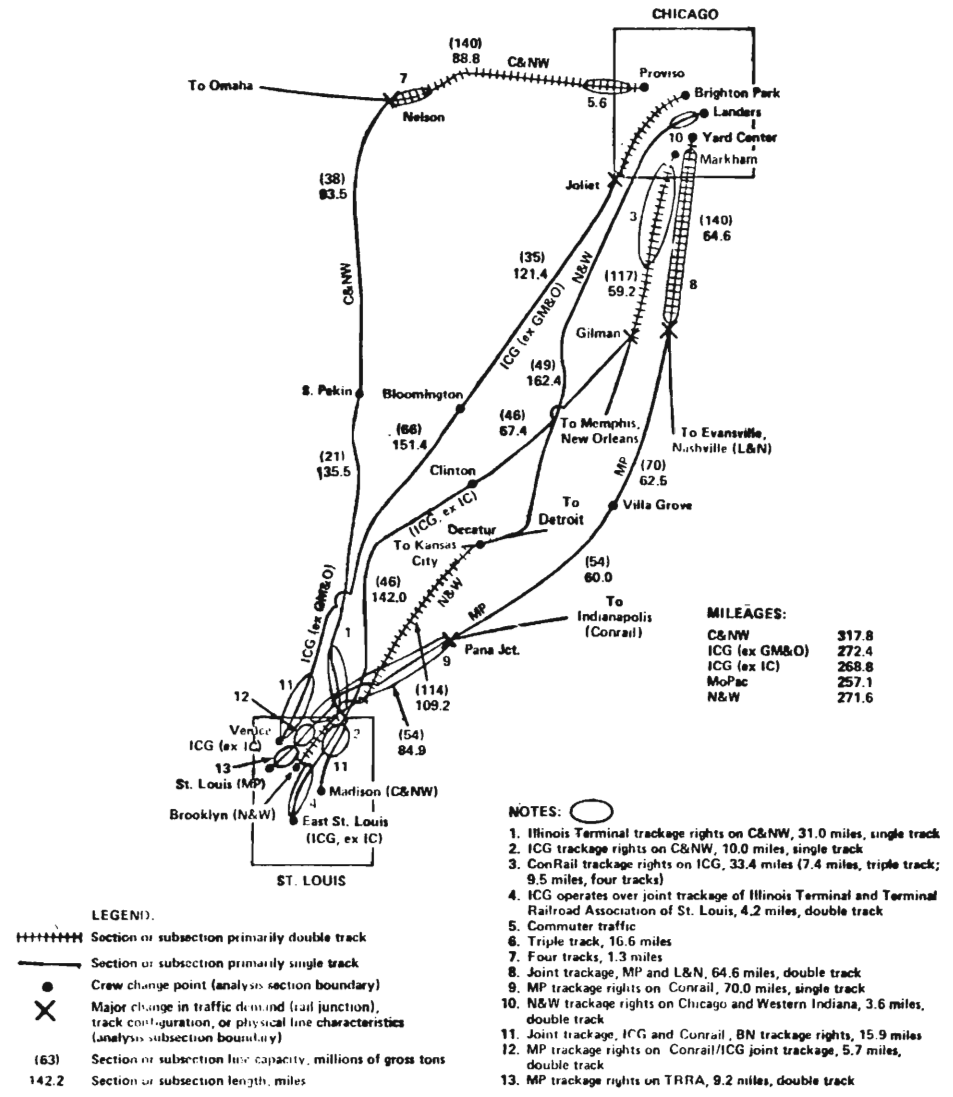


Table 3. -- The Chicago-St. Louis Corridor

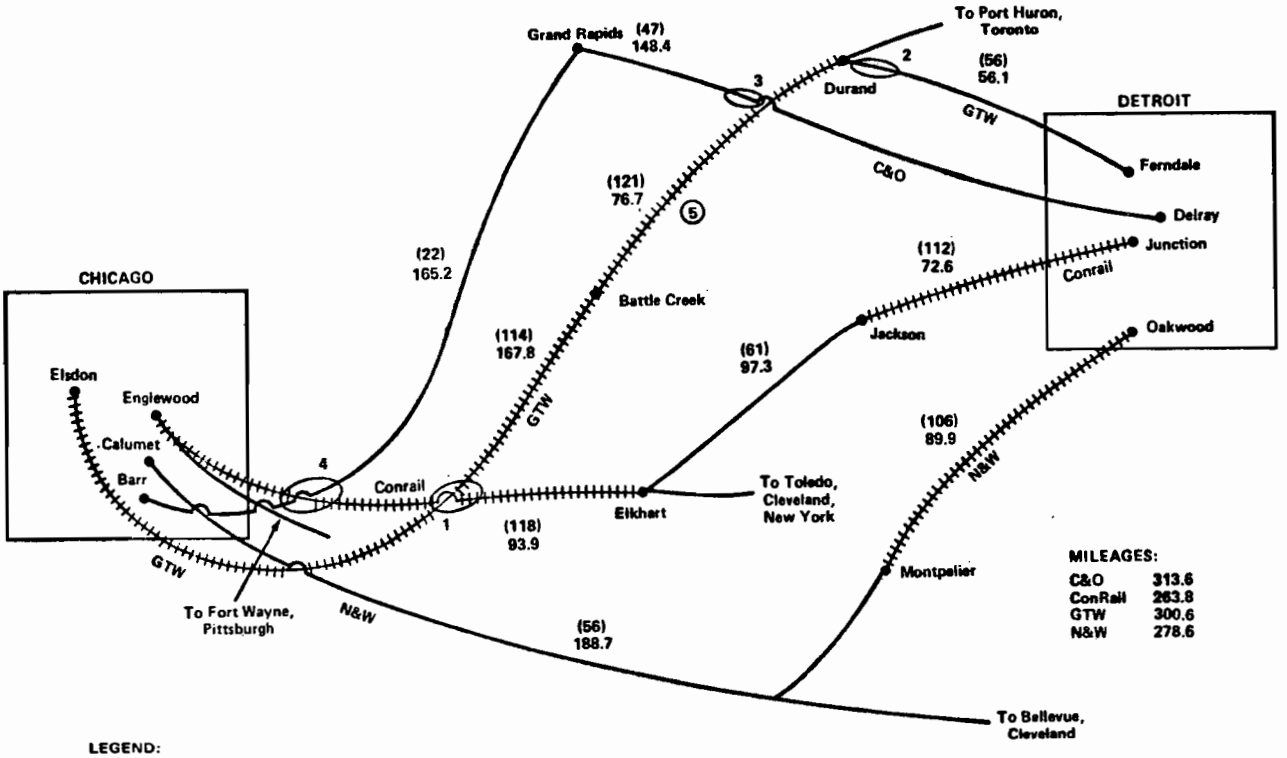
Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT)
Chicago & North Western	318	33	21	23	21
Illinois Central Gulf (ex GMO)	273	10	35	16	66
Missouri Pacific	257	18	54	23	54
Norfolk & Western	272	13	49	8	49
Illinois Central Gulf (ex IC)	269	21	46	16	46
TOTALS:	1389	95	205	86	236

