U.S. Department of
Transportation
**Federal Railroad
Administration**

Methodology for Determining the Avoidable and Fully Allocated Costs of Amtrak Routes

Volume I, Main Report

U.S. Department
of Transportation

**Federal Railroad
Administration**

Administrator

1200 New Jersey Avenue, SE
Washington, DC 20590

December 15, 2009

The Honorable Daniel K. Inouye
Chairman
Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

The Consolidated Appropriations Act, 2005, Public Law 108-447 ("the Act"), authorized the Secretary of Transportation "to retain a consultant . . . to develop . . . a methodology for determining the avoidable and fully allocated costs of each Amtrak route." The Federal Railroad Administration (FRA) is responsible for meeting this requirement. The FRA tasked the Volpe National Transportation Systems Center to collaborate closely with Amtrak in developing the cost accounting methodology referenced in the Act, and FRA's Office of Passenger and Freight Programs also provided significant input and oversight to the effort.

I am pleased to submit a report that describes FRA's recommended methodology developed in accordance with this requirement. Subsequent reports, to be submitted by Amtrak in accordance with Public Law 108-447, will document the results of the methodology's application on a route-by-route basis. I hope that the information contained in the enclosed report will assist the Committee in its work.

Identical letters have been sent to the Ranking Member of the Senate Committee on Appropriations, and to the Chairman and Ranking Member of the House Committee on Appropriations, the House Committee on Transportation and Infrastructure, and the Senate Committee on Commerce, Science, and Transportation.

Sincerely,

Joseph C. Szabo

Enclosures

**U.S. Department
of Transportation**

Administrator

1200 New Jersey Avenue, SE
Washington, DC 20590

**Federal Railroad
Administration**

December 15, 2009

The Honorable Thad Cochran
Ranking Member
Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Senator Cochran:

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the Secretary of Transportation "to retain a consultant . . . to develop . . . a methodology
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Joseph C. Szabo

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U.S. Department
of Transportation

**Federal Railroad
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Administrator

1200 New Jersey Avenue, SE
Washington, DC 20590

December 15, 2009

The Honorable David R. Obey
Chairman
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

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Senate Committee on Commerce, Science, and Transportation.

Sincerely,

Joseph C. Szabo

Enclosures

December 15, 2009

The Honorable Jerry Lewis
Ranking Member
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Congressman Lewis:

The Consolidated Appropriations Act, 2005, Public Law 108-447 ("the Act"), authorized the Secretary of Transportation "to retain a consultant . . . to develop . . . a methodology for determining the avoidable and fully allocated costs of each Amtrak route." The Federal Railroad Administration (FRA) is responsible for meeting this requirement. The FRA tasked the Volpe National Transportation Systems Center to collaborate closely with Amtrak in developing the cost accounting methodology referenced in the Act, and FRA's Office of Passenger and Freight Programs also provided significant input and oversight to the effort.

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Sincerely,

Joseph C. Szabo

Enclosures

December 15, 2009

The Honorable Kay Bailey Hutchison
Ranking Member
Committee on Commerce, Science and Transportation
United States Senate
Washington, DC 20510

Dear Senator Hutchison:

The Consolidated Appropriations Act, 2005, Public Law 108-447 ("the Act"), authorized the Secretary of Transportation "to retain a consultant . . . to develop . . . a methodology for determining the avoidable and fully allocated costs of each Amtrak route." The Federal Railroad Administration (FRA) is responsible for meeting this requirement. The FRA tasked the Volpe National Transportation Systems Center to collaborate closely with Amtrak in developing the cost accounting methodology referenced in the Act, and FRA's Office of Passenger and Freight Programs also provided significant input and oversight to the effort.

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Sincerely,

Joseph C. Szabo

Enclosures

U.S. Department
of Transportation

**Federal Railroad
Administration**

Administrator

1200 New Jersey Avenue, SE
Washington, DC 20590

December 15, 2009

The Honorable John D. Rockefeller, IV
Chairman
Committee on Commerce, Science and Transportation
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

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Joseph C. Szabo

Enclosures

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13. ABSTRACT (Maximum 200 words)

The Federal Railroad Administration tasked the Volpe Center with developing a methodology for determining the avoidable and fully allocated costs of Amtrak routes. Avoidable costs are costs that would not be incurred if an Amtrak route were discontinued. Fully allocated costs are the total costs of operating a route, including operating, marketing, general and administrative, and capital costs. The methodology was developed in cooperation with Amtrak staff and is being implemented within Amtrak's new Amtrak Performance Tracking (APT) system. This report describes the methodology for determining Amtrak's avoidable and fully allocated costs.

Challenges faced in developing the methodology included how to allocate shared costs that cannot be directly linked to single trains, how to spread high-level costs, such as general and administrative costs, how to distribute costs to Amtrak's ancillary businesses, how to estimate and allocate capital costs given Amtrak's history and structure, and how to estimate avoidable costs given record keeping limitations and the fact that many Amtrak costs are shared.

The methodology will provide improved estimates of avoidable and fully allocated costs as compared to Amtrak's current cost allocation system. It simplifies the cost allocation rules, incorporates Amtrak's ancillary businesses in the allocation process, and increases transparency.

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Background

The Consolidated Appropriations Act, 2005 (Act) authorized the U.S. Secretary of Transportation "to retain a consultant … to develop … a methodology for determining the avoidable and fully allocated costs of each Amtrak route." The Act further specified that "Amtrak shall apply the methodology in compiling an annual report to Congress…." The Federal Railroad Administration (FRA) is responsible for meeting the requirements of the Act and tasked the Volpe National Transportation Systems Center (Volpe) with developing the Amtrak cost accounting methodology.

This report describes FRA's recommended methodology for determining both Amtrak's Avoidable Costs and its Fully Allocated Costs as required by the Act. A more detailed explanation of the two cost terms can be found in the main body of the report, but a suitable general understanding of these terms is provided in the following definitions:

- **Avoidable Costs** are estimates of the cost savings that would occur if a single Amtrak route were eliminated.
- **Fully Allocated Costs** are the portion of total costs recorded on Amtrak's income statement that best represent an equitable share for a single Amtrak route.[1]

Challenge

The National Railroad Passenger Corporation (Amtrak) is a large, complex enterprise focused on the operation of intercity passenger trains in the U.S. It operates as many as 315 trains per day on more than 43 routes, carrying an average of 70,000 daily passengers. Amtrak has more than 18,000 employees and had FY 2007 revenues of $2.2 billion, which included intercity passenger revenues, revenues from related businesses, and state capital payments. Amtrak's revenues would place it at number 819 on the 2007 list of Fortune 500 companies.

In addition to performing the full range of functions and activities required to operate the National Train System (NTS), Amtrak engages in related ancillary business that include:

- Operating commuter railroad services under contract,
- Providing rail infrastructure access to commuter agencies and freight railroads,
- Performing rail services for other rail operators, both commuter agencies and freight railroads, on a reimbursable basis, and

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[1] Although this definition is useful as the a basic concept for the intended measure of Fully Allocated Costs, the actual methodology defined in this report varies from this strict definition in that it substitutes a synthetic capital charge for the depreciation and interest expense included on the income statement.

    ▪   Managing and leasing of commercial real estate.

The size and complexity of the Amtrak enterprise pose many challenges to defining methods for allocating its costs to routes and estimating their avoidability—the focus of this report. First, many of the activities involved in operating trains[2] cannot be directly linked to a single train or route. For example, train yard activity, such as breaking up, making up, and positioning trains in the yard, cannot be economically linked and recorded to individual trains. Further, train yard management and supervision, by its nature, is a shared cost, and therefore a specific method to apportion these shared costs must be selected. Second, in many cases, activities and their costs are local in scope and should not be allocated to the entire national train system. The cost allocation method should somehow distribute local costs only to the relevant routes utilizing the local resource and broader shared costs both to the NTS and also to the ancillary businesses where appropriate.

At a higher corporate level, various general and administrative functions, such as maintaining financial records, running various computer systems, providing human resource services, and executive management, are necessary to operate the enterprise. These activities are even further removed from the operation of individual trains, and their costs, in addition to being allocated to intercity passenger routes, must also be allocated to the various ancillary businesses. Because the ancillary businesses usually are not integrated with the operations of the NTS, the activity measures typically used in the cost allocation process for trains are not available, and alternative procedures must be developed.

As specific functional areas of the Amtrak enterprise are considered, other costs allocation issues are confronted. Among them are determining a sensible and appropriate way to treat capital costs given Amtrak's corporate history and structure, and the public financial contributions to the corporation. In the case of fuel, the nature of the operation and record keeping make it difficult and costly to identify the actual fuel costs of a specific train. In the case of equipment maintenance costs, the allocation method must recognize that outside of certain services using dedicated equipment, such as the Acela Express and the Cascades Route, an individual piece of equipment can generally be used on multiple routes.

Estimating the expected Avoidable portion of Fully Allocated Costs due to the elimination of a route is similarly challenging due to the practical limitations of record keeping and the fact that many costs are shared. In addition, the methodology for estimating Avoidable Costs must take into account potential changes to Amtrak's organization, both in the short and longer term, and contractual labor protection provisions applicable to employees whose jobs are eliminated due to service reductions.

Overview of Methodology

As with all large public corporations, Amtrak has in place accounting systems and procedures for recording and reporting its expenditures and receipts, and its financial reports are audited by a public accounting firm. Thus, its basic financial data can be considered a sound and suitable

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[2] As is explained more fully in the report, because routes are made up of two or more trains, all costs are first distributed to trains and then the costs for a route are summed for all trains making up that route.

basis for developing a cost-accounting methodology. All of Amtrak's expenditure transactions are recorded on its general ledger, known as the Financial Information System (FIS). As a result, FIS is the starting point for the cost accounting methodology recommendations in this report.

All FIS data records include, in addition to the transaction dollar amount, certain codes that further identify the type of transaction. These codes are key to classifying and analyzing expenditures for the purpose of the desired methodologies. As a first step, expenditures are sorted into:

- Operating expenses (allocated),
- Capital expenditures (added to assets and used to calculate the capital charge), and
- Other financial transactions (not Amtrak route operating costs, so not further considered).

Figure EX-1 illustrates this process for five hypothetical FIS transactions (FIS Expense1 to FIS Expense5). The items in parentheses under each expense "record" are the accounting classification codes recorded along with each transaction in FIS.

Some operating expenses are directly linked to specific trains or other ancillary businesses in FIS and can be "assigned" to those trains or businesses, but most are shared and must be allocated. The sum of assigned and allocated costs is Fully Allocated Costs as that term is defined in this report. Thus, operating costs are:

- Direct (assigned to trains or ancillary businesses[3]), and
- Indirect or Shared (allocated to trains or ancillary businesses).

Figure EX-2 illustrates the case of a direct expense (FIS Expense4) and shows that it is assigned directly to Train5 without any need for allocation. Each direct expense is assigned to one and only one train or other ancillary business.

Indirect or Shared expenses are split between:
- Trains that are part of Amtrak's National Train System
- Ancillary businesses

Allocation of Shared Costs

The primary focus of this report is to develop a methodology for estimating the Avoidable and Fully Allocated Costs of Amtrak Routes, i.e., the NTS, but costs are also allocated to the ancillary businesses.

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[3] Whereas, for the purpose of conciseness, this report refers to costs being assigned or allocated to ancillary businesses, in many cases the methodology distributes costs at a more detailed level to individual customers (e.g., specific commuter agencies, freight railroads, and so on) similar to the manner in which costs are distributed to individual Amtrak trains.

Figure EX-1: Allocation Methodology

FINANCIAL INFORMATION SYSTEM (FIS)

FIS Expense1
(ResCen #, Function #, Account #, Location #)

FIS Expense2
(ResCen #, Function #, Account #, Location #)

FIS Expense3
(ResCen #, Function #, Account #, Location #)

FIS Expense4
(ResCen #, Function #, Account #, Location #)

FIS Expense5
(ResCen #, Function #, Account #, Location #)

...

Operating

Capital

Other Financial Transactions

Direct

Shared

Asset Ledger
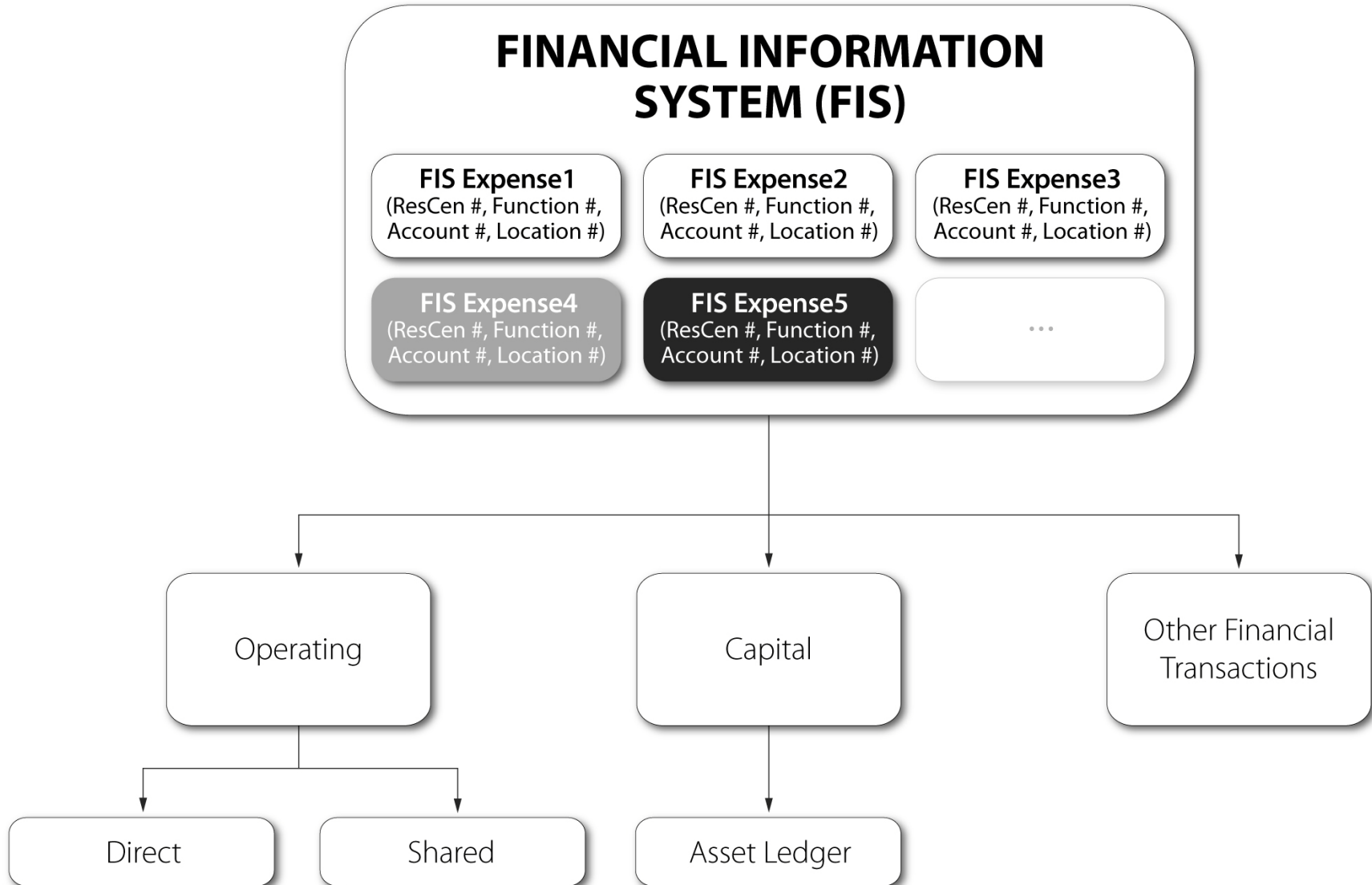
Figure EX-2: Allocation Methodology – Direct Cost Example

FIS Expense4
(ResCen #XXXX, Function #YYYY,
Account #ZZZZZZ, Location #AAAA)

NTS	CIA	COP	Freight	Reimbursable	Commercial
Train1	Delaware Transit	Peninsula	Conrail		
Train2	LIRR	MARC	CPR		
Train3	MARC	Shoreline East	CSX		
Train4	MBTA	Sound Transit	CT Southern		
Train5	NJT	VRE	NS		
Train6	SEPTA	Tri-Rail	P&W		
…	Shoreline East		Springfield		
…	VRE		UP		
…	Metra				
…					
…					

NTS = National Train System
CIA = Commuter Infrastructure Access
COP = Commuter Operations
Freight = Freight Infrastructure Access

Figure EX-3: Allocation Methodology – Shared Cost Example

FIS Expense5
(ResCen #BBBB, Function #1713,
Account #CCCC, Location #DDDD)

RC #BBBB = MoW: C&S Subfamily

MoW: C&S Subfamily Profile allocates Function #1713 (Signal & Interlocker Maintenance) costs using Train Frequency (FTT) statistic

Allocation Statistic = FTT

NTS
- Train1
- Train2
- Train3
- Train4
- Train5
- Train6
- …
- …
- …
- …
- …

CIA
- Delaware Transit
- LIRR
- MARC
- MBTA
- NJT
- SEPTA
- Shoreline East
- VRE
- Metra

COP
- Peninsula
- MARC
- Shoreline East
- Sound Transit
- VRE
- Tri-Rail

Freight
- Conrail
- CPR
- CSX
- CT Southern
- NS
- P&W
- Springfield
- UP

Reimbursable

Commercial

NTS = National Train System
CIA = Commuter Infrastructure Access
COP = Commuter Operations
Freight = Freight Infrastructure Access

6

Amtrak has a hierarchical organizational structure composed of about 1,600 Responsibility Centers (ResCens). For this cost allocation methodology, Amtrak's ResCens are grouped, based on similarity of activities and functions, into nine broad cost Families. The cost Families are divided into 37[4] Subfamilies, and several Subfamilies are further divided into more detailed Subcategories. Examples of Families are Maintenance of Way (MoW), Transportation Operations, and General & Administrative. Examples of Subfamilies in the MoW Family include MoW-Track, MoW-Communication and Signals (MoW-C&S), and MoW Support.

A key characteristic of the cost allocation methodology is that the same rule or set of rules is applied to all ResCens performing similar activities. A "Profile" is defined for each Subfamily or Subcategory that defines the "rules" for assigning or allocating all expenditures incurred at ResCens within that Subfamily or Subcategory.

Cost allocation is performed in a series of steps or "rounds." In the first round, direct expenses are assigned and those shared expenses that most closely linked to train operations are allocated. One or more intermediate rounds, depending on the characteristics of a particular Subfamily, may also be required. The final round involves allocation of the highest level expenses, such as those incurred at ResCens in the General and Administrative Family.

The allocation methods for all rounds are similar and can be illustrated using the example of the MoW-C&S Subfamily. The MoW-C&S Subfamily is composed of ResCens responsible for maintaining the C&S systems within a geographical area, i.e., a section of right-of-way (ROW). To allocate expenses incurred at ResCens in a given Subfamily, the rules specified in that Subfamily's Profile are applied to all the ResCens in the Subfamily. In the case of the MoW-C&S Subfamily, Signal & Interlocker Maintenance expenses at a particular ResCen are allocated to Amtrak trains, commuter agencies, and freight railroads using the section of ROW for which that ResCen is responsible based on relative shares of total train frequency over that section. Thus, the rule involves specifying a type of expense (expenditures at MOW-C&S ResCens), a set of cost objects to which costs are allocated (in this case Amtrak trains, commuter agencies, and freight railroads), and an allocation statistic (in this case train frequency). Figure EX-3 illustrates the case in which a hypothetical shared MOW-C&S expense (FIS Expense5) would be allocated to trains 1, 2 and 5, and also to ancillary business customers MBTA and CSX.

This example shows that the methodology requires some common measure of ResCen activity (a "statistic") that is available across all users (cost objects) to allocate the shared expenses. When allocating expenses exclusively to trains, a train operating statistic, such as train frequency, labor hours, or total passenger miles, may be used to allocate expenses. When allocating expenses among NTS and non-NTS ancillary businesses, sometimes the most appropriate statistic is not available for some of the ancillary businesses. In such cases, various alternatives used include:

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[4] Only 36 are used for cost allocation; the 37th provides a mechanism for treatment of expenses that are not considered costs under this methodology.

- Employing multiple allocation rounds and splitting expenses between NTS and non-NTS ancillary businesses in the first round based on some statistic common to all Amtrak businesses, a detailed analysis, or professional judgment
- Using some relative measure of activity such as the total activity cost (from prior rounds)

An important part of the methodology development process was to consider the potential availability of allocation statistics that could be linked to specific cost objects at specific ResCens, especially for cases where a portion of expenses needed to be allocated to the ancillary businesses.

Each of the Subfamilies and Subcategories were the subject of a separate analysis leading to a well-defined allocation process. The main steps in the process were:

- Developing the hierarchal family structure
- Placing each of Amtrak's 1,600-plus ResCens into the appropriate Family-Subfamily-Subcategory
- Identifying the primary activities and corresponding FIS cost code combinations for each Subfamily[5]
- Determining to what train or ancillary businesses the expenses should be allocated, i.e., what "customers" are supported by the Subfamily's activities
- Identifying an appropriate and available statistic (or statistics) to use in allocating the various types of Subfamily or Subcategory expenses
- Selecting the appropriate allocation "level." In most cases expenses can be satisfactorily allocated at the ResCen level, but in a few cases this was found to result in incorrect allocations and, instead, expenses needed to be allocated at a regional or national level.

Treatment of Capital Costs as Part of Fully Allocated Costs

Any sizable enterprise, and especially a railroad with its rolling stock and fixed infrastructure, has expenditures for items that are long-lived relative to the typical monthly, quarterly, and annual financial reporting periods. These expenditures are referred to as capital and are given special treatment in the reporting of operating costs under generally accepted accounting procedures (GAAP). Under GAAP, rather than being recorded in the time period in which they are actually incurred, capital expenditures are annualized over the expected time period for which the underlying assets are expected to contribute to the production of output (in the case of Amtrak, the output is mostly the operation of trains). The annualized charge or cost is referred to as depreciation and is used in the income statement calculation of profit or loss from continuing operations. In addition, the interest expense on funds borrowed to finance capital expenditures

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[5] As noted previously, in some cases the analysis occurred at the Subcategory level. However, since the overall process is the same for Subfamilies and Subcategories, the latter does not require separate treatment in this methodology overview.

are shown on the income statement and figure into the calculating the total net profit or loss of the enterprise.

Significant effort was made to determine how best to incorporate the cost of capital into Amtrak's Fully Allocated costs. Consideration was given to the history of public sector contributions towards Amtrak capital expenditures, Amtrak's use of borrowings (and hence its incurring of interest expenses) for the acquisition of only certain subsets of its capital assets, and the use of leases and sale-leaseback transactions for some capital assets. It was decided that simply allocating GAAP depreciation and interest to routes and other ancillary businesses did not yield a contribution to Fully Allocated Costs for a particular route that accurately reflected that route's relative usage of capital assets.

Instead, the decision was made to replace depreciation and interest with a synthetic capital charge, which provides a more representative measure of the resource cost of all capital equipment and property – regardless of how financed – currently being used by Amtrak to produce its various services and outputs. The synthetic capital charge is an annualized value based on the original acquisition costs of the assets and the underlying opportunity cost of capital as a production resource as reflected in the U.S. Treasury long term borrowing rate. Since Amtrak's data systems do not link capital assets to ResCens in specific areas, procedures needed to be developed to link such assets to the outputs and services whose production they support.

The development and inclusion in APT of a methodology for calculating, on a sound economic basis, a capital charge to be allocated to Amtrak route and other businesses in both the Fully-Allocated and Avoidable Cost aspects of this methodology, implies no recommendation regarding the practical application—for example, in the negotiation and pricing of services that Amtrak performs for other entities—of the charges thus calculated. The capital charges, like other topics covered herein, are presented solely for the sake of objectively and comprehensively responding to this report's Congressional mandate, thereby advancing the state-of-the-art in the allocation and analysis of the costs of intercity passenger rail service.

Figure EX-4 summarizes the process for calculating Fully Allocated Costs. In addition to the cases covered in Figure EX-2 (FIS Expense4) and Figure EX-3 (FIS Expense5), it illustrates the conceptual data flow for converting asset acquisitions in prior periods to capital charges allocated to trains and other customers. It also shows the final step in which costs are aggregated to Amtrak's Routes and ancillary businesses.

Estimation of Avoidable Costs

In developing the method for estimating the avoidable costs of each Amtrak route, Subfamilies were first placed in one of four groups based on the relative avoidability of their costs:

- Avoidable
- Fixed
- Mixed-Statistical
- Mixed-Detailed

Figure EX-4: Aggregation of Fully Allocated Costs
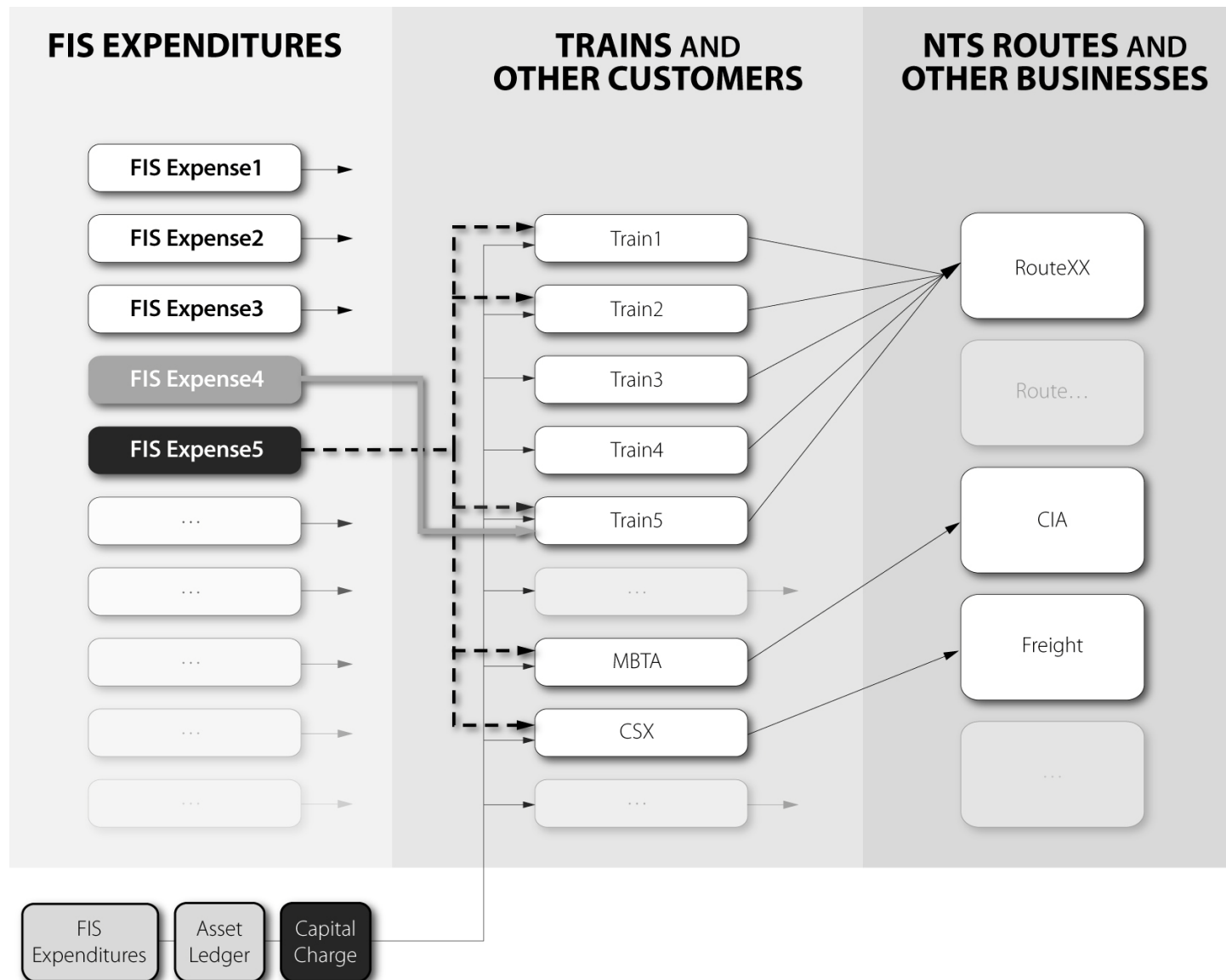
Expenses at ResCens in some Subfamilies would be completely (100 percent) Avoidable for a particular route if that route were eliminated and these expenses are classified as Avoidable. One example is the Subfamily used to record fuel costs. Since only the direct expenditures on fuel are included in this Subfamily, these costs would be avoided if operations for a route were discontinued. Expenses recorded in some other Subfamilies would remain even if any particular route was eliminated and these are classified as Fixed. Examples are the various general management and support Subfamilies, mostly in the General and Administrative Family.

Those Subfamilies that lie between completely Fixed or completely Avoidable are considered Mixed. Statistical analysis was used where possible to estimate the Avoidable Costs of Amtrak routes for such Subfamilies. Using regression analysis of panel data, equations were estimated that used train operating statistics to explain the level of ResCen costs both in the short and long terms. The resulting statistical coefficients are used to estimate the costs at a ResCen both with and without a particular route, and the sum of such calculations over all relevant ResCens results in the Avoidable Cost for the Route

Where the data did not support the use of statistical techniques, other types of analysis and professional judgment were used to investigate and determine the Avoidable Costs of some Mixed Subfamilies—those referred to as Mixed-Detailed. Literature reviews and interviews with Amtrak personnel and industry officials led to a series of Avoidable Cost approaches for these Subfamilies. Often the approach taken was to consider the Subfamily's costs at a disaggregated level using accounting codes to identify the type of costs. Rules were then developed for these more disaggregated costs—treating some as completely Avoidable, some as completely Fixed, and some as partially Avoidable, using either a simple percentage or equation based on other analysis.

In calculating the Avoidable Costs of an Amtrak route, two time periods were investigated. Short-run Avoidable Costs are those costs that would no longer be incurred one year after a Route is eliminated, in effect providing an estimate of what costs would remain on the first day of the second year. Many costs are Avoidable in the short term such as fuel, materials, supplies, and some labor. Long-term Avoidable Costs are those costs that would no longer be incurred five years after a Route is eliminated, i.e. providing an estimate of what costs would remain on the first day of the sixth year. The long-term period gives Amtrak management time to restructure the organization, dispose of assets not needed, and shift resources to more efficiently provide the new level of service.

The Avoidable Cost estimation methods outlined above result in an expected savings assuming that Amtrak will reduce its use of resources commensurate with the reduced level of service, and realize financial savings proportionate to the resource savings. However, labor contracts covering most Amtrak operating personnel contain labor protection provisions providing for payments and/or other protections for covered employees in the event that service is reduced. The payments vary both in amount and duration based on employee years of service. The effect of such labor protection payments is to reduce Avoidable Costs. The Avoidable Cost methodology includes adjustments for the labor protection payments based on data on staffing levels, employee years of service and routes served for each onboard service (OBS) and trainmen and enginemen (T&E) crew base.

General Assessment and Recommendations

The new methodology, when properly implemented, will provide a much improved estimate of Fully Allocated and Avoidable Costs over that provided by Amtrak's current Route Profitability System (RPS). This methodology, developed in concert between Volpe and Amtrak staff, is being implemented within Amtrak's new cost accounting system, to be known as Amtrak Performance Tracking (APT). The new methodology will simplify the cost allocation rules, incorporate Amtrak's ancillary businesses in the cost allocation process, and increase transparency among system users, resulting in an improved cost allocation system.

Many aspects of the methodology will be automatically or easily maintained and updated as Amtrak's organization evolves, but in several areas there is a need for a more systematic and substantial review and updating at least every two years. The areas in need of such review and updating are identified in the report sections describing the methodology details.

As with any complex cost accounting system, there is always room for still further improvement. There is also a need for some supplemental efforts to make several technical refinements to the methodology—or that are required to guide its implementation in APT—that could not be accomplished prior to the preparation of this report. These methodology refinements are not expected to have a sizable effect on the quantitative results.

Finally, at press time for this report, one methodological area remained where the development effort was incomplete. That area involved the avoidability of capital charges (Section 8.7.1). Accordingly, it is possible that the actual implementation of this subject in APT will differ somewhat from the recommendations of this report. Also, as Amtrak continues to translate these methodologies into the elements of its APT system, additional discrepancies of a detailed nature may arise between this report's recommendations and the implementation of APT.

Acronyms

ACC	Avoidable Cost Code
ACK	Account Code Key
ALU	Acela Units Used
Amtrak	National Railroad Passenger Corporation
APT	Amtrak Performance Tracking
B&B	Bridges and Buildings
BUU	Baggage Units Used
CAE	Customer Activity Expense
CC	Capital Charge
CEP	Customer Electric Percentage
CETC	Centralized Electric and Traffic Control
CIA	Commuter Infrastructure Access
CNOC	Consolidated National Operations Center
COP	Commuter Operations
CRF	capital recovery factor
CRH	Crew Hours
C&S	Communications and Signal
CUS	Chicago Union Station Company
CUT	Car Unit Trips
DLH	Dining Labor Hours
DLU	Diesel Locomotive Units Used
DOT	Department of Transportation
DPUF	Diesel Power Usage Factor

DRV	Dining Car Revenues
ET	Electronic Traction
ELU	Electric Locomotive Units Used
EPUF	Electric Power Usage Factor
EUM	Electric Locomotive Unit Miles
FCR	First Class Riders
Fingate	Financial Gateway
FIS	Financial Information System
FRA	Federal Railroad Administration
FTT	Train Frequency
FY	Fiscal Year
G&A	General and Administrative
GAAP	Generally Accepted Accounting Principles
GEU	General Electric Locomotive Units Used
GLC	Gallons Consumed
GTM	Gross Ton Miles
HSR	High-Speed Rail
ICC	Interstate Commerce Commission
IFS	Integrated Financial System
LMS	Labor Management System
MDC	Mechanical Direct Costs
MoE	Maintenance of Equipment
MOLAP	Multidimensional Online Analytical Processing
MoW	Maintenance of Way
MoW-ET	Maintenance of Way Electric Traction

MWDC   Maintenance of Way Direct Costs

NEC   Northeast Corridor

NJT   New Jersey Transit

NON   no statistic

NTS   National Train Service

OBS   Onboard Services

OLH   On Board Labor Hours

OMS   Operations Management System

PAS/ALMS   Passenger Accounting System/Automated Lift Match System

PRIL   Passenger Railroad Insurance Limited

PRV   Total Passenger Revenue

PSL   Penn Station Leasing

PTT   Paperless Time Ticket

RC   Responsibility Center

ResCen   Responsibility Center

RPS   Route Profitability System

RR   Railroad

RSCC   Reservation Sales Call Center

RSO   Usage Time for Reservations Sales Office Operations

SQ   Stat Qualifier

SSSO   Security Strategy & Special Operations

STB   Surface Transportation Board

TAC   Total Activity Cost

TAS   Travel Agent Sales

TBD   Total Boards and Deboards

TCM	Total Car Miles
T&E	Trainmen and Enginemen
TEH	Trainmen and Enginemen Hours
TLH	Trainmen Labor Hours
TMC	Total Mechanical Cost
TPM	Total Passenger Miles
TRD	Total Riders
TSL	30th Street Limited, L.P.
TTE	Total Train Expense
TTM	Total Train Miles
TUM	Total Unit Miles
TUS	Train Unit Statistics
TUT	Total Unit Trips
UM	Unit Miles
UU	Units Used
VRE	Virginia Rail Express
Volpe	Volpe National Transportation Systems Center
WBD	Weighted Total Boards and Deboards
WIP	Work in Progress
WMS	Work Management System
WTC	Washington Terminal Company

1 Introduction

1.1 Background

The Consolidated Appropriations Act, 2005 (Act) authorized the Secretary of Transportation "to retain a consultant … to develop … a methodology for determining the avoidable and fully allocated costs of each Amtrak route." The Federal Railroad Administration (FRA) is responsible for meeting this requirement. The Act further specified that "Amtrak shall apply the methodology in compiling an annual report to Congress…." FRA tasked the Volpe National Transportation Systems Center (Volpe Center) to closely collaborate with the National Railroad Passenger Corporation (Amtrak) in developing the cost accounting methodology referenced in the Act.

The Volpe Center and Amtrak jointly developed the methodology for the Fully Allocated Costs. Fully Allocated Costs are the total costs associated with operating an Amtrak Route, including both direct operating expenses, a portion of shared expenses, and a portion of corporate overhead expenses. The Volpe Center developed the methodology to estimate the Avoidable Costs of Amtrak routes, with assistance from Amtrak staff. Avoidable Costs are those that would cease if a particular Amtrak route were to be eliminated. The complex interrelationships among Avoidable and Fully Allocated Costs—combined with Amtrak's eventual need to implement the entire methodology in its accounting system—required the Volpe Center and Amtrak teams to work closely together to develop a coherent approach.

1.2 Objective

The overall objective of this effort is to develop, document, and implement a cost accounting methodology for determining and reporting the Avoidable and Fully Allocated Costs of each Amtrak Route. In addition, the Volpe Center was tasked to provide additional features for analyzing Amtrak's costs that provide value to Congress, FRA,[6] and Amtrak.

The recommended cost accounting methodology fulfills the Congressional mandate and provides additional features and value to both FRA and Amtrak. Improved and timelier cost information will be generated on Amtrak's train routes. Cost information will be provided on Amtrak's ancillary businesses that will be useful not only to Amtrak management, but also to other stakeholders, including Congress, the U.S. Department of Transportation (DOT), and States that contract with Amtrak for train service.

1.3 Scope of Report

This report describes the new cost accounting methodology and rules for determining Amtrak's avoidable and Fully Allocated costs required by the Act. It provides background information on Amtrak's current accounting system and methodology for reporting costs, presents an overview

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[6] While FRA will be the primary user of the information generated by the cost allocation methodology within the Department of Transportation, other parts of the Department including the Office of the Secretary and Inspector General will also be users of data generated by the methodology.

of the general principles of cost allocation, describes the proposed approach for estimating the Fully Allocated and Avoidable Costs of Amtrak routes and other businesses, and describes the proposed methodology and rules for allocating various categories of Amtrak costs and determining the avoidability of those costs. The report concludes by providing recommendations for further improvements to Amtrak's cost reporting capabilities.

Appendices present supplementary information relating to the proposed methodology:

- Appendix A: Family Profiles, lists the general allocation rules for each Amtrak Performance Tracking (APT) Family and Subfamily.
- Appendix B: Family Cost Distribution, shows the total of Amtrak's expenses applicable to each APT Subfamily (fiscal year (FY) 2007).
- Appendix C: Glossary.
- Appendix D: Statistics and Definitions, provides an overview of statistics used in the recommended allocation and avoidable cost estimation methodologies.
- Appendix E: Synthetic Capital Charge describes the methodology for estimating the capital charge.
- Appendix F: List of Interviewees, lists individuals participating in requirements analysis meetings and interview participants.
- Appendix G: Amtrak Crew Bases, lists onboard services (OBS) and train and engineman (T&E) crew bases and the routes that they support.

- Appendix H: Definition and Use of the TAC and CAE Statistics.

An ongoing parallel effort by Amtrak to implement this methodology, using a new cost allocation system, is nearing completion; a brief description of this effort is also provided in this report.

2 Current Amtrak Cost Accounting and Reporting Systems

The Route Profitability System (RPS) is Amtrak's current cost accounting and reporting system for Fully Allocated costs. This section describes RPS and other Amtrak systems relevant to the cost accounting methodology.

2.1 RPS Overview

RPS is used to calculate the costs and revenues of each Amtrak route and to estimate its resulting surplus or deficit. Amtrak describes RPS as "a mainframe system that, based on feeds from [the general ledger] and other systems, converts the departmental reporting of profit and loss into a train profit and loss." RPS is both a methodology and a process for estimating train and route level cost and revenue data and is also a database with a post-processor for analysis and report generation.

2.2 Revenue and Cost Distribution

RPS estimates the profitability of Amtrak routes by distributing historical cost and revenue data from the company's general ledger system to individual trains, and then aggregating train level data to the route level. Revenue and cost data are distributed to trains in two ways: (a) direct assignment and (b) allocation.

2.2.1 Direct Assignment

Revenue is associated with individual trains; this information is provided to RPS at the train level. Likewise, certain types of costs are coded within Amtrak's general ledger with specific train numbers. Revenues and costs identified with train numbers are *directly assigned* to the relevant trains.

2.2.2 Cost Allocation

Most Amtrak costs are not coded to specific trains and instead must be *allocated* to trains.

Costs that are not linked to a particular train are allocated to trains proportionally using allocation variables. These variables are typically operating or other types of statistics from another Amtrak information technology system, such as the Operations Management System (OMS) or Passenger Accounting System/Automated Lift Match System (PAS/ALMS). For a cost to be correctly allocated in RPS, it must be correctly coded in the general ledger and also be allocated to trains using an appropriate allocation statistic. RPS is not a static system. Its cost allocation rules are periodically updated to reflect changes in Amtrak's operations and to improve the allocation methodology.

RPS allocates general ledger transactions to Amtrak trains. To the extent that the general ledger captures all Amtrak expenses and to the extent that those expenses are properly assigned or

allocated, RPS costs provide a reasonable estimate of the Fully Allocated costs for Amtrak routes.

2.2.3 RPS Usage

Although RPS calculates Fully Allocated costs, making it useful for examining the profitability of specific routes, for reporting historical route profitability, and for determining costs for state-supported services, it currently does not calculate avoidable costs.[7] RPS is not considered an appropriate tool for analyzing route and service adjustments. In recent years, Amtrak has begun reporting "FRA-defined costs." FRA-defined costs are groups of cost categories roughly corresponding to route costs, and therefore likely to disappear if a particular route were eliminated. Although FRA-defined costs have been used as a proxy for route level avoidable costs, they are considered a temporary measure and not a permanent solution to the issue of identifying avoidable costs for the purposes of managerial decisionmaking and Federal Government oversight.

