





Amtrak Fleet Strategy

AMTRAK

Building a Sustainable Fleet for the Future

of America's Intercity and High-Speed Passenger Railroad

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1. Executive Summary

The heart of Amtrak's ability to deliver competitive intercity rail transportation service is the fleet that we operate. The fleet impacts on all aspects of Amtrak's services including the customer's perception of and willingness to use the product, the operating reliability of that product and the cost of maintaining and delivering the service.

As an entity created by the Federal government to serve as the national intercity passenger service provider, Amtrak relies on Federal support to maintain, operate and improve its services. While Amtrak covers a substantial portion of its annual operating costs (over 80%) from revenues, sustained capital support from the Federal government, and states in certain instances, is essential to the continuation and betterment of the national intercity network.

Amtrak has suffered over many years from insufficient Federal capital investment. This lack of funding that constrained Amtrak's ability to deliver the modern and reliable service that its customers deserve and has resulted in a fleet where the average age of the equipment is approaching 25 years. This report lays out the basis for recapitalizing the entire fleet over a period of time in a manner that will not only provide new and modern equipment for our customers but will also develop and sustain the domestic production capacity needed for the long term viability of intercity passenger rail in the United States.

Figure 1: P-42 Diesel Locomotive Hauling a Long Distance Train

The need to commence recapitalization of the fleet is an urgent one. As the equipment has progressively aged, a steadily increasing burden has been forced upon the maintenance organization to ensure that Amtrak can continue to deliver service. Aging components and a steadily higher level of obsolescence is a growing problem, often compounded by parts suppliers exiting the supply chain. Some equipment is not well suited to delivering reliable service on a year round basis in certain markets. In addition, customers perceive an aged and tired fleet which has consequences for ridership and revenue that are clearly counteracted when new equipment is introduced.

This report analyzes the equipment requirements to supplement and replace the existing fleet in a timely manner as well as what is necessary to manage the growth in demand that is forecast across the network. It lays out a strategic approach to the acquisition of new equipment and the funding requirements that are necessary to deliver that approach. The modeling that has been undertaken to underpin this plan is based on anticipated growth in all major lines of Amtrak business, the Northeast Corridor (NEC), long distance services and state corridors (both existing and new). This approach is consistent with the goals that have been set within Passenger Rail Investment and Improvement Act of 2008 (PRIIA), which reauthorizes Amtrak and establishes new programs for the development of the intercity passenger railroad system within the United States, and the experience of recent years with the increase in demand for the current services.

It cannot be emphasized enough that new equipment is a vital pre-requisite to the process of delivering enhanced passenger rail as envisioned by PRIIA. Moreover, a sustainable passenger service requires regular investment in equipment. Rebuilding existing equipment is always a temporary solution and does not save money in the long term. If passenger rail service is to be sustained and grown, equipment investment has to be accepted as part of the process.

Additionally, the capabilities that Amtrak needs to develop and enhance to allow it to plan for and deliver equipment now and into the future are assessed and reviewed. A cornerstone of all future planning is the maintenance of this report as a living document that will be updated regularly on the basis of the actions that are implemented and developments in the market.

Figure 2: F-59 Diesel Locomotive Hauling Superliner Cars

Amtrak has defined lifing policies for all of its passenger equipment types within this report. These policies are based on a combination of operational, maintenance, customer environment and financial factors. Only once these policies have been determined is it possible to provide a concrete plan for the introduction and replacement of equipment.

Based upon demand analysis and the defined lifing policies, Amtrak needs to buy the following equipment over the next 14 years:

- 780 single level cars
- 420 bi-level cars
- 70 electric locomotives
- 264 diesel locomotives
- 25 high speed trainsets

Such a program will require approximately $11bn of investment in 2009 dollars. This is just the start of the process. In order to meet the lifing policies, further acquisition programs will run indefinitely. Years 15 through 30 will have similar levels of acquisitions and investment at which point the replacement process for the initial equipment will commence. This steady state of acquisition will ultimately provide a fleet that remains commercially viable.

The initial priority purchases for the fleet are as follows:

- Replacement of all of the AEM-7 locomotives with new electric locomotives
- Replacement of the approximately 90 Heritage cars with new single level vehicles
- Replacement of the approximately 420 Amfleet I fleet with a new single level coach
- Replacement of the approximately 250 Superliner I vehicles with a new bi-level vehicle
- Development of a next generation of fuel-efficient high speed diesel locomotive for introduction to service within the next few years.
- Providing for the growth expected in the Acela services whilst planning for the introduction of the next generation of equipment within the next 10 years.

Based on the current growth assumptions, it will take until 2028 to fully retire the existing single level fleet and until 2033 to retire the last of the current bi-level fleet. Cars will be progressively withdrawn during that time as new equipment is delivered. Variations in actual growth will influence the final retirements and the actual production rates of new vehicles may be varied to accommodate such changes. However, in order to provide for a more sustainable future for both Amtrak and the equipment supplier base, this approach is warranted. The replacement/retirement of equipment is a continuous process based on lifing policies. Once the initial retirement process is complete, we will be approaching the commencement of the retirement of the first equipment bought under this program.

The capital cost associated with acquiring this equipment over the period to 2040 is approximately $23bn in 2009 dollars ($46bn in escalated dollars[1]). This includes the cost of the equipment, the project management expenses involved in such large scale procurement activity, the modifications to the maintenance infrastructure to support the new vehicles, the procurement of sufficient spare parts to support the vehicles in service and the provision of overhaul services on both the new vehicles and those required to remain in service pending their introduction.[2]

[1] Based on assumed 4% per annum escalation rate

[2] No assessment has been made on the relative financial merits of individual services, only what is necessary to deliver those services.

Follow on work to this report will include investigating the merits of changing from utilizing a car-based consist approach to the use of trainsets as currently used on Acela service, Cascades service and elsewhere worldwide. Additionally, a structured research and development process will be required to ensure that future fleet acquisition programs will have sufficient data to support decisions on equipment specifications.

The provision of a long term program of vehicle acquisition has a number of positive effects.

– Firstly, by introducing a steady approach to equipment procurement, a more stable fleet age profile can be developed that will avoid future situations whereby large numbers of vehicles will require replacement at once.

– Secondly, it will provide a clear message to the supplier base about the long term vision of Amtrak and allow them to plan their approach to the market accordingly.

– Thirdly, it will provide for regular procurement activity that will encourage a competitive environment in which the suppliers can operate and provide the best that the market can offer to Amtrak when sourcing new vehicles.

– Lastly, it will allow for a progressive development of new products and services into the fleet to allow Amtrak to continually evolve the quality of the product it offers its customers and the approach it takes to maintenance and sustainability of its fleet.

This plan provides Amtrak with a flexible approach to fleet development and the ability to adapt to a changing technological environment. It lays out a plan for the long term and provides a capability to adapt to change as it occurs.

2. Context for Amtrak's Fleet Plan

Amtrak has built its fleet plan based on a thorough understanding of the intercity passenger rail business, a conservative but flexible view of its growth prospects, and in a manner consistent with Amtrak's own vision: to build U.S. intercity passenger rail on the foundation of rail's inherent advantages as a greener, safer mode of travel.

The plan that follows has been designed as a flexible tool to support development of a collaborative future vision, in partnership with the FRA and states, to address a national agenda for dramatically expanding intercity passenger rail.

Market Context

Amtrak's business includes three major categories of services: Northeast Corridor (NEC), Long Distance, and State Supported/Other Corridor services. When evaluating the potential for growth across these business lines we can consider three options.

- Baseline secular growth associated with increased demand for the existing services.
- Incremental growth from market demand that is stimulated by substantial service improvements due to new investment in rail infrastructure.
- Externally driven growth due to a "seismic" change in demand drivers – such as dramatically increased gasoline prices or collapse of a competing travel mode – that generates drastic levels of new demand.

Given these variable scenarios for potential growth, this fleet plan, of necessity, is scaled to resource baseline needs, but is also built on a premise of flexibility to meet the actual requirements for passenger rail equipment as they unfold in the future.

Northeast Corridor (NEC)

The NEC, which includes services operating between Richmond, Virginia and Boston, Massachusetts, is Amtrak's largest revenue generating business line with 55 percent of all Amtrak ticket revenues and its second largest ridership generating business line. The combination of Acela Express and Northeast Regional trains provides a product to a broad range of customers for both business and leisure travel. Traffic in this region has grown strongly over recent years due to continued service improvements including competitive city center trip times and reliability as compared to other transportation modes in the market. The result has been that limitations on infrastructure and fleet capacity have been reached frequently in the NEC, especially for key (peak) departures.

Figure 3: Acela is the Premium Northeast Corridor Product

The NEC today has adequate capacity to support limited growth in ridership. However it is clear that, within the next decade, the existing infrastructure will not allow the growth that might otherwise be achieved. Lengthening existing trains will provide some additional seat capacity, but infrastructure upgrades will be necessary to achieve significant further growth. At the same time, the NEC as a travel market has begun to mature and – short of a fundamental change in service such as might be possible with mode shifting investment to achieve greater frequencies and reduced travel times – demand is projected to grow at an average rate of 2 percent annually.

With investment in infrastructure upgrades, it will be possible to reduce journey times to a level that will provide greater incentive to passengers to change mode and drive significant ridership increases. Such infrastructure changes will require significant Federal, state or other funding, take a number of years to complete, require the agreement of multiple parties and need detailed environmental assessments. With significant Federal funding now available for high speed and intercity passenger rail corridor development and a Federal commitment to achieve a state of good repair expressed through the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), the work to advance the development of the NEC has begun, but is still in the early stages. Once these upgrades are in place, annualized growth rates of 5 percent or higher are feasible.

Growth rates of between 2 and 5 percent annually – which equate over 20 years to total growth in the range of 49 to 165 percent – assume that the general market context for the intercity system remains constant. If there were to be a significant change in one of more market drivers – such the cost of oil (and thus gasoline for cars and jet fuel for airlines) – this could have a fundamental impact on demand and market share for rail. While the level of change is speculative, ideally the approach to rail fleet and infrastructure should consider this possibility and integrate flexibility to respond to those conditions, assuming this can be done in a financially prudent manner.

Long Distance Services

In recent years, Amtrak's Long Distance services – those operating more than 600 miles and often overnight – have grown around 2 percent annually. This gradual increase in demand can be satisfied through the progressive replacement of equipment to maintain customer appeal and lengthening of existing train consists, as required.

Figure 4: Viewliner Sleeper Car as Used on Long Distance Services

Current Federal funding for Amtrak's long distance services, as authorized by PRIIA, does not support significant service increases and thus Amtrak's focus will remain on improving today's current network. Consequently, only the secular growth is presently envisioned for these services. Such a growth model could be altered as a consequence of an increase in Federal operating and capital funding permitting additional frequencies on existing routes or the development of new routes, such as the several routes recently studies by Amtrak pursuant to PRIIA.

Should such additional support be provided, the fleet plan will be adjusted to incorporate the greater equipment need. Additionally, as with the NEC, a major change in transportation patterns driven by external factors could result in a significant change in the demand for long distance trains and the associated economics of those services. In that case, the fleet planning process described within is designed to accommodate such growth as it occurs.

Despite the secular growth scenario anticipated for Long Distance service, the fact that this existing fleet of both single level and bi-level equipment is scheduled for replacement with a new generation of conventional rolling stock creates an opportunity to advance a fleet acquisition strategy for conventional corridor equipment for both states and the NEC. The next generation of single and bi-level passenger coaches and café cars are being designed based on parallel rolling stock needs of corridors and Long Distance service, so that a significant, ongoing volume of equipment orders will be available to stimulate the supplier base needed to support passenger rail expansion.

In effect, the well defined Long Distance fleet replacement need reflected in this plan presents an economy of scale sufficient to galvanize a supplier base and provide a vehicle on which to "piggy-back" initial corridor equipment orders, which will ultimately be much larger than the relatively modest but already known Long Distance fleet replacement need.

State-Supported/Other Corridors

Amtrak's State-Supported/Other Corridors have the highest ridership of the three business lines. Ridership growth in recent years has been strong across the state corridors and is anticipated to continue to be so. Without any change in service patterns or infrastructure, ridership is anticipated to continue to grow and, conservatively, the 2% per annum growth rate is considered a reasonable estimate in aggregate for all such routes that Amtrak operates at present.

However, in light of existing state commitments to build and expand on these services, additional route and service improvements are likely. These improvements will consist of both additional services on current routes as well as development of new corridors. Nearly all of the proposed initiatives will also require Federal capital support primarily provided through the capital grant programs authorized under PRIIA. The $10.5 billion worth of grant funding available for such investments in 2010 through the American Reinvestment and Recovery Act of 2009 (ARRA) and the Fiscal Year 2010 Transportation and Housing Urban Development Appropriations Act demonstrate the current Federal commitment to the expansion of these services and the high likelihood that ridership and services will continue to grow in Amtrak's existing corridors.

Figure 5: The Cascades Service is the product of a partnership between Washington State DOT and Amtrak

Amtrak is working closely with its state partners in developing these services as key opportunities for growth for the national intercity passenger rail network. With the states' expanded planning and funding roles for these services under PRIIA, Amtrak will look to collaborate with states in the design, planning, implementation and operation of these services. As these new or improved services are funded and take shape in the coming years, our fleet plan will be adjusted to incorporate new services and service growth on top of the baseline fleet requirements for the corridors as needed.

Additionally, as with Amtrak's other business lines, major changes in transportation patterns driven by external factors could result in a significant change in demand for corridor services and the fleet planning process set forth here is designed to accommodate such growth as it occurs.

Fleet Plan Design

The market context makes clear that Amtrak can reasonably and conservatively expect growth in demand of at least 2 percent annually – a rate that should be considered the baseline.

Perhaps the key question both Amtrak and its state partners face is how to position to be able to capitalize on rates of growth that are higher than this baseline – and how to do so in a fiscally prudent way?

The answer lies in the fact that, even with the secular growth case, there is a substantial demand for new equipment given the backlog in equipment replacement resulting from years of underinvestment. In short, addressing this backlog creates the opportunity to create the production flow of equipment and capacity that will be necessary regardless of the rate of growth that eventually materializes. By adopting fleet designs to flexibly serve a range of markets, economies of scale can be achieved to develop new or expanded routes.

Amtrak is today positioned to commence a major acquisition program across all equipment types. Moreover, there will need to be significant developments of capabilities within the organization to manage these multiple programs. Those capabilities, once created, will have the flexibility to accommodate the sorts of changes identified in the larger growth scenarios.

The fleet planning process is a fluid process. This document will be constantly updated. As service parameters and resulting demand levels change, the fleet plan will be updated to reflect those changes and, as the future requirements are modeled, the impact on the acquisition process will be understood. By adopting this approach, changes in demand can be accommodated through expansion of existing procurement programs and revision of planned upcoming programs. With the inherent capabilities of the organization developed, the critical path will be the availability of the necessary funding to deliver the equipment to meet the demand. Equally important will also be the infrastructure investments necessary to deliver the capacity needed to run additional trains.

3. Introduction

Amtrak's *Strategic Guidance 2009* imparts a vision for the future development of Amtrak's business lines to meet the changing needs of the existing services and the potential development of new services in partnership with the states and commuter agencies. A particular focus was given to the environmental benefits of rail transportation today and the need to further develop and enhance the Amtrak system and intercity passenger rail network in order to help the nation achieve the goals of environmental preservation, energy efficiency, economic development, job creation, and the creation of sustainable and livable communities.

Additionally, the "Transportation, Housing and Urban Development and Related Agencies Appropriation Act, 2010" has placed a strong focus on the delivery of a fleet strategy that not only covers the immediate issues to be dealt with in the next few years but also puts together a solid plan for how fleet issues will be dealt with in the coming decades and aligns this with the changing market for intercity passenger rail transportation.

Amtrak's executive team defined a strategic vision for the fleet to determine the core principles of what was projected to be required and what changes were necessary to meet those requirements. These changes were both in equipment types and also the methodology to be utilized to acquire those vehicles. With this guidance and building upon existing planning efforts underway at Amtrak, this report was developed. The details of the development process are provided in Section 8.

Figure 6: P32 Dual Mode Locomotive

The culmination of this work is this report. The proposals contained herein are designed to cover not only the vehicle needs for the coming years but also address ways in which the organization needs to be structured to deliver against those needs, how it will continue to evaluate future needs as the passenger rail sector develops, how it will approach the procurement of equipment from a strategic perspective to gain best value from the supplier base and what impact and changes this will have on the supporting infrastructure throughout the organization.

4. Funding of Fleet Acquisition

There are a variety of funding options that are available and under consideration for support of the acquisition of new fleet equipment. It is, of course, pivotal to establish a dedicated and reliable funding source in order to deliver the goals for Amtrak's fleet laid out in this plan. Without this funding, it will not be possible to make the commitment to long term investment and this will impact on the willingness of the supplier base to engage in the development of the intercity passenger market.

The main funding alternatives presently under consideration are:

- Direct Federal appropriations
- To Amtrak
- To another entity as presently under consideration by PRIIA Section 305
- Federal loan programs, to be paid back by Amtrak through joint financing with state partners, potentially including funding authorized under PRIIA; through increases in ridership, revenue, and lease income; and through annual appropriations
- Commercial financing, although given the current liquidity levels of banks this may be difficult to acquire.

For Amtrak to enter into any transaction that increases the debt burden, the approval of the Secretary of Transportation is necessary. As Amtrak explores debt opportunities, this will be carried out in consultation with the Department of Transportation. Given Amtrak's inability to service debt to fund its existing capital needs from its own revenues, Federal investment will be required. This will have to occur either up front or in support of debt servicing needs.

An analysis of the funding needs for the equipment envisaged to be acquire up to FY23 has been undertaken to compare the cash flows for the options of capital grants, federal loan programs or commercial lending.

The figure below provides the comparative cash flows for the three funding options.

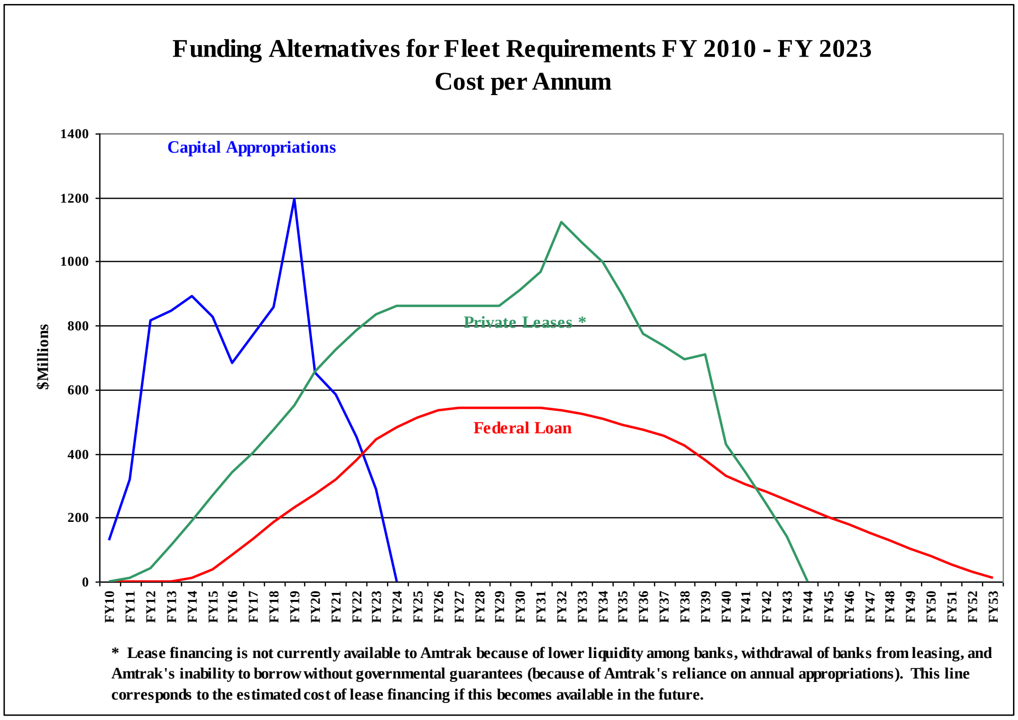


Figure 7: Cash Flow Requirement of Funding Alternatives

Amtrak is already in the process of analyzing these alternatives and continues to discuss them with our state and Federal partners.

5. Current Fleet Composition

Amtrak presently operates service on intercity corridors across the United States as well as commuter rail service in some regions. The current intercity passenger route map is included below.

Figure 8: Amtrak Route Network

The service provided is a combination of corridor services in highly traveled areas that involves multiple frequencies per day and long distance service connecting across multiple regions multiple times per week. (In Section 8 will be a more detailed analysis of current demand and the potential demand in future years.) It is this underlying service demand and the ability to deliver that service to the customer against which a fleet plan is necessary.

It is no secret that there has been very limited investment in new passenger equipment by Amtrak in recent years. No new passenger equipment has been purchased by Amtrak since the Surfliner vehicles. Until recently, Amtrak's role in national transportation policy has not been strongly emphasized and fiscal constraints have led to more of a focus on survival than on development and enhancement. This reality, coupled with the inherently long life of rail equipment which can be operated safely despite its commercial obsolescence, has hindered Amtrak's prior ability to effectively advocate for the Federal investment necessary to provide for a modern and efficient fleet. The result is that Amtrak's fleet is generally quite old, which creates numerous financial, marketing, and operating challenges. The age profiles of the existing fleet are as follows:

Table 1: Amtrak Passenger Car Portfolio

Car Type	Number of Cars Available for Service	Year Started in Service	Age of Car in 2009	Average Mileage
Acela	120	1999 to 2000	9 to 10 years	1,200,000
Amfleet I	412	1974 to 1977	32 to 35 years	3,800,000
Amfleet II	122	1980 to 1981	28 to 29 years	5,100,000
Superliner I	249	1979 to 1981	28 to 30 years	5,500,000
Superliner II	184	1994 to 1996	13 to 15 years	2,900,000
Horizon	97	1989 to 1990	19 to 20 years	2,400,000
Viewliner	50	1995 to 1996	13 to 14 years	2,500,000
Surfliner	41	2000 to 2002	7 to 9 years	1,100,000
Talgo	29	1999	10 years	1,700,000
Heritage	92	1948 to 1956	53 to 61 years	Unknown
Metroliner	17	1967	42 year	Unknown[3]
Total	1413			

Table 2: Amtrak Locomotive Portfolio

Loco Type	Number of Locos Available for Service	Year Started in Service	Age of Car in 2009	Average Mileage
P32	18	1991	18 Years	1,880,000
P32DM	18	1995-1998	11-14 Years	1,350,000
P40	0	1993	16 Years	1,800,000
P42	207	1996-2001	8-13 Years	1,930,000
F59PHI	21	1998	11 Years	1,300,000
AEM-7	49	1980-1988	21-29 Years	3,500,000
HHP-8	15	1999-2001	8-10 Years	750,000
Total	328			

For an illustrated summary of the equipment types in service, Attachment 3 identifies the different types of vehicle in service. The data contained therein summarizes each vehicle fleet type in service. It should be noted that within each type, there are sub-types of car configuration to meet the differing service needs. These will include coach and

[3] Mileages on these vehicles are tracked from the time the present recording systems were implemented. Prior to that time, the incremental mileage is unknown. However they are a significant number of miles.

business class cars, sleepers, diners etc. and will reflect the different requirements of the routes on which they are operated.

Given the fleet size, maintaining a stable age profile of the equipment requires a near constant effort at procurement. As we shall discuss later in Section 20, it is possible to achieve a constant procurement process. However, procurement in the past has involved sporadic large buys of a given vehicle type and long periods without any procurement activity.

A lack of reliable and adequate funding to procure equipment has been detrimental to development of the market in this country. The lack of orders has discouraged the domestic and international supplier base from committing time and resource to developing products for the intercity market and, instead, focusing their efforts on the commuter rail and transit sectors which have been more active on the procurement front. Similarly, it has impacted Amtrak's core capabilities to manage such procurements as there is little continuity of experience. Without a clear stream of procurement activity, moreover, there has been no incentive within the organization to develop and plan in a comprehensive manner for such things.

Elements of fleet planning have, of course, been undertaken. The team is well aware of the vehicle condition, needs and ideal replacement timescales. Existing plans have identified what needs to be done looking forward on up to a five year timeline. However, those plans have not brought together an integrated approach to the need, the process, the funding and the support aspects.

This strategic fleet plan assembles data from various disciplines throughout the Amtrak team to develop and recommend an integrated and comprehensive approach to meeting the equipment needs of its business lines.

At the time of writing, there are two active acquisition projects underway within Amtrak and a third is in development. The two active projects are the single level long distance vehicle acquisition and the replacement for the AEM-7 locomotives.

– The single level long distance vehicle project will provide replacement vehicles for the Heritage cars which are becoming difficult to maintain and are some of the oldest in the fleet. Some additional vehicles to expand capacity are also to be included in the program.

Figure 9: Heritage Diner Car of Type to be replaced

– The AEM-7 electric locomotives are in two sub-classes – those that are still fitted with the original DC traction package and those that have been retrofitted with AC traction. The new acquisition will replace the DC locomotives as the base order and also includes options to allow the AC units to be replaced as well. Reliability of these locomotives has been poor recently and this program is also seen as a high priority4.

– The potential upcoming project under development involves a specification for additional bi-level cars. This specification has been developed in concert with the California Department of Transportation (Caltrans) with both parties contemplating an order for this type of car. Whether Amtrak or Caltrans becomes the lead agency for the acquisition will likely be determined by whichever entity is the first to have funding in place. Amtrak sees value in taking the lead on this acquisition given the urgent need for new bi-level equipment.

These acquisition programs will be the transition that Amtrak makes to a long term acquisition strategy. The changes that are required to the process of acquiring vehicles can, in many cases, be piloted through these programs. They will set the benchmark for how future acquisitions are managed and must be approached accordingly.

[4] DC locomotives currently achieve 14 days between unscheduled shop visits while AC locomotives achieve 17 days.

6. Current Fleet Issues

There are two major issues facing the fleet at present. These are:

- Fleet Age profile
- Fleet Capacity

The average age of the Amtrak fleet is just under 25 years. Several car types in service that have already exceeded their commercial life and are in need of replacement. Even more are nearing the time when they should be replaced. It is not feasible or desirable to replace all aged equipment at the same time. Consequently, there will be a requirement to sustain the aging equipment in service as a methodical replacement process gets underway. Although costly, Amtrak has demonstrated that it has the ability to achieve this since it has been underway on some car types for some time.

Figure 10: Amfleet II Coach, Primarily Used on Long Distance Services

The capacity issue that presently faces the fleet is a function of the lack of investment in new equipment in preceding years and the increase in ridership and services that have occurred over the same time period.

Amtrak's core services have seen significant ridership growth while the state supported services have also seen both substantial ridership growth and increases in service levels. This has been achieved by bringing wrecked or stored equipment back into service to meet the need. With the creation of American Recovery and Reinvestment Act of 2009 (ARRA), PRIIA and the proposed long term federal funding stream for intercity rail development, the demand for service and equipment is only going to increase. Meanwhile, ridership of Amtrak's core services is also anticipated to increase with current service patterns and would only get higher with increased service.

Growth in the demand for services is imminent. Consequently, there is going to be a transitional approach that will require the amount of new equipment being introduced to be greater than the equipment retired. In order to accommodate demand, the retirement profile of older equipment will have to be tailored to satisfy the growth. Whether this is addressed through a "cascade" mechanism or via allocating the new equipment to new or growth services will be a decision to be reached at the time based on the service demands, the supportability of the equipment at particular locations and the funding sources (and volumes) that are being utilized to deliver the services.

There are some specific fleet issues that restrict operations today. The most prominent of these is the use of the Horizon cars in the Midwest. These cars suffer from a variety of operational problems in cold temperatures and winter conditions[5]. However, they are among the more recently acquired vehicles and will not be replaced until late in the fleet replacement cycle. Therefore, these cars are likely candidates for relocation to a more suitable environment as new vehicles become available.

The HHP-8 fleet of electric locomotives was purchased at the beginning of this decade. These units have not operated with a level of reliability that was anticipated. Amtrak has worked to improve their reliability levels somewhat but they are still performing at a lower level than optimal[6]. In addition, since there are only 15 locomotive of this type (and despite much similarity with Acela power cars), they have high per unit support costs. Replacement of these units constitutes a small order size that makes it difficult to have a competitive procurement due to higher per unit costs. In order to improve reliability and reduce costs, consideration is being given to replacing these locomotives at the same time as the replacement effort.

Figure 11: HHP-8 Electric Locomotive

A possible alternative use for some of the units is suggested in Section 12 regarding Acela developments.

[5] The design of the car make various systems vulnerable to freezing in cold conditions resulting in service cancellations
[6] Currently 12.6 days between unscheduled shop visits

7. Commercial and Useful Life of Vehicles

When considering the lifing policy of equipment, there are two main criteria to be considered. The first is *Useful Life* and the second is *Commercial Life*. Their respective impacts on the fleet planning process are a function of the driving factors behind their definitions.

