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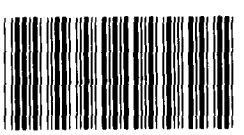
REPORT BY THE

Comptroller General

OF THE UNITED STATES

Amtrak's Productivity On Track Rehabilitation Is Lower Than Other Railroads'--Precise Comparison Not Feasible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Under the $2.5 billion federally funded Northeast Corridor Improvement Project, Amtrak's track rehabilitation is the largest work element in improving rail passenger service. GAO compared Amtrak's productivity in some of this work with that of other railroads and concluded that Amtrak's was not as high.

Conditions affecting productivity vary among railroads. Since many of these variations cannot be measured, productivity rates cannot be compared with precision. Because of the large differences in rates, GAO believes its conclusion is a fair one.

No attempt was made to determine the reasons for the differences in productivity; therefore, GAO cannot predict Amtrak's productivity potential.

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MARCH 13, 1981

CED 81-60

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COMPTROLLER GENERAL OF THE UNITED STATES
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B-201019

The Honorable Bob Packwood, Chairman
and the Honorable Howard W. Cannon,
Ranking Minority Member
Committee on Commerce, Science,
and Transportation
United States Senate

As requested in your joint letter dated July 2, 1980, this is our report comparing Amtrak's productivity on track work under the Northeast Corridor Improvement Project with the productivity of Conrail and other railroads for similar work.

As arranged with the committee office, we are sending copies to the Director, Office of Management and Budget; the Secretary of Transportation; the President of Amtrak; various Senate and House committees and Members of Congress; and other interested parties.

Milton J. Socolar

Acting Comptroller General
of the United States

REPORT BY THE
COMPTROLLER GENERAL
OF THE UNITED STATES

AMTRAK'S PRODUCTIVITY ON TRACK REHABILITATION IS LOWER THAN OTHER RAILROADS'--PRECISE COMPARISON NOT FEASIBLE

D I G E S T

Amtrak's productivity in upgrading track under the Northeast Corridor Improvement Project--while improving--still is not as high as the productivity of Conrail and five other railroads for similar work. (See p. 13.)

Track upgrading is the largest work element under the $2.5 billion Northeast Corridor Improvement Project to improve rail passenger service between Boston, New York, and Washington. (See p. 1.) Conrail also has used Federal funds to upgrade its track under a $3.3 billion Federal commitment. (See p. 2.) GAO was asked to compare Amtrak's track work productivity with that of Conrail and other railroads for the same type of work but did not attempt to determine why productivity rates varied. (See p. 3.)

SELECTIONS FOR COMPARISONS

GAO compared three track-upgrading functions which are common within the railroad industry and which are quantified and recorded as units of production and work hours expended:

--replacing wood crossties that support rails;

--removing existing rail and replacing it; and

--surfacing, which involves leveling and aligning the rails. (See p. 13.)

GAO selected five railroads with which to compare Amtrak's and Conrail's productivity. Three of the largest U.S. railroads were selected because they perform extensive

track work and are each located in a different geographical area. GAO also selected a relatively small railroad and a State-owned commuter railroad which operates service that is similar in many ways to Amtrak's Northeast Corridor service--heavy traffic densities in highly urbanized areas. (See p. 4.)

DIFFICULTIES IN COMPARING PRODUCTIVITY

Although railroads may perform similar track-upgrading functions, there are different factors and conditions that directly affect productivity rates. Although GAO tried to adjust its calculations for these variations, it was generally not able to do so within the parameters of this review. In many cases these variations cannot be measured. As a result, comparing the rates is a very complex task that cannot be done with scientific precision.

Examples of these varying conditions follow.

--Engineering specifications for track structures for high-speed passenger train service in the Northeast Corridor are more stringent than for freight trains, which travel at much lower speeds.

--Track structures which are properly maintained facilitate track work; more work is required to do a satisfactory rehabilitation job when track structures are in a poor state of repair, as is the case with Amtrak.

--Accounting and recordkeeping practices vary among railroads, primarily with respect to the types of employees whose time is included in productivity calculations. For example, Conrail and one other railroad include the time of supervisors while Amtrak does not. Conversely, Amtrak includes the time of support employees (timekeepers, cooks, etc.) while Conrail and the commuter railroad do not. (See ch. 2.)

RESULTS OF PRODUCTIVITY COMPARISONS

Amtrak's productivity has improved since Northeast Corridor track rehabilitation work was started in 1977, but it still is not as high as the other railroads'. Conrail's productivity, on the other hand, was comparable to the four private railroads included in GAO's study.

--During 1979, Amtrak's productivity rate for replacing wood ties was 0.50 ties per labor hour, as compared with 1.11 ties per hour for the commuter railroad, 2.75 ties for Conrail, and 2.10 to 2.39 ties for the four private railroads.

--Amtrak's productivity rate for replacing rail was 1.13 track feet per labor hour; the other rates were 2.08 for the commuter railroad, 4.14 for Conrail, and 4.42 to 6.75 for the three private railroads that did this type of work in 1979.

--Amtrak's productivity rate on surfacing was 21.17 track feet per labor hour, as compared with 32.08 feet for Conrail and 38.40 to 70.41 feet for three private railroads. The commuter railroad and one of the private railroads did not use a comparable measurement for recording surfacing production.

As noted above, the productivity rates for the seven railroads are probably not precisely comparable. The large differences between Amtrak's productivity rates and the other railroads' show that Amtrak's productivity is clearly not as high. GAO was asked only to find out what the productivity rates were, not why they varied. Because it did not attempt to determine the reasons for the differences in productivity, GAO cannot say how much better Amtrak should be able to do. (See ch. 3.)

COMMENTS FROM INTERESTED PARTIES

Amtrak said that GAO's report indicated a need for Amtrak to improve its productivity. Amtrak said that dramatic increases would be

difficult given the mix of traffic and speeds on the Northeast Corridor, the experience level of Amtrak's work force and supervision, and the constraints imposed on Amtrak by the Federal Railroad Administration (which has overall responsibility for the project). Amtrak nevertheless said that it accepted the challenge to increase productivity. (See p. 18.)

The Department of Transportation believed that GAO's conclusion about Amtrak's productivity was unsupported because of the lack of comparability among railroads. GAO does not agree. Most of the differences among the railroads involve situations where Amtrak is not unique; rather its situation is similar to one or more other railroads. Also, in the two situations where GAO was able to partially quantify some of the differences, Amtrak was not at either extreme of the ranges among railroads. Finally, the productivity differences between Amtrak and the other railroads were so large that it is unlikely that varying conditions would totally account for them. (See p. 19.)

Contents

ABBREVIATIONS

Amtrak	National Railroad Passenger Corporation
Conrail	Consolidated Rail Corporation
DCP	DeLeuw, Cather/Parsons and Associates
4R Act	Railroad Revitalization and Regulatory Reform Act of 1976
FRA	Federal Railroad Administration
GAO	General Accounting Office
NECIP	Northeast Corridor Improvement Project
USRA	United States Railway Association

CHAPTER 1

INTRODUCTION

This report was requested by the Chairman and Ranking Minority Member of the Senate Committee on Commerce, Science, and Transportation. We were asked to look at the National Railroad Passenger Corporation's (Amtrak's) productivity on the track work it has performed as a contractor under the Northeast Corridor 1/ Improvement Project (NECIP) and to compare Amtrak's productivity with the productivity of the Consolidated Rail Corporation (Conrail) and to compare both with other railroads. We were not asked to determine the reasons for any differences. Both NECIP and Conrail have received large amounts of Federal assistance for track upgrading.

