Cost of Meeting Accessibility Requirements for Over-the-Road Buses

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The voting members of the technical advisory panel selected to monitor this study and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the study.

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FOREWORD

By Staff, Transportation Research Board

This report addresses the costs to over-the-road bus (OTRB) operators of complying with the Final OTRB Accessibility Rule of the Americans with Disabilities Act of 1990 (ADA.) The report is intended to provide objective information for deliberations regarding the costs of meeting accessibility requirements in light of federal funding under the Transportation Equity Act for the 21st Century (TEA-21), which assists private operators with the costs of ADA compliance. This report presents ranges of estimates for capital, training, and maintenance costs—within the broader context of other costs and revenue issues. The appendixes include a summary of previous studies of major revenue-related issues and other factors associated with making OTRBs accessible. The report will be of interest to policy makers, federal officials, industry representatives, bus manufacturers, disability rights advocates, and professionals concerned with estimating the incremental costs to private operators of implementing the ADA.

This report includes findings of the work performed under TCRP Project J-06/Task 33, *Cost of Meeting Accessibility Requirements for Over-the-Road Buses*. The study originated with a request from the American Public Transportation Association in September of 1999 and was completed by KFH Group under a 4-month contract for $50,000. The study objective was to estimate the capital, training, and maintenance costs in making OTRBs accessible to persons with disabilities, in compliance with the Final OTRB Accessibility Rule of the ADA.

OTRBs are defined as buses with a high passenger deck and are most often used in scheduled service that takes passengers from city to city or on local and regional tours and charter trips. Federal requirements for providing accessible service on OTRBs vary by the size of operator and type of service. Firms with fixed-route service and revenues of at least $5.3 million annually face the most significant requirement, including a deadline for 100-percent fleet accessibility by October 2012. Separate requirements and deadlines are defined for smaller firms and firms operating on-demand.

In this study, the research team developed an estimate of the number of privately operated OTRBs and conducted a survey of regular-route OTRB operators to obtain information on existing OTRB fleets, current fleet accessibility, vehicle replacement plans, and training needs. The report presents a range of compliance costs for operators providing regular fixed-route service and for operators providing demand-response service. Also presented are analyses testing the sensitivity of various cost components. Amortization summaries for purchases of accessibility equipment that may be financed are included as well. It is unclear what effect accessibility requirements will have on revenue-related issues in the OTRB industry and what role revenue-related issues will have in overall compliance costs. To improve the body of understanding regarding these revenue-related issues, this report includes a review of previous cost analyses and previous estimates of newly generated ridership, loss of seating and package capacity, and possible fare increases or service discontinuation in rural areas.

An expert panel was formed to define the study technically, review products and materials, and ensure that the research agency's final report is based on a valid and objective research process. The panel met twice and consisted of 5 voting members and 13 non-voting liaisons. Liaisons represented organizations with special interests in the study and provided comments, thereby improving and informing the quality of research with their participation. Liaisons had no responsibility with regard to the approval of study findings or this final report. The acceptability of the work plan, study products, and final report was determined by voting members of the panel during executive sessions held in the course of panel meetings. The author of this report is the principal investigator of the research agency, KFH Group.

The full text of this report can also be found on the TCRP website as Web Document 13 at www4.national-academies.org/trb/crp.nsf

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EXECUTIVE SUMMARY

INTRODUCTION

This research project presents an analysis of the costs of implementing the accessibility requirements for over-the-road buses (OTRBs) operated by private firms as mandated in the Final Rule issued under the Americans with Disabilities Act of 1990 (ADA). Although there are many potential cost issues, this study focuses on the incremental costs of the accessibility equipment, the costs of maintaining the equipment, and the costs of training. A major focus of the Final Rule is the sector of the industry that provides fixed-route services, and a survey of firms in this sector was conducted to collect data on bus fleets, staff, and wage costs to provide a basis for the estimate of these costs. This survey information was combined with data from previous research to expand the cost estimates to cover the industry. Previous research involving other cost-related issues, such as revenue foregone because of loss of space on vehicles, potential incremental revenues, and effects on ridership and marginal services, is also summarized in this report.

THE CONTEXT

Prior to passage of the ADA, a major issue in the debate concerned the requirements that would be faced by the private operators of OTRBs. Disability rights advocates favored extending the public transit requirement of a lift on every new bus to the private OTRB operators, particularly those providing regular-route scheduled operations. The private OTRB operators contended that the potential demand would be very low, that there was no good lift technology for the high-deck OTRBs, that the cost of the available lifts was too high, maintenance costs would be excessive, that lost seating (particularly from accessible on-board restrooms) and reduced package express space would reduce revenues, and that these cost pressures would result in further abandonment of marginal services (primarily in rural areas) or fare increases or both. Cost issues formed a major part

of the debate, particularly as this industry is essentially unsubsidized, unlike Amtrak and the public transit sectors.

The ADA addressed the issues raised by this debate in Section 305, which mandated that the Office of Technology Assessment (OTA) of the U.S. Congress conduct a study to determine the access needs and the most cost-effective technology for providing access to OTRBs. This study would be used in the development of final regulations. In the meantime, the DOT issued interim regulations for privately operated OTRBs. These interim regulations required that these OTRBs provide boarding assistance, but not lifts or other accessibility devices. The OTA study concluded that the ADA required boarding options that allowed the wheelchair user to remain in his or her own wheelchair, thus limiting the options to on-board, station-based, or portable lifts with accessible doors and wheelchair securements. The OTA study included cost estimates developed on a per bus basis, without developing costs of industrywide implementation.

The Rulemaking Process

Following the OTA study, in the fall of 1993 the U.S. DOT held a meeting of the stakeholders and interested parties to review options. An Advance Notice of Proposed Rulemaking (ANPRM) was issued in the *Federal Register* in October 1993, which presented options for achieving accessibility and sought further comment and response. Finally, in March of 1998, the DOT issued a Notice of Proposed Rulemaking (NPRM). The Preliminary Regulatory Assessment (PRA) for this proposed regulation presented estimates of the costs of these proposals, based on estimates of fleet size, turnover, and available technology, along with costs for two alternative options.

The Final OTRB Accessibility Rule

The Final Rule was issued on September 24, 1998, accompanied by a final Regulatory Assessment (RA). It required that Class I fixed-route operators begin implementing the regulations in October 2000 and that small entities begin a year later. Beginning on these dates, new OTRBs delivered to operators of fixed-route systems must be accessible, although small carriers can provide equivalent service as an alternative. For the large carriers, 50 percent of their fixed-route fleets must be accessible by October 2006, and 100 percent must be accessible by October 2012 (a time extension is possible based on three possible factors specified in the rule). No retrofitting of existing vehicles is required.

Demand-responsive private operators of OTRBs, primarily charter and tour operators, must provide an accessible bus to anyone who requests it 48 hours in advance of the trip. These carriers do not have any fleet accessibility requirement, but they must find and provide a bus when a request is made. Small operators offering both fixed-route and charter services have a special exception.

If they use 25 percent or less of their fleet for fixed-route service (with the rest in demand-responsive service), they can provide the 48-hour advance reservation service option for all their services, including fixed-route service.

In the interim period, before fixed-route carrier fleets are fully accessible, they are required to provide 48-hour advance reservation accessible service. Small carriers, who may never have a fully accessible fixed-route fleet because they buy used buses, will have to offer this option indefinitely. Under the Final Rule, carriers have to provide compensation to passengers if carriers fail to provide the service as required. No requirement for maximum times between rest stops are included, although passengers with disabilities must have the opportunity to leave the bus and use accessible rest stop facilities when the buses do make stops. Operators are required to make sure that staff are fully trained to provide safe accessible service, and operators must ensure that accessibility equipment is maintained.

TEA-21 Section 3038 Program Funding

Prior to the issuance of the Final Rule, Congress completed work on TEA-21, the current primary federal transportation authorizing legislation. Section 3038 of TEA-21, "Rural Transportation Accessibility Incentive Program," authorized funding for OTRB accessibility. The program makes funds available to private OTRB operators to pay for the incremental capital and training costs of complying with the Final Rule. Maintenance costs are not addressed by the Section 3038 program. Applications are solicited nationally, and grant recipients are selected competitively with the criteria for assessing the applications specified in the legislation. In its first year, only intercity fixed-route service providers were eligible to apply and the program paid for up to 50 percent of eligible project costs with federal funds. Starting in FY 2000, both intercity fixed-route providers and all other providers of services using over-the-road buses, such as commuter, charter, and tour operators, will be eligible for funding. The federal share is for up to 90 percent of the eligible project costs for fixed-route service providers for FY 2000.[1]

RESEARCH ISSUES

This study is not the first effort to estimate the costs of making privately operated OTRBs accessible. Costs and their potential effect on the industry and its ability to maintain services have been a major focus of this discussion for over a decade. The cost issue has evolved over the years

[1]The provision for a 90-percent federal share applies only to fixed-route providers and only to FY 2000, not beyond.

as the policy-making process has focused on particular alternatives for inclusion in the Final Rule and as the technology has evolved.

This research project focused on incremental capital, maintenance, and training costs associated with the implementation of the Final Rule. As in many of the previous studies, there are significant constraints on the research because of a lack of publicly available data regarding the industry, including such basic information as the numbers of vehicles in service, the relative proportion of vehicles providing different types of service, and the vehicle replacement cycle.

Previous studies, including the PRA and the RA addressed a broader set of issues including not only the cost of capital, training, and maintenance but also (1) costs resulting from loss of baggage space resulting from the installation of the lift, and (2) net revenues from new ridership stimulated by the increase in accessibility. Industry critiques focused on the incremental capital costs, the costs of lost seating (even when the lift and the restraints are not in use), the magnitude of the new revenues estimated by DOT (these revenues would be offset, they argued, by revenue that could be lost if overall ridership declines as a result of the fare increases that may be required to fund implementation), and effects on marginal rural routes.

This report includes information contained in earlier studies about the costs of foregone revenue resulting from the loss of seating and reduced baggage space, effects on revenues of using fare increases to fund implementation costs, and potential effects on rural services. Because of the uncertainty surrounding these revenue-related issues and the lack of time or resources to develop new data sources to improve upon existing data sources or analysis, no new research was conducted on them.

RESULTS OF THIS RESEARCH

The research approach and methodology were intended to answer the following questions:

1. **Number of OTRBs**--How many OTRBs are being operated by private companies? How many of these OTRBs are operated in fixed-route service?

2. **Number of OTRB Purchases by Year**--How many new OTRBs will be purchased by private operators to replace existing OTRBs or to expand the fleet and how many of these will be purchased new?

3. **Cost Components**--What is the capital cost of equipping each OTRB to comply with the ADA? What will be needed for the private operators to maintain the lifts and other

accessibility features? What will be required to train the private operator staff to the proficiency levels identified in the rule?

4. **Compliance Costs**--Finally, based on the above, what will be the total cost for the private operators to equip the OTRB fleets, maintain the lifts, and train staff?

The methodology used combines some new research and surveys of private OTRB carriers with the results of previous studies. In order to answer these questions, information was obtained by collecting primary data through two survey efforts and follow-up calls; gathering secondary data from previous reports, the *Bus Ride Bus Industry Directory* and *Russell's Official National Motorcoach Guide;* and reviewing applications to the FTA Section 3038 program to obtain cost estimates developed by applicant firms.

Number of Buses

Because of uncertainty about the number of OTRBs affected by the Final Rule, a range of estimated fleet sizes was developed. Combining data from the study survey with the estimate of the number of buses from the RA resulted in an estimate that 24,428 OTRBs would be affected by the Final Rule. This process assigns 8,563 OTRBs to the group that will have to purchase every new fixed-route bus with a lift (as compared with 8,060 in this group in the RA analysis[2]), and 15,855 to the group required to meet the 48-hour rule (compared with 15,940 in the RA analysis). This allocation provides a "low" estimate for the total number of OTRBs currently in use by private carriers.

Because of concerns about the age of the overall data on the structure of the industry, and the apparent growth in vehicle fleets (based primarily on Greyhound data) and OTRB sales, and the uncertainty about the true size of the national privately operated OTRB fleet, a "high" estimate was also developed to provide an upper bound for a range of cost estimates. The resulting "high" estimate shows a total fleet of 28,800, of which 9,555 are in the group that will be required to purchase accessible new buses for all fixed-route services and 19,245 are in the 48-hour equivalent service group.

[2]The RA assigns these allocations into the "under 25 percent" and "over 25 percent" groups in the text, and they are not presented in Chart II-1 of the RA.

Number of Accessible OTRBS Needed

Based on the final rule, OTRB fleet data, and assumptions about replacement and expansion plans by the private carriers, it is estimated that the industry will have to purchase between 10,341 and 11,301 accessible OTRBs from 2000 to 2012, or approximately 827 to 904 vehicles per year. For **replacement**, the research team used figures provided by Greyhound for its fleet and then assumed a 12-year replacement cycle for the other operators. For **expansion**, the researchers again used expansion figures provided by Greyhound for its fleet and then assumed that the other operators would expand 2 percent annually (based on the survey data collected by the research team and analysis of fleet size changes found in the *Bus Ride Bus Industry Directory* and other industry journals).

Capital Costs

Applying the projected capital cost per bus for accessibility features ($30,000) to the number of accessible OTRBs purchased each year results in an estimate of the annual capital cost of accessibility. The capital cost of acquiring between 10,341 and 11,301 accessible OTRBs by 2012, would be between $310 and $339 million, which translates into an average annual cost of between $25 and $27 million (in Year 2000 dollars).

If the industry does not obtain assistance to meet these costs, it is likely that they will be financed or leased in the same manner as the vehicles themselves, resulting in an additional cost of capital. To illustrate these costs, the study includes amortization tables separating the interest and principal costs over a 26-year implementation cycle.

Training Costs

Training costs are a significant part of the industry's cost of complying with accessibility requirements. The calculation of the training cost of accessibility relies on the industry's prevailing staffing levels and wages, as derived from the detailed data supplied by survey respondents. Although the focus here is on the wages paid to employees participating in training courses, the cost of paying course instructors is also included in the training cost estimates.

In this analysis, the researchers assumed that every employee, regardless of category, must be trained to some extent in the use of accessible facilities. Training would include such subjects as lift operation, maintenance and repair procedures, government and company policies, and sensitivity. The hours of training required vary depending on whether the employees are providing fixed-route or demand-responsive service. The number of hours used for calculation purposes incorporates variations in the number of hours needed to train a mechanic as opposed to a driver or customer service agent. For purposes of this analysis, drivers and customer service employees

providing fixed-route service will receive a 12-hour training course initially and mechanics will receive 16 hours initially; all employees will need 4 hours of refresher training every year. Employees providing demand-responsive service will receive 4 hours of training initially and a 4-hour refresher course every year.

Estimates are that the total cost of training employees for the period from the Year 2000 through Year 2012 will vary from $90.1 to $105 million depending on the number of buses. The cost for carriers who are predominantly regular-route operators is estimated at between $41 and $46 million, with the cost of training employees at carriers who are predominantly demand-responsive between $49 and $59 million during this same period. This translates into an average annual training cost of between $7.2 and $8.4 million in Year 2000 dollars.

Maintenance

A figure of $1,200 per bus per year was used to estimate the cost of lift maintenance and cycling. This included an assumption of 2 hours per month by a mechanic and daily cycling of the lifts by drivers (300 days per year, 10 minutes each). It is estimated that between $77 and $84 million will be needed for maintenance of the lifts from the Year 2000 through Year 2012 for an average annual cost of between $6.2 and $6.7 million in Year 2000 dollars.

SUMMARY OF RESULTS

Although compliance with the Final Rule of the ADA involves a number of potential cost issues, this analysis addressed the incremental capital costs of the lifts and other accessibility features, the training costs for personnel (i.e., drivers, mechanics, and customer service staff), and the maintenance costs on the lifts. The total of the costs included in this analysis for the years from 2000 through 2012 is estimated at between $477.6 and $528.1 million in Year 2000 dollars. This represents an average annual cost ranging from $24.8 million to $27.1 million for the capital cost of the lifts, $7.2 to $8.4 million for training, and $6.2 to $6.7 million for maintenance and cycling of the lifts. The Section 3038 program addresses the incremental capital and training costs, but not the related maintenance costs. Not including the cost of maintenance, the total incremental capital and training costs are estimated to fall in a range between $400.3 and $444 million (Year 2000 dollars) for the period from 2000 to 2012.

CHAPTER 1

INTRODUCTION AND BACKGROUND

INTRODUCTION

The objective of this research project was to perform an analysis of the capital needs for meeting accessibility requirements for over-the-road buses (OTRBs). Section 3038 of the Transportation Equity Act for the 21st Century (TEA-21) authorizes a program of federal funding to assist private OTRB operators in meeting the requirements of the Americans with Disabilities Act of 1990 (ADA) with the capital and training costs of compliance with the Final Rule implementing the ADA. This research project addressed the issue of the costs involved by the following:

- **Developing an estimate of the number of privately operated OTRBs** to determine the number of accessible vehicles that need to be acquired and the acquisition schedule that will be required to meet the requirements of the U.S. DOT Final Rule implementing the ADA. This included a survey of Class I and other regular-route intercity carriers to develop an inventory of current OTRBs used in regular-route intercity service and consideration of how many OTRBs already meet ADA accessibility standards. Information on fleet replacement plans and policies has also been collected to allow the development of a national OTRB fleet accessibility database.

- **Surveying bus companies** to obtain information on the annual maintenance costs of accessibility features and on the numbers of drivers, mechanics, and customer service staff who will need to be trained.

- **Summarizing the major revenue-related issues and other qualitative factors from previous studies,** including lost revenue resulting from loss of seating and package express capacity at peak travel periods, potential revenue gains resulting from new ridership by persons with disabilities and their travel partners, and ridership loss from potential service discontinuation in rural areas or from fare increases required to offset ADA compliance costs.

- **Analyzing the capital, training and maintenance costs of compliance** to determine the direct costs faced by the industry for accessibility equipment and training to meet the ADA Final Rule requirements.

The issue of the cost of making OTRBs accessible to persons with disabilities has been a factor in the development of policy for private operators of OTRBs during the consideration of the ADA, during subsequent years up until the Final Rule was issued in September 1998, and since then as implementation compliance dates near. The cost issue needs to be considered in the context of this history, which is discussed in the next section.

BACKGROUND ON ACCESSIBILITY AND PRIVATELY OPERATED OTRBS

Early Steps

The first major effort to create an accessible OTRB came in 1981 when the Transportation Development Centre of Transport Canada hired a consultant to study the technical and safety-related requirements to make OTRBs accessible to persons who use wheelchairs, in response to needs identified by the Transport Canada Advisory Committee on Transportation of the Handicapped. The resulting design involved the installation of an external platform lift in the back of the bus. The report also developed a plan for a demonstration project in Newfoundland that would involve the use of accessible coaches on particular schedules, supported by toll-free information/reservation numbers, driver training, and a publicity campaign. Before the demonstration could be undertaken, a new lift design was developed, involving an internal, elevator-style lift installed in the middle of the bus where the baggage compartments are located. A prototype was developed and placed in

service in the Newfoundland demonstration in February 1985 and an evaluation report of the project was made in 1988. The evaluation found that the additional ridership resulting from the availability of the lift did not justify the financial costs, but that the overall project was a success in terms of the qualitative improvements to the users. It recommended a public subsidy to the bus operators to cover the extra costs of wheelchair accessibility.

At about the same time as these Canadian efforts, Massachusetts became involved with a project to provide accessibility on OTRBs. In 1984, the Massachusetts Coalition of Citizens with Disabilities and the Governor's Commission on Accessible Transportation both identified a need to make interregional transportation accessible. This coincided with a state effort to assist private bus operators that offered commuter service from outlying areas into Boston. The state's Intercity Bus Capital Assistance Program provided state funds to purchase OTRBs for lease to the private carriers at discounted rates. The use of public funding enabled the accessibility needs to be addressed by purchasing lift-equipped coaches. By 1989, this program and other public purchases of lift-equipped OTRBs had placed 39 accessible coaches in service--about 15 percent of the total serving the state. These coaches used the internal elevator lift, which was relatively expensive, suffered from reliability problems, and had operational issues related to lost baggage and seating space, rattles, and drafts. Limited ridership on these coaches, coupled with the costs and operational problems, led the private operators to strongly resist later efforts to mandate a lift on every bus. At the same time, the ridership might have been affected by the limited availability of accessible coaches, scheduling problems, lack of information, and lack of operator training--all factors that limit the conclusions that can be drawn from this program. The internal elevator lift was also used on OTRBs operated by Golden Gate Transit in San Francisco, and it had many of the same problems in that environment as well.

Development of an External Lift

The Denver Regional Transit District (RTD), the public transit provider for Denver and the surrounding region, operates a large fleet of the OTRBs as commuter buses on its long regional

routes. Faced with the need to begin to make this fleet wheelchair-accessible, in 1987 RTD modified a Motor Coach Industries (MCI) MC-8 bus by fitting a Stewart & Stevenson PowerLift external lift just inside a new passenger door in the middle of the passenger deck. This installation was much less costly and the lift and associated equipment are simple and generally reliable. The lift is "passive," requiring operator involvement, which simplifies the controls, and its maintenance costs are minimal. This lift installation results in a loss of two seats (with that space needed for the lift) and the loss of two more seats for each occupied wheelchair position. RTD was sufficiently pleased that it ordered factory installations on 16 of 28 Neoplan Metroliners ordered in 1987. Other transit operators using OTRBs began ordering coaches equipped with this lift, including the Riverside Transit Authority, Post Road Stages (a contractor to Connecticut DOT), Dallas Area Rapid Transit (DART), Antelope Valley Bus Lines, and Houston Metro. The success of RTD in Denver with this lift was recognized by many in the disability rights community. In the debate over ADA requirements for the private operators of OTRBs, this implementation was cited as proof that accessible OTRBs are technologically feasible and potentially less expensive than the industry's figures would indicate.

ADA and the Debate over OTRB Accessibility

Prior to passage of the ADA in 1990, a major issue in the OTRB accessibility debate concerned the requirements that would be faced by the private operators of OTRBs. Disability rights advocates favored extending the public transit requirement of a lift on every new bus to the private OTRB operators, particularly those providing regular-route scheduled operations. The private OTRB operators, primarily Greyhound Lines, Incorporated, and the other intercity carriers, resisted on the grounds that there was no good lift technology for the high-deck OTRBs, the costs of the available lifts were too high, maintenance costs were excessive, lost seating and package express space would reduce revenues, and that these cost pressures would result in further abandonment of marginal services (primarily in rural areas) or fare increases or both. The industry pointed out that it was essentially unsubsidized, unlike Amtrak and the public transit sectors, and that it should be treated

differently. The OTRB industry's preferred options included use of a portable ramp or use of boarding chairs (including a self-propelled model called the Scalamobile), and/or a few lift-equipped coaches that could be accessed by passengers using wheelchairs through an advance reservation system. The industry cited the Massachusetts and Newfoundland experiences with the internal lift and low ridership; the disability rights groups cited the RTD experience with the external lift and the fact that ridership by wheelchair users would be limited until all services, including local transit access, offered open access. Related issues included the fact that OTRBs typically have on-board restrooms that are not accessible and that making them accessible could result in loss of many more passenger seats.

In the end, Section 305 of the ADA mandated that the Office of Technology Assessment (OTA) of the U.S. Congress conduct a study to determine the access needs and the most cost-effective technology for providing access to OTRBs. This study would be provided to the U.S. DOT for consideration in the development of final regulations. In the meantime, the DOT issued interim regulations for privately operated OTRBs. These regulations required that private operators of OTRBs provide boarding assistance, but not lifts or other accessibility devices.

The OTA Study

The OTA study included an analysis of demand, the current level of accessibility, the effectiveness of various means of providing accessibility, the costs of providing accessibility, design changes that could provide for accessible restrooms, and the effect of accessibility requirements on the continuation of private OTRB services, particularly in rural areas. The OTA formed an advisory panel and staff team and obtained consultant assistance. Ecosometrics, Inc., prepared three reports for OTA, including a background paper on the intercity bus industry and the current implementation of accessible coaches, an assessment of available technologies and costs, and an assessment of demand based both on the experience at the various demonstration projects and on demographic factors. These were used as input by OTA in the preparation of its study, which was delivered to the Secretary of the U.S. DOT in May 1993. The OTA study basically concluded that the ADA required

boarding options that allowed wheelchair users to remain in their own wheelchairs, thus limiting the options to on-board, station-based, or portable lifts combined with adequately sized access doors and wheelchair securements on the bus itself.