1/See footnote, Table 1.

2/See footnote, Table 1.

The Chicago to St. Louis corridor is served by five through routes, two of which are operated by the Illinois Central Gulf Railroad. The Missouri Pacific route is the shortest (257 miles), whereas the Chicago North Western line is the longest (318 miles). The capacity of the lines is over 200 MGT, which is about two times the total density.

CHICAGO—DETROIT CORRIDOR



LEGEND:

- Section or subsection primarily double track
- Section or subsection primarily single track
- Crew change point (analysis section boundary)
- X — Major change in traffic demand (rail junction), track configuration, or physical line characteristics (analysis subsection boundary)
- (63) — Section or subsection line capacity, million of gross tons
- 142.2 — Section of subsection length, miles

NOTES: ◯

1. Joint trackage, Conrail and GTW, 1.6 miles, single track
2. Joint trackage, Ann Arbor and GTW, 1.5 miles, single track
3. C&O trackage rights on Conrail, 0.9 miles, double track
4. C&O trackage right son Conrail, 17.9 miles, double track
5. Crew assumed to make round trip in 12 hours

Table 4. -- The Chicago-Detroit Corridor

Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT)
Cheaspeake & Ohio	314	24	22	28	22
Grand Trunk Western	301	22	56	12	56
Norfolk & Western	279	9	56	27	56
ConRail	264	30	61	21	61
TOTALS:	1158	85	195	88	195

1/See footnote, Table 1.

2/See footnote, Table 1.

Although the shortest route between Chicago and Detroit is 264 miles (ConRail), there is a total of almost 1200 through route mileage in the corridor. The Norfolk and Western line is the only route handling less than 20 MGT, but even the ConRail and Grand Trunk Western routes, which handle greater than 20 MGT, have considerable excess capacity. In toto, the density of the four routes is 85 MGT, as compared to a capacity of about 170 MGT.