A sound track structure/railroad bed is a fundamental prerequisite in operating a reliable, high-speed rail transportation system. Work on track structures is the largest and most important work element under NECIP, accounting for $809 million of the $2.5 billion March 1980 Corridor Master Plan.

THE NORTHEAST CORRIDOR IMPROVEMENT PROJECT

NECIP was authorized by the Railroad Revitalization and Regulatory Reform Act of 1976 (45 U.S.C. 801), commonly known as the 4R Act. Under the 4R Act, $1.75 billion was authorized to improve rail passenger service between Boston, New York City, and Washington so that regularly scheduled, dependable service would be established by February 1981. Rail service would operate on schedules of 2 hours 40 minutes between Washington and New York and 3 hours 40 minutes between Boston and New York. The act directed the Secretary of Transportation to implement NECIP, and the Secretary delegated the responsibility to the Federal Railroad Administration (FRA).

The Passenger Railroad Rebuilding Act of 1980 (Public Law 96-254, title II, May 30, 1980) increased the authorization for NECIP by $750 million to a total of $2.5 billion and extended the project completion date to September 30, 1985. The act provides that all authority and responsibility for the project will be transferred to Amtrak effective

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1/The Northeast Corridor is the 456-mile main railroad system between Boston, Massachusetts; New York, New York; and Washington, D.C.

October 1, 1985, and transferred authority and responsibility for contracting for construction solely related to track improvements to Amtrak no later than 90 days after the date of enactment. The act also provides that NECIP's goals are to be achieved to the extent compatible with a $2.5 billion authorization and establishes priorities for selecting and scheduling specific improvements.

While FRA has overall responsibility for implementing NECIP, two other entities play major roles in the project--Amtrak and DeLeuw, Cather/Parsons and Associates (DCP), FRA's principal architect and engineering contractor.

Amtrak has a dual role under its contract with FRA. As owner of most of the Northeast Corridor and operator of the corridor's intercity passenger service, Amtrak is supposed to participate in program and project development and in construction supervision, testing, and acceptance. Amtrak was also designated as construction manager for much of the NECIP construction work.

DCP is responsible for management support, system engineering, design, work package definition, cost estimates, and construction supervision and inspection. DCP is a joint venture, the principal firms of which are DeLeuw, Cather and Company and the Ralph M. Parsons Company.

We have issued two previous reports on NECIP--"Impact of Work Cutbacks on Northeast Corridor Improvement Project" (CED-81-23, Oct. 31, 1980) and "Problems in the Northeast Corridor Railway Improvement Project" (CED-79-38, Mar. 29, 1979).

FEDERAL INVOLVEMENT WITH CONRAIL

On April 1, 1976, Conrail took over the operations of six bankrupt railroads in the Northeastern United States under a reorganization plan developed by the United States Railway Association (USRA). 1/ The reorganization was carried out under the provisions of the Regional Rail Reorganization Act of 1973, as amended (45 U.S.C. 701). Under this legislation, known as the 3R Act, and subsequent amendments, the Federal Government has committed $3.3 billion to Conrail, and more will probably be needed.

1/USRA was established by the Congress to plan and finance the reorganization of the bankrupt Northeast railroads which were formed into the rail network known as Conrail.

Some of the Federal funds are for service improvements and for efficiency projects which are to reduce operating costs. These projects include track rehabilitation, 1/ additions and improvements to facilities, and equipment and overhauls.

OBJECTIVE, SCOPE, AND METHODOLOGY

This review was requested on July 2, 1980, by the Chairman and Ranking Minority Member of the Senate Committee on Commerce, Science, and Transportation. Our objective was to compare Amtrak's productivity on track work under NECIP with the productivity of Conrail and other private or publicly operated railroads for the same type of work. We did not attempt to determine why productivity rates varied or to evaluate the relative quality of the work performed by Amtrak and the other railroads.

We examined detailed project accounting and cost control system records and reports maintained at Amtrak. We also reviewed monthly production reports and talked with Amtrak's NECIP officials at the NECIP project office in Philadelphia, Pennsylvania, and FRA and DCP officials in Washington, D.C. We also visited various NECIP work sites and observed some of the track improvement work in progress.

In order to obtain a basis for comparison, we interviewed Conrail engineering officials and reviewed production records and reports at Conrail's Philadelphia headquarters. We reviewed annual reports and held discussions with personnel from USRA.

We also conducted our review at the engineering headquarters of five private or publicly operated railroads. These five railroads operate principally in the following sections of the country:

--New York City and Long Island, New York.

--Western Pennsylvania.

--Mid-Atlantic and Midwest States and Canada.

1/Conrail refers to this as discretionary track maintenance, a major rehabilitation effort intended to revitalize Conrail's deteriorated rail network. For financial statement purposes these costs are capitalized and charged as expenses over several years, but for Interstate Commerce Commission purposes they are charged as expenses in the year the costs are incurred.

--Midwest, Northwest, and west coast States.

--West coast and Southwest States.

We have not identified the names of the four private railroads in this report because we obtained the information from them on the understanding that their identities would not be disclosed. These arrangements were made to facilitate the obtaining of productivity data to use as a basis for our comparisons since we have no legal or contractual right of access to such data in the case of the private railroads. We have named the Long Island Railroad because it is owned by the State of New York, and since it receives Federal assistance from the Urban Mass Transit Administration, we have a legal right to examine its records.

We also looked at annual production data prepared by, and held discussions with, officials of the Association of American Railroads and the American Railway Engineering Association. 1/

We calculated Amtrak's productivity rates under NECIP for the 1979 construction season and compared these rates with those achieved by Conrail and five other railroads for similar track-upgrading functions. We selected the 1979 construction season because our review was initiated mid-way through the 1980 construction season, for which data was not complete.

In contrast to the detailed study performed at Amtrak, our efforts at Conrail and the five other railroads did not include a close examination of the records, reports, and documentation provided by these railroads. We generally accepted information and data obtained during discussions and interviews with railroad officials without assessing the accuracy or validity of such statements or the data provided. We did not verify the data obtained from Conrail and the five other railroads because of the extensive time involved in performing a detailed analysis of records, reporting systems, and data compiled by each individual railroad. Also, as noted above, we have no legal or contractual right of access to this information for the private railroads selected for our work.

In making our comparisons, we selected three of the largest railroads in the United States because they perform

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1/A professional association of railroad officers, engineers, and supervisors whose purpose is to advance knowledge on maintaining and operating railroads.

extensive track rehabilitation functions and are located in different geographical areas. We also selected a relatively small trunkline railroad which performs track rehabilitation functions on a limited basis. The final railroad included in our review--the Long Island--was selected primarily because it operates a large-scale commuter and passenger rail service that is similar in many ways to the passenger service provided by Amtrak within the Northeast Corridor--heavy traffic densities in a highly urbanized area.