Rulemaking

In the fall of 1993, the U.S. DOT held a meeting of the stakeholders and interested parties to review options. An Advance Notice of Proposed Rulemaking (ANPRM) was issued in the *Federal Register* in October 1993, which presented options for achieving accessibility and sought further comment and response. Finally, in March of 1998, the U.S. DOT issued a Notice of Proposed Rulemaking (NPRM) that basically set forth (1) a timetable and rationale for achieving accessibility by installing a lift on every new bus for the larger (Class I) regular-route carriers so as to achieve accessibility on 50 percent of the fleet 6 years after the effective date and 100-percent accessibility in 12 years and (2) a service-based provision for charter and tour operators requiring that 10 percent of their fleets be accessible so as to support provision of a lift-equipped bus on demand with a 48-hour advance reservation. Numerous other provisions addressed restroom accessibility and the idea of maximum times between rest stops to allow use of accessible station-based facilities. The Preliminary Regulatory Assessment (PRA) for this proposed regulation presented estimates of the costs of these proposals, based on estimates of fleet size, turnover, and available technology, along with costs for two alternative options involving station-based lifts only or a combination of such lifts with an advance reservation system for a limited percentage of accessible buses in the fleets of large carriers.

The comment period produced a great deal of input. Some commenters favored a faster schedule for achieving accessibility, noting how few accessible OTRBs had been added to the fleets since the passage of the ADA, but, in general, the disability rights community favored the U.S. DOT approach. The bus industry proposed equipping a portion of the fleet with lifts and offering an industrywide advance reservation system that would provide an accessible bus on 48 hour's advance notice. The industry also produced higher estimates of the costs of the proposed rule, including

those related to losses of revenue because of lost seating and package express space on buses, lost revenue and ridership resulting from potential fare increases to cover these costs, and potential reductions in service on marginal rural routes that would be affected by increased costs.

The Final OTRB Accessibility Rule

On September 24, 1998, the Final Rule was issued, accompanied by a final Regulatory Assessment (RA). It required that Class I fixed-route operators begin implementing the regulations in October 2000 and that small entities begin a year later (see Table 1-1). Beginning on these dates, new OTRBs delivered to operators of fixed-route systems must be accessible, although small carriers can provide equivalent service as an alternative. For the large carriers, 50 percent of their fixed-route fleets must be accessible by October 2006, and 100 percent must be accessible by October 2012 (a time extension is possible based on three possible factors specified in the rule). No retrofitting of existing vehicles is required. Demand-responsive private operators of OTRBs, primarily charter and tour operators, must provide an accessible bus to anyone who requests it 48 hours in advance of the trip. These carriers do not have any fleet accessibility requirement, but they must find and provide a bus when a request is made. Small operators offering both fixed-route and charter services have a special exception. If they use 25 percent or less of their fleet for fixed-route service (with the rest in demand-responsive service), they can provide the 48-hour advance reservation service option for all their services, including fixed-route service. In the interim period, before fixed-route carrier fleets are fully accessible, they are required to provide 48-hour advance reservation accessible service. Small carriers, who may never have a fully accessible fixed-route fleet because they buy used buses, will have to offer this option indefinitely. Under the Final Rule, carriers have to provide compensation to passengers for failure to provide the service as required. No requirement for maximum times between rest stops are included, although passengers with disabilities must have the opportunity to leave the bus and use accessible rest stop facilities when the buses do make stops. Operators are required to make sure that staff are fully trained to provide safe accessible service, and operators must ensure that accessibility equipment is maintained.

Table 1-1 - SUMMARY OF PROVISIONS: FINAL RULE ON ADA ACCESSIBILITY FOR PRIVATELY OPERATED OTRBs

GUIDELINES FOR FIXED-ROUTE OPERATORS

Issue	Large Fixed-Route Carriers Defined as firms with total revenues of at least $5.3 million	Small Fixed-Route Carriers Defined as firms with less than $5.3 million in total revenues **>25% Fixed-Route** More than 25 percent of their total fleet is used for fixed-route service	 **<25% Fixed-Route** Less than 25 percent of their total fleet used for fixed-route service
Effective Date	October 2000	October 2001	October 2001
Deadlines	50% of fixed-route buses must be accessible by 10/2006; 100% by 10/2012.	No deadline for accessibility.	No deadline for accessibility.
Requirements	All new vehicles delivered after Oct. 2000 must be lift-equipped.	Must purchase or lease only accessible vehicles until entire fixed-route fleet is accessible.	Must be able to provide accessible service with 48-hour advance notice to passengers with limited mobility.
Interim Service	Must be able to provide accessible service with 48-hour advance notice until fleet is 100% accessible.	Must be able to provide accessible service with 48-hour advance notice until fleet is 100% accessible. *or* Equivalent service defined by S. 37.105	Must be able to provide accessible service with 48-hour advance notice. *or* Equivalent service defined by S. 37.105

GUIDELINES FOR DEMAND-RESPONSE OPERATORS

Issue	
Effective Date	October 2000
Deadlines	No deadline for accessibility
Requirements	Can meet accessibility guidelines by providing 48-hour advance notice for passengers with limited mobility
Interim Service	Must be able to provide accessible service with 48-hour advance notice

Table 1-1 - SUMMARY OF PROVISIONS: FINAL RULE ON ADA ACCESSIBILITY FOR PRIVATELY OPERATED OTRBs

APPLIES EQUALLY TO ALL BUS CARRIERS WITH OTRBs	
Rest Stops	On express runs of 3 hours or more where the bathroom on board the bus is inaccessible, the operator is required to make a good faith effort to provide an unscheduled rest stop if requested. If it is not possible to stop, all denials must be explained to the passenger who requested the stop.
Interlining	**Fixed-route carriers** are required to send and receive information to one another to ensure that all accessible service needed for a trip involving more than one carrier is provided.
Penalties	If a company fails to provide 48-hour advance notice service, it must compensate the passenger who requested the service. The compensation amount ranges from $300-$700, depending on how many times the company has failed to provide service.
Overflow	If there are more wheelchair users on a given bus than securement locations, the bus company must offer to provide boarding assistance and transfer to a vehicle seat. If the passenger declines the offer, the bus operator is not required to transport the passenger on that bus.
Training	Bus operators must be trained to be compliant with S.37.209. A list of specific skills necessary is provided.
Maintenance	Bus companies are required to check lifts frequently enough to catch any problems in a timely manner. Daily cycling is not necessary. If a problem is found with the lift, the vehicle may be kept in service for up to five days from the discovery, if no substitute vehicle is available. This does not excuse the company operating the bus with the broken lift from paying compensation to a passenger if the lift is needed.

TEA-21 Section 3038 Program Funding

Prior to the issuance of the Final Rule, Congress completed work on TEA-21, the current primary federal transportation authorizing legislation. Section 3808 of TEA-21, "Rural Transportation Accessibility Incentive Program," authorized funding for OTRB accessibility. The program makes funds available to private OTRB operators to pay for the incremental capital and training costs of complying with the Final Rule. Applications are solicited nationally, and grant recipients are selected competitively according to the criteria for assessing the applications specified in the legislation.

In its first year, FY 1999, only intercity fixed-route service providers were eligible to apply and the program paid for up to 50 percent of eligible project costs with federal funds. Starting in FY 2000 both intercity fixed-route providers and all other providers of services using OTRBs, such as commuter, charter, and tour operators, will be eligible for funding. The federal share is for up to 90 percent of the eligible project costs for fixed-route service providers for FY 2000.[1] Table 1-2 lists funding by year. In FY 1999, Congress appropriated the $2 million authorized level.

This program is somewhat unusual in that applications are made directly to the U.S. DOT, with the funding directly to the carriers (rather than through the states and their subgrantees). The FTA program will fund retrofit of existing vehicles, which is not required by the Final Rule.

[1]The provision for a 90-percent federal share applies only to fixed-route providers and only to FY 2000, not beyond.

Table 1-2
SECTION 3038 "RURAL TRANSPORTATION ACCESSIBILITY INCENTIVE PROGRAM" AUTHORIZED FUNDING LEVELS AND MATCH RATIOS

Eligible Applicants	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	Total
Intercity Fixed-Route OTRB Service Providers:						
Authorized Funding (Millions):	$2.00	$2.00	$3.00	$5.25	$5.25	$17.50
Maximum Federal Share:	50%	90%	50%	50%	50%	
Other OTRB Services (including local fixed-route, commuter, and charter or tour)						
Authorized Funding (Millions):	$0.00	$1.70	$1.70	$1.70	$1.70	$6.80
Maximum Federal Share:	50%	50%	50%	50%	50%	
Total Program (Millions):	$2.00	$3.70	$4.70	$6.95	$6.95	$24.30

Source. *Federal Register*, January 18, 2000.

Federal requirements, such as "Buy America,"[2] apply to equipment needed to make vehicles wheelchair accessible. All federal requirements, including "Buy America," apply only to the incremental costs of making a vehicle accessible, not to the vehicle itself.

RESEARCH ISSUES

The primary concerns addressed in this research project were the incremental capital and training costs associated with the implementation of the Final Rule. Previous studies, including the PRA and the RA, basically set forth a method for estimating the total costs. These studies are described in greater detail in Appendix A, but, in general, these cost assessments included the incremental capital cost of the lifts and related accessibility equipment on new buses, the cost of capital related to this incremental increase in capital costs, costs due to loss of baggage space resulting from the installation of the lift, training costs associated with the accessibility features (but not other ADA-related training already required), and maintenance costs. In addition, net revenues from new ridership stimulated by the increase in accessibility were included in the cost estimate. Industry critiques focused on the incremental capital costs, the costs of lost seating (even when the lift and the restraints are not in use), the magnitude of the new revenues estimated by DOT (these revenues would be offset, they argue, by revenue that could be lost if overall ridership declines as a result of the fare increases that may be required to fund implementation), and effects on marginal rural routes. Given that the Section 3038 program is directed to capital and training costs, this report addresses capital and training costs within the broader context of the other costs and changes in revenues resulting from induced ridership.

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[2]The Federal Transit Administration "Buy America" regulations, 49 CFR Part 661, require that all iron, steel, and manufactured products be produced in the U.S.A. if they are funded in whole or in part by the FTA, and that all components of the products be made in the U.S.A. Under the Section 3038 program, FTA has defined the lift, the movable seats, and the securement devices as components. Bus companies applying for funding for any of these components need only meet the "Buy America" requirements for that component, even if the bus is assembled elsewhere. Also, FTA regulations include a "small purchase" threshold, which waives this requirement for all purchases under $100,000. For example, a firm could use this waiver for a grant to purchase three $30,000 lifts without having to meet the "Buy America" requirements.

The PRA, RA, and Greyhound critique developed the cost estimates largely by estimating the number of OTRBs operated by the different segments of the industry addressed by the Final Rule, applying an assumed replacement cycle to those numbers, and then multiplying the resulting annual fleet replacement by the estimated incremental capital costs. The numbers of accessible buses then affect the maintenance costs (an assumed amount per year per lift) and the training costs. Costs associated with the loss of seating or baggage space resulting from the lift installation can also be accumulated on a per bus basis. These costs can be expressed as an annual cost, or the total net present value of the cost can be calculated over a defined study period. Developing the costs per bus and then multiplying those costs by the number of buses to obtain totals, as done in these previous studies, is also an appropriate technique for use in this report.

CHALLENGES AND CONSTRAINTS ON THIS RESEARCH

Major challenges in the development of an estimate of the overall net costs of implementation of the Final Rule include the following:

- **Information on overall industry economic parameters is very limited**: Only carriers with over $5.3 million in annual revenue are required to file reports with the U.S. DOT's Bureau of Transportation Statistics (BTS), and there is no other reporting requirement.

- **There is no regulatory or other classification of firms or their fleets into the categories defined in the Final Rule**: These categories include fixed-route versus demand-responsive providers and services, firms providing mixed services with less than 25 percent of the fleet used for fixed-route service, and firms providing mixed services with over 25 percent of the fleet used for fixed-route service. As the requirements of the Final Rule vary for each category, this lack of data complicates the estimation of costs.

- **There is a lack of data on the numbers of OTRBs operated by different size firms, and how many are used to provide different types of service:** There is no public source of information on the total number of OTRBs in commercial service, the number of OTRBs operated by each carrier in different services (e.g., fixed-route versus demand-responsive), the number of OTRBs operated by different size firms (e.g., large carriers with revenues exceeding the Class I reporting level or small carriers with lower revenue levels).

- **There is no public information on the annual sales of new OTRBs:** Such information would provide additional data on the growth of the fleet and likely capital costs, particularly if it included additional data such as the type of service for which the bus is intended, whether the purchaser is a public or private entity, and whether it is a replacement or expansion vehicle.

- **There is no public data on the life cycle of OTRBs:** The average service life in commercial service or the average age when scrapped or the number scrapped annually could be combined with sales data to estimate growth in the overall fleet.

- **There is a lack of data on which to base valid or accurate ridership estimates:** There have been a number of examples of the use of lift-equipped OTRBs for intercity service, including some demonstration projects involving data collection and analysis, yet all have involved service limited to a region or line or have involved advance research requirements for partially accessible fleets. Other ridership examples have involved the use of lift-equipped OTRBs in commuter bus service, and urban fixed-route public transit experience has also been cited. The relevance of all of these as a basis for ridership estimation has been questioned. There are no data on the potential demand for accessible charter or tour services.

- **There is a lack of data on lift maintenance costs**: Experience with the currently available lifts on OTRBs is limited, and maintenance requirements (which will depend to some extent on usage) are still evolving.

- **There is a lack of data on the number of times that buses depart with four or fewer empty seats:** If a wheelchair user remains in his or her own mobility device on board an OTRB, four conventional seats must be folded up to provide space for the device and securements, for a net loss of three seats. However, if those seats would otherwise have been empty, there is no revenue loss. The only available data on this issue come from a 1-month sample by Greyhound Lines, Incorporated.

- **There is a lack of data on the number of times that buses depart with full baggage bins:** Current lift designs take up space in the baggage bays of the OTRB. This reduces the amount of space available for bus package express and passenger baggage. However, there is foregone revenue only if this space would have been used by revenue-producing bus package express. There is no information on the number of departures that currently involve a full baggage compartment.

- **There is limited information on the necessity of permanent seating loss:** Various types of OTRB may or may not have a permanent loss of seating capacity as a result of being lift-equipped, different seating layouts may affect this loss, and future designs may be able to avoid this loss.

Given a methodology that depends on multiplying cost factors by the number of affected buses, the major difficulty is that there is no real data source able to provide the numbers of vehicles operated by different firms, no regulatory or other classification of the firms into the categories addressed by the Final Rule, and no hard data on replacement cycles.

This research effort addressed this issue within the time and resource constraints of the study by surveying the carriers required to meet the accessibility deadlines and those carriers that have identified themselves as regular-route intercity carriers--these firms will face a major portion of the costs of implementation and they can be readily identified and contacted. The PRA and RA used the limited available data and some assumptions to develop estimates of the numbers of buses used by the various sectors of the industry, and this research utilized those estimates except when information from the carrier surveys was available.

The other major area of dispute among the cost estimates concerns how changes in ridership will affect revenues. Both the DOT and the industry examined the issue, made assumptions based either on the previous OTRB lift usage or on transit experience, and then developed estimates of stimulated ridership and potential ridership losses. Given the limited experience on which to base ridership estimates and the time available for this study, the research team's approach in this area is to report the various estimates along with the rationale or basis for them and present associated cost ranges.

The discussion of potential ridership and revenues is included in Appendix B, along with the presentation of information contained in earlier studies about the costs of foregone revenue resulting from the loss of seating and baggage space, effects on revenues of using fare increases to fund implementation costs, and potential effects on rural services. Because of the uncertainty surrounding these issues and the lack of time and resources to develop new data sources to improve upon existing data sources or analysis, all of these issues are addressed by presenting the previous research.

Based on the review of previous research, and the analysis performed for this study, a discussion of potential future research needs is presented in Appendix C.

SUMMARY

The major objective of this research project was to perform an analysis of the costs of implementation of the Final Rule implementing the ADA requirements for private operators of OTRBs. The costs addressed specifically through new research and analysis included the incremental capital costs of the lifts and associated accessibility equipment required by the Final Rule, the costs of required training, and the costs of maintenance. Section 3038 of TEA-21 authorizes a program of federal funding to assist private OTRB operators with funding for these incremental capital costs and for training costs.

The issue of providing accessibility for persons who use wheelchairs or other wheeled mobility devices on OTRBs operated by private firms surfaced during the debates leading up to the passage of the ADA, and the questions raised during that debate have led to a prolonged implementation period involving several studies of the issue and an extensive rulemaking process. The cost of implementation of alternative technologies and policies has been a major issue in each of these studies.

However, this has been and continues to be a difficult issue to address, largely because of the limited data available about many of the key parameters needed to develop a complete and reasonably accurate estimate of implementation costs. This study was designed to add to the knowledge on this issue by surveying the large carriers who will have to meet timetables for fleet accessibility for their fixed-route services and all the carriers who provide regular-route intercity bus service. This information was combined with existing data to present estimates of the incremental capital, training, and maintenance costs of the implementation of the Final Rule.

CHAPTER 2

RESEARCH APPROACH AND METHODOLOGY

The objective of this research project was to develop estimates of the capital, training, and maintenance costs for private OTRB operators in meeting the requirements of the ADA Final Rule. The research approach and methodology were intended to answer the following questions:

- **Number of OTRBs**--How many OTRBs are being operated by private companies?
- **Fleet and Operator Composition**--How many of these OTRBs are operated in fixed-route service? Further, how many of the OTRBs in fixed-route service are operated by small firms with more than 25 percent of their fleet in fixed-route service (and subject to the 100-percent accessibility rule)? How many of these OTRBs are used in demand-responsive service or by small firms with less than 25 percent of their fleet in fixed-route service (and subject to the 48-hour rule)?
- **Number of OTRB Purchases by Year**--How many new OTRBs will be purchased by private operators to replace existing OTRBs and to expand the fleet of OTRBs and how many OTRBs will be purchased new?
- **Cost Components**--What is the capital cost of equipping each OTRB to comply with ADA? What will be needed for the private operators to maintain the lifts and other accessibility features? What will be required to train the private operators' staffs to the proficiency levels identified in the rule?
- **Compliance Costs**--Finally, based on the above, what will be the total cost for the private operators to equip the OTRB fleets, maintain the lifts, and train staff?

DATA COLLECTION

In order to answer these questions, data were obtained by

- Collecting primary data through two survey efforts and follow-up calls;
- Gathering secondary data from previous reports, the *Bus Industry Directory,* and *Russell's Guide;* and
- Reviewing FTA grant applications for grantee cost estimates.

OTRB Operator Survey

Because the rule requires that a higher percentage of the fleets used in fixed-route service be made accessible (resulting in higher relative costs), the primary data collection for the study focused more heavily on private firms that provide fixed-route service. Due to the limited time available for data collection, the survey component of the study focused on the private firms that provide fixed-route service, including all the Class I carriers listed by BTS and a list of companies compiled from *Russell's Official National Motor Coach Guide (January 2000).* These included both Class I carriers and smaller firms.

The basic data collection involved surveying the Class I carriers and all carriers listed in the *Russell's Guide* to collect data on fleets, accessibility plans, and employees. The data collected through the survey effort were used as a basis for extrapolation to the broader universe of operators on a per bus basis for maintenance and capital and on a per employee basis for training.

The survey requested information on the OTRB vehicles owned by the larger private operators and any smaller operator with some fixed-route service–both in regular-route service and for charter and tour service. Information was collected on the model, year, current accessibility features, and expected replacement schedule for each vehicle. General vehicle replacement policies were also requested.

If the carrier had lift-equipped OTRBs, they were asked for information on the incremental capital costs of that equipment as compared with the costs of similar non-lift-equipped coaches. In addition, the operators were asked for an annual maintenance cost per vehicle attributable to the accessibility features. Information on the potential number of employees they have who would need training and training expenses (e.g., number of current employees, turnover and expansion rates, and salary) was also requested. Names, addresses, and telephone/fax/e-mail contact information were requested for each project to allow follow-up.

All listed firms were contacted by phone on either February 1 or February 2, 2000. The purpose of the phone calls was to establish a company contact, explain the intention and importance of the survey, and reiterate the short time line involved. On February 3, 2000, a copy of the survey was sent to all 70 companies. The survey form is included in Appendix D. After one week, all companies that had not yet responded were called again and, if necessary, a second survey was faxed to them. In total, 33 surveys were returned, 11 of which were Class I carriers, with another 3 firms calling in and explaining that they were charter-only companies or had no OTRBs in their fleet.

Once the surveys were collected, the research team combined the data into useful tables in order to find consistencies and uncover any absence of data. From the known data, four regressions were performed to extrapolate data for the firms that did not reply. The regressions identified the relationships between the number of employees (by category) and the number of buses for the training cost estimates. A regression also established how many buses on average are needed to achieve the Class I revenue level of $5.3 million. The latter regression was done to identify bus companies that may be required to comply with the Final Rule, but have not been included in the Large Fixed-Route category in previous studies because they have not filed as Class I operators with BTS. The results of all four regressions are included in Table 2-1.

Other Fleet Data

Some information was also gleaned from the *Bus Industry Directory, 2000,* which provides data on the number and make of OTRBs used, total buses owned, services provided, and number of

Table 2-1
REGRESSIONS: SUMMARY

Dependent Variable	Independent Variable	Intercept	X-Coefficient	R-Squared
Yearly revenue	**number of buses in fleet**	-811545	284721	0.998561211
	Standard error	-3312940.00	-4085.00	
	t-statistic	-0.244962226	69.70081972	
Drivers	**number of buses in fleet**	16.33587752	1.84816003	0.988149019
	Standard error	26.95236003	0.05741809	
	t-statistic	0.606101933	32.18776589	
Customer service staff	**number of buses in fleet**	-51.47905295	1.667806703	0.997822591
	Standard error	9.495335386	0.01787361	
	t-statistic	-5.421509705	93.31112807	
Mechanics	**number of buses in fleet**	1.675868041	0.264635082	0.994485797
	Standard error	2.004175993	0.0041089	
	t-statistic	0.836188063	64.40533635	

Table 2-1 (continued)
STAFFING REGRESSIONS: DETAIL

Revenue-buses

Regression Statistics	
Multiple R	0.999280347
R Square	0.998561211
Adjusted R Square	0.99835567
Standard Error	9050085.31
Observations	9

	Coefficients	*Standard Error*	*t Stat*
Intercept	-811545.2522	3312940.393	-0.244962226
X Variable 1	284721.434	4084.90797	69.70081972

Drivers-buses

Regression Statistics	
Multiple R	0.988149019
R Square	0.976438484
Adjusted R Square	0.975496023
Standard Error	134.3777706
Observations	27

	Coefficients	*Standard Error*	*t Stat*
Intercept	16.33587752	26.95236003	0.606101933
X Variable 1	1.84816003	0.05741809	32.18776589

Customer Service-buses

Regression Statistics	
Multiple R	0.998910702
R Square	0.997822591
Adjusted R Square	0.99770799
Standard Error	41.60314007
Observations	21

	Coefficients	*Standard Error*	*t Stat*
Intercept	-51.47905295	9.495335386	-5.421509705
X Variable 1	1.667806703	0.01787361	93.31112807

Mechanics-buses

Regression Statistics	
Multiple R	0.997239087
R Square	0.994485797
Adjusted R Square	0.994246049
Standard Error	9.592808317
Observations	25

	Coefficients	*Standard Error*	*t Stat*
Intercept	1.675868041	2.004175993	0.836188063
X Variable 1	0.264635082	0.0041089	64.40533635

current employees. The *Bus Industry Directory* was also used to identify private firms that are not **primarily** fixed-route carriers, but provide some fixed-route or intercity service. This effort found more than 300 companies, with more than 5,000 buses total, that may also be required to fit a percentage of their buses with lifts. Unfortunately, the directory listing does not include any information that would permit an analyst to assign a firm to either the "primarily fixed- route" (more than 25 percent of the fleet used in fixed-route service) or the "primarily charter" (less than 25 percent used in fixed-route service) categories. Combining fleet size with the regression allowed the research team to assign firms to the Large or Small category, based on the Final Rule definitions.