KANSAS CITY/OMAHA-COLORADO CORRIDOR

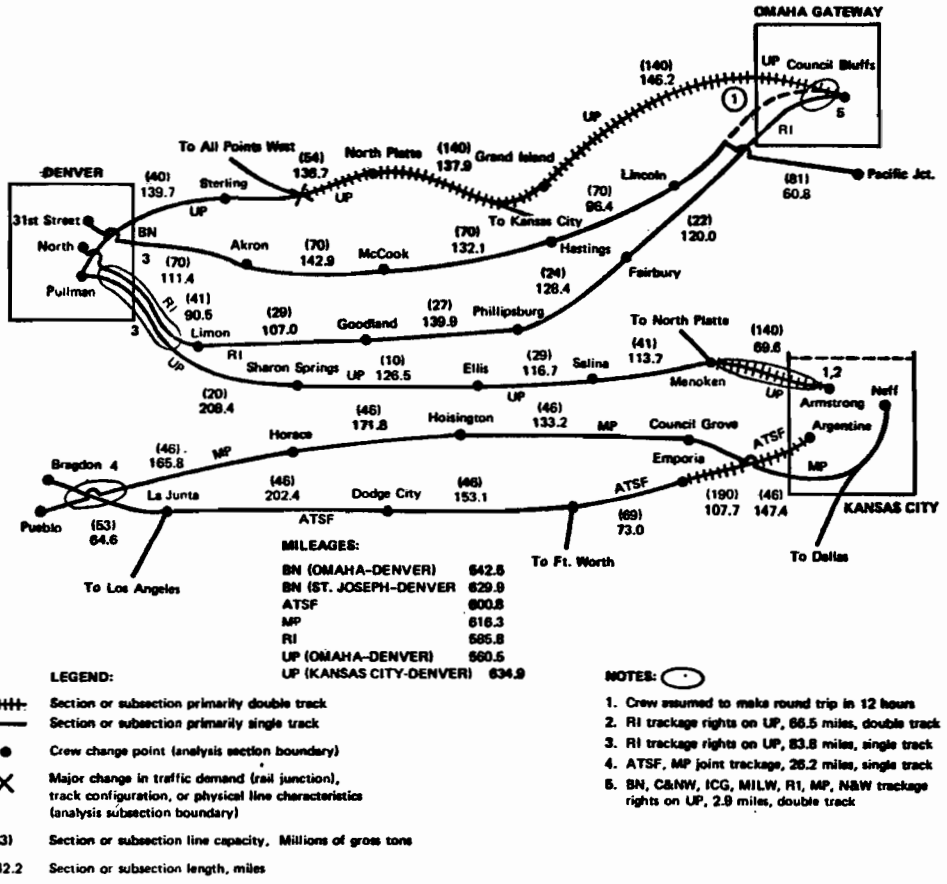


Table 5. -- The Kansas City/Omaha-Colorado Corridor

Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT)
Missouri Pacific	618	13	46	12	46
Santa Fe	600	24	46	22	53
Union Pacific (from Kansas City)	635	9	30	4	10
Burlington Northern	544	18	70	21	70
Rock Island	586	8	22	9	24
Union Pacific (from Omaha)	561	55	57	51	54
TOTALS:	3631	127	247	119	257

1/See footnote, Table 1.

2/See footnote, Table 1.

This corridor is the eastern link in the central transcontinental rail corridor, and is not easily defined by one city pair. The Union Pacific route from Omaha is one of the highest density lines in the nation and handles, at some points, over 100 MGT. The corridor's total density is 127 MGT, which is less than one-half of the estimated capacity. The total route mileage of the six lines is seven times the distance of the shortest route available.