Useful Life is a generic and somewhat arbitrary age based definition of 30 years for locomotives and 40 years for passenger cars. It does not take account of condition of the vehicles or investment to extend their life. Amtrak is required to report on the percentage of its equipment that is beyond its useful life as part of SOGR.

Commercial Life is a combination of a number of factors. The main elements are as follows:

– Maintainability – the condition of the equipment, the ability to support the components on the vehicle based on obsolescence, the cost in manpower, support infrastructure and parts consumption necessary to maintain the equipment, the reliability experienced in service with its associated impact on service delivery.

– Availability – the number of vehicles available to support the demand requirement.

– Technical capability – ability to meet the requirements of the service.

– Customer acceptance – the willingness of customers to pay to ride the vehicle and the impact on ridership or revenue that can be achieved by changing to a different type of vehicle.

– Capital availability – the capability of the organization to fund the capital investment required to provide replacement equipment

The combination of these factors will result in a proposed commercial life for equipment. This is usually a lower value than the useful life. Discussions within Amtrak have resulted in a proposed commercial life for equipment in accordance with the following:

- Single Level Coaches – 30 years
- Bi-Level Coaches – 30 years
- Tier I Trainsets – 25 years
- Tier II Trainsets – 20 years
- Electric Locomotives – 25 years
- Diesel Locomotives – 20 years

The purpose of defining a commercial life is to provide a basis for planning decisions on equipment. It does not dictate that equipment will automatically be replaced when it reaches the end of its commercial life. The choice of time to replace equipment will be dependent on the condition of the equipment and its performance against requirements at the time. Poor performing equipment may be withdrawn ahead of its anticipated commercial life. Other equipment may be used beyond commercial life either as a consequence of its inherent capabilities or constraints in procuring replacement equipment to an appropriate program.

These issues are tactical points that will be dealt with as required. From a strategic perspective, the commercial life allows the organization to define a long term plan for when equipment should be replaced and what the consequences are for the business as a whole when considering planning for capital investment.

The figure below outlines the proportion of the total existing Amtrak fleet that exceeds the planned commercial life for future years based on the planned acquisition rates of new equipment and the anticipated growth requirements.

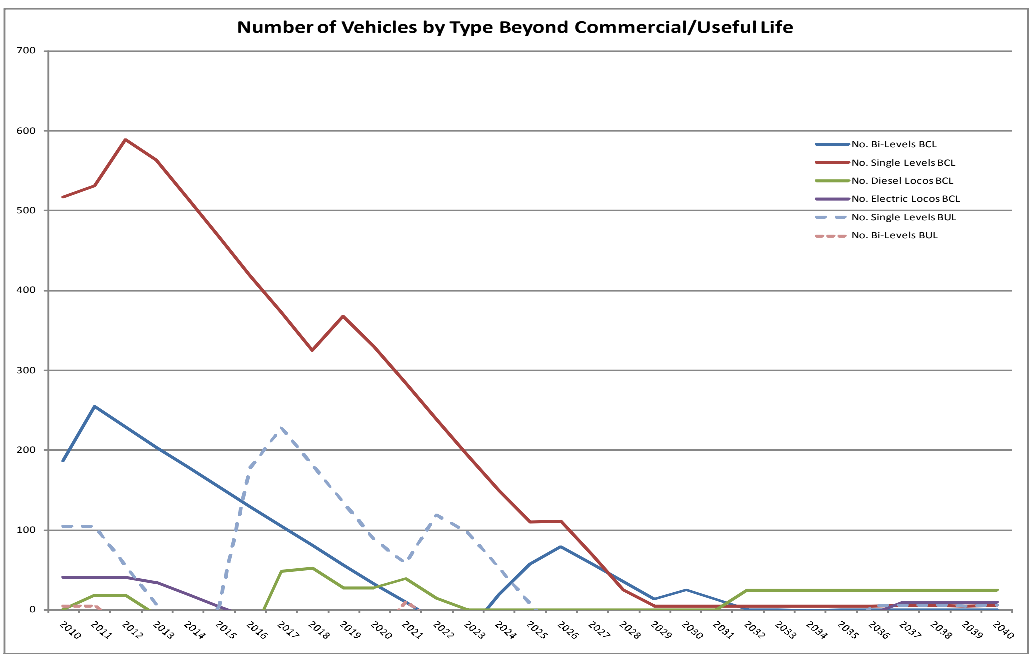


Figure 12: Vehicles Beyond Planned Life as New Fleet is Introduced

As can be seen from the above figure, a substantial portion of the fleet is already beyond the commercial life. A particular issue to highlight is the situation with regard to electric locomotives. There are presently 49 locomotives in the fleet, 20 of which retain their original DC traction package and the rest of which were re-equipped with AC traction. An acquisition process is underway at present for the replacement of the 20 DC locomotives. During the course of this acquisition, all of the locomotives – AC and DC – will pass the 30 year old point.

Given the lead time associated with running an acquisition, the increased cost of multiple smaller acquisitions and the time to complete the core 20 locomotive replacement, there is a strong case to exercise the options contained within the present procurement to cover a complete replacement of the entire AEM-7 fleet. This will avoid having locomotives significantly beyond their commercial life and will also standardize the locomotives in service. In addition, given the small size of the HHP-8 fleet, replacing them when due will be an expensive exercise. There will be maintenance benefits to reducing the number of locomotive types. It is proposed that the existing acquisition program cover the entire electric locomotive fleet

Figure 13: AEM-7 Electric Locomotive

The number of replacement locomotives should not be 1-1 with the existing fleet. Instead the total number procured should reflect the anticipated service usage across the full life of the locomotive, the predicted level of reliability (including any reduction as the fleet ages), any increases in planned service and a contingency for the potential loss of any locomotives throughout the life of the fleet. On this basis it is proposed to have a 70 electric locomotive procurement.

The second issue to highlight from the data on existing fleet life is the overall age of the fleet. Given that such a large proportion of the fleet is already past its commercial life, there is a substantial acquisition requirement ahead. However, it is not prudent to undertake large fleet acquisitions in a short space of time. To do so would have a number of effects.

- Intensive capital would be required in a short period to fund the acquisitions
- There would be a severe strain on available project resources to deliver and introduce to service many new vehicles
- A surge of demand on the supplier base that would be challenging to meet
- A large fall off in demand upon completion that would adversely affect the supplier base
- A future surge in replacement requirements when the new vehicle ultimately come due for replacement themselves

Instead, Amtrak will plan for a progressive introduction of new equipment slightly above what would be required to not only meet a steady state demand in order to progressively remove the aging fleet but also to meet our goals for development of the domestic supplier base.

Therefore, we will have to accept that, during the transition to a steady state replacement model, a significant number of vehicles will be operated beyond their commercial life. This is an acceptable transitional situation for the following reasons:

- The condition of the fleet is relatively good due to the maintenance efforts in recent years to sustain it
- The maintenance and spares capabilities remain in place to allow ongoing operation
- The most pressing replacement requirements are already being addressed
- A carefully planned and managed progressive replacement program will be beneficial for all of the reasons identified above in section 0.

8. Fleet Planning Process

The fleet planning process is designed to both meet the needs of the fleet in use to deliver the service required by our customers and to meet the strategic requirements of the business regarding sustainability, development of a long term viable supplier base, continuous enhancement of the product on offer to our customers and the funding requirements to meet these goals.

At the heart of the planning process are two key requirements. Firstly the demand modeling to identify what the seat requirements are over the life of the vehicles and secondly the assessment of what the life of equipment should be. When these requirements are overlaid on the existing fleet, a level of vehicle demand over time can be generated.

Amtrak has identified the commercial life for each equipment type that converts into a useful commercial life estimate. This life is a combination of the maintainability, reliability and cost of operation of the equipment, the customer environment and its impact on demand, the funding constraints of the business and the requirements to sustain a reliable and competitive domestic production capability.

The following tables show the age profile of the existing fleet. It can be clearly seen that the existing fleet is of a higher average age than would be preferred from a fleet planning perspective. This is clearly as a result of the lack of investment over many years. Based on the current fleet size and the lifing policy above, on average approximately 50 cars a year should be procured to maintain a steady state.

Table 3: Amtrak Passenger Car Portfolio

Car Type	Number of Cars Available for Service	Year Started in Service	Age of Car in 2009	Average Mileage
Acela	120	1999 to 2000	9 to 10 years	1,200,000
Amfleet I	412	1974 to 1977	32 to 35 years	3,800,000
Amfleet II	122	1980 to 1981	28 to 29 years	5,100,000
Superliner I	249	1979 to 1981	28 to 30 years	5,500,000
Superliner II	184	1994 to 1996	13 to 15 years	2,900,000
Horizon	97	1989 to 1990	19 to 20 years	2,400,000
Viewliner	50	1995 to 1996	13 to 14 years	2,500,000
Surfliner	41	2000 to 2002	7 to 9 years	1,100,000
Talgo	29	1999	10 years	1,700,000
Heritage	92	1948 to 1956	53 to 61 years	Unknown
Metroliner	17	1967	42 year	Unknown

Car Type	Number of Cars Available for Service	Year Started in Service	Age of Car in 2009	Average Mileage
Total	1413			

Table 4: Amtrak Locomotive Portfolio

Loco Type	Number of Locos Available for Service	Year Started in Service	Age of Car in 2009	Average Mileage
P32	18	1991	18 Years	1,880,000
P32DM	18	1995-1998	11-14 Years	1,350,000
P40	0	1993	16 Years	1,800,000
P42	207	1996-2001	8-13 Years	1,930,000
F59PHI	21	1998	11 Years	1,300,000
AEM-7	49	1980-1988	21-29 Years	3,500,000
HHP-8	15	1999-2001	8-10 Years	750,000
Total	328			

It is recommended that the acquisition profile be adjusted towards a standard annual amount in order to avoid another boom and bust cycle of equipment acquisition. A more uniform acquisition will support the domestic supplier base and avoid a future problem with a large amount of equipment needing to be replaced in a short period of time. This transition will require the extension of a substantial amount of the current fleet in the mean time.

Figure 14: Cab Car Used for Push-Pull Operations

Analysis of the demand for the existing and new routes is ongoing and dependent on a number of fluctuating factors at present. The analysis to date has therefore been undertaken on the basis of a conservative estimate of 2% secular growth on the existing system. This has been modeled on a car requirement basis across the fleet to get the first level of requirements. It projects a growth rate of approximately 18 single level cars and 10 bi-level cars in the early years (increasing as the fleet size grows in future years). A separate analysis has been undertaken on a route by route basis of the additional car requirements. The results of this analysis are contained in Attachment 1.

The results of the averaged and the route analysis show the following result for incremental cars over the 2009 levels for the years 2018 and 2023.

Table 5: Comparison of Averaged Demand and Route Based Analysis

	2018		2023	
	2% Average	Route by Route	2% Average	Route by Route
Single Level	120	112	216	203
Bi-Level	71	101	128	149

It can be seen that there is close correlation between the simplified model and the more detailed model. The fuller route analysis that is presently underway will be required to deliver the full view of the future demand. However, the conclusion that can be drawn here is that, whilst there will be some variation in the actual demand for cars from the averaged assumption, the assumption is sufficiently close to provide a good basis for the overall fleet planning process at this stage.

More importantly, this sort of variation in growth numbers has an effect on the fleet needs only for the out-years of 10-15 years hence. The existing age profile of the fleet and the need for new equipment means that the simplified approach does not deliver any significant differences in the early years. What level of sustaining procurement is required and when the sustaining level is reached will be the issues impacted by a variation in growth assumptions. Those points are presently modeled to occur in the 2028-2033 timeframe. Obviously, as we move through the next 20 years the future picture will become clearer and the plan will be progressively adjusted to align with the updated projections.

The buildup of assumptions was based on existing experience of the costs associated with managing major acquisitions, data on the costs of cars from previous acquisitions and the pricing presently seen in the commuter sector. There are two RFPs presently out in the market and the data from these will provide a further baseline for the pricing that can be expected and will allow the model to be continuously refined. This is an ongoing process to ensure that, as individual acquisition programs are brought forward, the most current data will be available to support the proposals. The rates of vehicle acquisition and batch sizes were based on the needs of the fleet plan as well as the realistic numbers that the supplier base can supply competitively. It avoids small acquisitions since these have high non-recurring cost percentages and limit the level of interest in the supplier base.

Assumptions: The following assumptions have been used in defining the fleet requirements. These assumptions are constantly under review to ensure they reflect the latest state of the fleet and the market. The assumptions are broken down into categories below:

– Age Assumptions: Amtrak has defined the commercial life assumptions for each of the fleet types. This life is a combination of the mechanical life of the equipment (including support costs and obsolescence), the customer environment (the appeal of the environment to customers who have modal choice and the ability of more modern equipment to drive ridership and revenue), the supplier base demands (the ability of the supplier base to deliver equipment; the ability of Amtrak to manage the acquisition and introduction to service of new types; and the regularity of new acquisition programs to keep the supplier base actively engaged and competitive) and the funding situation (the availability of capital funds to support the acquisition of new equipment).

– The different equipment types have different characteristics against each of these criteria and their utilization impacts on the projected life. The commercial life assumptions are:

  - Coaches – 30 years
  - Electric Locomotives – 25 years
  - Diesel Locomotives – 20 years
  - Tier II Trainsets – 20 years
  - Tier I Trainsets – 25 years

– Equipment Requirements Assumptions: A baseline requirement for the replacement of the existing fleet has been included. Beyond this, growth requirements have been overlaid. It has been assumed that new vehicles will deliver capacity at the same level as the present fleet. There are a number of limitations with this assumption that could influence the actual number either up or down.

– Americans with Disabilities Act (ADA) Compliance – New equipment will have to be fully compliant with the requirements of ADA. This is likely to reduce the seating capacity of cars compared to those that are being replaced. The actual reduction in seating capacity is under review. In order to meet the same seating demand, an increase in cars will be required.

– Maintenance methodology and operational spares – The introduction of new equipment could bring a change in the maintenance philosophy and the assumptions of spare equipment requirements to meet overhaul, running maintenance and operational spare needs. If a more efficient model is achievable, this will reduce the number of cars required. No data is presently available to justify such a reduction but it remains under investigation.

- Attrition – The present fleet is smaller than the sum of the vehicles of each type procured. Throughout the course of the life of a fleet type, a number of vehicles will be involved in accidents of some sort. There will be a number of vehicles under repair at various times which will not be available for service. Some vehicles will be beyond economical repair. Therefore, a margin of additional vehicles should be included to allow service needs to be met over the full life of the fleet.

- The replacement of all single level car types has been assumed to be a new single level car type and bi-level car types are replaced by another bi-level car. Transfer of service between the car types has not been assumed.

- Vehicle requirement has been analyzed from a strategic perspective. Total numbers of vehicles, annual procurement rates, costs of vehicles and the associated spares and infrastructure have been modeled. The actual acquisition programs will be broken down into numbers of cars, specific car types (coach, business, diner etc.) and scheduled for delivery as required at the time of the acquisition programs.

- Pricing Assumptions: The following assumptions have been made about equipment pricing:

  - Single level car $3.5m
  - Bi-Level Car $4.5m
  - Electric Locomotive $8m
  - Diesel Locomotive $4.5m
  - Tier I Trainset $20m
  - Tier II Power Car $8m
  - Tier II Coach $4m
  - Switcher $2m

These prices are 2009 prices.

- In addition, the following assumptions have been made for associated costs with new equipment procurement.

  - Project Management Costs at 5% of equipment cost
  - Capital spares and initial spares provisioning at 10% of equipment cost

- Infrastructure upgrades, training and development at 10% of equipment cost

– The infrastructure costs are incremental costs associated with the introduction of new vehicles into existing facilities. It does not provide for the provision of a new facility to be constructed, nor does it cover any necessary costs to bring existing facilities into a state of good repair.

– Delivery Rate Assumptions: The rate of delivery of new vehicles has been tailored to meet a number of requirements. Firstly, it is recognized that there is a significant backlog of equipment acquisition to be undertaken. In a stable funding environment, Amtrak would have been running a constant stream of acquisition programs to progressively renew the fleet. Instead, acquisition programs have been sporadic and significantly below what were required. The consequence of this is that the fleet is now aging rapidly.

– If a rapid program of new equipment acquisition was implemented to speedily overcome this situation, it would require a large infusion of capital, would tax the supplier base and Amtrak's core staff, would build a future problem (all of the new equipment would become age expired at the same time requiring a similar surge) and would provide a boom and bust environment for the supplier base.

– Instead, it is prudent to start a steady acquisition program that will deliver a stream of new vehicles to service allowing the progressive retirement of the aging fleet. This will require a number of cars to be operated for a period well beyond their commercial life. However, they can be sustained in service in order to allow a long term sustainable approach to be implemented.

– This approach is sustainable for both single and bi-level car types. The fleet sizes of both mean steady procurement is realistic. For locomotives, however, the smaller overall fleet size means that the acquisition programs will, by necessity be more sporadic. In these cases, the focus is on ensuring the programs are of sufficient size to get value for money from the supplier base and provide a fleet that is sufficiently common to allow it to be maintained and sustained on an affordable basis.

Figure 15: Amfleet I Coach

– A proposed build rate of 65 single level cars and 35 bi-level cars per annum has been modeled (double the rate for a zero growth identified in Section 0). This has the effect of removing the last of the single level fleet beyond its commercial life by 2028 and the last bi-level equipment beyond its commercial life by 2032 assuming a 2% annual growth rate in demand at the present average load factor.

- If growth exceeds the modeled levels, it can be accommodated in one of two ways. Either the build rate can be increased or the retirement of existing equipment can be deferred. The latter may have additional support costs of sustaining older equipment but may have benefits in that it will reduce the impact on the supplier base of going from a higher build rate during replacement to a lower build rate during sustainment.

- Overhaul Cost Assumptions: In planning the commercial life of the equipment, it has been assumed that sufficient investment is made in the equipment throughout its life in order for it to continue to have commercial value. This investment is a combination of rehabilitation and enhancement of the passenger environment and the investment in the running systems of the vehicle through periodic overhauls. These costs are not the scheduled maintenance activities that are necessary to keep the equipment in service on a daily basis. They are the capital investments required throughout the life to bring the equipment back to a condition that will allow it to remain in service for its full planned life.

- These investments have been planned at intervals throughout the equipment life and the scope and cost of each element are dependent on the area of the vehicle involved and the frequency planned (e.g. the interior gets a minor refresh at the shorter interval and a more substantial upgrade at approximately mid-life).

- Overhaul costs are as important to the equipment as the initial investment when acquiring the vehicles. It is vital to ensure that suitable investment is programmed throughout the life to ensure that the operating costs are managed and the customer environment is maintained in a condition that supports high levels and ridership and allows a fare structure that generates good revenue.

9. Goals of Fleet Strategy

When compiling a strategic plan for the Amtrak fleet, the goal is to provide the appropriate compromise between the various conflicting demands on the business. The primary areas of concern are the following:

- Future demand – The development of passenger rail service is a process that is spread over many years. Consequently, it is necessary to identify the demand for service a long way into the future and plan to meet that demand.

- Maintainability – from a maintenance perspective it would be preferable to have a single class of vehicle for each type. This would allow simplification of maintenance arrangements and spares support.

- Customer environment – when marketing to the customer is it desirable to have as new a fleet as possible to constantly provide the latest and best product offering.

- Funding – acquiring new vehicles requires a constant and reliable stream of capital funding.

- Supplier base development – it is desirable to have a constant stream of work available to ensure that there is sufficient business to support a competitive supplier base and avoid the boom and bust cycles seen in the past.

When looking at all of these requirements, it is clear that there is no solution that will satisfy all of them. Instead, it is necessary to come up with an approach that meets the needs of the business overall and allows for mitigation strategies to cope with the sub-optimal areas of any part of the business.

In addition, Amtrak's role as the national intercity passenger rail service provider impacts the way it approaches its fleet plan. The lack of a domestic supplier base for intercity passenger rail vehicles is purely due to the lack of an Amtrak fleet acquisition program. Without funding for new equipment, there has been no reason for the supplier base to devote resources to it. Instead, they have focused their efforts on transit and commuter rail opportunities. With a commitment to new acquisitions by Amtrak, the supplier base will respond swiftly to the new demand.

Figure 16: Recently Refurbished Superliner Lounge Car

Given the recent political support that has been given to intercity passenger rail both by Congress and the Administration, the manufacturer base in the US is certainly beginning to take the sector seriously again. The suppliers are working up their teams to understand the opportunities that exist for business with Amtrak and the new role that states will have in delivering service. Convincing manufacturers and state partners that this is a sustainable situation, however, will require clear evidence of strong, multi-year political and financial commitments.

10. Growth Modeling Cases

A number of possible modeling scenarios have been put together for the potential ridership in future years across the Amtrak system. These scenarios are subject to revision based on the development of service planned and should be considered a live analysis. The analysis covers three main areas of business.

- Northeast Corridor Service
- Long Distance Service
- State Supported Corridor Service

The first two items are clearly within Amtrak's core area of control. The last is, of course, entirely dependent on the developments that individual states wish to implement. The PRIIA and ARRA approaches will be taken in developing those services and Amtrak remains keen to support them in whichever ways the states wish.

Therefore, Amtrak can only make an overall assessment of the requirements of new services and derive some probabilities as to the likelihood of these services coming to pass. The purpose of this analysis is not to pass judgment on the merits of individual services and the plans of the states involved. Instead, it is recognized that it is not possible to accurately predict what the outcomes will be on individual routes but, by carrying out an analysis of the probabilities of service implementation across the country, it is possible to come to some conclusions about the approximate level of equipment requirements that will exist. This can then be factored in to the planning for new equipment.

Figure 17: P42 Diesel Locomotive

Of course, there is no guarantee that individual state partners will choose to work with Amtrak or, if they do, whether Amtrak will have a role in the acquisition of equipment for service. Instead it is a case of being aware of the possible requirements that may come to pass and how they can be integrated into the core Amtrak acquisition programs in an efficient manner should the requirement arise.

The first level of analysis undertaken was based on a 2% secular growth across the fleet. The results of this are included in the core planning contained in Section 8. Beyond this analysis is presently underway on the potential for additional service frequencies. The core assumptions have been compiled and the analysis is presently underway. The results of this work should be available early in the New Year of 2010 and will then be overlaid with the work done to date.

It should be noted that this work will refine the growth models but is unlikely to result in a significant change in the equipment requirements. The biggest likely change will come for the locomotive fleets. The existing modeling has been based on growing the services with additional vehicles assuming the locomotives will be able to haul the longer trains. With additional frequencies, there will be a redistribution of the cars to more trains which will require a higher number of locomotives.

A probability analysis has been undertaken of the additional requirements for equipment for state supported services based on those ARRA applications Amtrak had a supporting role in. These applications are Track 1 applications in round one. (There are additional applications which include equipment acquisition that may not presently be in the public domain and hence are not available to include in this analysis.) Amtrak does not take a position in this analysis on the relative merits of the proposals. Instead, an internal review of the probabilities of certain services being introduced in certain timeframes has been undertaken to gain a quantum view of the likely overall equipment needs. The following table identifies our present estimate of what those equipment needs will look like

Table 6: Potential Equipment Needs for Grant Applications

		2018	2023	2030
Electric Locomotives		4	9	15
Diesel Locomotives		15	36	49
Single Level Cars		36	78	103
Bi-Level Cars		16	44	57

These equate to approximately 5 single level cars a year and 2.5 bi-level cars per year on top of the growth already modeled. The locomotive requirements are proportionately smaller. It can be seen that, should Amtrak be required to deliver vehicles as a partner to state services, this additional level of equipment would be easily accommodated within the existing acquisition programs.

If a state partner wanted equipment of a different type to that Amtrak was either operating or in the process of acquiring, that would present more of a logistical and financial challenge. Running a separate acquisition program would require separate resource and, due to the smaller quantities involved, would likely result in a higher unit cost. However, if the state partner was willing to follow that course and had the funds to pay for it, Amtrak generally will be willing to meet their needs, provided sufficient staffing and resources are available.

11. Projected Fleet Procurement

In planning for the new equipment to be introduced in the coming years, the equipment types have been categorized into the broad definitions used above, i.e. single level passenger car, bi-level passenger car etc. Within these types of vehicles there will be individual demands that will result in sub-types of vehicle, e.g. coach car, business class car, diner car etc.

Attachment 2 is the table of proposed acquisition activity for the next 30 years. This plan is based on the existing active fleet and the modeling of growth on top of that fleet. The model has been based on the secular growth of the existing route structure. It does not include additional frequencies on existing routes or new routes. The requirements for equipment for such changes will be incremental to this plan but given the magnitude of replacing Amtrak's core fleet, such incremental additions should be easily manageable.

The key elements of the fleet acquisition plan are as follows:

– Implementation of an ongoing program of acquisition of single level vehicles at a rate of 65 vehicles per year. The breakdown of the types of vehicle to be acquired in a given year will be determined as required but the average will be 65 single level cars a year. The first vehicles will be for delivery in 2012.

– Implementation of an ongoing program of acquisition of bi-level vehicles at a rate of 35 vehicles per year. This will be a combination of vehicles in long distance and corridor configurations. The breakdown of the types of vehicle to be acquired in a given year will be determined as required but the average will be 35 bi-level cars a year. The first vehicles will be for delivery in 2012.

Figure 18: Superliner Car

– Acquisition of 70 electric locomotives. Delivery will commence in 2012. These locomotives will replace both the AEM-7 fleet and the HHP-8 fleet. This will avoid the need for a small procurement of electric locomotives when the small HHP-8 fleet comes due for replacement, provides for a more economic procurement program and reduces the fleet types in service. It would also provide an attrition reserve throughout the fleet's life. The HHP-8s may be held as a reserve for a period.

– Commencement of a high speed diesel locomotive acquisition program. First deliveries would be in 2012 and approximately 25 locomotives a year would be required. The development of new services would add the potential for additional locomotives but the core requirement would be for approximately 265 locomotives. This number could potentially be increased as an attrition reserve.

Figure 19: F-59 and P-38 Diesel Locomotives

– Acquisition of five additional Acela trainsets in 2014 and the replacement of the existing 20 Acela trainsets in 2019. The five trainsets are to provide growth in the existing service whilst the replacement would be due to commercial life expiration. In order to provide for sustainability over the long term, it may be preferable to group these two programs together and accelerate the Acela retirement. This topic is explored in greater detail in Section 12.

– Acquire a new fleet of 41 switching locomotives commencing in 2012 and concluding in 2016.

Based on the above acquisition plan, the following is the timetable for the retirement of the existing fleet of passenger cars. The locomotives will be replaced initially on a one for one basis with the new units coming on stream from approximately 2012. (NB: The number in service varies on a daily basis. The numbers below are from a fixed point in October 2009 but are close to the number at any given time based on the present active fleet.)

Table 7: Projected Retirement Dates by Fleet Type

Car Type	Number in Service	Retirement Period
Heritage	87	2012-2013
Metroliner Cab	17	2013-2014
Amfleet I	412	2014-2022
Amfleet II	144	2022-2026
Horizon	97	2026-2028
Viewliner	50	2028-2029
Hi-Levels	5	2012
Superliner I	249	2012-2022
Superliner II	184	2022-2030
Surfliner	41	2030-2032

The individual acquisition programs that will take place throughout the time period under consideration will determine the details of the individual cars types required. This will be a combination of the equipment that is being required, the customer environment and operating model being anticipated at that time and any technological advances that are planned for incorporation. These decisions can be classified as tactical decisions in the fleet planning process. The present analysis is taking the strategic outlook of the requirements for fleet over a number of decades which will average out the fluctuations and individual car type issues that will be dealt with on a tactical level.

When each acquisition program is commenced, it will have to be defined and justified on the basis of the requirements at that time and will have to show alignment with the larger strategic requirements.

The single level cars cover a wide range of requirements and operating environments. The same is true for the bi-level cars. The individual configurations will result in a variation in vehicle cost. This will be reflected in the specification and budgeting for the individual programs. From a strategic perspective, the pricing assumptions have been based on the average price of cars across the whole fleet.

One unknown area at this stage is the possibility of transitioning from one car type to another. There are a number of single level vehicles in service on routes that could equally be served by bi-level type equipment. There could be benefits to be gained from the enhanced seating capacity of the bi-level vehicles as well as some potential operational benefits on routes with shorter station platforms. However, there is resistance amongst some of Amtrak's state partners to the use of bi-level equipment because of concerns about customer perceptions and acceptance of such equipment. Therefore, whether this transition will take place or not is hard to project. However, if bi-levels are adopted, they should provide a lower per seat cost which should mean the present cost projects are conservative. It might mean a re-balance is required between the production rates of single and bi-level equipment and this would be a topic under review as the strategic fleet plan is constantly updated.

Figure 20: Horizon Single Level Car as used in some corridor services

12. Acela and Acela II

Given the revenue generated by the Acela program on the NEC, it is important to give priority to the options for developing this service. The operating environment is one that puts significant constraints on the possibilities for expanding the service and the revenue is a function of the benefits customers perceive over what is available from the Regional services.

Growth modeled for Acela indicates that there is a need for capacity on the service to be enhanced. However, the age of the present equipment and the plans for when it should be replaced make any decisions about capacity growth in the short term more difficult to conclude.