Bus Manufacturer Survey

A second survey was sent to all major bus manufacturers that sell buses in North America to determine the incremental cost of adding the lift option to new buses. The response rate for this survey was lower than expected, but, after researching the issue, the researchers found that manufacturers that did not reply provided only a small percentage of OTRBs to the industry. The researchers were able to collect price information from the companies that provide the overwhelming majority of OTRBs to private firms (i.e., MCI and Prevost).

DATA ANALYSIS

The analysis used data collected in the surveys conducted by the research team for this study as well as data collected in the studies discussed in Appendix B.

Number of OTRBs by Operator and Service Type

The purpose of this study task was to develop an accurate picture of the number, condition, accessibility of, and replacement schedules for the nation's OTRBs and then to further define how they are used. The number was compiled using information from a variety of sources. Given limited

time and resources, the numbers of OTRBs and their allocation were developed by combining the results of the survey effort described on page 2-2 with the final estimates contained in the RA. The segments of the industry surveyed include the Class I or larger carriers and all regular-route intercity carriers listed in *Russell's Official National Motorcoach Guide*. For the remaining segments of the industry, including local fixed-route (local tour and commuter/airport) and demand-responsive (completely charter and tour firms), data from the RA allocation of buses were used as a basis.

The product of this task was the inventory of OTRB by firm size and predominant use by class of operator addressed in the Final Rule. This process and the resulting estimates of accessible OTRBs are discussed in detail in Chapter 3 which also explores how many of these OTRBs are operated in fixed-route service and how many of the OTRBs in fixed-route service are subject to the 100 percent accessibility rule (operated by a large firm or a small firm with more than 25 percent of its fleet in fixed-route service).

Number of OTRB Purchases by Year

Chapter 4 presents the estimated number of accessible OTRBs that would be purchased by year from 2000 through 2012, including replacement vehicles and expansion. For **replacement**, the researchers used figures provided by Greyhound for its fleet and then assumed a 12-year replacement cycle for the other operators. This assumption was validated with survey data on replacement plans from the fixed-route operators. Although the percentage varied by operator, the overall percentage of annual fleet replacement by operators that responded (without Greyhound) was 8.33 percent, which confirms a 12-year replacement cycle.

For **expansion**, again, the researchers used expansion figures provided by Greyhound for its fleet and then assumed that the other operators would expand 2 percent annually (based on the research team's survey data). Although it was assumed that all additions to the large operator fleets would be new buses, for smaller operators, it was assumed that only two-thirds of the vehicles purchased would be new.

Cost Components

The purpose of this task was to develop the cost parameters and unit cost estimates that were used to estimate capital, maintenance, and training costs.

Cost of Accessibility Features

In order to determine the incremental cost of accessibility equipment to meet the Final Rule, several sources were contacted to determine the option costs of the required equipment on new OTRBs:

- A list of OTRB manufacturers and distributors was developed, and each of the firms was called to determine the appropriate person to be contacted for data.
- A letter and survey were sent to the companies previously identified as the major OTRB manufacturers and distributors. This letter described the project and requested data on the availability of a lift-option, the models on which it is available, the incremental costs of the option, if there are additional accessibility equipment costs, maintenance cost information, and information on the production levels of both accessible and non-accessible OTRBs.
- In the survey of bus operators, cost data were requested regarding OTRBs that have already been purchased or retrofitted.
- The grant applications for the first year of the Section 3038 program were reviewed to determine the accessibility equipment costs used by carriers in applying for the available federal funding.

In general, the incremental cost figures developed from these sources are within the same range, although the number of data points is not great.

Results of Manufacturer Surveys--Only two responses were obtained from true OTRB manufacturers--one from MCI and one from Prevost. Although there are other manufacturers or

importers, these two firms provide the largest percentage of the OTRBs sold in North America, particularly for regular-route service. Responders asked that the specific information provided be kept confidential, but option prices ranged from $26,500 to $29,000, varying by model. According to the manufacturers, the package price is all-inclusive, including the lift, cabin access door, sliding and folding seats (three or four such seats, depending on the lift location chosen), wheelchair and passenger restraint systems, required interlock and manual backup control systems, and modifications to overhead baggage racks (depending on the lift location). Samples of manufacturers' literature specifically state that the lift package meets ADA requirements.

The Access Board regulations defining an accessible OTRB (49 CFR Part 38) add lighting for the area around the lift door, and it is not clear whether or not the option package price includes this additional lighting (though if the package meets ADA it should). The only other change from the Interim requirements (other than the lift-related aspects and final disposition of door height issues) is that 50 percent of the aisle seats must have movable armrests–again, no separate cost for this change is available, nor is it known whether or not this is included in the option package price. Pricing for modifications related to the stepwell is also not clearly delineated in the information provided by the manufacturers, including changes in step flooring materials, additional lighting, and changes in grab handle clearances, called for by the Interim OTRB regulations and included in the Final Rule. OTRBs are built to order, and prices are negotiated, so there may well be some cases in which specific additional costs for these items are listed as components of a price–and others in which they are not.

Costs of Lifts from FTA Grant Applications--The applications filed with the FTA for funding under the Section 3038 program provide another source of information about the incremental costs of the accessibility package. All of the applications were reviewed, and the incremental costs for the lifts in the applications range from $26,260 (1999 pricing) per bus to $35,000 per bus. Most use $30,000 as the basic figure for estimating costs. At least two applicants applied for funding for lifts on buses ordered after the effective date of the program, but before the

initial application (i.e., the price is not an estimate, but the actual invoice price). These 1999 prices were $26,280 and $26,780.

Lift Cost Issues--One issue regarding the cost of accessibility is whether or not to include the incremental costs of additional accessibility equipment that is not required by the Final Rule, but that may well make an OTRB more usable to persons with mobility impairments. This includes items such as a stepwell hot air system (to melt ice and snow), modifications to the lift installation to protect it from baggage damage, and to reinforce the mounts, a kneeling feature, or a retractable front step. No data were provided directly by the manufacturers to allow costing of these items separately or to indicate whether or not they are included as part of the base price of any particular model bus, but, if specified, they may well cause the overall price of the bus to be higher. As mentioned earlier, OTRBs are built to order, and pricing is negotiated.

Another issue that emerged in the review of previous cost studies (see Appendix B) is that the incremental costs included in the Nathan study[1] and Greyhound's filing in the docket for the Final Rule included not only the accessibility costs, but the incremental cost difference between a 96-inch-wide bus and a 102-inch-wide bus. MCI only offers the lift options on the 102-inch-wide bus models. Greyhound's position was that the 96-inch-wide bus was the most common bus in their fleet, and, therefore, the analysis should include the additional cost of going to the wider bus as well as the cost of the accessibility package. Greyhound has purchased the 96-inch-wide buses as recently as 1998, when it acquired 186 such buses. The firm indicates that, beginning in the Year 2000, all equipment purchased will be 102 inches wide, though it is not clear whether or not this is because all its purchases will also be lift-equipped. In this analysis, no incremental costs have been included to represent the additional costs of a 102-inch-wide bus over a 96-inch-wide bus.

One carrier has suggested that the analysis of costs of implementing the Final Rule should include the costs of public address systems and destination signs, which were standard OTRB equipment prior to ADA. However, the concern is the incremental cost of accessibility, and so these

[1]Nathan Associates, Inc., Evaluation of Technology and Deployment Alternatives for Providing Regularly Scheduled Intercity Bus Service to Mobility Impaired Travelers, November, 1997.

items were not regarded as "accessibility" costs in this analysis. In fact, it is not clear that they are required by the Access Board Part 1192 regulations of Subpart G–Over-the-Road Buses and Systems, though public address systems and destination and route signs are required by Subpart A–Buses, Vans and Systems (which explicitly does not include OTRBs). Incremental costs related to these features are not included in the accessibility package costs used in this analysis.

Incremental Cost per Bus Used in This Analysis--Despite the issues presented above and because it appears that at this time the costs of the accessibility packages are increasing (from the 1999 actual prices cited by carrier applicants to the option costs provided by the manufacturers for Year 2000 buses), $30,000 has been used in this analysis as a reasonable estimate of the incremental capital cost of making an OTRB "accessible" as defined in Part 1192, Subpart G. This use of a slightly higher figure allows for inclusion of some items that may be priced separately (such as movable armrests, baggage compartment modifications, or signage) that are incremental to the basic cost of the bus.

Cost Components for Training

Training costs are a significant part of the industry's cost of complying with accessibility requirements. Training costs estimates were developed in consultation with the study panel and are based, in part, on recommended training activities and requirements from sources such as Project ACTION and its work on implementing accessibility.

The research team's calculation of the training component of the cost of accessibility relies on the industry's prevailing staffing levels and wages, as derived from the detailed data supplied by firms responding to the study survey. Although the focus here is on the wages paid to employees participating in training courses, the cost of paying course instructors is also included in the training cost estimates.

Staffing Levels and Wages--Regressions using data from the survey of firms show that staffing levels are highly correlated with the number of buses owned by a company. Separate regressions were performed for three categories of employees: drivers, customer service, and mechanics, with the number of employees as the dependent variable and the number of buses in the company's fleet as the independent variable.[2]

The results (Table 2-1 above) show a high correlation (R^2 ranging from 0.97 to more than 0.99), with a high degree of confidence (t-statistics of 32 to 93), between buses and employees. The coefficient for the number of buses is 1.85 for drivers, 1.67 for customer service personnel, and 0.26 for mechanics. In other words, OTRB operators employ, on average, two drivers for every bus, five customer service personnel for every three buses, and one mechanic for every four buses.

The regressions were also performed without including Greyhound in the calculation (indicating that the rest of the industry has 2.1 drivers, 0.44 customer service staff, and 0.34 mechanics per bus). However, the R^2 values were not acceptable (ranging from .22-.62) and the decision was made to use the industry totals. The researchers did decrease the number of customer service staff from 1.67 to 1.3 staff per bus to adjust for lower customer service staffing levels outside Greyhound.

Turnover rates for each category of employee, which are important for determining the costs of initial as opposed to refresher training each year, were calculated by averaging the rates reported by the companies in the survey sample.

The wage rates for each category used in calculating training costs are the weighted mean rates of the companies that reported: $15.66 per hour for drivers, $9.21 per hour for customer service personnel, and $17.13 per hour for mechanics.

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[2]The basic equation is as follows:

$$Y = \alpha + \beta X + \varepsilon,$$

where Y is the number of employees and X is the number of buses.

Training Schedules--In this analysis, the researchers assumed that every employee, regardless of category, must be trained to some extent in the use of accessible facilities. Training would include such subjects as lift operation, maintenance and repair procedures, government and company policies, and sensitivity. The hours of training required vary depending on whether the employees are providing fixed-route or demand-responsive service. The uniform number of hours used for calculation purposes incorporates variations in the number of hours needed to train, for example, a mechanic rather than a customer service agent. For purposes of this analysis, drivers and customer service employees providing fixed-route service will receive a 12-hour training course initially and mechanics will receive 16 hours initially; all employees will need 4 hours of refresher training every year. Employees providing demand-responsive service will receive 4 hours of training initially and a 4-hour refresher course every year.

To compute the cost for each year of initial and refresher training, the researchers first calculated the number of drivers, customer service personnel, and mechanics, based on the number of buses, for fixed-route and demand-responsive services. The number of employees was multiplied by their respective hourly wage rates, and then multiplied by the number of hours of initial training for each category of service. This yielded the cost of initial training in the first year, 2000. The same process was then used to determine the number of employees in each category in each subsequent year. All employees were assumed to need the 4-hour refresher training course annually, except for drivers hired as part of expansion or replacements, who were placed in the "initial training" category for cost calculations.

Cost of the Instructor--The cost of the instructor was estimated assuming an hourly rate of $30 and 10 students per class. The cost for course development was not included because Project ACTION has developed course materials for this purpose.

Cost of Maintenance

Annual maintenance costs per vehicle were estimated for the upkeep and repair of the lift and other accessibility features (not eligible under Section 3038, but a real cost). Table 2-2 presents the estimate for lift maintenance and cycling costs as $1,194 per lift annually. This figure is based on the assumption that preventive maintenance and repair will require 2 mechanic hours per month at a cost of $411 annually per lift. In addition, according to Greyhound, the lifts will be cycled daily by drivers (300 days per year), requiring 10 minutes and adding $783 annually. In the analysis, the estimated maintenance cost was $1,200 per year per lift.

COST ANALYSIS

The following section describes the key cost estimation assumptions for the cost estimates presented in Chapter 4. Key differences between previous studies and this analysis of costs are as follows:

- Costs have not been translated to net present values. No alternatives are being compared, much less alternatives with differences in timing of costs or revenues.
- More carriers have been classified as large carriers, based on the research team's estimates that these firms have the revenue levels of a Class I carrier, even though they do not file reports with the BTS.
- A higher level of training and maintenance is used as the basis for estimating costs than in previous studies.
- This analysis includes estimated growth in OTRB fleets during the implementation period of the ADA.
- The research team has assumed that 8 percent of the vehicles in the fleets of the carriers covered by the 48-hour rule will need to be lift-equipped and these costs are spread over the entire analysis period (they are not front loaded to all occur in the year compliance must begin).

Table 2-2 - ANNUAL MAINTENANCE COSTS PER VEHICLE
(Year 2000 Dollars)

Activity	Staff	Hourly Rate and Fringe	Annual Hours	Annual Cost
Preventive Maintenance/Repairs*	Mechanics	$ 17.13	24	$ 411
Lift Cycling**	Driver	15.66	50	783
				$ 1,194

* Estimated at 2 hours per month of mechanic time.
**Estimated at 300 cycles per year requiring 10 minutes of driver time each.

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses*, prepared by KFH Group, Inc., April 2000.

Compliance costs are projected to the Year 2012 when the firms affected by the mandated schedule for fleet accessibility (large fixed-route firms) will have to be completely accessible (in their fixed-route fleets). Three categories of costs were considered for compliance:

- Capital cost of accessible OTRBs,
- Maintenance cost for accessibility equipment, and
- Training costs for personnel.

All costs are in Year 2000 dollars, and the analysis is conducted for the 12.5-year period from 2000 through 2012. The analysis did not use net present value or annual equivalents, and the results are expressed as present average annual costs in Year 2000 dollars, with the exception of the financing cost analysis presented at the end of Chapter 4.

CHAPTER 3

DEVELOPMENT OF THE OTRB NUMBERS USED IN THE ANALYSIS

INTRODUCTION

As can be seen in Chapter 2 and in Appendix A, a key question in the development of cost estimates for OTRB accessibility implementation is the number of OTRBs that will need to be made accessible. Not only is the overall population of OTRBs required, but also the distribution of these vehicles among firms of different size and by the type of service in which they are operated. This information is needed because the Final Rule specifies different requirements for different types of services and different sizes of firms. However, **there are no current data available on the numbers of OTRBs in commercial service, the size of the firms that operate them, or the number of buses used for different types of service.**

The only official sources of public data on this industry are the *Motor Carriers of Passengers* reports compiled by the BTS. Although all carriers in interstate service are required to file with the Office of Motor Carriers at the U.S. DOT, the successor to the Interstate Commerce Commission (ICC) in terms of federal regulation, the focus of this regulation is meeting required financial responsibility (insurance) and safety requirements, and carriers do not provide updated fleet lists, nor do they provide revenues by type of service so as to allow classification. Only carriers with passenger revenues in excess of $5 million (adjusted for inflation, this amount is now $5.385

million), called Class I carriers, are required to file ridership, revenue and cost data on quarterly and annual reports to the BTS. These reports do not include fleet information.

The only other available data on the numbers of OTRBs in service are provided by the American Bus Association (ABA) web site. The ABA estimates that 26,000 to 28,000 commercial buses are in use for charters, tours, regular-route service, and special operations in North America, of which 8,000 to 10,000 are OTRBs operated by carriers involved in the regular-route industry[1].

Because there is so little current information regarding the numbers of OTRBs in service (much less their distribution by firm size or service type), **there is a great deal of uncertainty regarding the number of OTRBs that will be affected by implementation of the Final Rule.** In this study, data from the surveys described in Chapter 2 have been combined with estimates and assumptions from previous work to develop estimates of the overall population of OTRBs and their distribution by firm size and service type. This chapter will explain the method used and sources for the data.

DOT FLEET ESTIMATES FOR THE PRA AND THE RA

Other than the ABA estimates, the estimates of OTRB numbers and distribution developed by the U.S. DOT for use in the PRA, and their subsequent modification in the RA (to allow analysis of the provisions of the Final Rule), represent the most detailed and reasoned estimates. Exhibit 3-1 presents the number of buses by size of carrier and type of service as developed for the RA, which was published in September 1998. However, many of these estimates are based on earlier assessments.

[1] ABA cites itself as the source of this information.

EXHIBIT 3-1

OVER-THE-ROAD BUS INDUSTRY

NUMBER OF BUSES BY INDUSTRY SEGMENT

Carrier Segment:	INTERCITY REGULAR ROUTE			LOCAL FIXED-ROUTE		CHARTER /TOUR
Number of buses by service:	CLASS I		SMALL	LOCAL TOUR	COMMUTER, AIRPORT	
	GLI [1]	OTHER				
-Regular Route	2070	1229	775	3750	750	--
-Charter/Tour	30	121	775	1250	250	13,000
	2,100	1,350	1,550	5,000	1,000	
SEGMENT TOTAL	5,000			6,000		13,000
CUMULATIVE TOTAL	24,000					

[1]Greyhound Lines, Incorporated.

Source: U.S. DOT, *Regulatory Assessment, Transportation for Individuals with Disabilities: Accessibility of Over-the-Road Buses,* September 1998.

The PRA

According to the U.S. DOT[2] and as presented in the PRA, the regular-route intercity fleet numbers were developed for the Class I carriers reporting to the DOT's BTS from data published by industry trade journals, including *Bus Ride, Bus Ride Industry Directory,* and *Metro Fact Book,* which were combined with data made public by the carriers or submitted by them to the DOT during the proceedings. The regular-route total figure of 5,000 OTRBs was obtained from the OTA report of May 1993.[3] DOT developed the intercity regular-route small carrier number of 1,550 OTRBs by subtracting the known Class I and Greyhound fleets from the 5,000 figure. The total number of local tour and airport/commuter OTRBs (6,000) was developed from the OTA report as well[4], by subtracting the 5,000 regular-route buses from the OTA estimate of 10,000 to 11,000 OTRBs in scheduled service, including regular-route, airport, and sightseeing. Additional estimates by the Federal Transit Administration supported this figure. The estimates of 13,000 buses in demand-responsive service also came from the OTA report and were supported by examination of the industry trade journals previously mentioned.

The figures in the OTA report were developed from the Ecosometrics background report to the OTA dated March 31, 1991.[5] The citation in the Ecosometrics background report for fleet information is an article in *Metro Magazine*, January-February 1991, referencing a study by a firm called Planned Business International, Inc. Thus the data on the overall size structure of the industry as used in the OTA report and the PRA (except for updated Class I information) is essentially based on 1990 data, not 1997 or 1998 information.

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[2]Much of the information in this section is from personal communication with Edward L. Ramsdell, John A. Volpe National Transportation Systems Center, 4/10 & 4/11/00, and the PRA and RA documents.

[3]Office of Technology Assessment, Congress of the United States, *Access to Over-the-Road Buses for Persons with Disabilities*, p. 9, footnote 9.

[4]*Ibid.*, p. 9, footnotes 11 and 12.

[5]Ecosometrics, Incorporated, *Background Paper on Accessibility for the Disabled and the Intercity Bus Industry*, March 31, 1991, pp. 7-13 and p. 57.

The RA

The DOT further developed the estimates from the PRA by breaking out the numbers of OTRBs by industry segment to reflect the numbers used in the different services. For the Greyhound and Class I carriers, carrier reports to the BTS were used to develop a ratio of fixed-route to charter and tour service buses based on the number of passengers carried in each service type, with the conversion to numbers of buses based on the use of a 50-percent load factor for fixed-route service and a 90-percent load factor for charter and tour services.

The DOT also conducted a survey of 400 non-Class I carriers in an effort to determine the service breakout for this group of carriers. The 40 responses revealed that an average of 77 percent of the OTRBs used by this class of carriers were used in charter and tour services, but DOT adjusted this to 50 percent. This survey was also used to develop an allocation rule to address the Final Rule's division of small carriers into those with under 25 percent of their fleet in fixed-route service, and those with over 25 percent in fixed-route service. From the survey, it was estimated that, for approximately five-eighths of the small firms, no more than 25 percent of their fleets are used for fixed-route services. For the other three-eighths of the firms, over 25 percent of their fleets are used for fixed-route service.

The DOT used the allocation rules and the available data to assign 1,000 OTRBs to the commuter/airport segment and to allocate 50 percent of both the local tour and commuter/airport OTRBs to fixed-route service, with the remainder going to demand-responsive service. The DOT also recognized the large degree of uncertainty surrounding the overall numbers and the allocations.

NUMBERS OF OTRBS USED IN THIS REPORT

Given limited time and resources, the research team developed the numbers of OTRBs and their allocation by combining the results of the survey effort described in the previous chapter with the final estimates contained in the RA. The segments of the industry that were surveyed include the Class I or larger carriers, and all regular-route intercity carriers listed in *Russell's Official*

National Motorcoach Guide. For the remaining segments of the industry, including local fixed-route (local tour and commuter/airport) and demand-responsive (completely charter and tour firms), data from the RA allocation of buses was used as a basis.

DATA FROM SURVEYED SEGMENTS

Given the above background, it was decided that for the purposes of this cost analysis, a limited survey of Class I carriers and all firms listed as providing regular-route service (one type of fixed-route service) in *Russell's Official National Motorcoach Guide* (as described in Chapter 2) would be used to attempt to develop current estimates of the OTRBs operated by the regular-route intercity carriers. For those firms in the survey sample that did not reply, estimates of numbers of OTRBs were developed from the 2000 *Bus Ride Industry Directory*, an annual publication in which many carriers list the numbers of vehicles they operate by type or make. The *Bus Ride Industry Directory* information for the carriers who did reply to the survey was checked to validate the use of the directory. Overall, the *Industry Directory* numbers were within 10 percent of the actual figures submitted in the surveys and, in the absence of any other potential data source, these figures were used.

For the Class I carriers, current data on the number of firms and the names of the firms are available from the BTS, which imposes requirements for filing of quarterly and annual reporting forms. These forms do not request information on the number of vehicles operated. In 1997 there were 17 "intercity regular-route" Class I carriers, and 4 "other" Class I carriers. These firms were surveyed.

As shown in the first three columns of Table 3-1, based on the survey results, it is estimated that 4,352 of these OTRBs are operated by the large carriers, including Greyhound Lines (2,423 OTRBs) and those firms that report to the BTS (1,445 OTRBs). DOT's Final Rule defines a small operator as a firm that is not a Class I Motor Carrier. This implies that operators with $5.3 million or more in yearly operating revenue, even if they are not registered with the DOT as Class I firms, are "large firms," and, if they provide fixed-route service, they are required to comply with the

regulations for large fixed-route carriers. The research team estimated that 484 OTRBs are operated by these large fixed-route firms.

In order to develop this estimate, the research team developed a proxy measure of revenue based on the number of buses in a company's fleet. Given that data on revenues are only available for Class I carriers, a regression was performed on data from Class I firms ranging from very large to relatively small, with number of buses as the independent variable and yearly operating revenue as the dependent variable. The resulting equation has a high correlation (R greater than 0.99) between the two numbers, with a high degree of confidence (t-statistic of 69).

Based on this regression, firms with 15 or more buses can be categorized as having yearly operating revenues of more than $5.3 million. These carriers, identified in Table 3-1 as "Large Class I Revenue Level" firms, use an estimated 4,020 OTRBs in fixed-route service (requiring 100 percent fleet accessibility) and 332 in demand-responsive service (requiring "48-hour rule" advanced notice). The Large Class I Revenue Level carriers are required to purchase all new OTRBs used for fixed-route service with accessibility features and are required to have 50 percent of their fixed-route fleet accessible by 2006 and 100 percent of their fleet accessible by 2012. Thus, the assumption was made that all new OTRBs in this category will be accessible.