DALLAS/FT. WORTH-HOUSTON CORRIDOR

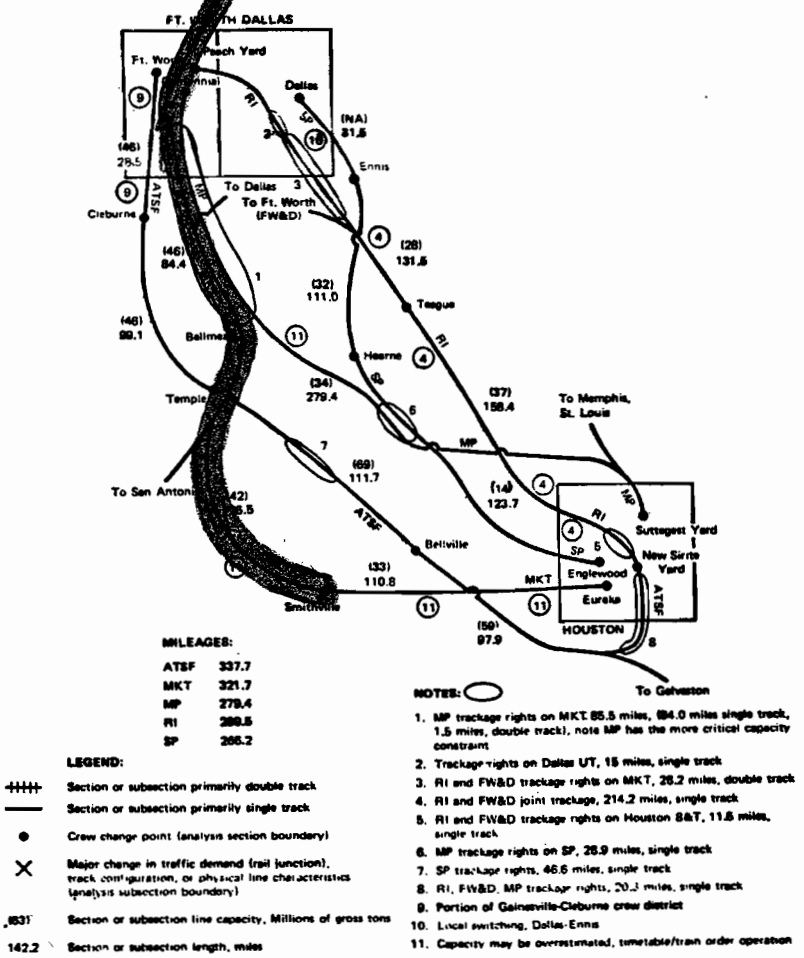


Table 6. -- The Dallas/Ft. Worth-Houston Corridor

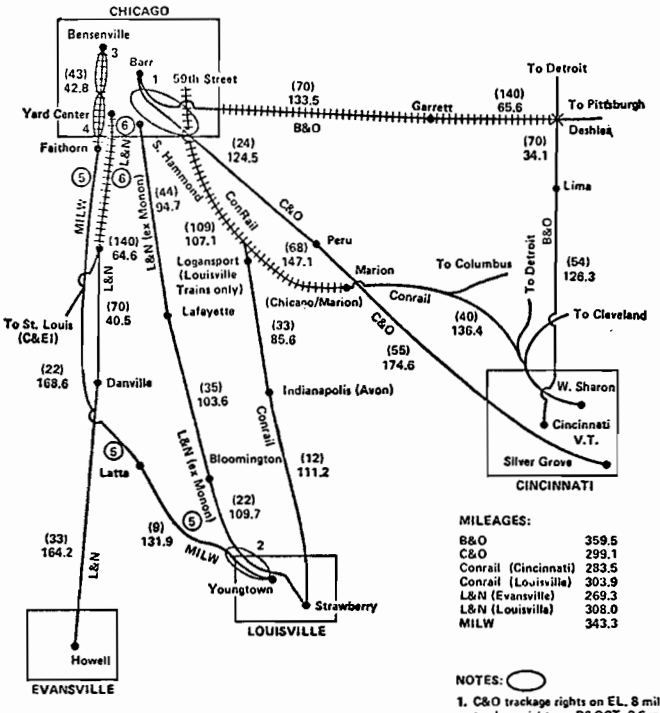
Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT)
Santa Fe	338	27	46	39	59
Missouri-Kansas-Texas	322	11	33	12	33
Rock Island	289	7	28	12	28
Missouri Pacific	279	16	30	29	34
Southern Pacific	266	20	14	33	32
TOTALS:	1494	81	151	125	186

1/See footnote, Table 1.

2/See footnote, Table 1.

This corridor to the Gulf is served by five routes with a density of about 80 MGT total. The shortest line is operated by the Southern Pacific (266 miles), and the longest by the Santa Fe (338 miles). The Santa Fe line has the highest density (27 MGT) and the highest capacity (48 MGT). Altogether there are about 1500 route miles, which taken together have almost double the capacity required to haul the current traffic levels.

CHICAGO—SOUTHERN GATEWAYS



MILEAGES:

B&O	359.5
C&O	299.1
Conrail (Cincinnati)	283.5
Conrail (Louisville)	303.9
L&N (Evansville)	269.3
L&N (Louisville)	308.0
MILW	343.3

NOTES:

1. C&O trackage rights on EL, 8 miles, double track; trackage rights on B&OCT, 6.5 miles, double track
2. MILW trackage rights on L&N, 73.6 miles, single track
3. MILW trackage rights on IHB, 25.5 miles, double track
4. MILW trackage rights on B&OCT, 15.7 miles, single track
5. Capacity may be overestimated; timetable/train order operation
6. Joint trackage L&N/MP, 64.6 miles

LEGEND:

- Section or subsection primarily double track
- Section or subsection primarily single track
- Crew change point (analysis section boundary)
- Major change in traffic demand (rail junction), track configuration, or physical line characteristics (analysis subsection boundary)
- (63) Section or subsection line capacity, millions of gross tons
- 142.2 Section or subsection length, miles

Table 7. -- The Chicago-Southern Gateways Corridor

Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT)
Baltimore & Ohio (to Cincinnati).....	360	37	54	40	54
Milwaukee Road (to Louisville).....	343	5	9	5	9
Louisville & Nashville (to Evansville).....	269	17	33	21	33
Louisville & Nashville (to Louisville).....	308	8	22	13	22
ConRail (to Louisville).....	304	13	12	9	12
ConRail (to Cincinnati).....	284	15	40	13	40
Chesapeake & Ohio (to Cincinnati).....	299	7	24	9	24
TOTALS:	2167	102	194	110	194

1/See footnote, Table 1.

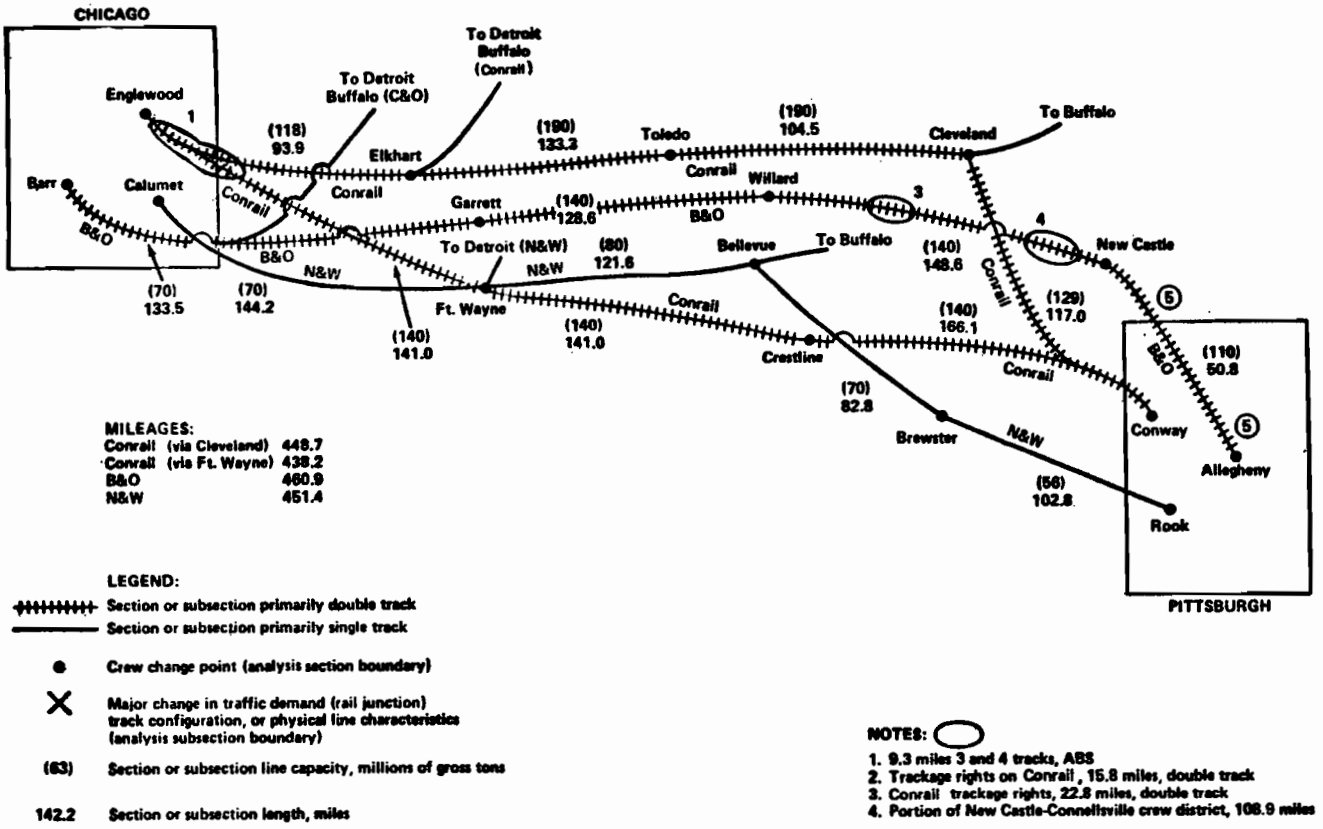
2/See footnote, Table 1.