RPS estimates and reports Fully Allocated costs monthly. Costs are allocated to trains and the train level cost data is aggregated to the route level. RPS also assigns each allocated cost to an "RPS Line," allowing Amtrak to report the costs associated with a particular train or route by broad cost category.

RPS also separates and reports costs as either "above-the-line" or "below-the-line." Above-the-line costs are costs associated with Amtrak's core national train service (NTS) business that are distributed to Amtrak trains. Below-the-line costs, on the other hand, are costs not associated with Amtrak's core business. Costs, directly associated with Amtrak's other businesses including its commuter operations and reimbursable businesses, are considered below-the-line in RPS. However, many categories of overhead-type expenses exist that the current RPS distributes exclusively among train routes that more properly should also be shared by the ancillary businesses. Other above-the-line costs are the depreciation and interest expenses listed in the monthly RPS report submitted by Amtrak to FRA. In contrast, the RPS tables included in the Monthly Performance Reports posted by Amtrak on its Web site do not distribute depreciation and interest to NTS trains or ancillary businesses but rather report them as lump-sum items that reconcile the RPS dollar amounts with the total of all expenses appearing on Amtrak's consolidated corporate income statements.

2.3 RPS Interfaces

RPS interfaces with several other information systems at Amtrak.

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[7] In 1993, the system also calculated the long-term avoidable costs, the short-term avoidable costs, and the fixed costs for routes, but there were doubts about the accuracy of the underlying methodology and the procedures have not been maintained.

2.3.1 Financial Information System (FIS)

Transactional data on Amtrak's revenues and costs comes from Amtrak's general ledger or Financial Information System (FIS), which classifies and records all company financial transactions. FIS is used to produce Amtrak's audited financial statements and is a comprehensive and accurate source of transactional data suitable for obtaining historical revenues and costs when estimating Amtrak route profitability. Each financial transaction in FIS is coded according to the following characteristics:

1. *Responsibility Center (ResCen or RC).* The organizational unit within Amtrak responsible for incurring the expense.
2. *Business Line.* The specific line of business, sub-business, customer, or product line associated with a revenue or expense.
3. *Account.* The type of expense.
4. *Function.* The nature of the activity or type of work performed.
5. *Location.* The physical location associated with the transaction.

The combination of these five codes is called the Primary Account Key also known as the Account Code Key (ACK). The codings associated with each transaction, in particular Function, ResCen, and Account, are key elements in how each transaction is allocated within RPS.

2.3.2 Other Interfaces

RPS interfaces with and receives statistical data from several statistical systems and databases in addition to FIS. Most statistical data are calculated externally and provided to RPS while some calculated within the system. In addition, most statistics are calculated at the train level while others are calculated at other than the train level such as Total Boards and Deboards (TBD), which is calculated at the station level.

The primary source of train operating statistics is OMS, a mainframe-based system that calculates and maintains statistics such as train mileage, vehicle trips, and frequency. The Train Unit Statistics (TUS) system is a DB2 mainframe table that captures and stores data on equipment moves by city pair from OMS. Data from TUS are used by RPS to calculate certain important statistics on equipment usage. The PAS/ALMS system is the source of data on passenger boards and deboards at stations and flows into RPS through the Amtrak's Revenue Data Warehouse. Onboard labor hours (OLH) data are coded directly to individual trains in Amtrak's payroll system and flow into RPS through its interface with FIS.

RPS currently resides on a mainframe computer and is accessed through a post-processing system called Financial Gateway (Fingate). Fingate provides access to data from several Amtrak systems, including RPS and FIS and allows users to prepare summary level reports and to analyze and view data at a detailed level. Fingate uses a multidimensional online analytic processing (MOLAP) database and a set of Microsoft Excel extensions that allow MOLAP data to be analyzed using Excel. Not all RPS data is available through Fingate due to Excel capacity limitations and Amtrak staff must sometimes access RPS directly through the mainframe system. In practice, however, very few Amtrak staff use the mainframe system, thus limiting their ability to fully utilize the outputs of RPS.

3   From RPS to Amtrak Performance Tracking

3.1   Summary

The APT system will replace RPS and will implement the methodology described in this report. APT is the culmination of efforts by Amtrak, FRA, and Volpe to develop an improved methodology and a process for calculating and reporting Fully Allocated costs, Avoidable costs, and revenues for Amtrak routes and other businesses.

APT is an information technology system implemented and managed by the Financial Analysis and Systems Division within Amtrak's Finance Department. APT was developed through the synthesis of two parallel efforts to improve the availability of cost information at Amtrak. As noted in Section 1.0, FRA tasked Volpe to help the agency meet its legislative mandate of developing a methodology for determining the avoidable and Fully Allocated costs of each Amtrak route. In addition, Amtrak recognized the need to replace RPS with a system that was more robust and that would provide Amtrak management with more accurate and timely information to use in analysis, reporting, and decisionmaking.

3.2   Requirements Analysis

One of the first steps in developing the cost accounting methodology was to define the methodology requirements and identify the strengths and weaknesses of the allocation methodology used in RPS. Volpe staff interviewed various RPS stakeholders, including regular RPS users within Amtrak, other relevant Amtrak staff, and the staff at FRA who use RPS.[8] The interviews focused on RPS functionality, how each Amtrak department utilizes RPS, the strengths and weaknesses of RPS, and desired features of a modified or new cost accounting methodology.

3.2.1   Findings

The primary strength identified by Volpe was that in the majority of cases, RPS allocates FIS transaction expenses to trains and routes at a detailed level based on appropriate cost drivers. Because all expense data are obtained from FIS, RPS results reconcile with Amtrak's published financial statements.

The most important finding, and the most significant weakness of RPS from the perspective of FRA's Congressional mandate, is that RPS does not currently calculate and report avoidable costs by route as required by statute. Other RPS weaknesses expressed by various RPS stakeholders include:

- Resides on a mainframe computer making it difficult to access/maintain/update,
- Results are not transparent/explainable (RPS is perceived as a "black box"),

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[8] Participants are listed in Appendix F.

- Documentation is inadequate,

- Results are not accurate/reliable and vary inexplicably across periods,

- Allocation rules are not always internally consistent,

- Results are of limited use as a management tool,

- Does not allocate General and Administrative (G&A) costs to non-NTS businesses,

- Does not allocate infrastructure costs to non-Amtrak users of Amtrak owned infrastructure,

- "Below-the-line" costs are not allocated,

- Capital costs do not properly reflect opportunity cost of all capital equipment and property employed by Amtrak, and

- Some allocation rules are conceptually lacking.

Some of these points are unequivocally true factual statements but many are subjective judgments that might not reflect a majority view. Nevertheless, the unquestionable conclusion of the study was that RPS does not meet the needs of internal or external stakeholders and that a new cost accounting methodology is required that will (1) fulfill Amtrak's congressional mandate, (2) improve the real or perceived deficiencies to RPS, and (3) provide Amtrak, FRA, and other stakeholders with more accurate and timely information on Amtrak costs and assist in management decisionmaking.

Amtrak must also implement the new methodology within a short period of time, which means that the methodology has to use readily available information and be compatible with existing Amtrak data sources and information systems, such as FIS and Fingate. Finally, to ensure that the methodology will be used for more than just fulfilling Amtrak's annual reporting requirement to Congress, Volpe and FRA also had to obtain Amtrak's acceptance regarding the usefulness and validity of the methodology.

3.3   Amtrak Initiatives

Amtrak also has been working deliberately to develop an improved cost accounting system to facilitate improved decisionmaking among Amtrak management. Over the next several years Amtrak will implement several new accounting systems and processes, including the Integrated Financial System (known as IFS), a new managerial cost accounting system using SAP commercial software, for which Congress appropriated approximately $5 million, and a new activity-based budgeting process. Amtrak also recognizes the need to modernize RPS. Through the RPS Validation and the RPS System Rewrite Project, real and perceived weaknesses were corrected, the quality and timeliness of RPS results improved, and system functionality expanded.

3.3.1 RPS Validation

In 2006, Amtrak formed an RPS Working Group to plan and conduct an RPS validation to review and update the relationships or associations between Amtrak ResCens and trains and

routes listed in the RPS allocation rules. The objective was to enhance the credibility of RPS results and to improve communication between the Amtrak Finance Department and field operations. The validation focused on identifying and correcting errors in the current system, including validating operational information and procedures, making sure that operational changes had been incorporated into RPS rules, confirming the reasonableness of allocation statistics, and updating train pools. Amtrak staff also reviewed company data sources to identify all available allocation statistics, ensuring that RPS was using the best source of statistics, and to identify areas for future analysis and improvement, such as fuel and electric propulsion.

Even though the validation resulted in several improvements being made to existing RPS allocation rules, the allocation results were generally deemed to be reasonable and accurate. The validation effort also resulted in the decision to try to reduce and consolidate the current allocation rules in any successor to RPS.

3.3.2 RPS System Rewrite Project

Amtrak's second initiative was the RPS System Rewrite Project. Through this project Amtrak is implementing a new information system to allocate revenues and costs and to analyze the profitability of Amtrak's train and other businesses in a different software and hardware environment from the current RPS mainframe environment. The end result will be a client-server-based system supported by the Amtrak Finance Department. The decision to rewrite RPS using different software and hardware was based on various internal and external initiatives, including several flowing from Federal legislation. Amtrak management determined that an improved system similar to RPS was required to help Amtrak meet and manage any reforms that Amtrak is required to implement in the years to come. Amtrak's Finance Department also decided to rewrite RPS to replace the current mainframe system with a modern client-server architecture that would be less of a black box, more accessible to users, and easier to change, document, and audit.

The phrase "RPS rewrite" is not accurate for describing this initiative, which was much more ambitious and comprehensive than simply translating RPS software code and transferring that code to a new computer system. Amtrak originally intended to re-host RPS on a server platform and upgrade its functionality in a follow-on project. That goal was quickly changed to include expanding RPS functionality to address many of the weaknesses documented in FRA's and Volpe's requirements analysis described above, and to become the platform for implementing the eventual DOT-approved methodology Congress mandated. In the end, Amtrak retained elements of RPS that worked well and introduced new functionalities, such as the ability to calculate the avoidable costs of Amtrak routes, allocate G&A expenses to all Amtrak businesses, and allocate infrastructure-related costs to all users of Amtrak infrastructure, including freight and commuter agencies.

3.4   APT: A Collaborative Solution

The similarity between FRA's and Volpe's effort to develop a methodology for estimating the Avoidable and Fully Allocated costs of Amtrak routes and Amtrak's effort to improve RPS and rehost it in a client-server environment offered a unique opportunity for collaboration and

synergy that greatly facilitated developing the methodology described in this report. Recognizing this opportunity, FRA, Amtrak, and Volpe made the decision to pursue these parallel initiatives as an integrated effort. The result of this collaboration is the APT system.

FRA, Amtrak, and Volpe worked together on many levels to develop APT. Recognizing early on that APT would be used to assist in preparing data on the avoidable and Fully Allocated costs of Amtrak's routes for its annual report to Congress, Amtrak's Finance Department invited FRA and Volpe to be part of its RPS System Rewrite Project by helping to evaluate approaches for its new information system and to evaluate software vendors and their proposed solutions. This collaborative approach extended to deciding as a team which new features and functionalities APT would include and how the system's cost methodology would be structured and configured. Because APT integrates with existing financial and reporting systems, Amtrak assumed primary responsibility for information system development. Volpe and Amtrak jointly developed and achieved consensus on the allocation rules used to calculate the Fully Allocated costs of Amtrak routes (and the need for additional studies or updates where the preferred rules were not immediately feasible or implementable). Volpe assumed primary responsibility for developing the methodology to estimate the avoidable costs of Amtrak routes, with invaluable assistance from Amtrak staff in providing the necessary information to complete this work.

The development of APT was made possible through the collaboration of FRA, Volpe, and Amtrak. The fact that the methodology for calculating the avoidable and Fully Allocated costs of Amtrak routes was developed with substantial input by Amtrak, which means APT more likely will be properly implemented and maintained and the results will be viewed as valid.

Amtrak will shut down RPS shortly after APT is operational and validated.

4   General Principles of Cost Allocation

4.1   Background

Whether a particular method of allocating costs to a company's different products and services is appropriate or not depends on the managerial task at hand.

4.1.1   Financial Accounting

Periodic audited financial statements, such as those prepared by Amtrak, are produced primarily for the use of stakeholders external to company management. They are an attempt to answer for a company's stockholders and the general public the question of whether, taken as a whole, the company operated profitably during a particular time period. This requires appropriate allocation to the past time period of the total cash inflows and outflows that took place during the period, as well as the proper accrual of noncash revenues and expenses. In turn, the preparation of such financial statements also requires the identification of certain portions of these flows as constituting not the period revenues or expenses, but rather the acquisition of new assets or liabilities that are useable to the enterprise over many periods.

Generally accepted accounting principles (GAAP) are intended to counter any temptation for exaggeration in these statements by requiring physical assets to be valued at original cost, not subject to markup until sale and subject to markdown only if proven to be no longer useable. This original valuation is preserved when, for future financial statements, portions of these assets are allocated to time periods in the form of periodic depreciation expense.

4.1.2   Managerial Accounting

Stakeholders internal to a company require different information about costs. Within a company, management requires that cash outflows be allocated not only to different time periods, but, in order to make operating and marketing decisions, also to the various products and/or services that the company sells. Managerial accounting asks questions such as: "What expenses are being incurred solely to produce particular products?" and "How much revenue would the company have to receive for each of its products for all its period expenses to be covered?" In manufacturing companies, the preparation of public financial statements also requires that some portion of total period expense be allocated to particular products to value end-of-period product inventory as an asset.

Managerial accounting is closely related to management's task of reviewing and controlling the period expenses incurred by the different production and internal service functions within the company. This typically involves expense budgets based on estimated relationships between the volumes of different products or services produced for sale and the expense incurred by particular functions. RPS, which allocated a large portion of each accounting period's recorded expenses to the different trains on which it provides service, is an example of a managerial accounting system. In a nongovernment sponsored company, that is a purely private enterprise, such estimates would likely only be included in internal management planning and control

reports. In Amtrak's case, however, such information is prepared for distribution to its diverse stakeholders including FRA, Congress, and the general public.

4.2   Cost Allocation Techniques

4.2.1   Identifying and Allocating Direct and Indirect Costs

Some of a company's operating costs, typically certain labor and materials costs, are directly generated by, and thus can be exclusively identified with, particular products and/or services. It is appropriate for the financial record-keeping system to identify these expenses by direct coding, although it is not cost-effective to do so where the cost of such additional coding would be greater than the benefit of the additional information received. Where an operating expense is so identified and directly coded to particular unit of production, then it can be straightforwardly attributed or assigned to each unit of each product.

Other costs are generated by service activities, such as information and communications systems support, plus G&A activities, such as legal staff, that the company requires in order to operate but can only be indirectly associated with products and/or services. Expenses that cannot be directly coded because they are not directly associated with particular products are normally pooled and allocated to products through the use of "cost drivers" or allocation statistics representing a reasonable estimate of the relationship between the production and the size of the particular expense pool. All expenses, grouped within a given cost pool, are then allocated on the same consistent basis. Certain expenses, such as those related to G&A activities that have no reasonably quantifiable relationship to production processes, may be allocated to individual products using percentage markups over cost driver-allocated expense. RPS, which allocates certain corporate overheads to trains on the basis of total train expense (TTE), is an example of such a practice.

4.2.2   A Cost Accounting Option: Allocating Service Activity Costs to Production Activities

In managerial accounting systems of manufacturing enterprises, the costs of their internal service departments, whose activities are not directly related to individual products, are typically allocated to their production departments, whose total costs are, in turn, finally allocated to the different products manufactured for sale to customers. At Amtrak, by contrast, cost allocation stops at the level of trains, which might be viewed as "production activities," even though Amtrak's true "product" is its transportation of individual customers. In RPS, all costs attributed to individual trains, including those of Amtrak's service activities or G&A activities, are either (1) directly identified with or (2) allocated to those trains either by cost drivers representing characteristics of the trains themselves (engineman hours, locomotive miles, etc.) or by markup over already-allocated expense. RPS treats trains as the products to be costed; it does not currently allocate costs to subtrain level services, such as point-to-point basic transportation, sleeping car service, and food and beverages sold to customers on the same train.

Several acceptable alternatives exist for allocating costs to individual products. The simplest method is the single-step approach. Under this approach, all types of costs, such as production

department costs, service department costs, and G&A costs, are allocated directly to final products. Where the cost effects of a company's products throughout the enterprise can be traced by detailed product coding or the pattern of these effects differs little between products, a single-step allocation method is satisfactory. RPS employs a single-step approach to cost allocation. As noted above, each expense in FIS is either directly assigned or allocated to a final "product," for example, either an Amtrak train or other business, in a single step.

Where the cost burden of service activities is unevenly distributed among products, some of which pass through production processes that have required considerable service activity support and some of which do not, a multi-step approach may be used. Under a step-down or two-stage method, costs are trickled down from service departments to other service departments and production departments, using cost drivers that reflect the nature of the workload placed on the former by the latter and ultimately to final products. A more complex approach, the reciprocal method, involves setting up a series of equations to allocate costs among all service and production departments simultaneously rather than in a particular sequence as in the step-down method. Given the similarity of Amtrak's trains in the sense of the type, if not the quantity, of cost inputs they require, combined with its extensive collection of statistics describing individual train characteristics and available for use as cost drivers, a multi-step system is not the most appropriate for this new cost accounting methodology.

4.2.3 Recognizing Cost Variability

When managers use product cost information, they must distinguish between costs that vary directly with production volume and those that are fixed over certain ranges of production. Many indirect costs may vary partially with production volume. Separation of these costs into fixed and variable elements may be estimated by inspection of past volume and expense records or by subjecting production and expense data to formal regression analysis.

4.3 Defining Avoidable and Fully Allocated Costs

Amtrak is required by statute to report periodically the "Avoidable" and "Fully Allocated" costs of its routes. Some confusion can arise over the definition of these terms in different applications.

4.3.1 Classic Full Product Costing in the Manufacturing Environment

Manufacturing firms often value their units of product inventory on the basis of their directly traceable costs of labor and materials plus that portion of indirect manufacturing cost that they believe varies with product volume. This might be thought of as the avoidable cost of production. They then add an allocation of the remaining indirect manufacturing cost to arrive at the typical "full absorption" inventory value that is used for financial statement purposes. Corporate G&A costs are normally not included as they are considered costs pertaining to the particular accounting period on which the statement reports and not suitable to be capitalized as part of inventory asset values.

When projecting the cost of a possible increase in volume, however, manufacturing managers would consider the total incremental costs that would be generated by such an increase, that is, variable manufacturing costs plus the portion of marketing, administrative, and other corporate costs that they believe would vary with volume. If the contemplated volume increase were significant enough to require expanded equipment and facilities, incremental capital charges would have to be considered.

4.3.2 Avoidable Costs

The term "Avoidable Cost" has been employed by the Surface Transportation Board (STB) and its predecessor Interstate Commerce Commission (ICC) for many years in deliberations regarding abandonment of rail lines and discontinuance of railroad service. The definition and usage of the term in this study largely follows this precedent.[9]

Avoidable Costs are defined as costs that cease to exist when a route is no longer operated. When a service stops being provided, some activities that were required to provide it can be eliminated or reduced to a smaller scale. The costs of the resources they previously consumed are *avoidable.* The portion of a company's costs that may be considered avoidable clearly depends on the time horizon involved. In a sense, all costs are avoidable in that if a company discontinued all productive activities and liquidated, then it would have avoided all its costs of operation because it would not be operating. Short of liquidation, however, a company may avoid certain support activity costs and capital costs for certain facilities and equipment by reducing its volume of productive activity, although a lower scale of operations may not allow the same efficiency in the application of direct labor or materials to production. However, a company's Avoidable Cost of producing a product is understood to mean the costs that the company would not incur, after a period long enough to make appropriate adjustments in direct production labor and purchases of materials and business services, if it discontinued some part of its production without changing the scale of those parts of the enterprise that support rather than perform direct production activity.

Procedures to estimate Avoidable Costs for STB and ICC deliberations include the recognition of lost revenues on connecting services. By including these effects, a more complete measure of the financial impact of service termination on the enterprise is provided. These lost revenue effects will exist to varying degrees if Amtrak routes are terminated, but have not been included in this methodology for regular reporting of Avoidable Costs and should be considered as part of follow-on development efforts. As Amtrak's trains function as a network and changes to individual or multiple trains likely result in changes to revenue not just on the affected trains but on other trains, calculating the avoidable revenue is a difficult exercise.

Distinctions exist between Avoidable Costs as used in this methodology and the similar concepts of variable costs, incremental costs, and marginal costs that are used elsewhere for other purposes:

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[9] Differences arise in the treatment of capital charges and liquidation of assets.

- *Variable costs* are those that fluctuate directly with the *level* of output, in contrast to fixed costs which do not vary. Total costs are the sum of fixed and variable costs.
- *Incremental costs* are the costs that vary, either positively or negatively, as output changes from a baseline level.
- *Marginal costs* are the differential costs of (only) the *last unit* of production, either added or subtracted.
- *Avoidable Costs* refer to the specific case in which output is reduced or eliminated. Because it is used in conjunction with specific time horizons, it can include what are referred to as fixed costs in the other cost concept definitions. This gives rise to the succinct statement: "All variable costs are avoidable, but not all Avoidable Costs are variable."

4.3.3 Fully Allocated Costs

A general definition for Fully Allocated costs may be taken from the management question posed in the background section above, that is: "How much revenue would the enterprise have to receive for each of its products for all its period expenses to be covered?"[10] Allocation of all costs to individual products and services does not imply that each product caused its particular portion of the company's total costs, but rather defines the level of revenue that, for all products taken together, is required for the company to recover all its costs. These include time period allocation of past capital investment costs in the form of depreciation expense and payment in the form of interest expense for remaining outstanding debt used to financed these investments.

In some situations, an allowance for profit is included in the Fully Allocated cost for a product or service, which, however, is not an expense that appears in the expense section of a company's income statement. For example, government bodies sometimes contract for services on a Fully Allocated cost basis with the intention that vendors selling under such arrangements be enabled to recover all their costs, including those not directly identifiable with contract performance, plus usually an allowed level of net income. A similar approach is generally taken when government authorities empowered to regulate the prices charged by public utility enterprises evaluate the costs of the services these firms sell to the public.

Two costing definitions are encountered in cost allocation literature:[11]

> **Full absorption costing:** The costing method that assigns all types of *manufacturing* costs (direct material, direct labor, fixed and variable manufacturing overhead) to units produced. Full absorption costing excludes nonmanufacturing costs such as marketing, administrative, interest, and other central corporate expenses.
>
> **Full costing ("Fully Allocated" costs):** The total cost of producing and selling a unit; often used in long-term profitability and pricing decisions. Full cost per unit equals full absorption cost per unit plus marketing, administrative, interest, and other central corporate expenses per unit. The sum of full costs for all units equals total costs of the

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[10] This presumes that those expenses not attributable exclusively to a particular product were allocated to all products on a consistent basis

[11] Glossary of *Cost Management Concepts*, Roman Weil, Chicago: University of Chicago.

firm and is the concept used in this Fully Allocated cost methodology.

4.3.4 Substitution of a Forward-looking Capital Charge in Fully Allocated Costs

If calculated on the basis of underlying financial accounting data, the Fully Allocated costs of all of a company's products should total all expenses shown on its income statement for the time period during which the products were produced and sold.[12] Although presuming that the enterprise will continue to operate in the future and requiring certain projections of future financial obligations it has undertaken, GAAP-compliant income statements intended for external financial reporting essentially constitute an evaluation of a company's activities in the past. In particular, depreciation charges are based on the values of physical assets recorded in balance sheet accounts at the time of acquisition and interest expense on the provisions of still-outstanding debt obligations contracted for in the past. For internal decision-making and planning purposes managers may project these capital charges, as well as other expenses, as they will likely appear on future financial statements, when the firm's economic conditions may be different. As explained in Section 7.7, however, Volpe recommends that the capital cost element of a new Amtrak route cost methodology be based on the same "historical" values of physical assets as underlie Amtrak's GAAP-compliant financial statements, which appears consistent with normal practice in external financial reporting and may be presumed to respond to the intent of Congress in requiring that such a methodology be developed. As will be further explained, the only modification to a "backward-looking" approach to capital costs recommended here is use of a continuously-updated rate of return in converting past asset acquisition values into capital charges applicable to current periods.

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[12] However, one would not normally expect these total fully allocated costs to have included any expenses reported on the enterprise's income statement as extraordinary or non-recurring or as income tax expense, the latter only constituting a continuing cost to the extent, under tax liability calculation procedures, other costs are eventually exceeded by revenues. (Amtrak, in any case, is exempt from State and local income taxes and has not been recording any income statement provisions for Federal income taxes.).

5 Methodology for Estimating Fully Allocated Costs

5.1 General Approach

The methodology for estimating Avoidable and Fully Allocated costs for Amtrak's routes observes established principles of cost allocation outlined in Section 4 of this report, while at the same time reflecting Amtrak's unique circumstances and requirements, and correcting some of the real and perceived deficiencies of the current RPS system.

Although Amtrak is currently developing a new information technology system for implementing the methodology described in this report, both for practical purposes and to maintain consistency with Amtrak's audited financial reports, any methodology used by Amtrak to calculate avoidable and Fully Allocated costs must operate within the constraints of the company's other information technology systems and of its recordkeeping structure. These include FIS, and its various systems for calculating and maintaining operating and other statistics, such as OMS and PAS/ALMS. As discussed earlier in this report, each financial transaction in Amtrak's general ledger is identified by five pieces of information: (1) ResCen, (2) Business Line, (3) Account, (4) Function, and (5) Location. The methodology for estimating avoidable and Fully Allocated costs will focus primary on three of these designations, namely, the ResCen, Account, and Function.

Discussions among FRA, Amtrak, and the Volpe Center concluded that to accurately estimate costs for Amtrak's trains and routes and to correct deficiencies of the current system, the methodology must incorporate additional system requirements beyond those found in RPS. FRA's primary mandate is to develop a methodology for estimating the avoidable and Fully Allocated costs for Amtrak's routes. Amtrak's current RPS system, however, does not estimate avoidable costs. Further, for a number of reasons, RPS does not clearly or accurately allocate all company costs to Amtrak routes and other businesses.[13] For example, the current RPS system allocates some costs entirely to its train routes that should be spread across both the company's routes and its other businesses, thereby overburdening the former. To accurately estimate avoidable and Fully Allocated costs for Amtrak routes, the new methodology must allocate systemwide costs, such as G&A and other overhead costs, to all of Amtrak's businesses in a logical and equitable manner. It must also allocate Amtrak infrastructure-related costs to all users of Amtrak infrastructure.

The methodology described in this report is also intended to improve the accuracy of the cost estimation process by improving the logical process through which costs are spread among Amtrak's routes and other businesses and, to the extent possible without necessitating changes to underlying business operations, by reducing the methodology's susceptibility to coding errors. Finally, the methodology ideally should be clear, relatively easy to understand and explain, and readily maintained and updated in response to changes in company operations.

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[13] In addition to its National Train System (NTS), Amtrak operates several other businesses, including Commuter Operations, Freight & Commuter Infrastructure Access, Reimbursable, and Commercial businesses.

To achieve these objectives, the new methodology for estimating avoidable and Fully Allocated costs incorporates the following strategies:

- Increase the proportion of costs directly coded to (and therefore capable of being directly assigned to) trains. This effort, however, is constrained by certain features of Amtrak's accounting system and operational processes.
- Focus primarily on ResCens to allocate shared expenses that cannot reasonably be directly coded to trains. Discussions with Amtrak's Finance Department staff indicated that operating expenses in FIS are most accurately coded to ResCens; other codings in FIS, such as Function and Account, are more prone to coding errors.
- Allocate ResCen expenses described in bullet two above at the more finely grained Function and Account levels in order to better match Amtrak train and other business activity with resources consumed.

Most ResCen costs are allocated to Amtrak routes and other businesses through a single-step or direct process. Given Amtrak's extremely detailed cost coding system, it was determined that the step-down and reciprocal approaches to cost allocation described in this report's previous section would likely add needless complexity to the methodology. Finally, route costs will follow Amtrak's existing convention of allocating costs to the train and then aggregating ("rolling up") costs to the route level. Not only is this the most accurate means of estimating train and route costs, but such an approach has the practical advantage of allowing the utilization of existing Amtrak operating statistics.

5.2   ResCen Family Structure

A particularly important feature of the methodology for estimating avoidable and Fully Allocated costs involves the grouping of Amtrak's ResCens into cost categories or "Families" based on similarities of costs and activities, as reflected by Functions, Accounts and other factors. ResCen families provide a framework both for the purpose of analysis and for the allocation of costs to trains and other Amtrak businesses. While the Family framework was designed primarily as a tool for estimating Fully Allocated costs, it also serves as the basis for estimating avoidable costs; i.e., Fully Allocated and Avoidable Costs are estimated in a parallel manner for each ResCen Family.

An analysis of Amtrak ResCen activity has resulted in the development of nine broad ResCen families, broken down for allocation purposes into 36[14] Subfamilies. In a few cases, Subfamilies are further broken down into Subcategories. The following tables list the nine families and one example of a ResCen Subfamily breakdown. A full listing of ResCens Families, Subfamilies, and Subcategories and their members, roughly 1,600 ResCens in total,[15] can be found in Appendix A. A key element of the methodology is that ResCen families are mutually exclusive

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[14] Only 36 are used for cost allocation but APT uses a 37th to provide a mechanism for treatment of expenses that are not considered costs under this methodology.

[15] The exact number of ResCens changes as the Amtrak organizational structure evolves over time.

in terms of their members (each ResCen is assigned to one and only one Family). The same rule holds true for Subfamilies and Subcategories.[16]

Allocating ResCens expenses through the mechanism of ResCen Families has a number of advantages over allocating general ledger expense entries in a less systematic manner. Organizing the estimation methodology around ResCen Families provides structure to the allocation process, and helps to ensure that similar types of expenses are allocated in a consistent manner and to the correct routes and businesses. Within each Family, rules exist for how to allocate particular types of expenses based on the Functions and Accounts associated with those expenses and other factors in special cases. Organizing the cost allocation process around ResCen Families improves the clarity of the overall methodology by organizing these numerous rules into a smaller number of "meta-rules," or Profiles.[17] Each Subfamily or Subcategory has its own Profile, consisting of all the rules for allocating expenses for ResCens contained in that Subfamily. Because all ResCens in the Subfamily perform similar activities and all expenses within those ResCens are allocated using the same rules as specified in the Subfamily profile, expenses for similar activities are allocated in a consistent manner. Furthermore, allocating expenses through such Profiles makes the new methodology easier to implement and update.

Establishing Profiles for the various Subfamilies of ResCens also improves the accuracy of the methodology by providing a mechanism for monitoring possible incorrect cost coding. Under the new methodology, an expense coded to a particular ResCen is allocated to trains and other businesses associated with that ResCen no matter what Function or Account is associated with the expense. The methodology also includes a capability whereby costs coded to a ResCen that do not conform to that ResCens profile, for example because they are coded with an inappropriate or atypical Function or Account for that Subfamily, are flagged for review. Costs that are properly coded would be allocated to trains and business associated with that ResCen in a logical manner; costs that are not correctly coded would be redirected to the appropriate Family.

The development of the ResCen Families was a collaborative process between Amtrak and the Volpe Center. This process entailed two steps. First, the overall Family structure, including Subfamilies and Subcategories, was created based on an understanding of railroad operating requirements and conventional organizational structures. Second, ResCens fitting the Subfamily and Subcategory Profiles were assigned to those cost categories based on an analysis of Amtrak's Chart of Accounts and discussions with Amtrak field and finance staff.

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[16] Due to the current configuration of ResCens at Amtrak, a small number of exceptions exist to the rule that costs within a ResCen single Family, Subfamily or Sub-category are allocated perfectly consistently. For example, ResCen 0202, Corporate Common, is a member of Subfamily 603, Qualified Management and Services; however, because it is extremely broad in the scope of its activities, this ResCen must be treated differently than other ResCens within this subfamily. Rather than create a subcategory consisting a single ResCen, ResCen 0202 was allowed to remain in Subfamily 603.

[17] Profiles are explained in more detail in Section 5.3.2 below, and a full listing appears in Appendix A.

Table 5-1: Hierarchy of Amtrak ResCen Families

ResCen Families

Family #	Family Name
100	Maintenance of Way
200	Maintenance of Equipment
300	*Operations - Transportation*
400	Sales & Marketing
500	Stations
600	General & Administrative
700	Capital
800	Utilities
900	Police Environmental & Safety

#300 Operations - Transportation Family

Subfamily #	Subfamily Name
301	*OBS*
302	T&E
303	Yard Operations
304	Fuel
305	Transportation-Multiple
306	Train Movement
307	Train Movement-Host RR
308	Transportation-Support
309	Power-Electric Traction

#301 OBS Subfamily

Subcategory #	Subcategory Name
301_1	Crew
301_2	Supplies
301_3	Commissary Management
301_4	Support

5.3   Estimating Amtrak's Fully Allocated Costs

5.3.1   Definition

As defined in Section 4 of this report, Fully Allocated Costs for a product or service are the total costs of producing and selling that product or service, including all types of production costs (direct materials, direct labor, and fixed and variable overhead) and also a share of marketing, administrative, financing and other central corporate expenses.

5.3.2   ResCen Subfamily Profiles

The ResCen Family structure of Families, Subfamilies and Subcategories described above provides the framework for the estimation of Fully Allocated costs. Each Subfamily has a Profile which establishes the rules for allocating expenses within that Subfamily. The members of each Subfamily (ResCens) determine the expenses to be either assigned or allocated; that is, expenses coded to a ResCen belonging to a particular Subfamily will be allocated according to that Subfamily's rules. The expenses referred in the methodology are transaction level expenses from FIS.

The Profile or meta-rule for each Subfamily establishes several essential elements of the method for estimating Fully Allocated costs. First, it establishes whether an expense will be directly assigned to a train or other Amtrak business[18] or allocated. In the methodology, expenses that are coded with a train number are directly assigned to that train without undergoing any allocation process. The wages of Amtrak onboard service employees, for example, are coded directly to the train on which they work. In addition, in certain cases, the ResCen or Function indicates the train or other business that should receive the cost. ResCen 7113, for example, is "Yard Crews Virginia Rail Express (VRE)," which specifies that this ResCen is responsible for the Yard Crews that handle VRE trains and, therefore, all of its expenses should be assigned to Amtrak's Commuter Operating business. Similarly, Function 1997, Maintenance-of-Way (MoW) Reimbursable, indicates that all of its expenses should be attributed to Amtrak's Reimbursable business.

Expenses that are not coded with train numbers and that cannot be traced to a train or other business through any other means are allocated. Each expense in Amtrak's general ledger, FIS, is coded with a Function code and an Account code. The Subfamily Profile determines how expenses coded with each Function code and Account code are allocated and what allocation statistic is used to allocate expenses associated with each code (how an individual expense is allocated is referred to as its "allocation rule"). The allocation rules are the same for all ResCens in the same Subfamily (or Subcategory). For example, ResCen 2554, Station Services Savannah,

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[18] Although this report refers to costs being allocated to trains for the purposes of conciseness, the methodology allocates costs both to Amtrak's NTS trains and to all its other businesses and the references to allocating to trains should be read to mean allocation to trains and other Amtrak businesses where appropriate.

GA, and ResCen 2858, Stations Services Seattle, WA, are both in the Stations-Shared Subfamily. Expenses coded to Function 1271, Station Services-Station Operations, in FIS at those stations will be allocated to all trains served by those stations using the same allocation statistics, namely (TBD).

5.3.3 Allocation Statistics

Allocation statistics are typically operating or other types of statistics from another Amtrak information system, although they also may be manually calculated or calculated within the new APT system. For an expense to be correctly allocated to trains, it has to be assigned an appropriate allocation statistic, which is used to calculate the share of an expense that is allocated to a particular train. Each train receives a share of a given expense in proportion to the value of its allocation statistic relative to the total value of that statistic for all relevant trains. Two main criteria exist for choosing the allocation statistics. First, an allocation statistic needs to be logically related to the activity generating the expense, preferably a cost driver. Second, it needs to be available for all trains and other businesses to which the expense is allocated. The statistics used in the Profiles satisfy these criteria, however, in a few cases, the preferred statistic for allocating a certain expense was not available and an alternate, but still reasonable, statistic was chosen. A description of all the allocation statics used in the methodology can be found in Appendix D.

In some cases, all or nearly all Subfamily expenses are allocated using a single allocation statistic. In others, several different allocation statistics are required depending on the Functions and/or Accounts making up the Profile or other special features of the Subfamily. In a few rare cases, the allocation rule requires that a single expense be allocated using more than one statistic. This is the case in which a single cost driver could not be identified for the activity associated with the expenses or a portion of expenses have no single reasonable cost driver associated with them.

To allocate an expense using more than one statistic, the methodology uses an "ACK Ratio". As detailed in Section 2 of this report, ACK stands for Account Code Key and refers to the five information codes attached to each transaction in Amtrak's FIS (ResCen, Business Line, Account, Function, and Location). An ACK Ratio is a value between zero and one that defines the proportion of an expense that is to be allocated using each allocation statistic. Together, each ACK Ratio must sum to one for a particular expense. When ACK Ratios are used, they are specified clearly in the Subfamily Profile.

Several ACK Ratios were utilized in cases when professional judgment and/or other research and analysis were used to determine that a single statistic was inappropriate. One such example is in Subsidiary Subfamily #605, where some self insurance expenses associated with the Passenger Railroad Insurance Limited (PRIL) subsidiary are allocated using an ACK Ratio. Although expenses share the same ACK code, some arise due to the operation of NTS trains and other are self insurance expenses covering liabilities related to Amtrak employees performing work for third parties. The latter is related solely to Amtrak's Reimbursable business and needs to be allocated to that business alone. Based on a review of liability claims by Amtrak staff, the majority of insurance claims (66 percent) are allocated to NTS trains based on Total Passenger

Miles (TPM) and the remainder (34 percent) are directly assigned to the Reimbursable business. The methodology uses an ACK Ratio of 0.66 for NTS and 0.34 for Reimbursable to achieve this. Similar analyses contributed to the use of ACK Ratios in other Subfamilies. The use of ACK ratios is noted in the Section 6 descriptions of allocation methodology for individual Subfamilies, or in Appendix A (in the Statistics columns of the Profile tables), or both.

5.3.4 Cost Objects

Subfamily Profiles identify the cost objects or entities to which costs are allocated. In the case of Amtrak, cost objects include trains and other businesses.

Activity Groups

An Activity Group is a fixed list of trains and other businesses to which expenses are allocated. Activity Groups are used to restrict the list of trains and other businesses to which a ResCen expense is allocated. For example, Turnaround ResCens clean, inspect, and perform minor repairs on Amtrak trains and Amtrak-operated commuter trains before each departure. Although turnaround servicing is performed by a ResCen at a train's origin, trains are not always serviced at each Turnaround ResCen through which their routes pass. Thus, Activity Groups are used to limit and identify the particular trains that receive a share of expenses at each ResCen.

Statistical Qualifiers

Another way to restrict the list of trains to which a cost is allocated is through statistical qualifiers or "Stat Qualifiers" (SQ). SQs use ResCen, Location, Station, Station Pair or other information to define a list of trains to which costs will be allocated. When a SQ is used, only trains that meet established criteria receive a share of the cost being allocated. For example, "ResCen Stat Qualifiers" are used in the Trainmen and Enginemen (T&E) Subfamily to allocate expenses that are not directly coded and assigned to trains. Expenses coded to Function 1617 (T&E Overhead) at T&E crew bases are allocated using the allocation statistic Trainmen and Enginemen Hours or TEH. To allocate expenses associated with Function 1617 at a certain crew base (for example, RC5624, BOS-NHV Road Engine Crews), all trains with a non-zero value for TEH at that ResCen are identified and Function 1617 expenses are allocated only to those trains. The list of trains is dynamically defined, in that as operations change, the list also changes without any need for any manual changes to the Profile or allocation rule.

5.3.5 Other Methodology Features

Treatment of Capital Costs as Part of Fully Allocated Costs

Any sizable enterprise, and especially a railroad with its rolling stock and fixed infrastructure, has expenditures for items that are long-lived relative to the typical monthly, quarterly, and annual financial reporting periods. These expenditures are referred to as capital costs and are given special treatment in the reporting of operating costs under GAAP. Using GAAP guidelines, capital costs, rather than being reflected in the time period in which they are actually

incurred, are annualized over the expected time period for which the asset is expected to contribute to the production of output (in the case of Amtrak, the output is mostly the operation of trains). The annualized charge or cost is referred to as depreciation and is used in the income statement calculation of profit or loss from continuing operations. In addition, the interest expense on funds borrowed to cover capital expenditures are shown on the income statement in calculating the total net profit or loss of the enterprise.

In determining how best to incorporate the cost of capital into Amtrak's Fully Allocated costs, consideration was given its history of public sector contributions towards capital expenditures, the use of borrowings (and hence interest costs) for the acquisition of only certain subsets of its capital assets, and Amtrak's use of leases and sale-leaseback transactions for some capital assets. It was decided that allocating GAAP-defined depreciation and interest to trains and other ancillary businesses could not be done in a manner that would yield a cost contribution to Fully Allocated costs that reflected the relative usage of capital assets for particular trains. Instead, it was decided that a synthetic capital charge provides a more representative measure of the resource cost of all capital equipment and property—regardless of how financed—currently being used by Amtrak to produce its various services and outputs. The synthetic capital charge is an annualized value based on the original acquisition costs of the assets and the underlying opportunity cost of capital as a production resource as reflected in the U.S. Treasury long-term borrowing rate. Because Amtrak's data systems do not link capital assets to ResCens in specific areas, other procedures link them to the trains and other businesses they support.