Officials from various railroads we visited and of professional railroad organizations told us that a report which compares the track productivity of several railroads has never been formally published by the railroad industry. This report seems to be the first of its kind to be publicly released.

CHAPTER 2

COMPARING TRACK PRODUCTIVITY RATES--NO EASY TASK

Computing the track productivity rates for seven railroads and comparing the rates for similar track-upgrading functions is a very complex task that cannot be done with scientific precision. Although some railroads may seemingly perform similar track-upgrading functions, many factors and conditions vary among the railroads and directly affect productivity rates. While we tried to adjust our calculations for these variances, we were generally not able to do so within the parameters of our review. These variances cannot be measured in many cases and create major problems in comparing track productivity rates for freight or passenger railroads. The following conditions directly or indirectly affect track productivity rates.

FREIGHT AS OPPOSED TO PASSENGER CARRIERS AND RELATED CONSIDERATIONS

One obvious difference among railroads is the type of traffic they carry. Most U.S. railroads are primarily freight haulers while NECIP is intended for high-speed passenger traffic. To broadly generalize, freight trains travel at slower speeds, haul cargo longer distances, and carry heavier loads than passenger trains in the Northeast Corridor. Furthermore, freight trains traveling outside the Northeast Corridor are usually powered by diesel locomotives and often travel over track structures that do not carry a high traffic volume. In the Northeast Corridor, on the other hand, passenger trains generally (1) operate at high speeds and (2) travel through highly urbanized areas over tracks that carry a high traffic volume. Furthermore, electric power is available for passenger and freight trains traveling within the corridor between Washington, D.C., and New Haven, Connecticut.

One final difference between freight railroads and the Northeast Corridor which must not be overlooked is that rider comfort is a key factor in the operation of a responsive passenger railroad.

Because of safety and passenger comfort considerations, engineering specifications for track structures are critically important for a reliable, high-speed, rail passenger transportation system. The track specifications for passenger trains traveling at speeds up to 120 miles per hour are more stringent than track specifications for freight

trains traveling at speeds which do not exceed 80 miles per hour and are often much slower.

In comparing productivity rates, it is important to note that lower traffic densities on railroads outside the Northeast Corridor generally tend to permit higher productivity. Since lower traffic densities allow work gangs more work time on the tracks, delays due to traffic conditions are minimized.

Conversely, track work on the Northeast Corridor involves high traffic density routes and tracks positioned in close proximity to the catenary (the system of overhead wires which provides electric power for the trains). These conditions generally reduce productivity because high traffic density limits access to tracks, and the presence of electricity, either catenary or third rail, may require workers to be more safety conscious than they are when working on structures which are not electrified. (See discussion of delay time on p. 11.)

Although we know that traffic densities and the need to meet more stringent specifications play an important part in productivity rates, we were unable to quantify their effects within the limited parameters of our review.

CONDITION OF TRACK STRUCTURES AND MAINTENANCE PHILOSOPHY

The general condition of track structures and prevailing management philosophy regarding maintenance practices can affect productivity rates. Both Amtrak's and Conrail's track structures were in a deteriorated condition when the massive track rehabilitation programs were initiated. More effort was required to bring the tracks up to a satisfactory condition because they were in such a poor state of repair.

Officials from several private railroads covered in our review said that they maintain tracks to keep them from deteriorating and that management provides for track maintenance operations in addition to large-scale track rehabilitation programs. Effective preventive maintenance allows track rehabilitation programs to be performed routinely and reduces the overall cost of maintenance operations. The president of the American Railway Engineering Association told us that track structures which are in a reasonable state of repair are easier to work on than dilapidated or neglected track structures, permitting higher productivity.

If management decides to reduce normal maintenance operations and delay track rehabilitation programs, tracks will deteriorate through neglect. These decisions could result in massive rehabilitation programs and hiring many new, untrained employees, resulting in periods of low productivity. This was the case with Amtrak and also with Conrail.

While we recognize that management philosophy and practices and the condition of track structures can play a part in comparing track work productivity rates, we were unable to make any special allowances or provisions for the effects of these variables.

ACCOUNTING AND RECORDKEEPING PRACTICES

Accounting and recordkeeping practices play an important role in determining track work productivity rates. Since no two railroads are alike, accounting and recordkeeping practices used to report direct labor hours, delay time, support time, production, and other essential data tend to vary considerably. These variations relate primarily to the types of employees whose time is included in productivity calculations.

We attempted to identify the major recordkeeping differences when we computed the track productivity rates but were not able to correct for all the unique features employed by the individual railroads included in this report. (See app. I.) Because these factors may work against a uniform data base, the track productivity rates should be viewed as approximate ranges rather than as accurate and precise measurements.

The major example of the differing recordkeeping practices we encountered involved accounting for the total labor hours for different types of employees associated with track rehabilitation programs. Our visits to the seven railroads disclosed four broad employee categories which play a direct or indirect role in track work functions: (1) work gangs, (2) foremen, (3) supervisors, and (4) support employees. Although precise definitions for these employee categories are not readily available, work gangs and foremen are generally those employees who are directly involved in rehabilitating the track. In contrast, supervisors are generally responsible for materials, manpower, and equipment; support employees perform a wide variety of duties and include administrative employees (timekeepers, recordkeepers, etc.), cooks, camp car workers, drivers, etc.

The railroads we visited do not account for these employees' time uniformly. One railroad includes only the labor hours charged by the work-gang members that actually work on the track, but another railroad includes the time charged by all four employee categories. Railroads that include time for all four employee categories will have a larger labor-hour base for computing productivity rates. Eliminating one or more of these categories would reduce the labor-hour base and automatically increase the computed productivity rate. The following chart shows the individual employee categories that have been included in our productivity computations. (See app. II.)

	Employee cagetories			
Railroad	Work gangs	Supervisors	Foremen	Support
Amtrak	X		X	X
Long Island	X		X	
Conrail	X	X	X	
Railroad A	X		X	X
Railroad B	X		X	X
Railroad C	X	X	X	X
Railroad D	X			

Because of the way the railroads accumulated their labor-hour data, we were not able to include the same employee categories in all of our productivity calculations. For example, supervisors' time had to be included for two railroads because it could not be separated from other employees' time. For the other five railroads, supervisors' time could not be included because it could not be separated from other employees' time which was not included.

CLIMATE, WEATHER CONDITIONS, AND LENGTH OF CONSTRUCTION SEASON

Climate and weather can play a big role in track maintenance programs and affect overall track rehabilitation efforts and productivity. Severe weather conditions reduce productivity rates and cause more rapid deterioration of roadbed, the restoration of which requires extensive labor commitments. Weather conditions also dictate the length of the work season. Railroads which operate in relatively severe climates, such as Amtrak and Conrail, cannot carry out track rehabilitation programs during the entire winter. This situation causes a loss of skilled employees during winter layoffs, with the associated loss of production and extra expense during the training period for new employees.

We were unable to quantify weather's effect within the parameters of our review.

LABOR CONTRACTS AND WORKER ATTITUDES

Work rules--the labor contract provisions that govern how railroads use and pay employees--are an industry-wide problem. Officials from several railroads we visited stated that labor and union contracts for east coast railroads, including Amtrak and Conrail, are in many cases unusually restrictive and cumbersome. Consequently, management has a difficult time scheduling and administering track rehabilitation programs.