Traffic which radiates from Chicago towards the Ohio River is generally destined for the Southern Region through three gateway cities, Evansville, Louisville and Cincinnati. However, while the largest portion of the North/South traffic is carried by only two railroads (Southern and Louisville and Nashville), five railroads operate between Chicago and these gateways.

The L&N provides one carrier service to Evansville and Louisville, while the Chessie (B&O and C&O), Milwaukee Road and ConRail interchange at Louisville and Cincinnati with Southern and L&N. The railroads north of these gateways have considerable excess capacity -- about two and one-half times greater than the traffic handled.

The two carriers operating south of these Southern Gateways have an additional advantage in that they can aggregate additional traffic to and from other Midwestern industrial centers such as St. Louis, Detroit, and Toledo. This enhances density considerably more than if they had to rely exclusively on the Chicago traffic.

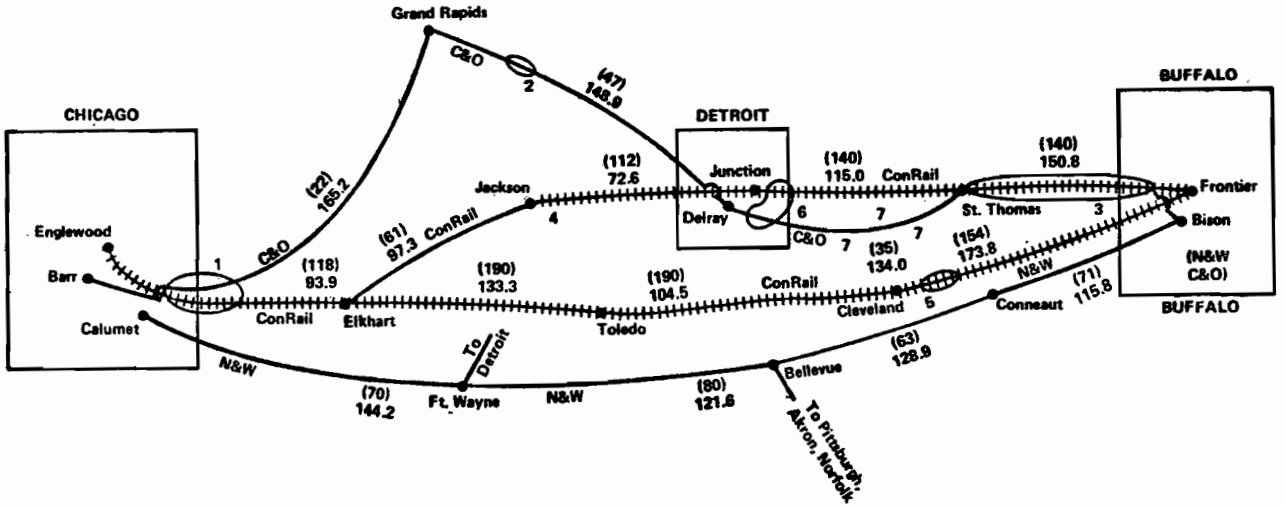
CHICAGO—PITTSBURGH CORRIDOR



Although USRA conducted a thorough planning effort for the Northeast and Midwest Region, that effort concentrated more heavily on the railroads in reorganization rather than on the two key solvents in the region -- the Chessie and the Norfolk and Western. However, significant levels of excess capacity still remain on the ConRail lines.

An initial examination looked at the through lines between Chicago and the Mid-Atlantic coastal region. This analysis found the entire corridor to have excessive capacity. However, when several subsets of the corridor were considered, it was discovered that a significant decrease in capacity, along with an increase in line density, occurred East of the Buffalo and Pittsburgh gateways. This examination allowed a better definition of the corridor which was determined to be Chicago to Pittsburgh and Chicago to Buffalo.