The development of a methodology for calculating, on a sound economic basis, a capital charge to be allocated to businesses and trains in both Fully Allocated and avoidable costing modes, implies no recommendation regarding the practical application—for example, in the negotiation and pricing of services that Amtrak performs for other entities—of the charges thus calculated. The capital charges, like other topics covered herein, are presented solely for the sake of objectively and comprehensively responding to this report's Congressional mandate, thereby advancing the state-of-the-art in the allocation and analysis of the costs of intercity passenger rail service.

Total Activity Cost (TAC) and Customer Activity Expense (CAE) Statistics

Previously, Amtrak's RPS used TTE to allocate all G&A costs, but TTE is not feasible as an allocation statistic in this new methodology. TTE cannot be calculated because some of these G&A costs are to be allocated to non-train businesses and customers for which train expenses do not exist. Instead, the methodology uses a new Total Activity Cost (TAC) allocation statistic when allocating certain G&A costs that do not have a more appropriate activity-based statistic. TAC is defined to encompass both train and nontrain activities and hence has the needed functionality for allocating G&A expenses in the methodology. TAC includes the total of costs for MoW, Maintenance of Equipment (MoE), Operations-Transportation, Sales & Marketing, Stations, Capital, Utilities and Police (Regional), but excludes G&A, Police (National) and Environmental/Safety. See Appendix H for a full description of the reasoning behind and composition of TAC. Appendix H also describes the CAE statistic which is similar in concept to TAC, but is needed for G&A expenses that only get allocated to a subset of Amtrak businesses.

Levels of Allocation

Subfamily Profiles also define the level of allocation, that is, whether expenses at a particular ResCen will be spread locally, regionally, or nationally. Station expenses for a particular ResCen, for example, will be allocated locally only to trains or other business that actually operate at that Station ResCen. Fuel expenses, on the other hand, will be allocated nationally; expenses recorded at every fuel ResCen will be allocated to all Amtrak trains using diesel fuel whether those trains actually received fuel at that ResCen or not.[19] This procedure is the equivalent of pooling all diesel fuel expenses for all ResCens and allocating that cost pool to all Amtrak diesel trains.

5.3.6 Summary of Fully Allocated Cost Methodology

A ResCen Subfamily and Profile answer three questions: (1) what expense(s) is being assigned or allocated (an FIS expense for an individual ResCen), (2) how the expense will be allocated (what statistic will be used to apportion the expense), and (3) to what Amtrak trains and other businesses the expense will be allocated.

Figures 5-1–5-4 illustrate the Fully Allocated cost methodology for several hypothetical FIS transactions. Figure 5-1 depicts the initial step whereby expenditures are sorted into three categories:

- Operating expenses, which are directly assigned or allocated
- Capital expenditures, which are added to assets in Amtrak's asset ledger and eventually used to calculate the capital charge
- Other financial transactions which are not operating expenses and therefore are not further considered in the methodology.

The items in parentheses under each expense "record" are the accounting classification codes recorded along with each transaction in FIS.

Figure 5-2 illustrates the case of a hypothetical direct expense (Expense4) and shows that it is assigned directly to Train5 without any need for allocation. Each direct expense is assigned to one and only one train or other ancillary business. Figure 5-3 illustrates the case of a hypothetical shared expense, in this case an expense within the MoW-Communication and Signal (C&S) Subfamily. The MoW-C&S Subfamily is composed of ResCens responsible for maintaining the C&S systems in a geographical area, such as a section of right-of-way (ROW). As described in Section 5.3.2, to allocate expenses incurred at ResCens in a given Subfamily, the rules specified in that Subfamily's Profile are applied to all the ResCens in the Subfamily.

Figure 5-3 shows the process for allocating this shared MoW-C&S expense (Expense5) to Trains 1, 2, and 5, and also to ancillary business customers MBTA (Commuter Infrastructure Access (CIA) business) and CSX (Freight Infrastructure Access business). The ResCen number (BBBB) tells us that the ResCen belongs to the MoW-C&S Subfamily. The Profile for the C&S

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[19] See the methodology description for Subfamily #304–Fuel for further explanation on this subject.

Subfamily (see Table A-2 in Appendix A) tells us that expenses recorded with Function Code 1713 (Signal & Interlocker Maintenance) should be allocated to all Amtrak trains and other customers using the section of ROW for which that ResCen is responsible based on their relative shares of train frequency (FTT) over that section.

Figure 5-4 summarizes the process for calculating Fully Allocated costs. In addition to the cases covered in Figure 5-2 (Direct Expense4) and Figure 5-3 (Shared Expense5), it illustrates the conceptual data flow for converting asset acquisitions in prior periods to capital charges allocated to trains and other businesses. The final step is displayed also in which costs are aggregated to Amtrak's routes and ancillary businesses.

Figure 5-1: Allocation Methodology
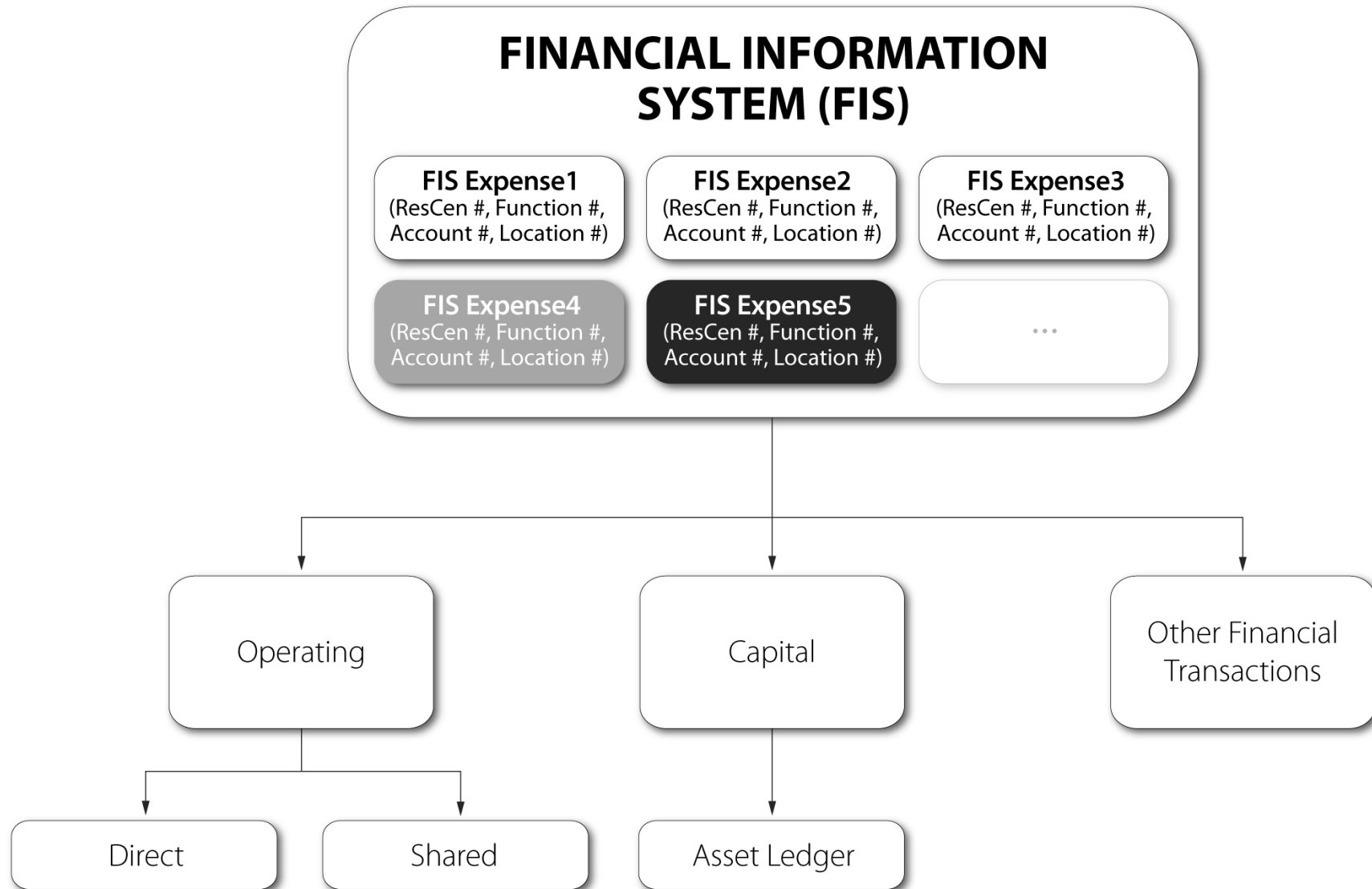
Figure 5-2: Allocation Methodology – Direct Cost Example

FIS Expense4
(ResCen #XXXX, Function #YYYY,
Account #ZZZZZZ, Location #AAAA)

NTS	CIA	COP	Freight	Reimbursable	Commercial
Train1	Delaware Transit	Peninsula	Conrail		
Train2	LIRR	MARC	CPR		
Train3	MARC	Shoreline East	CSX		
Train4	MBTA	Sound Transit	CT Southern		
Train5	NJT	VRE	NS		
Train6	SEPTA	Tri-Rail	P&W		
…	Shoreline East		Springfield		
…	VRE		UP		
…	Metra				
…					
…					

NTS = National Train System
CIA = Commuter Infrastructure Access
COP = Commuter Operations
Freight = Freight Infrastructure Access

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Figure 5-3: Allocation Methodology–Shared Cost Example

FIS Expense5
(ResCen #BBBB, Function #1713,
Account #CCCC, Location #DDDD)

RC #BBBB = MoW: C&S Subfamily

MoW: C&S Subfamily Profile allocates Function
#1713 (Signal & Interlocker Maintenance) costs
using Train Frequency (FTT) statistic

Allocation Statistic = FTT

NTS	CIA	COP	Freight	Reimbursable	Commercial
Train1	Delaware Transit	Peninsula	Conrail		
Train2	LIRR	MARC	CPR		
Train3	MARC	Shoreline East	CSX		
Train4	MBTA	Sound Transit	CT Southern		
Train5	NJT	VRE	NS		
Train6	SEPTA	Tri-Rail	P&W		
…	Shoreline East		Springfield		
…	VRE		UP		
…	Metra				
…					

NTS = National Train System
CIA = Commuter Infrastructure Access
COP = Commuter Operations
Freight = Freight Infrastructure Access

Figure 5-4: Aggregation of Fully Allocated Costs
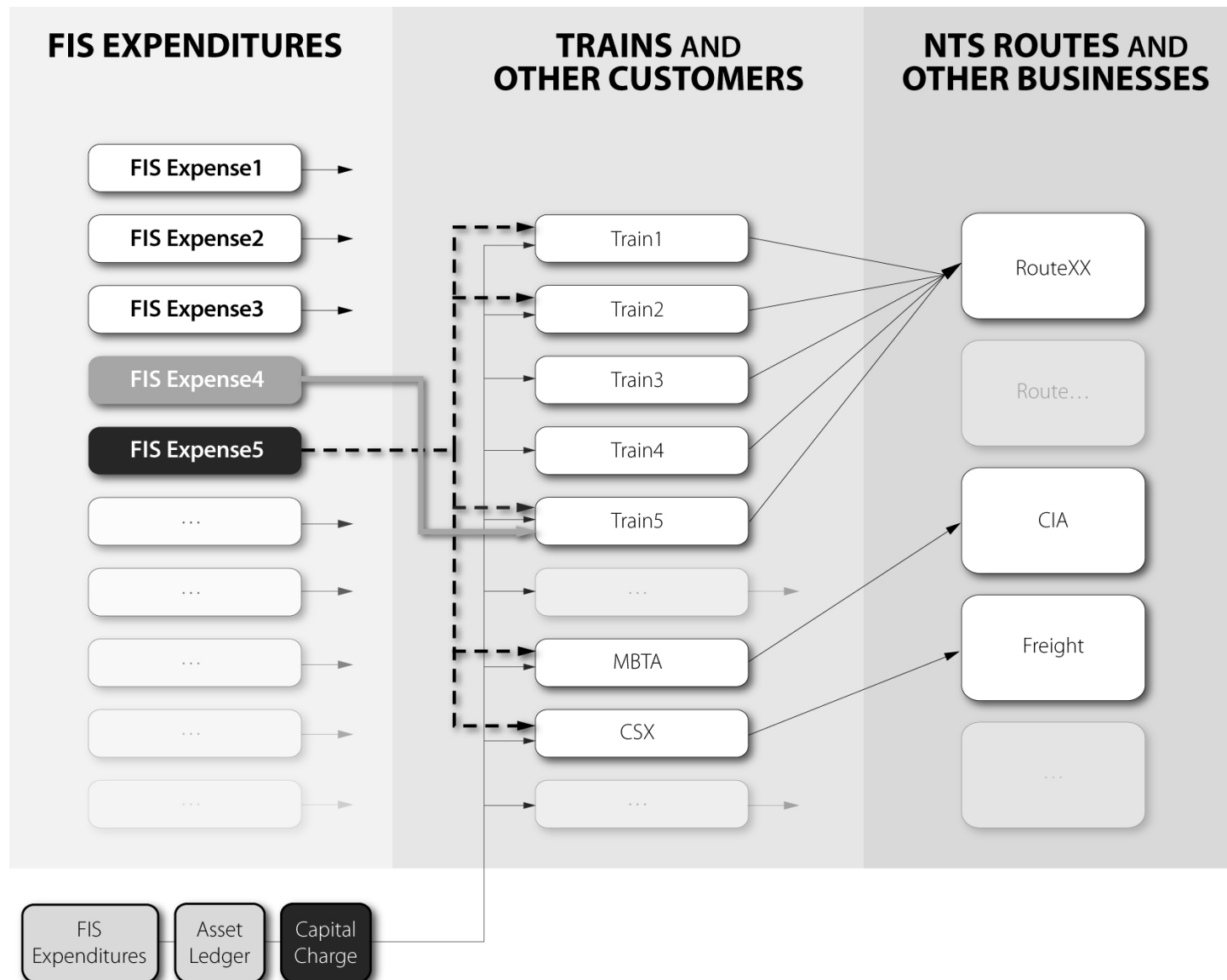
6 Methodology for Estimating Amtrak's Avoidable Costs

6.1 Definition of Avoidable Costs

A key part of this recommended methodology involves estimating the costs that Amtrak can expect to avoid by eliminating a specific route. As with the method for estimating Fully Allocated costs, the approach to analyzing avoidable costs involves developing rules for Subfamilies and Subcategories and then applying those rules to costs at the ResCen level.

As discussed in Section 4.3.2, an avoidable cost is one that ceases to exist within a specified time frame when a service is no longer provided. Avoidable costs include the direct costs of operating a route, as well as any portion of shared costs that are directly connected with the performance of activities required to operate that route.

All variable costs of operating a route can be immediately avoided if that route is terminated. Other resources and activities that support a route may require some time to eliminate or adjust when a service is eliminated, so that their costs are only fully or partly avoidable after that time has elapsed. The avoidability of costs for Amtrak services is estimated over two different time horizons: (1) short run - costs that no longer will be incurred one year after a route is eliminated, (2) long run - costs that no longer will be incurred five years after a route is eliminated.

In the short run, some costs, mainly the direct costs of operating trains, such as fuel expenses, wages and other direct labor, and certain materials, can be eliminated relatively quickly when a route is terminated. Other cost savings in the first year occur as a result of operational adjustments and lags in the accounting system. In the long-term, other costs can be avoided as Amtrak's scale of operations is reduced in certain areas, such as at stations and equipment maintenance ResCens. Also, costs can be avoided as facilities dedicated to a specific route are "retired" and sold, thereby avoiding any operating and capital charges associated with their ownership. Rolling stock employed on a specific route is treated as partly avoidable in the long term. This is true because in the long run a reduced need for cars and locomotives due to cessation of a particular Amtrak service is expected to translate into a reduced need for capital outlays to renew and rehabilitate its fleet.

The actual estimates of Amtrak's avoidable costs necessarily are reduced by the expected labor protection payments provided for in its collective bargaining agreements covering certain categories of workers. Under current agreements, these payments are phased out over five years, therefore, such labor protection payments are 100 percent avoidable in the long run.

6.2 Subfamily ResCen Approach

The same Family structure used in the Fully Allocated methodology provided the framework for analyzing the avoidability of Amtrak's costs. The relative uniformity of activities across ResCens within each Family and Subfamily provides a basis for developing a single method for each. As a first step, the specific functions and ResCen descriptions for each Subfamily were examined to understand their nature and make judgments as to expected variability associated

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with service changes. Specifically, a determination was made as to whether, if a route were eliminated, the supporting activities at ResCens within the Subfamilies, and hence costs associated with those ResCens, would be expected to (a) remain unchanged (fixed), (b) be reduced in (exact) proportion to the reduction in activity associated with the eliminated route (100 percent avoidable), or (c) be only partly reduced (mixed). Because of how the Subfamilies are defined, a number of them could readily be classified as having either 100 percent fixed costs or 100 percent avoidable costs.

6.2.1 Fixed

Among the Subfamilies whose costs are considered to be fixed are those in the G&A Family. The functions and activities that take place in these Subfamilies, generally, have no direct connection to operating trains on a single Amtrak route and would be likely to continue indefinitely at their current levels even if one route were eliminated.[20] Costs for some Subfamilies in the MoW area would not vary if a single route were eliminated because of the sizable level of operations that would need to continue. Track maintenance is the exception to this rule because it does vary based on the volume of traffic over any given segment.

6.2.2 Avoidable

A few Subfamilies were classified as having costs of a type that would be 100 percent avoidable if a route were eliminated. Two related examples are the Fuel and Electric Traction Power Subfamilies. In both cases, the costs are limited to "materials" purchased (diesel fuel or electric power for train operations); no labor or facility costs are incurred at ResCens within these Subfamilies. Fuel expenses are essentially proportional to train activity, and the costs incurred at a fuel or electric traction power ResCen and allocated to a particular route will be avoided if that route is eliminated. In addition, crew, food and beverage, and some other supply costs are directly coded to specific trains in the Amtrak accounting system and, except for labor protection payments, are fully avoidable if a service is eliminated.

6.2.3 Mixed-Statistical

Subfamilies classified as having mixed costs, such as those whose costs are expected to be partly fixed and partly avoidable as train service changes, required further analysis leading to a more complex method for separating a route's Fully Allocated costs into its avoidable and fixed portions. Specifically for some Subfamilies, statistical analysis of three years of cost data for the ResCens in a given Subfamily was performed to develop equations that are used to estimate each ResCen's avoidable costs. This method is referred to in this report as "Mixed-Statistical." In most cases, separate equations were developed for estimating short-run and long-run avoidable costs. A general description of this statistical analysis and how it is used to estimate avoidable costs is provided in Section 6.5, whereas details of the statistical analysis for each of the Subfamilies analyzed using this approach is provided in Section 8.

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[20] Such costs may be expected to vary over time for other reasons and thus their "fixity" is only related to route changes.

6.2.4 Mixed-Detailed

In a few cases, it was either not possible to perform a statistical analysis on a mixed cost Subfamily, or the statistical results were unsatisfactory. In these cases an alternate method was developed, which is referred to in this report as "Mixed-Detailed." This method is based on further examination of the specific FIS Function and Account codes, and classifying them as either fixed or avoidable. Specific details are provided in Section 8.

6.2.5 Single Route ResCens

As part of developing the methodology for estimating Avoidable Costs, it was observed that some ResCens were involved in supporting only a single Amtrak route. In such cases, the elimination of the route would result in the elimination of the entire ResCen (and eventually all of its costs) and, depending on the specific case, possibly the short term elimination of some costs. A prime example of this situation is referred to as "route stations." Route stations serve a single Amtrak route in contrast to "shared stations," which serve two or more routes. As part of the avoidable cost methodology, for Subfamilies in the mixed category, the number of routes served by a ResCen is determined. If a ResCen serves a single route, alternative rules are used to identify the short- and long-term Avoidable Costs instead of applying the avoidability equations.

Table 6-1 summarizes the approach used for estimating the avoidability of costs for each of the Subfamilies.

6.3   Level of Avoidable Cost Reduction

As explained elsewhere, because of the underlying structure of Amtrak's accounting systems, the methodology estimates and reports avoidable costs at the single route level, but the underlying analysis is based on costs for individual trains. Expenses at each ResCen are related to the amount of activity, such as train frequency (FTT), taking place at these ResCens that would be expected to have an effect on costs. Based on the statistic selected through the modeling process, the effect of eliminating a single train is calculated for each expense record. However, this analysis does not account for the effect of any interaction between multiple route changes on the avoidable costs specific to an individual ResCen.

To ensure consistency, the statistical analysis of avoidable costs is done at the ResCen level. This is the same level of detail at which the Fully Allocated costs methodology is applied. As a result, the analytical approach used to calculate cost changes is consistent and comparable across cases for which costs are fixed, avoidable, or mixed. For each ResCen, a determination is made based on its Subfamily as to whether costs are to be treated as fixed, avoidable, or mixed. Based on this determination, the required approach for analyzing avoidable costs is selected, whether statistical analysis or, in the case of an avoidable cost like fuel, a more direct approach.

Table 6-1. Summary of Approach for Estimating Amtrak's Avoidable Costs by Subfamily

Subfamily Number	Subfamily	Subcategory Number	Subcategory	Approach
101	MoW Track	101_0	MoW Track – General	Mixed-Detailed
102	MoW Communications & Signal	102_0	MoW Communications and Signal – General	Fixed
103	MoW Electric Traction	103_0	MoW Electric Traction – General	Mixed-Detailed
104	MoW Bridges and Buildings	104_0	MoW Bridges and Buildings – General	Fixed
105	MoW Support	105_0	MoW Support – General	Fixed
201	MoE Turnaround	201_0	MoE Turnaround – General	Mixed-Statistical
202	Locomotive Maintenance	202_0	Locomotive Maintenance – General	Mixed-Statistical
203	Car Maintenance	203_0	Car Maintenance – General	Mixed-Statistical
204	MoE Support	204_0	MoE Support – General	Mixed-Statistical
205	MoE - Multiple	205_0	MoE – Multiple – General	Mixed-Detailed
206	HSR Maintenance	206_0	HSR Maintenance – General	Avoidable
207	Backshop	207_0	Backshop – General	Mixed-Detailed
301	OBS	301_1	Crew	Avoidable (LP)[21]
	OBS	301_2	Supplies – Food and Beverage (F&B)	Avoidable
	OBS	301_3	Commissary/Mgmt. - F&B	Mixed-Detailed
	OBS	301_4	Support	Fixed
302	T&E	302_1	Crew	Avoidable (LP)
	T&E	302_2	Support	Fixed
303	Yard	303_1	Yard Direct	Mixed-Statistical
	Yard	303_2	Train Moves	Mixed-Statistical
	Yard	303_3	Equipment Moves	Mixed-Statistical
	Yard	303_4	Train & Equipment Moves	Mixed-Statistical
304	Fuel	304_0	Fuel – General	Avoidable
305	Transportation - Multiple	305_0	Transportation - Multiple – General	Mixed-Detailed
306	Train Movement	306_0	Train Movement – General	Mixed-Detailed
307	Train Movement-Host RR	307_0	Train Movement-Host RR – General	Mixed-Detailed
308	Transportation Support	308_0	Transportation Support – General	Mixed-Detailed
309	Power - Electric Traction	309_0	Power–Electric Traction-General	Avoidable
401	Sales	401_0	Sales-General	Mixed-Detailed
402	Information & Reservations	402_0	Information & Reservations – General	Mixed-Detailed
403	Marketing	403_0	Marketing – General	Mixed-Detailed
501	Stations-Route	501_0	Stations-Route – General	Mixed-Statistical

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[21] "LP" refers to Labor Protection. The Avoidable (LP) methodology is described in Section 6.4

Table 6-1: Summary of Approach for Estimating Amtrak's Avoidable Costs by Subfamily, cont'd

Subfamily Number	Subfamily	Subcategory Number	Subcategory	Approach
502	Stations-Shared	502_0	Stations-Shared – General	Mixed-Statistical
601	Corporate Administration	601_0	Corporate Administration – General	Fixed
602	Centralized Services	602_0	Centralized Services – General	Fixed
603	Qualified Mgmt.	603_0	Qualified Mgmt. – General	Fixed
604	Direct Customer (Non-NTS)	604_0	Direct Customer (Non-NTS) – General	Fixed
605	Subsidiary	605_0	Subsidiary – General	Mixed-Detailed
701	Capital	701_0	Capital – General	Mixed-Detailed
801	Utilities	801_0	Utilities – General	Fixed
901	Police	901_1	National	Fixed
	Police	901_2	Regional/Local	Fixed
902	Security Strategy & Special Ops	902_0	National	Fixed
903	Environmental & Safety	903_0	Environmental & Safety – General	Fixed

6.4 Adjusting for Labor Protection Provisions

6.4.1 Background: Labor Protection at Amtrak

The methodology for calculating the avoidable costs of labor needs to take into consideration existing labor protection provisions (LPPs) in Amtrak collective bargaining agreements. The existence of LPPs means that certain labor costs are not eliminated even if a Route is eliminated and the employees working on that Route are no longer needed. Amtrak's collective bargaining agreements have provided for various labor protections almost since the inception of the company. The Rail Passenger Service Act, through which Amtrak was established in 1970, called for Amtrak to establish fair and equitable arrangements, similar to those in existence at the freight railroads, to protect the interests of Amtrak employees affected by a discontinuance of intercity passenger service.[22] As a result, Amtrak and its unions negotiated the so-called "C-2" (applicable to operating and non-operating crafts) and "Rule 10/11" (applicable to shop crafts)

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[22] For a summary and discussion of the history of labor protection provisions (LPP) at Amtrak and the status of current LPPs, see *In the Matter of the Arbitration between National Railroad Passenger Corporation (Amtrak) and Coalition of Amtrak Unions*, Board of Arbitration, October 29, 1999.

protections, providing various types of benefits to employees adversely affected by a "Transaction."[23]

Congress passed the Amtrak Reform and Accountability Act (Act) in 1997 in an effort to provide Amtrak with more flexibility to manage costs and confront the financial challenges it was facing. The Act did away with existing Amtrak collective bargaining provisions relating to labor protection and required Amtrak and its unions to negotiate new provisions that would continue to provide adequate protections to Amtrak employees, but also assist Amtrak in containing costs. Unable to negotiate new LPPs on their own, the parties submitted their dispute to binding arbitration. The Board of Arbitration under Chairman Richard Mittenthal issued a decision in October 1999 (the "Mittenthal Award") that reaffirmed most of the principles of the C-2 and Rule 10/11 provisions, while adjusting downward the length of benefits to which employees are entitled and injecting a new service tier for receiving those benefits.[24] A Supplemental Award in 2002 provided for reduced benefits to employees on state-supported trains where the decision to discontinue service is made by the State and not Amtrak.

6.4.2 Current Labor Protections Provisions (LPPs)

The trigger for granting labor protection benefits is the "Transaction," which, in the case of all employees covered by unions, including operating craft employees, is defined as a discontinuance of intercity rail passenger service below tri-weekly service on a route.[25] Displaced Employees are those who, a result of a transaction, are placed in a worse position with respect to compensation and rules governing their working conditions. A Displaced Employee will, in general, during his or her Protective Period, receive an ongoing Displacement Allowance equal to the difference between his or her average monthly compensation during the 12 months before the transaction and the compensation received for any new assignment.

Dismissed Employees are employees who as a result of a transaction are deprived of employment because of the elimination of their positions or the loss of their positions due to the exercise of seniority rights by other employees whose own positions were eliminated as a result of a Transaction. A Dismissed Employee may receive a Dismissal Allowance depending on his or her years of service. A Dismissal Allowance is a monthly allowance equal to one twelfth of the employee's compensation during the prior 12-month period, reduced by unemployment benefits and outside earnings. Employees are required to exhaust all available seniority before qualifying for a Dismissal Allowance, although as a general rule Amtrak, usually through implementing arrangements, does not compel employees to relocate immediately. A Dismissed Employee receiving a Dismissal Allowance remains an Amtrak employee and continues to

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[23] The "C-2" and "Rule 10/11" terminology is derived from the subsection names in the relevant collective bargaining agreements.

[24] Service tier refers to various Years of Service categories of Amtrak employees.

[25] This discussion and the avoidable cost methodology detailed in this report only address labor protection for operating craft employees. While LPPs also apply to other employees, such as clerks, ticket agents, and mechanics, for the purposes of this methodology the nexus between a service discontinuance and the displacement or dismissal of such employees is more ambiguous and avoidable costs resulting from a service discontinuance are considered more speculative. Although not addressed in this report, such avoidable costs may be estimated in future refinements of this methodology.

receive fringe benefits, such as health insurance. Employees only maintain their status as Dismissed Employees so long as they are deprived of employment. Therefore, once an employee is no longer deprived of employment, he or she is no longer eligible for a Dismissal Allowance.

The length of time for which a Dismissed or Displaced Employee is entitled to receive an allowance and fringe benefits is termed the Protective Period and is based on the employee's years of service. The Protective Periods for various years of service timeframes are detailed in Table 6-8 and range from no Protective Period for employees with fewer than two years of service to 60 months for employees with greater than 25 years of service. Dismissed Employees may instead resign and accept a lump sum Separation Allowance in lieu of all other payments and benefits. If an employee is required to change his or her residence at any time during the Protective Period, then he or she is entitled to compensation for relocation expenses, including all moving expenses, temporary loss of wages, and losses resulting from the sale of a home. A change of residence generally is defined as new employment at a point both in excess of 30 miles from the employee's place of residence, and located further from his residence than his or her former work location.

6.4.3 Labor Protection and the Avoidable Cost Methodology for T&E[26] and OBS[27] Labor

The methodology for calculating the avoidable costs of operating labor involves calculating the Fully Allocated costs of labor assigned or allocated to a train and then applying various avoidable cost percentages to those Fully Allocated costs to estimate the costs that would be avoided if a Route were to be eliminated. The avoidable cost of operating labor is the sum of all avoidable costs in the T&E-Crew and OBS-Crew Subfamilies for all trains.

Avoidable cost percentages are calculated for each Route at each T&E and OBS crew base. Crew bases are the geographic bases of operations for T&E and OBS employees. They are where T&E and OBS employees sign in and perform other administrative tasks. In some cases a crew base may consist of two or more ResCens[28] in which case the avoidable cost percentages for a particular crew base will be applied to all ResCens that make up that crew base. All operating labor costs assigned or allocated to trains are also coded to particular crew base ResCens. Appendix G contains a table listing Amtrak's OBS and T&E crew bases and the Routes that each crew base supports.

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[26] Trainmen and Enginemen.
[27] Onboard Services
[28] An example of a crew base made up of multiple ResCens is the Boston OBS crew base, which is made up of the following three ResCens:

    RC5048   BOS – OBS NEC Exbd
    RC5051   BOS – OBS NEC
    RC5052   BOS – OBS Ready Crew

Separate avoidable cost percentages are calculated for both direct labor and fringe benefits due to differences in how LPPs apply to these two categories of expenses. In addition, separate Avoidable Cost percentages are required to estimate short-term and long-term avoidable costs because in the long-term, after the Protective Period has expired for Amtrak's most senior employees, all direct labor and benefit expenses are avoidable. In addition, while in the short–term, Dismissal Allowances need to be reduced by unemployment compensation and outside earnings, in the long-term, no such adjustment is necessary.

A limited number of expenses at T&E or OBS crew bases correspond to specific Functions for which no avoidable costs percentages exist, and are treated as fixed in the short term because they are not directly related to direct T&E or OBS labor or benefits. In cases where a T&E crew base serves only one route, these Functions are treated as 100 percent avoidable in the long term. Furthermore, expenses associated with certain Accounts at T&E and OBS crew base ResCens (e.g., Account 540301, Crew Meals) are treated as 100 percent avoidable proportional to labor hours because those expenses would not be incurred if a Route were to be discontinued.

The methodology applies these avoidable costs percentages at the Function and Account level to the Fully Allocated Costs for each train within each specified Route in the same way that avoidable cost percentages are applied to costs in other Subfamilies. The rules for applying the Avoidable Cost percentage and other rules for estimating Avoidable Costs for T&E and labor are detailed in Table 6-2 through Table 6-9. The crew base determines the ResCens to which the rules apply. A look-up table is employed containing wage and fringe benefit avoidable cost percentages for each Route and crew base for both the short and long term. An example of the information that is included in this look-up table is found in Table 6-2.

Table 6-2: Sample OBS Crew Base Avoidable Cost Percentage Look-up Table

	Short Term		Long Term	
	Wages	**Fringe Benefits**	**Wages**	**Fringe Benefits**
Route 1	4.2%	4.7%	8.3%	9.4%
Route 2	4.5%	5.1%	89.4%	89.8%

6.4.4 Calculation of Wage and Fringe Benefit Avoidable Cost Percentages

The method for calculating the avoidable cost percentages utilizes information on the distribution of employees at each crew base by years of service, direct labor statistics for routes served by and operating out of that crew base, and information on contractual LPPs. Embedded in the logic for estimating the Avoidable Cost percentages are certain assumptions regarding how LPPs would logically be invoked (e.g., what the affected parties would actually do) if a route were to be eliminated as well as other assumptions about Amtrak wages. Table 6-3 is an illustration of how avoidable cost percentages are calculated for a sample OBS Crew Base.

Labor statistics, such at Trainmen Labor Hours (TLH), Enginemen Labor Hours (ELH) and OLH, for each crew base are used to calculate the percentage of total labor usage at that crew base by Route to approximate the percentage of total crew base employees required to operate each Route. If a Route is eliminated, the labor required to operate that Route is no longer needed. In cases where a crew base consists of multiple ResCens, the statistics for those ResCens must be combined to calculate relative labor usage for the crew base as a whole. In the case of T&E crew bases, relative labor usage will be calculated separately for T&E using TLH and enginemen labor hours (ELH) statistics.

In the case of OBS crew bases, relative labor usage will be calculated based on OLH.[29] For example, the sample OBS crew base in Table 6-3 serves two routes. Route 1 accounts for approximately 90 percent of the total OLH at the crew base, while Route 2 accounts for approximately 10 percent of those hours. If Route 2 were discontinued, then approximately 10 percent of the labor force at the crew base (corresponding to the 10 percent of total labor hours) would no longer be needed.

Table 6-3: Sample OBS Crew Base Labor

Routes	OLH (value)	OLH (%)	Estimated Employee Distribution
Route 1	29,968	90.5%	115
Route 2	3,147	9.5%	12
	33,115	100.0%	127

The next step is to determine which employees at a particular crew base would be affected if a route operating out of that crew base were to be eliminated. Due to seniority rules and the requirement that employees generally exhaust all available seniority before qualifying for a Dismissal or Separation Allowance, the methodology assumes that those employees with the fewest years of service at a particular crew base are those who will be dismissed. Using information provided by Amtrak on actual employees working out of each crew base, the methodology ranks employees at each crew bases by years of service, and a "cumulative percentage of total employees" figure is calculated for each employee from the least senior to the most senior by dividing that employee's rank by the total number of employees at the crew base (or within a particular craft at a T&E crew base). The cumulative percentage of total employees for a particular employee represents the cumulative percentage of employees at a crew base with the same or fewer years of service than the reference employee. The methodology compares the percentage of labor at a crew base associated with each route with the cumulative percentage of employees for each employee at that crew base to estimate what will happen if that Route were to be eliminated. For example, if a particular Route represents 10 percent of total crew base labor (and presumably approximately 10 percent of total labor at that crew base) as in the case of the sample crew base described above, then all those employees below the 10 percent cumulative

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[29] Avoidable costs percentages will be calculated by craft type where data on length of service by craft and labor statistics by craft type are both available. Currently, length of service by craft data is available for trainmen and enginemen at T&E crew bases, but is not available for OBS employees.

percentage of employees threshold will be subject to dismissal or separation because they have the least seniority.

For each employee who is subject to dismissal or separation, the methodology uses a combination of information on contract provisions and assumptions about how the two parties, Amtrak and the individual employees, will react in a given situation to estimate what labor protection benefits, if any, each affected employee in the crew base will receive and also the avoidable costs associated with each employee. As a final step, the avoidable costs associated with all employees in the crew base are summed and used to calculate avoidable wage and benefit costs as a percentage of total wages and benefit costs for the crew base (the avoidable cost percentage). Avoidable cost percentages will be calculated annually for each route and crew base for both the short- and long-term time frames. The Route and crew base-specific avoidable cost percentages for a particular Route will be applied to the Fully Allocated costs for all trains that make up that Route at all ResCens that make up the crew base. As previously noted, separate avoidable cost percentages will be estimated for wages and for fringe benefits. Wage avoidable cost percentages will be applied to direct labor Functions, while benefit avoidable costs percentages will be applied to indirect labor Functions as detailed in Table 6-4, Table 6-5, Table 6-6, and Table 6-7.

Table 6-4: T&E Crew Subcategory—Short Term

Function	Function Description	Account	Account Description	Cost Category	Statistic	Statistic Description
		540301	Crew Layover	Avoidable	TEH	Train & Enginemen Labor Hours
		540302	Crew Meals (Payroll)	Avoidable	TEH	Train & Enginemen Labor Hours
		540303	Crew Transportation	Avoidable	TEH	Train & Enginemen Labor Hours
		530761	Road Vehicle Rental	Avoidable	TEH	Train & Enginemen Labor Hours
		530765	Road Vehicle Supplies	Avoidable	TEH	Train & Enginemen Labor Hours
FN1615	Extra Bd. Guar. Eng. Crew Oper.			Enginemen Wages ST AC %	ELH	Enginemen Labor Hours
FN1633	Psg. Train Enginemen			Enginemen Wages ST AC %	ELH	Enginemen Labor Hours
FN1642	Qualifying Enginemen			Fixed	ELH	Enginemen Labor Hours
FN1616	Extra Bd. Guar. Trainmen			Trainmen Wages ST AC %	TLH	Trainmen Labor Hours
FN1635	Psg. Train Trainmen			Trainmen Wages ST AC %	TLH	Trainmen Labor Hours
FN1643	Qualifying Trainmen			Fixed	TLH	Trainmen Labor Hours
FN1631	Train Operations			Fixed	TEH	Train & Enginemen Labor Hours
FN1601	Transportation Mgmt. & Supervision			Fixed	TEH	Train & Enginemen Labor Hours
FN1617	T&E Overhead			T&E Benefits ST AC %	TEH	Train & Enginemen Labor Hours
FN1689	Train Operations –Special Projects			Fixed	TEH	Train & Enginemen Labor Hours
FN1131	Training Amtrak			Fixed	TEH	Train & Enginemen Labor Hours
FN1234	SAP Payroll Adjustments			Fixed	TEH	Train & Enginemen Labor Hours
FNxxxx	All Other Functions			Fixed	TEH	Train & Enginemen Labor Hours

Table 6-5: OBS Crew Subcategory—Short Term

Function	Function Description	Account	Account Description	Cost Category	Statistic	Statistic Description
		540301	Crew Layover	Avoidable	OLH	On-Board Labor Hours
		540302	Crew Meals (Payroll)	Avoidable	OLH	On-Board Labor Hours
		540303	Crew Transportation	Avoidable	OLH	On-Board Labor Hours
		540306	Crew Meals (F&B Stock)	Avoidable	OLH	On-Board Labor Hours
		540319	Train Supplies-Consumables (OBS)	Avoidable	OLH	On-Board Labor Hours
FN1002	Division Administrative			Fixed	OLH	On-Board Labor Hours
FN1131	Training Amtrak			Fixed	OLH	On-Board Labor Hours
FN1234	SAP Payroll Adjustments			Fixed	OLH	On-Board Labor Hours
FN1301	OBS Management & Supervision.			Fixed	OLH	On-Board Labor Hours
FN1313	OBS Services - Extra Board			Wages ST AC %	OLH	On-Board Labor Hours
FN1315	OBS Services - Overhead			Benefits AC %	OLH	On-Board Labor Hours
FN1321	OBS Dining & Snack			Wages ST AC %	OLH	On-Board Labor Hours
FN1331	OBS Sleeping Car			Wages ST AC %	OLH	On-Board Labor Hours
FN1341	OBS Coach Service			Wages ST AC %	OLH	On-Board Labor Hours
FN1388	OBS Special Projects			Fixed	OLH	On-Board Labor Hours
FN1291	Passenger Inconvenience			Fixed	OLH	On-Board Labor Hours
FNxxxx	All Other Functions			Fixed	OLH	On-Board Labor Hours

Table 6-6: T&E Crew Subcategory—Long Term

Function	Function Description	Account	Account Description	Cost Category	Statistic	Statistic Description
		540301	Crew Layover	Avoidable	TEH	Train & Enginemen Labor Hours
		540302	Crew Meals (Payroll)	Avoidable	TEH	Train & Enginemen Labor Hours
		540303	Crew Transportation	Avoidable	TEH	Train & Enginemen Labor Hours
		530761	Road Vehicle Rental	Avoidable	TEH	Train & Enginemen Labor Hours
		530765	Road Vehicle Supplies	Avoidable	TEH	Train & Enginemen Labor Hours
FN1615	Extra Bd. Guar. Eng. Crew Operations			Enginemen Wages LT AC %	ELH	Enginemen Labor Hours
FN1633	Psg. Train Enginemen			Enginemen Wages LT AC %	ELH	Enginemen Labor Hours
FN1642	Qualifying Enginemen			Fixed (Avoidable if Single Route)	ELH	Enginemen Labor Hours
FN1616	Extra Bd. Guar. Trainmen			Trainmen Wages LT AC %	TLH	Trainmen Labor Hours
FN1635	Psg. Train Trainmen			Trainmen Wages LT AC %	TLH	Trainmen Labor Hours
FN1643	Qualifying Trainmen			Fixed (Avoidable if Single Route)	TLH	Trainmen Labor Hours
FN1631	Train Operations			Fixed (Avoidable if Single Route)	TEH	Train & Enginemen Labor Hours
FN1601	Transp. Mgmt. & Supervision.			Fixed (Avoidable if Single Route)*	TEH	Train & Enginemen Labor Hours
FN1617	T&E Overhead			T&E Benefits LT AC %	TEH	Train & Enginemen Labor Hours
FN1689	Train Ops - Special Projects			Fixed (Avoidable if Single Route)	TEH	Train & Enginemen Labor Hours
FN1131	Training Amtrak			Fixed (Avoidable if Single Route)	TEH	Train & Enginemen Labor Hours
FN1234	SAP Payroll Adjustments			Fixed (Avoidable if Single Route)	TEH	Train & Enginemen Labor Hours
FNxxxx	All Other Functions			Fixed (Avoidable if Single Route)	TEH	Train & Enginemen Labor Hours

Table 6-7: OBS Crew Subcategory—Long Term

Function	Function Description	Account	Account Description	Cost Category	Statistic	Statistic Description
		540301	Crew Layover	Avoidable	OLH	On-Board Labor Hours
		540302	Crew Meals (Payroll)	Avoidable	OLH	On-Board Labor Hours
		540303	Crew Transportation	Avoidable	OLH	On-Board Labor Hours
		540306	Crew Meals (F&B Stock)	Avoidable	OLH	On-Board Labor Hours
		540319	Train Supplies-Consumables (OBS)	Avoidable	OLH	On-Board Labor Hours
FN1002	Division Administrative			Fixed (Avoidable if Single Route)	OLH	On-Board Labor Hours
FN1131	Training Amtrak			Fixed (Avoidable if Single Route)	OLH	On-Board Labor Hours
FN1234	SAP Payroll Adjustments			Fixed (Avoidable if Single Route)	OLH	On-Board Labor Hours
FN1301	OBS Management & Supervision			Fixed (Avoidable if Single Route)	OLH	On-Board Labor Hours
FN1313	OBS Services - Extra Board			Wages LT AC %	OLH	On-Board Labor Hours
FN1315	OBS Services - Overhead			Benefits LT AC %	OLH	On-Board Labor Hours
FN1321	OBS Dining & Snack			Wages LT AC %	OLH	On-Board Labor Hours
FN1331	OBS Sleeping Car			Wages LT AC %	OLH	On-Board Labor Hours
FN1341	OBS Coach Service			Wages LT AC %	OLH	On-Board Labor Hours
FN1388	OBS Special Projects			Fixed (Avoidable if Single Route)	OLH	On-Board Labor Hours
FN1291	Passenger Inconvenience			Fixed (Avoidable if Single Route)	OLH	On-Board Labor Hours
FNxxxx	All Other Functions			Fixed (Avoidable if Single Route)	OLH	On-Board Labor Hours

6.4.5 *Logical Assumptions Incorporated into Avoidable Cost Percentage Calculation*

The logic embedded into the methodology for calculating the avoidable cost percentages for operating labor is as follows[30]:

- The elimination of an Amtrak Route constitutes a transaction, which triggers certain LPPs under the existing collective bargain agreement.