Worker attitudes, which are difficult to define or identify, may also play a major part in track productivity. Several persons we interviewed believed that worker attitudes and employee motivation have a direct bearing on productivity rates. Railroad officials from a Midwest railroad and an east coast railroad both believed that better worker attitudes in the West have much to do with the greater productivity that they said is generally reported by western railroads.

We were not able to make any adjustments in our computation of track productivity rates to compensate for labor contracts or worker attitudes which may negatively affect railroads operating primarily on the east coast.

SIZE OF WORK GANGS AND EXTENT OF MECHANIZATION

The size of the work gang, its composition, and members' assigned responsibilities also have some impact on productivity. In addition to these factors, the degree of mechanization can also play an important role in determining track productivity rates.

The average size for each work gang varied significantly among the railroads we visited. Theoretically, by computing the average productivity for each work unit, we have compensated for the size of each work gang. That is, larger work gangs can achieve more production, but they also use more total labor hours, and thus productivity rates (production divided by labor hours) are placed into proper focus. (See app. II for descriptions of typical work gangs.) We took steps to compensate for gang sizes, but as discussed below, we were unable to adjust for the following variances: (1) composition and assigned responsibilities of each work gang and (2) degree of mechanization.

The composition and assigned responsibilities of each work gang varied significantly among the railroads visited. Some railroad work gangs are organized and staffed to do all the ancillary work as they progress through a given project while other railroads do all or part of this ancillary work with separate gangs. As previously discussed (see p. 8), some railroads include supervisors' and support employees' time as part of the total labor hours charged to track rehabilitation programs. Time charged by supervisors and support employees, coupled with the actual composition and assigned responsibilities of each individual work gang, plays an important part in determining the computed productivity rate.

The degree of mechanization used by individual work gangs varied among the seven railroads surveyed. Furthermore, some railroads incorporated a mix of both manual and mechanized work gangs based on management philosophy and previous productivity achievements.

Within the parameters of our review, we were not able to make any special allowances for the composition and assigned responsibilities of work gangs in computing the track productivity rates for the 1979 construction season. Furthermore, because the effects of the equipment mix (manual labor versus mechanization) cannot be easily isolated or quantified, we did not make any special allowances for mechanization in computing the track productivity rates.

DELAY TIME--A COMMON PROBLEM FACED BY THE RAILROAD INDUSTRY

In analyzing the track productivity rates for Amtrak, Conrail, and five other railroads, we noted that delay time appeared to be an industry-wide problem. Delay time represents that part of the normal work day when no work is actually done due to such things as mechanical and equipment failure, inclement weather conditions, rail traffic (see p. 7), and movement of equipment and work crews to and from job sites. For purposes of our review, delay time was included in production labor hours in computing the annual productivity rates for each railroad. Increasing the delay time results in a corresponding reduction in the productivity rate. If railroads can reduce or control their delay time, then productivity rates should improve. Our analysis shows that delay times ranged from 30 to 62 percent of the total production time during the 1979 construction season, as shown in the following table.

Track work unit	Delay time percentages						
	Amtrak (note a)	Long Island	Conrail	A	B	C	D
Wood tie renewal	58	58	43	48	50	43	60
Rail renewal	50	54	47	47	50	30	(b)
Surfacing (note c)	52	62	43	53	50	40	62

a/Represents data for a 6-month period.

b/Not available.

c/Surfacing involves aligning the rails' profile (vertical positioning) and alignment to an established plane, including final positioning of the ties in the established ballast.

The wood tie renewal, rail renewal, and surfacing track work units are discussed in detail in chapter 3 of this report.

We did not adjust the productivity rates for delay times because (1) the spread between railroads is not great enough to alter the productivity relationships and (2) Amtrak does not have the highest delay times even though it has the lowest productivity. (See app. I.)

CHAPTER 3

NECIP TRACK PRODUCTIVITY RATES ARE LOWER THAN OTHER RAILROADS'

Amtrak's productivity under NECIP has steadily improved each year since track rehabilitation efforts were initiated in 1977, but it still is not as high as other railroads'. Our comparisons of Amtrak's performance in three fundamental track-upgrading functions revealed that productivity under NECIP was considerably lower than the rates recorded by Conrail and five other railroads.

In connection with these comparisons, it should be pointed out that (1) there are no industry-wide principles for computing track productivity rates, (2) we did not take an indepth look at the supporting documentation presented by the other railroads we visited, and (3) our analysis was not predicated on a uniform and consistent data base. (See ch. 2.) Accordingly, the productivity data should be viewed as general indicators for comparison purposes rather than exact measurements.

COMPARABLE TRACK-UPGRADING FUNCTIONS

There are three fundamental track-upgrading functions, or work units, that are generally common within the railroad industry and that lend themselves to productivity analysis: (1) wood tie renewal, (2) rail renewal, and (3) surfacing. For these track functions, work performed is quantified and recorded, both in terms of (1) actual production and (2) work hours expended. In our comparisons, we excluded track work performed in yards since NECIP primarily involves road trackage rather than yard trackage.

We recognize that there are other track-related functions performed under NECIP, such as Amtrak's highly mechanized system for placing track and concrete ties; however, these functions do not generally lend themselves to comparative analysis. For example, no other U.S. railroad has a mechanized system for placing track which is comparable to Amtrak's; also, concrete ties are not in general use in the United States.

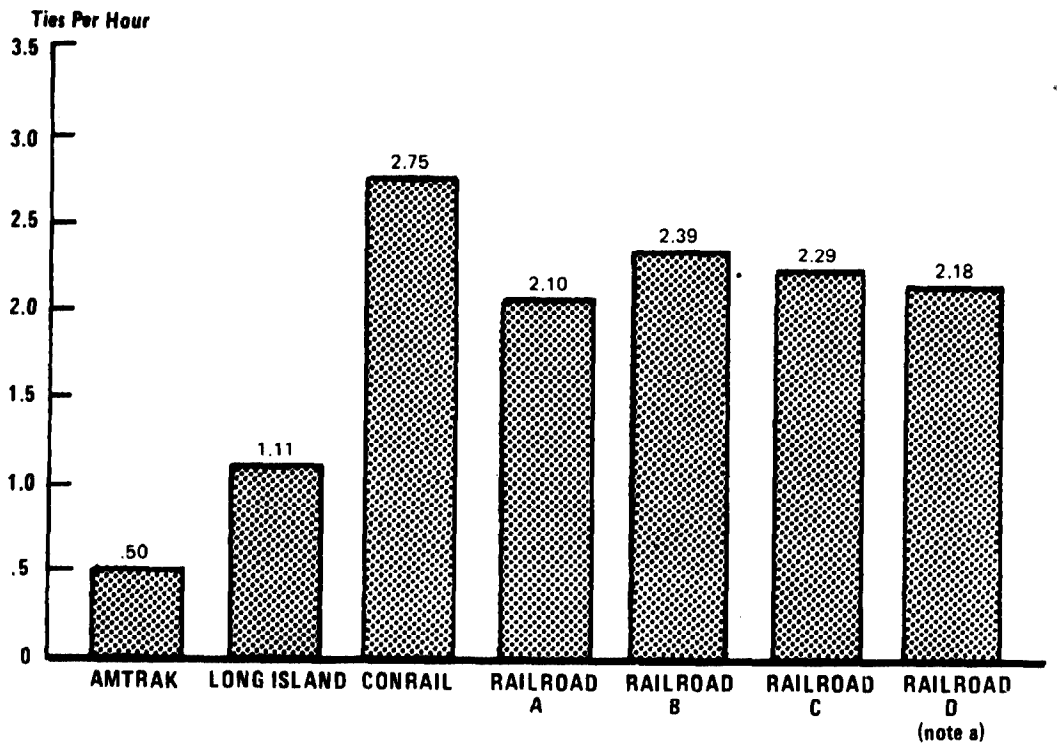
WOOD TIE RENEWAL

A crosstie is that element of the track structure that provides support for the rail and distibutes the imposed load