The Acela fleet presently consists of 20 trainsets, each of which has two power cars and six trailer vehicles. Of these 20 sets, 16 are presently used in daily service allowing four sets to be in planned maintenance or overhaul at any one time. The cars are all high level boarding only so are limited in their usefulness to stations with high level platforms. Of course, the power cars are electrified so they cannot operate in territories without catenary.

Figure 21: Acela trainset entering Washington Union Station

Modeling of the potential ridership across the whole corridor shows the following trends on passenger miles and ridership:

Table 8: Ridership and Passenger Mile Projections for Acela Services

Year		Ridership	Passenger Miles
FY09		3,031,800	569,450,000
FY18		4,396,400	833,463,400
FY23		4,992,400	953,573,700
FY30		5,922,000	1,137,105,900

With the current fleet planned for replacement between FY18 and FY23, it can be seen that there is a need to carry a substantial increase in customers before the new fleet is introduced. This then throws up some difficult questions about how to cope with that additional growth.

The options for accounting for growth are as follows:

- Do nothing with the existing fleet and manage capacity through revenue management. Plan for the introduction of the replacement fleet on schedule.

- Add cars to the existing trainsets. These cars would have a limited service life and would be withdrawn at the same time as the new fleet was introduced. (This assumes, as do some of the following options, that it is possible to procure additional cars of the existing type. It is certain that there will be some system differences since not all systems will still be available.)
- Add cars and use these cars as the basis for the replacement fleet program in due course. They would then have to either run an extended life to meet the out of service date of the new fleet or would have to be replaced out of sync with the rest of the replacement fleet setting up a cycle of out of sync acquisitions.
- Add cars and then reconfigure them into a new trainset when the original sets are retired. This will require the addition of new power cars that will be compatible with the existing cars. Again, they can either be retired when they are life expired or they will need to be extended to retire in sync with the next generation fleet.
- Add additional trainsets to the current design. These trainsets would run through into the life of the replacement fleet and would be withdrawn either at the end of their life cycle or extended to coincide with the withdrawal of the replacement fleet when it is life expired. This would require the support of a small sub fleet with the associated life cycle cost penalty. Additionally, it would require scheduling management and train crew training requirements to be more complex.
- Procure additional trainsets on the understanding they would only be utilized until the replacement fleet was introduced. They would be anticipated to be the last equipment to be replaced. This would mean they had a short life. However, it would provide some risk mitigation were there to be delays to the replacement of the fleet.
- Advance the acquisition of the replacement fleet such that they can be introduced to provide the capacity growth. This would allow the accelerated withdrawal of the existing Acela fleet but would advance capital requirements.

Assumptions: When considering the above possible ways forward, what are the assumptions that can be made?

- Current demand and the projections for the next 10 years require 2 additional cars per trainset and potentially 2 additional trainsets to protect service.
- The non-recurring cost for additional vehicles is unknown at this stage. It is anticipated that the cost will be significantly higher for the power cars than for the trailer cars.

- The unit price for additional trailer cars is $4m and the unit price for additional power cars is $8m.
- From approval to proceed, it would approximately 4 years to produce the first vehicles.
- The development process for the replacement for the present Acela fleet would take approximately 8 years from project commencement to first trainset in service.

Based on these assumptions we are still short of sufficient information to make firm decisions. However, based on what we do know, the following course of action should be implemented.

- Engage actively with suppliers to get priced proposal data for new trailer cars and power cars.
- Plan on introducing two additional new cars to each of the sets starting in four years and adding them to the sets as quickly as possible to minimize the operational impact of having different sets in service.
- Plan on acquiring an additional two sets of cars (full sets of coach, first class and café cars).
- Investigate the possibility of operating the two additional sets utilizing HHP-8 locomotives at each end in place of the Acela power cars. This approach will provide a use for some of the HHP-8 locomotives planned to be displaced by the new electric locomotives. Include an analysis on whether such sets should be restricted to the southern portion of the NEC or whether they could operate across the whole route without service impact.
- Compare the HHP-8 option with additional new power cars. However, it is likely that the HHP-8 solution will be more cost effective.
- Commence the project planning for the introduction of the Acela II fleet in 10 years time. Identify a full project timeline from operational modeling through customer environment testing to specification development, acquisition, testing, commissioning and service introduction.

This approach will decouple the immediate requirement from the timescales for development of the next generation of equipment, particularly if project or funding delays were to delay the availability of that equipment. It would be a lower risk strategy for the existing fleet and would provide a potential additional use for HHP-8 locomotives should that course be adopted.

13. Time to Retire the Fleet

In the present plan, an average of 65 single level cars will be acquired each year along with an average of 35 bi-level cars. However, these will not replace existing equipment on a one for one basis. Since growth in service is predicted, there will be a lower retirement rate of existing equipment than a rate of delivery of new equipment. Consequently, the difference between the two rates will provide the capacity for growth in the fleet.

Previously, the retirement schedule for the existing passenger cars was identified and is repeated here for clarity.

Table 9: Projected Retirement Dates and Vehicle Ages at Retirement

Car Type	Number in Service	Retirement Period	Age of Oldest Vehicle at Retirement
Heritage	87	2012-2013	64
Metroliner Cab	17	2013-2014	47
Amfleet I	412	2014-2022	45
Amfleet II	144	2022-2026	43
Horizon	97	2026-2028	38
Viewliner	50	2028-2029	32
Hi-Levels	5	2012	56
Superliner I	249	2012-2022	41
Superliner II	184	2022-2030	34
Surfliner	41	2030-2032	31

The five Hi-Level cars may not necessarily conform to the plan exactly. Since they are cars of a unique configuration, there may be a longer lead time for the design and construction of their replacements. They are presently identified as the highest priorities for replacement but will have to be delivered based on what is achievable and overlaid with the replacement of the first Superliner I vehicles.

Figure 22: Hi-Level Dome Car

Implementation of a steady state procurement coupled with a backlog of aged equipment that needs replacement result in lengthy timescales for replacing the existing cars. The last of the Amfleet I vehicles will not be removed from service under this projection until 2022 and the last of the Superliner II vehicles will leave service in 2030.

The actual retirement dates for the car types will always be subject to variation in the fleet needs over time. If ridership demand is significantly above that projected, this will have to be managed through either increasing the rate of equipment acquisition or through further deferral of the retirement of existing equipment. The course of action taken will depend heavily on the long term demand for services that use a particular equipment type.

Based on the planned commercial life assumptions determined previously, the following chart shows how many vehicles of each type are beyond their commercial life in a given year. In addition it also includes details of how many vehicles will be beyond their useful life according to the present age based definition and will have to be reported as such in the state of good repair analysis.

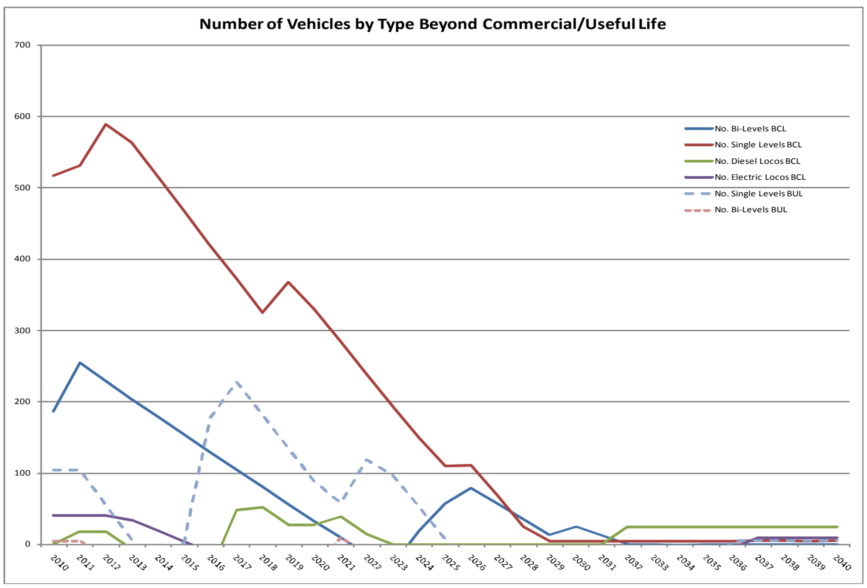


Figure 23: Vehicles Beyond Planned Life as New Fleet is Introduced

If a surge in demand is forecast, this may best be managed through tailoring retirement. However, if the growth is sustained, it will be necessary to increase the rate of vehicle acquisition. It should always be kept in mind, however, that the rate of acquisition should not be too high such that it results in a cessation of acquisition in the future since this will be detrimental to the supplier base development work that will have gone before. We must always strive to sustain the domestic supplier base and avoid the boom and bust situations that have occurred in the past.

If demand is below projections, the same two variables can be tailored. It may be acceptable to keep a slightly higher rate of production to bring forward the retirement dates for the older vehicles but, again, this must be balanced against harming the long term viability of the supplier base.

14. Disposal of Retired Vehicles

At the fleet retreat held by the Amtrak management team in September 2009, the topic of how to dispose of the existing vehicles was raised. Specifically, should retired vehicles be stored, sold or scrapped?

It was concluded that the best course of action was to hold a number of vehicles in reserve for a period after they are retired from service but to then scrap the vehicles rather than sell them (with the possible exclusions for museum requests).

It was noted that the fleet is already older than desirable and, by the time of retirement, this situation will only be worse. The value of the vehicles on the open market will be very low and the scrap value will probably be better. Moreover, Amtrak does not wish to operate these vehicles once they are retired. Should they be acquired by a third party that than requests Amtrak to operate them, the point of disposal would have been circumvented.

In addition, part of the strategy is to sustain and develop the supplier base for intercity passenger rail vehicles in the United States. Providing low cost aged equipment to third parties would undermine that strategy. If others are interested in acquiring vehicles or new service, Amtrak will be willing to work with those parties to achieve their goals using existing or new equipment but in accordance with the overall fleet strategy.

15. Sustainability During the Transition

The following table repeats the schedule out of service dates and age of the oldest vehicles for each of the passenger car types presently in the fleet.

Table 10: Retirement Dates and Vehicle Ages at Retirement

Car Type	Number in Service	Retirement Period	Age of Oldest Vehicle at Retirement
Heritage	87	2012-2013	64
Metroliner Cab	17	2013-2014	47
Amfleet I	412	2014-2022	45
Amfleet II	144	2022-2026	43
Horizon	97	2026-2028	38
Viewliner	50	2028-2029	32
Hi-Levels	5	2012	56
Superliner I	249	2012-2022	41
Superliner II	184	2022-2030	34
Surfliner	41	2030-2032	31

As can be seen, aside from the Heritage and Hi-Level cars, a number of the fleets will be in their mid-40s when they get retired. As the plan progresses further, the age at retirement coalesces to the planned commercial life of 30 years for passenger cars.

The question this raises is what problems will Amtrak face during the transition period and what actions can be taken to deal with them? The problems are going to be two-fold. Firstly, as the equipment ages it is going to require progressively more support to deliver the service. Secondly, the systems on the vehicles will face obsolescence issues as they age and modifications or replacement may be necessary to allow them to continue in use.

A review of the operating budget requirements for maintenance over the past few years have shown a steady increase in costs, even as an emphasis was being placed on improved processes and budget restrictions. This is a function of the age of the fleet progressively increasing since no new vehicles were being acquired. How this cost will develop in the coming years is hard to project. The data gathering exercises presently underway using the existing and legacy systems will allow a more detailed forecast to be made but, as vehicles age, they can be prone to discontinuities in the rate of cost growth. However, as the present work moves forward, it should be possible to make some sensible projections of future costs taking account of the rundown of certain fleets as new vehicles are brought online.

Component obsolescence is not something that can be generalized. Solutions to this can range from buying up spares in advance, finding a secondary source for overhaul to component or system replacement. The course of action to take will depend on the upfront costs, the ongoing costs and the projected remaining life of the vehicle.

16. Limitations on Growth Possibilities

Demand forecasting indicates the likelihood of substantial growth in both the Northeast Corridor and in state corridors, with a more modest growth in the long distance network. In order to realize the secular growth of two percent year and promise of even more growth in developing corridors, additional service(s), modifications to existing services and/or a combination of both will be necessary. However, it is important to note that there are substantial obstacles and limiting factors to be overcome if growth is going to be accommodated in some corridors.

Within existing services levels, there are a variety of methods that could be employed to meet secular growth projections. Those routes that are operating at a relatively low peak load factor can accommodate some growth by simply selling more seats. In other instances, it may be appropriate to add cars to existing trains to increase carrying capacity. It may also be necessary to manage demand through aggressive pricing and marketing strategies to drive demand to off-peak ridership periods. Finally, different types of equipment with higher capacities (i.e. bi-level) may need to be considered where operationally feasible. Such methods of increasing carrying capacity may prove difficult to implement.

Examples of limitations on existing service modifications include station facilities in the NEC and King Street Station in Seattle, where the physical configuration of station tracks, ingress and egress to the station, and coordination of commuter train, Amtrak Cascades regional trains and long distance trains must be carefully choreographed to allow differing types of trains to simultaneously use a facility that has severe space constraints that limit expansion opportunities. Likewise, the Pacific Central Station in Vancouver, BC can only accommodate trains of a certain maximum length in the “sterile” area that trains are held for customs and security reasons.

Impacts and changes to operational practices, including competitive travel times, scheduling and allocating equipment throughout a corridor or the system, availability of equipment, the ability to adequately maintain longer consists and adequate locomotive power to meet schedule must be considered. Given the new locomotive procurements underway and planned, scope for future growth must be catered for. Accommodating secular growth may require substantial investment and modification to stations, facilities and related infrastructure well beyond the rolling stock itself. Each corridor’s particular features, needs and growth expectations need to be carefully weighed and trade-offs will need to be made to meet anticipated growth in demand.

Ultimately, substantial growth will require additional service frequencies and the additional infrastructure that may be necessary to provide adequate capacity in the system as to not degrade existing services. In the case of developing state corridors, intensive negotiations are underway with host freight railroads to prepare for this growth. In most cases, the ability to grow services in a timely manner will be dependent upon a federal investment partnership through ARRA and PRIIA. Without a strong federal/state partnership to develop corridors, growth in new services will be extremely difficult.

A key constraint on the development of new routes or the increase in frequency of service in existing corridors is the availability of funds to support operations. The capital investment in new equipment and facilities to grow services is only justified if there is sufficient additional operating funding available to sustain those services

Capacity at maintenance facilities and storage locations will also have to be factored in.

17. PRIIA Section 305 Committee

The Passenger Rail Investment and Improvement Act (PRIIA) included a specific requirement regarding the development of next generation passenger rail equipment to be used in corridor services. Section 305 of PRIIA required Amtrak to create a committee tasked with the following.

> (a) IN GENERAL.—Within 180 days after the date of enactment of this Act, Amtrak shall establish a Next Generation Corridor Equipment Pool Committee, comprised of representatives of Amtrak, the Federal Railroad Administration, host freight railroad companies, passenger railroad equipment manufacturers, interested States, and, as appropriate, other passenger railroad operators. The purpose of the Committee shall be to design, develop specifications for, and procure standardized next-generation corridor equipment.
>
> (b) FUNCTIONS.—The Committee may—
> (1) determine the number of different types of equipment required, taking into account variations in operational needs and corridor infrastructure;
> (2) establish a pool of equipment to be used on corridor routes funded by participating States; and
> (3) subject to agreements between Amtrak and States, utilize services provided by Amtrak to design, maintain and remanufacture equipment.
>
> (c) COOPERATIVE AGREEMENTS.—Amtrak and States participating in the Committee may enter into agreements for the funding, procurement, remanufacture, ownership, and management of corridor equipment, including equipment currently owned or leased by Amtrak and next-generation corridor equipment acquired as a result of the Committee's actions, and may establish a corporation, which may be owned or jointly-owned by Amtrak, participating States, or other entities, to perform these functions.
>
> (d) FUNDING.—In addition to the authorizations provided in this section, capital projects to carry out the purposes of this section shall be eligible for grants made pursuant to chapter 244 of title 49, United States Code.
>
> (e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary $5,000,000 for fiscal year 2010, to remain available until expended, for grants to Amtrak and States participating in the Next Generation Corridor Train Equipment Pool Committee established under this section for the purpose of designing, developing specifications for, and initiating the procurement of an initial order of 1 or more types of standardized next-generation corridor train equipment and establishing a jointly-owned corporation to manage that equipment.[7]

The requirements under Section 305 of PRIIA were developed primarily to promote the creation of a pool of standardized, interoperable equipment that could be used by Amtrak and the states in various state-sponsored corridors with flexibility and efficiency. This "pool" equipment would largely share design elements and systems in order to improve maintainability and lower design and acquisition costs. Furthermore, by creating a series of common fleet designs that Amtrak and the states could procure against, larger acquisitions with lower unit costs could be achieved, all while incentivizing the creation of domestic manufacturing capacity for rolling stock.

Additionally, Section 305 reacts to previous efforts to develop specifications among Amtrak and the states that had stalled due to a lack of clear direction and lack of

[7] Passenger Rail Investment & Improvement Act of 2008, Section 305

available funding to implement procurement programs, either by Amtrak or the states. The strong policy direction provided by Section 305 and the other programs contained within PRIIA to develop intercity passenger rail service in this country helps focus and direct these work products.

The work of this committee is underway in partnership with the Federal Railroad Administration (FRA), the American Association of State Highway and Transportation Officials (AASHTO), the States for Passenger Rail Coalition (SPRC), interested state rail program offices and Amtrak. Amtrak brings significant expertise and experience to the table. It will play a significant role in this process and will provide considerable resource to allow the goals to be met. The FRA has also indicated that Federal support for fleet acquisitions for corridor services will be aligned with the process and outcomes of the Section 305 committee's collaborative efforts.

Therefore, the recommendations of the Section 305 Committee will likely have implications on Amtrak's approach and involvement in state corridor development. There will likely be common elements of these processes that will match well with existing Amtrak programs, providing partnership opportunities that do not exist today. A more coherent and coordinated approach to procurement by Amtrak and the states could provide many potential benefits, including a consistent message to the supplier base, a more sustainable product line throughout the life cycle, reduced up front and through life costs, greater flexibility in delivery timescales for state services and a potential for a reduction in the overhead costs associated with the procurement of vehicles.

The evolving work plan of the Section 305 committee will include the development of common specifications for next generation equipment, suggest procurement strategies to successfully carry out equipment acquisitions among the corridor partners, recommend funding strategies to help obtain the best value for potential investment, and ultimately implement corridor development programs. A coordinated approach and pooling of efforts should enhance fleet sustainability and Amtrak should be better placed to serve as a more productive partner with states. Furthermore, better alignment among Amtrak and the states should provide opportunities for stronger partnerships and active Amtrak participation in growing state corridors.

18. ARRA and Impact on Fleet Needs

The American Recovery and Reinvestment Act (ARRA) of 2009 provided significant funding for intercity passenger rail service development. Amtrak received $1.3 billion directly whilst $8 billion was provided for competitive grants to states and Amtrak for the development of high speed and intercity passenger services. This is a significant kick start to the development of existing services and the creation of new services envisioned under PRIIA.

The notable aspect of the $8bn identified under ARRA was the fact that these funds are to be awarded to the states for the further development and implementation of intercity passenger rail corridors. Consistent with PRIIA programs for intercity passenger rail, further development of the corridors would either involve a partnership between the state/states and Amtrak or could involve the state taking its own actions. The dynamics of the relationship between Amtrak and the states is now different, with the states having a much larger role and responsibility for the design, funding, and implementation of the nationals intercity passenger rail network. Amtrak has recognized this change and is working hard to ensure it is the partner of choice for states developing or creating services.

FRA has not yet awarded grant funding to the states for intercity passenger rail development under ARRA. Amtrak provided considerable technical assistance to states as they developed their competitive applications for funding. Theoretical levels of additional equipment necessary to implement these corridors are being studied. As state corridors have been identified as the most likely segment of Amtrak's business lines to have substantial growth, future updates to the fleet plan will appropriately incorporate partnerships that receive ARRA and PRIIA funding.

One thing that Amtrak can do that will be clearer than anything else is to get acquisition programs up and running. With the plan laid out in this report for new single level cars, bi-level cars, diesel and electric locomotives, there is a basis for many other programs to work from. Obviously, the Section 305 committee work will put together the requirements for next generation corridor equipment for state supported services. However, if Amtrak has launched acquisition programs, the manufacturing base will have been activated and there will be products in development from which the manufacturers can base any work to meet the requirements of Section 305.

Of course, Amtrak's acquisition programs will be large in comparison to the needs of other parties and there should be scope for anyone who so chooses to approach Amtrak about taking additional vehicles as part of an ongoing acquisition program. This will obviously have to be factored into the plans for the equipment Amtrak already has and the impact on equipment planned for retirement but such flexing of the plan should not be too difficult.

A second related issue is the replacement of the Acela fleet. A number of states are looking at true high speed services. If those projects go ahead, there would be scope for cooperation in developing the next generation of high speed technology. Indeed, in creating the next generation of Acela equipment, Amtrak could create a product that could closely meet the needs of other high speed corridors itself and take a lead in this process. The topic of Acela and its replacement from an Amtrak perspective is covered further in Section 12.

19. Tactical Versus Strategic Fleet Decisions

Throughout all of the analysis above, the decision making process has been based on the overall fleet requirement. This has involved categorizing equipment into broad groups, i.e. single level coaches, bi-level coaches, and has not broken down the analysis to individual types of vehicle. This is the heart of the strategic approach to the fleet needs.

There does need to be a tactical element to the planning as well. This looks more specifically at individual route needs and the types of vehicle that are required to deliver that service. From a strategic perspective, the mix of individual car types is less relevant. With an average price per car and an overall fleet size requirement, the long term planning can be undertaken.

Where the tactical element of the planning becomes more significant is when breaking the overall requirement down to the individual acquisition programs that will be undertaken. The remainder of this section will focus on the individual acquisition programs.

The key topics that will come into the acquisition plan will be:

- Number of vehicles to be acquired during the program
- Budgeting for the vehicles, the project management, capital spares, initial provisioning of spares, infrastructure updates, tooling requirements and training
- Composition of the project team to manage the program
- The route structure that the equipment will be operated on
- The existing and/or new maintenance locations for the equipment and the overlap with other requirements upon them, either permanent or transitional
- The desired product offering to the customers and the impact that has on the car configurations
- The maintenance philosophy that is to be followed with the vehicles
- The anticipated delivery rate of the vehicles into service
- The disposal requirements of the existing equipment (where there is some) either to other services or scrapping

These elements will have to be understood when defining the scope of the project team. It will then be necessary to roll back the critical points of this plan to the fleet strategy to ensure that any downstream consequences are understood.

20. Rolling Procurement and Batch Sizing

In the modeling of the fleet requirements over multiple years, an averaging approach has been taken to determine the total number of vehicles required. From the point of view of determining what the overall need is and how it overlays with the existing fleet and projected demand, this is an acceptable approach.

However, when it comes to the actual acquisition programs, there will need to be a more granular approach to equipment acquisition. Specifically, the programs will have to address the following points.

- How much equipment will be bought in this batch?
- Which equipment is anticipated to be replaced/supplemented?
- Where is the equipment going to be operated?
- Where is the equipment going to be maintained?
- Is it beneficial to have type commonality with other equipment in similar service?
- What sub-types of equipment will be part of the acquisition?
- What is an efficient delivery rate to aspire to?
- What options might be desirable to include in the acquisition?

Some of these questions will come back to the heart of the conflicting dynamics within the organization identified previously. A strong feature of this planning process should be an understanding of the supplier base and what is necessary to keep it competitive and technically competent to support Amtrak’s requirements. With the ongoing nature of the equipment requirement, batch sizes should be set at a level that provides:

- Sufficient quantities to make the program attractive to bidders
- Sufficient quantities to make support of the fleet efficient
- Small enough quantities to ensure that a new program is not so far downstream that there is nothing for losing bidders to see to justify them remaining in the market
- An appropriate level of capability exists within Amtrak to manage the overlapping programs at their various stages without overtaxing the available resources

Given the rates at which equipment is required, a batch size in the region of 150 cars might seem to be suitable. This would obviously be tailored appropriate to the circumstances at the time but from a planning perspective, it would appear to give a good compromise between the needs of the supplier base and the needs of Amtrak.

This would be particularly true if Amtrak is taking the ownership of the design of the equipment. In that case, multiple batches could, in effect, deliver the same vehicle. However, that could be counterproductive when looking at taking an evolutionary approach to the product development. Moreover, with multiple car builders bidding to build the same car to an Amtrak design, the systems suppliers would be in a strong position and would take away the majority of the pricing competition.

If individual suppliers have the ability to bid their own designs to an Amtrak outline requirement, this will introduce a higher level of supplier variation with an impact on spares support and maintainability. It is possible to set up spares support agreements with the suppliers that push the burden of sustaining the spares and delivering them to time.

21. Accelerated Development of True High Speed Service

At present, there is considerable discussion about the introduction of true high speed service within the US. The definition of high speed rail in the U.S. applies to services operating at 110 mph and above, with the current top American speed of 150 MPH achieved by Acela service. For the purposes of what is being considered here, true high speed services go beyond this up to as much as 220mph. At present, only Acela service operates at what can be considered true high speeds with sections of the route being cleared to 150mph and the Acela train sets being capable of those speeds.

True high speed projects are under consideration for a number of state projects. The technical solutions being considered have included the import of equipment from foreign manufacturers that have high speed services already in place. However, such equipment is not compliant with FRA safety regulations and such regulations and related FRA oversight is expected to be operative for all high speed rail applications in the U.S. Therefore, non-compliant foreign equipment would require regulatory waivers to operate domestically or would have to be modified to make it compliant with the associated impact on unit cost.

This report does not put forward proposals for what equipment should meet the needs of those projects. That decision is in the hands of the project leaders within the states concerned. However, there is a possible role for Amtrak to take in how such equipment needs might be met.

In Section 12, the need for the replacement of the existing Acela fleet is discussed. One stated desire is to increase the performance on the NEC to achieve a 2 hour journey time between Washington DC and New York. A substantial part of this will be down to infrastructure upgrades to overcome existing bottlenecks on the system. However, higher train performance will also be a significant factor.

This higher performance requirement will drive design considerations more in the direction that is being considered for other high speed rail projects. Therefore, if Amtrak starts its development process for the replacement of Acela in the next couple of years as suggested in Section 12, this work could be evaluated for alignment with other projects to see whether greater scale can be achieved in the overall acquisition requirements to make for a more competitive equipment acquisition process. Whether this means identical equipment or whether it is the pooling of requirements for core systems and technologies will need to be evaluated.

22. Deployment of Trainsets Versus Conventional Car-Based Consists

In the existing Amtrak operations, there are two services that presently utilize trainsets instead of consists of coaches, with a third coming soon. These are the Acela services on the NEC, the Cascades services in the Pacific Northwest and Hiawatha service in Wisconsin and Illinois, which is anticipated to begin trainset operation in 2011. Elsewhere in the network, the train consists are built up from individual coaches on an as required basis.

There are benefits and downsides to both types of operation. On a global basis, there has been a shift towards more trainset types of operation. Further analysis is required to determine whether there are any parts of the system that would benefit from trainsets over conventional consists.

This topic has not been addressed in this report. Instead it is proposed that the topic should be taken on by Amtrak as part of the development of the implementation phases of the future fleet acquisitions.

From the point of view of this plan and the possible impact of the trainset debate, it is believed that the impact should be relatively neutral. The fleet requirements are based on a seat need. Trainsets are believed to be broadly competitive with car-based consists on a per seat cost basis. Therefore, the funding profiles proposed should be able to cope with a change in philosophy. What will be required of maintenance facilities is a larger issue and would have to be part of the work undertaken when looking at the merits of trainsets.

23. Diesel Multiple Units – What Role?

The possibilities of Diesel Multiple Units (DMUs) have been discussed much in recent years. The Budd built Rail Diesel Cars (RDC) continue to provide service in some locations in North America but have largely been withdrawn from service. Indeed they have had an influence on the discussion of DMU usability based on their capabilities and limitations.

Modern DMU designs are significantly advanced from the RDC and they are service around the world in both short and long distance service at moderate and relatively high speeds. There is no inherent limitation of the DMU concept with regard to the type of service it can be utilized on.

A strength of the DMU type of vehicle is in providing higher frequency service without having excess capacity. Studies have been undertaken as to the largest size a DMU can efficiently be before a locomotive and coach consist becomes more efficient. The received wisdom is that approximately 4 cars is the break point. This number is, of course, very dependent on a number of factors such as route structure, frequency and demand but of course the seating capacity of the vehicles concerned is significant factor.

Given these caveats, it still appears likely that there could be a good case for using DMUs on routes that are either of lower ridership density or are in development mode to build ridership before increasing capacity to a larger train formation.

This then brings the discussion to heart of the issue for the North American market. At present, there is no active builder of DMU vehicles that comply with FRA crashworthiness requirements. Colorado Railcar did produce a compliant DMU concept in both single and bi-level configurations but ceased operations. Their designs have been obtained by US Railcar which is looking to establish an operation in Ohio.