CHICAGO—BUFFALO CORRIDOR



NOTES: ◯

1. C&O trackage rights on ConRail, 17.9 miles, double track
2. C&O trackage rights on ConRail, 0.9 miles, double track
3. C&O trackage rights on ConRail, miles, double track
4. Crew assumed to make round trip
5. 19 miles, 3 tracks
6. C&O trackage rights on ConRail 13.7 miles, (3.0 miles single track, 10.7 miles double track)
7. Capacity may be overestimated because of timetable/train order operation

MILEAGES:

C&O	598.4
ConRail (via Detroit)	529.6
ConRail (via Cleveland)	505.5
N&W	510.5

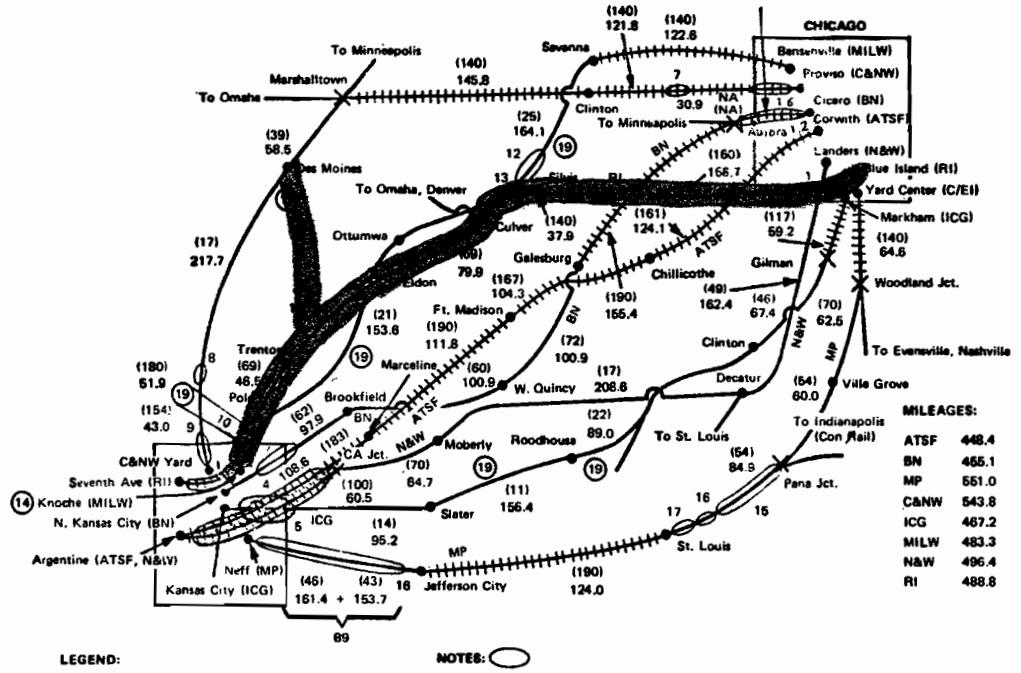
Table 8. -- The Chicago-Pittsburgh and Chicago-Buffalo Corridors

Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT)
CHICAGO to PITTSBURGH					
Baltimore & Ohio	464	35	70	39	70
Norfolk & Western	451	32	56	61	80
ConRail (via Cleveland)	449	70	118	70	118
ConRail (via Ft. Wayne)	438	26	140	70	140
TOTALS:	1802	163	384	240	408
CHICAGO to BUFFALO					
Chesapeake & Ohio	598	7	22	28	22
ConRail (via Detroit)	530	15	61	21	61
Norfolk & Western	511	33	63	61	80
ConRail (via Cleveland)	506	74	118	70	118
TOTALS:	2145	129	264	180	281

1/See footnote, Table 1.

2/See footnote, Table 1.

CHICAGO-KANSAS CITY CORRIDOR



LEGEND:

- Section or subsection primarily double track
- Section or subsection primarily single track
- Crew change point (analysis section boundary)
- Major change in traffic demand (rail junction), track configuretion, or physical line characteristics (analysis subsection boundary)
- (63) Section or subsection line capacity, Millions of gross tons
- 142.2 Section or subsection length, miles

NOTES:

1. Commuter traffic
2. Triple track, 30.9 miles
3. BN trackage rights on N&W, 16.0 miles (15.1 miles, single track, 0.9 miles, double track)
4. N&W trackage rights on ATSF, KCT, 38.5 miles (34.4 miles, double track, 2.1 miles, single track) ATSF trackage rights on KCT, 6.2 miles double track
5. ICG trackage rights on KCT, 6.8 miles, double track
6. 3 tracks, 16.6 miles
7. 4 tracks, 2.1 miles
8. C&NW trackage rights on BN, St. Joseph Terminal, ATSF, 6.9 miles, (0.8 miles, double track, 6.1 miles, single track)
9. C&NW trackage rights on MP, 24.3 miles, single track
10. MILW trackage rights on RI, 42.5 miles, (38.5 miles, double track, 4.0 miles, single track)
11. RI trackage rights on KCS, KCT, 8.8 miles, double track
12. MILW trackage rights on DRI, C&NW, 37.3 miles single track
13. MILW trackage rights on RI. 26.5 miles, double track
14. MILW trackage rights on KCS, 1.3 miles, double track
15. MP trackage rights on Conrail, 70.0 miles, single track
16. MP trackage rights on joint Conrail/ICG trackage, 5.7 miles, double track
17. MP trackage rights on TRRA, 9.2 miles, double track
18. MP has two routes, Jefferson City-Neff Yard, both primarily single track
19. Capacity may be overestimated; timetable/train order operetion not explicitly evaluated by analysis

Table 9. -- The Chicago-Kansas City Corridor

Rail Routes	Route Miles	Average Line Density (MGT)	Line Capacity (MGT) 1/	BOTTLENECK CAPACITY 2/ Segment Density (MGT)	Segment Capacity (MGT
Missouri Pacific	551	18	43	15	43
Chicago & North Western	544	33	17	13	17
Norfolk & Western	496	19	17	21	17
Rock Island	489	18	53	18	53
Milwaukee Road	483	10	21	10	21
Burlington Northern	455	22	60	30	72
Santa Fe	448	42	161	69	183
Illinois Central Gulf	467	13	11	8	11
TOTALS:	3933	175	383	184	417

1/See footnote, Table 1.