- Labor protection benefits are as shown in Table 6-8.

Table 6-8: Length of Protective Period and Amount of Separation Allowance

Years of Service	Full LPP (wages and benefits)	Reduced LPP[31]	Separation Allowance
less than 1	None	None	None
1	None	None	None
less than 2	None	None	None
2	6 months	2 months	6 months
3	6 months	2 months	6 months
3+	12 months	4 months	9 months
4+	12 months	4 months	9 months
5+	18 months	6 months	12 months
6+	18 months	6 months	12 months
7+	18 months	6 months	12 months
8+	18 months	6 months	12 months
9+	18 months	6 months	12 months
10+	24 months	8 months	12 months
11+	24 months	8 months	12 months
12+	24 months	8 months	12 months
13+	24 months	8 months	12 months
14+	24 months	8 months	12 months
15+	36 months	12 months	12 months
16+	36 months	12 months	12 months
17+	36 months	12 months	12 months

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[30] These assumptions are not necessarily the way in which Amtrak and/or individual employees will react in a given situation, but are assumptions as to how they logically might behave and are necessary to sufficiently simplify the methodology.

[31] Reduced benefits apply to employees on state-supported trains where the decision to discontinue service is made by the state and not Amtrak. See *In the Matter of the Arbitration between National Railroad Passenger Corporation (Amtrak) and Coalition of Amtrak Unions, Supplemental Award,* Board of Arbitration, May 22, 2002.

Years of Service	Full LPP (wages and benefits)	Reduced LPP[31]	Separation Allowance
18+	36 months	12 months	12 months
19+	36 months	12 months	12 months
20+	48 months	16 months	12 months
21+	48 months	16 months	12 months
22+	48 months	16 months	12 months
23+	48 months	16 months	12 months
24+	48 months	16 months	12 months
25+	60 months	20 months	12 months

- Employees with fewer than two years of service do not quality for any benefits.

- Employees with greater than two years of service may choose to resign and receive a lump sum Separation Allowance but no ongoing fringe benefits, or they can receive a Dismissal Allowance and fringe benefits for the duration of their Protective Period. The methodology assumes that employees will choose to receive a Dismissal Allowance rather than a Separation Allowance, even where the Dismissal Allowance and Separation Allowance consist of an equal number of months of wages, because in the former case they will continue to receive fringe benefits during the Protective Period and eventually may have the opportunity to return to work.

- Employees will exhaust their seniority to the extent required to qualify for benefits. The methodology assumes, however, that Amtrak will not require employees to relocate because then contractual Relocation Expenses would be incurred, nor will employees exercise seniority rights outside of their current crew bases or work zones.[32]

- Employees remain under pay status with Amtrak. As a result, they are not eligible for unemployment benefits. Dismissal employees will not receive any other outside earnings during the Protective Period.

- Employees with greater than five years of service receive the full wage for their craft. Wages for beginning employees are 75 percent of full wages and increase five percent per year until they reach the full wage for their craft (after five years).

- Avoidable cost percentages will only be estimated for T&E (operating craft employees) and OBS labor (onboard employees) during the first phase of APT implementation because a close nexus exists between service discontinuance and the dismissal of these employees. Future enhancements of this

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[32] Relocation would involve dismissal of employees with relatively less seniority that, to the extent they are entitled to first year benefits, would simply shift the location but not the amount of avoidable costs offsets. To the extent that cost savings would accrue because of lower seniority, they would be reduced by relocation expenses. Since a route elimination would involve effects at crew bases across a region, as a practical matter including relocation effects would likely have little effect on the estimates of avoidable costs.

methodology may estimate avoidable cost percentages for other crafts, especially in the MoE and Station Families and other Operations - Transportation Subfamilies.

- If a discontinuance of service (transaction) and resulting eliminations of employees involve a state-supported route, the model assumes that the decision to discontinue service was made by Amtrak, not the relevant state, and therefore that Dismissed Employees are entitled to benefits for the full Protective Period.

- No adjustment is made for normal labor turnover that would result in the re-hire of Dismissed employees. Future enhancements of this methodology may incorporate historical average turnover rates into the estimating procedure.

6.4.6 Examples of Possible Impacts on Adversely Affected Employees

The following are examples demonstrating how costs for individual employees are estimated in the methodology for including labor protection effects in the estimation of avoidable costs. The examples assume that the employees are subject to Dismissal or Separation because their seniority places them in the group of employees below the relevant "Cumulative Percent of Total Employees" threshold associated with the discontinuation of a particular Route at a particular crew base.

Example 1: Conductor Trainee with 6 months of total continuous service (includes other craft time)
Conductor Trainees are grouped with Conductors for this analysis. A Conductor Trainee with six months of service is not eligible for either a Dismissal Allowance or a Separation Allowance, both of which require at least two years of service.

Example 2: Assistant Conductor with 2 years and 3 months of total continuous service
Assistant Conductors are grouped with Conductors for this analysis. An Assistant Conductor with at least two, but not yet three years of service is eligible for either a Dismissal Allowance of six months wages and benefits or a Separation Allowance of 6 months wages. The methodology assumes that the employee is dismissed and continues to receive wages and benefits for 6 months. A Conductor with 2 years and 3 months of service is assumed to earn 85 percent of the full wage for the Conductor craft.

Example 3: Conductor with 3 years and 6 months of total continuous service
A Conductor with at least 3, but not yet 5 years of service is eligible for either a Dismissal Allowance of 12 months wages and benefits or a Separation Allowance of 9 months wages. The model assumes that the employee is dismissed and continues to receive wages and benefits for 12 months. A Conductor with 3 years and 6 months of service is assumed to earn 90 percent of the full wage for the Conductor craft.

Example 4: Conductor with 10 years of total continuous service
A Conductor with at least ten, but not yet 15 years of service is eligible for either a Dismissal Allowance of 24 months wages and benefits or a Separation Allowance of 12 months wages. The model assumes that the employee is dismissed and continues to receive wages and benefits

for 24 months. A Conductor with 10 years of service is assumed to earn the full wage for the Conductor craft.

Table 6-9 provides details of the calculations of avoidable percentages for employees at a sample OBS crew base.

Table 6-9: Calculation of Avoidable Cost Percentages for a Sample OBS Crew Base

					Short Term						Long Term					
					Wages			Fringe Benefits			Wages			Fringe Benefits		
Years of Service	Employee #	Cumulative %	Affected Employee?	Impact	Avoidable %	% of Full Wage	Avoidable as % of Full Wage	Full Benefits	Avoidable %	Avoidable as % of Full Benefits	Avoidable %	% of Full Wage	Avoidable as % of Full Wage	Full Benefits	Avoidable %	Avoidable as % of Full Benefits
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
2.09	1	0.8%	Yes	Employee Receives 6 Months LPP	50%	85%	43%	100%	50%	50%	100%	85%	85%	100%	100%	100%
2.09	2	1.6%	Yes	Employee Receives 6 Months LPP	50%	85%	43%	100%	50%	50%	100%	85%	85%	100%	100%	100%
2.09	3	2.4%	Yes	Employee Receives 6 Months LPP	50%	85%	43%	100%	50%	50%	100%	85%	85%	100%	100%	100%
	4 - 9	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
2.64	10	7.9%	Yes	Employee Receives 6 Months LPP	50%	85%	43%	100%	50%	50%	100%	85%	85%	100%	100%	100%
2.75	11	8.7%	Yes	Employee Receives 6 Months LPP	50%	85%	43%	100%	50%	50%	100%	85%	85%	100%	100%	100%
2.75	12	9.4%	Yes	Employee Receives 6 Months LPP	50%	85%	43%	100%	50%	50%	100%	85%	85%	100%	100%	100%
2.75	13	10.2%	No	Employee Retains Job	0%	85%	0%	100%	0%	0%	0%	85%	0%	100%	0%	0%
3.22	14	11.0%	No	Employee Retains Job	0%	90%	0%	100%	0%	0%	0%	90%	0%	100%	0%	0%
3.22	15	11.8%	No	Employee Retains Job	0%	90%	0%	100%	0%	0%	0%	90%	0%	100%	0%	0%
3.30	16	12.6%	No	Employee Retains Job	0%	90%	0%	100%	0%	0%	0%	90%	0%	100%	0%	0%
3.36	17	13.4%	No	Employee Retains Job	0%	90%	0%	100%	0%	0%	0%	90%	0%	100%	0%	0%
3.40	18	14.2%	No	Employee Retains Job	0%	90%	0%	100%	0%	0%	0%	90%	0%	100%	0%	0%
	19 - 124	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
35.35	125	98.4%	No	Employee Retains Job	0%	100%	0%	100%	0%	0%	0%	100%	0%	100%	0%	0%
36.32	126	99.2%	No	Employee Retains Job	0%	100%	0%	100%	0%	0%	0%	100%	0%	100%	0%	0%
37.80	127	100.0%	No	Employee Retains Job	0%	100%	0%	100%	0%	0%	0%	100%	0%	100%	0%	0%

- Shaded lines reflect additional employees whose information is omitted since the table is only for illustrative purposes.

- Years of Service (Column A) is the number of years the employee has been at Amtrak calculated since his or her date of hire.

- Employee # (Column B) is a number assigned to each employee based on his or her Years of Service rank from the most junior (Rank = 1) to the most senior (Rank = 127).

- Cumulative % (of Total Employees) (Column C) for a particular employee represents the cumulative percentage of employees at a crew base with the same or fewer years of service than the reference employee and is calculated for each employee by dividing an employee's Employee # by the total number of employees at the crew base (or within a particular craft at a T&E crew base).

- Affected Employee (Column D) compares the Cumulative % of Total Employees figure for each employee with the percentage of labor at the crew base associated with each route (see Table 6-4) to determine whether an employee will be adversely impacted by the elimination of a route.

- Impact (Column E) details the impact to each employee based on the logical assumptions detailed above.

- Avoidable % (Column F) calculates the percentage of an employee's annual wages that would be avoidable based on the logical assumptions detailed above. For example, an employee receiving a 3-month lump sum Separation Allowance would have an Avoidable % of 75 percent because 75 percent of his annual wages would be avoidable while an employee receiving a Dismissal Allowance for 6 months would have an Avoidable % of 50 percent because 50 percent of his wages would be avoidable on an annual basis.

- Percentage of Full Wage (Column G) represents an employee's estimated wages as a percentage of the full wage for his or her craft. It assumes that an employee with less than 1 year of service earns 75 percent of the full wage for his or her craft and that that percentage increases 5 percent per year until the employee earns the full wage for his or her craft.

- Avoidable as % of Full Wage (Column H) is Column F multiplied by Column G.

- Full Benefits (Column I) represent the fact that employees on the job receive full benefits.

- Avoidable %–Fringe Benefits (Column J) calculates the percentage of an employee's annual fringe benefits that would be avoidable based on the logical assumptions detailed above. For example, an employee receiving a Dismissal Allowance throughout a 6-month Protective Period is also entitled to fringe benefits during those six months and would have a Benefits Avoidable Cost % of 50 percent because 50 percent of his benefit costs would be avoidable on an annual basis.

- Avoidable as % of Full Benefits (Column K) is Column K multiplied by Column L.
- Columns L through Q are calculated in a similar manner to the previous column, although they are based on different logical assumptions taken from LPPs in Amtrak's collective bargaining agreements.

6.5   Statistical Analysis of Avoidable Costs for Mixed Subfamilies

The Subfamilies classified as having mixed costs, such as whose costs are expected to be partly fixed and partly avoidable as train service changes, required further analysis leading to a more complex method for separating a route's Fully Allocated costs into its fixed and avoidable portions. Panel data regression analysis is the statistical method that was chosen for the task of estimating avoidable costs for Mixed Subfamilies.[33] In this method, costs incurred at a ResCen during 1-year periods are explained by activity levels at that ResCen during each of the same time periods. For example, a statistical relationship exists between station costs during a year and TBD at that station during the same year and that statistical relationship can be used to explain avoidable costs for the Stations Family.

The panel datasets for each Subfamily combine cross-sectional and time-series data. The cross-sectional data are the costs and activity levels for all of a Family's ResCens in any given year. The time-series data are the yearly costs and activity levels at those same ResCens for each of Amtrak's FYs 2005–2007. The combination of the cross-sectional and time-series data allow the investigation of how costs change with level of activities from two perspectives, the short run and the long run.

A statistical model, called the fixed-effects model, is used to show the effect of changes in activity level from one period to the period immediately following. This produces a short-run cost function because it shows how costs change at a ResCen within one year of changes in the related activity level at that ResCen. Amtrak ResCens, like any enterprise, face limitations regarding the speed with which costs can be adjusted, which typically allow less flexibility in adjusting costs in the short-run. Many costs, such as those related to real estate, simply cannot be reduced immediately.

In the long run, some costs that were fixed in the short run may often be reduced or avoided. A statistical model called the between-effects model shows the effect of varying activity levels on cost when those activity levels differ among the various ResCens that conduct a specific activity. This relationship represents a long-run cost function. The three year average cost and activity levels show the costs that need to be incurred to conduct the corresponding level of activity when a ResCen has time to make all the necessary adjustments. This estimate shows the total long-run avoidable cost, including both costs that can and cannot be avoided in the short run. As a result, short-run avoidable cost should not be added to this estimate.

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[33] The technical details of statistical analysis using panel datasets are provided in Wooldridge, Jeffrey M., *Econometric Analysis of Cross Section and Panel Data*. The MIT Press, October 2001.

Because every Subfamily represents a different type of activity necessary to operate a passenger rail service, each Subfamily's cost function is likely to be unique. Some Subfamilies have costs that can be avoided in the short run, but do not have additional costs that can be avoided in the long run. For these Subfamilies, all costs that are avoidable within any time period can be avoided in the short run. In these cases, it is appropriate to explicitly recognize the equivalence of the short- and long-run cost relationship in the statistical model. The statistical model used in these cases is the random-effects model. The three statistical models used by the methodology to estimate Avoidable Costs, fixed-effects, between-effects and random-effects, are discussed in the following section.

6.5.1 Statistical Models

6.5.1.1 Fixed-Effects Model

The first cost relationship to be estimated is the short-run cost function. Each ResCen changes slightly each year, both in terms of its activity level and its costs. When activity at a ResCen increases or decreases from one year to the next, costs at that ResCen are expected to change as well. On average, cost increases occur in years where activity levels are increasing, while cost decreases occur in years when activity levels are decreasing. Average changes in costs demonstrate the potential for Amtrak to reduce costs within the same year that a route is eliminated.

Estimating a statistical model with pooled cross-section and time-series data, such as without identifying the time periods and ResCens to which the data apply, confounds the short-run and long-run effects. In principle, it is possible to estimate the short-run avoidable cost function for an individual ResCen by using data only for that ResCen. The regression line estimated for these three points would show how changing activity levels from year to year affect annual costs. However, three years of data are not enough to establish a statistically significant short-run cost function. By using a statistical procedure called a fixed-effects panel model, cost and activity data for all of the ResCens included in a Subfamily are used to establish a statistically significant "average" relationship between short-run changes in ResCen costs and activity levels that can be applied to all ResCen within a Subfamily.

The regression equation for the fixed-effects panel model is:

$$y_{it} - \underline{y}_i = b_{oi} + b_i (x_{it} - \underline{x}_i) + u_{it}$$

where y_{it} = annual cost for ResCen i at time t
$\underline{y}_i$ = average annual cost over all time periods (2005-2007) for ResCen i
x_{it} = activity level for ResCen i at time t
$\underline{x}_i$ = average annual activity level over all time periods (2005-2007) for ResCen i
u_{it} = unexplained residual or error

This model estimates the effect of increasing or decreasing the annual activity level on annual cost for a ResCen in a given Subfamily. Essentially, this methodology produces a statistical relationship that can be used to represent typical cost behavior for many ResCens where there is

not enough data to establish a statistical relationship for each ResCen individually. The statistical results of such a model are sometimes called the "within" estimator, because they do not reflect differences between ResCen, but instead show the effect of changing activity levels on the costs "within" a ResCen.

6.5.1.2 Between-Effects Model

The second cost relationship to be estimated is the long-run cost function. To estimate long-run costs, it is assumed that all ResCens within a Subfamily face a similar relationship between activity and cost but that ResCens differ in their scale of activity, for instance, they are at different points on the cost function. Specifically, the systematic factor explaining different cost levels at different ResCens within a Subfamily is the level of a specific activity that is conducted at each ResCen.

Given this assumption, avoidable costs can be modeled as a function of activity levels at each ResCen. The statistical results of such a model show the effect of activity level on the differences "between" ResCens.

The regression equation for the between-effects panel model is:

$$\underline{y_i} = b_0 + b_1 \ \underline{x_i} + u_i$$

where $\underline{y_i}$ = average annual cost over all time periods (2005-2007) for ResCen i
$\underline{x_i}$ = average annual activity level over all time periods (2005-2007) for ResCen i
u_i = unexplained residual or error

Regressing average cost on average activity level at ResCens reduces the number of observations to equal the number of ResCens, which removes the short-run effects of year-to-year variation in cost and activity levels from the statistical result. This step is necessary to identify the true long-run response of costs to variation in activity levels, such as a long-run estimate not confounded by the more immediate short-run response.

6.5.1.3 Random-Effects Model

In some cases, the between-effects models and the fixed-effects models result in very similar coefficient estimates. This result suggests that variation in activity levels affect costs nearly equally in the short run and the long run in which case the random-effects model is appropriate. Whereas fixed-effects, between-effects and random-effects models will all produce unbiased and consistent estimates of the statistical relationships between costs and activity in these cases, the random-effects estimator is the most efficient in the sense that it makes the best use of the data to produce the estimator with the lowest standard error. The random-effects model produces estimates of cost avoidability that are a weighted average of the between-effects model and the fixed-effects model, but the estimates produced by this model are only valid if they are not statistically different from the estimates produced by the fixed-effects model. A Hausman test, which tests the validity of the random-effects model by measuring the statistical difference

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between the estimators for the fixed-effects and random-effects models, was conducted for all families that show nearly identical long- and short-run cost functions.

Avoidable cost equations were estimated for most Mixed Subfamilies that were expected to have both fixed and avoidable costs. Although all of these Subfamilies had statistically significant avoidable costs in the short run, only some Subfamilies were shown to have additional avoidable costs in the long run, and in these cases, fixed-effects and between-effects panel regression models were estimated to show how these long and short-run costs relationships differ. Other Subfamilies were found to have exhausted their potential to avoid costs once short-run costs are eliminated. This result was established statistically by using the Hausman test, which showed no significant difference occurring between fixed-effects and random-effects models. For these Subfamilies, the long- and short-run effects due to changes in activity level are equal.

6.5.2 Functional Forms

All Amtrak Subfamilies included in the Mixed-Statistical category have been found to have costs that increase with a variable that measures the level of activity at each ResCen, such as total unit trips (TUT) or train frequency (FTT). Some activities required to operate passenger trains exhibit economies of scale—they can be performed more cost-effectively at a large scale, while other activities do not. The estimated relationship between costs and activity levels is unique for each Subfamily. This variety of relationships can sometimes be best modeled by transforming one or both of the variables to the log form, although it is important to recognize how these transformations affect the interpretation of the results.

6.5.2.1 Linear Equation

Models, which explain the absolute value of cost as a function of the absolute activity level, yield statistical results that show a constant relationship between the independent (activity) and dependent (cost) variables. A one-unit change in activity will result in a "B" unit change in cost. This model implies constant marginal costs (i.e., an increase in activity levels has the same effect on costs at both large and small ResCens). Figure 6-1 shows a linear cost function.

General Form: $Y = C + B*X$

where   B = regression coefficient
             C = constant

Figure 6-1: Linear Regression – Total ResCen Cost
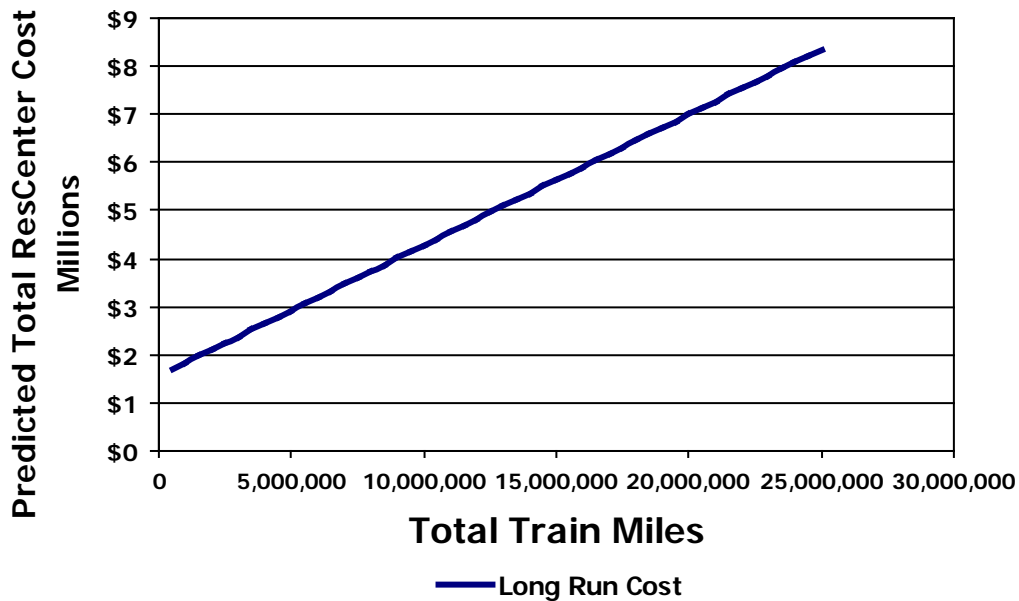
6.5.2.2 Log-Log Equation

Models, which explain the log of cost as a function of the log of activity level, yield statistical results that show the relationship between percentage changes in the activity and cost variables. In the mathematical representation of this function form that follows, a one percent change in activity will result in a "B-" percent change in cost.

$$General\ Form:\ ln(Y) = C + B*ln(X)$$

$$where\ \ ln = natural\ log$$

When B<1, as is found for many Amtrak Subfamilies, this model implies declining marginal costs.

Figure 6-2 shows a log-log cost function graphically where total cost is a function of the activity variable total unit trips TUT. Figure 6-3 shows that marginal costs are declining with higher activity levels. If B>0, marginal costs are increasing. An increasing marginal cost relationship is not found in any Amtrak Subfamily.

Figure 6-2: Log-log Regression – Total ResCen Cost
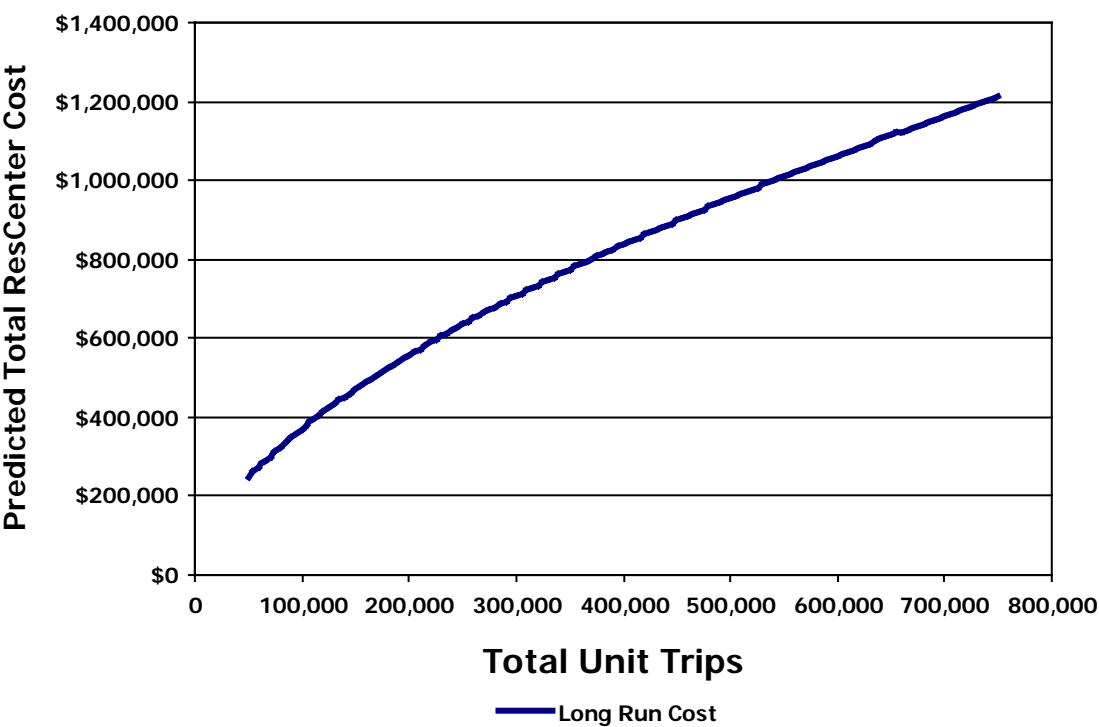
Figure 6-3: **Log-log Regression – Marginal Cost of a Unit Trip**

Long Run Avoidable Cost
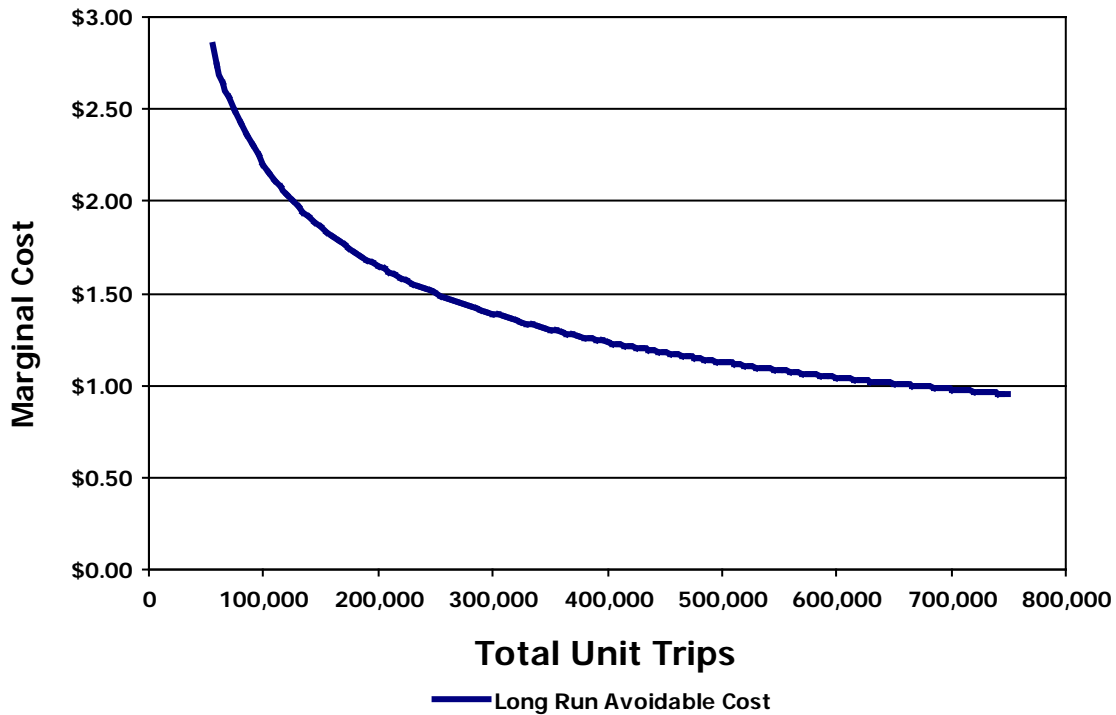
6.5.2.3 Linear-Log Equation

Models, which explain the absolute value of cost as a function of the log of activity level, yield statistical results that show the relationship between a percent change in the activity variable and the absolute value of the cost variable. In the model shown in Figure 6-4, a one percent change in activity will result in a B/100 change in cost. This model implies large economies of scale, such as the potential to increase activity significantly at large ResCens for relatively low additional costs. Such a cost relationship was tested as part of the statistical analysis process, but it was not found to result in the best cost function for any Amtrak Subfamily.

General Form: $Y = C + B*\ln(X)$

Figure 6-4: Linear-log Regression – Total ResCen Cost
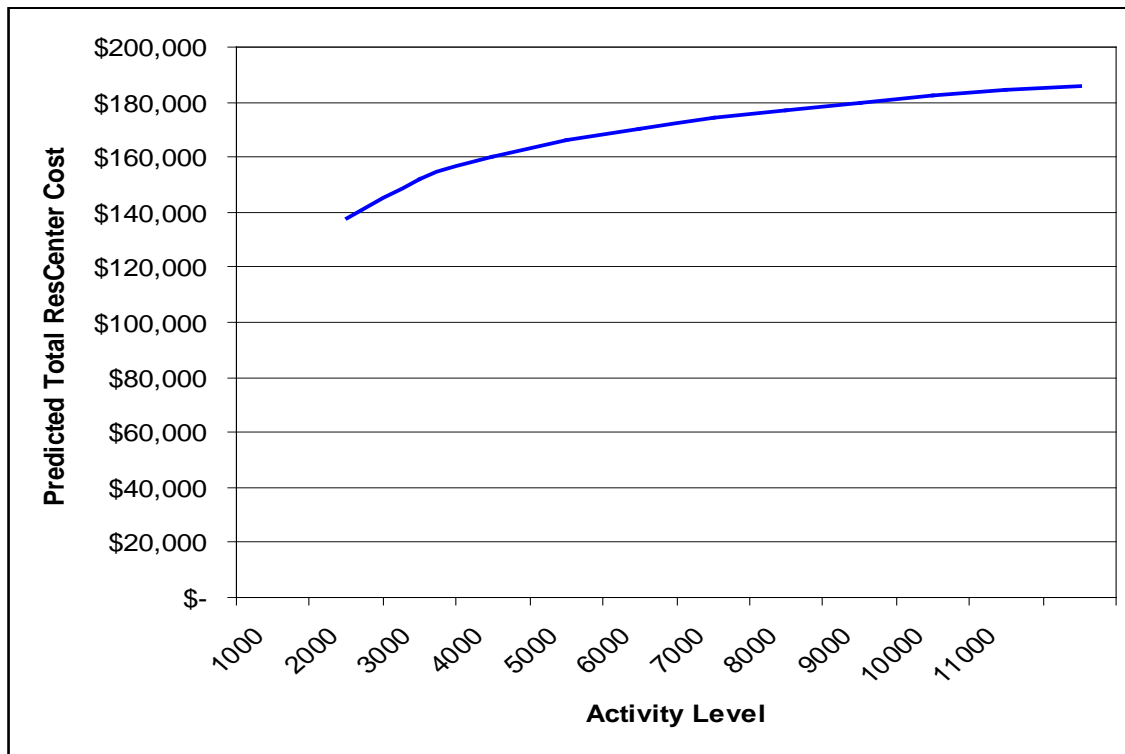
6.5.3 Application of Regression Results

Estimating the avoidable cost for a given route requires several additional steps. The preferred regression equation that resulted from the statistical analysis is used to predict costs at each ResCen that is affected by a route. These predicted costs are estimated for the current activity level as well as the activity level that would exist if the route were eliminated. The difference between the predicted cost at the current activity level and the predicted cost at the reduced activity level is then used to calculate a percentage change in cost. The percentage change in cost is applied to the actual Fully Allocated cost of the observed ResCen to calculate the Avoidable Cost for that ResCen. This approach is used to assure that the predicted Avoidable Costs are properly scaled at each ResCen. Finally, Avoidable Costs are summed for all ResCens in all Subfamilies that support that route to estimate the Avoidable Costs of discontinuing the route.

6.6 Revenue Losses Offset Avoided Costs

Estimating changes in direct Avoidable Costs at the route level represents only the cost side of Amtrak's business. Removing a route from service will also have an effect on short-run and long-run passenger revenue levels on both the discontinued route and on connecting routes.

These secondary or indirect effects are not included in the recommended methodology for regular reporting of avoidable costs in APT.

7 Methodologies for Estimating Fully Allocated Costs by APT Family

This section describes the essential elements of the methodology for estimating Fully Allocated costs for the 36 individual Subfamilies within APT. The methodology divides Amtrak ResCens and costs into nine Families representing the broad categories of activity, such as MoW and MoE, required to operate a passenger railroad such as Amtrak. Within each Family are one or more Subfamilies. The activities within each Subfamily are of a similar nature and the methodology distributes the costs associated with these activities in a logical and consistent manner.

The report subsections that follow contain separate descriptions of the methods for calculating Fully Allocated costs for each of the individual Subfamilies. The descriptions provide information on the type of work performed in the Subfamily, FY07[34] costs and share of Amtrak total costs for the Subfamily, the Amtrak businesses (including the core passenger rail business) to which costs are allocated, and finally, the allocation rules for allocating costs to Amtrak trains and other businesses. The primary allocation statistic(s) as well as any relevant Stat Qualifiers are also discussed.

In many cases, the cost allocation method indicates that costs are allocated at the national, regional or ResCen level. A national level allocation signifies that costs are allocated to a cost object (train or other Amtrak business or customer) based on that cost object's value for the specified statistic relative to the total systemwide value for that statistic for all cost objects. A regional allocation signifies that costs are allocated to a costs object based on that cost object's value for the specified statistic relative to the total regionwide value for that statistic for all cost objects. A ResCen level allocation signifies that costs are allocated to a costs object based on that cost object's value for the specified statistic relative to the total ResCen value for that statistic for all cost objects.

Each description includes a table containing a brief summary of this information, including the total cost associated with the Subfamily and the main accounting Functions and allocation statistics used.

Importantly, the FY07 costs that are shown for the Subfamilies, except Capital (#700), include all expenditures recorded in FIS for that year, including those that were capitalized. The Capital Subfamily is treated differently from other Subfamilies because the methodology replaces capital costs associated with physical property and equipment with a new synthetic capital charge, which will be calculated by Amtrak according to the method described in this report. Because the capital charge is new, no FY07 costs are shown below in the table for Family #700–Capital. The FIS expenses that would have been classified in this category pertain to depreciation and interest (to be completely replaced by the new capital charge).

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[34] Amtrak's Fiscal Year ran from October 1, 2006, to September 30, 2007.

The use of the new capital charge also does not alter the methodology's assumption that the costs to be reported in APT for route performance purposes—other than the new capital charge—are only those that are treated as expenses on Amtrak's audited income statement, as was the RPS practice.

As noted above, the expenses reported in the tables reflect total expenditures at ResCens as recorded in FIS for FY07. Some of the expenditures recorded in FIS were not allocated by RPS, but are included here, namely, unallocated Capital expenditures as well as some "Below the Line" costs. The totals in the table therefore do not represent RPS Fully Allocated Costs, nor are they a projection of how costs would be allocated by APT, but are simply a summary of FY07 total expenditures for all ResCens in each Subfamily.

Business types represent the separate businesses within the overall Amtrak enterprise. Each Subfamily table contains a listing of all the businesses to which ResCen costs within that Subfamily are allocated. For example, a table listing NTS, CIA, and COP, indicates that ResCen costs for the corresponding Subfamily will be allocated to Amtrak trains and to commuter agencies that Amtrak either operates (COP) or to which it provides infrastructure access (CIA). The business types that make up the Amtrak enterprise are as follows:

- **National Train Service (NTS):** Amtrak's "core" business of providing intercity passenger train service

- **Commuter Infrastructure Access (CIA)**: Provision of access to Amtrak's track and other facilities to independently operated commuter railroad agencies

- **Commuter Operations (COP):** Operation of commuter service by Amtrak on behalf of outside commuter railroad agencies

- **Freight:** Provision of access to Amtrak's track and other facilities to freight railroads

- **Reimbursable:** Maintenance of infrastructure and equipment performed by Amtrak for freight railroads or other outside enterprises on a reimbursable cost basis

- **Commercial:** Management of Amtrak's property and assets other than for the provision of intercity passenger train service (e.g. retail space, parking garages, air rights, etc.)

The "Top Five Functions" are those Functions that recorded the highest FY07 costs in FIS at the ResCens in each Subfamily.[35] The "Top Three Statistics" are the primary statistics that are used in the new methodology to allocate costs at ResCens located in each Subfamily.[36] The table incorporates several new statistics created as part of the overall methodology development effort, including a placeholder statistic, named "Direct (Unallocated)," which is used to represent

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[35] In most cases, these Functions will appear on each Subfamily's Profile (see Appendix A for a full listing). In some cases however, a Function used at a ResCen in FY07 was not included in the new APT profiles due to a change in activity at or modification of Routes serviced by that ResCen. Also included are expenses coded to Functions that were not allocated by RPS and that will not be allocated by APT, such as capital-related Functions.

[36] The expenditures listed in the summary tables are actual FY07 expenditures recorded in FIS. The expenditures associated with each statistic are those that would be allocated using that statistic if those expenditures were to be incurred again and allocated in APT.

expenditures that are not allocated in APT. Examples of these unallocated expenditures are capital expenses and expenses assigned directly to a specific business or customer. This placeholder statistic is abbreviated as "NON" within the APT allocation programming system.

The allocation method for each Subfamily is further defined in Appendix A contained in Volume II of this report. This appendix contains the complete Subfamily Profiles, including the allocation statistics and/or processes for all the Functions (not just the main five) and the list of ResCens comprising each Subfamily.

7.1 MoW Family

7.1.1 MoW Track Subfamily

Family: **MoW - #100**
Subfamily: **MoW Track - #101**

Scope

The MoW Track Subfamily performs maintenance and capital work on track assets along the right-of-way, including the roadbed, rails, cross-ties, ballast, and grade crossings. Most of this work takes place in the Northeast Corridor, although some work is performed outside the NEC on other Amtrak-owned assets or on assets owned by other entities on a reimbursable basis.

Subfamily expenditures for FY07 were $156.9M and accounted for 3.8 percent of Amtrak's total expenditures.

Cost Allocation Method

Cost allocations are at the ResCen level, using Stat Qualifiers to focus costs at a local or regional level. There are several cost types in the Track Subfamily (with varying allocation methods), including direct costs, indirect costs, costs that are assigned directly to a customer or outside agency, and capital expenditures. Direct costs are those coded in FIS to direct cost Functions in the Track Subfamily and identifiable to a specific project by a Work Element Number. These costs are allocated by TUT using a city pair Stat Qualifier. City pair Stat Qualifiers are identified for each ResCen and restrict cost allocations only to trains that travel on that specific segment where the Track work was performed.

Indirect costs are not identified by a Work Element Number and are allocated in a second round by MoW direct costs (MWDC) using a ResCen Stat Qualifier. MWDC is calculated as the sum of all direct Function costs at a ResCen that are allocated to a particular customer. After the direct costs are allocated, MWDC is calculated and indirect costs are allocated to each train or other customer in proportion to its share of MWDC relative to total MWDC for all trains or customers using track maintained by that specific ResCen. All trains traveling on a segment, Amtrak, freight, or commuter, will be automatically identified by the city pair Stat Qualifier as having traveled through that segment and will be allocated direct costs by TUT and indirect costs by MWDC.