Non-compliant vehicles have also been delivered into the US market with both Siemens and Stadtler delivering DMUs for commuter rail operations. These vehicles have been allowed based on temporal separation from freight services to avoid the potential for collisions. This is not a practical solution for more wide ranging use of DMUs on the national or state corridor networks.

Potential compliant DMUs are on the drawing board. The Denver FasTracks program has a DMU requirement for at least one of the lines that would require a compliant DMU product. SMART and eBART in California also have requirements. The SunRail project in central Florida could also have a requirement although their planning has been adjusted following the demise of Colorado Railcar. These projects could result in a compliant DMU design being brought to market. Whether it would be suitable for use on intercity services remains to be seen. The timescales for introduction are still very fluid.

From the above, it is not unreasonable to conclude that, if a requirement exists for a DMU product for the intercity market, there is nothing presently available and little on the horizon on which to base any planning. Therefore, Amtrak either takes the leadership on developing a DMU requirement to take to the supplier base, it waits to see what comes from the commuter market to see whether it can be adapted or the concept is dropped from further consideration.

If Amtrak is to take the leadership on a DMU concept, there must be sufficient vehicles required to justify a new product development launch. Ideally this should be a vehicle requirement of over 100 cars to allow the non-recurring costs to be amortized. This will allow the manufacturers to engage in the process.

Maintenance support of the DMU must be a factor in considering its utilization. The maintenance regime for this type of vehicle is based around the modularity of the design. Major systems are unbolted and exchanged rather than being fixed on the vehicle. Only diagnostics and lower level maintenance tasks are performed on the vehicle. This may require a revision to the maintenance practices required. It can also be undertaken in a relatively small facility. As DMUs are considered locomotives under FRA rules, they must undergo more frequent inspections in line with locomotive requirements as opposed to those of coaches.

Based on the interest being shown both within Amtrak and the states at this point, there does not appear to be a clear cut case for Amtrak to take the initiative on a DMU product. The concept does not appear to be a bad one but it doesn't appear to have a good fit with the existing network and operating model. New state services might be the best chance but few messages from the states are suggesting this is something they desire. If acquisition went ahead, it would be for a relatively small overall fleet size which would mean that, without other outlets for the product, it would not be a sustained build line for a supplier/suppliers.

The only thing that is likely to significantly change the outlook for DMUs in the US market is for an existing product to be demonstrated in service and found to have the performance characteristics and customer appeal necessary to change the discussion. Such vehicles do exist in Europe but since they are not FRA compliant, they require a waiver to be operated in the US.

24. Long Term Goals for Car Design

The existing manufacturing capacity in the North American market has been focused in recent years on the commuter rail and transit markets. There has been little business to be done in intercity products and so capabilities there have been limited.

With a new stream of orders, manufacturers will have to make decisions about whether to devote capability and production capacity to the new product types. Given the scale of orders under consideration, it is likely that they will wish to do so. However, what would be in the interests of both the intercity rail planners and the operators of commuter rail markets would be for the manufacturers to evolve product lines that can be adapted to meet both requirements.

The concept under consideration here would be for families of vehicles. The configuration of the "box" would be the variable element but the key subsystems would be designed to have applicability to either market. These systems would include such things as truck design, brakes, air conditioning, electrical controls and door systems.

Such an approach would mean that a manufacturer was looking at a far larger potential customer base for their design and would have fewer obstacles to switching from one type of car manufacture to another. It would also increase the customer base for sub-systems which should be beneficial to all customers.

Such an approach will not be something that can occur overnight. For a start, there are some well established existing products in the market. It is unlikely that the manufacturers of those products would be willing to scrap a design that has sold (and continues to sell) well to create something new at this stage. However, if Amtrak demonstrates a long term commitment to its fleet acquisition strategy, this will gradually persuade the manufacturers of the value in an approach such as is proposed here. For those manufacturers who may be entering the market, it would make sense to take such an approach from the beginning.

25. Further Work

There are a number of areas of further development that will be required for future updates to this plan. These areas as follows:

– Integration of additional ridership projections. The ridership assumptions built into the modeling used in this report were based on some basic assumptions of what can be conservatively expected in the coming years. In parallel, more detailed analysis has been underway on individual routes of the potential for growth in the short, medium and long terms. As the results from this analysis become available, they should be rolled back into the fleet modeling to provide a refined version of the future. (It should be noted that this is unlikely to have a significant impact on the level of equipment procurement in the coming years. Instead, it will affect the rate of retirement of the existing fleets. However, if substantial growth is forecast over and above what has been assumed, then it may be necessary to increase the acquisition rates assumed.)

– Push-pull analysis. Some analysis should be done of the impact of a move to push-pull type operations on the various corridors that don't operate in that manner now to see what effect that would have on the turnaround times at the end of the routes and the overall level of equipment necessary to support the services.

– As identified in Section 22, the merits of trainsets as opposed to consists of individual cars should be more thoroughly analyzed to see whether it would provide a more cost beneficial service on certain routes. This will have to consider the full life cycle cost of such a change.

26. Conclusions

A significant fleet re-equipment process is before Amtrak at this time. The backlog that has developed over the years has to be dealt with if the current system is be maintained and improve and the growth that is foreseen in the future will only increase the demand.

A funding level has been calculated that will allow the acquisition process to proceed and meet the needs of the traveling public in the coming years. This level of funding will ensure that goal is met. Not only does new equipment get introduced into service but it is done in a manner that provides a solid foundation for the development of a domestic supplier base capability in the intercity sector. In addition, this capability will be sustainable for the long term.

It also will provide for a smooth plan for equipment replacements in future years that will avoid the necessity for unusually large amounts of capital in a short space of time so easing the budgeting requirements. The plan can be adjusted over time to take account of changes in demand in a progressive way that does not undermine the principles stated above.

Attachment 1

Analysis Results of 2% Growth on a Route By Route Basis

Forecast Results for Northeast Region by Segment and Service
(prepared 9/14/09)

Corridor & Service	Segments	Current Service* FY09* Ridership	FY09* Ticket Revenue	FY09* Passenger Miles	Future Service (daily round trips, travel times, and OTP by segment provided by Amtrak on 9/03/09) FY18** Ridership	FY18** Ticket Revenue	FY18** Passenger Miles	FY23** Ridership	FY23** Ticket Revenue	FY23** Passenger Miles	FY30** Ridership	FY30** Ticket Revenue	FY30** Passenger Miles
NEC Spine (Boston-New York-Washington)													
Acela	Boston-New York	904,500	$101,352,000	187,180,000	1,359,400	$182,152,700	281,469,200	1,618,200	$239,588,700	335,458,300	1,912,500	$325,680,600	397,312,200
	New York-Washington	1,843,600	$266,661,000	306,550,000	2,593,600	$449,621,400	433,559,400	2,847,200	$545,680,900	477,088,200	3,378,000	$746,621,700	570,060,300
	Thru New York	283,700	$43,902,000	75,720,000	443,400	$82,300,200	118,434,800	527,000	$108,089,800	141,027,200	631,500	$149,081,700	169,733,400
	Subtotal	3,031,800	$411,915,000	569,450,000	4,396,400	$714,074,300	833,463,400	4,992,400	$893,359,400	953,573,700	5,922,000	$1,221,384,000	1,137,105,900
Northeast Regional	Boston-New York	1,335,100	$69,225,000	196,290,000	1,741,900	$107,833,500	254,826,200	1,844,200	$126,149,400	270,102,500	2,087,200	$164,840,100	307,291,100
	New York-Washington	4,784,700	$303,767,000	652,560,000	6,145,100	$467,677,900	841,316,300	6,645,600	$559,092,000	911,934,500	7,771,300	$754,900,300	1,074,335,200
	Thru New York	728,800	$59,298,000	192,520,000	1,048,400	$101,301,100	270,827,200	1,110,700	$118,544,700	287,025,900	1,272,600	$156,166,700	329,745,900
	Subtotal	6,848,600	$432,290,000	1,041,370,000	8,935,400	$676,812,500	1,366,969,700	9,600,500	$803,786,100	1,469,062,900	11,131,100	$1,075,907,100	1,711,372,200
New Haven-Springfield													
All trains (Route 12)	New Haven-Springfield	191,600	$2,224,000	7,660,000	325,100	$4,259,000	12,930,200	348,300	$4,910,500	13,844,200	404,200	$6,556,100	16,089,900
	Thru New Haven	123,900	$6,932,000	21,450,000	324,200	$21,593,900	55,756,100	385,400	$28,267,400	65,997,300	446,000	$37,593,000	76,425,300
	Subtotal	315,500	$9,156,000	29,110,000	649,300	$25,852,900	68,686,300	733,700	$33,177,900	79,841,500	850,200	$44,149,100	92,515,200
New York-Albany													
Empire	entire route (NY-Albany)	923,800	$36,415,000	114,290,000	1,419,700	$66,995,700	175,954,900	1,628,600	$84,879,800	201,897,500	1,874,800	$112,155,800	232,185,600
Lake Shore Ltd	New York-Albany only	16,100	$662,000	2,120,000	17,100	$841,300	2,255,400	15,800	$859,600	2,087,100	13,500	$840,900	1,776,800
	Subtotal	939,900	$37,077,000	116,410,000	1,436,800	$67,837,000	178,210,300	1,644,400	$85,739,400	203,984,600	1,888,300	$112,996,700	233,962,400
Philadelphia-Harrisburg													
Keystone	Philadelphia-Harrisburg	879,900	$9,536,000	56,460,000	1,074,400	$13,881,100	69,003,100	1,179,300	$16,814,900	75,721,800	1,264,300	$20,708,300	81,184,000
	Thru Philadelphia	333,400	$15,757,000	51,930,000	406,300	$22,948,900	63,291,200	458,600	$28,593,300	71,420,600	504,300	$36,121,400	78,497,000
	Subtotal	1,213,300	$25,293,000	108,390,000	1,480,700	$36,830,000	132,294,300	1,637,900	$45,408,200	147,142,400	1,768,600	$56,829,700	159,681,000
Pennsylvanian	Philadelphia-Harrisburg	34,200	$614,000	2,660,000	114,500	$2,430,100	8,811,100	116,500	$2,731,600	8,970,500	124,900	$3,364,000	9,617,600
(includes Altoona)	Thru Phil. to/from Harrisburg***	21,800	$1,067,000	3,640,000	72,500	$4,240,900	12,060,700	73,200	$4,727,300	12,177,300	78,000	$5,788,300	12,975,800
	Subtotal	56,000	$1,681,000	6,300,000	187,000	$6,671,000	20,871,800	189,700	$7,458,900	21,147,800	202,900	$9,152,300	22,593,400
Washington-Richmond													
Virginia trains	Washington-Richmond	119,900	$3,293,000	5,230,000	251,800	$8,321,400	18,499,400	249,400	$9,114,500	18,834,100	322,100	$13,503,700	20,192,700
	Thru Washington to/from Richmond****	160,800	$11,794,000	7,160,000	286,000	$24,830,100	24,977,900	286,800	$27,576,600	25,438,000	314,800	$35,120,100	27,106,000
	Subtotal	280,700	$15,087,000	12,390,000	537,800	$33,151,500	43,477,300	536,200	$36,691,100	44,272,100	636,900	$48,623,800	47,298,700
Carolinian/SEHSR	Washington-Richmond only	12,200	$397,000	2,090,000	18,700	$729,900	3,224,400	53,800	$2,336,300	9,375,000	70,700	$3,513,500	12,213,200
	Thru Washington to/from Richmond****	20,400	$1,439,000	9,130,000	28,400	$2,391,200	12,776,200	80,000	$7,447,700	36,080,800	132,600	$14,241,000	60,058,500
	Subtotal	32,600	$1,836,000	11,220,000	47,100	$3,121,100	16,000,600	133,800	$9,784,000	45,455,800	203,300	$17,754,500	72,271,700
Long Distance trains	Washington-Richmond only	13,900	$478,000	2,770,000	15,200	$625,300	3,027,000	14,800	$672,300	2,949,100	11,500	$600,500	2,291,500
	Thru Washington to/from Richmond****	26,700	$1,869,000	12,520,000	29,200	$2,434,000	13,612,900	27,300	$2,526,100	12,823,000	25,600	$2,727,900	12,078,400
	Subtotal	40,600	$2,347,000	15,290,000	44,400	$3,059,300	16,639,900	42,100	$3,198,400	15,772,100	37,100	$3,328,400	14,369,900
Total Northeast Region		12,759,000	$936,682,000	1,909,930,000	17,714,900	$1,567,409,600	2,676,613,600	19,510,700	$1,918,603,400	2,980,252,900	22,640,400	$2,590,125,600	3,491,170,400

These forecasts are based solely upon information available to AECOM Consult as of 9/14/09.
These forecasts are provided for the sole use of Amtrak. They are not intended for disclosure in a financial offering statement.
Notes:
* FY09 Estimate (prepared 6/12/09) and current timetables
** Secular growth at 2%/year through 2019 and then 1%/year thereafter; Ticket revenue forecasts also include 2%/year increase in fares to match inflation (no ridership loss)
*** Pennsylvania markets west of Harrisburg not included in this or any other totals.
**** Virginia, Carolinian/SEHSR, and Long Distance train markets south/east of Richmond not included in this or any other totals.

Required Data for Long Distance and State Corridor Routes

Prepared November 6, 2009

Route		Current Service			Long Term Demand Forecasts Base Case (FY10 Budget service levels)								
		FY09*			FY18**			FY23**			FY30**		
		Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles
State Supported Routes													
RT - 03	Ethan Allen	46,748	2,347,000	8,764,000	53,748	3,227,000	10,064,000	57,451	3,810,000	10,752,000	62,876	4,793,000	11,765,000
RT - 04	Vermonter	74,016	4,012,000	21,374,000	84,586	5,490,000	24,421,000	90,083	6,460,000	26,012,000	98,785	8,145,000	28,524,000
RT - 07	Albany-Niagara Falls-Toronto	339,434	19,269,000	101,430,000	419,865	28,488,000	125,691,000	468,444	35,077,000	140,338,000	544,026	46,783,000	163,237,000
RT - 09	Downeaster	460,474	6,496,000	36,347,000	582,612	9,772,000	45,806,000	650,897	12,007,000	51,016,000	765,444	16,140,000	59,751,000
RT - 12	New Haven-Springfield	325,518	9,209,000	29,440,000	389,024	13,153,000	35,184,000	412,916	15,414,000	37,344,000	442,702	18,982,000	40,038,000
RT - 14	Keystone	1,215,785	25,105,000	107,370,000	1,452,976	35,856,000	128,317,000	1,542,212	42,019,000	136,198,000	1,653,460	51,749,000	146,023,000
RT - 15	Empire (NYP-ALB)	925,746	36,756,000	113,962,000	1,106,352	52,497,000	136,195,000	1,174,300	61,520,000	144,560,000	1,259,009	75,765,000	154,988,000
RT - 20	Chicago-St. Louis (Lincoln Service)	506,235	11,328,000	91,117,000	617,731	16,407,000	110,415,000	670,966	19,609,000	119,552,000	765,967	25,622,000	136,031,000
RT - 21	Hiawatha	738,231	13,301,000	58,897,000	883,233	18,992,000	70,362,000	958,082	22,726,000	76,253,000	1,089,640	29,652,000	86,603,000
RT - 22	Wolverine	444,127	15,042,000	94,185,000	529,650	21,395,000	111,988,000	568,956	25,333,000	120,002,000	642,767	32,814,000	135,154,000
RT - 23	CHI-Carbondale (Illini/Saluki)	259,630	7,127,000	49,290,000	299,590	9,738,000	56,433,000	317,253	11,320,000	59,459,000	351,151	14,285,000	65,348,000
RT - 24	CHI-Quincy (IL Zephyr/Carl Sandburg)	202,558	4,657,000	34,365,000	223,293	6,114,000	37,858,000	229,637	6,930,000	38,929,000	242,822	8,401,000	41,159,000
RT - 29	Heartland Flyer	73,564	1,592,000	12,733,000	89,556	2,313,000	15,464,000	97,351	2,771,000	16,773,000	110,070	3,597,000	18,947,000
RT - 35	Pacific Surfliner	2,592,996	46,551,000	213,713,000	3,524,294	75,326,000	289,960,000	4,116,651	96,858,000	338,114,000	5,189,313	139,824,000	425,384,000
RT - 36	Cascades	740,154	20,945,000	113,634,000	1,136,951	39,009,000	178,580,000	1,350,341	51,077,000	212,071,000	1,718,011	74,557,000	269,801,000
RT - 37	Capitol Corridor	1,599,625	22,161,000	102,283,000	2,157,800	35,675,000	137,794,000	2,515,047	45,859,000	160,441,000	3,142,789	65,754,000	200,271,000
RT - 39	San Joaquin	929,172	27,817,000	133,712,000	1,276,847	45,526,000	182,967,000	1,491,159	58,625,000	213,327,000	1,877,599	84,712,000	268,225,000
RT - 40	Adirondack	104,681	5,313,000	31,744,000	119,887	7,276,000	36,406,000	127,908	8,572,000	38,848,000	140,043	10,785,000	42,570,000
RT - 41	Blue Water	132,851	4,112,000	26,645,000	159,621	5,891,000	31,980,000	172,316	7,011,000	34,474,000	196,117	9,151,000	39,184,000
RT - 46	Washington-Lynchburg	0	0	0	61,051	4,507,000	14,865,000	69,477	5,663,000	16,912,000	83,640	7,831,000	20,346,000
RT - 47	Washington-Newport News	446,604	23,905,000	94,934,000	625,151	39,839,000	131,389,000	708,287	49,704,000	148,554,000	845,730	67,965,000	176,930,000
RT - 54	Hoosier State	31,384	678,000	4,878,000	35,808	924,000	5,576,000	37,701	1,074,000	5,876,000	40,821	1,336,000	6,371,000
RT - 56	KCY-St. Louis (MO River Runner)	150,870	3,275,000	27,478,000	186,206	4,807,000	33,724,000	205,338	5,835,000	37,067,000	239,533	7,796,000	43,111,000
RT - 57	Pennsylvanian	199,484	7,819,000	47,377,000	228,556	10,691,000	53,720,000	243,577	12,567,000	56,906,000	267,934	15,843,000	62,010,000
RT - 65	Pere Marquette	103,246	2,818,000	15,778,000	126,221	4,120,000	19,301,000	138,113	4,978,000	21,123,000	159,504	6,606,000	24,402,000
RT - 66	Carolinian	277,740	14,708,000	84,092,000	344,484	20,759,000	99,198,000	395,917	25,624,000	110,863,000	487,210	34,729,000	130,798,000
RT - 67	Piedmont	68,427	1,120,000	7,959,000	173,299	3,492,000	20,889,000	205,825	4,608,000	24,960,000	261,867	6,792,000	32,007,000
State Supported Routes - Subtotal		**12,989,300**	**337,463,000**	**1,663,501,000**	**16,888,392**	**521,284,000**	**2,144,547,000**	**19,016,205**	**643,051,000**	**2,396,724,000**	**22,678,830**	**870,409,000**	**2,828,978,000**
Long Distance Routes													
RT - 16	Silver Star	371,235	27,035,000	193,899,000	458,912	39,622,000	237,698,000	512,208	48,553,000	263,881,000	596,011	64,476,000	305,039,000
RT - 18	Cardinal	108,614	6,364,000	43,291,000	124,240	8,734,000	49,422,000	131,511	10,233,000	52,279,000	143,368	12,856,000	56,940,000
RT - 19	Silver Meteor	330,734	32,641,000	202,577,000	406,933	47,658,000	246,763,000	453,789	58,327,000	273,232,000	526,511	77,188,000	314,185,000
RT - 25	Empire Builder	515,444	54,065,000	375,835,000	600,368	76,147,000	440,812,000	643,922	90,624,000	474,139,000	710,943	115,825,000	526,116,000
RT - 26	Capitol Limited	215,371	17,581,000	107,028,000	244,000	24,012,000	121,602,000	256,970	28,031,000	128,256,000	278,123	35,034,000	139,092,000
RT - 27	California Zephyr	345,558	38,680,000	274,206,000	414,204	55,371,000	326,343,000	451,319	66,492,000	353,826,000	511,422	86,445,000	398,790,000
RT - 28	Southwest Chief	318,025	38,034,000	289,531,000	375,011	54,112,000	343,318,000	405,429	64,878,000	372,180,000	455,663	84,311,000	419,956,000
RT - 30	City of New Orleans	196,659	14,976,000	93,686,000	223,888	20,325,000	106,033,000	236,515	23,655,000	111,646,000	256,844	29,409,000	120,590,000
RT - 32	Texas Eagle	260,467	19,722,000	152,777,000	320,252	28,807,000	185,896,000	350,333	34,709,000	202,588,000	399,970	45,325,000	229,838,000
RT - 33	Sunset Limited	78,775	8,272,000	67,448,000	96,895	12,164,000	82,451,000	106,935	14,810,000	90,658,000	123,063	19,558,000	103,858,000
RT - 34	Coast Starlight	432,565	32,638,000	217,586,000	562,517	49,155,000	273,068,000	641,049	60,736,000	305,078,000	777,776	82,409,000	359,564,000
RT - 45	Lake Shore Limited	334,456	23,978,000	162,929,000	377,926	32,634,000	184,465,000	398,916	38,147,000	194,743,000	431,418	47,609,000	210,865,000
RT - 48	Palmetto	171,316	12,480,000	72,081,000	204,265	17,730,000	85,425,000	222,568	21,292,000	92,764,000	251,901	27,598,000	104,372,000
RT - 52	Crescent	286,576	26,499,000	144,733,000	343,357	38,074,000	173,308,000	374,190	45,886,000	188,750,000	421,937	59,555,000	212,501,000
RT - 63	Auto Train	232,955	58,590,000	200,574,000	285,263	86,103,000	245,611,000	315,947	105,505,000	272,030,000	363,482	139,815,000	312,958,000
Long Distance Routes - Subtotal		**4,198,750**	**411,555,000**	**2,598,181,000**	**5,038,031**	**590,648,000**	**3,102,215,000**	**5,501,601**	**711,878,000**	**3,376,050,000**	**6,248,432**	**927,413,000**	**3,814,664,000**

These forecasts are based solely upon information available to AECOM Consult as of 11/06/09.
These forecasts are provided for the sole use of Amtrak. They are not intended for disclosure in a financial offering statement.
Notes:
* FY09 Actuals
** Aggressive secular growth (except routes 12, 14, and 15 use NEC growth assumption at 2%/year through 2019 and then 1%/year thereafter); Ticket revenue forecasts also include 2%/year increase in fares to match inflation (no ridership loss
No changes in frequency, travel time, or OTP from FY10 Budget (which includes WAS-Lynchburg extension; WAS-Richmond extension; Bellingham - Vancouver extension; and 2nd Piedmont)

Route		Current Service			Long Term Demand Forecasts Base Case (FY10 Budget service levels)								
		FY09*			FY18**			FY23**			FY30**		
		Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles
State Supported Routes													
RT - 03	Ethan Allen	46,748	2,347,000	8,764,000	53,748	3,227,000	10,064,000	57,451	3,810,000	10,752,000	62,876	4,793,000	11,765,000
RT - 04	Vermonter	74,016	4,012,000	21,374,000	84,586	5,490,000	24,421,000	90,083	6,460,000	26,012,000	98,785	8,145,000	28,524,000
RT - 07	Albany-Niagara Falls-Toronto	339,434	19,269,000	101,430,000	419,865	28,488,000	125,691,000	468,444	35,077,000	140,338,000	544,026	46,783,000	163,237,000
RT - 09	Downeaster	460,474	6,496,000	36,347,000	582,612	9,772,000	45,806,000	650,897	12,007,000	51,016,000	765,444	16,140,000	59,751,000
RT - 12	New Haven-Springfield	325,518	9,209,000	29,440,000	389,024	13,153,000	35,184,000	412,916	15,414,000	37,344,000	442,702	18,982,000	40,038,000
RT - 14	Keystone	1,215,785	25,105,000	107,370,000	1,452,976	35,856,000	128,317,000	1,542,212	42,019,000	136,198,000	1,653,460	51,749,000	146,023,000
RT - 15	Empire (NYP-ALB)	925,746	36,756,000	113,962,000	1,106,352	52,497,000	136,195,000	1,174,300	61,520,000	144,560,000	1,259,009	75,765,000	154,988,000
RT - 20	Chicago-St. Louis (Lincoln Service)	506,235	11,328,000	91,117,000	617,731	16,407,000	110,415,000	670,966	19,609,000	119,552,000	765,967	25,622,000	136,031,000
RT - 21	Hiawatha	738,231	13,301,000	58,897,000	883,233	18,992,000	70,362,000	958,082	22,726,000	76,253,000	1,089,640	29,652,000	86,603,000
RT - 22	Wolverine	444,127	15,042,000	94,185,000	529,650	21,395,000	111,988,000	568,956	25,333,000	120,002,000	642,767	32,814,000	135,154,000
RT - 23	CHI-Carbondale (Illini/Saluki)	259,630	7,127,000	49,290,000	299,590	9,738,000	56,433,000	317,253	11,320,000	59,459,000	351,151	14,285,000	65,348,000
RT - 24	CHI-Quincy (IL Zephyr/Carl Sandburg)	202,558	4,657,000	34,365,000	223,293	6,114,000	37,858,000	229,637	6,930,000	38,929,000	242,822	8,401,000	41,159,000
RT - 29	Heartland Flyer	73,564	1,592,000	12,733,000	89,556	2,313,000	15,464,000	97,351	2,771,000	16,773,000	110,070	3,597,000	18,947,000
RT - 35	Pacific Surfliner	2,592,996	46,551,000	213,713,000	3,524,294	75,326,000	289,960,000	4,116,651	96,858,000	338,114,000	5,189,313	139,824,000	425,384,000
RT - 36	Cascades	740,154	20,945,000	113,634,000	1,136,951	39,009,000	178,580,000	1,350,341	51,077,000	212,071,000	1,718,011	74,557,000	269,801,000
RT - 37	Capitol Corridor	1,599,625	22,161,000	102,283,000	2,157,800	35,675,000	137,794,000	2,515,047	45,859,000	160,441,000	3,142,789	65,754,000	200,271,000
RT - 39	San Joaquin	929,172	27,817,000	133,712,000	1,276,847	45,526,000	182,967,000	1,491,159	58,625,000	213,327,000	1,877,599	84,712,000	268,225,000
RT - 40	Adirondack	104,681	5,313,000	31,744,000	119,887	7,276,000	36,406,000	127,908	8,572,000	38,848,000	140,043	10,785,000	42,570,000
RT - 41	Blue Water	132,851	4,112,000	26,645,000	159,621	5,891,000	31,980,000	172,316	7,011,000	34,474,000	196,117	9,151,000	39,184,000
RT - 46	Washington-Lynchburg	0	0	0	61,051	4,507,000	14,865,000	69,477	5,663,000	16,912,000	83,640	7,831,000	20,346,000
RT - 47	Washington-Newport News	446,604	23,905,000	94,934,000	625,151	39,839,000	131,389,000	708,287	49,704,000	148,554,000	845,730	67,965,000	176,930,000
RT - 54	Hoosier State	31,384	678,000	4,878,000	35,808	924,000	5,576,000	37,701	1,074,000	5,876,000	40,821	1,336,000	6,371,000
RT - 56	KCY-St. Louis (MO River Runner)	150,870	3,275,000	27,478,000	186,206	4,807,000	33,724,000	205,338	5,835,000	37,067,000	239,533	7,796,000	43,111,000
RT - 57	Pennsylvanian	199,484	7,819,000	47,377,000	228,556	10,691,000	53,720,000	243,577	12,567,000	56,906,000	267,934	15,843,000	62,010,000
RT - 65	Pere Marquette	103,246	2,818,000	15,778,000	126,221	4,120,000	19,301,000	138,113	4,978,000	21,123,000	159,504	6,606,000	24,402,000
RT - 66	Carolinian	277,740	14,708,000	84,092,000	344,484	20,759,000	99,198,000	395,917	25,624,000	110,863,000	487,210	34,729,000	130,798,000
RT - 67	Piedmont	68,427	1,120,000	7,959,000	173,299	3,492,000	20,889,000	205,825	4,608,000	24,960,000	261,867	6,792,000	32,007,000
State Supported Routes - Subtotal		**12,989,300**	**337,463,000**	**1,663,501,000**	**16,888,392**	**521,284,000**	**2,144,547,000**	**19,016,205**	**643,051,000**	**2,396,724,000**	**22,678,830**	**870,409,000**	**2,828,978,000**
Long Distance Routes													
RT - 16	Silver Star	371,235	27,035,000	193,899,000	458,912	39,622,000	237,698,000	512,208	48,553,000	263,881,000	596,011	64,476,000	305,039,000
RT - 18	Cardinal	108,614	6,364,000	43,291,000	124,240	8,734,000	49,422,000	131,511	10,233,000	52,279,000	143,368	12,856,000	56,940,000
RT - 19	Silver Meteor	330,734	32,641,000	202,577,000	406,933	47,658,000	246,763,000	453,789	58,327,000	273,232,000	526,511	77,188,000	314,185,000
RT - 25	Empire Builder	515,444	54,065,000	375,835,000	600,368	76,147,000	440,812,000	643,922	90,624,000	474,139,000	710,943	115,825,000	526,116,000
RT - 26	Capitol Limited	215,371	17,581,000	107,028,000	244,000	24,012,000	121,602,000	256,970	28,031,000	128,256,000	278,123	35,034,000	139,092,000
RT - 27	California Zephyr	345,558	38,680,000	274,206,000	414,204	55,371,000	326,343,000	451,319	66,492,000	353,826,000	511,422	86,445,000	398,790,000
RT - 28	Southwest Chief	318,025	38,034,000	289,531,000	375,011	54,112,000	343,318,000	405,429	64,878,000	372,180,000	455,663	84,311,000	419,956,000
RT - 30	City of New Orleans	196,659	14,976,000	93,686,000	223,888	20,325,000	106,033,000	236,515	23,655,000	111,646,000	256,844	29,409,000	120,590,000
RT - 32	Texas Eagle	260,467	19,722,000	152,777,000	320,252	28,807,000	185,896,000	350,333	34,709,000	202,588,000	399,970	45,325,000	229,838,000
RT - 33	Sunset Limited	78,775	8,272,000	67,448,000	96,895	12,164,000	82,451,000	106,935	14,810,000	90,658,000	123,063	19,558,000	103,858,000