uniformly onto the ballast. Ties hold the rails in proper gauge and line and provide a base to which the rail can be anchored to prevent it from moving longitudinally under pressure. When crossties fail to perform these functions, they must be renewed (replaced). A crosstie's useful life is affected by the wheel loads of trains and climate conditions. Amtrak uses both wood and concrete ties under NECIP, but concrete ties are not in general use by other railroads.

During the 1979 construction season, Amtrak replaced a total of about 183,000 wood ties in the Northeast Corridor. In performing this track-upgrading function, Amtrak expended about 368,000 labor hours, thus achieving a productivity rate of 0.50 wood ties per hour. In contrast, Conrail replaced about 2.726 million wood ties in 1979, expended about 991,000 labor hours, and achieved a productivity rate of 2.75 wood ties per hour.

Analyzing the range of productivity rates for the seven railroads included in our review shows that Amtrak had the lowest rate of 0.50 and that Conrail reported the highest rate of 2.75 wood ties per hour. The following chart shows the 1979 wood tie renewal productivity rates reported by the railroads for their track work program.



a/BASED ON WORK DONE IN 1978; NO WORK WAS DONE ON MAIN-LINE TRACK IN 1979

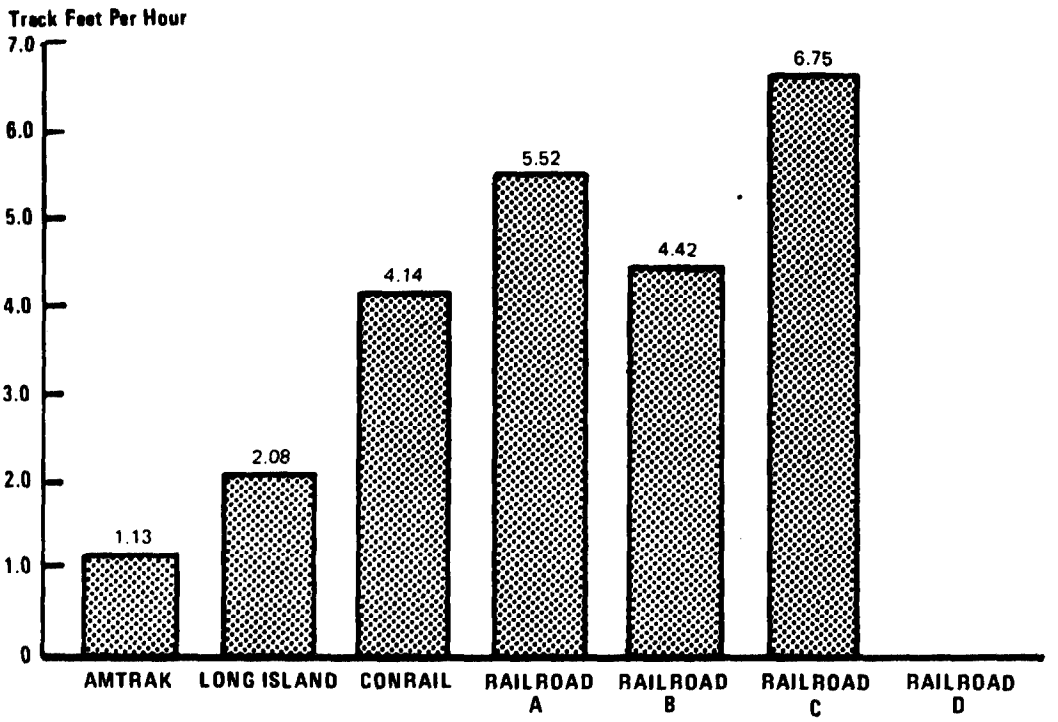
While it is clear that Amtrak's 1979 productivity is much lower than that of other railroads we looked at, it is important to note that Amtrak's tie renewal productivity rate has improved from the 0.37 ties per hour rate achieved during the 1977 construction season to 0.50 ties per labor hour in 1979. (See app. III.)

RAIL RENEWAL

Rail renewal consists of removing the existing rail and replacing it with continuous welded rail. Continuous welded rail is formed by shop-welding 39-foot sections of rail end to end, usually in 1,440-foot lengths, for field installation. The 1,440-foot lengths may in turn be field-welded into longer lengths.

During the 1979 construction season, Amtrak replaced a total of 71.8 track miles of rail with continuous welded rail in the Northeast Corridor. In performing the rail renewal function, Amtrak expended about 334,000 labor hours, a productivity rate of 1.13 track feet per hour. In contrast, Conrail renewed 921.1 track miles, expended about 1.174 million labor hours, and achieved a productivity rate of 4.14 track feet per hour.

The productivity rates for the seven railroads included in our review range from a low of 1.13 track feet per hour (Amtrak), to a high of 6.75 track feet per hour (railroad C). The following chart shows the 1979 rail renewal productivity rates reported by the railroads for their track programs.



a/NO RAIL RENEWAL PERFORMED IN RECENT YEARS.

Amtrak's performance between the 1977 and 1979 construction seasons improved from 0.84 track feet per hour in 1977 to 1.13 track feet per hour in 1979. (See app. III.)

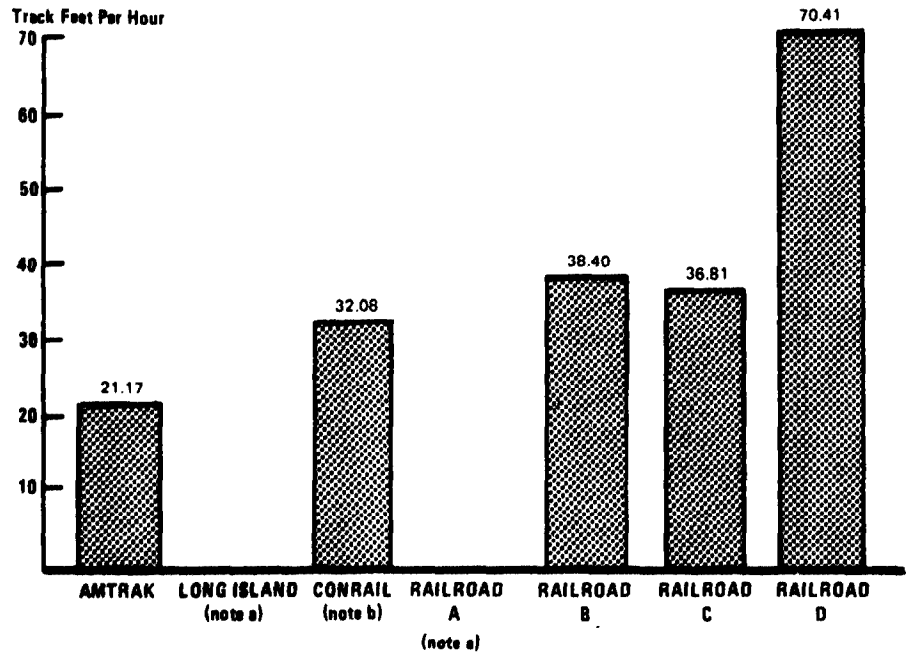
SURFACING

Surfacing involves fine tuning the alignment and surface of track. In order to ensure the safe operation of trains, both rails must be in the specified plane or surface. When one or both rails deviate, they must be restored to the proper plane or surface.