This category now includes some of the buses that appeared in the RA as being operated by small carriers, as these firms have been assigned to the large carrier category based on their revenue as estimated from their fleet size. In addition, some of the regular-route carriers listed in *Russells' Official National Motorcoach Guide* that were surveyed have fewer than 15 OTRBs, and they are included in the small regular-route category.

Use of Estimates from the RA

For the other categories and service types, the allocation of OTRBs used in the RA was joined to the survey results to create the "low" estimate of the number of buses by industry segment shown in Table 3-1. This included the next category of carriers: small regular-route and "composite" companies that operate both fixed-route and demand-responsive service with their

Table 3-1 - OTRB BUS INDUSTRY NUMBER OF BUSES BY INDUSTRY SEGMENT "LOW" ESTIMATE OF FLEET SIZE

Carrier Segment	Intercity Regular-Route				Local Fixed-Route		Charter/Tour	TOTAL
	Large Class I Revenue Level			Small Mixed	Local Tour	Commuter, Airport		
Accessibility Requirements	GLI (a)	Other BTS	Other Non-BTS					
Total Fleet Accessible (100%)	2,423	1,328	269	403	3,450	690	---	8,563
48-Hour Rule	-	117	215	663	1,550	310	13,000	15,855
Subtotal	2,423	1,445	484	1,066	5,000	1,000	13,000	
SEGMENT TOTAL	5,418				6,000		13,000	24,418
CUMULATIVE TOTAL	24,418							

(a) Greyhound Lines, Incorporated.

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, Inc., April 2000.

OTRBs. To estimate the number of OTRBs operated by small intercity regular-route firms, the numbers of OTRBs operated by this segment was subtracted from the DOT estimate for this segment, which was 775 vehicles in fixed-route service and 775 in charter and tour.

For the remaining buses in this segment, a further allocation was required because the Final Rule allows small firms using under 25 percent of their fleet in fixed-route service to meet the requirements through advance reservations under the 48-hour equivalent service rule, while those small firms with over 25 percent of their fleet in fixed-route service must purchase accessible coaches when new fixed-route buses are obtained (although there is no timetable for fixed-route fleet accessibility for this group). In order to split the small regular-route firms into these two groups, the DOT determined (based on their survey) that three-eighths of the **firms** in this category were in the "under 25 percent" group, and the remaining five-eighths were in the "over 25 percent" group. The numbers of coaches operated by the "under 25 percent" group was estimated by taking the midpoint between one coach (per firm) and the number of coaches that the firm would be assumed to have to purchase to meet the 48-hour rule (6 to 10 percent of each firm's fleet). This number of coaches was subtracted from the 775 fixed-route, small intercity operator group and added to the demand-responsive or 48-hour category.

As the study team had already accounted for some of the estimated 775 small regular-route intercity OTRBs through the survey, the number of OTRBs to be allocated between the "under 25 percent" and "over 25 percent" subcategories was already reduced. The proportions of OTRBs assigned to each of these groups in the RA was then used to allocate the remaining small intercity regular-route OTRBs into the group requiring all new fixed-route buses to be accessible and the group required to meet only the 48-hour rule. On this basis, as seen in Table 3-1, 403 OTRBs were allocated to the group requiring all new fixed-route OTRBs to be accessible ("over 25 percent") and 663 were allocated to the group required to meet the 48-hour rule ("under 25 percent"). As in the RA, the assumption is made that two-thirds of the vehicles purchased for fixed-route service by small predominantly fixed-route carriers will be new, accessible OTRBs and that the other one-third will be purchased used (and, therefore, not accessible).

Similarly, the three-eighths/five-eighths allocation developed by DOT for use in the RA was applied to the RA estimates of local fixed-route (local tour and commuter/airport) OTRBs to reallocate these vehicles to the group requiring every new fixed-route bus be accessible, and those required to meet only the 48-hour requirement. These allocations should be the same as those used in the RA economic analysis and are presented in Table 3-1. Of the local tour segment, 3,450 vehicles were assigned to the group requiring that every new bus be accessible, and 1,550 were assigned to the 48-hour rule group, preserving the segment total of 5,000 as found in the RA. For commuter/airport, the resulting allocation was 690 OTRBs to the group requiring every new bus to be accessible, and 310 to the 48-hour rule group, with the segment total remaining at 1,000 from the RA.

The result of combining the survey results with the RA is that 8,563 OTRBs are assigned to the group that will have to purchase every new fixed-route bus with a lift (as compared with 8,060 in this group in the RA analysis[6]), and 15,855 are assigned to the group required to meet the 48-hour rule (compared with 15,940 in the RA analysis). This allocation provides a "low" estimate for this analysis that includes all the survey data, and the RA allocation for those sectors not surveyed in this effort.

High Estimate

Because of concerns about the age of the overall data on the structure of the industry, and apparent growth in vehicle fleets (based on primarily on Greyhound data) and OTRB sales, and the uncertainty about the true size of the national privately operated OTRB fleet, a "high" estimate was also developed to provide an upper bound for a range of cost estimates.

The original size estimates from 1990 might seem to call for simply inflating all sectors equally by some growth rate to create a year 2000 baseline. However, not all segments of the industry have grown since 1990. In the original Ecosometrics background report to the OTA, *Bus*

[6]The RA describes these allocations into the "under 25 percent" and "over 25 percent" groups in the text, and they are not presented in Chart II-1 of the RA.

Ride Industry Directory fleet numbers for OTRBs were obtained for all firms listed in *Russell's Official National Motorcoach Guide*. Based on this 1989 fleet data, there were 104 firms in the intercity regular-route sector, and they operated 6,975 OTRBs. Greyhound's 1989 fleet was 3,871 OTRBs. The same analysis, also performed by Ecosometrics for OTA, but using the 1992 list of firms and the 1991 fleet lists, finds 128 firms, but only 6,253 OTRBs. Greyhound's fleet had declined to 2,400 OTRBs, as service shrank in the wake of the strike and bankruptcy.

Today, the same analysis using the same sources (Year 2000 carrier list and 1999 bus fleet data) finds 58 firms and 5,039 OTRBs in this sector. Thus, it appears that the fixed-route services of the regular-route intercity segment have not yet fully recovered the fleet size of a decade ago, upon which the estimate of 25,000 coaches was based. Recent high growth rates in this segment are a healthy sign, but they should not be used to increase the fleet size beyond the numbers obtained in the survey for this segment.

However, the surveys have provided current data for this segment, which means that some method could be used to reflect possible growth of the other segments of the industry since the 25,000 bus figure was developed. The survey included questions on projected expansion, and the average expansion was estimated to be 2 percent per year. For the surveyed carriers, the survey responses were compared with a 1997 *Bus Ride Industry Directory*, and, for the group as a whole, the annual growth rate since those data were collected has been 2 percent. For that reason, a 2-percent annual growth rate was applied to the segments of the industry not included in the survey effort, in effect growing them at that rate since 1990. The resulting "high" estimate is presented in Table 3-2, which shows a total fleet of 28,800, of which 9,555 are in the group that will be required to purchase accessible new buses for all fixed-route services and 19,245 are in the 48-hour equivalent service group.

There may well be more (or fewer) OTRBs than have been included in this analysis, but without any kind of census or reporting it is difficult to expand the estimated fleet above this range. Currently, OTRB sales are high compared with previous years, but without any data on the numbers of buses being withdrawn from service, it is difficult to determine if these sales are expansion vehicles or replacements.

Table 3-2 - OTRB BUS INDUSTRY NUMBER OF BUSES BY INDUSTRY SEGMENT "HIGH" ESTIMATE OF FLEET SIZE

Carrier Segment	Intercity Regular-Route				Local Fixed-Route		Charter/Tour	TOTAL
	Large Class I Revenue Level			Small Mixed	Local Tour	Commuter, Airport		
Accessibility Requirements	GLI (a)	Other BTS	Other Non-BTS					
Total Fleet Accessible (100%)	2,423	1,328	269	491	4,204	840	---	9,555
48-Hour Rule	-	117	215	808	1,888	377	15,840	19,245
Subtotal	2,423	1,445	484	1,299	6,092	1,217	15,840	
SEGMENT TOTAL	5,651				7,309		15,840	28,800
CUMULATIVE TOTAL	28,800							

(a) Greyhound Lines, Incorporated.

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, Inc., April 2000.

CONCLUSIONS

Tables 3-1 and 3-2 present the low and high numbers of OTRBs developed for use in this cost analysis. There is a great deal of uncertainty about the numbers of vehicles and their allocation by segment, and these two estimates should be considered the endpoints of a range of potential numbers of affected vehicles. These estimates combine the survey data collected for this project with the allocation of vehicles found in the U.S. DOT's RA for those segments not surveyed. Growth rates were developed based on survey responses and on a comparison of the numbers of vehicles operated by the surveyed firms now with their 1997 fleets, as identified (for both years) in the *Bus Ride Industry Directory.* The low estimate corresponds closely in overall totals to the fleet estimate used in the RA, while the high estimate reflects potential growth in the sectors other than intercity regular route.

CHAPTER 4

CAPITAL, TRAINING, AND MAINTENANCE COSTS

INTRODUCTION

This chapter presents estimates of the incremental capital, training, and maintenance costs of compliance. Based on the number of OTRBs as defined in Chapter 3, it is estimated that between 24,418 and 28,800 OTRBs are operated by private carriers and subject to the ADA rule. This includes between 8,563 and 9,555 OTRBs that are used by a variety of carriers in fixed-route service. The rule requires that 100 percent of all new bus purchases in this category must be ADA-accessible.

The remaining 15,855 to19,245 OTRBs are used in demand-responsive service. Under this service category, carriers are required to provide accessible services with 48-hour advance reservation. It is assumed, based on previous studies, that carriers will need between 6 and10 percent of their fleets to be accessible to meet this requirement.

NUMBER OF ACCESSIBLE OTRBS PURCHASED BY YEAR

Chapter 3 presented "Low" and "High" estimates of the total number of OTRBs subject to the ADA rule. Table 4-1 and Table 4-2 present the estimated number of accessible OTRBs that would be purchased by year from 2000 through 2012 under the "low" and "high" estimates. These include both replacement vehicles and fleet expansion. For **replacement** vehicles, the research team

Table 4-1 - NEW ACCESSIBLE OTRB PURCHASES FOR REPLACEMENT AND EXPANSION -- "LOW" ESTIMATE -- 2000-2012

		Total Fleet Oct. 2000	New Accessible OTRBs Purchases - Replacement and Expansion													
			2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*TOTAL*
Regular-Route Service																
	Greyhound	2,423	75	322	317	312	323	341	360	355	377	368	367	344	394	4,255
	Large Regular Route and Mixed Companies (Class I definition - Over 5.3M gross rev)	1,597	47	132	132	132	132	132	132	132	132	132	132	132	132	1,628
	Small Regular Route and Mixed Companies More than 25% of fleet used in FR	4,543	45	-	255	260	265	271	276	282	287	293	299	305	311	3,148
Subtotal	Vehicles	8,563	167	454	704	704	720	743	768	768	796	793	798	780	837	9,031
	Accessibility Cost (@$30,000) (in FY2000 dollars in millions)		***$5.0***	***$13.6***	***$21.1***	***$21.1***	***$21.6***	***$22.3***	***$23.0***	***$23.0***	***$23.9***	***$23.8***	***$23.9***	***$23.4***	***$25.1***	***$270.9***
Demand-Responsive - assuming 8% fleet accessibility																
	Large Demand-Responsive	332		2	2	2	2	2	2	2	3	3	3	3	3	30
	Other Demand-Response Companies	13,000		-	87	88	90	92	94	96	98	100	102	104	106	1,055
	Small Regular Route/Mixed Companies 25% or fewer of fleet used in Fixed-Route	2,523		17	17	17	18	18	19	19	19	20	20	21	21	226
Subtotal	Vehicles	15,855		19	106	108	110	113	115	117	119	122	124	127	129	1,310
	Accessibility Cost (@$30,000) (in FY2000 dollars in millions)			***$0.6***	***$3.2***	***$3.2***	***$3.3***	***$3.4***	***$3.4***	***$3.5***	***$3.6***	***$3.7***	***$3.7***	***$3.8***	***$3.9***	***$39.3***
TOTAL																
	Vehicles	24,418	167	473	810	812	830	856	883	885	915	915	922	907	966	10,341
	Accessibility Cost (@$30,000) (in FY2000 dollars in millions)		***$5.0***	***$14.2***	***$24.3***	***$24.4***	***$24.9***	***$25.7***	***$26.5***	***$26.6***	***$27.5***	***$27.4***	***$27.7***	***$27.2***	***$29.0***	***$310.2***

Source: TCRP Project J-06(33), *Cost of Meeting Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, Inc., April, 2000.

Table 4-2 - NEW ACCESSIBLE OTRB PURCHASES FOR REPLACEMENT AND EXPANSION -- "HIGH" ESTIMATE -- 2000-2012

	Total Fleet Oct. 2000	New Accessible OTRBs Purchases - Replacement and Expansion													
		2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*TOTAL*
Regular-Route Service															
Greyhound	2,423	75	322	317	312	323	341	360	355	377	368	367	344	394	4,255
Large Regular Route and Mixed Companies (Class I definition - Over 5.3M gross rev)	1,597	47	132	132	132	132	132	132	132	132	132	132	132	132	1,628
Small Regular Route and Mixed Companies More than 25% of fleet used in FR	5,535	55	-	310	316	323	329	336	342	349	356	363	371	378	3,829
Subtotal Vehicles	9,555	177	454	759	760	777	802	827	829	858	856	862	846	904	9,712
Accessibility Cost (@$30,000) (in FY2000 dollars in millions)		***$5.3***	***$13.6***	***$22.8***	***$22.8***	***$23.3***	***$24.1***	***$24.8***	***$24.9***	***$25.7***	***$25.7***	***$25.9***	***$25.4***	***$27.1***	***$291.3***
Demand-Responsive - assuming 8% fleet accessibilIty															
Large Demand-Responsive	332		2	2	2	2	2	2	2	3	3	3	3	3	30
Other Demand-Response Companies	15,840		-	106	108	110	112	114	117	119	121	124	126	129	1,285
Small Regular Route/Mixed Companies 25% or fewer of fleet used in Fixed-Route	3,073		21	21	21	22	22	23	23	24	24	24	25	25	275
Subtotal Vehicles	19,245		23	129	131	134	137	139	142	145	148	151	154	157	1,589
Accessibility Cost (@$30,000) (in FY2000 dollars in millions)			***$0.7***	***$3.9***	***$3.9***	***$4.0***	***$4.1***	***$4.2***	***$4.3***	***$4.3***	***$4.4***	***$4.5***	***$4.6***	***$4.7***	***$47.7***
TOTAL															
Vehicles	28,800	177	476	888	891	911	938	967	971	1,003	1,004	1,013	1,000	1,061	11,301
Accessibility Cost (@$30,000) (in FY2000 dollars in millions)		***$5.3***	***$14.3***	***$26.6***	***$26.7***	***$27.3***	***$28.2***	***$29.0***	***$29.1***	***$30.1***	***$30.1***	***$30.4***	***$30.0***	***$31.8***	***$339.0***

Source: TCRP Project J-06(33), *Cost of Meeting Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, Inc., April, 2000.

used figures provided by Greyhound for its fleet and then assumed a 12-year replacement cycle for the other operators. For **expansion**, the researchers again used expansion figures provided by Greyhound for its fleet and then assumed that the other operators would expand 2 percent annually (based on the survey data collected by the research team and analysis of fleet size changes found in the *Bus Ride Bus Industry Directory* and other industry journals).

CAPITAL COSTS

Applying the projected capital cost per lift to the number of accessible OTRBs purchased per year results in an estimate of the annual capital cost of accessibility. As shown in Table 4-1 and Table 4-2, the rule will require acquisition of between 10,341 and 11,301 accessible OTRBs by 2012. The capital cost of these improvements would be between $310 and $339 million, which translates into an average annual cost of between $25 and $27 million (in Year 2000 dollars).

TRAINING COSTS

Training costs are a significant part of the industry's cost of complying with accessibility requirements. The research team's calculation of the training cost of accessibility relies on the industry's prevailing staffing levels and wages, as derived from the detailed data supplied by survey respondents. Table 4-3 and Table 4-4 present estimates that the cost of training employees will vary from $90.1 to $105 million, depending on the number of buses. The cost for carriers who are predominantly regular-route operators is estimated at between $41 and $46 million from the year 2000 through 2012 with the cost of training employees at carriers who are predominantly demand-responsive between $49 and $59 million during this same time. This translates into an average annual training cost of between $7.2 and $8.4 million (in Year 2000 dollars).

Table 4-3 - TRAINING COSTS BY YEAR - USING WEIGHTED HOURLY RATES - "LOW' ESTIMATES OF BUSES (in Year 2000 Dollars)

Fixed-Route Service

Year	Number of Buses	Number of Drivers	Number of New Drivers	Number of Customer Service	Number of New Customer Service	Number of Mechanics	Number of New Mechanics	Cost of Initial Training	Cost of Refresher Training	Cost of Instructor	Total Training Cost
2000	8,563	15,858	--	11,132	--	2,228	--	$4,820,915	--	$1,402,440	$6,223,356
2001	8,711	16,131	2,637	11,324	3,899	2,267	413	$644,517	1,245,868	$606,819	2,497,203
2002	9,106	16,862	3,134	11,838	4,285	2,369	483	$760,998	1,168,580	$657,321	2,586,899
2003	9,387	17,382	3,032	12,203	4,307	2,442	471	$738,518	1,221,539	$665,477	2,625,535
2004	9,675	17,915	3,123	12,578	4,438	2,517	485	$760,798	1,259,177	$685,806	2,705,780
2005	9,960	18,442	3,196	12,948	4,559	2,591	497	$778,872	1,297,827	$704,856	2,781,555
2006	10,250	18,978	3,284	13,325	4,688	2,667	511	$800,185	1,336,022	$724,993	2,861,201
2007	10,549	19,532	3,381	13,714	4,826	2,744	526	$823,991	1,374,842	$746,275	2,945,108
2008	10,850	20,088	3,467	14,105	4,958	2,823	539	$845,032	1,414,964	$766,916	3,026,912
2009	11,152	20,647	3,552	14,497	5,089	2,901	553	$865,785	1,455,323	$787,522	3,108,630
2010	11,459	21,214	3,644	14,896	5,226	2,981	567	$888,342	1,495,791	$808,848	3,192,982
2011	11,771	21,793	3,739	15,303	5,367	3,062	582	$911,685	1,536,914	$830,679	3,279,278
2012	12,138	22,471	3,926	15,779	5,572	3,158	610	$956,138	1,578,832	$860,780	3,395,750
							TOTALS	$14,595,775	$16,385,678	$10,248,734	$41,230,187

Demand-Responsive Service

Year	Number of Buses	Number of Drivers	Number of New Drivers	Number of Customer Service	Number of New Customer Service	Number of Mechanics	Number of New Mechanics	Cost of Initial Training	Cost of Refresher Training	Cost of Instructor	Total Training Cost
2000	2,855	5,298		3,712	--	744	--	$519,560	--	$117,039	$636,599
2001	16,172	29,934	25,426	21,024	18,548	4,206	3,587	$2,521,810	416,019	$661,974	$3,599,803
2002	16,496	30,533	5,059	21,444	7,421	4,291	791	$644,458	2,352,105	$675,210	$3,671,772
2003	16,825	31,143	5,160	21,873	7,570	4,376	807	$657,343	2,399,128	$688,710	$3,745,181
2004	17,162	31,766	5,263	22,311	7,721	4,464	823	$670,487	2,447,092	$702,480	$3,820,058
2005	17,505	32,401	5,368	22,757	7,876	4,553	839	$683,893	2,496,015	$716,525	$3,896,433
2006	17,855	33,048	5,475	23,212	8,033	4,644	856	$697,568	2,545,916	$730,851	$3,974,335
2007	18,212	33,709	5,585	23,676	8,194	4,737	873	$711,516	2,596,815	$745,464	$4,053,795
2008	18,577	34,383	5,696	24,150	8,358	4,832	891	$725,743	2,648,733	$760,369	$4,134,844
2009	18,948	35,070	5,810	24,633	8,525	4,928	908	$740,254	2,701,688	$775,572	$4,217,515
2010	19,327	35,771	5,927	25,125	8,695	5,027	926	$755,056	2,755,703	$791,079	$4,301,838
2011	19,714	36,486	6,045	25,628	8,869	5,127	945	$770,153	2,810,798	$806,897	$4,387,848
2012	20,108	37,216	6,166	26,140	9,047	5,230	964	$785,553	2,866,995	$823,030	$4,475,579
							TOTALS	$10,883,393	$29,037,007	$8,995,200	$48,915,601

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, Inc., April 2000.

Table 4-4 - TRAINING COSTS BY YEAR - USING WEIGHTED HOURLY RATES "HIGH" ESTIMATES OF BUSES (in Year 2000 Dollars)

Fixed-Route Service

Year	Number of Buses	Number of Drivers	Number of New Drivers	Number of Customer Service	Number of New Customer Service	Number of Mechanics	Number of New Mechanics	Cost of Initial Training	Cost of Refresher Training	Cost of Instructor	Total Training Cost
2000	9,555	17,693	--	12,422	--	2,486	--	$5,379,003	--	$1,564,811	$6,943,814
2001	9,703	17,967	2,910	12,614	4,329	2,524	456	$711,733	1,390,088	$674,275	2,776,097
2002	10,138	18,772	3,482	13,180	4,766	2,638	537	$845,483	1,301,563	$731,337	2,878,383
2003	10,440	19,329	3,355	13,571	4,781	2,716	521	$817,345	1,359,895	$739,038	2,916,277
2004	10,749	19,901	3,452	13,974	4,921	2,796	537	$841,201	1,400,299	$760,837	3,002,337
2005	11,055	20,468	3,532	14,372	5,052	2,876	549	$860,883	1,441,772	$781,388	3,084,043
2006	11,367	21,045	3,626	14,777	5,191	2,957	564	$883,836	1,482,846	$803,056	3,169,739
2007	11,688	21,640	3,731	15,195	5,339	3,041	580	$909,316	1,524,603	$825,898	3,259,817
2008	12,012	22,239	3,823	15,616	5,481	3,125	595	$932,063	1,567,720	$848,132	3,347,915
2009	12,337	22,840	3,915	16,039	5,623	3,209	610	$954,557	1,611,134	$870,363	3,436,053
2010	12,668	23,452	4,015	16,468	5,770	3,295	625	$978,889	1,654,718	$893,346	3,526,953
2011	13,005	24,075	4,118	16,906	5,922	3,383	641	$1,004,043	1,699,019	$916,867	3,619,929
2012	13,396	24,799	4,311	17,415	6,139	3,485	670	$1,050,343	1,744,180	$948,691	3,743,214
							TOTALS	$16,168,694	$18,177,836	$11,358,040	$45,704,571

Demand-Responsive Service

Year	Number of Buses	Number of Drivers	Number of New Drivers	Number of Customer Service	Number of New Customer Service	Number of Mechanics	Number of New Mechanics	Cost of Initial Training	Cost of Refresher Training	Cost of Instructor	Total Training Cost
2000	3,405	6,315	--	4,427	--	887	--	$619,435	--	$139,545	$758,980
2001	19,630	36,331	30,957	25,519	22,566	5,105	4,367	$3,069,755	495,979	$803,468	$4,369,202
2002	20,022	37,058	6,140	26,029	9,008	5,208	960	$782,215	2,854,812	$819,533	$4,456,560
2003	20,423	37,798	6,262	26,550	9,188	5,312	979	$797,856	2,911,889	$835,919	$4,545,664
2004	20,831	38,554	6,388	27,081	9,372	5,418	999	$813,809	2,970,108	$852,633	$4,636,551
2005	21,248	39,325	6,515	27,622	9,560	5,526	1,019	$830,082	3,029,491	$869,682	$4,729,255
2006	21,673	40,111	6,646	28,175	9,751	5,637	1,039	$846,680	3,090,062	$887,071	$4,823,814
2007	22,106	40,913	6,778	28,738	9,946	5,749	1,060	$863,611	3,151,845	$904,808	$4,920,263
2008	22,549	41,731	6,914	29,313	10,145	5,864	1,081	$880,879	3,214,862	$922,900	$5,018,642
2009	23,000	42,565	7,052	29,899	10,348	5,982	1,102	$898,494	3,279,141	$941,354	$5,118,988
2010	23,460	43,416	7,193	30,497	10,554	6,101	1,125	$916,460	3,344,705	$960,177	$5,221,342
2011	23,929	44,284	7,337	31,107	10,766	6,223	1,147	$934,786	3,411,580	$979,376	$5,325,742
2012	24,407	45,170	7,484	31,730	10,981	6,348	1,170	$953,478	3,479,792	$998,959	$5,432,230
							TOTALS	$13,207,541	$35,234,267	$10,915,426	$59,357,234

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, Inc., April 2000.