Route		Current Service FY09*			Long Term Demand Forecasts Base Case (FY10 Budget service levels) FY18**			FY23**			FY30**		
		Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles	Riders	Ticket Revenue	Passenger Miles
RT - 34	Coast Starlight	432,565	32,638,000	217,586,000	562,517	49,155,000	273,068,000	641,049	60,736,000	305,078,000	777,776	82,409,000	359,564,000
RT - 45	Lake Shore Limited	334,456	23,978,000	162,929,000	377,926	32,634,000	184,465,000	398,916	38,147,000	194,743,000	431,418	47,609,000	210,865,000
RT - 48	Palmetto	171,316	12,480,000	72,081,000	204,265	17,730,000	85,425,000	222,568	21,292,000	92,764,000	251,901	27,598,000	104,372,000
RT - 52	Crescent	286,576	26,499,000	144,733,000	343,357	38,074,000	173,308,000	374,190	45,886,000	188,750,000	421,937	59,555,000	212,501,000
RT - 63	Auto Train	232,955	58,590,000	200,574,000	285,263	86,103,000	245,611,000	315,947	105,505,000	272,030,000	363,482	139,815,000	312,958,000
Long Distance Routes - Subtotal		**4,198,750**	**411,555,000**	**2,598,181,000**	**5,038,031**	**590,648,000**	**3,102,215,000**	**5,501,601**	**711,878,000**	**3,376,050,000**	**6,248,432**	**927,413,000**	**3,814,664,000**

These forecasts are based solely upon information available to AECOM Consult as of 11/06/09.
These forecasts are provided for the sole use of Amtrak. They are not intended for disclosure in a financial offering statement.
Notes:
* FY09 Actuals
** Aggressive secular growth (except routes 12, 14, and 15 use NEC growth assumption at 2%/year through 2019 and then 1%/year thereafter); Ticket revenue forecasts also include 2%/year increase in fares to match inflation (no ridership loss);
No changes in frequency, travel time, or OTP from FY10 Budget (which includes WAS-Lynchburg extension; WAS-Richmond extension; Bellingham - Vancouver extension; and 2nd Piedmont)

Northeast Corridor Projections:

Option	Number of Coaches	Total Train Miles	Frequency	Daily Trips	Total Riders (TRD)	Riders per Freq.	Estimated # of Coaches	Change	Riders per Coach/ Trip
2009	Currently average 5.5 coaches per departure which results in an average of 100 riders per coach car trip.								
1	5.5		12,392	34	6,848,600	553	5.5		100
2018									
1	6.5		12,392	34	8,935,400	721	6.5		111
2	**7.0**		12,392	34	8,935,400	721	7.0	1.5	103
3	7.5		12,392	34	8,935,400	721	7.5		96
2023									
1	7.0		12,392	34	9,600,500	775	7.0		111
2	**7.5**		12,392	34	9,600,500	775	8.0	1.0	97
3	8.0		12,392	34	9,600,500	775	8.0		97

Calculation of total cars required

Incremental Coaches Needed					
Route #	**Sets**	**added coaches per consist**	**extended**	**20% shop count**	**Total (all single level**
2018	22	1.5	33	6.6	**40**
2023	22	1.0	22	4.4	**27**

FY18

Calculation of required added cars per set

						Sleepers									
Route #	Route Name	FY08 sleeper cars per consist (2)	FY08 Coach cars per consist	Frequency	Daily Trips	Peak Sleeper Load Factor (FY08 Avg)	FY18 Total Sleeper Riders Forecast	FY18 Sleeper Riders per Freq.	FY18 Proposed number of sleepers per consist (3)	Net sleeper change per consist	FY 18 Proposed Riders per Sleeper per trip	FY08 avg. riders per sleeper per trip	Peak Coach Load Factor (FY08 Avg)	FY18 Total Coach Riders Forecast	FY18 Coach Riders per Freq.
RT - 16	Silver Star	1.8	4.0	730	2	81%	30,601	42	2.0	0.0	21	19	86%	428,311	587
RT - 18	Cardinal	0.8	3.0	313	2	94%	7,630	24	1.0	0.0	24	27	83%	116,610	373
RT - 19	Silver Meteor	2.8	4.0	730	2	87%	45,736	63	4.0	1.0	16	17	86%	361,197	495
RT - 25	Empire Builder	3.1	4.0	730	2	93%	98,022	134	4.1	1.0	33	39	88%	502,346	688
RT - 26	Capitol Limited	2.1	3.0	730	2	85%	53,309	73	3.1	1.0	24	29	78%	190,691	261
RT - 27	California Zephyr	2.1	3.0	730	2	86%	74,143	102	3.1	1.0	33	41	78%	340,061	466
RT - 28	Southwest Chief	2.1	3.0	730	2	87%	64,575	88	3.1	1.0	29	37	85%	310,436	425
RT - 30	City of New Orlean	1.2	3.0	730	2	86%	33,099	45	2.1	1.0	22	33	81%	190,789	261
RT - 32	Texas Eagle	1.2	3.0	730	2	86%	37,989	52	2.1	1.0	25	35	75%	282,263	387
RT - 33	Sunset Limited	1.2	3.5	313	2	84%	19,201	61	2.1	1.0	29	39	56%	77,694	248
RT - 34	Coast Starlight	3.0	4.0	730	2	80%	86,924	119	4.0	1.0	30	26	80%	475,593	651
RT - 45	Lake Shore Limited	2.8	5.0	730	2	85%	38,790	53	3.0	0.0	18	17	84%	339,136	465
RT - 52	Crescent	1.8	4.0	730	2	94%	36,441	50	2.0	0.0	25	24	91%	306,916	420
RT - 63	Auto Train	5.0	4.0	730	2	82%	122,526	168	6.0	1.0	28	28	63%	162,737	223
RT - 48	Palmetto (4)	0.5	4.0	730	2	n/a	13,857	19	0.5	0.0	38	31	77%	190,408	261

2) 0.8, 1.8 and 2.8 includes deduction of crew in line space; 1.2, 2.1 and 3.1 includes dorm rooms sold to public.

3) Assume crew removed from line space (1.8 = 2.0); 1.2, 2.1 and 3.1 includes dorm rooms sold to public.

4) Club-dinette (for business class) instead of sleeper for Palmetto

Calculation of total cars required

			Incremental Sleepers/Business Class Cars Needed							Incremental Coaches Needed					
Route #	Route Name	Sets per consist	added sleepers per consist	extended	20% shop count	total	Superliner	Viewliner	Business Class Car	added coaches per consist	extended	20% shop count	total	Bi - Level	Single Level
RT - 16	Silver Star	4	0.0	0	0	**0**		**0**		1.0	4	0.8	**5**		**5**
RT - 18	Cardinal	2	0.0	0	0	**0**		**0**		0.0	0	0	**0**		**0**
RT - 19	Silver Meteor	4	1.0	4	0.8	**5**		**5**		1.0	4	0.8	**5**		**5**
RT - 25	Empire Builder	5	1.0	5	1	**6**	**6**			1.0	5	1	**6**	**6**	
RT - 26	Capitol Limited	3	1.0	3	0.6	**4**	**4**			0.0	0	0	**0**	**0**	
RT - 27	California Zephyr	6	1.0	6	1.2	**8**	**8**			1.0	6	1.2	**8**	**8**	
RT - 28	Southwest Chief	5	1.0	5	1	**6**	**6**			1.0	5	1	**6**	**6**	
RT - 30	City of New Orlean	3	1.0	3	0.6	**4**	**4**			1.0	3	0.6	**4**	**4**	
RT - 32	Texas Eagle	4	1.0	4	0.8	**5**	**5**			0.0	0	0	**0**	**0**	
RT - 33	Sunset Limited	4	1.0	4	0.8	**5**	**5**			0.0	0	0	**0**	**0**	
RT - 34	Coast Starlight	4	1.0	4	0.8	**5**	**5**			2.0	8	1.6	**10**	**10**	
RT - 45	Lake Shore Limited	3	0.0	0	0	**0**		**0**		1.0	3	0.6	**4**		**4**
RT - 52	Crescent	4	0.0	0	0	**0**		**0**		1.0	4	0.8	**5**		**5**
RT - 63	Auto Train	2	1.0	2	0.4	**3**	**3**			1.0	2	0.4	**3**	**3**	
RT - 48	Palmetto (4)	2	0.0	0	0	**0**			**0**	0.0	0	0	**0**		**0**
		Total Superliner Sleepers				**51**	**46**	**5**	**0**	**Total Superliner Coaches**			**56**	**37**	**19**

FY23

Calculation of required added cars per set

						Sleepers									
Route #	Route Name	FY18 sleeper cars per consist [2]	FY18 Coach cars per consist	Frequency	Daily Trips	Peak Sleeper Load Factor (FY08 Avg)	FY23 Total Sleeper Riders	FY23 Sleeper Riders per Freq.	FY23 Proposed number of sleepers per consist [3]	Net sleeper change per consist	Proposed Riders per Sleeper per trip	FY08 avg. riders per sleeper per trip	Peak Coach Load Factor (FY08 Avg)	FY23 Total Coach Riders	FY23 Coach Riders per Freq.
RT - 16	Silver Star	2.0	5.0	730	2	81%	34,344	47	3.0	1.0	16	19	86%	477,864	655
RT - 18	Cardinal	1.0	3.0	313	2	94%	8,152	26	1.0	0.0	26	27	83%	123,359	394
RT - 19	Silver Meteor	4.0	5.0	730	2	87%	51,145	70	4.0	0.0	18	17	86%	402,644	552
RT - 25	Empire Builder	4.1	5.0	730	2	93%	106,768	146	4.1	0.0	36	39	88%	537,154	736
RT - 26	Capitol Limited	3.1	3.0	730	2	85%	56,780	78	3.1	0.0	25	29	78%	200,190	274
RT - 27	California Zephyr	3.1	4.0	730	2	86%	81,352	111	3.1	0.0	36	41	78%	369,967	507
RT - 28	Southwest Chief	3.1	4.0	730	2	87%	70,969	97	3.1	0.0	31	37	85%	334,460	458
RT - 30	City of New Orleans	2.1	4.0	730	2	86%	35,060	48	2.1	0.0	23	33	81%	201,455	276
RT - 32	Texas Eagle	2.1	3.0	730	2	86%	41,801	57	2.1	0.0	27	35	75%	308,532	423
RT - 33	Sunset Limited	2.1	3.5	313	2	84%	21,323	68	2.1	0.0	32	39	56%	85,612	274
RT - 34	Coast Starlight	4.0	6.0	730	2	80%	96,300	132	5.0	1.0	26	26	80%	544,749	746
RT - 45	Lake Shore Limited	3.0	6.0	730	2	85%	41,472	57	3.0	0.0	19	17	84%	357,444	490
RT - 52	Crescent	2.0	5.0	730	2	94%	40,106	55	3.0	1.0	18	24	91%	334,084	458
RT - 63	Auto Train	6.0	5.0	730	2	82%	136,878	188	7.0	1.0	27	28	63%	179,069	245
RT - 48	Palmetto [4]	0.5	4.0	730	2	n/a	15,227	21	1.0	1.0	21	31	77%	207,341	284

2) 0.8, 1.8 and 2.8 includes deduction of crew in line space; 1.2, 2.1 and 3.1 includes dorm rooms sold to public.

3) Assume crew removed from line space (1.8 = 2.0); 1.2, 2.1 and 3.1 includes dorm rooms sold to public.

4) Club-dinette (for business class) instead of sleeper for Palmetto

Calculation of total cars required

			Incremental Sleepers Needed							Incremental Coaches Needed					
Route #	Route Name	Sets per consist	added sleepers per consist	extended	20% shop count	total	Superliner	Viewliner	Business Class Car	added coaches per consist	extended	20% shop count	total	Bi - Level	Single Level
RT - 16	Silver Star	4	1.0	4	0.8	**5**		**5**		1.0	4	0.8	**5**		**5**
RT - 18	Cardinal	2	0.0	0	0	**0**		**0**		1.0	2	0.4	**3**		**3**
RT - 19	Silver Meteor	4	0.0	0	0	**0**		**0**		1.0	4	0.8	**5**		**5**
RT - 25	Empire Builder	5	0.0	0	0	**0**	**0**			0.0	0	0	**0**	**0**	
RT - 26	Capitol Limited	3	0.0	0	0	**0**	**0**			1.0	3	0.6	**4**	**4**	
RT - 27	California Zephyr	6	0.0	0	0	**0**	**0**			0.0	0	0	**0**	**0**	
RT - 28	Southwest Chief	5	0.0	0	0	**0**	**0**			0.0	0	0	**0**	**0**	
RT - 30	City of New Orleans	3	0.0	0	0	**0**	**0**			0.0	0	0	**0**	**0**	
RT - 32	Texas Eagle	4	0.0	0	0	**0**	**0**			1.0	4	0.8	**5**	**5**	
RT - 33	Sunset Limited	4	0.0	0	0	**0**	**0**			1.0	4	0.8	**5**	**5**	
RT - 34	Coast Starlight	4	1.0	4	0.8	**5**	**5**			1.0	4	0.8	**5**	**5**	
RT - 45	Lake Shore Limited	3	0.0	0	0	**0**		**0**		0.0	0	0	**0**		**0**
RT - 52	Crescent	4	1.0	4	0.8	**5**		**5**		0.0	0	0	**0**		**0**
RT - 63	Auto Train	2	1.0	2	0.4	**3**	**3**			1.0	2	0.4	**3**	**3**	
RT - 48	Palmetto [4]	2	1.0	2	0.4	**3**			**3**	1.0	2	0.4	**3**		**3**
		Total Superliner Sleepers				**21**	**8**	**10**	**3**	**Total Superliner Coaches**			**38**	**22**	**16**

FY18

Calculation of required added cars per set

Route #	Route Name	FY08 ridership	FY08 Coach cars per consist	Frequency	Daily Trips	Coach: Peak Coach Load Factor (FY08 Avg)	FY18 Total Coach Riders Forecast	% Increase in riders from FY08	FY18 Coach Riders per Freq.	Proposed number of coaches per consist	Net coach change per consist	FY18 Proposed Riders per Coach per trip	FY08 avg. riders per coach per trip
RT - 03	Ethan Allen Express	46,881	4.5	730	2	56%	53,748	15%	74	4.5	0.0	16	14
RT - 04	Vermonter	72,655	4.5	730	2	78%	84,586	16%	116	5.5	1.0	21	22
RT - 07	Maple Leaf	354,492	4.5	730	2	69%	419,865	18%	575	5.5	1.0	105	108
RT - 09	The Downeaster	474,492	3.5	3,650	10	42%	582,612	23%	160	4.5	1.0	35	37
RT - 12	New Haven - Springfield	349,928	2.0	2,920	8	n/a	389,024	11%	133	2.0	0.0	67	60
RT - 14	Keystone Service	1,183,821	4.0	9,490	26	39%	1,452,976	23%	153	4.0	0.0	38	31
RT - 15	Empire Service	994,293	4.0	5,110	14	51%	1,106,352	11%	217	4.0	0.0	54	49
RT - 20	Chicago-St.Louis	476,427	3.5	2,920	8	59%	617,731	30%	212	4.0	0.5	53	47
RT - 21	Hiawathas	749,659	6.0	5,110	14	41%	883,233	18%	173	7.0	1.0	25	24
RT - 22	Wolverines	472,393	4.8	2,190	6	66%	529,650	12%	242	5.5	0.7	44	45
RT - 23	Illini	271,082	3.5	1,460	4	67%	299,590	11%	205	3.5	0.0	59	53
RT - 24	Illinois Zephyr	202,814	3.5	1,460	4	56%	223,293	10%	153	3.5	0.0	44	40
RT - 29	Heartland Flyer	80,892	3.0	730	2	40%	89,556	11%	123	3.0	0.0	41	37
RT - 35	Pacific Surfliner	2,898,859	5.0	8,760	24	45%	3,524,294	22%	402	6.0	1.0	67	66
RT - 36	Cascades	758,667	5.0	3,650	10	65%	1,136,951	50%	311	6.5	1.5	48	42
RT - 37	Capitols	1,693,580	4.0	5,840	16	36%	2,157,800	27%	369	4.5	0.5	82	72
RT - 39	San Joaquins	949,611	3.0	4,380	12	51%	1,276,847	34%	292	3.5	0.5	83	72
RT - 40	Adirondack	112,047	4.0	730	2	62%	119,887	7%	164	4.0	0.0	41	38
RT - 41	Blue Water	136,538	3.5	730	2	72%	159,621	17%	219	4.5	1.0	49	53
RT - 47	New York-Newport New	459,236	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RT - 54	Hoosier State	31,774	2.0	730	2	57%	35,808	13%	49	2.0	0.0	25	22
RT - 56	Kansas City-St.Louis	151,690	3.0	1,460	4	52%	186,206	23%	128	3.0	0.0	43	35
RT - 57	Pennsylvanian	200,999	4.5	730	2	78%	228,556	14%	313	5.5	1.0	57	61
RT - 65	Pere Marquette	111,716	3.0	730	2	69%	126,221	13%	173	4.0	1.0	43	51
RT - 66	Carolinian	295,427	5.0	730	2	77%	344,484	17%	472	6.0	1.0	79	81
RT - 67	Piedmont (2)	65,941	4.5	2,190	6	49%	173,299	163%	79	4.5	0.0	18	20

1) Part of NE Regionals analysis

2) frequency in FY18 for the piedmont would be 3 roundtrips (6 daily trips)

Calculation of total cars required

Route #	Route Name	Incremental Coaches Needed: Sets	added coaches per consist	extended	20% shop count	total	Single Level	Bi- Level
RT - 03	Ethan Allen Express	2	0.0	0	0	**0**	0	
RT - 04	Vermonter	2	1.0	2	0.4	**3**	3	
RT - 07	Maple Leaf	2	1.0	2	0.4	**3**	3	
RT - 09	The Downeaster	2	1.0	2	0.4	**3**	3	
RT - 12	New Haven - Springfield	3	0.0	0	0	**0**	0	
RT - 14	Keystone Service	8	0.0	0	0	**0**	0	
RT - 15	Empire Service	10	0.0	0	0	**0**	0	
RT - 20	Chicago-St.Louis	4	0.5	2	0.4	**3**	3	
RT - 21	Hiawathas	2	1.0	2	0.4	**3**	3	
RT - 22	Wolverines	3	0.7	2.1	0.42	**3**	3	
RT - 23	Illini	2	0.0	0	0	**0**	0	

FY23

Calculation of required added cars per set

						Coach							
Route #	Route Name	FY18 ridership	FY18 Coach cars per consist	Frequency	Daily Trips	Peak Coach Load Factor (FY08 Avg)	FY23 Total Coach Riders Forecast	% Increase in riders from FY08	FY23 Coach Riders per Freq.	Proposed number of coaches per consist	Net coach change per consist	FY23 Proposed Riders per Coach per trip	FY08 avg. riders per coach per trip
RT - 03	Ethan Allen Express	53,748	4.5	730	2	56%	57,451	7%	79	5.5	1.0	14	14
RT - 04	Vermonter	84,586	5.5	730	2	78%	90,083	6%	123	5.5	0.0	22	22
RT - 07	Maple Leaf	419,865	5.5	730	2	69%	468,444	12%	642	6.5	1.0	99	108
RT - 09	The Downeaster	582,612	4.5	3,650	10	42%	650,897	12%	178	4.5	0.0	40	37
RT - 12	New Haven - Springfield	389,024	2.0	2,920	8	n/a	412,916	6%	141	3.0	1.0	47	60
RT - 14	Keystone Service	1,452,976	4.0	9,490	26	39%	1,542,212	6%	163	5.0	1.0	33	31
RT - 15	Empire Service	1,106,352	4.0	5,110	14	51%	1,174,300	6%	230	5.0	1.0	46	49
RT - 20	Chicago-St.Louis	617,731	4.0	2,920	8	59%	670,966	9%	230	4.5	0.5	51	47
RT - 21	Hiawathas	883,233	7.0	5,110	14	41%	958,082	8%	187	7.0	0.0	27	24
RT - 22	Wolverines	529,650	5.5	2,190	6	66%	568,956	7%	260	5.5	0.0	47	45
RT - 23	Illini	299,590	3.5	1,460	4	67%	317,253	6%	217	4.5	1.0	48	53
RT - 24	Illinois Zephyr	223,293	3.5	1,460	4	56%	229,637	3%	157	3.5	0.0	45	40
RT - 29	Heartland Flyer	89,556	3.0	730	2	40%	97,351	9%	133	3.0	0.0	44	37
RT - 35	Pacific Surfliner	3,524,294	6.0	8,760	24	45%	4,116,651	17%	470	7.0	1.0	67	66
RT - 36	Cascades	1,136,951	6.5	3,650	10	65%	1,350,341	19%	370	8.0	1.5	46	42
RT - 37	Capitols	2,157,800	4.5	5,840	16	36%	2,515,047	17%	431	5.0	0.5	86	72
RT - 39	San Joaquins	1,276,847	3.5	4,380	12	51%	1,491,159	17%	340	4.0	0.5	85	72
RT - 40	Adirondack	119,887	4.0	730	2	62%	127,908	7%	175	5.0	1.0	35	38
RT - 41	Blue Water	159,621	4.5	730	2	72%	172,316	8%	236	4.5	0.0	52	53
RT - 47	New York-Newport New	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RT - 54	Hoosier State	35,808	2.0	730	2	57%	37,701	5%	52	2.0	0.0	26	22
RT - 56	Kansas City-St.Louis	186,206	3.0	1,460	4	52%	205,338	10%	141	4.0	1.0	35	35
RT - 57	Pennsylvanian	228,556	5.5	730	2	78%	243,577	7%	334	5.5	0.0	61	61
RT - 65	Pere Marquette	126,221	4.0	730	2	69%	138,113	9%	189	4.0	0.0	47	51
RT - 66	Carolinian	344,484	6.0	730	2	77%	395,917	15%	542	7.0	1.0	77	81
RT - 67	Piedmont (2)	173,299	4.5	2,190	6	49%	205,825	19%	94	4.5	0.0	21	20

1) Part of NE Regionals analysis

2) frequency in FY18 for the piedmont would be 3 roundtrips (6 daily trips)

Calculation of total cars required

	Incremental Coaches Needed							
Route #	Route Name	Sets	added coaches per consist	extended	20% shop count	total	Single Level	Bi- Level
RT - 03	Ethan Allen Express	2	1.0	2	0.4	**3**	3	
RT - 04	Vermonter	2	0.0	0	0	**0**	0	
RT - 07	Maple Leaf	2	1.0	2	0.4	**3**	3	
RT - 09	The Downeaster	2	0.0	0	0	**0**	0	
RT - 12	New Haven - Springfield	3	1.0	3	0.6	**4**	4	
RT - 14	Keystone Service	8	1.0	8	1.6	**10**	10	
RT - 15	Empire Service	10	1.0	10	2	**12**	12	
RT - 20	Chicago-St.Louis	4	0.5	2	0.4	**3**	3	
RT - 21	Hiawathas	2	0.0	0	0	**0**	0	
RT - 22	Wolverines	3	0.0	0	0	**0**	0	
RT - 23	Illini	2	1.0	2	0.4	**3**	3	

Attachment 2

Projected Equipment Procurement and Funding Requirements (in 2009 dollars)

	New Single Level Introductions	Number of Single Levels Retired	New Bi-Level Introductions	Number of Bi-Levels Retired	New Diesel Locos	New electric Locos	New Acela Coaches	New Acela Power Cars	New Talgo Trainsets	New Switcher Locos Built	Vehicle Capital Cost	Annual Cashflow Requirement	Project Management Funding	Project Related Infrastructure Funding	Spares Funding	Annual Overhaul Costs	Total Capital Required	Running Total Capital
2010	0	0	0	0	0	0	0	0	0	0	$ -	$ 127,500,000	$ -	$ -	$ -	$ 95,450,000	$ 222,950,000	$ 222,950,000
2011	0	0	0	0	0	0	0	0	0	0	$ -	$ 318,750,000	$ -	$ -	$ -	$ 81,900,000	$ 400,650,000	$ 623,600,000
2012	65	49	35	25	25	15	0	0	0	10	$ 637,500,000	$ 657,500,000	$ 31,875,000	$ 63,750,000	$ 63,750,000	$ 49,950,000	$ 866,825,000	$ 1,490,425,000
2013	65	49	35	25	25	15	0	0	0	10	$ 637,500,000	$ 687,500,000	$ 31,875,000	$ 63,750,000	$ 63,750,000	$ 20,250,000	$ 867,125,000	$ 2,357,550,000
2014	65	48	35	25	25	15	15	5	0	10	$ 737,500,000	$ 705,900,000	$ 36,875,000	$ 73,750,000	$ 73,750,000	$ 174,250,000	$ 1,064,525,000	$ 3,422,075,000
2015	65	48	35	25	25	15	15	5	0	10	$ 737,500,000	$ 642,100,000	$ 36,875,000	$ 73,750,000	$ 73,750,000	$ 96,900,000	$ 923,375,000	$ 4,345,450,000
2016	65	48	35	25	25	10	0	0	0	1	$ 579,500,000	$ 538,500,000	$ 28,975,000	$ 57,950,000	$ 57,950,000	$ 98,550,000	$ 781,925,000	$ 5,127,375,000
2017	65	47	35	24	25	0	0	0	0	0	$ 497,500,000	$ 646,300,000	$ 24,875,000	$ 49,750,000	$ 49,750,000	$ 61,750,000	$ 832,425,000	$ 5,959,800,000
2018	65	47	35	24	25	0	0	0	0	0	$ 497,500,000	$ 731,900,000	$ 24,875,000	$ 49,750,000	$ 49,750,000	$ 65,350,000	$ 921,625,000	$ 6,881,425,000
2019	65	46	35	24	25	0	110	38	0	0	$ 1,241,500,000	$ 886,300,000	$ 62,075,000	$ 124,150,000	$ 124,150,000	$ 156,100,000	$ 1,352,775,000	$ 8,234,200,000
2020	65	46	35	24	25	0	10	2	0	0	$ 553,500,000	$ 515,600,000	$ 27,675,000	$ 55,350,000	$ 55,350,000	$ 137,050,000	$ 791,025,000	$ 9,025,225,000
2021	65	46	35	24	25	0	0	0	0	0	$ 497,500,000	$ 460,150,000	$ 24,875,000	$ 49,750,000	$ 49,750,000	$ 107,700,000	$ 692,225,000	$ 9,717,450,000
2022	65	45	35	23	14	0	0	0	0	0	$ 448,000,000	$ 424,500,000	$ 22,400,000	$ 44,800,000	$ 44,800,000	$ 150,000,000	$ 686,500,000	$ 10,403,950,000
2023	65	45	35	23	0	0	0	0	0	0	$ 385,000,000	$ 397,000,000	$ 19,250,000	$ 38,500,000	$ 38,500,000	$ 150,000,000	$ 643,250,000	$ 11,047,200,000
2024	65	45	35	23	0	0	0	0	2	0	$ 425,000,000	$ 405,000,000	$ 21,250,000	$ 42,500,000	$ 42,500,000	$ 244,400,000	$ 755,650,000	$ 11,802,850,000
2025	65	44	35	23	0	0	0	0	0	0	$ 385,000,000	$ 385,000,000	$ 19,250,000	$ 38,500,000	$ 38,500,000	$ 190,450,000	$ 671,700,000	$ 12,474,550,000
2026	65	44	35	22	0	0	0	0	0	0	$ 385,000,000	$ 385,000,000	$ 19,250,000	$ 38,500,000	$ 38,500,000	$ 149,600,000	$ 630,850,000	$ 13,105,400,000
2027	65	43	35	22	0	0	0	0	0	0	$ 385,000,000	$ 369,600,000	$ 19,250,000	$ 38,500,000	$ 38,500,000	$ 194,800,000	$ 660,650,000	$ 13,766,050,000
2028	65	43	35	22	0	0	0	0	0	0	$ 385,000,000	$ 332,500,000	$ 19,250,000	$ 38,500,000	$ 38,500,000	$ 188,500,000	$ 617,250,000	$ 14,383,300,000
2029	43	20	35	22	0	0	0	0	0	0	$ 308,000,000	$ 273,700,000	$ 15,400,000	$ 30,800,000	$ 30,800,000	$ 351,300,000	$ 702,000,000	$ 15,085,300,000
2030	23	0	35	21	0	0	0	0	0	0	$ 238,000,000	$ 254,150,000	$ 11,900,000	$ 23,800,000	$ 23,800,000	$ 209,700,000	$ 523,350,000	$ 15,608,650,000
2031	24	0	35	21	0	0	0	0	0	0	$ 241,500,000	$ 267,600,000	$ 12,075,000	$ 24,150,000	$ 24,150,000	$ 184,500,000	$ 512,475,000	$ 16,121,125,000
2032	24	0	26	12	25	0	0	0	0	0	$ 313,500,000	$ 289,450,000	$ 15,675,000	$ 31,350,000	$ 31,350,000	$ 260,550,000	$ 628,375,000	$ 16,749,500,000
2033	24	0	15	0	25	0	0	0	0	0	$ 264,000,000	$ 265,750,000	$ 13,200,000	$ 26,400,000	$ 26,400,000	$ 254,250,000	$ 586,000,000	$ 17,335,500,000
2034	25	0	15	0	25	0	0	0	0	0	$ 267,500,000	$ 268,200,000	$ 13,375,000	$ 26,750,000	$ 26,750,000	$ 334,950,000	$ 670,025,000	$ 18,005,525,000
2035	25	0	15	0	25	0	0	0	0	0	$ 267,500,000	$ 294,150,000	$ 13,375,000	$ 26,750,000	$ 26,750,000	$ 251,150,000	$ 612,175,000	$ 18,617,700,000
2036	26	0	15	0	25	0	0	0	0	0	$ 271,000,000	$ 333,950,000	$ 13,550,000	$ 27,100,000	$ 27,100,000	$ 235,900,000	$ 637,600,000	$ 19,255,300,000
2037	26	0	16	0	25	15	0	0	0	0	$ 395,500,000	$ 546,750,000	$ 19,775,000	$ 39,550,000	$ 39,550,000	$ 268,650,000	$ 914,275,000	$ 20,169,575,000
2038	27	0	16	0	25	15	0	0	0	0	$ 399,000,000	$ 636,050,000	$ 19,950,000	$ 39,900,000	$ 39,900,000	$ 257,400,000	$ 993,200,000	$ 21,162,775,000
2039	28	0	16	0	25	15	110	38	0	0	$ 1,146,500,000	$ 712,150,000	$ 57,325,000	$ 114,650,000	$ 114,650,000	$ 291,950,000	$ 1,290,725,000	$ 22,453,500,000
2040	28	0	17	0	25	15	10	2	0	0	$ 463,000,000	$ 231,500,000	$ 23,150,000	$ 46,300,000	$ 46,300,000	$ 230,750,000	$ 578,000,000	$ 23,031,500,000