There are two basic units of measurement used in determining the production achieved in surfacing road trackage: (1) actual track miles and (2) pass-miles. Actual track miles surfaced refers to the linear track miles which have been satisfactorily surfaced according to the appropriate engineering specifications. On the other hand, a pass-mile is a standard production measure of surfacing output representing 1 mile of surfacing work performed by a work gang. Because the condition of the track may require the work gang to go over a stretch of track more than once to meet the engineering specifications, a pass-mile of surfacing is always equal to or greater than an actual mile of road trackage surfaced.

During the 1979 construction season, Amtrak surfaced a total of 141.4 actual miles of road trackage, expending 35,261 labor hours, at a rate of about 21.17 track feet per hour. In contrast, Conrail surfaced about 32.08 track feet per hour.

The range of productivity rates for the five railroads for which we could determine surfacing production in actual track miles ranged from a low of about 21.17 track feet per labor hour (Amtrak) to a high of about 70.41 track feet per hour (railroad D). The following chart shows the 1979 surfacing productivity rates reported by the railroads included in our review.



a/SURFACING PRODUCTION MEASURED IN PASS-MILES RATHER THAN ACTUAL TRACK MILES.

b/CONRAIL USES PASS-MILES AS ITS STANDARD UNIT OF MEASUREMENT. WE MADE THE CONVERSION TO ACTUAL FEET BASED ON A RATIO OF 1.29 PASS-MILES PER 1.00 ACTUAL MILES, WHICH WAS SUPPLIED BY USRA.

Although Amtrak's 1979 surfacing performance is lower than the productivity rates of the other railroads, Amtrak realized a significant improvement in total output and productivity over 1977. Production increased from 54.1 track miles in 1977 to 141.1 track miles in 1979. In addition, track feet per hour increased from 8.00 to 21.17 during the same period. (See app. III.)

CONCLUSION

Analyzing the productivity rates for railroads is an extremely difficult undertaking because many variables and intangible factors have a direct impact on the productivity rates. Accordingly, the track productivity rates for the seven railroads are probably not precisely comparable. Nevertheless, the differences between Amtrak's productivity and that of the other railroads are so great that we can fairly conclude that Amtrak's productivity is not as high. Because we did not attempt to determine the reasons for the differences in productivity rates, we cannot say how much better Amtrak should be able to do.

AGENCY COMMENTS AND OUR EVALUATION

Amtrak

Amtrak said that our data indicated a need for Amtrak to improve its productivity. (See app. IV.) It said that accomplishing dramatic increases in productivity would be difficult given the mix of traffic and speeds on the Northeast Corridor, the experience level of Amtrak's work force and supervision, and constraints imposed on Amtrak by FRA--which has overall responsibility for NECIP--in making "on-the-ground" decisions. Amtrak said that it accepted the challenge to increase productivity and that it considered our report a constructive and useful contribution to its body of knowledge.

Amtrak cautioned against drawing final conclusions based on our analysis alone and pointed out a number of differences between the corridor and other railroads. Amtrak said that the surfacing complement of its tie gang was included in its average gang size and in total labor hours, but was not included in other railroads' data. According to Amtrak, another difference between NECIP and other railroads is that Amtrak has a very limited work force from which to draw the experienced supervisors to do the job. Amtrak added that the seasonal nature of the project also causes a problem in retaining a trained work force.

Amtrak further said that historically, maintenance of way in the corridor had cost more for its prior operators than the other territories in their systems. (Amtrak included the New York Central in its statement, but the New York Central did not operate on the Northeast Corridor; the reference intended may have been the New York, New Haven, and Hartford, which operated between New York and Boston before the Penn Central Railroad was formed.) Amtrak noted that it operates over 1,300 trains a.day in the corridor, and to its knowledge, other railroads do not have to contend with the mix of traffic, high speeds, and construction activity that are encountered in the Northeast Corridor. Amtrak added that costs are heavily affected by the extremely tight maintenance standards necessary for high-speed operations.

We recognize that conditions vary considerably among railroads and we have attempted to point out these differences and their effects on productivity comparisons in this report. As noted, the productivity data in our report should be viewed as general indicators for comparison purposes rather than exact measurements.

Regarding Amtrak's need to improve productivity, we conclude only that Amtrak's productivity is not as high as other railroads'. Because we did not attempt to determine the reasons for the differences in productivity, we cannot say how much better Amtrak should be able to do.

With respect to Amtrak's comments on the inclusion of Amtrak's surfacing complement in its average gang size and total labor hours, Amtrak's NECIP senior project accountant told us that the surfacing done by the tie gangs involves a limited surfacing of the track structure so that it can be used immediately after the ties are replaced. The final surfacing to specifications, which is the work we have shown under "Surfacing" (see pp. 16 and 17), is done later by a separate work crew. Officials of Conrail and railroad C told us that their tie gangs also have people who do limited surfacing and that the labor hours for these people is included in the total hours charged to tie renewal, as is the case with Amtrak.

Department of Transportation

The Department of Transportation believed that our conclusion about Amtrak's productivity was unsupported because of the lack of comparability among railroads. (See app. V.) The Department said that its experience leads it to the conclusion that there are inefficiencies in Amtrak's work performance and it was willing to accept, intuitively, the supposition that Amtrak's productivity in upgrading track is not yet comparable to railroads with greater experience or less complex track structures. According to the Department, the size of NECIP and the relatively inexperienced labor and front-line supervisory forces had contributed to the problem. The Department said that Amtrak has made significant strides and can be expected to continue to improve with greater experience.

We recognize that conditions do vary from railroad to railroad, as we have discussed in our report. While we have acknowledged that the data in our report should be viewed only as general indicators for comparison purposes, we do not agree with the Department's contention that the lack of precise comparability prevents conclusions concerning Amtrak's productivity. Most of the differing conditions we discussed involve situations where Amtrak is not unique but rather is in a situation similar to one or more other railroads. In the two situations where we were able to partially quantify some of the differences--types of employees included in labor hours and delay times--Amtrak was not at either extreme of the ranges among the railroads.

For example, the Department cited our discussion of the effects of deteriorated track conditions as one of the differences which would not support our conclusion on Amtrak's productivity. However, as the Department recognized in its comments, Conrail also faced the same problem of deteriorated track conditions when it began its track rehabilitation program. Nevertheless, our figures indicate that Conrail was able to achieve a productivity rate which was comparable to that of the private railroads covered in our review.