Expenses that are direct to a specific customer are identified by specific Functions in the profile, e.g., commuter agencies have exclusive (specific) functions for their direct costs. These costs are allocated by NON (no statistic). The NON statistic does not apportion costs among multiple customers, but rather assigns all costs to the single customer identified for that Function. A few Functions that are assigned directly to customers also require a Work Element Number to identify a specific project and customer. The NON statistic is also used to assign these expenditures directly to a single customer.

Capital functions are used by these ResCens and make up the majority of the Subfamily expenses but are not allocated. These expenses include any capital improvements to extend the life of the assets. Unallocated capital expenses, using these Functions, are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other businesses and customers using that asset.

TUT for Amtrak trains is automatically available from the Train Unit Statistic (TUS) system using data from the Operating Management System (OMS). The Audit and Financial Controls group provides TUT for commuters and the Financial Analysis group manually calculates TUT statistics for freights. The preferred allocation statistic for direct costs in the Track Subfamily is gross ton miles (GTM) as track structures are degraded and require repair and maintenance activity based not just on the number of units traveling on that segment of track (TUT), but also by the weight of those units. However, although GTM is available for Amtrak trains, it is unavailable for freight or commuter trains. Until such a time as GTM is available for all trains, TUT will serve as its proxy allocation statistic. Future developments in traffic control information systems may allow Amtrak to automatically collect and maintain freight and commuter activity statistics including GTM.

Summary

Table 7-1 is an overview of the cost allocation for the MoW Track Subfamily.

Table 7-1: MoW Track Subfamily Overview

Subfamily	MoW Track - #101		
Subcategory	MoW Track - General (101_1)		
FY 2007 Expenditures (Mil.)	$156.9		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable		
Number of ResCens	51		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Road Land & Other Work in Progress (WIP)	3501	$53.9	34.3%
M of W Overhead	1751	$20.8	13.2%
Track Maintenance	1703	$18.4	11.7%
SEPTA Joint Benefit Capital	3077	$17.4	11.1%
M of W Reimbursable	1797	$10.1	6.4%

Subfamily	MoW Track - #101		
Subcategory	MoW Track - General (101_1)		
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Total Unit Trips	TUT	$30.9	19.7%
MoW Direct Costs	MWDC	$27.3	17.4%
Direct (Unallocated)	NON	$98.7	62.9%

7.1.2 MoW Communications & Signal Subfamily

Family: **MoW - #100**
Subfamily: **MoW Communications & Signal - #102**

Scope

The MoW C&S Subfamily performs maintenance and capital work on C&S assets including maintenance of communication systems such as telegraph, telephone, radio systems; train signal and interlocking systems; and communications-related maintenance of buildings, ROW, or other facilities. Most of this work takes place in the NEC, although some work is performed outside the NEC on other Amtrak-owned assets or on assets owned by other entities by reimbursable agreement.

Subfamily expenditures for FY07 were $92.7 million and account for 2.2 percent of Amtrak's total expenditures.

Cost Allocation Method

Cost allocations are at the ResCen level using Stat Qualifiers to focus cost at a local or regional level. Several cost types are in the C&S Subfamily with varying allocation methods including direct costs, indirect costs, costs that are assigned directly to a customer or outside agency, and capital expenditures. Direct costs are coded in FIS to direct cost Functions for direct labor in the C&S Subfamily and identifiable to a specific project by a Work Element Number. These costs are allocated by FTT using a city pair Stat Qualifier. City pair Stat Qualifiers are identified for each ResCen and restrict cost allocations only to trains that travel on that specific segment where the C&S work was performed.

Indirect costs are not identified by a Work Element Number and are allocated in a second round by MWDC using a ResCen Stat Qualifier. MWDC is calculated as the sum of all direct function costs at a ResCen that are allocated to a particular customer. After the direct costs are allocated, MWDC is calculated and indirect costs are allocated to each train or customer in proportion to its share of MWDC relative to total MWDC for all trains and customers operating in the area maintained by that specific ResCen. All trains traveling on a segment, Amtrak, freight, or commuter, will be automatically identified by the city pair Stat Qualifier as having traveled through that segment and will be allocated direct costs by FTT and indirect costs by MWDC.

Expenses that are direct to a specific customer are identified by specific functions identified in the profile, such as commuter agencies have exclusive (specific) functions for their direct costs. These costs will be allocated by NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single customer identified for that function. A few functions that are assigned directly to customers also require a Work Element Number to identify a specific project and customer. The NON statistic is also used to assign these expenditures directly to a single customer.

Capital functions are used by these ResCens and make up the majority of the Subfamily expenses but are not allocated. These expenses include any capital improvements to extend the life of the assets. Unallocated capital expenses using these functions are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other businesses and customers using that asset. Previously, TUT was used to allocate C&S costs, but after discussions and consultation with field personnel, it was determined that FTT is more appropriate as C&S operations relate to a single place and point of time. FTT is available from the TUS system using data from OMS. The Audit and Financial Controls group will provide FTT for commuters and the Financial Analysis/APT group will manually calculate FTT statistics for freights. Future developments in traffic control information systems may allow Amtrak to automatically to collect and maintain freight and commuter activity statistics including FTT.

Summary

Table 7-2 is an overview of the cost allocation for the MoW Communications & Signal Subfamily.

Table 7-2: MoW Communications & Signal Subfamily Overview

Subfamily	MoW Communications & Signal - #102		
Subcategory	MoW C&S General (102_1)		
FY 2007 Expenditures (Mil.)	$92.7		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable		
Number of ResCens	61		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Signal & Interlocker Maintenance	1713	$21.8	23.5%
Road Land & Other WIP	3501	$18.5	19.9%
M of W Overhead	1751	$12.8	13.8%
Amtrak New Jersey Transit (NJT) Joint Benefit Capital Program	3021	$7.9	8.6%
M of W Reimbursable	1797	$6.3	6.8%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**

Subfamily	MoW Communications & Signal - #102		
Subcategory	MoW C&S General (102_1)		
Frequency	FTT	$32.9	35.5%
MoW Direct Costs	MWDC	$18.4	19.8%
Direct (Unallocated)	NON	$41.5	44.7%

7.1.3 MoW Electric Traction Subfamily

Family: **MoW - #100**
Subfamily: **MoW Electric Traction - #103**

Scope

The MoW Electric Traction (ET) Subfamily operates the electric propulsions systems as well as performs maintenance and capital work on the electric transmission assets. These assets include the catenary and support apparatus, transmission systems between power plants and the network, power substations along the corridor, and building and structures that house these systems. Operational costs include salary and benefits for power directors and load dispatchers.

Subfamily expenditures for FY07 were $65.2 million and account for 1.6 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level using Stat Qualifiers to focus cost at a local or regional level. Several cost types are in the ET Subfamily with varying allocation methods including direct costs, indirect costs, costs that are assigned directly to a customer or outside agency, and capital expenditures. Direct costs are those coded in FIS to direct cost Functions for direct labor in the ET Subfamily and identifiable to a specific project by a Work Element Number. These costs are allocated by electric unit miles (EUM) using a city pair Stat Qualifier. Where a ResCen incurs direct function cost within a given city pair segment, costs are allocated to each electric train traveling over that segment in proportion to its share of all trains' EUM within that segment. City pair Stat Qualifiers are identified for each ResCen and restrict cost allocations only to electric trains that travel on that specific segment where the ET work was performed.

Indirect costs are those that cannot be identified by a Work Element Number and are allocated in a second round by MWDC using a ResCen Stat Qualifier. MWDC is calculated as the sum of all direct function costs at a ResCen that are allocated to a particular customer. After the direct costs are allocated, MWDC is calculated and indirect costs are allocated to each customer in proportion to its share of MWDC relative to total MWDC for all customers operating in the area maintained by that specific ResCen. All electric trains traveling on a segment, Amtrak, or commuter, will be automatically identified by the city pair Stat Qualifier as having traveled through that segment and will be allocated direct costs by EUM and indirect costs by MWDC.

Expenditures that are direct to a specific customer are identified by specific functions identified in the profile, commuter agencies or other entities have an exclusive (specific) function for their direct costs. These costs will be allocated by NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single customer identified for that function. A few functions that are assigned directly to customer also require a Work Element Number to identify a specific project and customer. The NON statistic is also used to assign these expenditures directly to a single customer.

Capital functions are occasionally used by these ResCens but are not allocated. These expenses include any capital improvements to extend the life of the assets. Unallocated capital expenses using these functions are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other businesses and customers using that asset.

EUM for Amtrak trains is automatically available from the TUS system using data from OMS. The Audit and Financial Controls group will provide EUM for commuters. Future developments in traffic control systems may allow Amtrak to automatically collect and maintain commuter statistics including EUM.

Summary

Table 7-3 is an overview of the cost allocation for the MoW Electric Traction Subfamily.

Table 7-3: MoW Electric Traction Subfamily Overview

Subfamily	MoW Electric Traction - #103		
Subcategory	**MoW Electric Traction - General (103_0)**		
FY 2007 Expenditures (Mil.)	$65.2		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Reimbursable, Commercial		
Number of ResCens	29		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Road Land & Other WIP	3501	$20.2	30.9%
M of W Overhead	1751	$9.0	13.8%
M of W Reimbursable	1797	$6.8	10.3%
Amtrak NJT Joint Benefit Capital Program	3021	$6.2	9.5%
Power Transmission System Maintenance	1718	$4.6	7.1%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
MoW Direct Costs	MWDC	$16.5	25.3%
Electric Locomotive Unit Miles	EUM	$11.4	17.5%
Direct (Unallocated)	NON	$37.3	57.3%

7.1.4 MoW Bridges & Buildings Subfamily

Family: MoW - #100
Subfamily: MoW Bridges & Buildings - #104

Scope

The MoW Bridges & Buildings Subfamily performs maintenance and capital work on various Amtrak physical assets including tunnels, bridges, culverts, overhead highway bridges, signs, buildings that house facilities for the MoW employees, and office buildings for Amtrak administrative staff. Maintenance costs for station buildings are excluded from the Bridges and Buildings (B&B) Subfamily and are recorded in the Stations Family.

Subfamily costs for FY07 were $62.5 million and account for 1.5 percent of Amtrak's total costs.

Cost Allocation Method

Cost allocations are at the ResCen level using Stat Qualifiers to focus cost at a local or regional level.

Several cost types are in the B&B Subfamily with varying allocation methods including direct costs, indirect costs, costs that are assigned directly to a customer, and capital expenditures. Direct costs are those coded in FIS to direct cost Functions for direct labor in the B&B Subfamily and identifiable to a specific project by a Work Element Number. These costs are allocated by either TUT or FTT using a city pair Stat Qualifier. Where a ResCen incurs direct function cost within a given city pair segment, costs are allocated to each train traveling over that segment in proportion to its share of all trains' TUT or FTT within that segment. City pair Stat Qualifiers are identified for each ResCen and restrict cost allocations only to trains that travel on that specific segment where the B&B work was performed.

Indirect costs are those that cannot be identified by a Work Element Number and are allocated in a second round by MWDC using a ResCen Stat Qualifier. MWDC is calculated as the sum of all direct function costs at a ResCen that are allocated to a particular customer. After the direct costs are allocated, MWDC is calculated and indirect costs are allocated to each customer in proportion to its share of MWDC relative to total MWDC for all customers using B&B maintained by that specific ResCen. All trains traveling on a segment, Amtrak, freight, or commuter, will be automatically identified by the city pair Stat Qualifier as having traveled through that segment and will be allocated direct costs by TUT or FTT and indirect costs by MWDC.

Expenditures that are direct to a specific customer are identified by specific functions identified in the profile, e.g., commuter agencies have exclusive (specific) functions for their direct costs. These costs will be allocated by NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single customer identified for that function. A few functions that are assigned directly to customer also require a Work Element Number to identify a specific project and customer. The NON statistic is also used to assign these expenditures directly to a single customer.

Capital functions are used by these ResCens and make up the majority of the Subfamily costs but are not allocated. These expenditures include any capital improvements to extend the life of the assets. Unallocated capital costs using these functions are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other businesses and customers using that asset. Some function costs for repairs to bridges, culverts, and trestles are allocated by TUT. The preferred allocation statistic for direct costs in the B&B Subfamily would be Gross Ton Miles (GTM) as the structures are degraded and thus require repair and maintenance activity based not just on the number of units traveling on bridges (TUT), but also by the weight of those units. However, while GTM is available for Amtrak trains, it is unavailable for freight or commuter trains. Until such a time as GTM is available for all trains, TUT will serve as a proxy allocation statistic. TUT for Amtrak trains is automatically available from the TUS system using data from OMS. The remaining costs for overhead bridges, tunnels, and buildings are allocated by FTT because their work is constrained not by the load of the trains, but the number of trains they must work around. FTT is available from the TUS system using data from OMS. The Audit and Financial Controls group will provide TUT and FTT for commuters and the Financial Analysis/APT group will manually calculate TUT and FTT statistics for freights. Future developments in traffic control information systems may allow Amtrak to automatically collect and maintain freight and commuter statistics including FTT and TUM.

Summary

Table 7-4 is an overview of the cost allocation for the MoW Bridges & Buildings Subfamily.

Table 7-4: MoW Bridges & Buildings Subfamily Overview

Subfamily	MoW Bridges & Buildings - #104		
Subcategory	MoW Bridges & Buildings - General (104_0)		
FY 2007 Expenditures (Mil.)	$62.5		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable, Commercial		
Number of ResCens	35		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Road Land and Other WIP	3501	$19.6	31.4%
M of W Overhead	1751	$8.2	13.1%
Roadway Bldg Maintenance.	1726	$6.2	9.8%
Station Services-Bldg Maintenance	1281	$4.4	7.1%
M of W Reimbursable	1797	$3.9	6.2%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Total Unit Trips	TUT	$13.2	21.1%
MoW Direct Cost	MWDC	$11.3	18.0%
Direct (Unallocated)	NON	$30.6	48.9%

7.1.5 MoW Support Subfamily

Family: **MoW - #100**
Subfamily: **MoW Support - #105**

Scope

The MoW Support Subfamily performs general support activities that support all or some of the other MoW Subfamilies (Track, Communications & Signal, Electric Traction, and Buildings & Bridges). These activities include management and supervision; training; dedicated material control shops and procurement; work, wire, and wreck trains; support work for specific capital projects; and related activities.

Subfamily costs for FY07 were $248.1 million and account for 5.8 percent of Amtrak's total costs.

Cost Allocation Method

Cost allocations are at the ResCen level using Stat Qualifiers to focus cost at a local or regional level.

Several cost types are in the MoW Support Subfamily with varying allocation methods including direct costs, indirect costs, costs that are assigned directly to a customer or outside commuter

agency, and capital expenditures. Direct costs are those coded in FIS to direct cost Functions for direct labor in the MoW Support Subfamily and identifiable to a specific project by a Work Element Number. Depending on the type of work, these costs are allocated by Total Unit Trips (TUT), Frequency (FTT), or Electric Unit Miles (EUM using a city pair Stat Qualifier. Where a ResCen incurs direct function cost within a given city pair segment, costs are allocated to each train traveling over that segment in proportion to its share of all trains' TUT, FTT, or EUM within that segment. City pair Stat Qualifiers are identified for each ResCen and restrict cost allocations only to trains that travel on that specific segment where the MoW Support work was performed.

Indirect costs are those that cannot be identified by a Work Element Number and are allocated in a second round by MoW Direct Costs (MWDC) using a ResCen Stat Qualifier. MWDC is calculated as the sum of all direct function costs at a ResCen that are allocated to a particular customer. After the direct costs are allocated, MWDC is calculated and indirect costs are allocated to each customer in proportion to its share of MWDC relative to total MWDC for all customers operating in the area maintained by that specific ResCen. All trains traveling on a segment, Amtrak, freight, or commuter, will be automatically identified by the city pair Stat Qualifier as having traveled through that segment and will be allocated direct costs by TUT, FTT, or EUM and indirect costs by MWDC.

Expenditures that are direct to a specific customer are identified by specific functions identified in the profile, such as commuter agencies, have an exclusive (specific) function for their direct costs. These costs will be allocated by NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single customer identified for that function. A few functions that are direct to customer also require a Work Element Number to identify a specific project and customer. The NON statistic is also used to assign these expenditures directly to a single customer.

Capital functions are used by these ResCens and make up the majority of the Subfamily expenditures but are not allocated. These expenses include any capital improvements to extend the life of the assets. Unallocated capital expenses using these Functions are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other businesses and customers using that asset.

TUT, FTT, and EUM for Amtrak trains are automatically available from the TUS system using data from OMS. Where TUT is used, the preferred allocation statistic would be GTM as MoW structures are degraded and thus require repair and maintenance activity based not just on the number of units traveling on that segment (TUT), but also by the weight of those units. However, while GTM is available for Amtrak trains, it is unavailable for freight or commuter trains. Until GTM is available for all trains, TUT will serve as its proxy allocation statistic. The Audit and Financial Controls group will provide TUT and FTT for commuters and the Financial Analysis/APT group will manually calculate TUT and FTT statistics for freights. Future developments in traffic control systems may automatically incorporate freight and commuter statistics.

Summary

Table 7-5 is an overview of the cost allocation for the MoW Support Subfamily.

Table 7-5: **MoW Support Subfamily Overview**

Subfamily	MoW Support- #105		
Subcategory	**MoW Support- General (105_0)**		
FY 2007 Expenditures (Mil.)	$241.8		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable		
Number of ResCens	65		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Road Land & Other WIP	3501	$177.1	73.2%
LIRR Life Safety Capital	3075	$35.5	14.7%
Amtrak NJT Joint Benefit Capital Program	3021	$13.9	5.7%
M of W Reimbursable	1797	$9.8	4.0%
M of W Overhead	1751	$9.2	3.8%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Direct (Unallocated)	NON	$250.5	103.6%
Total Unit Trips	TUT	$8.0	3.3%
MoW Direct Cost	MWDC	-$17.8	-7.4%

7.2 MoE Family

7.2.1 MoE Turnaround Subfamily

Family: **MoE - #200**
Subfamily: **MoE Turnaround - #201**

Scope

The MoE Turnaround Subfamily performs cleaning, inspections, and minor repairs on Amtrak trains and Amtrak-operated commuter trains before each departure and also enroute. Turnaround facilities can work exclusively on cars, locomotives, or both types of equipment. At some locations, turnaround services are performed by outside contractors rather than Amtrak employees. Additionally, Amtrak employees known as "train riders" accompany trains and perform minor enroute repairs as required.

Subfamily costs for FY07 were $113.8 million and account for 2.7 percent of Amtrak's total costs.

Cost Allocation Method

Cost allocations are at the ResCen level to Amtrak trains or Amtrak-operated commuter trains that either begin their trips at or pass through a particular ResCen. Because trains are not always serviced at each turnaround ResCens enroute, a train group is necessary for each turnaround ResCen to identify the specific trains to which costs at a ResCen are allocated. Several types of costs are in the Turnaround Subfamily (with varying allocation methods for each), including costs directly assigned to trains, direct costs, and indirect costs. The Function used to capture "train rider" costs requires a train number to assign costs directly to the appropriate trains. Direct cost Functions are used for direct labor and materials and identify the specific type of work performed. Direct Functions are associated with either car or locomotive servicing and are allocated by car unit trips (CUT) or a locomotive activity statistic, either diesel locomotive units used (DLU) or electric locomotive units used (ELU). At locations that utilize outside contractors, direct costs are not differentiated by equipment type and the statistic TUT is used to allocate costs.

Indirect costs are those that cannot be tied to a particular type of equipment and are allocated in a second round by MoE direct mechanical costs (MDC) using a ResCen Stat Qualifier. MDC is calculated as the sum of direct turnaround costs allocated to a train or other customer at a ResCen. After direct costs are allocated, MDC is calculated and indirect costs are allocated to each train or customer in proportion to its share of total MDC for all trains or customers using turnaround services at that specific ResCen.

Summary

Table 7-6 is an overview of the cost allocation for the MoE Turnaround Subfamily.

Table 7-6: MoE Turnaround Subfamily Overview

Subfamily	MoE Turnaround - #201		
Subcategory	MoE Turnaround - General (201_0)		
FY 2007 Expenditures (Mil.)	$113.8		
Business Types To Which Costs Are Allocated	NTS		
Number of ResCens	49		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Car Turnaround Service	1828	$53.2	46.7%
M of E Supervision Clerical & Office	1808	$9.5	8.4%
M of E-Vacation/Holiday/Non-Prod Labor	1815	$9.0	7.9%
Contract Roll Stock Mgt/Maintenance	1851	$7.2	6.3%
M of E Overhead	1814	$6.5	5.7%

Subfamily	MoE Turnaround - #201		
Subcategory	MoE Turnaround - General (201_0)		
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Car Unit Trips	CUT	$53.8	47.2%
Mechanical Direct Cost	MDC	$41.1	36.1%
Total Unit Trips	TUT	$7.2	6.3%

7.2.2 Locomotive Maintenance Subfamily

Family: MoE - #200
Subfamily: Locomotive Maintenance - #202

Scope

The Locomotive Maintenance Subfamily performs maintenance on Amtrak's diesel and electric locomotives. The work performed in this Subfamily includes both preventive maintenance and as-needed maintenance due to locomotive failures, bad orders, freeze damage, and wrecks. No significant capital work is undertaken in this Subfamily; instead, the Backshop Subfamily performs locomotive capital work. Amtrak's Work Management System (WMS) tracks labor and materials costs, the type of work performed, and the specific unit number and equipment type on which maintenance work is performed.

Subfamily expenditures for FY07 were $54.9 million and account for 2.7 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the national level to all trains that utilize the types of equipment being repaired. Amtrak locomotives are maintained at numerous facilities. Since a particular locomotive could be maintained at several different facilities, using the national level allocation approach ensures that the actual location where such equipment is maintained does not affect how maintenance costs for that equipment are allocated to trains. Train activity statistics are used in conjunction with equipment type Stat Qualifiers to ensure that the costs for maintaining a particular equipment type, regardless of the place where it is maintained, are allocated only to trains using that equipment type.

Several cost types are in the Locomotive Maintenance Subfamily, including direct costs, indirect costs, and costs assigned directly to a customer or outside agency. Direct cost Functions are used for direct labor and materials and identify the specific type of work performed. Direct Functions require Work Element Numbers from WMS from which specific locomotive types are inferred. Costs coded to these Functions are allocated using units used (xUU)[37] and unit miles (xUM) statistics for specific types of equipment. UU is used to allocate costs associated with preventive maintenance because preventative maintenance is largely based on time and UU is a time-based

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[37] The "x" is a "wildcard" to indicate different codes are used for each equipment type.

statistic. UM is used to allocate nonpreventative maintenance costs because such maintenance is based on usage. Direct costs are allocated nationally to all trains that use the corresponding equipment type—these costs are allocated at the national level. Indirect costs in this Subfamily are those for which a particular equipment type cannot be identified. These costs are allocated in a second round by MoE MDC using a ResCen Stat Qualifier. MDC is the sum of direct costs allocated to a train or to another customer at a ResCen. After direct costs are allocated, MDC is calculated and indirect costs are allocated to each train or customer at a ResCen in proportion to its share of total MDC for all trains or customers at that specific ResCen.

Expenditures that are assigned directly to a specific customer, such as a commuter agency, are identified in the Subfamily Profile. These costs are allocated by NON. The NON statistic does not apportion costs among multiple customers but assigns all costs to the single customer identified for that Function. In some cases, a Work Element Number is required to identify the appropriate customer when a general Reimbursable or Recollectable Function is used.

Unallocated capital expenses coded to this Subfamily are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other businesses and customers using that asset.

ResCen 3962, GE Contract Services, performs maintenance on locomotives under contract. Costs incurred at this ResCen are allocated using General Electric Locomotive Units Used (GEU), a new statistic used to calculate the sum of units used for those particular locomotives.

Summary

Table 7-7 is an overview of the cost allocation for the MoE Locomotive Maintenance Subfamily.

Table 7-7: MoE Locomotive Maintenance Subfamily Overview

Subfamily	Locomotive Maintenance - #202		
Subcategory	**Locomotive Maintenance - General (202_0)**		
FY 2007 Expenditures (Mil.)	$54.9		
Business Types To Which Costs Are Allocated	NTS		
Number of ResCens	9		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Contract Roll Stock Mgt/Maintenance	1851	$9.9	18.0%
Locomotive Diesel Bad Orders	1864	$9.3	16.9%
Locomotive Diesel Program Svc	1863	$6.7	12.1%
Locomotive Electric Bad Orders	1823	$4.3	7.8%
Locomotive Electric Program Svc	1822	$3.9	7.1%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**

Subfamily	Locomotive Maintenance - #202		
Subcategory	**Locomotive Maintenance - General (202_0)**		
Mechanical Direct Cost	MDC	$19.0	34.7%
Units Used	UU	$10.8	19.6%
General Electric Locomotive Units Used	GEU	$9.9	18.0%

7.2.3 Car Maintenance Subfamily

Family: **MoE - #200**
Subfamily: **Car Maintenance - #203**

Scope

The Car Maintenance Subfamily performs maintenance on Amtrak's cars, including passenger coaches, dining cars, sleeping cars, and baggage cars. The work performed in this Subfamily includes both preventive maintenance and as-needed maintenance due to car failures, bad orders, freeze damage, and wrecks. No significant capital work is undertaken in this Subfamily; instead, the Backshop Subfamily performs car capital work. Amtrak's WMS tracks labor and materials costs, the type of work performed, and the specific unit number and equipment type on which maintenance work is performed.

Subfamily expenditures for FY07 were $41.7 million and account for 1.0 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the national level to all trains that utilize the type of equipment being repaired. Amtrak cars are maintained at numerous facilities. Since a particular car could be maintained at several different facilities, using the national level allocation approach ensures that the actual location where such equipment is maintained does not affect how maintenance costs for that equipment are allocated to trains. Train activity statistics are used in conjunction with equipment type Stat Qualifiers to ensure that the costs for maintaining a particular equipment type, regardless of the place where it is maintained, are allocated only to trains using that equipment type.

Several cost types are in the Car Maintenance Subfamily, including direct costs, indirect costs, and costs assigned directly to a customer. Direct cost Functions are used for direct labor and materials and identify the specific type of work performed. Direct Functions require Work Element Numbers from WMS from which specific car types are inferred. Costs coded to these Functions are allocated using xUU and Unit Miles (xUM) statistics for specific types of equipment. UU is used to allocate preventive maintenance costs as such maintenance is largely based on time and UU is a time-based statistic. UM is used to allocate nonpreventive maintenance costs as such maintenance is based on usage. Direct costs are allocated nationally to all trains that use the corresponding equipment type—these costs are allocated at the national level. Indirect costs in this Subfamily are those for which a particular equipment type cannot be

identified and are allocated in a second round by MoE MDC using a ResCen Stat Qualifier. MDC is the sum of direct costs allocated to a train or customer at a ResCen. After the direct costs are allocated, MDC is calculated and indirect costs are allocated to each train or customer at a ResCen in proportion to its share of total MDC for all trains or customers at that specific ResCen.

Expenditures that are assigned directly to a specific customer, such as a commuter agency, are identified in the Subfamily Profile. These costs are allocated by NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single customer identified for that Function. In some cases, using a Work Element Number is required to identify the appropriate customer when a general Reimbursable or Recollectable Function is used. Where capital Functions are used, they are not allocated. Unallocated capital expenses coded to this Subfamily are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other customers using that asset.

Table 7-8 is an overview of the cost allocation for the MoE Car Maintenance Subfamily.

Table 7-8: MoE Car Maintenance Subfamily Overview

Subfamily	Car Maintenance- #203		
Subcategory	Car Maintenance - General (203_0)		
FY 2007 Expenditures (Mil.)	$41.7		
Business Types To Which Costs Are Allocated	NTS		
Number of ResCens	8		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Car Program Maintenance.	1829	$13.9	33.3%
Car Bad Orders	1830	$13.2	31.6%
M of E Overhead	1814	$2.7	6.6%
M of E-Vacation/Holiday/Non-Prod Labor	1815	$2.6	6.2%
M of E Supervision Clerical & Office	1808	$2.5	5.9%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
Units Used	UU	$15.2	34.0%
Mechanical Direct Cost	MDC	$13.4	32.1%
Unit Miles	UM	$13.2	31.7%

7.2.4 MoE Support Subfamily

Family: **MoE - #200**
Subfamily: **MoE Support - #204**

Scope

The MoE Support Subfamily performs managerial, administrative, material control, and other activities in support of turnaround servicing, rolling stock maintenance and repair, and component work performed in the various Amtrak mechanical shops.

Subfamily expenditures for FY07 were $68.7 million and account for 1.7 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level to the appropriate Amtrak train, commuter train, or other customers. ResCen and ResCen Group Stat Qualifiers are used to more closely align costs to trains and other customers. Each MoE Support ResCen is assigned a Stat Qualifier that identifies a ResCen or group of ResCens that the MoE Support ResCen supports. The majority of costs in this Subfamily are allocated based on MDC in conjunction with the assigned Stat Qualifier. Costs at a particular MoE Support ResCen are allocated only to a train or customer if that train or customer is associated with one of the ResCen(s) linked to that Support ResCen through a Stat Qualifier. The train or customer at issue receives a portion of the Support ResCen's costs in proportion to its share of total MDC for all trains and customers in that ResCen group.

Amtrak maintains trains for several outside commuter agencies, the costs of which are coded to agency-specific ResCens or Functions. In both cases, these costs are allocated by NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to a single customer identified for that Function or ResCen. In some cases, a Work Element Number is required to identify the appropriate customer when a general Reimbursable or Recollectable Function is used.

Capital expenses are occasionally coded to ResCens in this Subfamily but are not allocated or assigned. Unallocated capital expenses coded to this Subfamily are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other customers using that asset.

Summary

Table 7-9 is an overview of the cost allocation for the MoE Support–General Subfamily.

Table 7-9: MoE Support – General Subfamily Overview

Subfamily	MoE Support - #204
Subcategory	MoE Support - General (204_0)
FY 2007 Expenditures (Mil.)	$68.7
Business Types To Which Costs Are Allocated	NTS, CIA, COP
Number of ResCens	93
Top 5 Functions by Expenditures (Dollars, Mil., FY07)	

Subfamily	MoE Support - #204		
Subcategory	MoE Support - General (204_0)		
Function	**Code Number**	**Expenditures**	**Percent of Family**
M of E Managerial	1801	$27.1	39.4%
M of E Material Control	1816	$10.4	15.1%
M of E Overhead	1814	$7.0	10.2%
M of E Supervision Clerical & Office	1808	$5.3	7.7%
Road Land & Other WIP	3501	$3.9	5.7%
Top 2 Allocation Statistics by Expenditures (Dollars, Mil., FY07			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Mechanical Direct Cost	MDC	$61.0	88.7%
Direct (Unallocated)	NON	$7.6	11.0%

7.2.5 MoE Multiple Subfamily

Family: **MoE - #200**
Subfamily: **MoE-Multiple - #205**

Scope

ResCens in the MoE-Multiple Subfamily do not perform one primary activity, but rather perform multiple mechanical-related activities using various Functions that are typically used in other subfamilies within the MoE Family. The ResCens in this Subfamily perform two or more main activities to a degree that precludes their inclusion in a single Subfamily. The types of activities performed at these ResCens include turnaround servicing, locomotive maintenance, and car maintenance.

Subfamily expenditures for FY07 were $123.4 M and account for 3.0 percent of Amtrak's total expenses.

Cost Allocation Method

The MoE-Multiple Subfamily relies upon the various allocation methods used in the MoE Turnaround, Locomotive Maintenance, and Car Maintenance Subfamilies. In the case of locomotive and car maintenance activities, cost allocations are at the national level to all trains that utilize the type of equipment being maintained. In the case of turnaround servicing activities, costs are allocated at the ResCen level using the same method as in the MoE Turnaround Subfamily.

Several types of costs are in the MoE-Multiple Subfamily, including direct costs, indirect costs, and costs assigned directly to particular train or customers. Direct costs are those costs coded to direct cost Functions. Direct costs Functions are turnaround servicing or maintenance Functions used for direct labor and materials in the MoE-Multiple Subfamily and identify the specific type of work performed.

When turnaround Functions are used, Functions are associated with either car or locomotive servicing and are allocated by CUT or a locomotive activity statistic respectively, either DLU or ELU. At the turnaround servicing locations that utilize outside contractors, direct costs are not differentiated by equipment type and costs are allocated instead by TUT.

Direct car and locomotive maintenance functions require Work Element Numbers from WMS from which specific equipment types are inferred. Costs coded to these Functions are allocated by specific xUU and xUM statistics for specific types of equipment. UU is used to allocate preventive maintenance costs as such maintenance is largely based on time. UM is used to allocate nonpreventive maintenance costs as such maintenance is based on usage. Car and locomotive maintenance direct costs are allocated nationally to all trains that use the corresponding equipment type.

Indirect costs are those for which a particular equipment type cannot be identified and are allocated in a second round by MoE MDC using a ResCen Stat Qualifier. MDC is the sum of direct cost allocated to a train or other customer at a ResCen. After direct costs are allocated, MDC is calculated and indirect costs are allocated to each train or customer at a ResCen in proportion to its share of total MDC for all customers services by that specific ResCen.

Amtrak maintains trains for several outside commuter agencies, the costs of which are coded to agency-specific ResCens or Functions. In both cases, these costs are allocated by NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to a single customer identified for that Function or ResCen. In some cases, using a Work Element Number is required to identify the appropriate customer when a general Reimbursable or Recollectable Function is used.

Capital expenses are occasionally coded to ResCens in this Subfamily but are not allocated or assigned. Unallocated capital expenses coded to this Subfamily are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other customers using that asset.

When Turnaround Functions are used in this Subfamily, train groups are needed to identify the specific trains to which costs at a ResCen are allocated since trains are not always serviced at each turnaround ResCen enroute. Activity groups are not required when locomotive or car maintenance Functions are used in this Subfamily because costs for these Functions are allocated nationally to appropriate trains based on the equipment types used by each train.

In other Subfamilies, costs associated with the same activity of Function are allocated using the same or similar statistics and other costs not typically associated with the main Subfamily activity are allocated using a "miscellaneous" rule. In the MoE-Multiple Subfamily however, the diversity of costs within individual ResCens requires a finer level of allocation. For instance, MoE-Multiple ResCen 4753 (Boston MoE Support Shops) performs several activities, including Turnaround Servicing, Car Maintenance, Locomotive Maintenance, and Maintenance Support.

Table 7-10 is an overview of the cost allocation for MOE-Multiple ResCen 4573.

Table 7-10: MoE-Multiple ResCen 4753 – Boston MoE Support

Related Subfamily	FY07 Costs	Share	Allocation Statistic
Turnaround Servicing	$6,110,612	48.7%	CUT
Locomotive Maintenance.	$369,331	2.9%	UU/UM
Car Maintenance.	$1,634,579	13.0%	UU/UM
Maintenance Support	$4,432,264	35.3%	MDC

In their respective families, Turnaround Servicing Function costs are allocated largely by CUT, while Maintenance Function costs are allocated by either UU or UM and Support Function costs are allocated by MDC. If this ResCen had been assigned to the Turnaround Servicing Subfamily, the remaining majority of maintenance costs would have been allocated by the statistic for the Turnaround Servicing miscellaneous rule, in this case CUT. Using a more detailed allocation method within the MoE-Multiple Subfamily allows for a more accurate allocation of costs where ResCens perform multiple activities.

Summary

Table 7-11 is an overview of the cost allocation for the MoE Multiple Subfamily.

Table 7-11: MoE Multiple Subfamily Overview

Subfamily	MoE-Multiple - #205		
Subcategory	MoE-Multiple - General (205_0)		
FY 2007 Expenditures (Mil.)	$123.4		
Business Types To Which Costs Are Allocated	NTS, CIA, COP		
Number of ResCens	22		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Car Turnaround Service	1828	$40.3	32.6%
Car Program Maintenance.	1829	$15.8	12.8%
Car Bad Orders	1830	$10.1	8.2%
MoE-Vacation/Holiday/Non-Prod Labor	1815	$7.9	6.4%
MoE Supervision Clerical & Office	1808	$7.3	5.9%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
Car Unit Trips	CUT	$40.4	32.7%
Mechanical Direct Cost	MDC	$33.0	26.8%
Units Used	UU	$20.6	16.7%

7.2.6 High Speed Rail Maintenance Subfamily

Family: **MoE - #200**
Subfamily: **HSR Maintenance - #206**

Scope

The High Speed Rail (HSR) Maintenance Subfamily performs all activities related to maintaining Amtrak's high speed rail (Acela) equipment, including rolling stock maintenance, turnaround servicing, management, and support activities. Additionally, Amtrak contracts with Alstom to manage material control for Acela trains, including the supply of overhaul packages, scheduled maintenance kits, other maintenance materials, and technical assistance.

Subfamily expenditures for FY07 were $64.1 million and account for 1.5 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level exclusively to Amtrak's high speed Acela trains. All direct maintenance costs are allocated based on the Acela Units Used (ALU) statistic. Because all direct expenses are allocated using a single statistic, indirect and miscellaneous costs also can be allocated at the ResCen level using the same statistic, ALU, and no second round allocation is required. In addition, no Stat Qualifiers are required for this Subfamily.

Table 7-12 is an overview of the cost allocation for the HSR Maintenance Subfamily.

<p align="center">Table 7-12: HSR Maintenance Subfamily Overview</p>

Subfamily	HSR Maintenance - #206		
Subcategory	**HSR Maintenance - General (206_0)**		
FY 2007 Expenditures (Mil.)	$64.1		
Business Types To Which Costs Are Allocated	NTS		
Number of ResCens	6		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
HST Program Service	1853	$13.3	20.7%
HST Bad Orders	1854	$12.5	19.5%
HST Turnaround Servicing	1852	$11.6	18.1%
MoE Managerial	1801	$10.4	16.2%
Contract Roll Stock Mgt/Maintenance	1851	$5.3	8.3%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Acela Express Units Used	ALU	$59.0	92.0%
Direct (Unallocated)	NON	$5.1	8.0%

7.2.7 Backshop Subfamily

Family: **MoE - #200**
Subfamily: **Backshop - #207**

Scope

The ResCens in the Backshop Subfamily perform major repairs and capital overhauls, and produce and repair components. They also perform some minor car and locomotive maintenance and servicing. Amtrak has three Backshop facilities, located in Beech Grove, Indiana; Bear, Delaware; and Wilmington, Delaware. These facilities are functionally and geographically separate from the Car and Locomotive Maintenance Subfamily facilities, which focus on preventative maintenance and noncapital repairs. Amtrak's WMS tracks labor and materials costs, the type of work performed, and specific unit numbers and equipment types on which work is performed.

Subfamily expenditures for FY07 were $202.4 million (inclusive of transfer credits) and accounted for 4.9 percent of Amtrak's total expenses.

Cost Allocation Method

Several major categories of expenditures are recorded in the Backshop Subfamily corresponding to the varied activities performed in this Subfamily. These expense categories include capital expenditures, component expenses, direct maintenance and servicing costs, indirect costs, and expenses assigned directly to customers or other businesses. The largest share of costs in this Subfamily is coded to capital Functions and is not allocated. Capital expenditures in this Subfamily include any expenditure for capital improvements necessary to extend the life of Amtrak rolling stock (specifics are provided in Appendix A, Table A-23, Profile for Subfamily Backshop). Unallocated capital expenses coded to the Backshop Subfamily are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other customers using that asset (see Section 7.7.1, Capital Subfamily).

The next largest category of costs is component expenditures. Component expenditures are costs incurred to rework rolling stock components in preparation for return to the mechanical facilities. If the labor and material costs incurred to rework a component are different from the standard cost used when the component is transferred back to the mechanical facility, a residual balance remains in the Backshop ResCen that still must be allocated. As components themselves are fungible and can be used on many different pieces of equipment, the costs of component repairs are allocated not as other equipment maintenance costs to trains using that equipment type, but as indirect costs as described below.

Indirect costs in the Backshop Subfamily are those that cannot be directly tied to a particular train or equipment type. These costs are allocated in a second round allocation based on total MDC. MDC is the sum of direct mechanical costs allocated to a train or other customer and is calculated after all direct mechanical costs are allocated. Because the majority of costs in the Backshop Subfamily are unallocated capital costs, a portion of indirect costs in the Backshop Subfamily are related to capital work and should also be unallocated. Using billing rates established by Amtrak finance staff, an overhead rate is calculated for the capital costs incurred in the Backshop Subfamily. A credit is then issued to Backshop ResCens for the overhead associated with this capital work. Both indirect costs in the Backshop Subfamily and this credit are allocated to trains using the same method, which achieves the same effect as crediting total Backshop Subfamily indirect costs by the amount of overhead associated with capital work.

Where direct locomotive and car maintenance Functions are used in the Backshop Subfamily, the allocation rules are the same as those in the Locomotive Maintenance and Car Maintenance Subfamilies for the same Functions. Costs for maintaining a certain type of equipment are allocated at the national level to all trains that utilize that type of equipment. Direct costs are recorded to direct maintenance Functions. Direct maintenance Functions identify the specific type of work performed and also are coded with Work Element Numbers from which specific equipment types are inferred. Costs coded to direct maintenance Functions are allocated xUU and xUM statistics for specific equipment types. UU is used to allocate scheduled Backshop

maintenance costs as such costs typically are based on time and UU is a time-based statistic. UM is used to allocate wreck and accident costs as such costs typically are related to usage. Direct costs are allocated nationally to all trains that use the corresponding equipment type.

Amtrak performs Backshop work for several outside commuter agencies, the costs of which are captured using Functions dedicated to an individual commuter agency. These costs are allocated by NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to a single customer identified for that Function or ResCen. In some cases, a Work Element Number is required to identify the appropriate customer when a general Reimbursable or Commuter Function is used.