MAINTENANCE COSTS

The number of buses in service each year multiplied by the $1,200 annual maintenance and cycling cost described in Chapter 2 produces an estimated total annual maintenance cost for the entire fleet. Table 4-5 and Table 4-6 present the maintenance cost estimates by year for "low" and "high" ranges for total buses, respectively. The tables indicate that between $77 and $84 million will be needed for maintenance of the lifts from 2000 through 2012 for an average annual cost of between $6.2 and $6.7 million (in Year 2000 dollars). Maintenance costs are not addressed by the FTA Section 3038 program.

SUMMARY OF COMPLIANCE COST ESTIMATES

Table 4-7 summarizes the compliance costs included in the analysis–the capital cost of the lifts and other accessibility features, the training cost for personnel (i.e., drivers, mechanics, and customer service staff), and the maintenance costs on the lifts. The total estimated cost of compliance from 2000 through 2012 is estimated at between $477.6 and $528.1 million (in Year 2000 dollars). This represents an average annual cost of $38.2 to $42.2 million, including ranges of $24.8 million to $27.1 million for the cost of the lifts, $7.2 to $8.4 million for training, and $6.2 to $6.7 million for maintenance and cycling of the lifts.

SENSITIVITY ANALYSIS

A sensitivity analysis was performed in order to test the sensitivity of the overall cost estimates to changes in the individual cost components. The analysis involved changing each of the following variables over a range of values and examining the effect on total costs. Using only the "low" base case for the total OTRBs affected by the rule (24,418 buses), only one component was changed at a time; all other components were held constant. The ranges for each component were determined on a case-by-case and were chosen to illustrate the potential effects on total costs of

Table 4-5 - MAINTENANCE ON ACCESSIBLE OTRBs -- REPLACEMENT AND EXPANSION - 2000-2012 -- "LOW" ESTIMATE OF BUSES

	Total Fleet Oct. 2000	Total Accessible OTRBs - Replacement and Expansion													
		2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*TOTAL*
Regular-Route Service															
Vehicles	8,563	167	621	1,325	2,029	2,749	3,492	4,260	5,028	5,824	6,617	7,415	8,195	9,032	
Maintenance Cost (@$1,200/vehicle) (Year 2000 dollars in thousands)		***$200***	***$745***	***$1,590***	***$2,435***	***$3,299***	***$4,190***	***$5,112***	***$6,034***	***$6,989***	***$7,940***	***$8,898***	***$9,834***	***$10,838***	***$68,105***
Demand-Responsive - assuming 8% fleet accessibility															
Vehicles	15,855		19	125	233	343	456	571	688	807	929	1,053	1,180	1,309	
Maintenance Cost (@$1,200/vehicle) (Year 2000 dollars in thousands)			***$23***	***$150***	***$280***	***$412***	***$547***	***$685***	***$826***	***$968***	***$1,115***	***$1,264***	***$1,416***	***$1,571***	***$9,256***
TOTAL															
Vehicles	24,418	167	640	1,450	2,262	3,092	3,948	4,831	5,716	6,631	7,546	8,468	9,375	10,341	
Maintenance Cost (@$1,200/vehicle) (Year 2000 dollars in thousands)		***$200***	***$768***	***$1,740***	***$2,714***	***$3,710***	***$4,738***	***$5,797***	***$6,859***	***$7,957***	***$9,055***	***$10,162***	***$11,250***	***$12,409***	***$77,360***

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, Inc., April 2000.

Table 4-6 - MAINTENANCE ON ACCESSIBLE OTRBs -- REPLACEMENT AND EXPANSION - 2000-2012 -- "HIGH" ESTIMATE OF BUSES

	Total Fleet Oct. 2000	Total Accessible OTRBs - Replacement and Expansion												
		2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*TOTAL*
Regular-Route Service															
Vehicles	9,555	177	631	1,390	2,150	2,927	3,729	4,556	5,385	6,243	7,099	7,961	8,807	9,711	
Maintenance Cost (@$1,200/vehicle) (Year 2000 dollars in thousands)		*$212*	*$757*	*$1,668*	*$2,580*	*$3,512*	*$4,475*	*$5,467*	*$6,462*	*$7,492*	*$8,519*	*$9,553*	*$10,568*	*$11,653*	*$72,919*
Demand-Responsive - assuming 8% fleet accessibility															
Vehicles	19,245		19	152	283	417	554	693	835	980	1,128	1,279	1,433	1,590	
Maintenance Cost (@$1,200/vehicle) (Year 2000 dollars in thousands)			*$23*	*$182*	*$340*	*$500*	*$665*	*$832*	*$1,002*	*$1,176*	*$1,354*	*$1,535*	*$1,720*	*$1,908*	*$11,236*
TOTAL															
Vehicles	28,800	177	650	1,542	2,433	3,344	4,283	5,249	6,220	7,223	8,227	9,240	10,240	11,301	
Maintenance Cost (@$1,200/vehicle) (Year 2000 dollars in thousands)		*$212*	*$780*	*$1,850*	*$2,920*	*$4,013*	*$5,140*	*$6,299*	*$7,464*	*$8,668*	*$9,872*	*$11,088*	*$12,288*	*$13,561*	*$84,155*

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, April 2000.

Table 4-7 - SUMMARY OF COMPLIANCE COSTS
(Year 2000 Dollars in Millions)

	Type of Service: Regular-Route	Type of Service: Demand-Response	TOTAL (2000-2012)	Average Annual Cost (12.5 yrs)
"Low" Estimate of Buses				
Capital Cost	$ 270.9	$ 39.3	$ 310.2	$ 24.8
Training Cost	41.2	48.9	90.1	7.2
Maintenance Costs	68.1	9.2	77.3	6.2
TOTAL	$ 380.2	$ 97.4	$ 477.6	$ 38.2
"High" Estimate of Buses				
Capital Cost	$ 291.3	$ 47.7	$ 339.0	$ 27.1
Training Cost	45.7	68.9	105.0	8.4
Maintenance Costs	72.9	11.2	84.1	6.7
TOTAL	$ 409.9	$ 127.8	$ 528.1	$ 42.2

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses*, prepared by KFH Group, Inc., April 2000.

Table 4-8 - RESULTS OF SENSITIVITY ANALYSIS
(Year 2000 Dollars in Millions)

Cost Component	Range Tested	Variation in Total Cost		Variation in Average Annual Cost	
		Low	High	Low	High
NUMBER OF ACCESSIBLE BUSES					
Percent of Demand-Responsive Fleet that Needs to be Accessible	6 -10 %	$ 465.1	$ 489.6	$ 37.2	$ 39.2
CAPITAL COST ITEMS					
Cost of Lift and Other Accessibility Features	$25,000 - $35,000	$ 423.4	$ 529.4	$ 33.9	$ 42.4
TRAINING COST ITEMS					
Staff to Bus Ratio					
Drivers	1.6 - 2.1	$ 470.0	$ 485.30	$ 37.6	$ 38.8
Customer Service Reps	1.0 - 1.6	$ 472.0	$ 483.3	$ 37.8	$ 38.7
Mechanics	0.25 - 0.35	$ 477.3	$ 480.8	$ 38.2	$ 38.5
Number of Initial Training Hours for Fixed-Route Drivers and Customer Service Reps	8 - 16 hours	$ 473.7	$ 481.4	$ 37.9	$ 38.5
MAINTENANCE COST ITEMS					
Annual Lift Maintenance Cost	$200 - $600	$ 463.7	$ 489.4	$ 37.1	$ 39.2
Maintenance - No. of Lift Cycles/Yr.	50-300	$ 435.2	$ 477.6	$ 34.8	$ 38.2

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses,* prepared by KFH Group, Inc., April 2000.

changing input components. The results are summarized in Table 4-8. As might be expected, the most important factors affecting the total cost of compliance are (1) the number of OTRBs that need to be accessible and (2) the capital cost per bus for the lift and other accessibility features.

COST OF FINANCING

The Nathan report, the PRA, and the RA all included analyses that reflected the fact that private operators of OTRBs lease or finance their new vehicles, and any new accessibility equipment on new vehicles will likely be financed (Appendix B discusses these analyses in more detail). The analysis of the capital costs of complying with the Final Rule should include the financing cost that will be faced by the operators unless they receive public funding to pay for these incremental capital costs.

However, the analysis to this point has estimated these costs in Year 2000 dollars as if they are to be paid in the year of vehicle purchase, in cash, with no discounting of future costs to net present values. The year-by-year costs presented above are an appropriate estimate for annual program allocations, while the discounted analyses found in the PRA and the RA reflect the time value of money by discounting future payments back to present values.

Because financing a current capital cost adds the dimension of the time value of money in the form of interest payments and because it defers payments into the future, it would be inappropriate to mix these two analyses by including both finance costs and the incremental capital costs in the year of purchase. However, if carriers have to pay the entire incremental costs of accessibility equipment, and they lease or finance all their equipment, they will pay substantial interest costs.

In order to demonstrate this, Table 4-9 and 4-10 present summary amortization tables for the incremental costs of accessibility equipment on all the buses purchased in the years 2000 through 2012, as shown in the previous analysis. Based on information from Greyhound's Chief Financial Officer, a 7.5-percent interest rate was applied to the capital costs of the lifts and other accessibility equipment, over a 12-year period. Smaller firms might well face higher interest costs and shorter

Table 4-9 - AMORTIZATION TABLES OF FINANCE LEASE COSTS FOR INCREMENTAL COSTS OF ACCESSIBILITY EQUIPMENT "LOW" FLEET SIZE ESTIMATE (Year 2000 Dollars)

Year	Sum Interest	Sum Principal	Total Annual Payments
2000	375,750	271,931	647,681
2001	1,419,604	1,062,527	2,482,131
2002	3,162,413	2,461,165	5,623,579
2003	4,804,824	3,967,961	8,772,784
2004	6,374,726	5,617,076	11,991,801
2005	7,879,443	7,432,213	15,311,657
2006	9,308,775	9,427,450	18,736,225
2007	10,592,966	11,575,587	22,168,552
2008	11,783,547	13,933,682	25,717,229
2009	12,797,273	16,468,637	29,265,910
2010	13,636,628	19,205,111	32,841,738
2011	14,236,996	22,122,395	36,359,391
2012	15,127,068	24,978,794	40,105,862
2013	14,317,907	25,787,956	40,105,863
2014	14,206,314	25,899,549	40,105,863
2015	14,090,847	26,015,020	40,105,866
2016	14,007,219	26,098,641	40,105,860
2017	13,975,824	26,130,042	40,105,866
2018	14,002,819	26,103,041	40,105,860
2019	14,036,343	26,069,523	40,105,866
2020	14,139,877	25,965,985	40,105,862
2021	14,251,176	25,854,685	40,105,861
2022	14,386,576	25,719,284	40,105,860
2023	14,498,377	25,607,481	40,105,858
2024	15,127,068	24,978,794	40,105,862
2025	14,317,907	25,787,956	40,105,863
Total	$ 296,858,267	$ 474,542,483	$ 771,400,750
NPV@7% (a)	$ 110,908,715	$ 162,818,305	$ 273,727,019
AAPW (b)	$ 9,378,555	$ 13,768,083	$ 23,146,638

(a) NPV - Net Present Value
(b) AAPW - Average Annual Present Worth

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses*, prepared by KFH Group, Inc., April 2000.

Table 4-10 - AMORTIZATION TABLES OF FINANCE LEASE COSTS FOR INCREMENTAL COSTS OF ACCESSIBILITY EQUIPMENT "HIGH" FLEET SIZE ESTIMATE (Year 2000 Dollars)

Year	Sum Interest	Sum Principal	Total Annual Payments
2000	398,250	288,214	686,464
2001	1,447,633	1,084,917	2,532,549
2002	3,364,263	2,612,244	5,976,507
2003	5,173,092	4,259,009	9,432,100
2004	6,903,415	6,061,847	12,965,262
2005	8,559,275	8,043,866	16,603,141
2006	10,131,733	10,221,757	20,353,490
2007	11,549,850	12,569,504	24,119,354
2008	12,863,887	15,145,437	28,009,324
2009	13,986,982	17,916,195	31,903,177
2010	14,922,520	20,909,414	35,831,934
2011	15,604,316	24,105,956	39,710,272
2012	16,581,871	27,243,314	43,825,185
2013	15,609,621	28,215,565	43,825,186
2014	15,491,457	28,333,729	43,825,187
2015	15,371,176	28,454,014	43,825,190
2016	15,286,874	28,538,309	43,825,183
2017	15,257,004	28,568,186	43,825,190
2018	15,290,138	28,535,045	43,825,183
2019	15,334,762	28,490,427	43,825,190
2020	15,454,728	28,370,457	43,825,185
2021	15,585,942	28,239,242	43,825,184
2022	15,747,250	28,077,933	43,825,183
2023	15,891,401	27,933,779	43,825,180
2024	16,581,871	27,243,314	43,825,185
2025	15,609,621	28,215,565	43,825,186
Total	$ 323,998,933	$ 517,677,239	$ 841,676,172
NPV@7% (a)	$ 120,860,491	$ 177,373,394	$ 298,233,885
AAPW (b)	$ 10,220,087	$ 14,998,877	$ 25,218,964

(a) NPV - Net Present Value
(b) AAPW - Average Annual Present Worth

Source: TCRP Report on J-06 (33), *Cost of Meeting the Accessibility Requirements for Over-the-Road Buses*, prepared by KFH Group, Inc., April 2000.

terms. The amortization tables present a 26-year analysis period, consisting of the initial period of equipping the fleets, and a subsequent replacement of those lift-equipped vehicles. No growth in the fleet has been added for years 14 through 26. The amortization tables separate the annual payments (assumed as one annual payment, 12 altogether) on $30,000 lifts for the bus purchases in each year into the principal and interest components.

As can be seen, in the early years, financing the incremental capital cost of the lifts reduces the annual costs to the bus firms, but, over the study period, there are substantial interest costs. Because these costs are paid in future dollars, however, they must be discounted to the present value. In each table, the total sum of payments is discounted to a current value using a discount rate of 7 percent and then the average annual present worth is calculated to reflect an average annual discounted value of these payments. As expected, future payments at 7.5 percent interest, discounted to current values, are quite close in magnitude to the annual cash payments that would be required to purchase this equipment. Thus in an economic sense, they are essentially equivalent.

Bus operators lease or finance equipment for a number of reasons, including lack of available cash for capital costs, tax benefits, and potential alternative uses for the funding. This analysis cannot present a full picture of the costs of financing this equipment because the analysis does not net out the potential benefits to the firm. However, operators will need to make these payments, including the interest costs, if they cannot pay cash at purchase. To the extent that these incremental capital costs are paid by public sources, the carriers will not need to make these payments.

SUMMARY OF RESULTS

Although compliance with the Final Rule of the ADA involves a number of potential cost issues, this analysis addressed the incremental capital costs of the lifts and other accessibility features, the training costs for personnel (i.e., drivers, mechanics, and customer service staff), and the maintenance costs on the lifts. The total of the costs included in this analysis for the years from 2000 through 2012 is estimated at between $477.6 and $528.1 million in Year 2000 dollars. This represents an average annual cost ranging from $24.8 million to $27.1 million for the capital cost

of the lifts, $7.2 to $8.4 million for training, and $6.2 to $6.7 million for maintenance and cycling of the lifts. The Section 3038 program addresses the incremental capital and training costs, but not the related maintenance costs. Not including the cost of maintenance, the total incremental capital and training costs are estimated to fall in a range between $400.3 and $444 million (Year 2000 dollars) for the period from 2000 to 2012.

It is difficult to put these incremental costs into current financial context for the firms because there is so little current information on the financial health of the industry, particularly for the regular-route carriers. For example, Greyhound no longer files separate Security and Exchange Commission reports because it is owned by Laidlaw, which is publicly traded but includes many other operations, and Coach USA is owned by Stagecoach, with is also publicly traded but includes many different transportation operations around the world.

ABBREVIATIONS, ACRONYMS, AND TERMS

48-hour Advance Reservation - Individuals with limited mobility are encouraged to provide bus companies with 48-hour's notice to ensure accessible bus availability.

48-hour Requirement - Bus companies are required to provide accessible service given 48 hour's advance notice.

48-hour Rule - *See 48-hour Requirement.*

ADA - Americans with Disabilities Act of 1990.

ANPRM - Advanced Notice of Proposed Rulemaking.

ABA- American Bus Association.

Accessible - The extent to which transportation vehicles and facilities are free of barriers and usable by persons with disabilities, including wheelchair users.

Airport - Type of service provided by some bus companies where buses or other vehicles pick up passengers at the airport and transport them to various locations nearby, including, but not limited to, hotels, home addresses, and businesses.

BTS - Bureau of Transportation Statistics.

Calendar Year - The 12-month period beginning on January 1 and ending on December 31.

Capital Cost - The expenditure made by companies when purchasing physical assets such as buses or lift equipment. This figure does not include interest or maintenance costs.

Carrier - Any bus company primarily in the business of transporting people between locations.

Charter - A type of demand-responsive bus service provided by some companies for a predetermined fee to an individual or group of individuals. There is scheduled pick up and delivery of a specific group of people from designated points with limited stops in between.

Charter Only - The bus company provides exclusively charter service and no other types of service.

Class I Carriers - Group of bus companies whose total revenue is at least $5.3 million per year.

Class I Firms - *See Class I Carriers.*

Class I Operators - *See Class I Carriers.*

Class I Motor Carriers - *See Class I Carriers.*

Commercial Service - Bus service provided for hire for an indefinite amount of time; does not include motorhomes or music industry tour buses.

Commuter - Type of service provided by some bus companies for a fee involving taking people from either their homes or a designated pick-up location to their workplace and back.

Companions - People who accompany bus passengers with mobility limitations on trips to ensure their safety and comfort.

Cycling - Maintenance procedure that involves complete deployment of the lift equipment on buses. Cycling is done to ensure proper working condition of the lift.

DART- Dallas Area Rapid Transit.

D3 - Model of over-the-road bus manufactured by MCI with dimensions of 40 feet long by 102 inches-wide.

DL3 - Model of bus manufactured by MCI with dimensions of 45 feet long by 102 inches wide.

Demand-Response Only - A type of service provided by some bus companies that involves making only requested trips. These companies do not provide any fixed-route service.

Demand-Responsive - A type of service provided by companies that involves making individually requested trips for a person or group of people. These types of trips include tour and charter service, as well as human service agency programs.

Equivalent Service - A mode of transporting passengers with mobility impairments that has been approved as an equal alternative. This is deemed acceptable under the Final Rule if an accessible OTRB is not available at the time of travel.

Expansion - New buses purchased to accommodate increased ridership or company growth.

Final Rule - Regulation recently passed that requires all bus companies to provide for passengers with mobility limitations. Requirements differ with company size and services provided.

Fiscal Year - 12-month period used by companies to determine annual profits or losses. There is no set beginning or ending month.

Fixed-Route - Type of service provided by some bus companies that involves a bus traveling on a regular schedule making consistent stops at designated places. This type of service is open to the general public.

Federal - Describes anything that originates from the U.S. government. Generally refers to regulations or standards.

Industrywide - Any standard or practice that is practiced by an entire industry, such as the bus industry.

ICC - Interstate Commerce Commission.

Intercity - A bus route that originates in one locality and terminates in another at least 75 miles away. Usually refers to fixed-route service provided by bus carriers.

Intercity Regular Route - *See Intercity.*

Large Carrier - A bus company whose total annual revenue is at least $5.3 million.

Large Demand-Responsive - A bus company whose total annual revenue is at least $5.3 million and whose primary service is transporting people on a request basis.

Large Fixed-Route - A bus company whose total annual revenue is at least $5.3 million and whose primary service is transporting people between known locations at scheduled times.

Large Regular-Route - *see Large Fixed-Route.*

Local Fixed-Route - A bus carrier that provides scheduled service exclusively for a town or region.

MCI - Motor Coach Industries.

MC-8 - Model of over-the-road bus manufactured by MCI with dimensions of 40 feet long by 96 inches wide.

MC-12 - Model of over-the-road bus manufactured by MCI with dimensions of 40 feet long by 96 inches wide; a later model of the MC-8.

Maintenance Cost - The expenditure made by companies to keep the lift equipment in proper working condition.

Mixed Service - A combination of fixed-route and demand-responsive service provided by some bus companies.

Mobility Device - Describes any tool used by persons with disabilities to improve their ability to get places independently. Most often refers to a wheelchair.

NPRM - Notice of Proposed Rulemaking.

OTRB - Over-the-Road Bus.

Operator - (1) Term used to describe an entire bus company; (2) Term used to describe the specific individual in charge of running an OTRB on a daily basis.

Over-the-Road Bus - A bus characterized by an elevated passenger deck located over a baggage compartment. OTRBs are a familiar type of bus used by intercity bus carriers as well as charter and tour operators.

"Over 25 percent" small carriers - Bus companies that use at least 25 percent of their fleet for fixed-route service.

OTA - Office of Technology Assessment.

PRA - Preliminary Regulatory Assessment.

Persons with Disabilities - Individuals who face a unique set of challenges completing everyday activities. Most commonly refers to persons with mobility impairments.

Persons with Mobility Impairments - Individuals who have difficulty with ambulatory functions. Most often refers to persons restricted to wheelchairs.

Persons Using Wheeled Mobility Devices - Individuals using a wheelchair.

"Primarily Charter"- Any bus company that uses at least 50 percent of its total bus fleet for charter services rather than fixed-route services.

"Primarily Fixed-Route" - Any bus company that uses at least 50 percent of its total bus fleet for fixed-route services rather than charter and tour services.

Privately Operated - A company that is owned and run on a daily basis by an individual or a group of individuals not affiliated with any government entity. All profits or losses are absorbed by the company.

PowerLift - Model of wheelchair lift for OTRBs manufactured by Stewart & Stevenson.

Regular-Route - *See Fixed-Route.*

Regular-Route Intercity - *See Fixed-Route.*

Replacement - Bus purchases by a company to replace old or improperly functioning buses. This type of bus purchase does not reflect company growth or increased ridership.

Retrofitting - Selecting buses currently in a fleet and equipping them with wheelchair lifts. This is a way of meeting accessibility requirements without purchasing new buses. It is not required under the Final Rule.

Rulemaking - The process the federal government goes through in order to pass proposed regulations into law.

RA - Regulatory Assessment.

Ricon - A primary manufacturer and supplier of lift-equipment for OTRBs.

Ricon Mirage - A common type of lift manufactured by Ricon used for OTRBs.

Small Carrier - Any bus company whose total annual revenues are less than $5.3 million.

Small Composite Service Carriers - Any bus company that provides various services (e.g., fixed-route, charter, tour, commuter, etc.) whose total annual revenues are less than $5.3 million.

Small Fixed-Route - Any bus company that provides primarily fixed-route service and whose total annual revenue is less than $5.3 million.

Small Regular-Route - *See Small Fixed-Route.*

Systemwide - Standard or practice that is adopted throughout a network of companies or operators.

Stewart & Stevenson - A primary manufacturer and supplier of lift-equipment for OTRBs.

TEA-21 - "Transportation Equity Act for the 21st Century"; authorizing legislation that allows funding for FTA programs from FY 1998 through FY 2003.

Tour - A type of service provided by some bus companies that involves retail sale of seats on a bus traveling from a given origin to a given destination on a set schedule.

Training Cost - The expenditure made by companies to teach employees to become proficient with the lift equipment. This includes payments to trainers and wages lost in training time.