As another example, the Department cited the fact that Amtrak is running a full schedule of passenger and freight trains while doing its track work. The Department said that this scheduling automatically reduces track availability and has a definite impact on productivity. In our discussion of the differences among railroads in chapter 2, we included a section on delay time. (See p. 11.) Delay time represents that part of the normal work day when no work is actually done due to delays such as those caused by rail traffic. The data we obtained showed that Amtrak's delay time percentages were not the highest of the railroads we selected and that the spread among the railroads was not great enough to alter the overall productivity relationships. For example, work was not actually done during 52 percent of a normal work day for Amtrak's surfacing operations. Long Island's delay time was 62 percent, and for Conrail and the four private railroads, delays ranged from 40 percent to 62 percent.

Finally, the differences between the productivity rates of Amtrak and the other railroads are so large that we believe it is fair to conclude that Amtrak's productivity is considerably lower than the other railroads even though there are many differences among the railroads and the data is not strictly comparable. It is unlikely that varying conditions between Conrail and Amtrak, for example, would totally explain away data showing that Conrail installs 5.5 times as many ties per labor hour as Amtrak.

The Department said that our statement about the differences in productivity rates was probably intended to mean that we had concluded that Amtrak management is doing a poor job. That was not our intention. As noted above, we did not attempt to determine the reasons for the differences in productivity rates. Consequently, we were not able to make any conclusion about the adequacy of Amtrak's management of the work.

COMPARISON OF 1979 TRACK PRODUCTION DATA FOR SELECTED RAILROADS

	Amtrak	Long Island	Conrail	Railroad A	Railroad B	Railroad C	Railroad D
Wood tie renewal:							
Production (ties)	182,955	47,475	2,726,042	1,478,103	854,697	363,974	a/40,856
Total labor hours (note b)	c/367,780	d,e/42,584	d,f/991,288	c,d/703,187	c,d/358,064	g/158,794	a,d,h/18,744
Labor hours per tie	2.01	.90	.36	.48	.42	.44	.46
Ties per labor hour	.50	1.11	2.75	2.10	2.39	2.29	2.18
Rail renewal:							
Production (track miles)	71.8	21.9	921.1	419.8	345.6	266.3	(i)
Total labor hours (note b)	c/334,270	d,e/55,544	d,f/1,173,791	c,d/401,710	c,d/413,094	g/208,451	(i)
Labor hours per track mile	4,655	2,536	1,274	957	1,195	783	(i)
Track feet per labor hour	1.13	2.08	4.14	5.52	4.42	6.75	(i)
Surfacing:							
Production (note j) (pass-miles)	(i)	117.0	7,676.4	4,096.0	(i)	(i)	(i)
(track miles)	141.4	(i)	5,950.7	(i)	1,079.5	1,403.4	109.9
Total labor hours (note b)	c/35,261	d,e/14,896	d,f/979,445	c/388,135	c,d/148,414	d/201,282	d,h/8,242
Labor hours per pass-mile	(i)	127	128	95	(i)	(i)	(i)
Labor hours per track mile	249	(i)	165	(i)	137	143	75
Pass-feet per labor hour	(i)	41.47	41.38	55.72	(i)	(i)	(i)
Track feet per labor hour	21.17	(i)	32.08	(i)	38.40	36.81	70.40

a/Production and total hours for 1978; no work was done on main-line track in 1979.
b/Total hours include both production and delay time charged to road trackage work units.
c/Supervisors' time is excluded; hours therefore include: (1) work gangs, (2) foremen, and (3) support employees.
d/Total hours were computed by us based on data and mathematical equations provided by the respective railroads.
e/Total hours include time charged by two employee categories: (1) work gangs and (2) foremen. Hours charged by supervisors and support employees are not included in these statistics.
f/Support time is excluded. Support hours generally consist of camp car operations, bus drivers, mechanics, material distribution, etc.
g/Total hours include four employee categories: (1) work gangs, (2) foremen, (3) support employees, and (4) supervisors.
h/Total hours includes time charged by the work gangs only.
i/Not applicable.
j/A pass-mile is a standard production measure of surfacing output representing 1 mile of surfacing accomplished by a work gang. Complete surfacing of track structures frequently requires more than one pass to meet engineering specifications. Therefore, a pass-mile generally exceeds a mile of track surfaced. Miles of track surfaced and pass-miles are not interchangeable units of measurement.

APPENDIX I

TYPICAL WORK GANG FOR TRACK WORK

Railroad	Workmen	Foremen	Super-visors	Support workers	Other	Average size
Wood tie renewal:						
Amtrak	61	3	-	5	-	69
Long Island	29	2	-	-	-	31
Conrail	a/21	-	-	-	-	21
Railroad A	16	1	-	-	-	17
Railroad B	29	2	-	2	-	33
Railroad C	33	-	-	-	b/10	43
Railroad D	15	-	-	-	-	15
Rail renewal:						
Amtrak	109	10	-	10	-	129
Long Island	54	4	-	-	-	58
Conrail	a/72	-	-	-	-	72
Railroad A	51	3	-	4	-	58
Railroad B	45	3	-	2	-	50
Railroad C	97	-	-	-	b/27	124
Railroad D	(c)	(c)	(c)	(c)	(c)	(c)
Surfacing:						
Amtrak	11	1	-	4	-	16
Long Island	6	2	-	-	-	8
Conrail	a/10	-	-	-	-	10
Railroad A	5	1	-	-	-	6
Railroad B	5	1	-	1	-	7
Railroad C	43	-	-	-	b/12	55
Railroad D	4	-	-	-	-	4

a/Supervisors and foremen are included in this figure.

b/Supervisors, foremen, and support workers are included in this figure.

c/Not applicable.

COMPARISON OF AMTRAK'S 1977, 1978, AND 1979 PRODUCTIVITY DATA

	Construction season		
	1977	1978	1979
Wood tie renewal:			
Production (ties)	215,886	231,436	182,955
Total labor hours (note a)	590,798	467,288	367,780
Labor hours/tie	2.74	2.02	2.01
Ties per labor hour	.37	.50	.50
Rail renewal:			
Production (track miles)	71.4	70.4	71.8
Total labor hours (note a)	446,237	381,250	334,270
Labor hours per track mile	6,250	5,415	4,655
Labor hours per track foot	1.18	1.03	.88
Track feet per labor hour	.84	.97	1.13
Surfacing:			
Production (track miles)	54.1	57.5	141.4
Total labor hours (note a)	35,694	18,433	35,261
Labor hours per track mile	660	321	249
Track feet per labor hour	8.00	16.47	21.17

a/Supervisory and inspection hours have been excluded.

APPENDIX IV

National Railroad Passenger Corporation 400 North Capitol Street N.W. Washington, D.C. 20001 Telephone (202) 383-3000

Amtrak

February 20, 1981

Mr. Henry Eschwege, Director
Community and Economic Development Division
United States General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Eschwege:

We have reviewed with a great deal of interest and concern your draft report entitled, "Amtrak's Productivity on Northeast Corridor Track Work Lags Behind the Productivity of Other Railroads." The comparisons between Amtrak and the example railroads are revealing and imply that Amtrak's productivity should be comparable. We agree that the data provided indicates there is need for Amtrak to improve.