2/See footnote, Table 1.

The Chicago to Kansas City corridor is served by more rail routes (8) than any other corridor identified. The most dense line is operated by the Santa Fe (42 MGT), whereas the Milwaukee Road route handles only 10 MGT. Altogether the nearly 4,000 miles of rail routes carries about 150 MGT, which is considerably less than the 360 MGT capacity. The rationalization process in this corridor is complicated because it exists in the heart of the Granger area, and most of the routes are key arteries in the individual roads' networks.

FOOTNOTES

1/Parametric Analysis of Railway Capacity, DOT Report No. DOT-FR-4-5014-2, August, 1975.

APPENDIX 4

INDIVIDUAL ANALYSES OF MAJOR TRANSPORTATION ZONES

The following summaries of the findings of analyses of the total of 12 Major Transportation Zones requiring Category A Mainline internal or external access or both are based upon 1973 carload traffic data.

Zone 1: Bangor, ME

Total traffic attributable to the Bangor Zone is about 116,000 cars. Major commodity groups are lumber and wood products, and pulp and paper products. Major traffic flows involving the zone are:

Zone Numbers				
Origin	Destination	No. of Cars	Percent of Total	Cumulative Percentage
1	1	36,300	31	31
1	2	15,500	13	44
2	1	12,00	10	54
1	74	2,800	2	56
1	58	2,600	2	58
1	4	2,100	2	60

Data indicates that 54 percent of Bangor's traffic moves within the Bangor Zone or between Zones 1 and 2. The remaining 46 percent requires a Category A connecting mainline between the Bangor area and the mainline system in Massachusetts. It is necessary to designate as Category A Mainline a joint interline route composed of lines of the Bangor and Aroostook (BAR), Maine Central (MEC) and Boston & Maine (BM) railroads. From Oakfield to Northern Maine Jct, a BAR line of 5.5 MGT desity is designated; from Bangor to Portland a MEC line of about 7 MGT; and from Portland to Ayer a BM line of 12 MGT.

Zone 2: Augusta, ME

The Augusta zone generates 83,000 cars, of which the major commodities are lumber and wood products, pulp and paper products, and petroleum or coal products. The major traffic movements involving the zone are:

Zone Numbers				
Origin	Destination	No. of Cars	Percent of Total	Cumulative Percentage
1	2	15,500	19	19
2	1	12,000	15	34
2	14	8,900	11	45
5	2	3,600	4	49
2	2	3,000	4	53

Augusta requires connectivity to Bangor, as well as the national mainline network; the joint route designated between Bangor and Ayer should satisfy that need.

Zone 166: Escanaba, MI

Escanaba accounts for 148,000 cars; major originating commodities are lumber and wood products and pulp and paper products; major received commodities are metallic ores. The largest flows attributable to the zone are:

Zone Numbers				
Origin	Destination	No. of Cars	Percent of Total	Cumulative Percentage
167	166	124,200	84	84
166	166	3,700	3	87
166	171	3,400	2	89

Since 84 percent of Excanaba Zone traffic moves from Marquette (Zone 167), the two zones require connectivity. Accordingly, the Chicago and North Western line between Ishpeming and Escanaba is designated Category A Mainline. Escanaba Zone traffic moving to or from other zones does not justify line upgrading to provide connectivity beyond.

Zone 167: Marquette, MI

Metalic ores constitute 60 percent of the total of 221,000 carloads generated by Marquette. Major freight moves involving the zone are:

Zone Numbers				
Orgin	Destination	No. of Cars	Percent of Total	Cumulative Percentage
167	166	124,200	56	56
167	167	57,800	26	82
167	155	4,900	2	84

Since 82 percent of Marquette traffic moves internally or to Escanaba, the zone is sufficiently served by the CNW line designated to provide connectivity for Zone 166 above.

Zone 198: Parkersburg, WV

Parkersburg accounts for 99,000 cars, of which the major incoming commodity is coal (58,500 cars) and the major originating commodities are chemicals and nonmetallic minerals. Major traffic movements involving Parkersburg are:

Zone Numbers				
Origin	Destination	No. of Cars	Percent of Total	Cumulative Percentage
195	198	43,900	44	44
197	198	8,00	8	52
200	198	3,900	4	56
198	197	3,300	3	59

To provide the connectivity required by this level of traffic generation, the Baltimore and Ohio (BO) between Grafton, WV, and Chillicothe, OH, via Parkersburg, now a Category B Mainline, is redesignated "A". The BO between Grafton and Cumberland (MD), is Category A on the basis of density.