Wheelchair - Mobility device used by persons with ambulatory difficulties.

APPENDIX A

REVIEW OF PREVIOUS COST ANALYSES

INTRODUCTION

As discussed in Chapter 1 of this report, this study is not the first effort to estimate the costs of making privately operated OTRBs accessible. Costs and their potential effect on the industry and its ability to maintain services have been a major focus of this discussion for nearly two decades. The cost issue has incorporated some considerations that have changed over the years, including the availability and cost of technology to permit accessibility, the effect of the technology on the service, the various policy options for implementing this technology, the number of vehicles that would be affected (an issue both in terms of the policy options and the available data on vehicle fleets and service types), the speed of implementation, and potential effects on demand and possible changes in revenues.

This appendix reviews previous studies and assessments that addressed the cost of accessibility for private operators of OTRBs. **The purpose of this review is to present a complete picture of the literature on this topic in order to lay out clearly the sources of available information, the assumptions made in previous work, and the areas of similarity and difference**. Included in this review are the following sources:

- *Potential Demand for Over-the-Road Bus Services by Individuals with Disabilities* and *Evaluation of Methods to Provide Accessibility to Over-the-Road Buses and Services*, prepared by Ecosometrics, Inc., for the Office of Technology Assessment, July 1992 (Ecosometrics studies).

- *Access to Over-the-Road Buses for Persons with Disabilities*, Office of Technology Assessment, Congress of the United States, May 1993 (OTA report).

- *Evaluation of Technology and Deployment Alternatives for Providing Regularly Scheduled Intercity Bus Service to Mobility Impaired Travelers*, Nathan Associates, Inc., prepared for Greyhound Lines, Inc., November 1997 (Nathan report).

- U.S. Department of Transportation, Office of the Secretary, Notice of Proposed Rulemaking, 49 CFR Part 37 [Docket OST-1998-3648; Notice 98-15] RIN 2105-ACOO, *Transportation for Individuals with Disabilities*, March 20, 1998 (NPRM).

- *Transportation for Individuals with Disabilities: Accessibility of the Over-the-Road Buses*, Notice of Proposed Rulemaking, Preliminary Regulatory Assessment; U.S. Department of Transportation, Assistant Secretary for Transportation Policy, Office of Environment, Energy and Safety; March 1998 (PRA).

- *Response of Greyhound Lines, Inc., to Notice of Proposed Rulemaking*, before the Department of Transportation, Office of the Secretary, Docket OST-1998-3648, Notice No. 98-15, May 26, 1998 (Greyhound response).

- U.S. Department of Transportation, Office of the Secretary, Rulemaking, 49 CFR Part 37 [Docket OST-1998-3648; Notice 98-15] RIN 2105-ACOO, *Transportation for Individuals with Disabilities*, September 24, 1998 (Final Rule).

- *Transportation for Individuals with Disabilities: Accessibility of the Over-the-Road Buses*, Rulemaking, Regulatory Assessment; U.S. Department of Transportation, Assistant Secretary for Transportation Policy, Office of Environment, Energy and Safety; September 1998 (RA).

The Ecosometrics reports and the OTA report provide background information on the technologies, costs of lifts, numbers of firms, and numbers of buses. The OTA report applies cost estimates to several potential strategies for achieving accessibility, but does not develop national cost estimates for the Final Rule. In late 1997, Nathan Associates produced for Greyhound Lines an assessment of the cost of different alternatives for achieving accessibility on Greyhound, including an option similar to the Final Rule. The NPRM and its PRA provide the DOT estimate of the costs of two alternative means of achieving accessibility, including one option that is quite close to the Final Rule. In its response to the NPRM, Greyhound countered the DOT cost estimates on several

grounds and included a revision of the Nathan report costs to address the specific aspects of the NPRM. The ABA also provided some cost information in its filing. The RA that accompanied the Final Rule set forth the final DOT estimates of the costs of implementation, and these take into account some of the criticisms of the PRA and the NPRM, in particular reducing the estimated demand and associated revenue offsets. However, the RA is critical to the assessment of the costs of implementing the Final Rule, because it basically represents the last word to this point.

The original Ecosometrics reports documented virtually all the previous experience regarding ridership changes following increased accessibility to that point (1992) and found very limited ridership by persons with disabilities requiring use of the lifts. The Nathan report, the PRA, and the RA all included some level of updating of this experience. However, like the OTA report, the PRA discounted this experience as not reflective of the ridership that would be stimulated by a nationally accessible system not requiring advance reservations. The Nathan report and the ABA filings cited the low levels of ridership experienced even since the OTA report, and the final RA produced by the DOT lowered the ridership estimates somewhat in response. This review will cover the ridership issue; however, there is little experience base and the DOT finally made some assumptions to complete the analysis.

THE ECOSOMETRICS STUDIES

Three studies were completed for the OTA: an overview of the industry, a review of available technologies, and an estimate of potential demand. The first, the overview of the industry, did not contain cost information, but is important because it provided information on the numbers of OTRBs in service and information about the basic structure of the industry that later was incorporated into the OTA report and appears to have been the basis for some of the PRA and RA analysis. This information is discussed in greater detail in Chapter 3 of this report. The report also provided information on the financial condition of the industry, changes in service levels following regulatory reform, and the status of rural services. **Its principal relevance to the current cost issue**

is that information on the numbers of OTRBs operated by various industry segments was used in the OTA report and subsequently by the DOT.

The second Ecosometrics report addressed the availability and costs of alternative technologies at that time. This report included a comprehensive review of technologies addressing various disability needs, including both station-based and vehicle-based lift technologies. Per bus cost estimates for various technologies were included, although, in most cases, the costs were based on prototype installations. Of the technologies reviewed at that time and still available, the study cited an estimated option cost for a Stewart & Stevenson PowerLift on an MCI coach, at $25,000 per bus, and a preliminary estimate for a Ricon F-9000 Mirage Lift, at $12,000 to $14,000 per bus, though no North American installations had been completed at that time. The study also included details about the amount of seating and baggage space lost for each type of lift.

The third Ecosometrics report concerned the potential demand for accessible services. It included a survey/interview with all known operators of accessible OTRBs in North America to determine lift usage and stimulated ridership, finding that there had been very limited usage to that point–even on comprehensive demonstrations or implementations that included outreach efforts and links with local accessible transit service. However, none of the projects to that point had been part of a comprehensive national system, and only the Canada Coach Lines demonstration had provided lift-equipped buses on all schedules, so the study included an additional assessment of potential ridership, based on demographic data. National data on disability incidence was used to estimate the numbers of persons requiring a lift to use an intercity bus and those who would benefit. Estimates were provided for regular-route and charter and tour services, using a trip rate that assumed that persons requiring a level change device[1] to access an OTRB would make trips at the same rate as the general population, if the systems were fully accessible and no reservations were required. These estimates were then adjusted to provide a range of potential demand reflecting the possibility that the trip rates of persons requiring a level change device might be lower. The final

[1]The trip rates were applied to the population of persons requiring a level change device, defined as all persons using wheelchairs (or other wheeled mobility devices) or walkers. Separate estimates were made for each group.

estimate of annual demand by persons requiring lifts at full implementation was 69,838 trips per year for regular-route intercity services and 66,793 trips per year for charter and tour services.[2] No estimates of revenues from stimulated trips were developed.

THE OTA REPORT: *Access to Over-the-Road Buses for Persons with Disabilities*

The OTA report incorporated some of the Ecosometrics work into the development of assessments of the potential costs of alternative means of providing accessibility and the potential demand (and revenues). Table A-1 summarizes the costs of various options as presented in the OTA report. OTA concluded that only accessibility alternatives permitting the wheelchair user to remain in his or her own wheeled mobility aid would meet the ADA definitions of accessibility, but these alternatives included options involving vehicle-based lifts, ramps, and station-based lifts. Only these alternatives were analyzed, eliminating consideration of some options favored by the bus industry, such as boarding chairs and station-based or portable ramps or lifts that would use the existing front door of the bus.

OTA classified the costs of implementing accessible OTRB service into (1) capital costs (including the level-change device, modifications to the bus, and major repairs); (2) maintenance (i.e., routine cycling and scheduled maintenance); (3) and lost revenue (from lost seating or lost baggage space). No estimates of training costs were included as part of the implementation. OTA estimates of capital costs were generally taken from the Ecosometrics work, with additional assumptions made regarding potential major repair costs. OTA developed these costs on a per bus basis for comparison, analyzing their effect in terms of the additional costs per mile involved in providing an accessible bus over a 20-year, 1.5-million-mile bus lifetime. The per mile costs of the scenario closest to the Final Rule requirements came to 2.3 cents per mile, representing an increase in the overall operating cost per mile of 1.15 percent. The report noted that the overall industry

[2] *Potential Demand for Over-the-Road Bus Services by Individuals with Disabilities*, Ecosometrics, Inc., Final Report. Prepared for Office of Technology Assessment, U.S. Congress, July 15, 1992.

Table A-1 - COST ESTIMATES FOR VEHICLE-BASED LIFTS FROM THE OTA STUDY (1992 Dollars, 20-Year Estimated Bus/Lift Life)

Parameter	Low-Cost Lift	Medium-Cost Lift	External Lift	High-Cost Lift
Capital Costs				
Lift Cost				
Ricon	$ 7,000	NA	NA	NA
Stewart & Stevenson	NA	$ 10,000	NA	NA
External	NA	NA	$ 11,000	NA
High-Cost Lift	NA	NA	NA	$ 17,000
Installation, door, seats, etc.	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Foregone Baggage Revenue	$ 5,600	NA	NA	$ 5,600
Lost Revenue Due to Lost Seats (a)	$ (5,500)	$ (3,000)	$ (5,500)	$ (5,500)
Lifetime Maintenance	$ 4,600	$ 4,900	$ 4,900	$ 5,700
Overhaul	$ 3,000	NA	NA	$ 7,300
TOTALS (b)	$ 19,700	$ 16,900	$ 15,400	$ 35,100

Source: Compiled by KFH Group from the OTA Report, Appendix A, Table A-1.

(a) OTA did not include any loss of revenue for seating lost when tie-downs are not occupied and instead counted revenue increases for stimulated ridership, net the loss in revenue when a tie-down is occupied and when the bus would otherwise be full.

(b) No training costs were included.

NA - Not Applicable.

operating ratio[3] (in 1991) of 98.7 percent meant that only 1.3 percent of revenues remained after accounting for all operating costs--this 1.3 percent essentially would be used in meeting accessibility requirements. Because some alternative technologies were still under consideration, OTA did three simulations of combinations of station-based and vehicle-based technologies and found that costs were likely to be lower if operators were permitted to meet an accessibility requirement with a combination that might well vary depending on the type of service and locale. OTA also did a separate analysis of the estimates of the costs (which were discounted to present values) of each alternative, including the cost of borrowing as compared with using funds on hand.

No estimate of induced revenue was included in the cost estimates, although the report did include potential stimulated demand estimates based on the assumption that the trip rates of travelers who require level change devices would be the same as the general population. The estimate of demand did not include stimulated demand from persons accompanying the new travelers who require level change devices. The OTA report described the low levels of ridership found in actual operation, but then discounted this experience with lift-equipped coaches, citing the fact that few routes were accessible, the lifts involved had been unreliable, marketing was limited, and usage data (except for the Canadian demonstrations) was unreliable.

The OTA report did not present an estimate of the total cost to the industry of each accessibility option. Instead, it focused the analysis on the costs per bus. This makes sense given the limited data on the number of buses operated in different kinds of service. The only estimate of the costs to the entire industry was provided in a section recommending public financial assistance, which estimated that the implementation costs borne by OTRB fixed-route operators nationwide would be less than $10 million annually, based on an estimate of 5,000 buses currently used in fixed-route service and a replacement rate of 5 percent per year (i.e., less than $40,000 per bus, compared with OTA's own estimate of $35,100 as the lifetime incremental cost of providing accessibility features on a coach equipped with a high-cost lift).

[3]Operating ratio is defined as the ratio of total operating expenses to total operating revenues. Ratios less than 100 demonstrate positive net revenues, ratios over 100 indicate that a firm's expenses exceed its revenues for the period in question.

In terms of the direct applicability of the OTA report to the estimation of accessibility costs under the Final Rule, the classification of costs and the "per bus" approach are particularly significant. The cost analysis was done of several alternative technologies, only one of which approximates that approach taken in the Final Rule. The unit cost of that technology has changed somewhat over time. The overall industry estimate of costs (and the related policy options) that might be publicly funded is useful as a check on new estimates.

THE NATHAN ASSOCIATES STUDY: ***Evaluation of Technology and Deployment Alternatives for Providing Regularly Scheduled Intercity Bus Service to Mobility Impaired Travelers*** **(November 1997)**

In November 1997, Greyhound Lines anticipated the forthcoming NPRM by commissioning Nathan Associates, Inc., to provide an analysis of the cost-effectiveness of various options to meet the accessibility needs of wheelchair users, using Greyhound data as a basis. The report dismissed the OTA report as assessing only the lift on every bus option and cited a need to examine a broad array of options. These included approaches similar to those used on commuter air carriers, in which travelers who require level change devices move from their mobility devices to boarding chairs and then to aircraft seats and back again. It also included alternatives for providing accessible service by advance reservation using a pool of lift-equipped coaches, an approach similar to the 48-hour rule service requirement in the Final Rule. A total of 12 alternative combinations of technologies and deployment strategies was analyzed in three broad groups: four alternatives equipping every bus in the fleet with various technologies; four alternatives combining a pool of 75 specially equipped buses with a 48-hour advance notice deployment; and four alternatives combining the pool of 75 buses for persons who provide 48-hour advance notice with station-based technologies at 321 major stations for those who do not provide advance notice.

The study included an overview of potential demand and, using the Canada Coach Lines experience, concluded that the likely demand for accessible Greyhound service would be 13,600 trips per year (based on 122 annual trips by a target market of 13,650 persons with mobility impairments in the service area for an average of 0.0089 one-way trips per person per year, applied to the U.S.

population of wheelchair users). The report also cited the experience of the Denver RTD (which was cited in the Ecosometrics and OTA reports), but included more recent data on wheelchair boardings on fixed-route services. Using the ratio of wheelchair boardings on fixed routes (8,500 per month) to total boardings (4,384,383 boardings per month), Nathan found that wheelchair boardings were 0.194 percent of the total. Applying this to Greyhound ridership, an estimate of 35,000 annual boardings was developed. Nathan also used data from Peter Pan Trailways, which had 101 wheelchair boardings on its 16 accessible coaches in 1 year, to project 2,800 annual boardings for Greyhound's much larger fleet (2,077 buses). The report settled on the middle estimate as the likely scenario for use in assessing the alternatives. No mention was made of other induced ridership (Greyhound's Helping Hand policy at the time allowed a companion to ride free) or of the much higher estimates in the OTA report.

The cost analysis differed from previous efforts somewhat in that it included a capital cost of leasing, training costs, lift maintenance and repair costs, and passenger revenue foregone when wheelchair users were on otherwise full buses. However, lost baggage space was not quantified as a cost, and no revenue from induced travel was used as an offset.

The cost analysis assumed that Greyhound would lease all the equipment involved at a capital cost of 8 percent per year, with a 12-year term for the buses and 7 years for other equipment. It also assumed that only the options involving use of the Ricon lift would result in the loss of passenger seating when a wheelchair user was on board, because all other options used the existing coach seats. By using the 13,600 trip estimate and an assumption that only one wheelchair user would be on board, the study estimated that $65,000 per year would be lost, based on the assumption that only coaches departing with two or fewer available seats would face a loss in revenue. These departures accounted for 4.6 percent of all Greyhound departures in a surveyed month.

Training costs were based on instructor costs, initial training for current and new employees, refresher training, and employee costs during training. A 6-hour course for drivers and customer service agents and an 8-hour course for mechanics was assumed, with class sizes of 20 for drivers and 25 for other employees. Course development costs were also included. Average annual training costs over the 23-year analysis period were $221,000 for the alternative most closely resembling the

Final Rule, Technology and Deployment Combination A-1, which called for replacing the entire fleet with factory-installed lifts on 40-foot-long, 102-inch-wide buses.

For this alternative, the incremental capital cost was developed using the difference in price between the 40-foot-long, 96-inch-wide MC-12 bus with no lift, and the 102-inch-wide MCI-102D3 with a Ricon Mirage factory-installed lift--a difference of $57,000 per bus. At the time, Greyhound Lines was purchasing both 96-inch-wide and 102-inch-wide vehicles (all without lifts). The difference in price between non-lift-equipped, 102-inch-wide and lift-equipped buses was much less--on the order of $30,000 to $35,000. However, using the larger figure and including the incremental capital cost, lift maintenance and repair, passenger revenue foregone, and training costs, the average annual incremental cost came to $8,664,000. The study suggested increasing the projected Greyhound accessibility costs by 25 percent to provide a close approximation of the total accessibility costs for all regular-route operators. This alternative, which produces an average annual figure of $10,830,000, is quite similar to the OTA estimate.

The Nathan study analyzed the alternatives in terms of cost-effectiveness by estimating the cost per new boarding for each alternative and the number of new passenger trips required (at an average fare of $33) to break even on each option. The Nathan study also included a comprehensive analysis of OTRB accessibility in an intermodal context, comparing the mode with commercial air service requirements and revenues, with public transit systems, and with Amtrak–making the point that bus passengers tend to have lower incomes and fewer choices and that the OTRB industry receives little in the way of subsidies (at that time no accessibility funding) when the other modes received substantial federal capital funding or faced less costly requirements.

THE PRELIMINARY REGULATORY ASSESSMENT: *Transportation for Individuals with Disabilities; Accessibility of Over-the-Road Buses*, NOTICE OF PROPOSED RULEMAKING (NPRM), PRELIMINARY REGULATORY ASSESSMENT (PRA), U.S. Department of Transportation

Under the ADA, the U.S. DOT was charged with developing regulations to implement accessibility for privately operated OTRBs after the OTA report assessed the available technology, the potential demand, and the potential effect on the industry. As part of the rulemaking process,

the DOT must perform an assessment of the costs and benefits of feasible options for such major rules, providing justification that the selected option is cost beneficial to the nation. The PRA presented this analysis. The U.S. DOT took into account the findings of OTA, but decided to perform a new analysis because the OTA study had not assessed boarding options that required wheelchair users to leave their own mobility devices and transfer to boarding chairs or bus seats. Also OTA did not provide national compliance costs for the various options, but only the per bus-mile comparison of alternatives. In addition, the PRA approach included estimates of potential revenue that would be generated by new riders, whose trips would be stimulated by previously unavailable access. This allowed them to estimate a net cost of implementation for each option. Also, the PRA included the cost of capital to the bus companies and provided the net present value costs of the alternative proposals. A 22-year period was used to estimate the net costs of implementation, and it was assumed that the fleet would turn over completely every 11 years.

The approach taken included the incremental capital costs, the maintenance costs related to accessibility equipment, revenue losses from reduced seating and reduced baggage capacity, incremental costs of training (beyond that already required by the Interim Rule), and revenue gains from increased tripmaking.

In terms of incremental capital costs, the PRA used a price of $22,844 for a low-cost vehicle-based lift option (the Stewart & Stevenson Baylift) and a $28,000 high-cost lift option (the Ricon Mirage--both in 1997 dollars). An average annual maintenance cost of $600 per lift was used for the Ricon lifts, and $300 per lift was used for the Stewart & Stevenson lifts. Leasing costs for the accessibility equipment were included at 8 percent compound interest over an 11-year term, resulting in an annual cost of $42,947 for the Stewart & Stevenson lift and $52,640 for the Ricon lift.

Revenue foregone because of lost seating and lost baggage space was estimated to occur when a passenger in a wheelchair occupied the wheelchair location and there were four or fewer vacant seats. Greyhound data from the Nathan report were used to estimate the frequency of this occurrence. When these conditions held, it was assumed that there would be a net loss of three seats at $33.00 each (the average Greyhound fare). This analysis is the same as used in the Nathan report, except that the numbers of wheelchair passengers were estimated to be much higher. No lost

revenue was included to reflect a permanent loss of two seats, nor was any loss of revenue or cost attributed to the reduction in baggage space (it was assumed that the lifts would be mounted in the rear, behind the wheels). In part, this was because the U.S. DOT assumed that Greyhound (and therefore the industry) would be acquiring only 45-foot-long coaches in the future.

The major change in the analysis of costs in the PRA is the inclusion of estimates of revenue gains resulting from increased ridership. The PRA was intended to include benefits as well as costs; however the potential fare revenue from new riders was the only benefit that could be quantified. The PRA cited the Nathan report from Greyhound, with its estimate of 13,600 trips as one extreme, and the OTA report, with its estimate of 180,000 new trips systemwide by persons using wheelchairs and 210,000 trips by persons using walkers, as the other extreme. Noting the difficulty of estimating demand for a system that has not previously existed, the DOT assumed that there would be substantial growth in travel by persons using wheelchairs once the system was accessible. Also, the DOT assumed that these new passengers would take along family members who previously did not travel. The DOT settled on an estimate of 70,000 new trips from wheelchair users for a system in which all OTRBs have lifts and assumed that 17 percent of these travelers would be accompanied by at least one other person. The DOT noted that this estimate amounted to 0.2 percent of the total annual estimated ridership, which is the same as the upper end of the range of wheelchair boardings on fixed-route transit systems. Additional ridership was also projected to come from persons with other mobility impairments. This projected demand was implemented in the model by assuming that overall stimulated traffic would grow to 0.75 percent of the overall passenger population, of which 0.20 percent would be persons in wheelchairs and 0.10 percent would be persons accompanying them. The rest would be persons with other mobility impairments enabled to use the service because of the availability of level change devices. Average intercity bus fares ($33 per trip) were then used to estimate revenues. The DOT estimated costs for Greyhound and for the other Class I carriers.

For the scenario closest to the Final Rule, it was estimated that Greyhound would purchase 191 new OTRBs per year and that the rest of the Class I fixed-route carriers would purchase 123 new accessible OTRBs per year. For charter and tour (demand-responsive) operators, the PRA estimated costs based on the fleet of 13,000 OTRBs assumed to be operated by these firms, with an 11-year

turnover rate, a $16.25 per trip average fare, with 10 percent of the fleet required to be accessible by October 2003 (as required in the NPRM). Thus the stimulated demand was allocated to 1,300 buses. The DOT used OTRB production figures to estimate potential purchases of new OTRBs by the remainder of the fixed-route industry (the small carriers, local fixed-route and commuter operators, tour companies, and airport services), determining that this group of firms would buy 465 buses per year, for a total fleet of 5,100 buses that would be purchased over an 11-year period. All other assumptions applying to the Large Class I fleet were also applied to this group in terms of costs and revenues.

For its Option I, basically a lift on every bus, the PRA included average annual cost estimates of $15.4 million for the low-cost scenario and $20.9 million for the high-cost scenario. These represent net (of stimulated passenger revenues) annual costs without any cost of capital (costs paid out of funds on hand), but including training. The $20.9 million scenario, based on the Ricon Mirage lift, includes a net annual cost of $5.362 million for Greyhound, $3.275 million for the other large intercity carriers, $10.234 million for the small composite service carriers, and $2.044 million for the charter and tour carriers. These individual figures do not include training, which presumably makes up the rest of the cost ($1.13 million).

The PRA is significant in that it provides a basis for a national, industrywide framework for estimating the costs of implementation. This framework includes the structure of the industry, estimates of the number of OTRBs operated by each, estimates of the proportion of the small firm segment using less than 25 percent of their fleet for fixed-route service, the unit costs of alternatives, the revenue effects of lost seating, training costs, and the inclusion of potential revenues as a revenue offset.

Greyhound's Response

Because much of the PRA approach was based on input from the Nathan study for Greyhound, Greyhound's initial docket filing in the comment period following the NPRM included the Verified Statement of Robert J. Damuth, Director of Policy Studies at Nathan Associates, author

of the Nathan study. This statement reviewed the Nathan study, and highlighted the assumptions made therein.