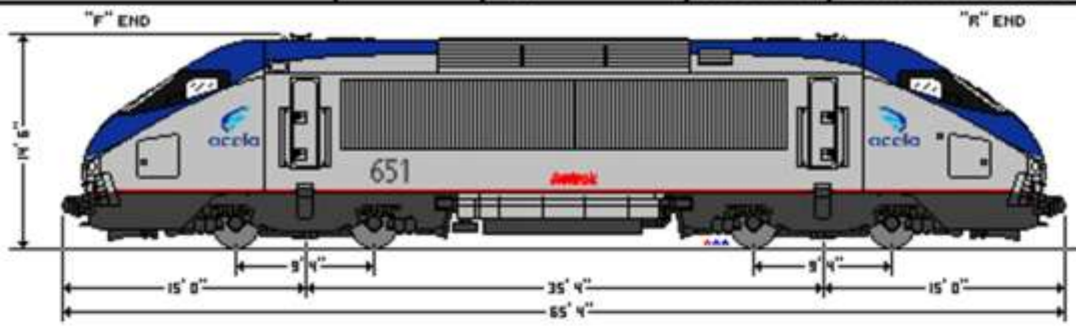
Attachment 3

Existing Amtrak Equipment:

The following document is a synopsis of the core vehicle types in Amtrak's fleet. There are many sub-types of each vehicle. Full details of the individual sub-types can be found in the Amtrak Equipment Guide from which this information was extracted. For the purposes of brevity, this attachment has one entry for each main equipment type as an example for reference purposes.

Electric motive power

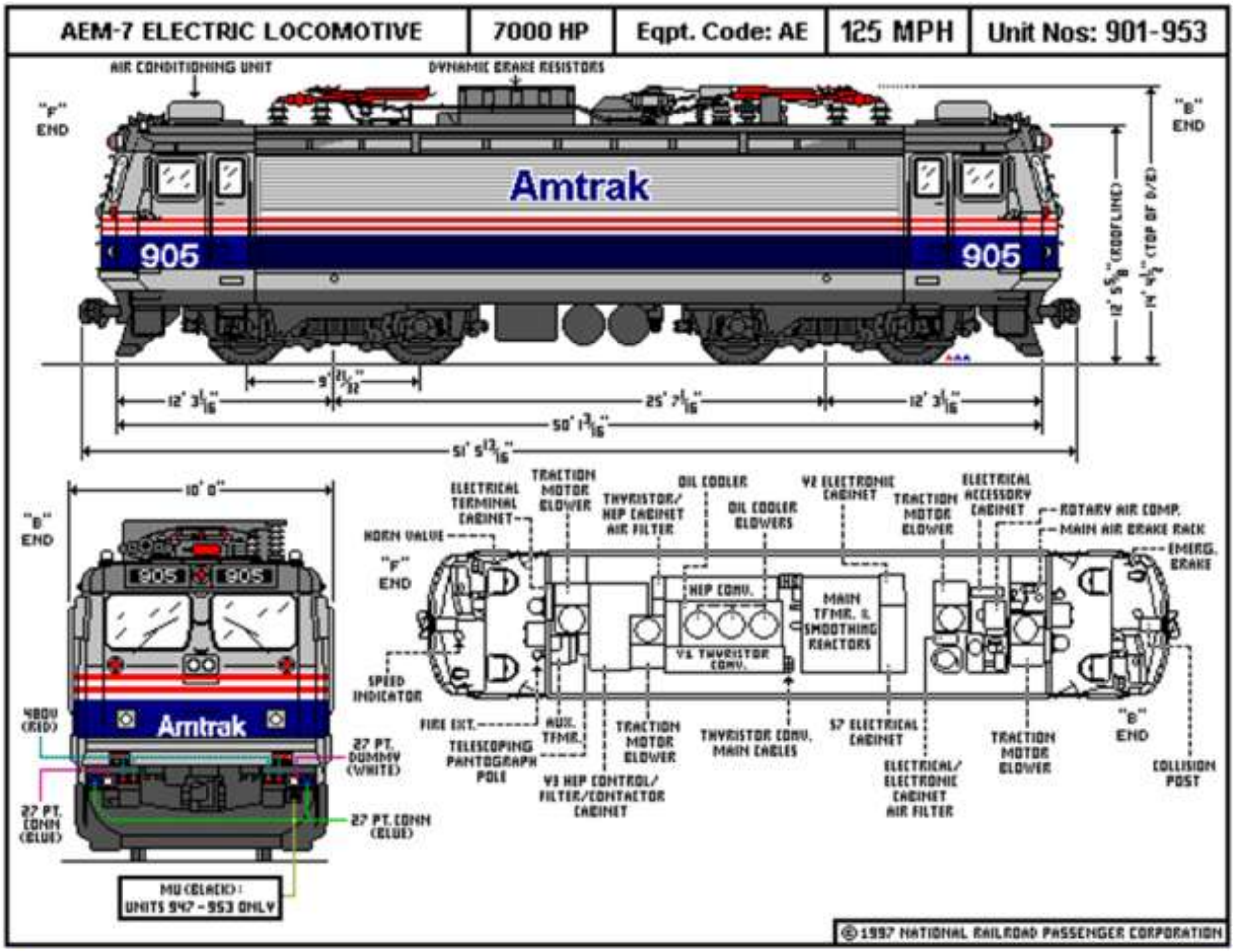
HHP-8 ELECTRIC LOCOMOTIVE	8000 HP	Eqpt. Code: EH	135 MPH	Unit Numbers: 650-664



Additional view to be added shortly

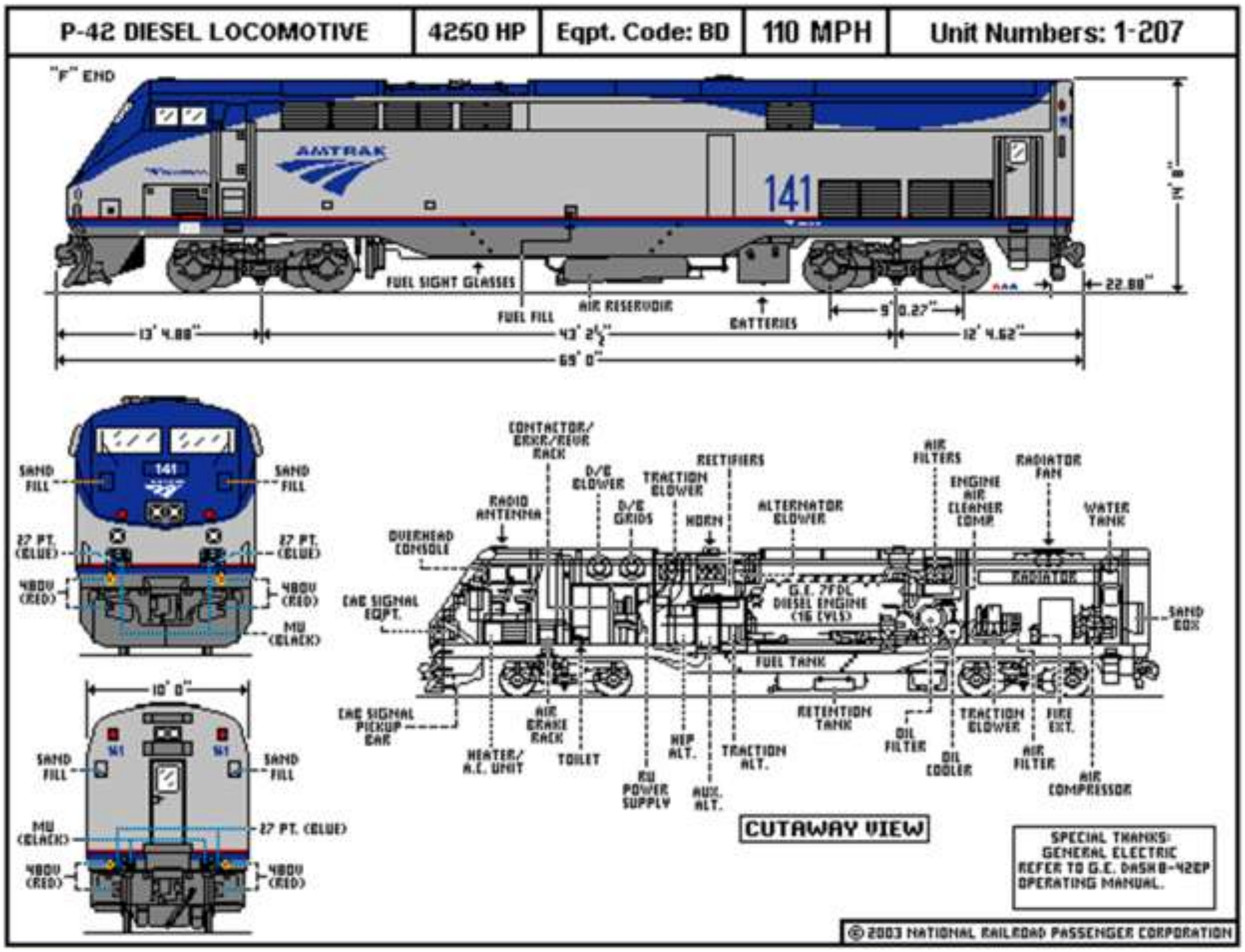
Active: 15
Builder: Alstom
Entered service: 2000-2001
Notes: Includes regenerative braking; based on Acela power car design. Purchased to provide additional locomotives for North End Electrification and to provide heavy-haul capability to replace aging E-60s

Electric motive power



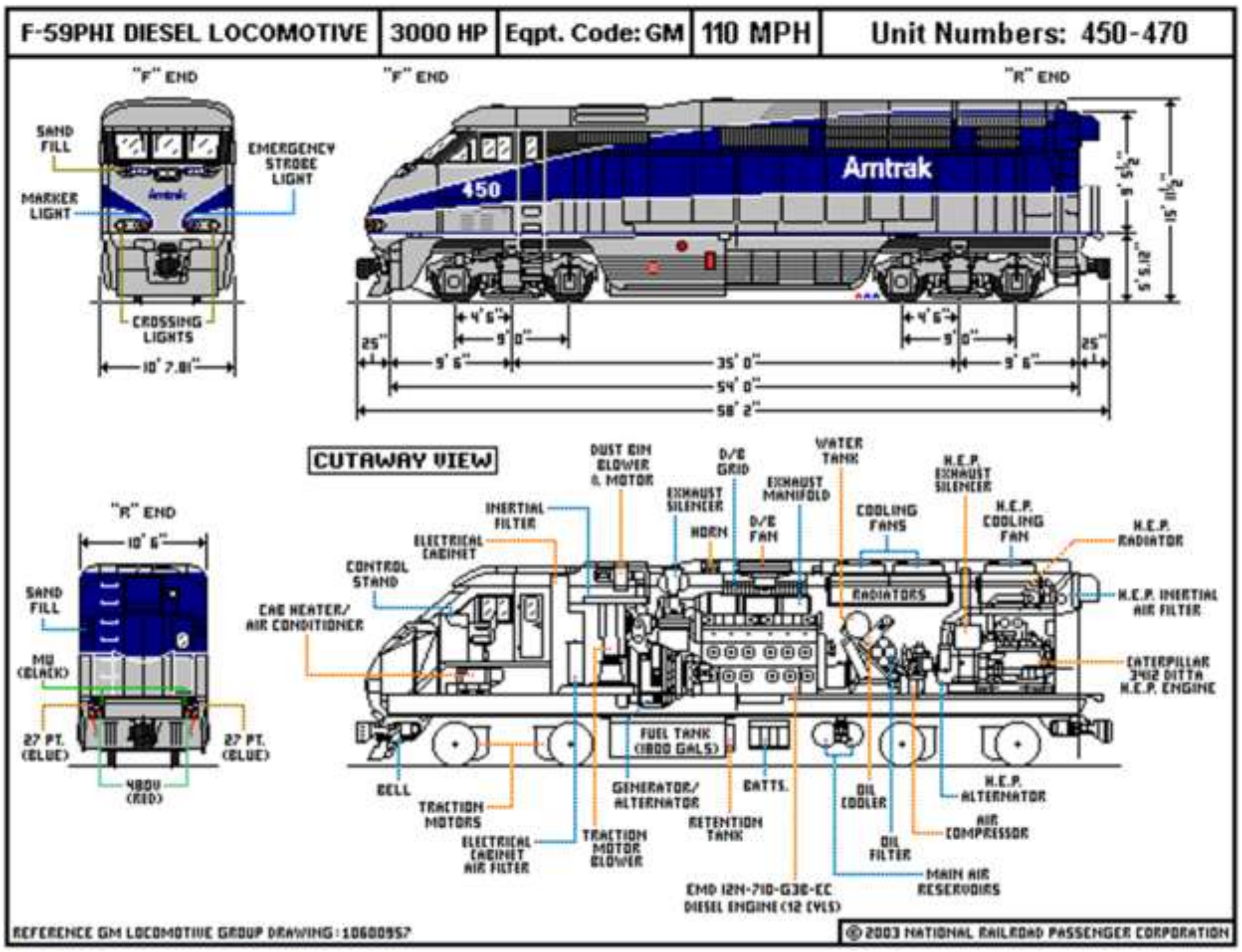
Active: 49
Builder: ASEA/EMD
Entered service: 1980-1988
Notes: 29 are AC conversions with regenerative braking; other 20 unmodernized DC units. Purchased in early 1980s to supplement 1970s-era E-60s and replace 1930s-era GG-1s.

Diesel-electric road power – P-42



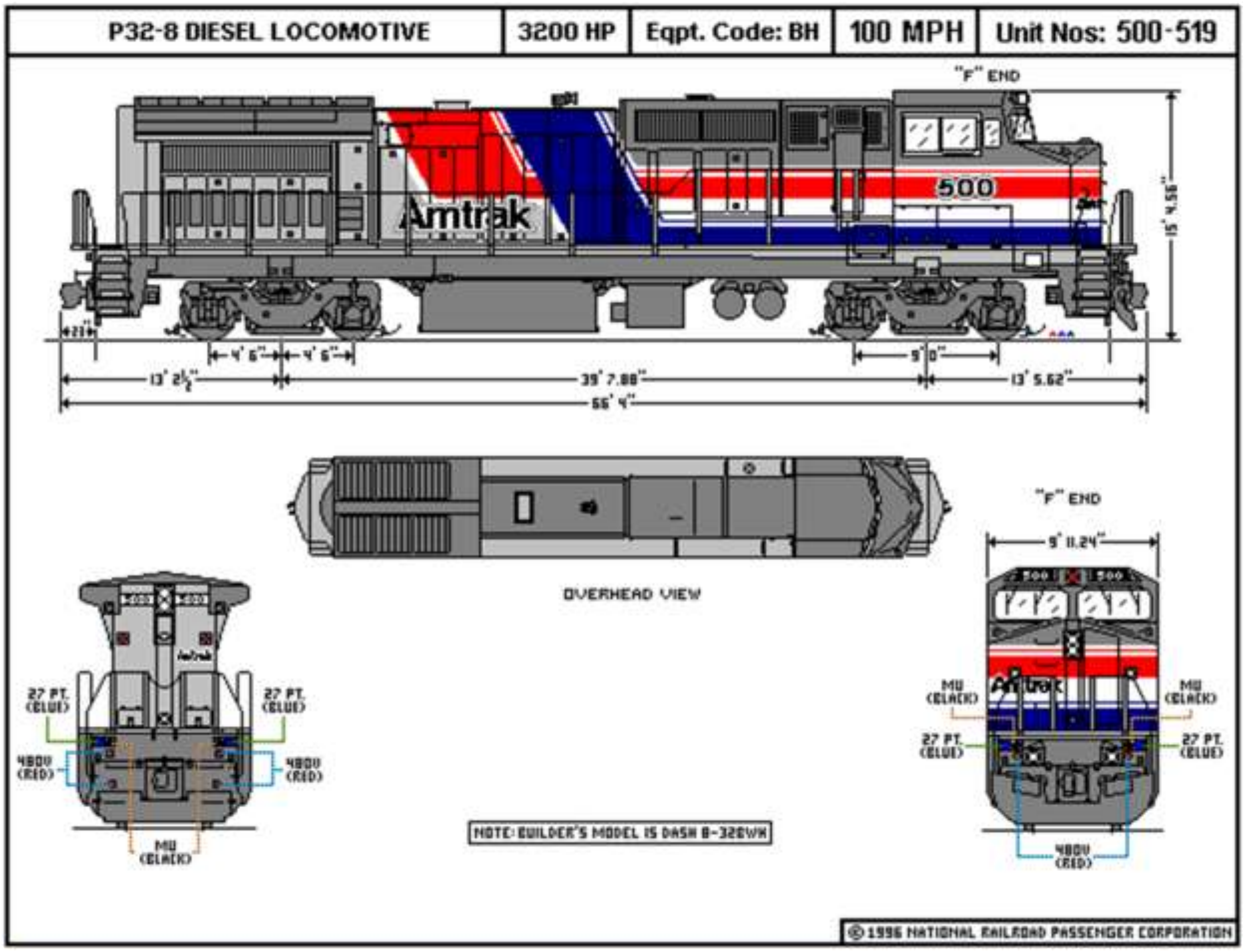
Active: 200
Builder: GE
Entered service: 1996-2001
Notes: Used in long distance and corridor service.

Diesel-electric road power – F-59



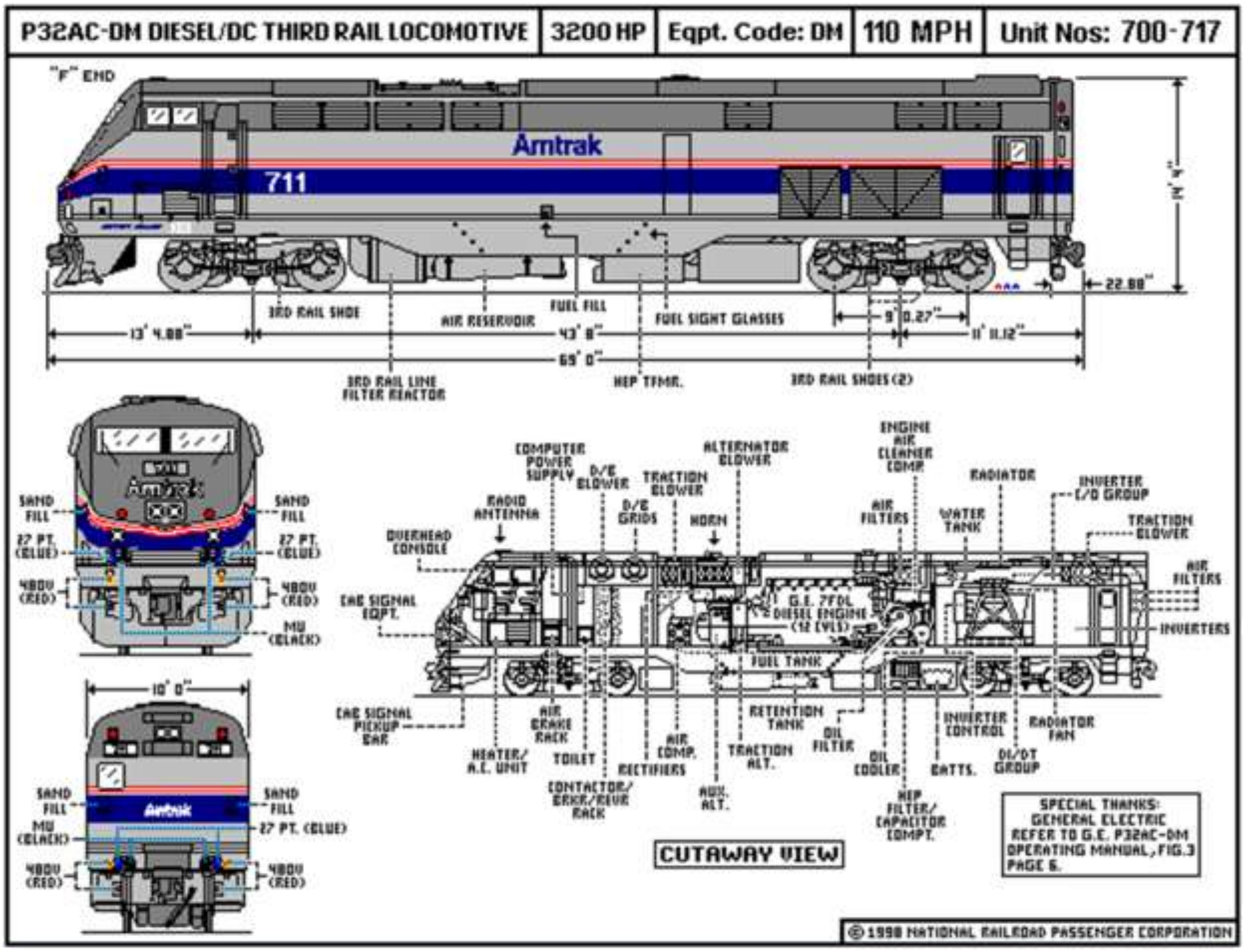
Active: 21
Builder: EMD
Entered service: 2000
Notes: Purchased for Western corridor services

Diesel-electric road power – P-32-8



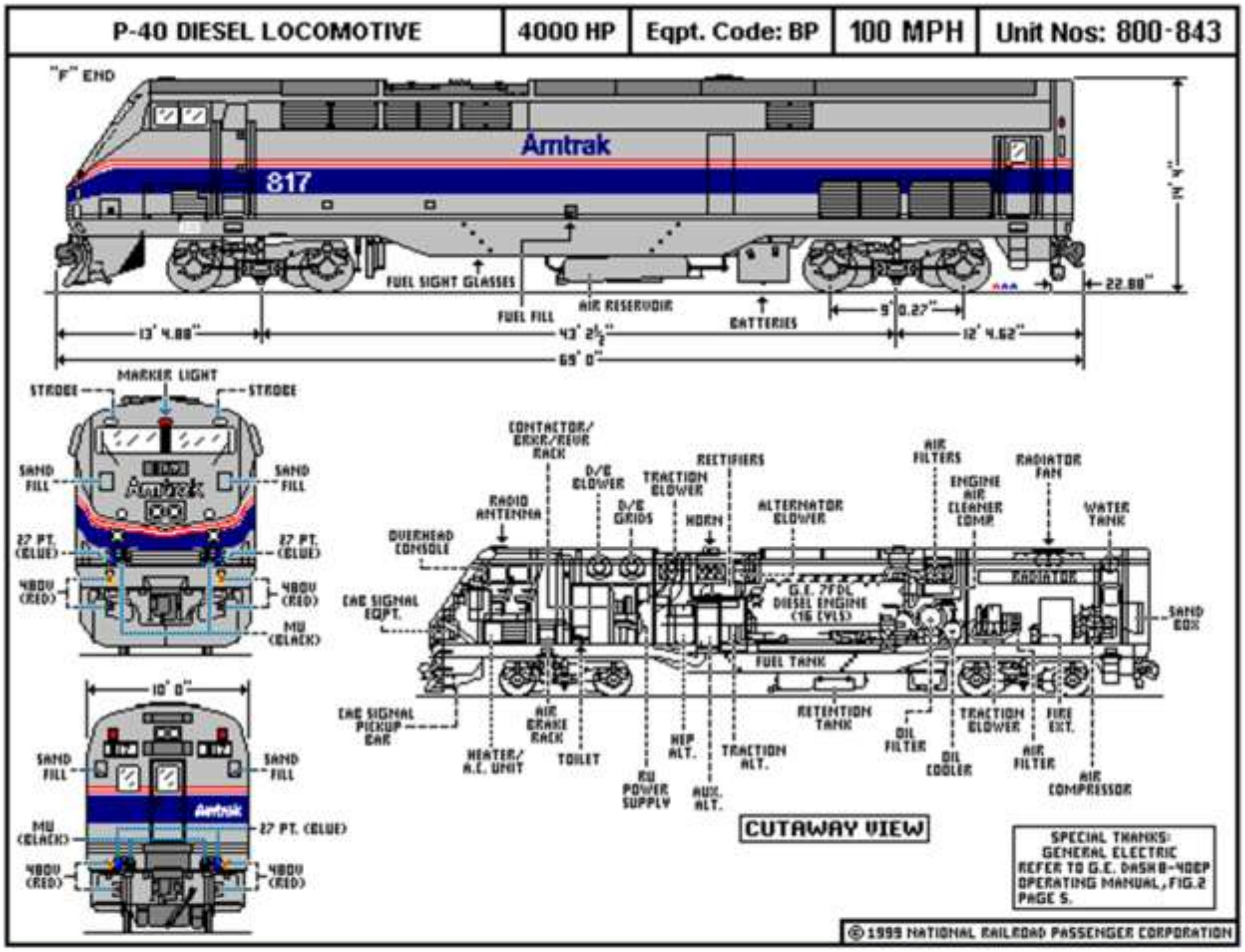
Active: 18
Builder: GE
Entered service: 1991
Notes: Used for terminal switching and some long distance service

Diesel-electric road power – P-32AC-DM



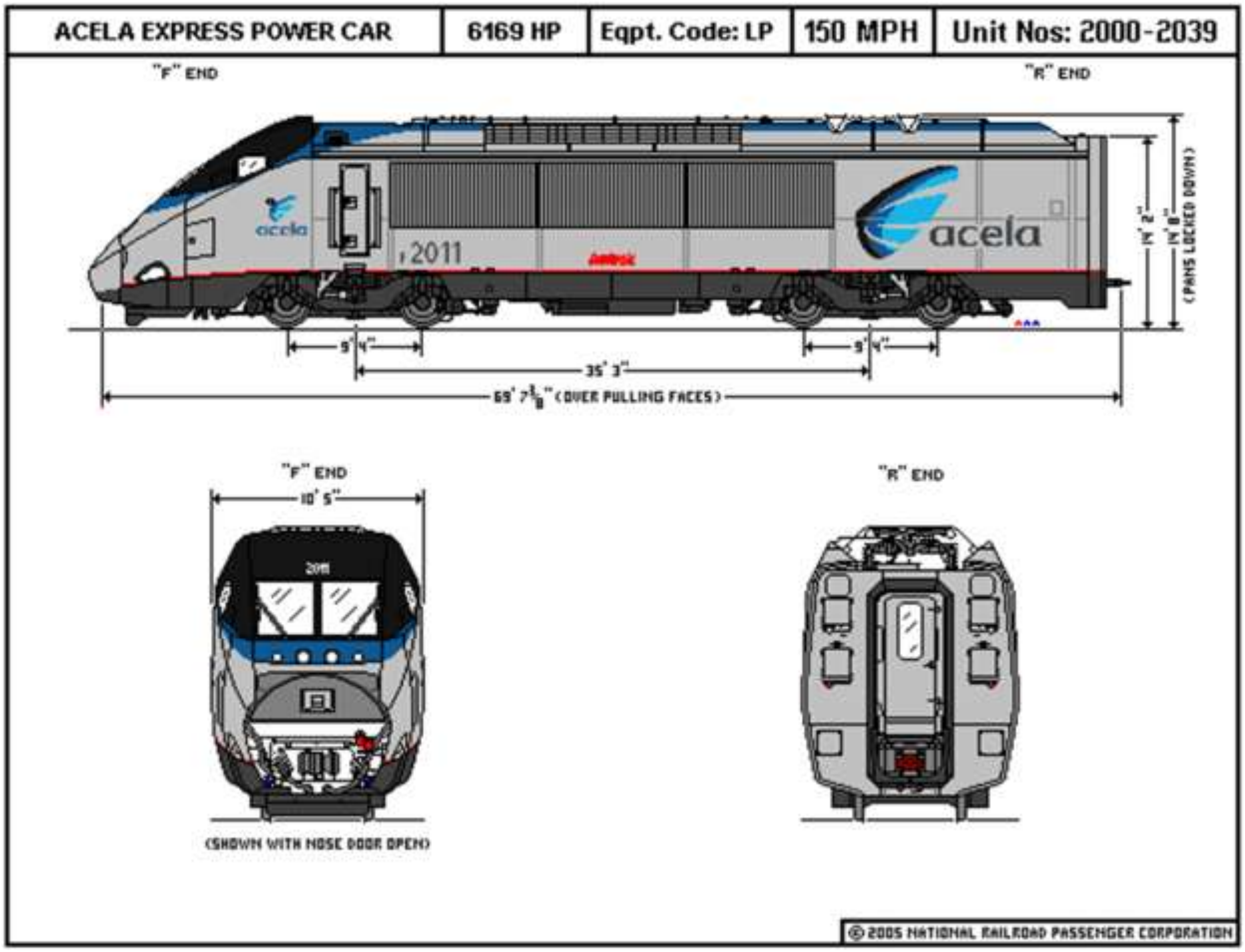
Active: 18
Builder: GE
Entered service: 1995 and 1998
Notes: "Dual mode" design allows operation on the DC third-rail electrification system in the New York terminal zone.