Zone 255: Ft. Myers, FL

Ft. Myers generates 117,000 cars; major traffic flows are:

Zone Numbers		No. of	Percent	Cumulative
Origin	Destination	Cars	of Total	Percentage
258	255	39,200	34	34
254	255	24,300	21	55
256	255	19,200	16	71
255	254	8,200	7	78
255	255	5,400	5	83

Since the majority of freight traffic attributable to Ft. Myers originates in the eastern half of the zone, the Florida East Coast Line between Marcy (crossing of the Seaboard Cost Line A Mainline) and Lake Harbor (around Lake Okeechobee) is designated a Category A Mainline for service within the zones as well as to connect the zone with the national mainline network.

Zone 258: Miami, FL

Miami generates 91,000 carloads and the major freight moves involving the zone are:

Zone Numbers		No. of	Percent	Cumulative
Origin	Destination	Cars	of Total	Percentage
258	255	39,200	43	43
256	258	10,300	11	54
237	258	6,800	7	61
258	241	5,800	6	67
258	258	5,800	6	73
250	258	5,000	5	78

Clearly, the Miami market requires connectivity both within Florida and to the interstate mainline network. The Seaboard Cost Line's mainline from Miami to Auburndale is, therefore, designated a Category A Mainline.

Zone 256: West Palm Beach, FL

West Palm Beach accounts for over 200,000 cars annually, and the major freight moves involving the market are:

Zone Numbers		No. of	Percent	Cumulative
Origin	Destination	Cars	of Total	Percentage
256	255	19,200	9	9
256	254	17,300	8	17
250	256	17,100	8	25
256	258	10,300	5	30
237	256	9,500	5	35
256	251	8,600	4	39
256	253	6,800	3	42
256	252	6,300	3	45
256	250	6,100	3	48

The Seaboard Coast Line's mainline, designated an "A" mainline for Miami's connectivity, provides appropriate mainline connectivity to West Palm Beach as well.

Zone 259: Panama City, FL

The Panama City zone accounts for 85,000 cars; major commodities are lumber and wood products and pulp and paper prpducts. Largest freight flows involving the zone are:

Zone Numbers		No. of	Percent	Cumulative
Origin	Destination	Cars	of Total	Percentage
261	259	15,700	19	19
259	259	8,400	10	29
264	259	6,700	8	37
247	259	5,400	6	43
209	259	4,200	5	48
266	259	3,700	4	52
259	260	3,000	4	56

The highest concentration of freight generated in the zone moves between Bay, Washington and Jackson counties and Transportation Zones in the States of Alabama and Tennessee. The volume of the movement requires that Panama City be provided direct access to the mainline system. The Atlanta and Saint Andrews Bay (ASAB), a Class II railroad company, is the sole rail route serving Bay County and linking it with the above-cited two counties in the zone and also linking Bay County with the mainline network. Designation as Category A Mainlines of the ASAB line between Panama City and Cottondale and of the Louisville and Nashville line between Cottondale and Flomaton, via Pensacola, provides the required access for Zone 259 to Alabama and Tennessee. As a Class II railroad company, the ASAB is not required to report its density levels. Its Class II status, which is based solely on the level of annual gross operating revenue, should not be assumed to reflect its traffic density level, however.

Zone 278: Baton Rouge, LA

Baton Rouge accounts for 96,000 cars. Inter-Zonal traffic flows are relatively fragmented--only five involving more than 2,000 carloads. Major moves are:

Zone Numbers				
Orgin	Destination	No. of Cars	Percent of Total	Cumulative Percentage
146	278	8,100	9	9
278	276	5,400	6	15
277	278	4,300	5	20
296	278	3,000	3	23
278	277	2,300	2	25

Flow fragmentation complicates selection of an interacting zone justifying connectivity. However, a high percentage of Baton Rouge Zone traffic moves via major north-south grain routes. The Illinois Central Gulf line between Baton Rouge and the high density mainline at Hammond is designated Category A Mainline.

Zone 297: Bemidji, MN

The Bemidji zone accounts for 244,000 cars, of which 65 percent is iron ore. Major traffic flows involving Zone 297 are:

Zone Numbers				
Orgin	Destination	No. of Cars	Percent of Total	Cumulative Percentage
297	296	172,200	68	68
118	297	17,100	7	75
297	297	10,500	4	79
297	300	8,900	3	82

Since 68 percent of Bemidji's traffic moves to Duluth, the Burlington North line between Grand Rapids, MN, and Brookston in the Duluth zone is designated as Category A Mainline.

Zone 370: Corpus Christi, TX

The Corpus Christi zone accounts for 96,000 cars; the most important commodities are metallic ores, nonmetallic minerals and chemical products. The largest flows involving the zone are:

Zone Numbers				
Orgin	Destination	No. of Cars	Percent of Total	Cumulative Percentage
390	370	5,800	6	6
349	370	4,300	4	10
378	370	4,300	4	14
370	268	4,000	4	18
376	370	3,700	4	22
371	370	3,500	4	26
381	370	3,100	3	29
370	374	2,300	2	31
346	370	2,300	2	33
370	367	2,200	2	35
345	370	2,200	2	37
340	370	2,100	2	39
375	370	2,000	2	41

Freight flows associated with Corpus Christi are fragmented. The primary need, therefore, is for connectivity to the mainline network in the Houston area, which provides direct access to the largest selection of routes beyond. The highest density route available for the purpose, the Missouri Pacific between Robstown and Alvin, is designated a Category A Mainline.

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