A major issue was the difference in estimates of stimulated trips. Upon reviewing the earlier work, Damuth revised the estimate of 13,600 trips down to 10,900 for Greyhound Lines alone, noting that the projected Greyhound demand amounted to 0.07 percent of all current Greyhound annual boardings. This was compared with figures from the 1997 *TCRP Report 24*, "Guidebook for Attracting Paratransit Patrons to Fixed-Route Services," which provided a figure on lift boardings on fixed-route transit buses. Greyhound used a national rate of 0.07 percent for lift boardings of transit buses in TCRP Report 24 to support the use of the 13,600 figure as their estimate of potential demand for all regular-route operators (of which 10,900 would be Greyhound passengers).

Another difference in assumptions noted by Damuth addressed the anticipated incremental capital costs. The Greyhound report had included the incremental cost difference between a non-lift-equipped 96-inch-wide MC-12 (the most common Greyhound bus) and a lift-equipped 102-inch-wide MCI-102D3, which included both the cost of the accessibility package and the cost of the wider bus. Because the DOT had assumed all new buses would be 102-inch-wide, 45-foot-long MCI-102DL3s, the DOT did not include costs for permanent seat loss or loss of baggage space. The DOT did not include the incremental costs of the wider or longer bus in the analysis. In this review, Damuth noted that in the Nathan report he had not included foregone revenues from the permanent loss of two seats in the buses equipped with the Ricon lift, thereby understating the overall costs of options involving lift-equipped buses. Damuth also noted that some of the DOT analysis included capital costs at 8 percent compounded lease costs, compared with the earlier use of 8 percent simple interest. The DOT summary tables, however, did not include the cost of capital. Also, the DOT estimates of maintenance costs were higher--at $600 per bus per year.

Given these differences, Damuth revised the Greyhound tables for options involving a Ricon Mirage lift on every new bus. This new cost estimate included an estimate of passenger revenues foregone because of a permanent loss of two seats, the DOT estimate of foregone baggage revenue (omitted earlier from the Nathan study), and an adjustment in the estimate of foregone revenue when a wheelchair user is on a bus with four or fewer remaining empty seats to reflect the lower demand

number (10,900). Damuth continued using the other assumptions of the earlier estimate, including the need to include the capital cost of the wider bus, the use of simple interest in the capital cost, and the lower maintenance cost. Table A-2 in this appendix includes Damuth's original Nathan study numbers, the revised figures from his Verified Statement in the Greyhound docket filing, the original and revised figures from the PRA (the revision includes the revenue loss from the permanent loss of two seats), and the High- and Low-Demand estimates from the RA. As can be seen, despite some major differences in assumptions regarding costs, there is some general agreement in overall magnitude. A major difference overall results from the assumptions regarding offsetting revenues from stimulated demand, particularly estimates of new trips from persons accompanying wheelchair users and from passengers using other mobility aids.

THE FINAL RULE AND REGULATORY ASSESSMENT

Following the comment period, the DOT issued the Final Rule and with it a new final *Regulatory Assessment.* In it, several changes were made in the cost analysis in response to the comments filed in the docket. The DOT changed the analysis to correspond more closely to the Final Rule.

One major change that affected the overall cost was a revision in the estimate of stimulated revenues. The DOT contacted several transit agencies and Transport Canada's accessible bus demonstrations and found that few users of other mobility aids use the lift for boarding. Consequently, the overall demand figures were reduced, and both a new lower "high" estimate and a new "low" estimate of stimulated patronage were developed. The "high" estimate assumed that new trips equal to 0.456 percent of total current traffic would develop at full implementation, including 0.150 percent by persons in wheelchairs, 0.240 percent by persons with other mobility impairments, and 0.066 percent by companions. This amounted to 48,000 new trips by wheelchair users (26,000 on Greyhound). The "low" estimate was based on a volume increase of 0.304 percent of total current traffic, including 0.100 percent by wheelchair users, 0.160 percent by other riders with mobility impairments, and 0.044 percent by companions. The "high" estimate was intended

Table A-2 - AVERAGE ANNUAL UNDISCOUNTED COST OF THE PROPOSED RULE (Year 2000 dollars in thousands)

Cost Component	Nathan Estimates (Greyhound Lines, Inc.)		Preliminary Regulatory Assessment Estimates (a)		Final Regulatory Assessment	
	Original	Revised	Original	Revised	High Demand	Low Demand
1) Acquisition, including leasing cost	8,107	8,577	8,216	8,216	8,581	8,581
2) Other Compliance Costs:						
A. Lift maintenance and repair	271	287	1,448	1,448		
B. Passenger revenue foregone						
1. From permanent loss of two seats	--	2,212 (b)	--	2,212		
2. From wheelchair passengers	65	55 (c)	222	222		
C. Baggage Revenue Foregone	--	1,039 (d)	1,039	1,039		
D. Training Cost	221	234	245	245		
Subtotal	557	3,827	2,954	5,166	3,376	3,376
Total Gross Cost	8,664	12,404	11,170	13,382	11,957	11,957
Additional wheelchair-passenger revenue	449	371 (c)	866 (e)	866	2,714 (g)	1,809 (h)
Additional revenue from passengers using other mobility aids and from companions	--	--	2,381 (f)	2,381		
Total Net Cost	8,215	12,034	7,923	10,135	9,243 (g)	10,148 (h)

Source: Nathan Associates, Inc., and KFH Group, Inc.

a) DOT estimates, except for training cost and passenger revenue foregone from the permanent loss of two seats are from Table B-1b in the DOT report. They are DOT-reported column totals divided by 22 years. Passenger revenue foregone from permanent loss of two seats is estimated by Nathan Associates on the basis of data presented in the DOT report on page 111-112., footnote nine. According to the note, the loss of seats will cost approximately $1,400 per bus. Training cost is from Table C-1 in the DOT report.

b) The estimate is based on the DOT report, page 111-112, footnote nine (see note "a" above).

c) Estimate is based on 10,900 one-way trips per year at $34 per trip.

d) Item was estimated by DOT.

e) Estimate is based on 35,000 one-way trips per year by wheelchair users. It is calculated by allocating DOT's estimate of total additional passenger revenue ($3,247 million per year) by the ratio of DOT-estimated wheelchair demand to DOT-estimated total wheelchair, other mobility aids, and companion demand (35,000/131,250)

f) Calculated from DOT estimate by subtracting wheelchair demand revenue from total (see note "e" above).

g) Regulatory assessment "high" demand. Combined revenue from wheelchair users, persons with other mobility aids, and companions.

h) Regulatory assessment "low" demand. Combined revenue from wheelchair users, persons with other mobility aids, and companions.

to correspond more closely to experience on commuter type operations and the "low" estimate was intended to correspond more closely experience on the intercity demonstrations. The wheelchair ridership for the "low" option would be 32,000, with Greyhound's share approximately 17,333. The DOT also adjusted the revenue estimates resulting from stimulated traffic to reflect the "net" cost of sales, after the bus companies pay their outside commission agents.

Because the Final Rule did not require a fixed percentage of the fleets of charter and tour firms to be accessible, two estimates were used in the analysis–6 percent and 10 percent. In addition, the regulatory flexibility of the Final Rule for small carriers was dealt with by assuming that five-eighths of the small carriers offering some level of fixed-route service use less than 25 percent of their fleet for fixed-route service. These carriers were defined as "principally charter," and 158 non-Class I intercity fixed-route buses were allocated to them, along with 356 of the 4,500 buses in local fixed- route service. As these carriers would be able to meet accessibility requirements with the 48-hour advance reservation requirement under the Final Rule, the numbers of buses allocated to these industry segments were developed by determining the midpoint of a range between a minimum of one lift bus per carrier and a maximum number consistent with the range of 6 percent to 10 percent of the fleet (operated by these segments of the industry) that would be needed to meet the 48-hour advance reservation requirement. This allocation of OTRBs means that, in the final RA, there are 8,574 fixed-route coaches, of which 3,299 have to be replaced on the schedule for large fixed-route carriers, and the others whenever a fixed-route coach is replaced by a new vehicle (or for small carriers an exception exists allowing equivalent service). There are 15,426 OTRBs in the charter/tour demand-responsive segment under this final allocation.

In general, unit costs stayed the same as in the PRA, except that adjustments were made to inflate the 1997 dollar values in the PRA to Year 2000 dollar values. For example, annual maintenance for a Ricon Mirage lift increased to $720 from $600. However, in the final summary table of the RA, net present value calculations make it difficult to compare the overall cost effects with those in the earlier PRA or the Greyhound comment in the docket or to estimate the annual costs of compliance for the entire industry. Only one table did not present summary net present value costs for the alternatives, and that table (Table 3 of the RA) presents data only for Greyhound.

In that table, all other compliance costs are combined (including training, loss of revenue from usage of nearly full buses by wheelchair users, and loss of revenue from baggage space eliminated by the lift), and only the purchase cost of the lifts and the finance lease costs are presented explicitly. The text suggests looking at Year 12 on that table for an equivalent to the estimated total annual compliance costs for Greyhound fixed-route service. That figure is approximately $12 million, including $8.6 million in lease finance costs and $3.376 million in other compliance costs. The RA then estimates stimulated demand revenue to be $2.714 million, based on 0.456 percent of total Greyhound regular-route ridership of 17.5 million annual passengers (approximately 79,800 trips).

For comparison with the earlier studies, Table A-2 in this appendix presented this figure along with the original Nathan estimates, the revised Nathan estimates, the PRA estimates, and the PRA estimates as revised by Nathan to include permanent loss of two seats. As can be seen, the changes made by DOT in the RA had the effect of increasing the total gross cost from $11,170 million to $11,957 million, while the revenue from stimulated patronage is reduced (but not by as much as one would expect, given that the initial DOT analysis used a stimulated traffic estimate of 0.75 percent, and the new "high" estimate is 0.456 percent, or 60.8 percent of the original figure). No similar comparison can be presented for the entire industry, but if Greyhound is correct in stating that the large fixed-route carriers would add 25 percent to the total, the implied costs come to $15 million before netting out revenue. Adding the small fixed-route carriers and the demand-responsive sector of the industry would also significantly increase this net annual cost estimate.

The final RA presents some refinements of the earlier work, including adjustments in the other costs of compliance and the revenues resulting from stimulated ridership. It also includes some reallocation of the fleets that are more reflective of the way in which the Final Rule affects various sectors. However, there is no new actual data. Because the analysis was summarized, only a limited comparison with earlier studies can be made, but it does provide order-of-magnitude estimates of some cost elements that can be used for comparison with estimates developed in this study.

SUMMARY

One thread that runs through all of these cost analyses is the lack of real data, beginning with the fact that little real information is available about the structure of the industry, the numbers of buses operated by different firms, and their replacement plans, service types, ridership, and demand characteristics. Assumptions and estimates play a major role in these analyses, and there is a great deal of room for asserting that these should be different. Table A-3 in this appendix presents a comparison of these studies, noting the sources of data, assumptions made, and areas of similarity and difference among the reports.

Table A-3 - SUMMARY OF PREVIOUS COST STUDIES

Study Name	Primary Data Sources	Assumptions	Similarities	Differences
Potential Demand for OTRB Services by Individuals with Disabilities, Ecosometrics, Inc.	-- Numbers of Buses: *Bus Ride Directory*, and *Heavy-Duty On-Highway Vehicle Report* by Planned Business International, as quoted in *Metro Magazine* (January-February 1991) -- Population Data: U.S.Census. -- Usage: Survey of Accessible OTRB operators, interviews	-- Trip rates of persons requiring level change devices to use OTRBs will be the same as those of the general population		
Evaluation of Methods to Provide Accessibility to OTRBs and Services. Ecosometrics, Inc.	-- Literature survey -- Survey of lift and vehicle manufacturers -- Site visits to manufacturers	-- Definition of accessible vehicle would require ability for users to board and remain in their own mobility devices		

Table A-3 (continued)

Study Name	Primary Data Sources	Assumptions	Similarities	Differences
Access to OTRBs for Persons with Disabilities. Office of Technology Assessment	-- Ecosometrics reports -- Staff research, including carrier and user interviews, extensive advisory committee input	-- Demand: Trip rates of persons requiring level change devices the same as general population -- Definition of Accessible OTRB requires that users be able to remain in their own mobility devices -- Low-cost portable or station-based lifts a viable option -- Mixed solutions of accessible buses and station-based lifts possible -- Advance reservation requirements for persons with disabilities, only legal during phase-in period unless required of all passengers	-- Technology cost estimates from Ecosometrics report -- Used assumption regarding demand trip rates similar to Ecosometrics -- Uses "per bus" cost approach included in all subsequent studies -- Includes cost categories used in subsequent research: capital, maintenance, lost revenue from reduced seat and reduced baggage capacity	-- Did not include estimate of industry-wide cost impacts -- Assumed no technologies requiring users to change from their mobility devices to either boarding chairs or vehicle seats–both Nathan report and DOT studies included such options -- Assumed very high level of stimulated demand, differing from other studies, particularly Nathan report and Greyhound

Table A-3 (continued)

Study Name	Primary Data Sources	Assumptions	Similarities	Differences
Evaluation of Technology and Deployment Alternatives for Providing Regularly Scheduled Intercity Bus Service to Mobility Impaired Travelers. Nathan Associates, Inc.	-- Demand: (1) Canada Coach Lines demonstration report, (2) Denver RTD experience, and (3) Peter Pan Trailways experience -- Greyhound Lines 1-month sample data on number of departures with four or fewer empty seats -- Greyhound Lines policy or experience -- Greyhound Lines vehicle costs	-- Low levels of demand based on actual experience -- Cost of financing lifts at 8 percent per year, calculated as simple interest -- All non-lift-equipped buses would have been 96 inches-wide, while lift buses have to be 102 inches-wide, thus incremental costs include both the accessibility equipment and the cost of the wider bus -- 6-hour training course for drivers and customer service agents, 8-hour course for mechanics	-- Included same cost categories as OTA report	-- Compared with OTA it added costs for financing and training -- Used actual data to estimate foregone revenues -- Used much lower demand estimates to estimate revenue from stimulated ridership

Table A-3 (continued)

Study Name	Primary Data Sources	Assumptions	Similarities	Differences
Transportation for Individuals with Disabilities: Accessibility of OTRBs, Notice of Proposed Rulemaking Preliminary Regulatory Assessment, U.S. DOT	-- Sources included OTA report number of OTRBs by segment based on OTA report, Nathan report, and data from FTA -- Staff analysis, interviews with lift manufacturers, etc. -- Nathan report for number of departures with 4 or fewer empty seats -- Other data expanded from Nathan report data for Greyhound Lines	-- Stimulated traffic is 0.20 percent ridership for persons in wheelchairs and 0.75 percent for all persons with disabilities. -- Total fleet size of 24,000 -- Ten percent of demand-responsive buses would be lift-equipped. -- Foregone passenger revenue only when wheelchair position is occupied and bus would have departed with 4 or fewer unoccupied seats -- Annual maintenance costs assumed to be $600 per bus for the high-cost lift, and $300 for the low-cost lift	-- Included same cost categories as Nathan report, except no assumption of permanent loss of two revenue seats	-- Differed from OTA by including analysis of options that would require travellers to move from their mobility devices to boarding chairs or bus seats -- Developed national total compliance costs for various options, unlike OTA "per bus" analysis -- Included estimate of revenues from both new riders and persons accompanying them -- Included analysis of net present value of alternative options

Table A-3 (continued)

Study Name	Primary Data Sources	Assumptions	Similarities	Differences
Response of Greyhound Lines, to Notice of Proposed Rulemaking	-- Data from earlier Nathan study, PRA, and additional Greyhound Lines data	-- Demand reduced to 10,600 for Greyhound Lines, held at 13,600 for regular-route industry -- Loss of revenue from permanent loss of two seats on lift-equipped buses -- Other assumptions as in Nathan report	-- Used overall Nathan report approach -- Continued use of 8 percent simple interest financing cost -- Added DOT cost assumptions regarding maintenance cost. -- Added DOT assumptions regarding baggage revenue foregone	-- Differed from PRA by continuing use of the incremental cost of both the lift and the wider bus -- Differed from PRA in use of lower demand estimate

Table A-3 (continued)

Study Name	Primary Data Sources	Assumptions	Similarities	Differences
Transportation for Individuals with Disabilities: Accessibility of the OTRBs, Rulemaking Regulatory Assessment, U.S. DOT	-- New data, but some limited adjustments made based on docket filings following NPRM -- Unit costs inflated to Year 2000 dollar values	-- Demand changed. High estimate was 0.456 percent of ridership, low was 0.304 percent -- Ridership estimates included users, other persons with mobility impairments, and companions -- Revenues now net of sales costs -- Six percent to 10 percent range used to estimate accessible fleet requirement for demand-responsive sector -- New assumptions on fleet size of small operators	-- Approach similar to PRA	-- Similar to PRA, but lower stimulated revenues -- Most of analysis presented only in net present value terms -- Allocation of small operator fleet reflecting Final Rule exceptions for carriers with under 25 percent of fleet in fixed-route service reduced number of accessible buses required.

APPENDIX B

OTHER COST COMPONENTS AND ISSUES IN THE ANALYSIS OF COSTS OF COMPLIANCE

A complete analysis of the economic costs of compliance with the Final Rule should include various elements, some of which can be estimated with a degree of confidence and others of which involve multiple assumptions and subjective information. Potential costs or cost-related issues include:

- The capital costs of the accessibility equipment on the vehicles,
- The cost of training employees to the level specified in the Final Rule,
- The cost of maintaining the equipment as required by the Final Rule,
- The cost of financing the accessibility equipment if it is not publicly funded,
- The opportunity cost of revenues foregone because of the effect of the lift installation on the OTRB, including:
  - -- a potential permanent loss of seating capacity
  - -- a potential loss of revenue when a person using a wheelchair (who occupies four seats) boards a bus that otherwise would have less than four open seats,
  - -- a potential permanent loss of baggage space
- Revenue gains from stimulated demand,
- Ridership/revenue loss from fare increases, and
- Potential loss of marginal services resulting from an increase in costs.

Other potential cost issues include increased fuel usage by the buses because of the increased weight of the equipment, other changes in bus maintenance costs (e.g., the increased brake wear found in the Canada Coach Lines demonstration), changes in insurance costs, potential changes in the values of used buses, and corporate tax implications. All of these may materialize to some extent, though estimates to this point suggest that they either cannot be estimated or that the estimates are low enough that they are less than the potential errors found in estimating the major cost components.

New independent estimates of the incremental capital costs of accessibility equipment, the costs of maintaining that equipment, and the cost of training employees were presented in Chapter 4 of this report. The other cost issues are reviewed and presented in this appendix mainly to describe the basis for previous estimates and the possible magnitude of these additional costs.

COST OF FINANCING THE ACCESSIBILITY EQUIPMENT

The Nathan report of 1997 included an estimate of the cost of capital and noted that, in the absence of public funding assistance for compliance, Greyhound probably would treat the additional costs of the accessibility equipment on buses as part of the cost of the bus and would finance it in the same way as the bus. The Nathan report included an 8 percent per year simple interest estimate of financing costs on a 12-year lease. No estimate of costs without the financing cost was presented. The PRA presented several cost estimates, one set of which included financing costs, also at 8 percent, but compounded over 11 years (the DOT estimate of the useful life of the equipment). The effect of this additional cost can be seen in the difference between the estimated unit cost of the accessibility package on the bus and its financed cost. For the Ricon Mirage lift package, the as-delivered incremental capital cost was estimated at $28,000 while the cost of the package, including capital, was estimated at $42,947, a difference of $14,947 or 53 percent. In the PRA economic model, the increase in annual Greyhound costs in the period from Year 11 on (when 100-percent accessibility is achieved) is $4,977,000. Of course, by financing the acquisition of the lifts, the firm is deferring the costs into the future, and the analysis should reflect the fact that those future dollars

have less worth now. This should be done by showing the discounted present value of the stream of payments. In the Nathan report, the analysis in Table A-1 of that report includes the cost of financing, for a total incremental acquistion cost for Greyhound of $186,463,000 (for a 23-year analysis period), and the present value of that total is $114,260,000 (discounted at 3.6 percent).

Nathan noted a difference between his estimate of finance costs using a simple interest calculation and the higher costs found in the PRA and also noted that DOT's estimates were perhaps more realistic; however, he did not revise his estimates to include this alternative means of estimating the cost of financing.

Finally, in the RA for the Final Rule, all cost estimates included the cost of financing the incremental capital costs. In the only summary chart in the RA that clearly identifies the various cost components, (Table 3), the cost of finance in Years 11 and beyond (when the fleet is fully accessible and the payments for replacement are level from year to year) amounts to $3,012,105 per year out of a total estimated cost of compliance of approximately $12 million, or roughly 25 percent of the overall estimated cost of compliance. However, the present value of this amount 12 years in the future is a far lower number, and, in the early years of implementation, financing allows the bus companies to have annual payments much lower than the cost of the lifts if paid in cash at the time of purchase. However, interest is a real cost to the firms each year if they must fund the incremental costs themselves. Most new OTRBs are leased or financed, and the accessibility equipment on them will be as well. The RA notes that, to the extent that the existing FTA Section 3038 program of capital and training assistance pays for equipment, the firms are able to save the finance cost.

THE OPPORTUNITY COST OF FOREGONE REVENUES

The previous studies have noted several categories of costs to the bus operators resulting from changes to the bus or its operation resulting from making it accessible for use by persons who remain in their own wheeled mobility devices. Although some prototype buses or particular models have minimized the effect of a lift on either the passenger compartment or the baggage space, no current production models have incorporated these design choices. The lift mechanism and platform

must be located somewhere, and OTRBs have previously been designed to maximize revenue space within the height, length, width, and weight limits provided by law. In addition, a person who remains in a mobility device on board the bus occupies the same floor space as four bus seats, which means that there is a potential loss of revenue if a particular bus would have departed with three or fewer seats empty had not a wheelchair user been aboard. The loss is increased if there are two wheelchair users on board. Obviously the greater the demand by wheelchair users, the higher the probability of this revenue loss. All of the cost studies have attempted to deal with these issues.

Permanent Loss of Seating

The revised cost analysis included in the Greyhound docket filing in the Final Rule noted that previous estimates of costs had failed to include any loss of revenue resulting from the permanent reduction in seating capacity of two seats on any bus equipped with the Ricon Mirage lift. Greyhound produced a letter from MCI which supported their inclusion of this cost by stating that the seating capacity of an MCI-102D3 (40 feet long) is 45 when the bus is equipped with a Ricon lift, rather than the 47 normally found. Similarly, the longer 45-foot-long MCI-102DL3 seats 53 when equipped with this lift, rather than 55. This loss apparently resulted from a change in the seat spacing to provide adequate clearance for the mobility device and its restraint system when the conventional folding seats are moved out of the way. Information supplied by MCI for this study notes that "Seating capacity will not be affected by lift installation" in the description of the Ricon Mirage lift option. However, the MCI information also notes that special seat layout drawings will be required. It may be that the Greyhound seating layout results in a 45-seat bus with the lift. Certainly the basic Greyhound MC-12 40-foot-long bus has 47 seats, so if the MCI-102D3 with a lift has 45, there is a loss as compared with the MC-12. The Stewart & Stevenson lift on these buses is also mounted in a baggage compartment with no above deck equipment and on the new E series is offered in its own compartment behind the rear axles, where it affects neither baggage nor passenger capacity.

If there is a permanent loss of two seats, what is the loss of potential revenue? Nathan estimated the loss based on the permanent loss of two seats on all buses (MCI-102D3 and MCI-102DL3 models) equipped with the Ricon lift. His cost estimate of the revenue foregone was $2,212,000 (average annual undiscounted costs in Year 2000 dollars). This was based on the PRA, footnote 9 on page III-12, which cites a figure of $1,400 per bus per year as the loss of revenue resulting from lost seats. The $1,400 figure may be in 1997 dollars, which would convert to $1,481.20 based on the Office of Management and Budget (OMB) inflator used in the PRA. The total amount of $2,121,000 understates the average annual cost effect once the fleet is entirely accessible, because it is an average of the costs over the 22-year transition period, so it includes early years when much of the fleet would not be accessible. If there is such a loss, it would be worth some engineering as a means of avoiding it.

The final RA assumed that the fixed-route industry would be buying buses that did not have this permanent reduction in seating resulting from the lift (all new coaches would apparently be MCI-102DL3s, which DOT assumed had no seating loss), so no other cost estimates have been made about the potential magnitude of this cost.