Diesel-electric road power – P-40



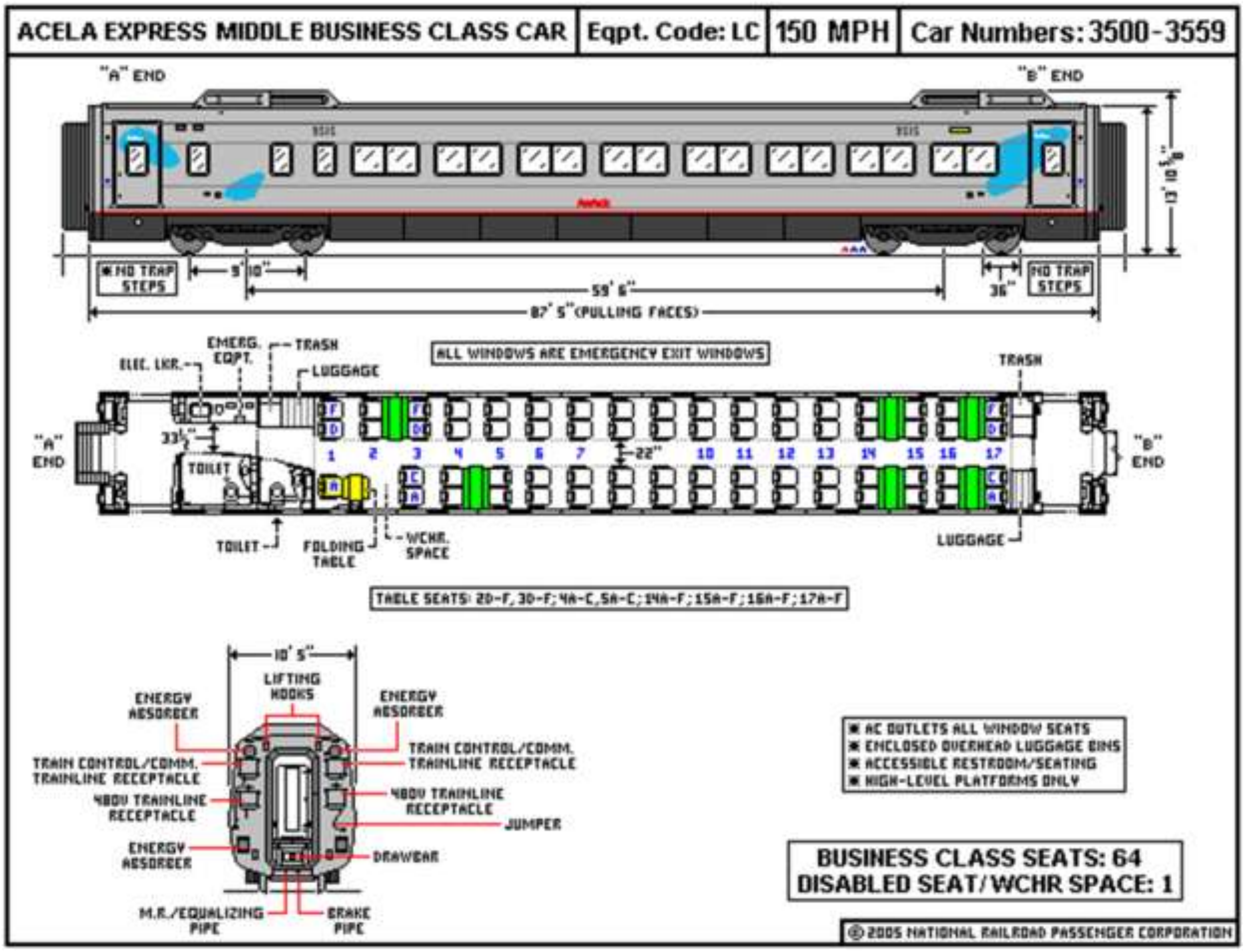
Active: 15 scheduled to return to service
Builder: GE
Entered service: 1993
Notes: ARRA funding will return some inactive engines stored at Beech Grove to service.

Powered integral trainsets – *Acela*



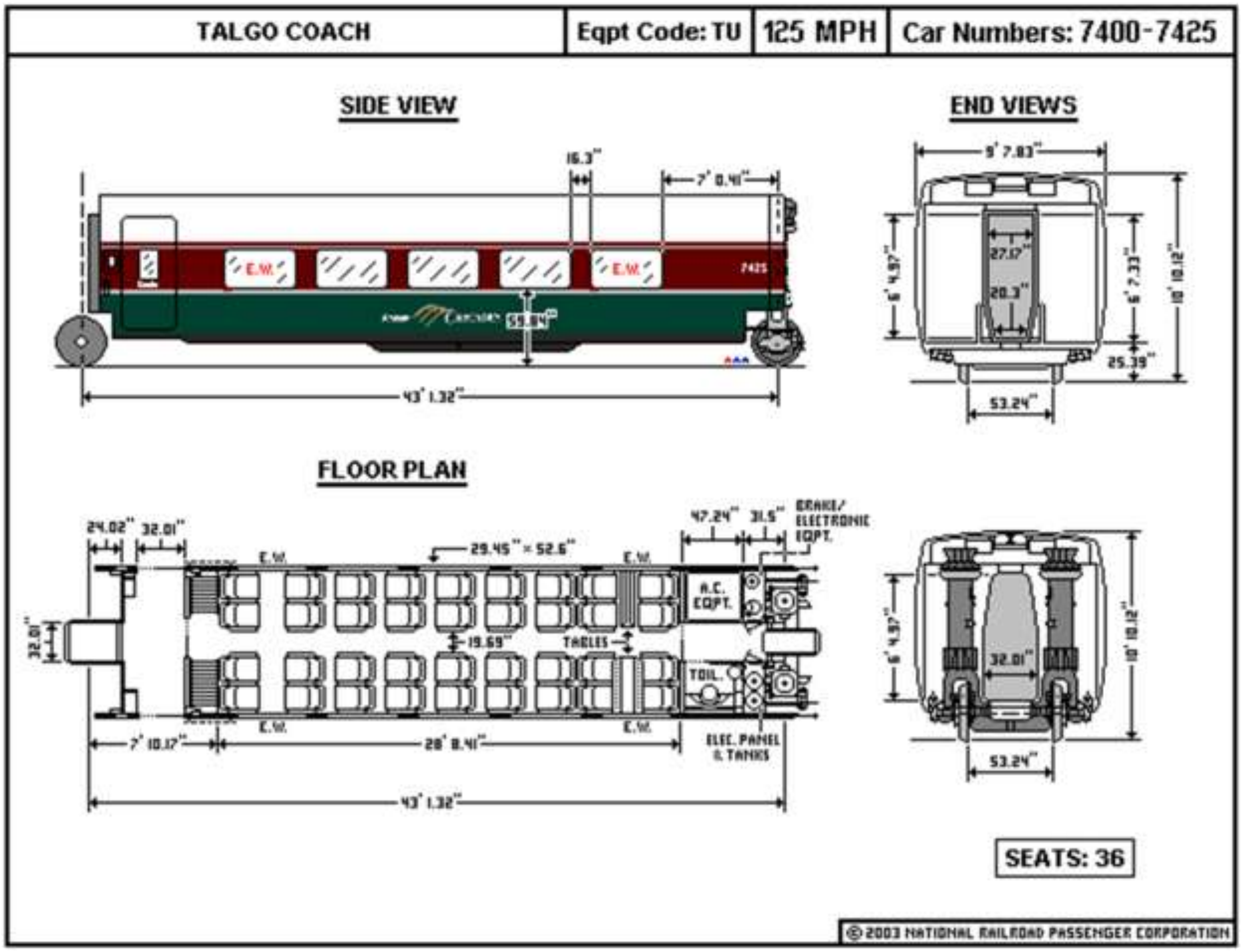
Active: 40
Builder: Bombardier
Entered service: 1999-2000
Notes: Includes regenerative braking; one unit permanently coupled to each end of every *Acela* trainset.

Powered integral trainsets – *Acela*



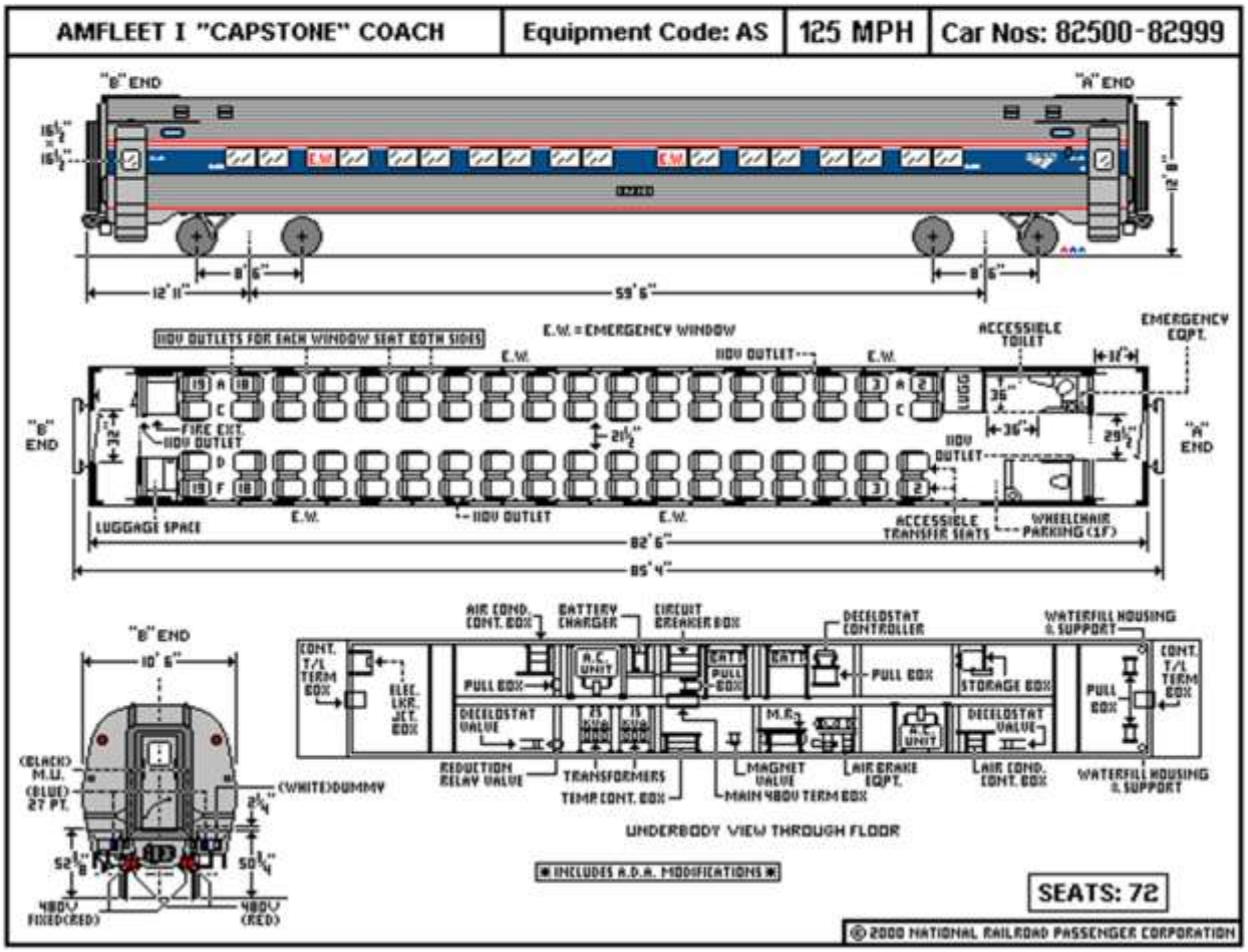
Active: 120 total Acela cars
Builder: Bombardier
Entered service: 1999-2000
Notes: 6 per *Acela* consist

Unpowered integral trainsets – *Cascades*



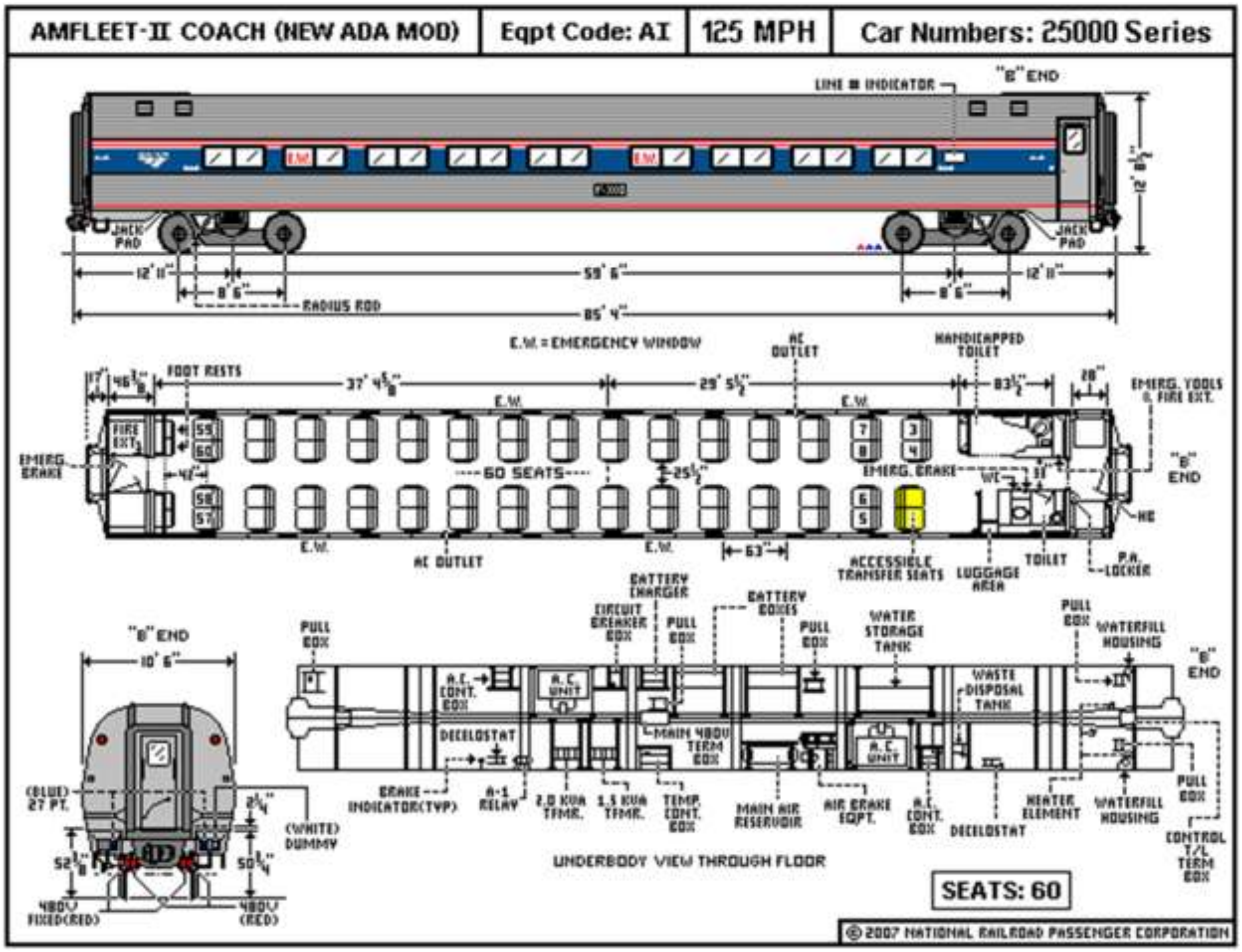
Active: 13 cars per trainset. Amtrak owns two trainsets
Builder: Talgo
Entered service: 1994 and 1999
Notes:

NEC single level equipment



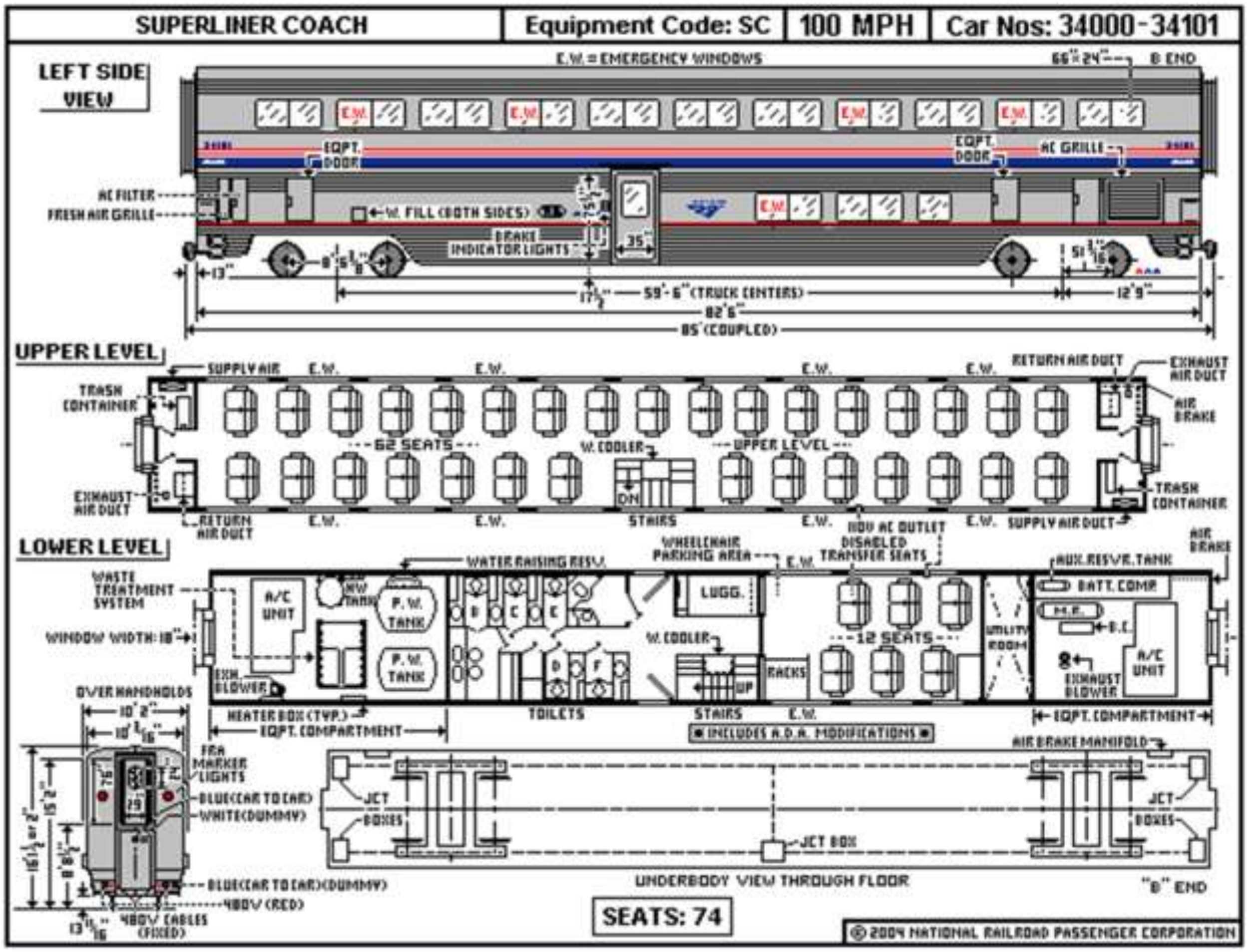
Active: Approximately 420
Builder: Budd
Entered service: 1975-1977
Notes: Includes coach, business and diner configurations

Single level long distance equipment



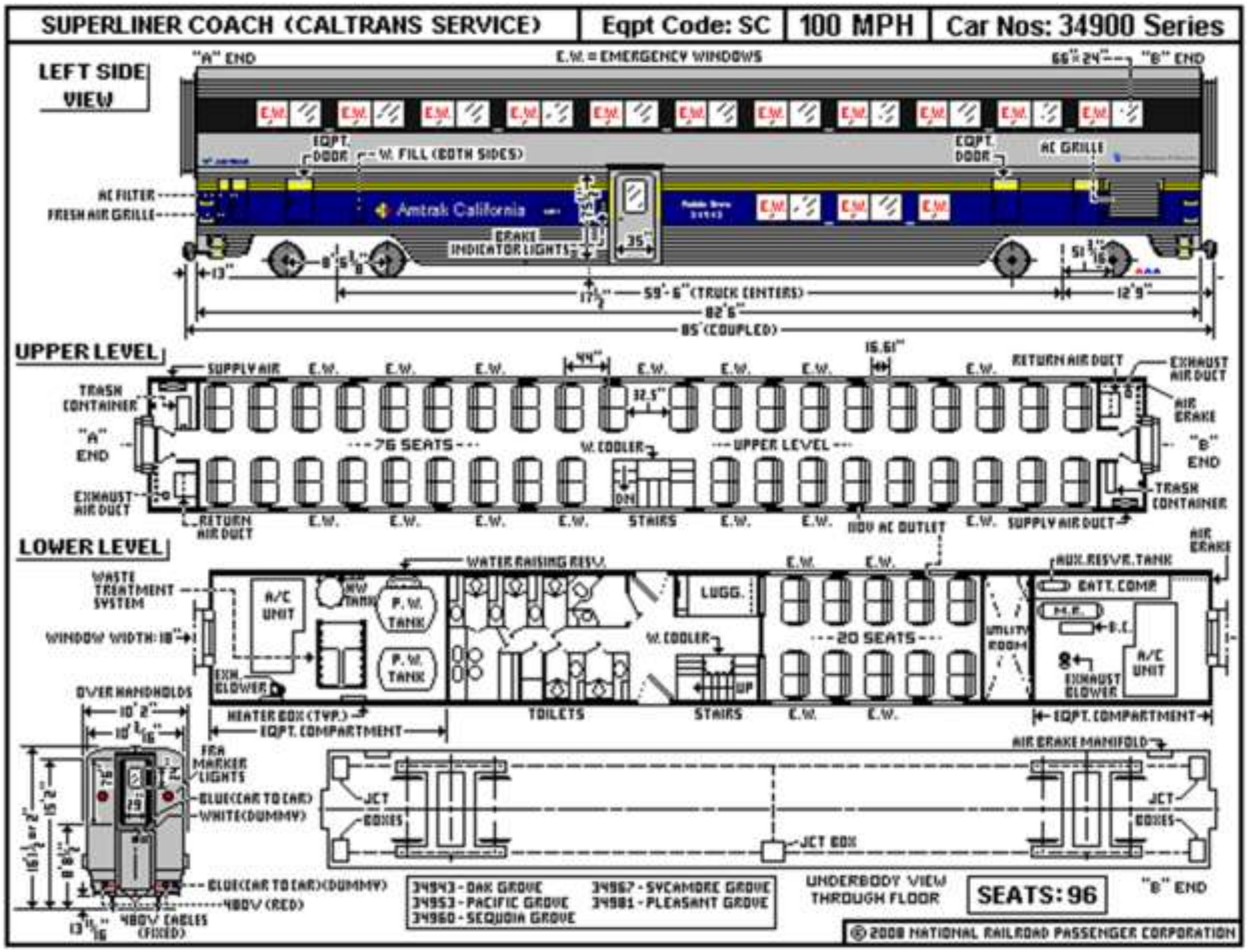
Active: Approx. 145
Builder: Budd
Entered service: 1981-1983
Notes: Used in long and medium distance services terminating at New York Penn Station.