Summary

Table 7-13 is an overview of the cost allocation for the Backshop Subfamily.

Table 7-13. Backshop Subfamily Overview

Subfamily	Backshop- #207		
Subcategory	**Backshop- General (207_0)**		
FY 2007 Expenditures (Mil.)	$202.4		
Business Types To Which Costs Are Allocated	NTS, COP, Reimbursable		
Number of ResCens	40		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Equip-Overhaul	3001	$106.4	52.5%
Component WIP Inventory	1810	$24.1	11.9%
Equip-Remanufacture	3000	$21.9	10.8%
Equip-Other Modifications	3004	$17.7	8.7%
MoE Overhead	1814	$14.0	6.9%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Mechanical Direct Costs	MDC	$43.2	21.3%
Car Unit Miles	CUM	$2.9	1.5%
Direct (Unallocated)	NON	$150.0	74.1%

7.3   Transportation Operations (OPS) Family

7.3.1   Onboard Services (OBS) Subfamily

Family: **Ops - Transportation - #300**
Subfamily: **OBS - #301**

Scope

The Onboard Services (OBS) Subfamily provides customer services onboard passenger trains including food and beverage (F&B), entertainment, and sleeping car services. The Subfamily includes the direct and indirect labor costs of the employees providing such services, the costs of materials and supplies, commissary operation costs, costs for contractors to operate the commissaries, and managerial and overhead costs. The Subfamily consists of four Subcategories: Crew, Supplies-F&B, Commissary/Management-F&B, and Support.

Cost Allocation Method

Subfamily expenditures (for all four Subcategories) for FY07 were $231.4 million and account for 5.6 percent of Amtrak's total expenses.

Many of the costs for this Subfamily are direct labor costs for the OBS crewmembers that are assigned directly to Amtrak trains through the OBS crew Labor Management System (known as LMS). Allocations for indirect labor-related costs are at the ResCen level to Amtrak trains with the allocation statistics depending on the Function used. OBS management and crew-related costs that are not directly assigned to trains, such as extraboard guarantee, benefits, crew meals, crew lodging, crew transportation, overhead, vacation, and holidays, are allocated to trains based on OBS labor hours (OLH) for those trains. Craft-specific labor hours, such as Dining Labor Hours (DLH), are used to allocate indirect labor costs with a corresponding craft-specific Function where possible, in this case FN1321-OBS Dining & Snack.

Commissary costs, including outsourced contract costs paid to Gate Gourmet, Inc. as well as Amtrak management and support costs, are allocated at the ResCen level to the Amtrak trains served by that commissary. Commissary costs are related to the level of food service offered onboard individual trains and are allocated by a statistic that measures the revenues received on each train (Dining Car Revenues or DRV). Each route has its own ResCen for food and beverage costs and indirect costs are allocated by DRV to the trains within that route. Expenditures for food supplies, beverages, crew meals, condemned food, and nonconsumables such as linens are all assigned directly to trains with no need to allocate.

Summary

Table 7-14 is an overview of the cost allocation method for the OBS Subfamily. Greater detail on the cost allocation method for the four Subcategories within this Subfamily can be found in Appendix A.

Table 7-14: OBS Subfamily Overview

Subfamily	OBS - #301		
Subcategories	**Crew (301_1), Supplies- F&B (301_2), Commissary/Mgmt.- F&B (301_3), Support (301_4)**		
FY 2007 Expenditures (Mil.)	$231.4		
Business Types To Which Costs Are Allocated	NTS		
Number of ResCens	120		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
OBS Dining & Snack	1321	$137.1	59.2%
Commissary	1311	$25.2	10.9%
OBS Sleeping Car	1331	$23.1	9.9%
OBS Coach Service	1341	$21.6	9.3%
OBS Management & Supervision.	1301	$10.8	4.7%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Dining Car Revenue	DRV	$145.7	63.0%
Dining Labor Hours	DLH	$25.1	10.9%
Onboard Labor Hours	OLH	$23.1	10.0%

7.3.2 T&E Subfamily

Family: **Ops - Transportation - #300**
Subfamily: **T&E - # 302**

Scope

The T&E Family[38] covers the direct labor and indirect labor-related costs of operating trains. Enginemen are the engineers who operate locomotives, while trainmen are the conductors who are in overall control of trains. Together, they are referred to as the road crew.   T&E are attached to one of 59 crew bases. A crew base is a road crew's geographic base of operations and may consist of multiple ResCens broken down by craft or route. Crew bases are where T&E sign in, obtain their manifests, receive briefings and perform administrative tasks. Amtrak T&E crews work on both Amtrak trains and commuter trains operated by Amtrak and their costs are assigned or allocated to both to Amtrak core passenger rail business and its commuter operations business. The T&E Subfamily consists of two Subcategories: Crew and Support. The Crew Subcategory consists of road crews and their immediate supervisors, whereas the Support Subcategory consists of management and supervisory costs.

Subfamily expenditures (for both Subcategories) for FY07 were $272.3 million and account for 6.6 percent of Amtrak's total expenses.

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[38] The terms "trainman" and "engineman" are used in a gender-neutral manner to apply to both men and women.

Cost Allocation Method

Most of the costs for this Subfamily are direct labor costs for the T&E road crews and are assigned directly to Amtrak trains through Amtrak's crew payroll management system (paperless time ticket or PTT). Every trainman and engineman has a "job symbol," a unique number that identifies the trains, scheduled hours, and pay rate associated with that employee and his position. When a trainman or engineman signs into the PTT system, his or her time is automatically assigned to one or more train that day (Amtrak, commuter, or Reimbursable business-related trains) based on the schedule.

Indirect costs in this Subfamily are also labor-related. Indirect costs include items such as extraboard guarantee, benefits, crew meals, crew lodging, crew transportation, vacation, holidays, other wages, and overhead management and support. These indirect costs are allocated by the level of crew activity for each train. Cost allocations are at the ResCen level with the allocation statistics depending on the Function used. All T&E costs that are not directly assigned to trains, are allocated to trains based on total Trainmen and Enginemen labor hours (TEH) or, where appropriate and feasible, craft-specific labor hours, such as Function 1643 (Qualifying Trainmen) costs are allocated using Trainmen labor hours (TLH). Costs are assigned or allocated to the trains that are served by the T&E attached to a particular ResCen.

Summary

Table 7-15 is an overview of the cost allocation method for the T&E Subfamily. Greater detail on the cost allocation method for the two Subcategories within this Subfamily can be found in Appendix A.

Table 7-15: T&E Subfamily Overview

Subfamily	T & E - #302		
Subcategories	**Crew (302_1), Support (302_2)**		
FY 2007 Expenditures (Mil.)	$272.3		
Business Types To Which Costs Are Allocated	NTS, COP		
Number of ResCens	167		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Passenger Train Trainmen	1635	$110.3	40.5%
Passenger Train Enginemen	1633	$79.1	29.0%
T&E Overhead	1617	$39.4	14.5%
Transportation Mgmt & Supervision	1601	$10.1	3.7%
Train Ops-Spec Project	1689	$7.31	2.7%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**

Subfamily	T & E - #302		
Subcategories	Crew (302_1), Support (302_2)		
Trainmen Labor Hours	TLH	$115.0	42.3%
Enginemen Labor Hours	ELH	$86.3	31.7%
Trainmen & Enginemen Hours	TEH	$70.9	26.1%

7.3.3 Yard Subfamily

Family: **Ops-Transportation-#300**
Subfamily: **Yard-#303**

Scope

The Yard Subfamily performs activities that support the movement of train equipment in preparation for revenue service. This includes the movement of trains between the yard and station, the makeup and breakup of trains, the movement of equipment to and from mechanical facilities, and the managerial costs related to scheduling the equipment moves and overseeing yard operations. The Yard Subfamily consists of four subcategories, each composed of groups of ResCens with similar missions and activities. While all of the Subcategories perform general operations and activities that properly fall in the Yard Subfamily, the Subcategories provide a finer level of detail for reporting and allocation purposes. The four subcategories are:

- Train & Equipment: the general case of yard ResCens that perform train makeup and breakup in support of transportation operations,
- Equipment Moves: yards that focus primarily on equipment moves in support of mechanical operations in addition to general yard operations,
- Yard Direct: yard ResCens that exclusively support Commuter operations, and
- Terminal Rent/Yard Services: ResCens incur costs paid by Amtrak for yard services performed by outside agencies or railroads.

Subfamily expenditures for FY07 were $55.9 million and account for 1.3 percent of Amtrak's total expenses.

Cost Allocation Method

All of the costs in this Subfamily are labor-related, but unlike T&E road crews, yard crew labor charges are never directly assigned to specific trains. Equipment movements vary daily depending on service changes, mechanical failures, and scheduled maintenance. While most of the costs are allocated to Amtrak trains, several yard ResCens are dedicated to an individual commuter operation and their costs are assigned directly to the appropriate customer. Some yard ResCens service commuter equipment in addition to Amtrak trains, in which case the Activity Group for such ResCens includes both types of customers. All costs are allocated at the ResCen level to an Activity Group particular to the individual location.

TUT is the primary allocation statistic in this Subfamily. In a typical yard ResCen, such as in the Train & Equipment Moves Subcategory, costs are allocated by TUT because trains with more

cars, more locomotives, and more varied types of equipment, ceteris paribus, require more crew time for train makeup and breakup and also are more likely to have mechanical failures. Yards in the Equipment Moves Subcategory require an unusually high level of mechanical support and use an ACK Ratio to split and allocate costs, using both the standard TUT statistic and the MDC statistic to reflect the relatively higher level of maintenance-caused activity. MDC is employed because it is consistent with the method for allocating support in the mechanical Family; the MDC statistic is a measure of the share of direct mechanical expenses incurred by a particular train at a mechanical ResCen relative to total direct mechanical costs at that ResCen. An ACK Ratio is used at yard ResCens in Chicago and New York. The Yard Direct Subcategory includes ResCens whose costs are allocated exclusively to outside commuter agencies, and the Terminal Rent/Yard Services Subcategory includes ResCens whose costs consist largely of terminal rent yard support provided by outside agencies/railroads.

The Yard Subfamily is unique in that the allocation methodology differs depending on the ResCen at issue. Subcategories are used not only to break out different types of costs (as in some other Subfamilies), but, in this case, to define a distinct allocation method. The Subfamily structure was initially created to implement consistent allocation methods across similar ResCens. However, in the case of the Chicago and New York yards, rather than move these ResCens with their unique allocation rules into a new Subfamily, they were kept in the Yard Subfamily but placed in the Equipment Moves Subcategory.

Summary

Table 7-16 is an overview of the cost allocation method for the Yard Subfamily.

Table 7-16: Yard Subfamily Overview

Subfamily	Yard - #303		
Subcategories	Yard Direct (303_1), Train & Equipment Moves (303_2), Equipment Moves (303_3), Terminal Rent/Yard Services (303_4)		
FY 2007 Expenditures (Mil.)	$55.9		
Business Types To Which Costs Are Allocated	NTS, CIA, COP		
Number of ResCens	29		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Yard Trainmen Operations	1623	$19.2	34.3%
Yard Engine Crew Operations.	1622	$16.6	29.6%
T&E Overhead	1617	$4.8	8.6%
Joint Terminal Facility	1651	$4.7	8.5%
Yardmasters and Clerks	1621	$3.1	5.6%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
Total Unit Trips	TUT		
Total Unit Trips	TUT	$45.3	81.0%
Mechanical Direct Cost	MDC	$10.6	19.0%

7.3.4 Fuel Subfamily

Family: **Ops - Transportation - #300**
Subfamily: **Fuel - #304**

Scope

The Fuel Subfamily records diesel fuel costs for Amtrak trains used in passenger service and for certain commuters. Costs incurred at ResCens in this Subfamily are the costs of fuel only; no labor or other costs are recorded in the Subfamily. Some diesel fuel-related costs are not coded in FIS to the ResCens in this Subfamily. For example, costs for diesel fuel purchased from other railroads used to fuel Amtrak trains are recorded in the Ops-Transportation: Train Movement-Host RR Subfamily, while costs associated with fuel hedging activities are incurred in RC0802—Treasury Mandatory—located in the G&A Corporate Administration Subfamily.

Subfamily costs for FY07 were $121.2 million and account for 2.9 percent of Amtrak's total costs.

Cost Allocation Method

Fuel costs are allocated exclusively by the statistic diesel power usage factor (DPUF) using a national allocation. Costs are allocated based on train's systemwide DPUF, not its DPUF attributable to a particular region or ResCen. DPUF is a new calculated statistic that incorporates factors such as a train's weight, trip length, trip time, locomotive type, and car types, as well as certain track and terrain characteristics. Fuel costs at commuter-specific ResCens are assigned directly to the relevant commuter agencies. Although costs for diesel fuel purchased from other railroads and for fuel hedging activities are recorded in other Subfamilies, they are nevertheless allocated using the same method specified for this Subfamily.

The national allocation of fuel to all diesel trains in this methodology replaces Amtrak's ResCen allocation method in RPS that combined fixed allocation percentages for short- and long-distance trains with an allocation by the gallons consumed (GLC) statistic. The previous allocation resulted in inaccurate results if trains fueled at multiple ResCens—an operating practice that often occurred. The national allocation removes this inaccuracy by creating a single activity group and also uses an improved allocation statistic.

Summary

Table 7-17 is an overview of the cost allocation method for the Fuel Subfamily.

Table 7-17: Fuel Subfamily Overview

Subfamily	Fuel - #304		
Subcategory	Fuel - General (304_0)		
FY 2007 Expenditures (Mil.)	$121.2		
Business Types To Which Costs Are Allocated	NTS, COP		
Number of ResCens	45		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Train Operations	1631	$119.0	98.2%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
Diesel Power Usage Factor	DPUF	$121.2	100%

7.3.5 Transportation – Multiple Subfamily

Family: **Ops-Transportation- #300**
Subfamily: **Transportation-Multiple- #305**

Scope

ResCens in the Transportation-Multiple Subfamily perform various Ops-Transportation activities using FIS Functions that are typically used in other Subfamilies. The ResCens in this Subfamily

performs two or more main activities to a degree that precludes their inclusion in a single Subfamily. The types of activities performed at these ResCens include Functions that would otherwise be located in the T&E, OBS, Transportation Support, Station Operations, and Yard Subfamilies.

Subfamily expenditures for FY07 were $35.0 million and account for 0.8 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations for ResCens in this Subfamily are performed at the ResCen and Function levels and in some cases at the Account level. There is no primary allocation statistic for this Subfamily; the statistic used for each allocation is dependent on the Function and Account information coded to the expense record. Statistics used in this Subfamily include, but are not limited to, TEH, OLH, crew hours (CRH), TUT, and TBD. The Subfamily serves both Amtrak and commuter trains, but specific customers and Activity Groups will be determined at each individual ResCen.

In other Subfamilies, expenses associated with the same activity or Function are allocated using the same or similar statistics and other expenses not typically associated with the main Subfamily activity are allocated using a "miscellaneous" rule. In the Transportation-Multiple Subfamily however, the diversity of expenses within individual ResCens requires a finer level of allocation. For instance, ResCen 2834 (Asst Supt Passenger Svc NW Dist) performs both OBS activities as well as Station operations activities. OBS-related activity accounted for nearly 70 percent of expenses, while Stations-related activity accounted for the remaining 30 percent.

Table 7-18 summarizes expenses for MOE-Multiple ResCen 2834–Asst Supt Passenger Svc NW Dist

Table 7-18: ResCen 2834-Asst Supt Passenger Svc NW Dist

Related Subfamily	FY07 Expenses	Share	Allocation Statistic
OBS	$567,956	69.4%	OLH
Stations	$249,880	30.6%	TBD

In their respective families, OBS Function expenses are allocated by OBS crew hours (CRH), while Stations Function expenses are allocated by TBD. If this ResCen had been assigned to the OBS Subfamily, the remaining 30 percent in Stations-related expenses would have been allocated by the statistic for the OBS miscellaneous rule, in this case OLH. Using a more detailed allocation method within the Transportation-Multiple Subfamily allows for a more accurate allocation of costs where ResCens perform multiple activities.

Summary

Table 7-19 is an overview of the cost allocation method for the Transportation–Multiple Subfamily.

Table 7-19: Transportation-Multiple Subfamily Overview

Subfamily	Transportation–Multiple - #305		
Subcategory	**Transportation–Multiple - General (305_0)**		
FY 2007 Expenditures (Mil.)	$35.0		
Business Types To Which Costs Are Allocated	NTS, CIA, COP		
Number of ResCens	9		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Passenger Train Trainmen	1635	$7.7	22.2%
Passenger Train Enginemen	1633	$5.0	14.3%
OBS Management & Supervisors	1301	$4.4	12.6%
Trans. Management & Supervisors	1601	$3.4	9.8%
T&E Overhead	1617	$2.2	6.4%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Trainmen Labor Hours	TLH	$8.0	22.8%
Enginemen Labor Hours	ELH	$5.3	15.1%
Onboard Labor Hours	OLH	$4.7	13.4%

7.3.6 Train Movement Subfamily

Family: **Ops-Transportation - #300**
Subfamily: **Train Movement - #306**

Scope

The Train Movement Subfamily performs activities associated with moving passengers from endpoint to endpoint. This includes managing train dispatching, signal or interlocking operations, and connecting bus service. The Subfamily includes the Centralized Electrified Traffic Control Center (CETC) offices, Consolidated National Operations Center (CNOC), block operators at various locations, and staff responsible for setting and enforcing operating rules and standards.

Subfamily expenditures for FY07 were $69.2 million and account for 1.7 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level to the appropriate Amtrak trains, freight, and commuter customers. The primary allocation statistic for the Subfamily is FTT, allocating train movement expenses to trains based on the number of trips made on the network. This Subfamily uses a city pair Stat Qualifier to allocate ResCen expenses to trains operating over particular portions of the Amtrak network. Using a city pair Stat Qualifier allows ResCen expenses to be allocated to all trains that travel over a specific area (set of city pairs) without the need for Activity Groups, which would need to be periodically updated. As FTT is automatically available from OMS at the city pair level, the Stat Qualifier will automatically allocate costs to all trains that travel over a specified segment. Once the city pairs for a ResCen are defined, the particular trains, receiving a share of costs, change dynamically depending on actual monthly operations.

Summary

Table 7-20 is an overview of the cost allocation method for the Train Movement Subfamily.

Table 7-20: Train Movement Subfamily Overview

Subfamily	Train Movement - #306		
Subcategory	**Train Movement - General (306_0)**		
FY 2007 Expenditures (Mil.)	$69.2		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight		
Number of ResCens	35		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
	Code Number	**Expenditures**	**Percent of Family**
Caltrans Bus Services	1648	$21.4	30.9%
Train Dispatching	1632	$13.9	20.1%
Signal & Interlocker Operation	1634	$11.8	17.1%
Transportation Management & Supervision	1601	$9.7	14.0%
Qualifying Block & Tower	1637	$1.9	2.7%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Frequency	FTT	$68.4	98.8%
Total Unit Trips	TUT	$0.5	0.7%
Baggage Units Demanded	BGU	$0.2	0.3%

7.3.7 *Train Movement-Host RR Subfamily*

Family: **Ops - Transportation - #300**
Subfamily: **Train Movement - Host RR - #307**

Scope

The Train Movement-Host RR Subfamily captures the costs incurred by Amtrak for services provided by the freight railroads, including infrastructure access, renting or leasing freight locomotives, purchased fuel, repairs to Amtrak rolling stock, dispatching and signal services, and station costs. Also included are incentive payments to host railroads for adherence to scheduled departure and arrival times.

Subfamily expenditures for FY07 were $91.9 million and account for 2.2 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level to the appropriate Amtrak trains and commuter customers. The primary statistic for the Subfamily is total train miles (TTM), allocating host railroad costs to trains or commuter customers based on their share of train miles traveled over a railroad's territory. This Subfamily uses a railroad-type Stat Qualifier to allocate ResCen expenses to trains operating over specified portions of each host railroad's network. A railroad Stat Qualifier is the combination of city pairs that make up the geographic area of each host railroad. TTM is available at the city pair level and an individual train's proportion of all train activity over that city pair can be determined. This information is then used to allocate costs to a set of trains for each ResCen associated with that city pair.

Using a railroad Stat Qualifier allows for the allocation of ResCen expenses to all trains or commuter customers that travel over a host railroad's network without the need for Activity groups, which would need to be periodically updated. As TTM is automatically available from OMS at the city pair level, the Stat Qualifier automatically allocates cost to all trains that travel over a specified segment. Once a set of city pairs is defined for a ResCen, the particular trains, receiving a share of cost, change dynamically depending on actual monthly operations.

Table 7-21 is an overview of the cost allocation method for the Train Movement-Host RR Subfamily.

Table 7-21: Train Movement-Host RR Subfamily Overview

Subfamily	Train Movement - Host RR - #307		
Subcategory	Train Movement - Host RR - General (307_0)		
FY 2007 Expenditures (Mil.)	$91.9		
Business Types To Which Costs Are Allocated	NTS, COP		
Number of ResCens	28		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Railroad Track & Roadway	1711	$37.8	41.2%
Railroad Incentives & Avoidable Cost	1691	$16.5	17.9%

Subfamily	Train Movement - Host RR - #307		
Subcategory	**Train Movement - Host RR - General (307_0)**		
Transportation Operations Railroad	1641	$16.0	17.4%
Train Operations	1631	$12.9	14.1%
R.R. Unallocated	1161	$5.6	6.1%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Total Train Miles	TTM	$89.6	97.6%
Total Boards and Deboards	TBD	$1.1	1.3%
Total Locomotive Unit Miles	TLM	$0.7	0.8%

7.3.8 Transportation Support Subfamily

Family: **Ops -Transportation - #300**
Subfamily: **Transportation Support - #308**

Scope

The Transportation Support Subfamily performs supervision and support for the operation of passenger train service. The Subfamily includes the costs of general and assistant superintendents, railroad foremen, assistant foremen, and other transportation-related activities. ResCens in the Transportation Support Subfamily support other Ops–Transportation ResCens that directly perform transportation services.

Subfamily expenditures for FY07 were $80.7 million and account for 1.9 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level to the appropriate Amtrak trains, freight, or commuter customers. The primary allocation statistic is TUT, allocating costs to trains or other customers based on their share of units traveling over the network. This Subfamily supports train activity, but does not provide direct train operations. For this reason, the Subfamily uses a ResCen group Stat Qualifier to allocate costs. A ResCen group Stat Qualifier allocates expenses from a Transportation Support ResCen to trains that are directly serviced at ResCens that are supported by that Transportation Support ResCen. The Stat Qualifier dynamically creates a pool of trains that are indirectly supported by the Transportation Support ResCen and allocates costs based on a particular train's share of TUT.

As in other Subfamilies, the statistic Total Passenger Miles (TPM) is used to allocate passenger inconvenience costs, but directly coding such costs to the appropriate trains is the preferred method and the future Amtrak goal.

Summary

Table 7-22 is an overview of the cost allocation method for the Transportation Support Subfamily.

Table 7-22: Transportation Support Subfamily Overview

Subfamily	Transportation Support - #308		
Subcategory	**Transportation Support - General (308_0)**		
FY 2007 Expenditures (Mil.)	$80.7		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight		
Number of ResCens	104		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Transportation Management & Supervision	1601	$40.6	50.3%
Division Administrative	1002	$10.1	12.5%
Corporate Service Centers	1121	$3.8	4.7%
Road Land & Other WIP	1123	$2.6	4.5%
Corporate Administration	1291	$1.8	3.8%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Total Unit Trips	TUT	$78.5	93.4%
Passenger Total Miles	TPM	$1.8	2.2%
Direct (Unallocated)	NON	$3.6	4.5%

7.3.9 Power-Electric Traction Subfamily

Family: **Ops-Transportation - #300**
Subfamily: **Power-Electric Traction - #309**

Scope

The Power-Electric Traction Subfamily captures the direct cost of powering electrified train service on the NEC and the Keystone route. The corridor is divided into northern and southern segments (north and south of New York City, respectively) with Amtrak purchasing power from 10 vendors on the entire corridor, as well as from commuter agency Metro North for the portion of the NEC between New Rochelle, NY, and New Haven, CT. In addition to purchasing electric power, Amtrak is reimbursed through agreements by commuter rail agencies for their power consumption on the southern segment, though this is treated as a revenue transaction.

Subfamily expenditures for FY07 were $100.2 million and account for 2.4 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level to all trains traveling over the segment served by each ResCen. As the three ResCens in this Subfamily each serve a particular area, the allocation is regionally-based. Costs at ResCen 0738 (Northend Propulsion) are allocated to trains on the northern segment of the NEC (except for the 56 miles of Metro North-owned track between New Rochelle, NY, and New Haven, CT) using the statistic Electric Power Usage Factor (EPUF). EPUF estimates power consumed by a train based on distance, car weight, and "hotel" power for onboard services. A station pair Stat Qualifier called "Electric North" is used to allocate costs only to those trains that travel on the individual segments specified by the Stat Qualifier.

Costs as ResCen 0739 (Southend Propulsion) are allocated to trains on the southern segment of the NEC, including the Keystone Corridor, by EPUF using an ACK Ratio in combination with a station pair Stat Qualifier. Four commuter agencies operate electric train service on the southern segment, but the limited operational data that they provide to Amtrak does not allow for their allocation by EPUF. A study by SYSTRA Consulting, Inc. simulated electric power usage by NEC users and a Customer Electric Percentage (CEP) for each was estimated from this data. These percentages are used as the factors in an ACK Ratio that splits ResCen 0739 costs among Amtrak and the other southern segment commuter operators. Amtrak's share of costs, 49 percent, is then allocated to Amtrak trains using EPUF, stat qualified at the station pair level. A station pair Stat Qualifier called "Electric South" is used to allocate costs to only those trains that travel on the individual segments specified by the Stat Qualifier. For the percentage assigned to each commuter agency, the costs are allocated by the NON statistic. The NON statistic does not apportion costs among multiple trains or customers, but directly assigns previously designated costs (in this case designated by the CEP using the ACK ratio) to a single customer. Table 7-23 summarizes CEP by user.

Table 7-23: Southend Customer Electric Percentages (CEP) by User

Amtrak	MARC	NJT	SEPTA	DelDOT
0.490	0.040	0.360	0.105	0.005

Costs at ResCen 0740 (Power Purchased from RR) consists of power expenses paid to Metro North incurred for the Amtrak trains using its 56 miles of track between New Rochelle, NY, and New Haven, CT. Amtrak is billed for these costs based on each train's Total Unit Miles (TUM) and for consistency purposes these expenses are allocated to its trains in the same manner. A "MetroNorth" station pair Stat Qualifier is used to calculate each Amtrak train's TUM within the 56 mile Metro North segment.

Some expenditures at ResCen 0739 are recorded with Account 510419 (Electricity Hedge Settlement) and are allocated to specific Amtrak passenger trains by EPUF with the Stat Qualifier "AmtrakElectric," which incorporates Amtrak's entire electrified network.

Because the SYSTRA study calculated CEP using service level estimates at a point in time, the ACK Ratios used to allocate costs in this Subfamily will need to be updated as new estimates are made or as commuter agencies adjust service levels.

Summary

Table 7-24 is an overview of the cost allocation method for the Power-Electric Traction Subfamily.

Table 7-24: Power-Electric Traction Subfamily Overview

Subfamily	Power- Electric Traction - #309		
Subcategory	Power- Electric Traction - General (309_0)		
FY 2007 Expenditures (Mil.)	$100.2		
Business Types To Which Costs Are Allocated	NTS, CIA		
Number of ResCens	3		
Top 2 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Train Operations	1631	$98.2	98.0%
Road Land & Other WIP	3501	$1.9	2.0%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
Electric Power Usage Factor	EPUF	$90.7	90.6%
Total Unit Miles	TUM	$7.5	7.5&
Direct (Unallocated)	NON	$2.0	2.0%

7.4 Sales and Marketing Family

7.4.1 Sales Subfamily

Family: **Sales & Marketing - #400**
Subfamily: **Sales - #401**

Scope

The Sales Subfamily is responsible for such activities as field sales, sales administration, travel agent services, and commercial account services and includes expenditures for travel agency commissions, credit card commissions, and airline system access fees.

Subfamily expenditures for FY07 were $23.9 million and account for 0.6 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level using Function and Account information to spread Sales Subfamily expenditures to all Amtrak trains. As Sales activities and expenditures are driven by the number of tickets sold for a service, most costs are allocated to all Amtrak trains based in proportion to their share of total riders (TRD). Within Function 1201 Sales, Account data is used to separate those expenditures related to travel agent commissions and airline reservation system access expenditures. These expenditures are allocated by travel agent sales (TAS), a manual statistic available from the Train and Earnings System that calculates the level of sales by outside travel agents.

Summary

Table 7-25 is an overview of the cost allocation method for the Sales Subfamily.

Table 7-25: Sales Subfamily Overview

Subfamily	Sales - #401		
Subcategory	Sales - General (401_0)		
FY 2007 Expenditures (Mil.)	$23.9		
Business Types To Which Costs Are Allocated	NTS		
Number of ResCens	7		
Top 4 Function by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditure	Percent of Family
Sales	1201	$12.7	53.1%
Marketing Admin	1210	$1.0	4.4%
Corporate Service Centers	1121	$0.9	3.8%
Marketing Support	1225	$0.6	2.7%
Top 2 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditure	Percent of Family
Total Riders	TRD	$8.6	35.9%
Travel Agent Sales	TAS	$7.1	29.8%
Direct (Unallocated)	NON	$8.2	34.3%

7.4.2 Information & Reservations Subfamily

Family: **Sales & Marketing - #400**
Subfamily: **Information & Reservations - #402**

Scope

The Information & Reservations Subfamily provides reservation services to both the general public as well as interacting with outside travel agency reservations and information service

systems. The Subfamily captures the costs of reservation sales call centers (RSCC) as well as the costs of the operating information systems required for Amtrak reservation services.

Subfamily expenditures for FY07 were $83.6 million and account for 2.0 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level and costs are spread to all Amtrak trains. The exclusive allocation statistic for the Information & Reservations Subfamily is usage time (talk time) for reservations sales office operations (RSO), which assigns Information & Reservations costs to Amtrak routes based on the share of talk time at RSCCs spent booking reservations for each route relative to total talk time. RSO is calculated based on a 3-month rolling average talk time survey of calls at RSCCs.

Summary

Table 7-26 is an overview of the cost allocation method for the Information & Reservations Subfamily.

Table 7-26: Information & Reservations Subfamily Overview

Subfamily	Information & Reservations - #402		
Subcategory	Information & Reservations - General (402_0)		
FY 2007 Expenditures (Mil.)	$83.6		
Business Types To Which Costs Are Allocated	NTS		
Number of ResCens	8		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Reservations	1221	$42.0	50.2%
Reservations Management Administration	1220	$25.4	30.4%
Corporate Service Centers	1121	$5.4	6.4%
Reservations Special Services	1219	$3.5	4.2%
Ticketing-CTO and TBM	1223	$0.6	0.7%
Top 2 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
RSCC Talk Time	RSO	$77.9	93.2%
Direct (Unallocated)	NON	$5.7	6.8%

7.4.3 Marketing Subfamily

Family: **Sales and Marketing - #400**
Subfamily: **Marketing - #403**

Scope

The Marketing Subfamily performs marketing and sales support activities for Amtrak's core passenger rail business. Activities include market research, customer relations, general advertising, telephone directory advertising, production of timetables, and sales promotions. Some marketing efforts are focused on specific Amtrak routes.

Subfamily expenditures for FY07 were $57.5 million and account for 1.8 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level. Some ResCens in this Subfamily are systemwide in scope and are responsible for marketing for all routes, whereas others correspond to broad regions or, in some cases, individual routes. In these latter cases, costs are allocated to specific routes for ResCens as appropriate to the specific case.

All Function expenditures in this Subfamily are allocated using the passenger revenue (PRV) statistic. The use of PRV allocates more costs to routes with higher passenger revenues on the grounds that more marketing efforts are focused on these services. Although the ResCens in this Subfamily vary in their scope, Amtrak marketing staff confirmed that activities and costs at these ResCens are roughly proportional to route revenues.

Summary

Table 7-27 is an overview of the cost allocation for the Marketing Subfamily.

Table 7-27: Marketing Subfamily Overview

Subfamily	Marketing - #403		
Subcategory	Marketing - General (403_0)		
FY 2007 Expenditures (Mil.)	$57.5 M		
Business Types To Which Costs Are Allocated	NTS		
Number of ResCens	20		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditure**	**Percent of Family**
Advertising	1211	$28.1	48.9%
Marketing Support	1225	$13.8	24.0%
Marketing Admin	1210	$6.3	10.9%
Corporate Service Centers	1121	$3.5	6.1%
Sales	1201	$2.2	3.8%
Top2 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditure**	**Percent of Family**

Subfamily	Marketing - #403		
Subcategory	**Marketing - General (403_0)**		
Passenger Revenue	PRV	$57.4	99.7%
Direct (Unallocated)	NON	$0.2	0.3%

7.5 Stations Family

7.5.1 Stations-Route Subfamily

Family: **Stations - #500**
Subfamily: **Stations-Route - #501**

Scope

The Stations-Route Subfamily performs station service activities at station ResCens dedicated to a single route. These activities include ticketing, baggage and express services, stationmaster and usher activities, station cleaning and maintenance, snow and ice removal, making passenger inconvenience payments, and training and supervision of staff.

Subfamily expenditures for FY07 were $34.0 million and account for 0.8 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level to the single Amtrak route or commuter agency served by that station. Some expenditures are directly assigned to Reimbursable or Commuter customers. Most station operations costs are driven by the number of passengers served at that station and, as a result, are allocated by TBD, a direct statistic maintained in Amtrak's Revenue Data Warehouse, which reports passenger counts at specific stations. Other statistics are used to allocate the costs of specific Functions to trains served by that station. For example, costs related to baggage and express are allocated to trains by baggage units used (BUU), special train costs are allocated by TRD, and passenger inconvenience costs are allocated by TPM.

Where Amtrak operates stations for commuter railroad agencies, the expenditures are coded to agency-specific ResCens, or Reimbursable or Recollectable Functions dedicated to an individual commuter agency. In both cases, these expenditures are allocated by NON . The NON statistic does not apportion costs among multiple customers, but assigns all expenditures to a single customer identified for that Function or ResCen.

At stations with commercial activity, two percent of expenditures coded to Functions 1241, 1271, 1281, and 1285 is allocated to Amtrak's Commercial business to account for station costs related to operating this business. Although no passenger statistics exist for Amtrak's commercial business, the two-percent figure was selected because commercial activity at a station does increase the costs of operating a station and, therefore, a method was necessary to

account for these costs. Amtrak will conduct a study to relate commercial activity to station costs and adjust the method accordingly.

As in other subfamilies, TPM is used to allocate passenger inconvenience costs, but directly coding these costs to the appropriate Amtrak train is a future goal.

Summary

Table 7-28 is an overview of the cost allocation for the Stations-Route Subfamily.

Table 7-28: Stations-Route Subfamily Overview

Subfamily	Stations-Route - #501		
Subcategory	Stations-Route - General (501_0)		
FY 2007 Expenditures (Mil.)	$34.0		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Commercial		
Number of ResCens	129		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditure	Percent of Family
Station Services - Ticketing	1231	$24.9	73.2%
Station Services - Station Operations	1271	$3.2	9.5%
Station Services – Bldg. Maintenance	1281	$2.3	6.8%
Station Services - Baggage/Express	1261	$1.1	3.4%
SAP Payroll Adjustments	1234	$1.1	3.1%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditure	Percent of Family
Total Boards and Deboards	TBD	$32.5	95.5%
Baggage Units Used	BGU	$1.1	3.4%
Total Passenger Miles	TPM	$0.1	0.3%

7.5.2 *Stations-Shared Subfamily*

Family: **Stations - #500**
Subfamily: **Stations-Shared - #502**

Scope

The Stations-Shared Subfamily performs station service activities at stations ResCens serving multiple routes. These activities include ticketing, operating first class lounges, Red Cap and porter services, baggage and express services stationmaster and usher activities, station cleaning

and maintenance, snow and ice removal, making passenger inconvenience payments, and training and supervision of staff.

Subfamily expenditures for FY07 were $155.7 million and account for 3.7 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the ResCen level to the Amtrak trains or commuter agencies served by that station. Some expenditures are directly assigned to Reimbursable and Commercial customers. Most station operations costs are driven by the number of passengers served at that station and, as a result, are allocated by TBD, a direct statistic maintained in Amtrak's Revenue Data Warehouse that reports the passenger counts at specific stations. However, at those shared stations also used by outside commuter agencies, most station operations costs are allocated using Passenger Unit Trips (PUT) because the TBD statistic is unavailable for commuter activity. In such cases, PUT for Amtrak trains will be calculated automatically within APT using a city pair Stat Qualifier, while PUT for commuters will be calculated by Amtrak Contract Audit and Financial Controls group.

While most Stations-Shared costs are allocated using TBD and PUT, other statistics are used to allocate the costs of some specific Functions. Red Cap and porter costs, which are driven by activity on long-distance routes and not corridor (commuter type) services, are allocated by Trip-length Weighted Total Boards and Deboards (WBD). This statistic is calculated by dividing Passenger Miles for riders boarding or debarring from a particular station by TRD boarding or debarring at that station, creating a trip-length weight which is applied to TBD at that station. Costs to operate first class lounges are allocated to trains based on First Class Riders (FCR). Costs related to baggage and express are allocated to trains by BUU. Special train expenditures are allocated by TRD. Passenger inconvenience costs are allocated by TPM.

Where general Reimbursable or Commercial Functions are used in this Subfamily, expenditures coded to these Functions are assigned to the appropriate customer by NON. The NON statistic does not apportion costs among multiple customers, but assigns all expenditures to a single customer identified for that Function or ResCen. Where capital Functions are used by ResCens in the Stations-Shared Subfamily, they are not allocated. Unallocated capital expenses are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge. The capital charge is then allocated to the trains and other customers using that asset.

At stations with commercial activity, two percent of the cost of Functions 1241, 1271, 1281, and 1285 is allocated to Amtrak's Commercial business to account for station costs related to operating this business. The 2-percent figure was selected because, although no passenger statistics exist for Amtrak's Commercial business, commercial activity at a station does increase the costs of operating a station, therefore a method was necessary to account for these costs. Amtrak will conduct a study to relate commercial activity to station costs and adjust the method accordingly.

As in other Subfamilies, TPM is used to allocate passenger inconvenience costs, but directly coding these costs to the appropriate Amtrak train is a future goal.

Summary

Table 7-29 is an overview of the cost allocation for the Stations-Shared Subfamily.

Table 7-29: Stations-Shared Subfamily Overview

Subfamily	Stations – Shared - #502		
Subcategory	**Stations – Shared - General (502_0)**		
FY 2007 Expenditures (Mil.)	$155.6		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Commercial		
Number of ResCens	167		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditure**	**Percent of Family**
Station Services–Ticketing	1231	$62.2	39.9%
Station Services–Station Operations	1271	$24.9	16.0%
Station Services–Baggage/Express	1261	$18.8	12.1%
Station Services—Management & Supervisors	1241	$9.4	6.0%
Station Services–Red Caps & Porters	1251	$8.3	5.4%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditure**	**Percent of Family**
Total Boards and Deboards or Passenger Unit Trips (with Commuter)	TBD PUT	$119.3	76.7%
Baggage Units Used	BUU	$18.9	12.1%
Weighted Boards and Deboards	WBD	$8.3	5.4%

7.6 General and Administrative [G&A] Family

7.6.1 Corporate Administration Subfamily

Family: **General & Administrative - #600**
Subfamily: **Corporate Administration - #601**

Scope

The Corporate Administration Subfamily performs managerial and administrative functions that are properly considered corporate-wide in scope. Expenses included in the Corporate Administration Subfamily are expenses such as the president's salary, expenses of the inspector general's office, and similar costs that support the overall mission of Amtrak rather than a subset of operations.

Subfamily expenditures for FY07 were $224.7 million and account for 5.4 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations at the national level to all Amtrak customers including Amtrak trains, commuter, freight, reimbursable, and commercial customers. For the large majority of expenses in this Subfamily, the allocation statistic is total activity cost (TAC), the total cost of each "cost object," including all direct costs, earlier round cost allocations, as well as the capital charge. TAC is available for customers of every business type and all customers receive a share of Corporate Administration costs based on their proportion of total Amtrak cost as reflected in the TAC statistic.

Capital Functions are used by these ResCens, but are not allocated. These Function expenses include any capital improvements to extend the life of the assets. Unallocated capital expenses using these Functions are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge, which is then allocated to the trains and other businesses and customers using that asset. Reimbursable Functions are used by these ResCens, but are not allocated to all customers. These Function expenses are assigned to the appropriate Reimbursable customer by NON. The NON statistic does not apportion costs among multiple customers, but rather assigns all costs to the single customer identified for that particular Function.

Certain expenses in ResCen 0802, Treasury Mandatory, require a finer level of detail for allocation. These transactions, identified by specified Accounts, are specific in nature and not appropriately allocated to all customers or may be allocated by a more appropriate statistic. Examples of these Account allocations include credit card commissions, allocated by PRV, or fuel hedging expenses, allocated by the DPUF. All other expenses at RC 0802 will be allocated similarly to all other Corporate Administration expenses.

Previously, Amtrak's G&A expenses were allocated only to Amtrak trains, excluding the other business line customers and TTE was used as an allocation statistic. TAC is a new statistic created to aggregate all costs for a customer, regardless of business type, to enable a single allocation to all customers, enterprise-wide. One component of TAC is the new synthetic capital charge, which as a replacement for depreciation and interest spreads out Amtrak's "lumpy" capital expenditures over an asset's life. As capital is an input to operations, it is included in the total cost of a customer and the new capital charge spreads the lumpy expenditure over time.