We would caution against drawing final conclusions based on your analysis alone. As pointed out in the draft, this is the first attempt to quantify the various production data as accumulated by various railroads. For instance, in the Corridor maintenance of way operation, the surfacing complement to our tie gang is included in our average gang size and also in the total labor hours identified in Schedule 1. After reviewing the other railroads' average gang size, it appears the surfacing complement was not included in the total. Another difference between our project and other railroads is that we have had a very limited force from which to draw the experienced supervision to do our work. The seasonal nature of this project also causes a problem in retention of a trained work force.

The conclusion also could be drawn that our costs should be comparable to other railroads, but this would not be completely valid because the Northeast Corridor is dissimilar in many respects. Maintenance of way in this corridor, historically, has cost considerably more for the New York Central, the Pennsylvania Railroad, or the Penn Central than for other territories in their systems. Amtrak operates over 1,300 trains daily in the Corridor, and we have provided detailed charts to indicate the density from New York to Washington. To our knowledge, other railroads do not have to contend with the mix of traffic, high speeds, and construction activity that are encountered in this corridor. Costs are also heavily impacted by the extremely tight maintenance standards necessary for high speed operation.

APPENDIX IV

Mr. Eschwege
Page 2
February 20, 1981

How much better Amtrak should do is of the utmost concern to Amtrak management, but a question left unanswered in the report. Dramatic increases in productivity will be difficult to accomplish considering the mix of traffic and speeds, the experience level of our work force and supervision, and the constraints imposed on Amtrak by the FRA in making on-the-ground decisions. Nevertheless, we accept the challenge to increase productivity; and we consider your report, the first of its kind, a constructive and useful contribution to our body of knowledge on maintenance of way productivity.

Sincerely,

Alan S. Boyd

Alan S. Boyd
President

APPENDIX V

U.S. Department of Transportation
Office of the Secretary of Transportation

Assistant Secretary for Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

FEB 20 1981

Mr. Henry Eschwege
Director, Community and Economic
Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

We have enclosed two copies of the Department of Transportation's (DOT) reply to the General Accounting Office (GAO) draft report, "Amtrak"s Productivity On Northeast Corridor Track Work Lags Behind The Productivity Of Other Railroads," dated January 21, 1981.

We believe that GAO's conclusion that "Amtrak productivity lags seriously behind the other railroads" is unsupported because of the lack of comparability. We know that from a low initial level of productivity Amtrak has made significant strides and can be expected to continue to improve with greater experience.

If we can further assist you, please let us know.

Sincerely,

Robert L. Fairman
Acting

Enclosures

APPENDIX V

DEPARTMENT OF TRANSPORTATION REPLY
TO
GAO DRAFT REPORT
ON
AMTRAK'S PRODUCTIVITY ON NORTHEAST CORRIDOR TRACK
WORK LAGS BEHIND THE PRODUCTIVITY OF OTHER RAILROADS

SUMMARY OF GAO FINDINGS AND RECOMMENDATIONS

Amtrak's productivity in upgrading track under the $2.5 billion Northeast Corridor Improvement Project--while improving--lags behind the productivity of Conrail and five other railroads selected for comparison. Conditions affecting productivity vary among railroads, and many of these variations cannot be compared with scientific precision. Nevertheless, GAO's comparison of Amtrak's productivity rates with those of other railroads leads it to conclude that "Amtrak's productivity lags seriously behind the other railroads." GAO does acknowledge the steady improvement in Amtrak's productivity each year since track rehabilitation efforts were initiated in 1977.

SUMMARY OF DEPARTMENT OF TRANSPORTATION POSITION

We have insisted on making Amtrak accountable for its own efficiency and unit costs through regular progress reviews. Our experience leads us to the conclusion that there have been and continue to be inefficiencies in Amtrak's work performance. We are willing to accept, intuitively, the supposition that Amtrak's productivity in upgrading track is not yet comparable to the productivity on railroads with greater experience or less complex track structures. Because of the qualifications GAO itself has placed upon its ability to measure Amtrak productivity, however, we are not able to accept GAO's conclusion that Amtrak's productivity "lags seriously behind."

POSITION STATEMENT

The report is replete with statements which acknowledge that it may not be legitimate to compare Amtrak's productivity with that of the other railroads because of differences in accounting for work hours, trade standards, existing track conditions, climate and hence length of work season, degree of mechanization, labor rules and "work ethics" and delay time related to more frequent trains, multiple tracks and extra caution because of high voltage power. "Nevertheless, GAO believes that the large differences between Amtrak's productivity rates and the other railroads' leads to the conclusion that Amtrak's productivity lags seriously behind the other railroads," to quote the GAO report.

Read one way, the above statement is simply tautological, i.e. differences in "productivity rates" mean differences in "productivity." However, it is probably intended to mean that the differences are so great that the authors must conclude that Amtrak management is doing a poor job. If this is the intent, we do not believe that the report itself, with all those qualifications, has shown that such a conclusion is necessarily true. By acknowledging all the qualifications, the authors make it appear that they have somehow accounted for their effects in drawing this conclusion, while in fact the text indicates that they have by and large not made allowances for the different conditions.

APPENDIX V

For example, the draft audit reports that "Because of safety and passenger comfort considerations, engineering specifications for track structures are of critical importance in designing a reliable, high-speed, rail passenger transportation system. Obviously, the track specifications for passenger trains traveling at speeds up to 120 miles per hour are more stringent than track specifications for freight trains traveling at speeds which do not exceed 80 miles per hour and often much slower." (Emphasis added)

It also recognizes that the location of track rehabilitation has a direct impact on productivity (see page 7). These are statements of fact and the impact of these factors should be quantified if they are used in a comparative analysis. The authors, however, merely point out that they "can play an important part in the productivity rate achieved by work gangs."

The draft audit also reports the effect of deteriorated track conditions and the resulting effort of work required to do a satisfactory job when such conditions are present. They state, correctly, that "in the case of both Amtrak and Conrail, track structures were in a deteriorated condition when the massive track rehabilitation programs were initiated." Again, recognizing these facts they "were unable to make any special allowances or provisions for the effects of these variables" but still reach the conclusion that Amtrak's productivity is lagging.

Since the authors are also using the functions of wood tie renewal, rail renewal and surfacing to determine and compare productivity, it is necessary for them to consider the traffic on the track and the condition of the track. They have already agreed that Amtrak started their improvement program on greatly deteriorated track. They must also consider that Amtrak is accomplishing the above functions while running a full schedule of passenger and freight traffic. This scheduling automatically reduces the track availability and has a definite impact on productivity. The other railroads in the comparison may have a great deal more maneuverability in productively scheduling their track outages.

Our experience has shown that there have been and continue to be inefficiencies in Amtrak's work which can be and have been corrected by sharper management discipline. The size of this project and its relatively inexperienced labor force and front line supervisory force have contributed to the problem. As GAO points out, however, there have been substantial improvements in productivity since 1977.

In summary, we believe that GAO's conclusion that "Amtrak's productivity lags seriously behind the other railroads" is unsupported because of the lack of comparability. We know that from a low initial level of productivity Amtrak has made significant strides and can be expected to continue to improve with greater experience.

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