Bilevel long distance equipment



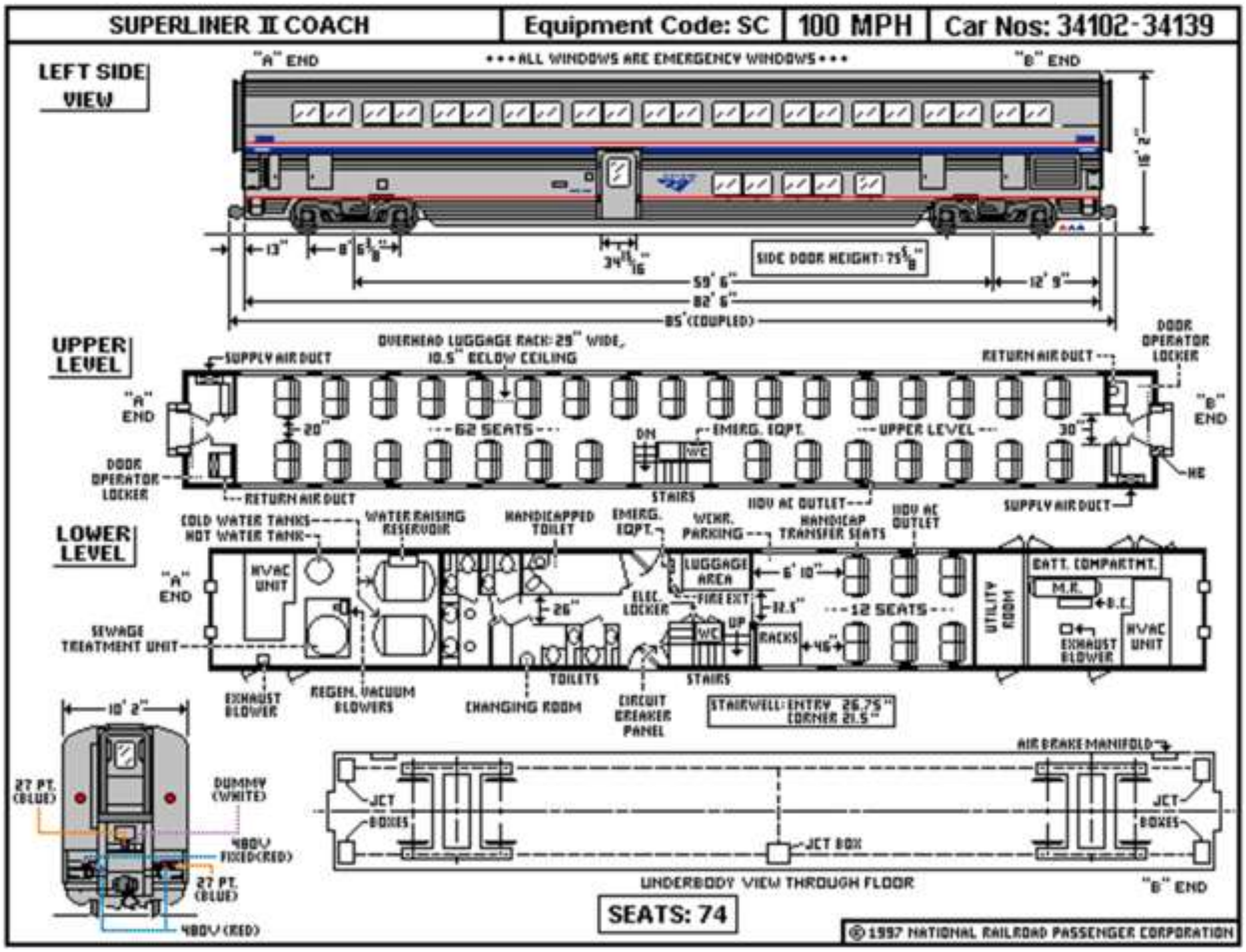
Active: Approx. 250
Builder: Pullman-Standard
Entered service: 1979-1981
Notes: Includes coach, lounge, sleeper and transition cars with sub-variants

Bilevel corridor equipment



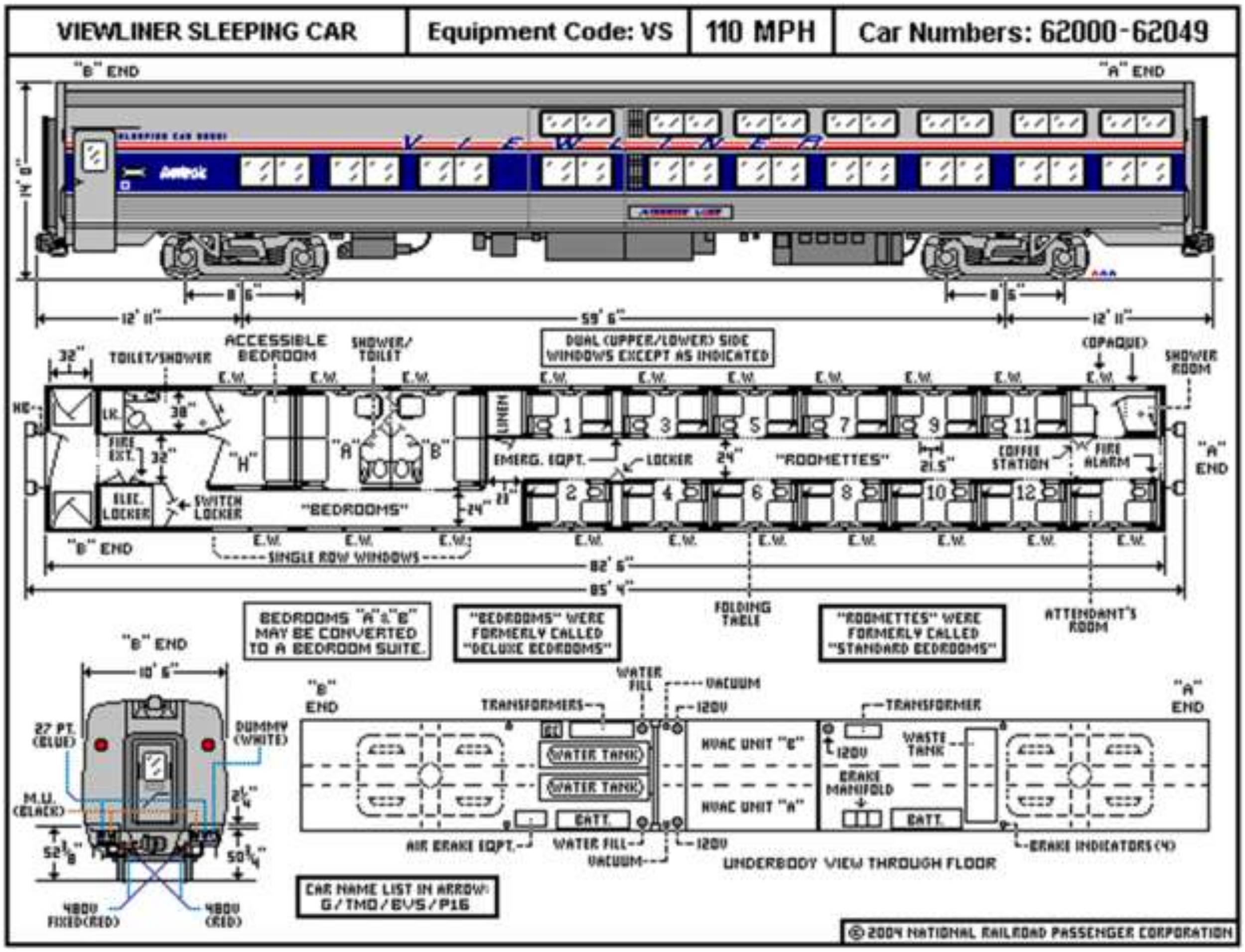
Active: 4
Builder: Pullman-Standard
Entered service: 1979-1981
Notes: Conversion of wreck-damaged Superliner coach funded by CalTrans for corridor service

Bilevel long distance equipment



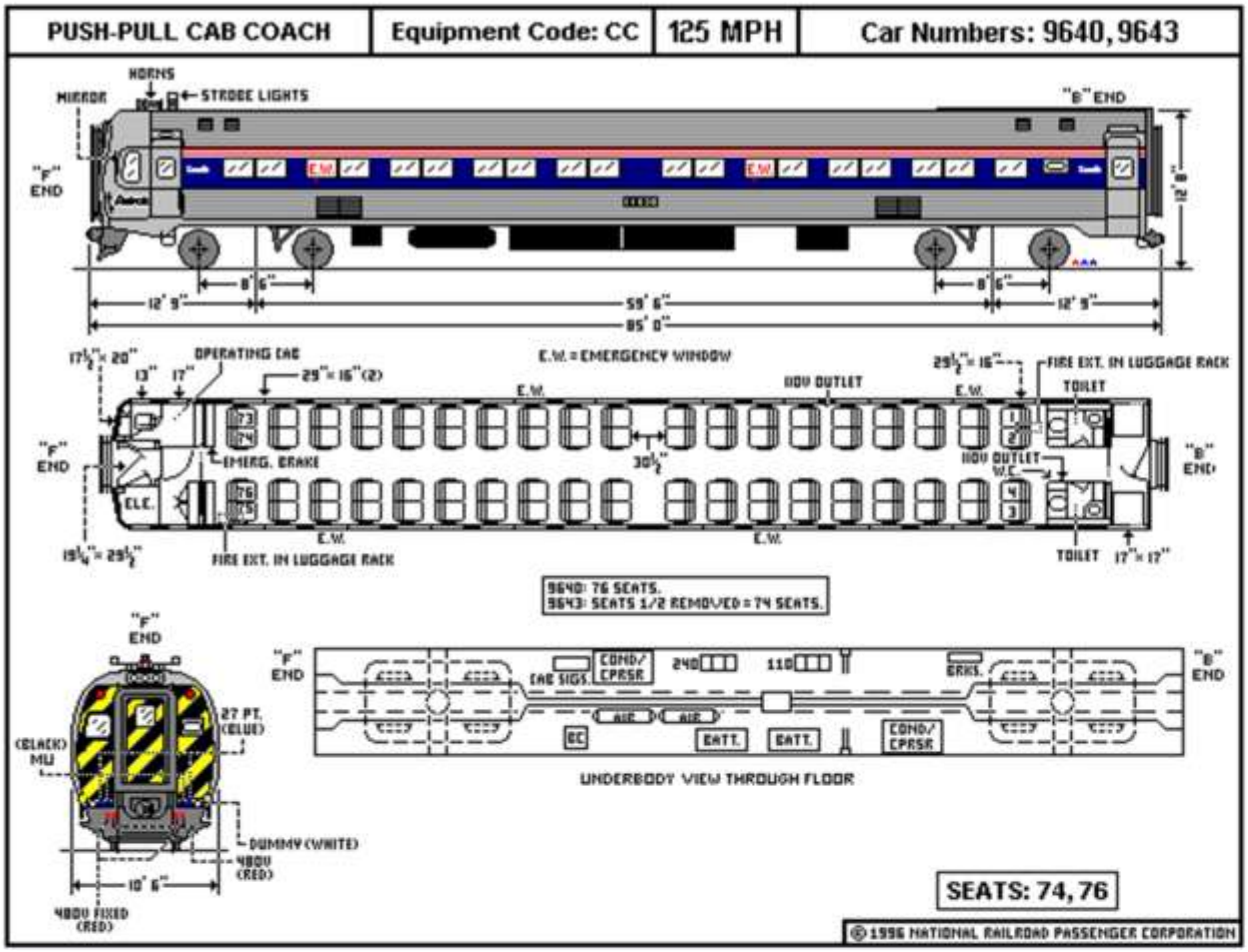
Active: Approx. 185
Builder: Bombardier
Entered service: 1993-1996
Notes: Used on long distance and some corridor services; compatible w/Surfliner and California cars

Single level long distance equipment



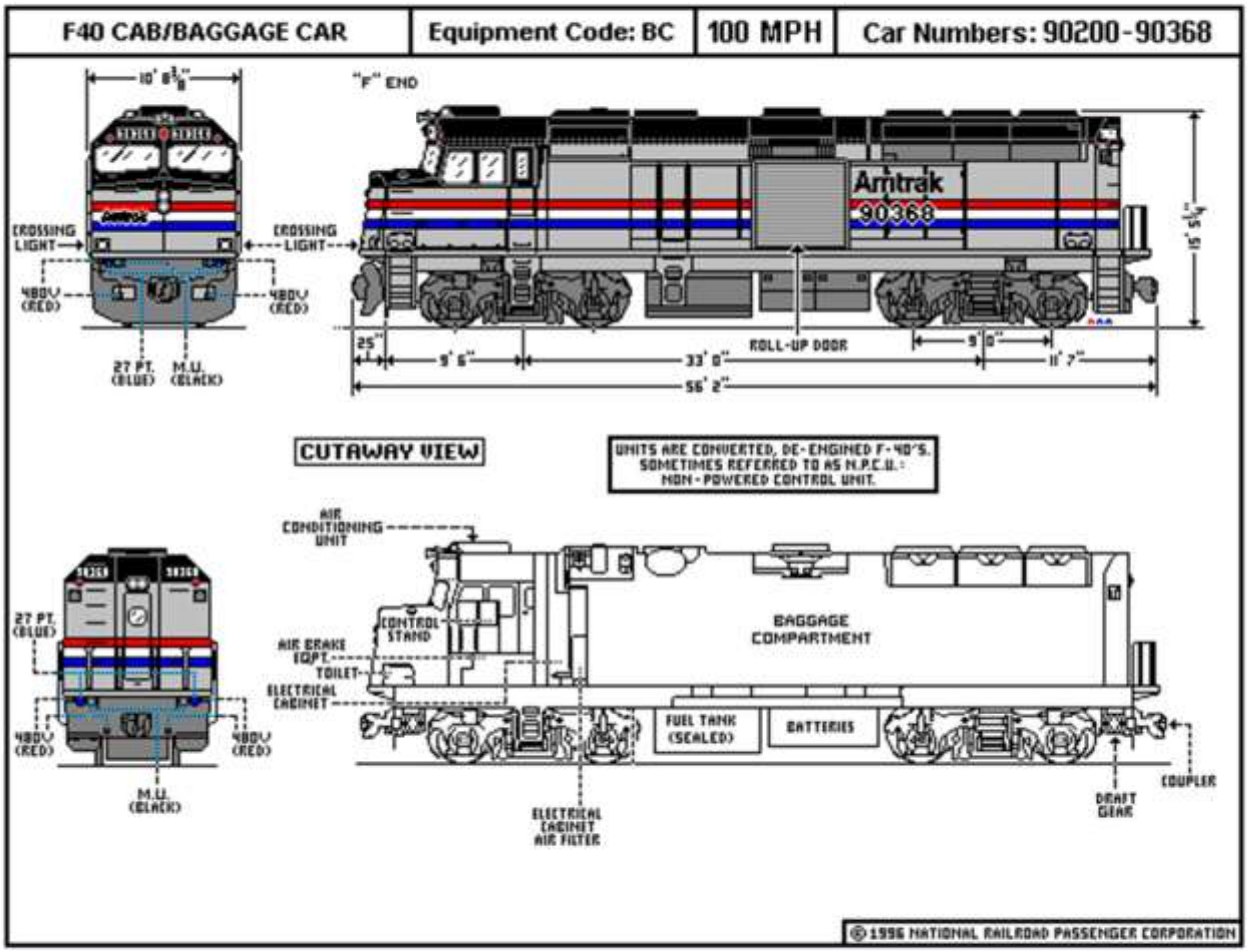
Active: 50
Builder: Amerail
Entered service: 1995-1996
Notes: Used in trains terminating at New York Penn Station; 12 revenue roomettes, 2 bedrooms, 1 accessible bedroom

Push-pull equipment



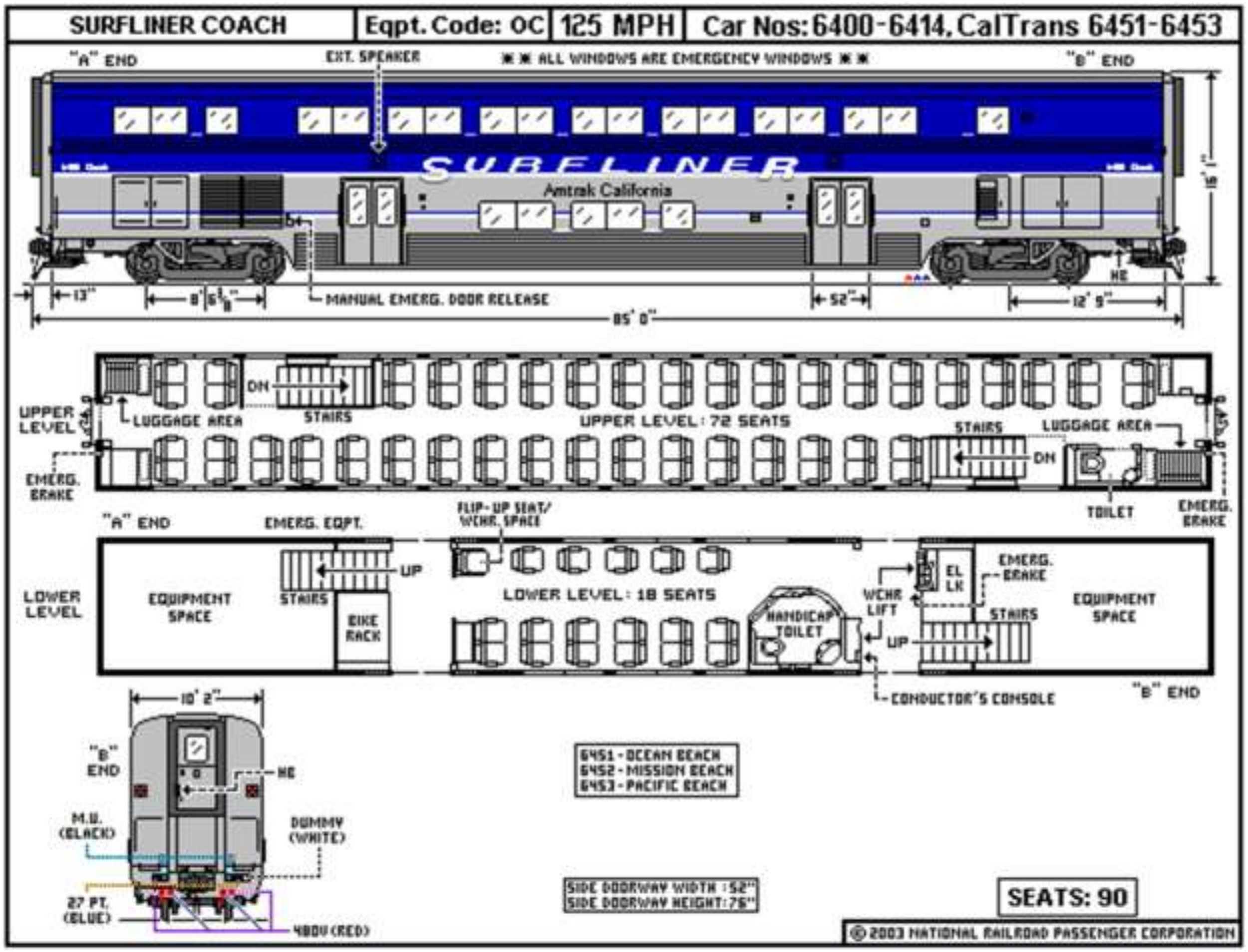
Active: 17
Builder: Budd
Entered service: 1967
Notes: Rebuilt from *Metroliner* EMU cars; several different interior configurations.

Push-pull equipment



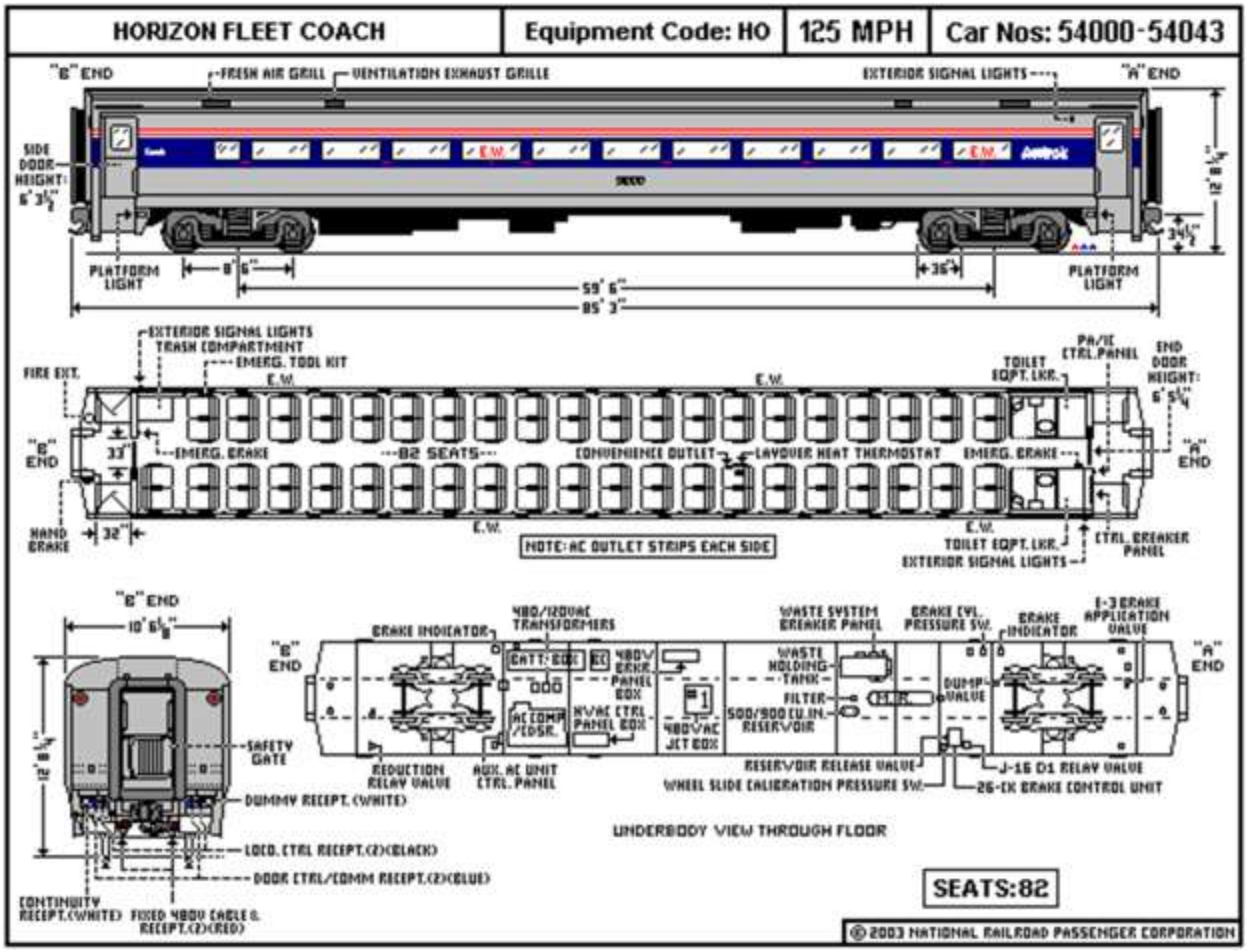
Active: 22
Builder: EMD
Entered service: 1976-1981
Notes: Surplus F-40PH locomotives converted to cab/baggage role.

Bilevel corridor equipment



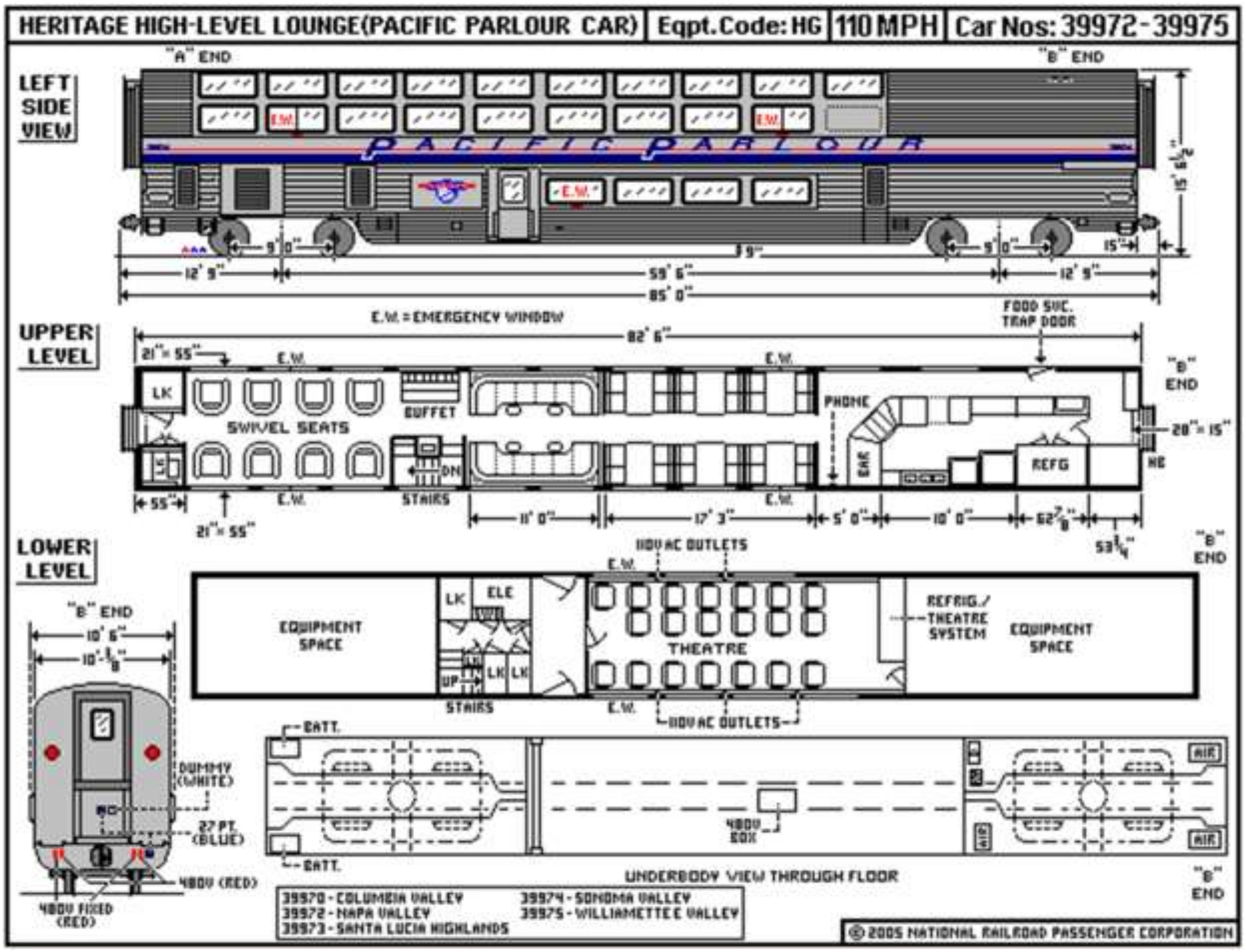
Active: 41
Builder: Alstom
Entered service: 2000-2001
Notes: Additional cars are owned by state of California

Single level corridor equipment



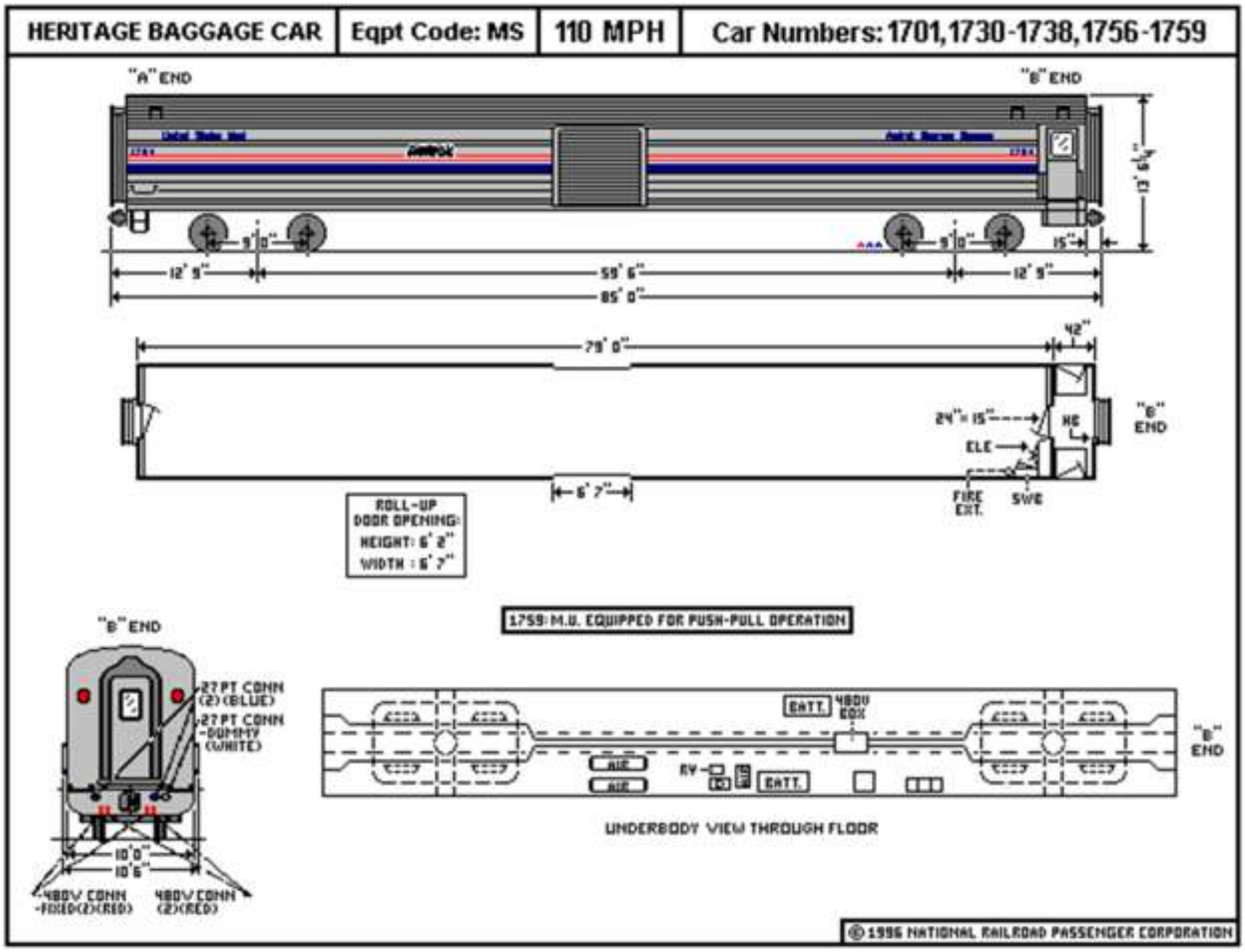
Active: Approx. 100
Builder: Bombardier
Entered service: 1989-1990
Notes:

Bilevel long distance equipment



Active: 5
Builder: Budd
Entered service: 1956
Notes: Used exclusively on the *Coast Starlight*.

Single level long distance equipment



Active: Approx 90
Builder: Various
Entered service: 1950-1961
Notes: Diagram is representative; class includes several distinct groups of cars (including diner cars) , as well as several unique designs. Built between 1950 and 1961.

Diesel-electric switcher (various models)

Type	Unit Nos	Active	HP	Speed	Year	Builder
GP-38H-3	520-527	7	2000	100	1966 (2004 rebuild)	EMD
MP15	530-539	10	1200	65	1970	EMD
SW1500	540-541	2	1500	60	1973	EMD
SW1001	569	1	1500	60	1973	EMD
GP-15D	570-579	10	1500	65	2004	MPI
GP-38	720-724	4	2000	65	1976	EMD
SW-1	737	1	600	50	1947	EMD
SW-1000	790-799	9	1000	50	1950	EMD