Summary

Table 7-30 is an overview of the cost allocation for the Corporate Administration Subfamily.

Table 7-30: Corporate Administration Subfamily Overview

Subfamily	Corporate Administration - #601		
Subcategory	**Corporate Administration - General (601_0)**		
FY 2007 Expenditures (Mil.)	$224.7		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable, Commercial		
Number of ResCens	33		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Corporate Administration	1001	$187.2	83.3%
Sales	1201	$32.0	14.2%
Insurance & Taxes	1181	$29.8	13.3%
Corporate Service Centers	1121	$10.7	4.8%
Finance Charges	1191	$8.1	3.6%
Top 2 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Total Activity Cost	TAC	$223.9	99.6%
Direct (Unallocated)	NON	$0.8	0.4%

7.6.2 Centralized Services Subfamily

Family: **General & Administrative - #600**
Subfamily: **Centralized Services - #602**

Scope

The Centralized Services Subfamily performs services for other portions of the Amtrak enterprise and is properly considered corporate-wide in scope. These services include computer services, payroll operations, human resources, and employee services available corporate-wide. Centralized Services costs represent services provided to and benefiting all employees and businesses operating under the Amtrak corporate umbrella.

Subfamily expenditures for FY07 were $234.6 million and account for 5.6 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations are at the national level to all Amtrak including Amtrak trains, Commuter Infrastructure Access, Commuter Operations, Freight, Reimbursable, and Commercial customers. The allocation statistic is TAC, the total cost of each "cost object," including all direct costs, prior-round cost allocations, as well as the capital charge. TAC is available for

customers of every business type and all customers receive a share of Centralized Services costs based on their proportion of total Amtrak cost as reflected in the TAC statistic.

Capital Functions are used by these ResCens, but are not allocated. These Function expenses include any capital improvements to extend the life of the assets. Unallocated capital expenses using these Functions are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge, which is then allocated to the trains and other businesses and customers using that asset. Commuter Functions are used by these ResCens, but are not allocated to all customers. These Function expenses are assigned to the appropriate Commuter customer by NON. The NON statistic does not apportion costs among multiple customers, but rather assigns all costs to the single customer identified for that particular Function.

Previously, Amtrak's G&A costs were allocated only to Amtrak trains, such as excluding the other business line customers, and TTE was used as an allocation statistic. TAC is a new statistic created to aggregate all costs for a customer, regardless of business type, to enable a single allocation to all customers, enterprise-wide. One component of TAC is the new synthetic capital charge which, as a replacement for depreciation and interest, spreads out Amtrak's "lumpy" capital expenditures over an asset's life. As capital is an input to operations, it is included in the total cost of a customer and the new capital charge spreads the lumpy expenditures over time.

For reporting and management reasons, the Centralized Services Subfamily includes several subcategories to identify specific costs such as payroll, procurement, and IT. These subcategories are all allocated in the same manner, i.e., using TAC.

Summary

Table 7-31 is an overview of the cost allocation for the Centralized Services Subfamily.

Table 7-31: Centralized Services Subfamily Overview

Subfamily	Centralized Services - #602		
Subcategory	Centralized Services - General (602_0), Finance (Payroll) (602_2), Finance (Receivables) (602_3), Computer Systems (602_6), Procurement and Purchasing (602_7)		
FY 2007 Expenditures (Mil.)	$234.6		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable, Commercial		
Number of ResCens	66		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Corporate Service Centers	1121	$184.2	78.5%
Road Land & Other WP	3501	$35.2	15.0%
Corporate Administration	1001	$11.3	4.8%

Subfamily	Centralized Services - #602		
Subcategory	Centralized Services - General (602_0), Finance (Payroll) (602_2), Finance (Receivables) (602_3), Computer Systems (602_6), Procurement and Purchasing (602_7)		
Project Support–Technology	5010	$1.13	0.5%
Divisional Service Centers	1122	$0.6	0.2%
Top 2 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Total Activity Cost	TAC	$199.4	85.0%
Direct (Unallocated)	NON	$35.2	15.0%

7.6.3 Qualified Managerial & Services Subfamily

Family: **General & Administrative - #600**
Subfamily: **Qualified Managerial & Services - #603**

Scope

The Qualified Managerial & Services Subfamily performs high-level managerial and supporting activities related to a subset of the total Amtrak enterprise. Although the ResCens in this Subfamily perform missions similar to the other G&A Subfamilies, because they do not support the entire operation, they are not considered corporate-wide and their allocation method needs to reflect this.

Subfamily expenditures for FY07 were $107.4 million and account for 2.6 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations will be at the ResCen level to the appropriate customers from all business types: NTS, CIA, COP, Freight, Reimbursable, and Commercial. The appropriate activity group containing some combination, but not all, of the customers will be determined individually for each ResCen. For the large majority of expenses in this Subfamily, the primary allocation statistic will be customer activity expense (CAE), which is the sum of all direct and allocated costs before this round including the capital charge. CAE is similar to the TAC but the TAC includes CAE as well as costs allocated in this round by CAE. ResCens in this Subfamily will be included in the base for calculating TAC, which is ultimately used to allocate the corporate-wide G&A expenses contained in Corporate Administration (601) and Centralized Services (602) Subfamilies.

Capital Functions are used by these ResCens, but are not allocated. These Function expenses include any capital improvements to extend the life of the assets. Unallocated capital expenses

using these Functions are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge, which is then allocated to the trains and other businesses and customers using that asset. Where ResCens use Functions that are directly assigned to a customer, the Subfamily will use NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single business identified for that particular Function.

Certain expenses in this Subfamily require a finer level of detail for allocation. These transactions, identified by Account, are specific in nature and not appropriately allocated to all customers or may be allocated by a more appropriate statistic. Examples of these Account allocations include passenger insurance claims, allocated by TPM, or diesel fuel taxes, allocated by the DPUF.

Included in the Subfamily is the special case ResCen 0202, Corporate Common. Some of the expenditures within this ResCen are corporate-wide whereas others are specific to a customer type. As a result, ResCen 0202 requires an allocation method that uses a finer level of data than the rest of the Subfamily. Although the ResCen will remain in the #603 Subfamily, it will be allocated by various statistics determined using an individual profile specifying individual activity groups for specific Function and account level allocations. The expenditures in ResCen 0202 will also be allocated before and be included in the formation of each customer's TAC.

Summary

Table 7-32 is an overview of the cost allocation for the Train Movement Subfamily.

Table 7-32: Train Movement Subfamily Overview

Subfamily	Qualified Managerial & Services - #603		
Subcategory	**Qualified Managerial & Services - General (603_0)**		
FY 2007 Expenditures (Mil.)	$107.4		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable, Commercial		
Number of ResCens	48		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Corporate Administrative	1001	$91.6	85.3%
Transfers Reimbursable	6889	$18.3	17.1%
Corporate Service Centers	1121	$17.3	16.1%
MoE Inventory Adjustment	1992	$12.9	12.0%
Division Administrative	1002	$7.1	6.2%
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Customer Activity Expense	CAE	$111.4	104.0%
Direct (Unallocated)	NON	$0.9	0.8%

Subfamily	Qualified Managerial & Services - #603		
Subcategory	Qualified Managerial & Services - General (603_0)		
Units Used	UU	-$4.9	-4.5%

7.6.4 Direct Customer (Non-NTS) Subfamily

Family: **General & Administrative - #600**
Subfamily: **Direct Customer (Non-NTS) - #604**

Scope

The Direct Customer (Non-NTS) Subfamily performs functions that support only Commercial or Commuter customers such as managing commuter operating contracts, real estate assets, and other support to customers outside of Amtrak's train operations. These ResCens are exclusively outside the NTS and have specific non-NTS customers.

Subfamily expenditures for FY07 were $9.4 million and account for 0.2 percent of Amtrak's total expenses.

Cost Allocation Method

Costs are directly assigned to a specific customer as determined individually for each ResCen. The Subfamily will exclusively use NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single business identified for that particular cost.

The Direct Customer (Non-NTS) Subfamily is a first round allocation and its costs comprise part of a customer's CAE and TAC, statistics that are used in subsequent G&A allocations.

Summary

Table 7-33 is an overview of the cost allocation for the Direct Customer (Non-NTS) Subfamily.

Table 7-33: Direct Customer (Non-NTS) Subfamily Overview

Subfamily	Direct Customer (Non-NTS) - #604		
Subcategory	Direct Customer (Non-NTS) - General (604_0)		
FY 2007 Expenditures (Mil.)	$9.4		
Business Types To Which Costs Are Allocated	CIA, COP, Commercial		
Number of ResCens	11		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Revenue Diversification	1009	$3.3	34.9%
Corporate Service Centers	1121	$0.6	5.8%
Division Administrative	1002	$0.4	3.9%

Subfamily	Direct Customer (Non-NTS) - #604		
Subcategory	Direct Customer (Non-NTS) - General (604_0)		
Corporate Administration	1001	$0.3	3.3%
Project Support-Other	5015	$0.2	2.5%
Top Allocation Statistic by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
Direct (Unallocated)	NON	$9.4	100%

7.6.5 Subsidiary Subfamily

Family: **General & Administrative - #600**
Subfamily: **Subsidiary - #605**

Scope

The Subsidiary Subfamily represents ResCens[39] associated with Amtrak's five Subsidiary Companies, which include Chicago Union Station Company (CUS), Passenger Railroad Insurance Limited (PRIL, Penn Station Leasing, LLC (PSL), Washington Terminal Company (WTC), and 30th Street Limited, L.P. (TSL). The subsidiaries and their activities are diverse: CUS owns and operates Chicago Union Station and various nearby real estate parcels; PRIL is an offshore captive insurance company that allows Amtrak to acquire insurance coverage that cannot be readily obtained domestically; PSL is a subsidiary established for the purpose of acquiring New York Penn Station from Amtrak and leasing it back to the parent company; WTC owns various parcels in the vicinity of Washington Union Station, although not the station itself; TSL was established for the purpose of rehabilitating and leasing 30th Street Station in Philadelphia, although the station itself is owned by Amtrak.

Subfamily expenditures for FY07 were $17.3 million and account for 0.4 percent of Amtrak's total expenses.

Cost Allocation Method

Amtrak's FIS includes (1) transactions taking place at the five Amtrak ResCens associated with these subsidiaries, (2) the transactions of the subsidiary companies themselves, both vis-à-vis the parent company and external entities, and (3) various elimination transactions necessary to produce consolidated financial statements. The Fully Allocated costs of Amtrak's subsidiaries need to be calculated in a manner consistent with costs in other ResCen families. Given that Amtrak has a controlling interest in all of the subsidiaries, so therefore, Amtrak and the subsidiaries must be treated as a single entity and only expenditures incurred vis-à-vis external entities should be considered costs for the purpose of calculating Fully Allocated costs. To achieve this result, both subsidiary expenditures incurred vis-à-vis external entities and all transactions (both expenditures and revenues) between Amtrak and its subsidiaries will be

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[39] The subfamily includes five Amtrak ResCens and ten "pseudo-ResCens," five of which correspond to the subsidiaries themselves and five to virtual ResCens used to process elimination entries between the parent company and the subsidiaries.

allocated (certain expenditures, such as depreciation and interest, will not be allocated, as to be explained in Section 7.1.1). This will have largely the same effect as only allocating costs vis-à-vis external entities because transactions between Amtrak and its subsidiaries will typically net to zero due to elimination entries.

One difficulty in allocating subsidiary expenditures is that many are coded to FN1004, Subsidiary Operating Activity, which is used to record intercompany operating activities, but gives no indication of the type of activity and how its costs should be allocated. To overcome this problem, many of the expenditures in this Subfamily are allocated at the detailed Account level.

Most Subsidiaries are associated with specific locations, so expenditures are allocated locally to the routes and customers operating at those locations. The exception is PRIL whose expenditures are allocated nationally. The diverse nature of Amtrak's subsidiaries means that the manner in which Subsidiary Subfamily expenditures are allocated depends on the particular subsidiary.

Capital Functions are used by these ResCens but are not allocated. These Function expenses include any capital improvements to extend the life of the assets. Unallocated capital expenses using these Functions are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge, which is then allocated to the trains and other businesses and customers using that asset. Where expenditures are unallocated the Subfamily uses NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single business identified for that particular Function.

Because CUS owns and operates Chicago Union Station, costs associated with this subsidiary are allocated in a manner similar to costs in the Stations Family. Most station and terminal costs are allocated to both Amtrak trains and the Metra Commuter. Two percent of Station operations-related costs also are allocated to the Commercial business. The other 98 percent of station operations costs are allocated based on TBD. Costs coded to FN1004, Suboperating Activity, are, in general, allocated in the same manner as Station operations expenses. MoW costs are allocated to Amtrak trains or other customers that use the specific areas of track maintained by the subsidiary, including Freights, using FTT or TUM, depending on the Function. Insurance costs are allocated based on TPM.

In the case of PRIL, the majority of subsidiary activity is related to insurance purchased on behalf of Amtrak and insurance claims. PRIL provides railroad protection coverage, which covers contractors working on Amtrak property, force account insurance, which covers liabilities related to Amtrak's Reimbursable business (i.e., where Amtrak employees perform work for third parties), as well as coverage for some other activities. Most passenger insurance is no longer processed through PRIL. A majority of the costs for this subsidiary are associated with Amtrak's accrual for self insurance for passenger claims, insurance policies with outside companies and professional fees. Based on a review of liability claims, the majority of passenger claims insurance expenditures are allocated based on TPM with the remainder going directly to Reimbursable, while purchased insurance expenditures will be allocated based on TPM. Professional services expenditures are allocated based on TPM. Expenditures and

revenues related to PRIL force account insurance and Equity in Subsidiary-PRIL are allocated in the same manner as passenger claims insurance expenses.

In the case of TSL, the majority of expenses represent station rent, interest and depreciation, and professional fees. Station rent and intercompany rent revenue are allocated to Amtrak trains using 30th Street Station based on TBD, except that 2 percent of those sums are allocated to the Commercial business. Depreciation and interest, which make up the bulk of remaining subsidiary expenses, and other subsidiary expenses, such as professional fees, go directly to unallocated.

In the case of PSL, the entirety of the subsidiary's monthly expenses represents interest charges. Therefore, the expenditures go directly to unallocated. Likewise, in the case of WTC, the entirety of the subsidiary's monthly expenses represents depreciation expenditures and goes directly to unallocated. No other types of Functions or Accounts are associated with these subsidiaries.

Summary

Table 7-34 is an overview of the cost allocation for the Subsidiary Subfamily.

Table 7-34: Subsidiary Subfamily Overview

Subfamily	Subsidiary - #605		
Subcategory	**Subsidiary - General (605_0)**		
FY 2007 Expenditures (Mil.)	$17.4		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Reimbursable, Commercial		
Number of ResCens	15		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Station Services-Station Operations	1271	$10.0	57.6%
Sub Operating Activity	1004	-$8.6	-49.6%
Depreciation All Other Assets	1171	$7.1	42.2%
Insurance & Taxes	1181	$4.1	23.5%
Power Transmission Sys Oper	1719	$2.4	14.0%
Top 4 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Total Board and Deboards	TBD	$10.3	60.2%
Direct (Unallocated)	NON	$5.7	33.2%
Frequency	FTT	$3.0	17.4%
Total Passenger Miles	TPM	-$2.0	-11.7%

7.7   Capital Family

7.7.1 Capital Subfamily

Family: **Capital - #700**
Subfamily: **Capital - #701**

Scope

The Capital Family covers the capital charges for operating Amtrak's NTS and other businesses. Under GAAP depreciation and interest expenses developed as part of the corporation's income and capital reporting systems and its audited financial statements reflect the capital costs of an enterprise. However, because of the financial history of Amtrak and its unique status as a government-assisted enterprise, it was decided that a synthetic capital charge provides a more representative measure of the resource cost of all capital equipment and property—regardless of how financed—currently being used by Amtrak to produce its various services and outputs. Thus, the synthetic capital charge described below is used instead of depreciation and interest in the methodology for estimating and reporting avoidable and Fully Allocated costs. However, the synthetic capital charge is only used as part of this methodology for estimating Avoidable and Fully Allocated Costs, and, importantly, does not replace the depreciation and interest expenses included in Amtrak's published and audited financial reports which are intended to measure—according to GAAP procedures—the corporation's overall profitability during particular time periods. A more detailed explanation for the rationale and approach of the synthetic capital charge is provided in Appendix E.

The synthetic capital charge represents both a return of capital (analogous to depreciation) and a return on capital (replacing interest expenses). It annualizes over assets' service lives the original dollar expenditures for their acquisition. The values of these expenditures to be annualized are based on the same original gross asset values that are recorded in Amtrak's accounting systems used in estimating depreciation for financial accounting purposes. The capital charge also uses asset service lives based on those employed by Amtrak in calculating depreciation expense, including that calculated under its group system. It does not, however, make use of rates of interest on debts incurred by Amtrak or by other commercial borrowers. Instead, it employs for asset acquisition cost annualization purposes a cost of capital factor based on the Federal Government's borrowing costs for the year in which Avoidable and Fully Allocated Costs are being estimated.

The capital charge is calculated by applying to the (undepreciated) gross value of each physical asset currently carried on Amtrak's books of account and in use or held for use in its service an annual capital recovery factor (CRF) or amortization factor based on an assumed useful lifetime for the asset and an appropriate rate of return, to the total of the initial acquisition costs for each asset. Where i denotes the rate of return and T denotes the asset's lifetime, the CRF is computed using the following equation:

$$CRF = i * (1+i)^T / [(1+i)^T - 1]$$

Where the initial capital cost of an asset is K, the capital charge (CC) formula for the asset is:

$$CC = K * CRF$$

The rate of return, i, used to calculate CRF is the U.S. Treasury borrowing rate on 20-year maturity notes prevailing at the time the capital charge is calculated. This corresponds to the view that the cost of the entire capital investment in Amtrak should reflect the Federal government's long-term cost of borrowing to finance that investment. At the time of this writing, May 8, 2009, the rate is 4.25 percent. The current rate is published daily by the U.S. Treasury and can be found on its Web site:

http://www.ustreas.gov/offices/domestic-finance/debt-management/interest-rate/yield.shtml

In monthly reporting of Fully Allocated and Avoidable Costs, the rate on the last day available of the reporting month is used. This monthly updating procedure serves to avoid larger discontinuities that could occur if updates are done less often, e.g., annually, since the rate can sometimes vary considerably over a calendar year. The annual capital charge is the sum of the monthly capital charges.

The capital charge uses a new, single virtual responsibility center created for dealing with these expenses. The individual cost records have Function, Account, and Location codes that are used for allocation to trains and other business types and for reporting various subcategories of the capital charge, such as ROW versus equipment. Existing Amtrak accounting codes are used where possible, but some new ones are required to provide the desired disaggregation and to distinguish the capital charge from other similar concepts.

The Function and Account codes used for the capital charge are listed in Table 7-35 and Table 7-36. Table 7-36 also provides the allocation statistic used for each of the Accounts.

Table 7-35: Functions Used in Allocating Capital Charges

Function Number*	Name	Description
	Fixed Assets–ROW	
	Fixed Assets–Non ROW	
	Passenger Rail Equipment	
	Highway Vehicles	
	Rail Work Equipment	

*To be determined: Function number not yet assigned.

Table 7-36: Accounts Used in Allocating Capital Charges

Account Number*	Name	Description	Allocation Statistic
	Rail Track		FTT
	Ballast		FTT
	Ties		FTT
	Land	Excludes improvements	FTT
	Signal & Communications	Systems	FTT

Account Number*	Name	Description	Allocation Statistic
	Electric Traction & Power	Systems	EUM
	Bridges & Tunnels		FTT
	Other ROW	Includes grading	FTT
	Stations		TBD&PUT
	Office Buildings		TAC
	MOE Facilities & Equipment		MDC
	MOW Facilities & Equipment		MWDC
	Locomotives		xUU
	Rail Passenger Cars		xUU
	Baggage/Package Cars		BUU
	Rail Work Equipment	For MoW	MWDC
	Computer-IT		TAC
	Other Office Equipment		TAC
	Vehicles		Any**

*To be determined: Account number not yet assigned.
**ResCen-based

The capital charge for each asset is matched to and assigned or allocated to the business elements that it supports. The basic allocation process is the same as that used for expenses in other Subfamilies. Statistics measure the amount of activity accounted for by each business element supported by an asset, and the relative shares based on these statistics are used in allocating the asset's capital charge expense. Stat Qualifiers are used to limit the allocation to subsets of business elements based on location. The statistics used for allocation vary based on the type of asset as shown in Table 7-36.   "Appendix A: Family Profiles" provides specifics on which Stat Qualifiers are used to allocate the capital charges for the various asset types.

The process for linking assets to the business elements they support differs for fixed assets and rail equipment. For most fixed assets the linkage to the business elements they support is made using location description information from the asset's record in the general ledger. The general ledger assets are linked to a specific Stat Qualifier used elsewhere in allocating expenses and hence provide a linkage to the business element having allocation statistics at that location. There are Stat Qualifiers for ROW (track) segments, stations, and maintenance facilities. The exception to the Stat Qualifier-location linkage process occurs for fixed assets that are treated like other G&A expenses, such as general office buildings and computer systems. The capital charges for these G&A-type fixed assets are allocated across the entire enterprise using the TAC statistic and thus do not require a location linkage.

The capital charges for fixed assets are allocated to NTS trains and other business types supported by the asset. For example, the capital charges associated with portions of the NEC ROW are allocated to commuters and freights that also use the infrastructure.

For rail equipment assets, the linkage to the business elements they support is made using equipment codes as Stat Qualifiers for the UU statistic. No location information is needed or relevant because the equipment capital charges are allocated directly to trains using a given type

of equipment. For leased equipment, the capital charges based on initial equipment acquisition values is used instead of lease payments and their related income statement adjustments.

Summary

Table 7-37 is an overview of the cost allocation for the Capital-General Subfamily.

Table 7-37: Capital-General Subfamily Overview

Subfamily	Capital - #701
Subcategory	Capital - General (701_0)
FY 2007 Expenditures (Mil.)	N/A (FIS entries pertaining to this Subfamily will be entirely replaced by the synthetic capital charge – see text.)
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable, Commercial

7.8   Utilities Family

7.8.1   Utilities Subfamily

Family: **Utilities - #800**
Subfamily: **Utilities - #801**

Scope

The Utilities Subfamily is used to account for utilities expenses including gas, electric, and water provided at various terminals, stations, and support facilities. Most of Amtrak's utilities expenses are recorded at ResCens already in another Subfamily and are allocated by that Subfamily method. ResCens in the Utilities Subfamily however, support multiple departments and utility costs cannot be attributed to a single ResCen or activity. The Washington Utilities ResCen for example, incurs utilities costs for mechanical, transportation, and mechanical operations.

Subfamily expenditures for FY07 were $17.0 million and account for 0.4 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations will be at the ResCen and Function level to the appropriate Amtrak train, commuter, or reimbursable business or customer. No primary allocation statistic exists for the Subfamily; the allocation statistic used is dependent on the Function for each cost record. Statistics used in the Subfamily include, but are not limited to, PUT, TEH, TUM, DRV, and units used (UU). For identified Commercial and Reimbursable Functions, these unallocated costs will

use NON. The NON statistic does not apportion costs among multiple customers, but assigns all costs to the single business identified for that particular Function.

The allocation statistic used is dependent on the Function associated with each expense. Utility expenses within a ResCen are recorded with Functions relating to the activity served by each meter. Utility expenses from a meter in a mechanical facility would be allocated by TUU while utility costs in a commissary would be allocated by DRV, etc. The Utilities profile lists the allocation statistics for the Functions associated with each general activity. Where the expense is at a station used by commuters, the Commuter business receives a portion of the station costs as allocated by PUT. TBD was not used because under existing agreements with commuter agencies Amtrak does not have access to the TBD statistic for commuter trains.

The Utilities Subfamily uses a station pair Stat Qualifier to allocate costs to the specific geographic area supported by each Utilities ResCen. The Stat Qualifier dynamically creates a pool of trains that travel over that area and allocates costs based on a particular train's share of activity.

Although Commercial customers are present at some of the locations served by the Utilities ResCens, Amtrak has no means to allocate costs to those businesses. However, some costs in this Subfamily are coded with commercial Functions and can be directly assigned to the appropriate business. Amtrak anticipates performing a future study that will determine and quantify commercial costs at stations allowing for a more accurate allocation of utility costs at stations.

Summary

Table 7-38 is an overview of the cost allocation for the Utilities Subfamily.

Table 7-38: Utilities Subfamily Overview

Subfamily	Utilities - #801		
Subcategory	Utilities - General (801_0)		
FY 2007 Expenditures (Mil.)	$17.0		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Commercial, Reimbursable		
Number of ResCens	9		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Station Services–Station Operations	1271	$12.1	71.1%
MoE Overhead	1814	$2.0	11.9%
MoW Overhead	1751	$1.4	8.4%
Signal & Interlocker Operation	1634	$0.8	4.6%
Commercial General Superintendent	4040	$0.2	1.1%

Subfamily	Utilities - #801		
Subcategory	Utilities - General (801_0)		
Top 3 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
Total Unit Trips	TUT	$12.2	71.8%
Units Used	UU	$2.0	11.9%
Total Unit Miles	TUM	$1.5	8.6%

7.9   Police, Security, & Environmental/Safety Family

7.9.1   Police Subfamily

Family: **Police, Security & Environmental/Safety - #900**
Subfamily: **Police - #901**

Scope

The Police Subfamily performs traditional patrolling duties in support of Amtrak trains, facilities, and ROW. The Police Subfamily consists of two Subcategories: National and Regional/Local. The Regional/Local Subcategory provides the front line policing duties while the National Subcategory coordinates and supports the operation across the Amtrak network.

Subfamily expenditures for FY07 were $35.5 million and account for 0.9 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations for the Police Subfamily are dependent on the subcategory. National Subcategory ResCen costs are allocated at the national level to all customers including Amtrak trains and other businesses and customers. The allocation statistic is CAE—the sum of all direct and allocated costs prior to this round including the capital charge. CAE is similar to the TAC but the TAC includes CAE as well as costs allocated in this round by CAE. ResCens in this Subfamily are therefore included in the base for calculating TAC.

Regional/Local Subcategory ResCen costs are mostly allocated at the ResCen level using TUT with an ACK Ratio as well as Station Pair Stat Qualifier. The key driver of Police costs are passenger levels in and around stations, but as passenger related statistics are unavailable for all customers they cannot be used in the allocation. For that reason, PUT is used to allocate as it is both reflective of passenger levels and available for freight and commuter customers. The Police Subfamily uses a Station Pair Stat Qualifier to allocate costs to the specific geographic area supported and patrolled by each Regional/Local ResCen. The Stat Qualifier dynamically creates a pool of trains that travel over that area and allocates costs based on a particular train's share of PUT. PUT is automatically available for Amtrak trains from the TUS system using data from

OMS. The Audit and Financial Controls group will provide PUT for commuters and the Financial Analysis/APT group will manually calculate PUT statistics for freights.

Commercial business customers operate in areas patrolled by the Police Subfamily and deserve a portion of costs; however, commercial customers do not have operational statistics and cannot be allocated costs by PUT as in the rest of the Subcategory. Through consultation with Amtrak field personal and in agreement between Volpe Center and Amtrak Finance staff, 2 percent of Regional/Local subcategory costs are assigned to the commercial business using an ACK Ratio. The remaining 98 percent is allocated using the PUT allocation methodology described above.

Where Capital Functions are used by these ResCens, they are not allocated. Unallocated capital expenses are entered into Amtrak's asset ledgers and become part of the asset base used in calculating a capital charge, which is then allocated to the trains and other businesses and customers using that asset. Police expenses that are direct to a Reimbursable are identified by specific Functions identified in the profile and allocated by NON. The NON statistic does not apportion costs among multiple customers, but rather assigns all costs to the single customer identified for that particular Function.

Summary

Table 7-39 is an overview of the cost allocation for the Police Subfamily.

Table 7-39: Police Subfamily Overview

Subfamily	Police - #901		
Subcategories	**National (901_1), Regional/Local (901_2)**		
FY 2007 Expenditures (Mil.)	$35.5		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable, Commercial		
Number of ResCens	24		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Police Security & Environmental Safety	1124	$31.6	89.0%
Project Support–Other	5015	$1.0	2.8%
Training Amtrak	1131	$0.8	2.3%
Road Land & Other WIP	3501	$0.7	1.9%
Reimbursable General Support	1197	$0.4	1.1%
Top 3 Allocation Statistic by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Total Unit Trips	TUT	$28.3	79.7%
Customer Activity Expense	CAE	$5.5	15.5%
Direct (Unallocated)	NON	$1.7	4.8%

7.9.2 Security Strategy, & Special Operations Subfamily

Family: **Police, Security & Environmental/Safety - #900**
Subfamily: **Security Strategy & Special Operations - #902**

Scope

The Security Strategy & Special Operations (SSSO) Subfamily works together with the Police Subfamily to provide traditional patrolling, intelligence, and counterterrorism efforts in support of Amtrak trains, facilities, and ROW. Additionally, the SSSO Subfamily manages all capital and grant projects related to security operations such as the installation of new security cameras on tunnels, bridges, and other ROW as well as all projects funded by the U.S. Department of Homeland Security.

Subfamily expenditures for FY07 were $8.0 million and account for 0.2 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations for the SSSO Subfamily are at the national level to all customers including Amtrak trains and other businesses and customers. The exclusive allocation statistic is CAE, the sum of all direct and allocated costs before this round including the capital charge. CAE is similar to the TAC but the TAC includes CAE as well as costs allocated in this round by CAE. ResCens in this Subfamily are included in the base for calculating TAC.

Where Capital Functions are used by these ResCens, they are not allocated. Unallocated capital expenses are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge, which is then allocated to the trains and other businesses and customers using that asset.

Summary

Table 7-40 is an overview of the cost allocation for the SSSO Subfamily.

Table 7-40: SSSO Subfamily Overview

Subfamily	Security Strategy & Special Operations - #902		
Subcategory	**National (902_0)**		
FY 2007 Expenditures (Mil.)	$8.0		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable, Commercial		
Number of ResCens	8		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	**Code Number**	**Expenditures**	**Percent of Family**
Police Security & Environmental Safety	1124	$5.3	66.3%

Subfamily	Security Strategy & Special Operations - #902		
Subcategory	**National (902_0)**		
Project Support–Other	5015	$1.3	16.3%
Road Land & Other WIP	3501	$1.1	13.8%
Project Support–Technology	5010	$0.1	1.3%
Training Amtrak	1131	$0.1	1.3%
Top 2 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	**Code**	**Expenditures**	**Percent of Family**
Customer Activity Expense	CAE	$7.0	86.7%
Direct (Unallocated)	NON	$1.1	13.3%

7.9.3 Environmental & Safety Subfamily

Family: **Police, Security & Environmental/Safety - #900**
Subfamily: **Environmental & Safety - #903**

Scope

The Environmental & Safety Subfamily performs activities to ensure and oversee environmental, health, and safety issues of Amtrak and its employees. These activities include reporting and safety compliance requirements by State and Federal agencies as well as compliance with environmental regulations.

Subfamily expenditures for FY07 were $9.8 million and account for 0.2 percent of Amtrak's total expenses.

Cost Allocation Method

Cost allocations for the Environmental & Safety Subfamily are at the national level to all customers including Amtrak trains and other businesses and customers. The exclusive allocation statistic is CAE, the sum of all direct and allocated costs prior to this round including the capital charge. CAE is similar to the TAC but the TAC includes CAE as well as costs allocated in this round by CAE. ResCens in this Subfamily are therefore included in the base for calculating TAC.

Where Environmental & Safety ResCens use Capital Functions, they are not allocated. Unallocated capital expenses are entered into Amtrak's asset ledgers and thereby become part of the asset base used in calculating a capital charge which is then allocated to the trains and other businesses and customers using that asset. Environmental & Safety expenses that are direct to a Reimbursable are identified by specific Functions identified in the profile and allocated by NON. The NON statistic does not apportion costs among multiple customers, but rather assigns all costs to the single customer identified for that particular Function.

Summary

Table 7-41 is an overview of the cost allocation for the Environmental & Safety Subfamily.

Table 7-41: Environmental & Safety Subfamily Overview

Subfamily	Environmental & Safety - #903		
Subcategory	Environmental & Safety - General (903_0)		
FY 2007 Expenditures (Mil.)	$9.8		
Business Types To Which Costs Are Allocated	NTS, CIA, COP, Freight, Reimbursable, Commercial		
Number of ResCens	5		
Top 5 Functions by Expenditures (Dollars, Mil., FY07)			
Function	Code Number	Expenditures	Percent of Family
Police Security & Environmental Safety	1124	$6.3	64.3%
Road Land & Other WIP	3501	$2.2	22.4%
General Supt Special Project	1198	$1.3	13.3%
MoW Overhead	1751	$0.01	0.1%
MoW Reimbursable	1797	$0.01	0.1%
Top 2 Allocation Statistics by Expenditures (Dollars, Mil., FY07)			
Statistic	Code	Expenditures	Percent of Family
Customer Activity Expense	CAE	$7.6	77.8%
Direct (Unallocated)	NON	2.2	22.2%

8 Methodologies for Estimating Avoidable Cost by APT Subfamily

This section describes the essential elements of the methodology for estimating Avoidable Costs for each of the 36 individual Subfamilies. The specific extension and application to the individual Subfamilies of the general Avoidable Cost methodology described in Section 6 are described here. Four different approaches are used to estimate Avoidable Costs. Subfamilies are classified into four groups depending on the approach followed:

- Fixed
- Avoidable
- Mixed-Statistical
- Mixed-Detailed

The four Avoidable Cost approaches differ both in terms of the logic underlying the calculations as well as the calculations themselves. On the basis of standard practice and professional judgment, some of the Subfamilies are classified as having costs that are either completely (100 percent) Fixed or completely (100 percent) Avoidable if a single Route were to be eliminated. The remaining Subfamilies are classified as Mixed, meaning that some costs are Fixed and others Avoidable. Many of the Mixed Subfamilies were subjected to statistical analysis in an attempt to identify their Fixed and Avoidable portions and to develop formulas for calculating those portions. Subfamilies whose Fixed and Avoidable portions could be estimated statistically are classified as Mixed-Statistical. For various reasons the statistical approach could not be used or was unsuccessful for some Mixed Subfamilies. In such cases, a detailed analysis of Subfamily costs was performed to identify and classify costs as either Fixed or Avoidable. Subfamilies for which such an approach was followed are classified as Mixed-Detailed.

Subfamilies Classified as Fixed

Subfamilies classified as Fixed contain costs that would not vary if a single route were to be eliminated. Costs in these Subfamilies would continue to be incurred as long as Amtrak continues to operate the majority of its train services. Examples of fixed costs include corporate management and administrative costs, including salaries for senior executives, costs stipulated by contract, costs associated with operating CNOC, and some MoW costs for shared infrastructure. Importantly, costs at Subfamilies classified as Fixed are fixed only with respect to the elimination of a single route; if multiple routes were eliminated, Amtrak's overall corporate structure could conceivably shrink, which might lower the long-run fixed costs of running the company. However, for Subfamilies classified as Fixed in this methodology, the Avoidable Costs associated with eliminating a particular route would not be significant or measurable.

Subfamilies Classified as Avoidable

Subfamilies that are classified as Avoidable contain costs that decrease proportionally with route activity. Costs in these Subfamilies would completely cease to be incurred if a route were to be

eliminated. Examples of costs that are completely avoidable include costs for diesel fuel and electric traction used to power locomotives as well as those for some types of labor and supplies. If an Amtrak route using diesel fuel were eliminated, for example, then Amtrak would no longer incur any fuel costs to operate that route. Diesel fuel costs incurred in the Fuel Subfamily have no fixed component and are classified as 100 percent avoidable in both the short run and the long run.

Subfamilies Classified as Mixed-Statistical

The Subfamilies classified as having Mixed costs require a more complex method for estimating avoidable costs. In the case of ten of the Mixed Subfamilies, cost equations were developed using statistical analysis. The Mixed-Statistical approach is described in Section 6.5. In most cases separate cost equations were developed for estimating short-run and long-run Avoidable Costs. The short-run equations are used to estimate only costs that can be avoided in the short run. The long-run equations estimate total long-run Avoidable Costs, including both costs that can and cannot be avoided in the short-run.[40] As explained in Section 6.5, in cases for which the long-run and short-run models result in very similar equation coefficients, the random-effects model is used to estimate a single equation and to estimate Avoidable Costs in both the short run and the long run.

The statistical analysis process and results for individual Subfamilies are presented below. Short-run, long-run, and combined coefficients, significance levels, the number of observations, and R-squared values are reported. Coefficients are statistical estimates of the true parameter values for the long-run and short-run cases, or, as mentioned above, for "combined effect" cases in which no statistically significant distinction between the short- and long-run effects could be found. Significance levels show the probability that the true parameter values are greater than zero. The number of observations is typically equal to the number of ResCens multiplied by three and the number of years of data used in the analysis. However, this is not always the case, because all three years of data were not available for some individual ResCens in the datasets.

The cost equations are used to predict the percentage of costs at each ResCen that can be avoided with the elimination of a route. The percentage change in cost is applied to the ResCen Fully Allocated cost estimates to calculate the Avoidable Cost for that ResCen. To calculate route level Avoidable Costs, the detailed ResCen-train level estimates of Avoidable Costs are summed for all Subfamilies.

Subfamilies Classified as Mixed-Detailed

For some Subfamilies with Mixed costs, the statistical approach could not be used to estimate avoidable costs because ResCen-level data for relevant explanatory variables was not available. For others, the Subfamilies were investigated statistically but a significant (usable) relationship between train activity and ResCen cost was not found. Assuming these costs were 100 percent Fixed or 100 percent Avoidable is unreasonable, so a detailed analysis at the sub-ResCen level was performed. Subfamilies analyzed using such an approach are classified as Mixed-Detailed.

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[40] Long-run Avoidable Cost include short-run costs, therefore estimates of short-run Avoidable Costs should not be added to long-run estimates.

For some Subfamilies in this category even though a large share of costs were indeed Fixed, costs associated with specific Functions or Accounts would decrease if a particular route were eliminated and thus are Avoidable. In calculating Avoidable Costs, these costs are identified as Avoidable while the remaining costs are classified as Fixed.

The Transportation-Multiple and MoE-Multiple Subfamilies are cases that required detailed Function and Account level analysis. ResCens in the Multiple Subfamilies perform a wide range of activities and incur costs that may be Fixed, Avoidable, or Mixed. The approach for calculating Fully Allocated Costs for these multi-purpose ResCens is to apply the same logic for specific cost Functions and Accounts as was used in the corresponding single-purpose Subfamilies. The same approach is used for estimating Avoidable Costs for multi-purpose ResCens, namely Avoidable Costs, which are estimated utilizing the methods and formulas applied to the Functions and Accounts in single-purpose Subfamilies. Typically, groups of Functions used in a multiple Subfamily are identified as corresponding to similar Functions used in another Subfamily for which an Avoidable Cost approach has already been defined. Then the latter Subfamily's Avoidable Cost approach is used to estimate Avoidable Costs for these groups of Functions. For example, in the MoE-Multiple Subfamily, the avoidability of costs coded to car maintenance Functions is estimated using the cost equations developed for similar Functions in the MoE-Car Maintenance Subfamily (classified as Mixed-Statistical). Although a statistical approach may be used to estimate Avoidable Costs for a group in Functions, Multiple Subfamilies are still classified as Mixed-Detailed because of the detailed Function and Account level analysis required.

8.1.1 MoW Track Subfamily

Family: **MoW - #100**
Subfamily: **MoW Track - #101**
Approach: **Mixed-Detailed**

Scope

The MoW Track Subfamily performs maintenance and capital work on track assets along the ROW, including the roadbed, rails, cross-ties, ballast, and grade crossings. Most track maintenance work is related to Amtrak-owned track and other assets on the NEC, the Keystone Corridor in Pennsylvania, and in Michigan,[41] although some work is performed on other Amtrak-owned assets. In addition, this Subfamily also incurs expenses for maintenance and repairs performed for Amtrak by other railroads and by Amtrak for various commuter agencies on a reimbursable basis. Amtrak's track is used not only by Amtrak, but also by commuter

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[41] Amtrak's primary track holdings are as follows:

  Northeast Corridor (363 of 456 NEC miles)

  New Haven, CT to Springfield, MA (60.5 miles)

  Philadelphia to Harrisburg, PA (104 miles)

  Michigan (97 miles)

  Seven tunnels (29.7 miles)

  1,186 bridges (42.5 miles)

agencies and freight railroads, and this fact has important implications for the avoidability of costs incurred within this Subfamily.

Total Subfamily costs for FY07 were $156.9 million, including $100.5 million in capital, reimbursable and commuter-related expenses that are not operating costs for Amtrak trains. The remaining $56.4 million represent Amtrak's allocated operating costs.

Avoidable Cost Approach

The statistical methods used to estimate avoidable costs for some other Subfamilies are not practical for estimating avoidable costs for the MoW-Track Subfamily for several reasons. In particular, it is not possible to estimate avoidable cost functions for this Subfamily because, although ResCen cost information is available, neither corresponding train activity statistics nor data on track length per ResCen (necessary to appropriately scale ResCen costs) is available. Further, because ResCens within this Subfamily differ greatly in terms of the length and complexity of track segments and types of other nonlinear assets for which they are responsible and the nuances of the geographical areas in which they operate, comparing costs across ResCens is not practical. Rather, the methodology estimates avoidable costs for this Subfamily using a combination of business judgment and a step by step disaggregating of total costs by Function and train activity to arrive at an estimate of costs that would be eliminated if a particular route were to be eliminated.