Loss of Seating When a Wheelchair User is Aboard

Regardless of the potential permanent loss of seating, there is a loss of available seating when a wheelchair user remaining in his or her mobility device is aboard. Two seating units (of two seats each) must be folded up to accommodate the wheelchair, resulting in a loss of four seats. With the wheelchair user now on board, there is a net loss of three seats, if the passenger is seated on the driver's side of the coach. If seated on the curbside, the net loss increases to five seats. If there are two wheelchair users on board (both sides), the net loss of seats is eight. However, there is a loss of revenue only if the seats would have been occupied, so there is a loss only when a coach would be departing with three or fewer available seats. So the loss of revenue is a function of both the number of such departures and the number of wheelchair users.

Greyhound did a 1-month survey in September 1997 and found that 4.6 percent of all Greyhound departures in that month left with two or fewer available seats. In the Nathan report, this was applied to the estimate of 13,600 one-way trips to yield an estimate that $65,000 in annual revenues would be lost as a result of carrying wheelchair users at peak times. This was assuming only one wheelchair user per departure. No costs were included for situations in which the loss of seating might result in the need to put an extra section on a route or segment.

The PRA acknowledged this cost, but modified the frequency from the Nathan report to account for departures with four or fewer available seats, 6.4 percent of all schedules. Also the PRA applied this loss to the various carrier segments. Using the much higher DOT demand estimates, the costs are much higher–for Greyhound (2,100 bus fleet), the PRA shows an annual loss of $306,000 per year in the out years (11 through 22) when the fleet is 100-percent accessible. For Greyhound, as well as the other Class I fixed-route carriers and the small composite carriers, this cost is shown as $1,236,000 per year. For the charter and tour carriers, a much higher figure, $7,480,000, reflects the fact that these services typically have much higher load factors.

The RA also includes an estimate of these costs, but reflects a lower estimate of demand. A full explanation of the application of the data (assumptions) is provided, however. The DOT used the following two equations to calculate the losses for different segments:

1. Greyhound, the Class I carriers, and the "over 25 percent" (of the fleet used in fixed-route service) small carriers:

   4 (seats lost) x 12.7 (new patrons per bus-year) x 0.064 (probability of a full departure) x $34 (average Greyhound fare) = $110.54 (revenue loss per bus)

2. Charter and tour:

   4 (seats lost) x 12.7 (new patrons per bus-year) x 0.5 (probability of a full departure) x $17.22 (average charter revenue per passenger) = $437.39 (revenue loss per bus)

For the small carriers with 25 percent or less of their service in fixed-route modes, the Greyhound fare and probability were used, according to the RA. These were then adjusted to reflect

the low estimate (by applying the ratio of the high to low estimates of wheelchair usage). No summary table presents the total estimates separately. Again, this is a real cost, but the estimates of loss depend on multiple assumptions–only the 1-month Greyhound survey, the net loss of seating on a bus, and the average fare are actually known.

Loss of Baggage Space

With the exception of the rear-mounted Stewart & Stevenson lift on the MCI E Series buses, at this time all of the OTRB lift installations occupy space in the baggage compartment. As the fixed-route OTRB industry also provides package express services, there is a potential loss of capacity for this revenue-earning product if the lift is occupying space that otherwise would have been sold. In the original OTA study, there was an estimate of this cost, but the original Nathan analysis for Greyhound did not include it, assuming the lift would be mounted in the rear near the engine. Data supplied by MCI indicates that the Ricon lift option on the MCI-102D3 and MCI-102DL3 is mounted in mid-bus, reducing the capacity of the Number 2 baggage compartment substantially and slightly reducing the capacity of the Number 1 compartment for the controls. The PRA and the RA did include a cost of foregone revenue resulting from this loss. For Greyhound, the average annual undiscounted cost of this loss was estimated at $1,039,000 in the PRA, according to Damuth in the Greyhound docket filing. The methodology was also applied to the other large intercity carriers and the small composite carriers, but not the charter and tour operators. The methodology was not spelled out, but for Year 12, the combined revenue loss for the three segments (fully accessible as called for in the NPRM) was estimated at $2,282,000, which would be an ongoing cost at that point.

The RA described a methodology used by DOT to estimate this loss. The methodology is is presented in the following equations:

1. Greyhound:

   [$58,719,000 (Greyhound's package express revenue)/2070(Greyhound's fixed-route fleet) = $28,367 (baggage revenue per bus)] x 80/365 (the number of days when all the space would be needed) x 1/9 (the proportion of the traffic that could have been carried but for the loss of space) = $693 per bus per year.

2. Other Class I (Large) Intercity Carriers:

   [$28,037,000 (package express revenue)/1,229 (Class I fixed-route fleet) = $23,889 (baggage revenue per bus)] x 80/365 (the number of days when all the space would be needed) x 1/9 (the proportion of the traffic that could have been carried but for the loss of space) = $555 per bus year

3. Small Fixed-Route Intercity Carriers:

   [$14,018,500 (half of Other Class I package express revenue)/775 (small fixed-route intercity fleet) = $18,088 (baggage revenue per bus)] x 80/365 (the number of days when all the space would be needed) x 1/9 (the proportion of the traffic that could have been carried but for the loss of space) = $441 per bus year

For the small fixed-route intercity carriers, this figure was applied only to the proportion of the fleet that would require new accessible buses.

REVENUE GAINS FROM STIMULATED DEMAND

As discussed in Appendix A, estimates of the potential new ridership that would result from making the OTRB system accessible have differed. The OTA report provided high estimates, but noted that it was very difficult to predict demand for a service that has never existed. The Ecosometrics reports to OTA provided great detail regarding the extremely low usage of the accessible OTRB services implemented to that point, including the intercity service demonstrations

in Newfoundland and Ontario (the Canada Coach Lines demonstration) and the experience of the Massachusetts carriers. These were supplemented by usage reports from other operators, including the OTRB services operated by Denver's RTD. This experience was cited by Nathan in his study and revisited in the Greyhound filing, supplemented by data showing that the PRA projections of stimulated demand and, therefore, additional revenue, were far in excess of experience to date on accessible fixed-route urban transit services, where one might find higher usage resulting from the much higher frequency of trip-making found on urban transit.

In the Damuth statement in the Greyhound Final Rule docket comment, the Nathan study estimate of 13,600 trips (for all scheduled intercity carriers) is estimated to be 0.07 percent of Greyhound's ridership. The Greyhound portion alone--10,900--would be slightly less. Damuth compares this with the percentage of lift users among fixed-route transit riders, based on data in *TCRP Report 24*, "Guidebook for Attracting Paratransit Patrons to Fixed-Route Services," which is used in combination with APTA data to estimate a rate of 0.07 percent for national transit bus lift usage. This transit experience contrasts with the 0.20 percent (for wheelchair users) used in the PRA, and the 0.15 percent (high rate, wheelchair users)/0.10 percent(low rate, wheelchair users) found in the RA. The actual ridership numbers associated with these rates are presented in Table B-1.

An actual rate is not known–the Ecosometrics work for OTA found rates between 0.004 percent and 0.210 percent for services using OTRBs. The 0.210-percent rate was based on usage of the Denver RTD intercity and regional routes only; the rates from the Massachusetts carriers were much lower--from 0.004 percent to 0.049 percent. At that time, the Massachusetts carriers required a reservation and only about 15 percent of the fleet was accessible. The Denver RTD OTRB fleet was 38-percent accessible, with schedules showing which trips had lifts. None of this information separates lift uses into wheelchair users versus others, though the RA includes an appendix that provides case studies suggesting few lift uses by persons with other mobility impairments, a category of stimulated ridership that makes up a large portion of the DOT estimates.

So, there is a wide variation in rates, and actual experience to date suggests a low level of ridership for fixed-route services. The only comprehensive demonstration is the Canada Coach

Table B-1 - ESTIMATES OF STIMULATED DEMAND FOR ACCESSIBLE FIXED-ROUTE OTRB SERVICE

Study	Ecosometrics	OTA Study	Nathan Report			Preliminary Regulatory Assessment	Final Regulatory Assessment	
			Low	Medium	High		Low	High
Wheelchair Users	69,838	180,000	2,800	13,600	35,000	70,000	32,000	48,000
Other Persons with Mobility Impairments	156,998	380,000	No Demand	No Demand	No Demand	157,500	51,200	76,800
Companions and Family Members	Not Included	Not Included	No Revenue	No Revenue	No Revenue	35,000	14,133	21,200
TOTAL	226,836	560,000	2,800	13,600	35,500	262,500	97,333	146,000

Source: Compiled from individual studies by KFH Group, Inc.

Lines experiment in Ontario, which had very low usage and is cited by Damuth in the Nathan report and the Greyhound filing. However, it was limited to service in one region. The uncertainty surrounding demand suggests that it may be inappropriate to rely on revenue forecasts that are based on stimulated demand as a funding offset for a substantial portion of the costs of compliance. Estimates of demand (and revenue) for charter and tour operator compliance have even less basis in real world experience and are, therefore, more speculative. The RA assessment of Greyhound's costs suggests that revenue from stimulated demand (before commission expenses) could be $2,714,043 per year (after Year 11 with a fully accessible fleet) for the "high" estimate and $1,809,362 (two-thirds of the "high" estimate) for the "low" estimate. This contrasts with Greyhound's estimate of $360,400. In either event, the projected revenue is likely to cover only a small portion of the overall cost of compliance.

RIDERSHIP LOSS FROM FARE INCREASES

In the Greyhound filing, the point is made that if the costs of compliance are unfunded and if the demand (revenue) is low, then the costs will eventually be passed on to users in the form of higher fares. Greyhound estimates that a 4.1-percent increase in fares would be required for it to pay the full costs of compliance (before corporate taxes and allowing for commission on sales). Rate increases result in ridership losses, and Greyhound notes that its ridership is very price sensitive and that this mode occupies a niche in the intercity travel market as the low-cost provider. Greyhound predicts a loss in riders of 2 million, based on a fare elasticity estimate based on the firm's experience of a 30-percent increase in ridership resulting from a 10-percent reduction in fares. Unfortunately, there are no recent econometric studies of intercity bus demand on which to estimate the potential ridership loss.

A loss of 2 million riders implies a revenue reduction of $68 million per year, based on a $34 average fare, which suggests that raising fares would not be the best way to offset a $13 million cost increase (although management probably would pursue an approach that involved combining reductions in other operating costs with some limited fare increase). Greyhound's point is that the

firm believes that this market is sensitive to fare increases and, therefore, increased costs cannot simply be passed along without expecting some effect on ridership.

The estimated a lower potential fare increase of 2.1 percent to cover the costs of implementation and that a fare increase of this magnitude would result in a loss of 2.1 percent of passenger trips, based on a fare elasticity of -1.0 estimated by DOT in the PRA. The RA goes on to note the availability of funding under the FTA Section 3038 program. With a 50-percent subsidy of all incremental capital and training costs, (an amount far greater than authorized in the FTA program), the RA estimates a loss in annual ridership of 532,000 for the entire industry, and 233,000 for Greyhound alone. The DOT notes that fare elasticities with an absolute value greater than -1.0 (the analysis in the Greyhound Docket Filing implies an elasticity of -3.0) would require reducing service until total firm costs (including profits) equal revenues. This suggests another potential cost of compliance--loss of service.

POTENTIAL LOSS OF SERVICE

In the filings in the docket, Greyhound provided a list of points on marginal routes that would be the first to be abandoned if costs rise. Greyhound listed 144 points on 19 routes, and the ABA filing expanded the list to 287 points, based on a survey of ABA members. The DOT RA noted these lists, but pointed out that many of the points on the ABA list are served by small carriers that have flexibility in the Final Rule and that many will be served by firms that operate only used buses in their fixed- route service and, therefore, will not face the costs of new lift-equipped buses.

The combined Greyhound-ABA analysis of rural service effects included a projected loss of 208,000 riders if these routes are abandoned--a loss greater than the projected stimulated demand in the RA.

CONCLUSIONS

There are substantial real costs of compliance that will be paid by the bus industry in addition to the incremental capital costs, training, and maintenance. Financing lift acquisition in the absence of public funding would increase the capital costs. Loss of seating capacity and reduced baggage capacity would have an ongoing cost as described above, particularly if lift-equipped buses result in a permanent loss of seating capacity. Funding these additional costs will be difficult in a price-sensitive market, and there is very little real basis for assuming that there will be substantial revenue from new users–even at the levels forecast by DOT, the revenues would cover only a small portion of the costs. Raising fares is likely to reduce ridership, and reducing costs implies loss of rural services. Both are potential outcomes and costs to society.

APPENDIX C

FUTURE RESEARCH

As with any new regulation, there are many unknowns that will need to be addressed as the private carriers begin to comply with the Final Rule for accessible OTRBs. A common theme in this research project has been the lack of some basic information needed to assess the effect of the rule (e.g., the number of OTRBs affected by the rule). Another theme, evident in our discussions with the carriers during the survey effort, is the need to assist private operators in understanding the requirements under ADA and what they need to do to comply. These themes suggest some issues for short-term and long-term research projects.

SHORT-TERM RESEARCH NEEDS

The research conducted for this study suggests that it would be beneficial if the following research issues were addressed in the short-term (i.e., as the rule is implemented):

1. Improved information on the number of OTRBs in service by type of service,
2. Improved education/outreach/information about compliance for private operators,
3. Technology for accessible coaches, and
4. Demand for accessible charter/tour service and resulting vehicle needs.

Among these short-term research needs, the two most critical are improved information on the number of OTRBs and improved education about compliance for private operators.

Improved Information on the Number of OTRBs in Service by Type of Service

The analysis of previous estimates of fleet size discussed in Chapter 3 reveals that there is very limited actual data on the OTRB fleet and that much of the information that exists is extremely dated. Assessment of policy issues such as ADA accessibility, air quality requirements, and safety issues that involve vehicle design will require better data on the number of OTRBs in service, how they are used, and which firms are operating them. This research effort should also address both fleet replacement and expansion rates. Section 37.213(d) of the Final Rule requires each operator to submit annual data (beginning 1 year and 30 days after publication of the rule) to the DOT on the number of new and used buses purchased or leased in the preceding year and how many of them are accessible. Section 37.213(d) also requires information on the total number of buses in the operator's fleet. Although this information would, over time, provide additional data on the OTRB fleet, a comprehensive one-time inventory would provide a baseline with which to assess the reported changes in the fleet and would support the DOT review of the requirements anticipated to take place in 7 years (under Section 37.215). Related research projects might assess the number or percentage of vehicles that are financed or leased as a means of addressing finance costs.

Improved Education/Outreach/Information About Compliance for Private Operators

The private OTRB operators need assistance as they implement the rule. Project ACTION has developed training materials and is working with the American Bus Association on disseminating these materials as the implementation deadlines approach. However, the survey effort conducted for this study suggests that many carriers are still unfamiliar with the requirements of the Final Rule, have difficulty in determining which aspects of the rule apply to their operations, and may need assistance in planning for compliance. Although the training materials already developed

would expand dissemination, many operators still need to know what is required and when. Despite significant efforts to address this problem, there is still a great deal of confusion on the part of many operators.

In addition, private operators of vehicles other than OTRBs have been required to provide accessible service since the original regulations were issued in 1992--there is anecdotal evidence that many such operators do not know or understand their compliance requirements. Thus any such research effort must address all the requirements, not just those related to OTRBs.

This research effort could focus on the development of a "toolkit" to be used by operators to help them determine their compliance requirements and plan for the necessary equipment availability and training.

Technology for Accessible Coaches

The bus and lift manufacturers have made considerable progress in the development of lift technologies; however, the degree to which such equipment reduces overall seating and baggage space on the vehicle when there are no passengers using the wheelchair securement positions is a cost issue. Different vehicle designs and seating configurations may result in permanent loss of seating capacity or in variable losses when persons who use wheelchairs are aboard. Research by bus builders needs to focus on reducing these additional operating costs while minimizing the capital costs. Moreover, changes need to be monitored by the policy researchers in order to determine the actual costs of foregone revenues resulting from reduced capacity.

Demand for Accessible Charter/Tour Service and Resulting Vehicle Needs

Research on the demand for accessible charter and tour service under the 48-hour rule can be conducted as the DOT monitors compliance among the demand-responsive service operators. However, some operators in this sector of the industry have operated accessible vehicles for some time. It would be useful in the short term to understand their experience in terms of demand,

operational issues, marketing, and future compliance. This includes development of some information regarding the numbers of accessible OTRBs that carriers will need to meet the requirements of the 48-hour advance notice rule. Although a great deal more will be known after several years of implementation, carriers need some information now as they plan for implementation.

LONG-TERM RESEARCH NEEDS

As the Final Rule is implemented, long-term research needs must also be addressed. An initial priority is the development of systems to capture information regarding the experience of the carriers as services are implemented. Section 37.213 of the Final Rule recognizes the need to collect information during implementation and requires that carriers complete data forms on every request for service under the 48-hour rule and for equivalent service provided by small fixed-route carriers. Required information includes the identity of the carrier and passenger, whether an accessible vehicle or equivalent service was provided, and, if not, whether compensation was provided. Annual summaries of these forms are to be submitted by the carriers to the DOT. The information that will be captured by this requirement is limited--the requirement does not address accessible boardings not provided under the advance notice requirements and does not collect information about the type of service, numbers of accompanying passengers, and so forth.

Section 37.215 of the Final Rule calls for a review of the Final Rule to be conducted by the DOT in the 7th year of implementation. Section 37.215 specifies categories of information to be considered in this review--research over the next several years will need to address these considerations. The DOT is anticipating that its reporting requirements will capture the data needed to address some of these issues, but this research effort indicates that additional data will be needed,

particularly information related to ridership, costs, and service. Thus it is important to capture information on the following

- Compliance issues such as
  - Payment of penalties for inability to provide services,
  - Timeliness of service, and
  - Service quality/training issues;

- Actual costs of compliance such as
  - Capital,
  - Maintenance,
  - Training,
  - Financing arrangements, and
  - Revenue lost because of lost seating and reduced baggage space;

- Demand--lift uses and total ridership by service type such as
  - Regular-route intercity,
  - Local fixed-route services,
  - Tours,
  - Airport and commuter services, and
  - Charters; and

- Service impacts such as
  - Loss of seating capacity at peak times,
  - Accessible rest stops,
  - Interline connections, and
  - Scheduling issues.

APPENDIX D

LETTER AND SURVEY FORM

KFH
◆ GROUP ◆

February 2, 2000

URGENT ACTION REQUESTED

Dear Sir or Madam:

We are asking you to give the enclosed questionnaire your immediate attention.

The KFH Group, Incorporated, under the Transit Cooperative Research Program (TCRP), is conducting Project J-06/Task 33, "Costs of Meeting Accessibility Requirements for Over-the-Road Buses (OTRBs)." The ultimate goal of this research is to develop an unbiased and accurate estimate of actual costs that will be faced by the private sector operators of OTRBs as they implement the requirements for accessibility that are contained in the Final Rule. Although this project will not include policy recommendations, it is intended to provide information that may be used by Congress in its development of policies and programs, including potential changes in the funding levels authorized for assisting in the implementation of this rule. In conducting the study, we are being guided by a panel of the National Research Council's Transportation Research Board, that consists of liaison representatives of the bus industry, including Mr. Bill Mahorney and Mr. Ted Knappen representing the American Bus Association, and Mr. Steve Sprague of the United Motorcoach Association.

Congress has asked for this study to proceed on a very tight schedule. We are committed to delivering a draft report by March 1, 2000, and must ask you to return the enclosed questionnaire as soon as possible, but no later than February 11, 2000.

4920 Elm Street, Suite 350, Bethesda, MD 20814 ◆ (301) 951-8660 ◆ FAX (301) 951-0026

Task 1 of this project includes the development of information about the operators of OTRBs to provide a basis for estimating the costs they will face as they implement the adopted regulations. -This includes an inventory of OTRBs operated by private sector providers, including the numbers of vehicles, their ages, and how many are currently lift-equipped. It also includes collecting information about the vehicle replacement plans of the operators, and the numbers of employees they have who will need to be trained in the use of accessibility equipment and other aspects of providing accessible service called for in the Final Rule.

The enclosed questionnaire is intended to collect this information, and we are asking for your cooperation in promptly replying. With our report due to the TCRP program by March 1, **we must have your information by February 11** in order to provide time for analysis. In order to expedite the flow of information, we suggest that you do not need to type the form, that you may include a copy of your fleet list, marking the buses that you use predominantly for fixed-route (regular-route) service, and that you fax your reply back to us (301-951-0026).

This questionnaire is being sent to all firms that are listed in Russell's Guide, and all Class I firms. If you have any questions or concerns about the study, please call, e-mail, or fax us immediately. Please also note that this is the first time we have contacted you regarding this study – any other questionnaires you may have already received do not address this project, and we really need your input on this topic.

We realize that you receive many similar requests for information like this and that they take up a lot of your time, but the success of this project depends on your input. We sincerely appreciate your efforts in providing this information which is likely to benefit both the industry and those who will use the additional accessibility features (you and your customers). A copy of the results of this survey will be sent to you when the study has been completed.

Sincerely,

Frederic D. Fravel
Principal Investigator

URGENT ACTION REQUESTED!

Name of Firm: _____

The KFH Group, Incorporated, under the Transit Cooperative Research Program (TCRP), is conducting Project J-06/Task 33, "Costs of Meeting Accessibility Requirements for Over-the-Road Buses (OTRBs)." *(1)* The ultimate goal of this research is to develop an unbiased and accurate estimate of actual costs that will be faced by the private sector operators of OTRBs as they implement the requirements for accessibility that are contained in the Final ADA Rule. We are asking for your cooperation in replying promptly. With our report due to the TCRP program by March 1, **we must have your information by February 11** in order to provide time for analysis. In order to expedite the flow of information, we suggest that you do not need to type the form, that you may include a copy of your fleet list marking the buses that you use predominantly for fixed-route (regular-route) service, and that you fax your reply back to us.

1) Bus Fleet Information: (Over-the-Road Buses) Only.

Vehicle Make		Width	Length	Year	How Many	Purchased New? Yes/No	Lift-Equipped? Yes/No (#)	Percent Regular Route	Year of Anticipated Replacement
Make	Model								
Example: *MC102*	*A3*	*102"*	*40'*	*1990*	*4*	*Yes*	*No (1)*	*100*	*2002*

OR you may attach your own fleet list that supplies this information!

(1) OTRBs: Over-the-Road Buses are defined as buses with a high level passenger deck, commonly used for scheduled intercity and commuter services or charter and tour operations.

FAX To: (301) 951-0026 -- ***BEFORE FEBRUARY 11!***
Questions: Fred Fravel @ (301) 951-8660
Mail to: KFH Group, 4920 Elm Street, Suite 350, Bethesda, MD 20814

Name of Firm: _____

2) Please provide us with information about your anticipated purchases of new OTRBs for regular route service:

Year	No. of New OTRBs		Total OTRB Purchases	Anticipated Replacement Type (40 or 45-ft., Lift-Equipped, 102" Wide, etc.)
	Replacement	Expansion		
2000				
2001				
2002				
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				

Or tell us your general policies regarding the purchase of new OTRB's for regular-route service:

_____

_____

_____

_____

_____

FAX To: (301) 951-0026 -- ***BEFORE FEBRUARY 11!***
Questions: Fred Fravel @ (301) 951-8660
Mail to: KFH Group, 4920 Elm Street, Suite 350, Bethesda, MD 20814

Name of Firm: _____

3) Information about Current Fleet Accessibility:

Make and Model of OTRB with Lift	Model Year	Retrofit? Yes/No	Purchased on New Vehicle? Yes/No	Cost of Retrofit or Lift Option *(1)*	Make of Lift
Example: *MC1 102A3*	*1990*	*Yes*	*No*	*$31,000*	*Ricon Mirage*

(1) Lift-option cost is the cost of the accessibility package over and above the cost of the bus and other options.

4) Training Needs: How many employees in each category will need to be trained each year?

Employee Category	Current No. of Employees	Annual Turnover (Replacement Hires)	Anticipated New Hires per Year (Expansion)	Average Hourly Wage (Gross)
Example: *Bus Drivers*	*60*	*10*	*2*	*$17.00*
Bus Drivers				
Customer Service Agents				
Mechanics				
Other: (specify)				

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