Several observations and assumptions regarding the MoW-Track Subfamily are necessary to sufficiently simplify the analysis to enable the avoidable costs of a route to be estimated. First, it is important to recognize that most costs within this Subfamily are capital-related. Some costs are related to Amtrak's Reimbursable and Commuter businesses. However, only avoidable costs related to Amtrak's NTS operations need to be estimated as part of this Subfamily methodology. Out of total Subfamily costs of $156.9 million in FY07, only $56.4 million represent Amtrak route operating costs and are potentially avoidable. Costs coded to Capital Functions in this Subfamily, such as FN3501, Road Land & Other WIP, and FN3077, SEPTA Joint Benefit Capital, total almost $86 million and are not avoidable in this Subfamily. Costs coded to Reimbursable and Recollectable Functions total more than $15 million and are also not avoidable. In addition, certain ResCens in this Subfamily, such as RC7261, Peninsula Maintenance of Rail Line, pertain entirely to Commuters and their costs are not avoidable.

It is also important to recognize that costs within this Subfamily are related to track Amtrak owns on the NEC, the Keystone Corridor in Pennsylvania, and in Michigan and that most of this track is used to some extent by Commuters and freight railroads. Due to these other users, the methodology assumes, as a general rule, that Amtrak cannot completely stop maintaining a particular track asset even if it were to completely eliminate all of its Routes utilizing that asset. On the other hand, some costs in this family are incurred to maintain more minor track assets in other areas of the country; costs related to such minor assets that are specific to a single Amtrak Route are assumed to be avoidable in the long term if that Route is eliminated. For example, RC3205, MoW Sanford, FL, only serves the Auto Train, therefore, costs coded to that ResCen ($313,858 in FY07) are avoidable in the short term if the Auto Train were to be discontinued.

Finally, except for certain single-route-specific ResCens, the approach assumes that costs associated with certain Function (e.g., FN1751, MoW Overhead) are fixed, while costs coded to other Functions are at least partially avoidable. Costs that are assumed to be partially avoidable are generally avoidable proportional to some measure of train activity for all track users (Amtrak, commuters, and freight railroads), taking into considerations factors such as train weight/axle load, train speed, and/or required track class. Certain maintenance activities, such as track inspection, vegetation and snow removal, and track and roadbed cleaning, are scheduled on the basis of time and, therefore, are not directly related to train activity. For example, while track inspection is mandated by regulation and those regulations likely are more burdensome for higher track classes, in practice—according to Amtrak staff—track inspection standards are set by company policy and are consistent across all Amtrak-owned track. As a result, the methodology assumes that inspection costs are only partially avoidable both overall and relative to track class.

Detailed Methodology Description

Rather than perform a detailed Function by Function analysis to determine the degree to which each Function is related to train activity, this analysis relies on the Fully Allocated cost methodology for the MoW-Track Subfamily to provide a basic breakdown between costs that are fixed and those that are potentially avoidable. In the MoW-Track Subfamily's Fully Allocated cost method, direct Functions cost are allocated using TUT as a proxy for preferred statistics, such as GTM or TUM, while indirect Function costs are allocated using MWDC as they are not tied directly to train activity. Table 8-1 lists the Functions included in the MoW-Track Subfamily profile used in the Fully Allocated cost methodology, except for Functions whose costs are unallocated and hence irrelevant to estimating avoidable costs for Amtrak's routes. Utilizing the same distinction between Functions as in the Fully Allocated cost methodology, the Avoidable Cost methodology for this Subfamily assumes that indirect Function costs allocated by MWDC are fixed while direct Function costs allocated by TUT are potentially avoidable. Miscellaneous Functions are included in the fixed category as they are allocated by MWDC.

Table 8-1: Subfamily #101, Track Subfamily Fully Allocated Cost Profile
(unallocated Functions excluded)

Function	Function Description	Statistic	Statistic Description	Cost Category	FY07 Actual Expenses
FN1702	Roadway Maintenance	TUT	Total Unit Trips	Partially Avoidable	3,969,710
FN1703	Track Maintenance	TUT	Total Unit Trips	Partially Avoidable	17,122,055
FN1704	Public ROW Maintenance	TUT	Total Unit Trips	Partially Avoidable	3,965
FN1711	RR Track & Roadway	TUT	Total Unit Trips	Partially Avoidable	(1,631)
FN1726	Roadway Bldg Maintenance	TUT	Total Unit Trips	Partially Avoidable	250,679
FN1733	Roadway Machine Maintenance	TUT	Total Unit Trips	Partially Avoidable	1,200,618

Function	Function Description	Statistic	Statistic Description	Cost Category	FY07 Actual Expenses
FN1734	Work Equip Maintenance	TUT	Total Unit Trips	Partially Avoidable	1,768,122
FN1741	Wrecks Storms Other-Track Repairs	TUT	Total Unit Trips	Partially Avoidable	2,266,589
FN1748	Snow and Ice Removal-Row	TUT	Total Unit Trips	Partially Avoidable	732,186
FN1844	Vehicle And Equipment Repairs	TUT	Total Unit Trips	Partially Avoidable	809,948
FN1131	Training Amtrak	MWDC	MoW Direct Costs	Fixed	2,311,977
FN1234	SAP Payroll Adjustments	MWDC	MoW Direct Costs	Fixed	212,788
FN1701	MoW Managerial	MWDC	MoW Direct Costs	Fixed	2,568,069
FN1751	MoW Overhead	MWDC	MoW Direct Costs	Fixed	20,780,700
FN1796	MoW Material Control	MWDC	MoW Direct Costs	Fixed	5,566
FN1798	MoW Spec Project	MWDC	MoW Direct Costs	Fixed	1,295,489
FNxxxx	All other functions	MWDC	MoW Direct Costs	Fixed	1,198,964

The main costs considered partially avoidable are track maintenance, roadway maintenance, repairs related to wrecks, storms and other incidents, and work and roadway equipment maintenance. Discussions with Amtrak staff confirmed that a large reduction in the number of trains would likely impact routine track maintenance costs, particularly those directly related to train activity. Amtrak staff stated that activities performed using each of these Functions are partially fixed because (1) a large proportion of maintenance costs are related to track inspections, which are set by policy and are not related to activity levels; (2) the same ResCen resources are used for track maintenance, track reimbursable work, and track Capital improvements, therefore, a reduction in routine maintenance and repair activity will not trigger a corresponding reduction in ResCen costs; and (3) certain costs coded to the track and roadway maintenance functions, such as vegetation and snow removal, are not related to train activity. These factors, in combination, suggest that even those functions considered variable have a fixed component. Absent a statistical approach, estimating the share of these function costs that is avoidable must necessarily rely on professional judgment since it is reasonable to assume that these costs would decline if an entire Amtrak Route were discontinued.

After consultation with Amtrak staff, the decision was that costs coded to the partially avoidable functions detailed above will be treated as 50 percent Avoidable (the Avoidable Percentage). This reflects the decision to treat other functions as 100 percent Fixed so that the resulting proportion of total costs in this Subfamily, which is treated as fixed, is greater than 50 percent. This Avoidable Percentage will be applied to MoW-Track function costs as detailed in Table 8-1 above to determine a Route's long-term Avoidable Cost. Short-term avoidable costs will not be calculated for this Subfamily. Because the majority of costs are Capital-related and even those partially avoidable costs have a large fixed component, staffing and resource levels would not adjust in the short term enough to calculate a short-term Avoidable Cost amount and are assumed to be fully fixed.

Using the Function detail from Table 8-1 in FY07, $28.3 million (50.2 percent) of MoW-Track Subfamily allocated costs are fixed while the remaining $28.1 million (49.8 percent) are partially

avoidable. Applying the Avoidable Percentage to the latter, $14.1 million of Subfamily operating costs remain to be considered as Avoidable if a Route is eliminated. These costs are considered avoidable proportional to train activity of all types. In the Fully Allocated methodology, these operational costs are allocated to Amtrak train, Commuters, and freight railroads; however, the notion of Avoidable Costs only pertains to those costs that would be avoided if Amtrak were to eliminate one of its own routes. Therefore, the operational costs allocated to Commuters and freight railroads (approximately 44 percent of MoW-Track operational costs) are also treated as fixed in estimating Amtrak's Avoidable Costs.[42]

After Capital, Reimbursable, Commuter, freight railroad, and fixed costs are removed from consideration, roughly $7.9 million, only about 5.0 percent of total annual Subfamily costs, are potentially avoidable. These costs are avoidable in proportion to some measure of activity for each Amtrak Route. The Fully Allocated cost methodology allocates costs based on each train's share of TUT. Although TUT is an acceptable statistic for apportioning costs among Amtrak trains, Commuters, and freight railroads, it does not take into consideration the impact of train weight, train speed, and/or required track class. At a minimum, the Avoidable Cost methodology must consider train weight and must distinguish between the Acela Route, which requires that track be maintained to a Class 8 standard, and other Amtrak Routes, which do not require that track be maintained to that standard. Costs for partially avoidable functions will be treated as avoidable in proportion to the statistics specified in Table 8-2. Costs coded to FN1703, Track Maintenance, which is used to record costs for track maintenance, repairs and inspections, will be treated as avoidable in proportion to Acela-weighted GTM. Acela-weighted GTM (AGTM) is a statistic that weights GTM for Acela trains by a factor of 1.2[43] to account for the higher speed at which Acela trains operate and the higher Track Class required for Acela service and non-Acela trains by a neutral factor of 1.0. Functions labeled as partially avoidable will be treated as avoidable in proportion to a train's GTM relative to GTM for all trains.

<div align="center">Table 8-2: Subfamily #101, Track Subfamily Avoidable Cost Profile
(unallocated Functions excluded)</div>

Function	Function Description	Statistic	Statistic Description	Cost Category
FN1702	Roadway Maintenance	GTM	Gross Ton Miles	Partially Avoidable
FN1703	Track Maintenance	AGTM	Acela-Weighted Gross Ton	Partially Avoidable
FN1704	Public ROW Maintenance	GTM	Gross Ton Miles	Partially Avoidable
FN1711	RR Track & Roadway	GTM	Gross Ton Miles	Partially Avoidable
FN1726	Roadway Bldg Maintenance	GTM	Gross Ton Miles	Partially Avoidable
FN1733	Roadway Machine	GTM	Gross Ton Miles	Partially Avoidable
FN1734	Work Equip Maintenance	GTM	Gross Ton Miles	Partially Avoidable
FN1741	Wrecks Storms Other-Track	GTM	Gross Ton Miles	Partially Avoidable
FN1748	Snow and Ice Removal-ROW	GTM	Gross Ton Miles	Partially Avoidable

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[42] Freight and Commuter GTM were roughly 43.7 percent of total GTM on Amtrak track in the Northeast in 2006 according to a September 2007 benchmarking study produced by Amtrak. The fully allocated cost methodology allocates the function costs labeled Partially Avoidable in Table 7-1 above using TUT as a proxy for GTM because Amtrak does not have an automated source of GTM data for Commuters and freight railroads.

[43] The weighting factor for Acela trains will be evaluated in consultation with Amtrak and will be the subject of a subsequent technical study .

Function	Function Description	Statistic	Statistic Description	Cost Category
FN1844	Vehicle And Equipment	GTM	Gross Ton Miles	Partially Avoidable
FN1131	Training Amtrak	N/A		Fixed
FN1234	SAP Payroll Adjustments	N/A		Fixed
FN1701	MoW Managerial	N/A		Fixed
FN1751	MoW Overhead	N/A		Fixed
FN1796	MoW Material Control	N/A		Fixed
FN1798	MoW Spec Projects	N/A		Fixed
FNxxxx	All other functions	N/A		Fixed

Summary

While this approach relies to a great extent on professional judgment regarding the nature of Function costs, it improves upon the unreasonable premise that MoW-Track costs are completely fixed. After Capital, Reimbursable, Commuter, and freight railroad costs are excluded from consideration as Avoidable with respect to Amtrak routes (i.e., assumed as fixed), the remaining operational costs in the MoW-Track Subfamily are classified by their functions as either fixed or partially avoidable. Costs for partially avoidable functions are multiplied by the Avoidable Percentage, 50 percent for this Subfamily, and then allocated to trains using either GTM or AGTM depending on the function and then aggregated to determine a Route's avoidable cost for MoW-Track.

8.1.2 MoW Communications & Signal Subfamily

Family: **MoW - #100**
Subfamily: **MoW Communications & Signal - #102**
Approach: **Fixed**

Scope

The MoW C&S Subfamily maintains Amtrak's communications systems, such as telegraph, telephone, radio systems, and train signal and interlocking systems. It also performs maintenance on communications-related buildings, ROW, and other facilities along the NEC and at other facilities, all of which serve multiple Routes.

Subfamily expenditures for FY07 were $92.7 million and account for 2.2 percent of Amtrak's total expenditures.

Avoidable Cost Approach

Based on qualitative analysis and professional judgment, the determination was virtually all of the costs in this Subfamily are fixed with respect to a single Amtrak route. Amtrak is required to maintain these assets, irrespective of the level of train service that it operates. Furthermore, after consultation with Amtrak MoW field staff and management, it was determined that the level of

maintenance activity is essentially unrelated to the level of train activity and thus Avoidable Costs for a particular route would not be significant or measurable.

Summary

Costs in the C&S Subfamily are 100 percent fixed with respect to a single Amtrak Route due to Amtrak's obligation to maintain these assets for Amtrak's multiple services and other users.

8.1.3 MoW Electric Traction Subfamily

Family: **MoW - #100**
Subfamily: **MoW Electric Traction - #103**
Approach: **Mixed-Detailed**

Scope

The MoW Electric Traction (MoW-ET) Subfamily operates the electric propulsion systems and performs maintenance and capital work on Amtrak's electric transmission infrastructure. This infrastructure includes the catenary and support apparatus, transmission systems between power plants and the network, power substations along the corridor, as well as the structures that house these systems. Operating costs also include salaries and benefits for power directors and load dispatchers.

Total Subfamily expenditures for FY07 were $65.2 million, including $37.3 million in Capital and Reimbursable expenses that are not operating costs for Amtrak trains. The remaining $27.8 million represents Amtrak's allocated operating costs.

Avoidable Cost Approach

Statistical methods were not used to estimate an avoidable cost equation for this Subfamily. Instead, the MoW-ET Subfamily utilizes a disaggregated deductive approach to estimate avoidable costs. The majority of expenditures in this Subfamily represent Capital and Reimbursable work. Only $27.8 million or 42.7 percent of total costs correspond to operating costs. This sum includes both fixed and avoidable costs. Rather than perform a detailed analysis of individual Functions to determine the degree to which each Function is related to train activity, the approach relies on the Fully Allocated cost methodology for the Subfamily to provide a basic breakdown between costs that are fixed and those that are potentially avoidable.

In the MoW-ET Subfamily's Fully Allocated Cost method, direct Functions are allocated using Electric Unit Miles (EUM). However, indirect costs are allocated by MoW Direct Costs (MWDC) as they are not tied directly to train activity.

Table 8-3 lists the Functions included in the MoW-ET Subfamily Profile used in the Fully Allocated methodology, but with the unallocated Functions excluded. As indicated in the table, indirect costs are allocated to trains based on MWDC, which represents their proportional share of total MoW-ET Subfamily direct costs (as allocated by EUM). Using the same distinction

between Functions are in the Fully Allocated methodology, the Avoidable Costs methodology for this Subfamily assumes that indirect Function costs allocated by MWDC are fixed while direct Function costs allocated by EUM are potentially avoidable. In this Subfamily, miscellaneous Functions are included in the fixed category as they are allocated by MWDC.

Table 8-3: Subfamily #103, Electric Traction Function Profile (unallocated Functions excluded)

Function	Function Description	Statistic	Statistic Description	Cost Category	FY07 Actual Expenses
FN1131	Training – Amtrak	MWDC	MoW Direct Costs	Fixed	$1,834,556
FN1234	SAP Payroll Adjustments	MWDC	MoW Direct Costs	Fixed	$182,921
FN1701	MoW Managerial	MWDC	MoW Direct Costs	Fixed	$4,174,365
FN1718	Power Transmission System Maintenance	EUM	Electric Locomotive Unit Miles	Partially Avoidable	$4,608,274
FN1719	Power Transmission System Operations	EUM	Electric Locomotive Unit Miles	Partially Avoidable	$1,183,660
FN1724	Power Plant & Substation Maintenance	EUM	Electric Locomotive Unit Miles	Partially Avoidable	$2,445,008
FN1747	Wrecks Storms Other- ET Repair	EUM	Electric Locomotive Unit Miles	Partially Avoidable	$692,861
FN1751	MoW Overhead	MWDC	MoW Direct Costs	Fixed	$9,022,330
FN1796	MoW Material Control	MWDC	MoW Direct Costs	Fixed	$56,050
FN1798	MoW Special Project	MWDC	MoW Direct Costs	Fixed	$1,196,607
FN1844	Vehicle And Equipment Repairs	EUM	Electric Locomotive Unit Miles	Partially Avoidable	$330,233
FNxxxx	All other functions	MWDC	MoW Direct Costs	Fixed	$2,109,948

The costs considered partially avoidable are (1) repair and maintenance costs of the power transmission systems that are not performed as part of capital projects, such as wreck, weather, or other repairs; (2) costs for maintenance of the power plants and substations used in the MoW-ET system; and (3) operating costs of the MoW-ET system, including the labor costs of system power directors and load dispatchers.

Discussions with Amtrak MoW staff suggest that the costs for activities performed using each of the direct cost Functions are partially fixed, meaning, they are less than 100 percent avoidable. In particular, MoW-ET staff stated that (1) as the NEC is currently not at a "state of good repair,"

the majority of activity is focused on capital work and most repairs are done as part of capital projects and thus excluded from consideration as avoidable operating costs; (2) inspection costs are focused on critical elements of the MoW-ET system that must be inspected regardless of activity levels; (3) not all types of repair costs are related to train activity, such as tree and vegetation clearing; and (4) the signal system is powered through the MoW-ET infrastructure and some of the transmission systems would need to be maintained even if Amtrak operated no electric trains.

These factors in combination suggest that even direct cost Functions have a fixed component. Absent a statistical approach, identifying the share of these costs that is Avoidable is based on professional judgment since it is reasonable to assume that these costs would decrease if an entire Amtrak route were discontinued. After consultation with Amtrak staff, it was assumed that costs associated with direct Functions would be considered 50 percent avoidable. This reflects the decision to treat other functions as 100 percent Fixed so that the total fixed portion of costs in this Subfamily is more than 50 percent. This Avoidable percentage will be applied to MoW-ET costs to determine a route's long-term Avoidable Cost. Short-term Avoidable Costs will not be calculated for this Subfamily. As the majority of expenditures are capital-related and even those partially Avoidable Costs have a large fixed component, staffing and resource levels would not adjust in the short term enough to calculate a short-term Avoidable Cost figure and are assumed to be fully fixed.

Using the Function detail from Table 8-13, in FY07, $18.6 million (59.2 percent) of MoW-ET Subfamily allocated costs were fixed whereas the remaining $9.3 million are partially avoidable. Applying the Avoidable Percentage to these costs, $4.6 million of total Subfamily operating costs remain that are considered avoidable proportional to train activity. In the Fully Allocated methodology, these operating costs are allocated by EUM to both Amtrak and commuter trains. However, the notion of Avoidable Costs only pertains to those costs that would be avoided if Amtrak were to eliminate one of its own routes. Therefore, the operating costs allocated to Commuters (roughly 40 percent of MoW-ET operating costs) are also fixed with respect to Amtrak's Avoidable Costs.

After Capital, Reimbursable, Commuter, and fixed costs are removed from consideration, roughly $2.9 million, less than 5 percent of the total annual Subfamily expenditures, is the estimate of Avoidable costs based on FY07 data. This remainder is avoidable in proportion to each Amtrak route's share of EUM.

Summary

While this approach relies on professional judgment regarding the nature of Function costs, it improves upon the unreasonable premise that MoW costs are completely fixed. After Capital, Reimbursable, and Commuter costs are eliminated from consideration, remaining operating costs in the MoW-ET Subfamily are classified by their Functions as either Fixed or Partially Avoidable. Costs for the Partially Avoidable Functions are multiplied by the percent avoidable, which is set at 50 percent for the Subfamily and aggregated to determine a route's Avoidable MoW-ET Costs

8.1.4 MoW Bridges & Buildings (B&B) Subfamily

Family: **MoW - #100**
Subfamily: **MoW Bridges & Buildings - #104**
Approach: **Fixed**

Scope

The MoW B&B Subfamily maintains a subset of Amtrak's physical assets, including tunnels, bridges, culverts, overhead highway bridges, signs, and buildings, both for the MoW Family and for other Amtrak departments.

Subfamily expenditures for FY07 were $62.5 million and account for 1.5 percent of Amtrak's total expenditures.

Avoidable Cost Approach

Based on qualitative analysis and professional judgment, it was determined that these costs are fixed with respect to a single Amtrak route. Amtrak is required to maintain these assets, irrespective of the level of service that it operates. Furthermore, after consultation with Amtrak MoW field staff and management, it was determined that any Avoidable Costs for a particular route would not be significant or measurable.

Summary

Costs in the B&B Subfamily are 100 percent fixed with respect to a single Amtrak Route due to Amtrak's obligation to maintain its assets for Amtrak's multiple services and other users.

8.1.5 MoW Support Subfamily

Family: **MoW - #100**
Subfamily: **MoW Support - #105**
Approach: **Fixed**

Scope

The MoW Support Subfamily performs general support activities for ResCens in the other MoW Subfamilies (Track, C&S, ET and B&B). These activities include management and supervision, training, material control and procurement, support for work, wire and wreck trains, planning and support for specific capital projects, and related activities.

Subfamily expenditures for FY07 were $248.1 million and account for 5.8 percent of Amtrak's total expenditures.

Avoidable Cost Approach

This Subfamily supports and manages the other MoW Subfamilies, whose costs are largely fixed. Based on qualitative analysis and professional judgment, it was determined that costs incurred in this Subfamily are by their nature overhead for the MoW Family and fixed with respect to a single Amtrak route. Amtrak is required to maintain most of its assets, irrespective of the level of service that it operates. Furthermore, after consultation with Amtrak MoW field staff and management, it was determined that any Avoidable Costs for a particular route would not be significant or measurable.

Summary

Costs in the MoW-Support Subfamily are 100 percent fixed with respect to a single Amtrak Route. This Subfamily supports the other MoW Subfamilies, whose costs are largely fixed due to Amtrak's obligation to maintain its assets for Amtrak's multiple services and other users.

8.2   MoE Family

8.2.1   MoE Turnaround Subfamily

Family: **MoE - #200**
Subfamily: **MoE Turnaround - #201**
Approach: **Mixed-Statistical**

Scope

The MoE Turnaround Subfamily performs cleaning, inspections, and minor repairs on Amtrak trains and Amtrak-operated commuter trains before each departure and also enroute. Turnaround facilities can work exclusively on cars, locomotives, or both types of equipment. At some locations, turnaround services are performed by outside contractors rather than Amtrak employees. Additionally, the Turnaround Subfamily includes Amtrak employees known as "train riders" accompany trains and performs minor enroute repairs as required.

Subfamily costs for FY07 were $113.8 M and account for 2.7 percent of Amtrak's total costs.

Regression Data

Three years of cost and activity data for the Turnaround Subfamily ResCens were assembled and analyzed as a panel dataset. Not all ResCens were included; specifically, ResCens 4306, 6652, 6660, 7281, 7172, 7150, 7162, 7173, 4306, and 7281 were removed from the analysis because they served commuter rail service and the focus of the Avoidable Cost analysis is only on the Amtrak routes. ResCens 6669, 7963, and 7160 were also removed from the analysis due to lack of activity data. ResCens 3118, 3119, 3120 were excluded because (1) they only serve Amtrak's single speed rail route and are therefore fully avoidable by definition, and (2) they have different cost characteristics from ResCens serving standard Amtrak routes. Eight ResCens were

combined into two ResCen groups (RC4252-55, RC4433-38) because they shared turnaround responsibilities at the same locations.

Statistical Model and Results

Linear, log-log, and linear-log functional forms were tested for the Turnaround Subfamily. The log-log relationship was found to have the best statistical fit for this Subfamily. Long-run Avoidable Costs were found to be larger than short-run Avoidable Costs, which is intuitively correct.

Turnaround costs rise at a decreasing rate with increases in passenger activity. This indicates that the Turnaround Subfamily exhibits economies of scale. Turnaround costs change more dramatically in the long-run compared to the short-run, indicating that some costs exist that cannot be avoided within a year of a change in activity levels.

Turnaround ResCens run by contractors were expected to have a different long-run cost function because their cost structure has less rigidity. Therefore, a contract dummy was included in the estimation of the long-run (between-effects) model. The contract dummy was found to reduce the constant for contractor-staffed ResCens relative to the Amtrak staffed turnaround ResCens. As a result, contract-staffed turnaround ResCens have larger Avoidable Costs than Amtrak-staffed ResCens for a given reduction in activity because the change occurs at a point where economies of scale have a smaller effect, such as the cost changes (savings) are larger as activity is reduced.

Including a contract dummy in the short-run (fixed-effects) model would be statistically inappropriate. The short-run model measures changes in costs due to activity changes from one period to another, but does not take into account differences between ResCens, for example, it is focused on differences over time and essentially ignores differences between ResCens. Thus, it is not designed to identify differences between types of ResCens such as contract versus noncontract.

The overall statistical results for the panel dataset are provided in the following table.

Equation	Ln(Cost) = Constant + B * ln(TUT)
Observations	135
R-square	0.243

The short-run (fixed–effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	8.72	99%
TUT	0.50	99%

The long-run (between-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	7.62	99%
Contract	-0.46	70%
TUT	0.61	99%

These regression equations are used to generate predicted ResCen costs before and after a route is eliminated. Avoidable Costs are calculated by applying the resulting percentage change in predicted costs to actual ResCen costs.

8.2.2 Locomotive Maintenance Subfamily

Family: **MoE - #200**
Subfamily: **Locomotive Maintenance - #202**
Approach: **Mixed-Statistical**

For purposes of developing an Avoidable Cost methodology, the Locomotive Maintenance Subfamily was combined with the Car Maintenance Subfamily. The analysis and results are described in Section 8.2.3 below.

8.2.3 Car Maintenance and Locomotive Maintenance Subfamilies

Family: **MoE - #200**
Subfamilies: **Locomotive Maintenance - #202 and Car Maintenance - #203**
Approach: **Mixed-Statistical**

Scope

The ResCens in Subfamilies 202 and 203 perform maintenance work on Amtrak's diesel and electric locomotives and on its passenger coaches and other types of cars, respectively. The work performed in these Subfamilies includes both preventive maintenance and as-needed maintenance. No significant capital work is undertaken in this Subfamily; instead, the Backshop Subfamily performs such capital work.

Locomotive Maintenance Subfamily expenditures for FY07 were $54.9 million and account for 2.7 percent of Amtrak's total, whereas Car Maintenance Subfamily expenditures were $41.7 million and account for 1.0 percent of Amtrak's total expenses.

Regression Data

Activity and cost data for these Subfamilies were available from 2005 through 2007. After an initial examination of the data, three ResCens within Subfamily 202 that had negative costs were

removed from the dataset leaving six ResCens with 18 observations. Subfamily 203 contained eight ResCens and with 24 observations. To be able to capture statistically valid information on how activity affects costs at these ResCens, a combined dataset was created using cost and activity information for Families 202 and 203. The combined dataset had 42 observations across 14 ResCens. Activity statistics tested were selected based on their logical and intuitive relationship with cost levels at these ResCens.

Statistical Model and Results

A preliminary examination of scatter plots of cost against activity suggested that a linear form equation best captures the relationship between these variables. Other functional forms, such as log-log and log-linear, were also examined. For the combined 202 and 203 Subfamilies, the linear form equation provided the best explanation of changes in costs relative to activity.

The most appropriate model was selected by examining regression statistics and using insight into which activities would logically drive costs for these Subfamilies. The statistical tests provided guidance on which specification captured most of the variation in Avoidable Costs relative to a particular activity. The best specification was found when using a linear model and TTM as the activity statistic.

The overall statistical results for the panel dataset are provided in the following table.

Equation	Cost = Constant + B * TTM
Observations	42
R-square	0.53

The short-run (fixed-effects) model results are provided in the following table.

	Coefficient	**Significance Level**
Constant	1,403,475	85%
TTM	0.38	99%

The long-run (between-effects) model results are provided in the following table.

	Coefficient	**Significance Level**
Constant	-1,241,950	48%
TTM	0.63	99%

These results indicate a linear relationship between costs within these two maintenance Subfamilies and TTM. The linear equation form shows no appearance of any economies of scale

for these Subfamilies. The increase in the coefficient on TTM between the short-run and long-run equations provides evidence that the potential for costs savings is higher in the long run.

These regression equations are used to generate predicted ResCen cost before and after elimination of a route. Avoidable Costs are calculated by applying the percentage change in predicted costs to actual ResCen costs.

8.2.4 MoE Support Subfamily

Family: **MoE - #200**
Subfamily: **MoE Support - #204**
Approach: **Mixed-Statistical**

Scope

The MoE Support Subfamily performs managerial, administrative, material control, and other activities in support of turnaround servicing, rolling stock maintenance and repair, and component work performed in the various Amtrak mechanical shops.

Subfamily expenditures for FY07 were $68.7 million and account for 1.7 percent of Amtrak's total expenses.

Regression Data

Cost and associated activity data were available for this Subfamily for the 3-year period from 2005 through 2007. An initial examination of these data showed many ResCens with costs, but no associated activity. Additionally, some ResCens had negative cost data. These ResCens were removed from the regression dataset. Activity statistics were selected for testing based on whether they measured activities that would logically affect costs at these ResCens.

Statistical Model and Results

A preliminary examination of scatter plots suggested that the relationship between ResCen cost and train activity is best represented by transforming the data into log form. Fixed, between and random-effects models were tested using both log form and linear form data. The best model was selected by examining regression statistics and using professional judgment regarding which types of train activities would logically drive ResCen costs for this Subfamily. Statistical tests provided guidance on which specification best explained the variation in ResCen costs relative to changes in train activity. Log form equations exhibited the best fit in terms of explaining this variation. Using this functional form, TTM was selected as the best predictor of ResCen costs out of the available train activity statistics.

Long-run Avoidable Costs were found to be statistically equivalent to short-run Avoidable Costs. A Hausman test was used to verify that the random-effects results are statistically equivalent to the fixed-effects results. Thus, the random-effects results represent the best estimate of both long- and short-run Avoidable Costs for the Transportation Support Subfamily.

The overall statistical results for the panel dataset are provided in the following table.

Equation	$Ln(Cost) = Constant + B * ln(TTM)$
Observations	177
R-square	0.42

The short-run and long-run (random-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	1.72	82%
TTM	0.72	99%

These results show a positive relationship between Transportation Support costs and TTM. The equation is specified in log-log form, which indicates the existence of economies of scale for this Subfamily. The potential for cost savings for this Subfamily are statistically equivalent across the short and long run, suggesting that all costs that can be avoided are avoidable within a year of a change in activity levels as measured by TTM.

This regression equation is used to generate predicted ResCen costs before and after a route is eliminated. Avoidable Cost is calculated by applying the percentage change in predicted cost to actual ResCen costs.

8.2.5 MoE Multiple Subfamily

Family: **MoE - #200**
Subfamily: **MoE-Multiple - #205**
Approach: **Mixed-Detailed**

Scope

ResCens in the MoE-Multiple Subfamily do not perform one primary activity, but rather perform multiple mechanical-related activities using various Functions that are typically used in other Subfamilies within the MoE Family. The ResCens in this Subfamily perform two or more main activities to a degree that precludes their inclusion in a single Subfamily. The types of activities performed at these ResCens include turnaround servicing, locomotive maintenance, and car maintenance.

Subfamily expenditures for FY07 were $123.4 million and account for 3.0 percent of Amtrak's total expenses.

Avoidable Cost Approach

The Fully Allocated Cost methodology for the MoE-Multiple Subfamily relies upon the allocation methodologies used in the MoE-Turnaround, Locomotive Maintenance, Car Maintenance, and Support Subfamilies. Expenditures coded to certain Functions in the MoE-Multiple Subfamily are allocated using the same rules used to allocate expenditures coded to the same Functions in other MoE Subfamilies. This approach ensures that similar types of expenditures are allocated in a consistent manner within the entire MoE Family.

The Avoidable Cost approach for the MoE-Multiple Subfamily utilizes a similar strategy. Estimating Avoidable Costs for the MoE-Multiple Subfamily is not possible using a single method because expenditures in this Subfamily are coded to many unrelated Functions. Furthermore, each ResCen may use multiple types of Functions. Therefore, grouping ResCens together by Function into Subcategories is not possible within the MoE-Multiple Subfamily to conduct a separate statistical analysis.

To provide insight into the Avoidable Cost structure within the MoE-Multiple Subfamily, costs were grouped by Function and then by the MoE Subfamily in which the Function typically is utilized. Using this approach, costs in this Subfamily can be categorized as follows:

Table 8-4: Expenditures in the MoE-Multiple Subfamily Related to other MoE Subfamilies

Related MoE Subfamily	FY07 Expenditure (millions)	Share of MoE-Multiple Subfamily
Turnaround Service	$50.7	36.1%
Car Maintenance	$31.0	22.1%
Support	$30.4	21.7%
Locomotive Maintenance	$12.7	9.1%
Direct to Capital or Commuter	$14.4	10.2%
Miscellaneous	$1.2	0.9%

The main expenditures within this Subfamily are related to Turnaround Service, MoE Support and Car Maintenance activities. Together these activities account for more than three-quarters of all expenditures within the MoE-Multiple Subfamily. Locomotive maintenance accounts for a much smaller portion as do expenditures coded directly to a specific customer.

Grouping MoE-Multiple Subfamily costs by Function allows Avoidable Cost statistical results from the other directly related MoE Subfamilies to be extrapolated to this Subfamily. For example, to estimate the avoidability of Turnaround costs within the MoE-Multiple Subfamily, the Avoidable Cost equation for Turnaround Subfamily #201 is used. Because the relationship between Turnaround costs and activity can be assumed to be the same between this Subfamily and the Turnaround Subfamily, the results from the statistical analysis of costs and activity in the Turnaround Subfamily can be applied to estimate Avoidable Costs for Turnaround Functions in the MoE-Multiple Subfamily.

The same approach is applied to each of the major Subfamily costs identified in the MoE-Multiple Subfamily. The matching statistical results used are as follows:

Table 8-5: Approach Used Within the MoE-Multiple Subfamily

Related MoE Subfamily	Approach Used
Turnaround Service	Subfamily #201 Avoidable Cost Equation
Car Maintenance	Subfamily #202/203 Avoidable Cost Equation
MoE Support	Subfamily #204 Avoidable Cost Equation
Locomotive Maintenance	Subfamily #202/203 Avoidable Cost Equation

This approach allows the statistical analyses from closely related MoE Subfamilies to be used to estimate Avoidable Costs within the MoE-Multiple Subfamily. Through this approach, Avoidable Costs can be estimated for approximately 80 percent of all activity-related costs in the MoE-Multiple Subfamily.

Costs associated with miscellaneous Functions that cannot be analyzed using the above approach are treated as Fixed within the MoE-Multiple Subfamily. Expenditures associated with the Reimbursable business, such as equipment repair expenditures for Commuter agencies, are not allocated to Amtrak trains and are automatically excluded from Avoidable Cost estimates. Capital expenditures within this Subfamily become part of Amtrak's capital assets and are included in the Capital Subfamily #701 and follow that Subfamily's Avoidable Cost method.

Summary

The MoE-Multiple Subfamily is composed of ResCens that perform several activities normally associated with different Subfamilies within the MoE Family. To calculate Avoidable costs for this Subfamily, functions within the MoE-Multiple Subfamily that are associated with another MoE Subfamily use that Subfamily's statistically estimated equation parameters (see Table 8-6 for specific details). For example, functions associated with the Turnaround Family use that Subfamily's equations. Thus, the various functions use another Subfamily's statistically estimated equation parameters or are classified as Fixed or are excluded from the analysis.

Table 8-6 summarizes the Avoidable Cost estimation approach for this Subfamily by Function.

Table 8-6: Grouping of Functions by Subfamily within MoE-Multiple - #205

Function	Function Description
Use the Avoidable Cost Equation for MoE Turnaround - #201	
FN1821	Locomotive Electric Turnaround Service
FN1828	Car Turnaround Service
FN1862	Locomotive Diesel Turnaround Service
Use the Avoidable Cost Equation for Locomotive Maintenance/Car Maintenance	

Function	Function Description
- #202/#203	
FN1822	Locomotive Electric Program Service
FN1823	Locomotive Electric Bad Orders
FN1824	Locomotive Electric Light Overhaul
FN1825	Locomotive Electric Modifications, Conversions and Testing
FN1826	Locomotive Electric Wreck & Accident
FN1827	Locomotive Warranty
FN1863	Locomotive Diesel Program Service
FN1864	Locomotive Diesel Bad Orders
FN1865	Locomotive Diesel Light Overhaul
FN1866	Locomotive Diesel Modifications, Conversions and Testing
FN1867	Locomotive Diesel Wreck & Accident
FN1820	Special Trains MoE
FN1829	Car Program Maintenance
FN1830	Car Bad Orders
FN1831	Car Modifications, Conversions, and Testing
FN1832	Car Light Overhaul
FN1833	Car Wreck & Accident
FN1834	Car Warranty
FN1836	Freeze Damage Repair
FN1839	Progressive Overhaul
FN1841	Car E-Clean and Fumigation
Use the Avoidable Cost Equations for MoE Support - #204	
FN1131	Training Amtrak
FN1182	Light Duty
FN1198	General Support - Special Projects
FN1234	SAP Payroll Adjustments
FN1801	MoE Managerial
FN1806	MoE Shop Facility
FN1807	MoE Shop Equipment
FN1808	MoE Supervisory Clerical & Office
FN1812	Mechanical Shop-Snow, Ice, & Exceptional Weather Exp
FN1814	M of E Overhead
FN1835	Component Rework
FN5000	Project Support–MoE
FN1844	Vehicle And Equipment Repairs
FN1851	Contract Roll Stock Management/Maintenance
FN1875	Environmental Activities

Function	Function Description
FN1876	Environmental Remediation Projects
FN1197	Reimbursable General Support
FN1997	MoE Reimbursable
FN2302	Recollectable MoE
FN1999	Conn DOT Commuter Agreement MoE
FN2011	New Jersey Transit
FN2036	Maryland DOT
FN2040	Virginia Rail Express
FN3000	Equipment–Remanufacture
FN3001	Equipment–Overhaul
FN3002	Equipment–Wreck Repairs
FN3003	Equipment–New Acquisition
FN3004	Equipment–Other Modifications
FN3501	Road Land & Other WIP
FN4040	Commercial General Support
FN1631	Train Operations
FN1815	MoE-Vacation/Holiday/Nonproductive Labor
FN1816	MoE Material Control
FN1889	MoE Special Projects
FN1988	Passenger Common–Train Riders
Fixed Costs	
FNXXXX	All Other Functions

8.2.6 High Speed Rail Maintenance Subfamily

Family: **MoE - #200**
Subfamily: **HSR Maintenance - #206**
Approach: **Avoidable**

Scope

The HSR Maintenance Subfamily performs all activities related to maintaining Amtrak's high speed rail (Acela) equipment, including rolling stock maintenance, turnaround servicing, management, and support activities. The Subfamily consists of six ResCens dedicated to servicing only equipment used on the Acela Express route. Additionally, Amtrak contracts with Alstom to manage material control for Acela trains, including the supply of overhaul packages, scheduled maintenance kits, other maintenance materials, and technical assistance.

Subfamily expenditures for FY07 were $64.1 million and account for 1.5 percent of Amtrak's total expenses.

Avoidable Cost Approach

If the Acela Express route were eliminated, in the long run, operations at ResCens responsible for maintaining Acela trainsets would also be eliminated and the facilities and equipment at those ResCens would be sold or otherwise disposed of. Thus, long-run costs for this Subfamily are 100 percent Avoidable. In the short run, most or all of the staff at these ResCens would likely be maintained to administer the decommissioning process and most ResCen costs would not be Avoidable.[44]

8.2.7 Backshop Subfamily

Family: **MoE - #200**
Subfamily: **Backshop - #207**
Approach: **Mixed-Detailed**

Scope

The ResCens in the Backshop Subfamily perform major repairs and capital overhauls, and produces and repairs components. They also perform some minor car and locomotive maintenance and servicing. The majority of expenditures in this Subfamily are Capital expenditures, followed by component-related and other maintenance work.

Subfamily expenditures for FY07 were $202.4 million (inclusive of transfer credits) and accounted for 4.9 percent of Amtrak's total expenses.

Avoidable Cost Approach

The Backshop Subfamily is similar to the MoE-Multiple Subfamily in that it performs a wide range of MoE-related activities, including locomotive and car maintenance and support activities, in addition to major repairs and capital overhauls and component work. The Backshop Subfamily uses the same Avoidable Cost approach as the MoE-Multiple Subfamily above, which relies on the methodologies used in, and the Avoidable Cost equations developed for, the MoE-Turnaround, Locomotive Maintenance, Car Maintenance, and MoE-Support Subfamilies.

In the MoE-Multiple Subfamily, expenditures coded to certain Functions are allocated using the same rules used to allocate expenditures coded to the corresponding functions in other MoE Subfamilies. This approach ensures that similar types of expenditures are allocated in a consistent manner within the entire MoE Family. The Avoidable Cost approach for the

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[44] This methodology does not estimate costs for the transition period between the first year and the long term. However, it is notable that these ResCens would be a special case if such analysis were done. In the transition period between the short and long run, staff costs likely would be rapidly reduced, but staff reductions would be subject to labor protection provisions in Amtrak's collective bargaining agreements. Nevertheless, because other equipment maintenance facilities servicing other routes exist in the same geographic locations, staff in the HSR Maintenance Subfamily ResCens is likely to be offered positions as they become available due to attrition, which would increase the transition period Avoidable Costs.

Backshop Subfamily utilizes a similar strategy. Estimating Avoidable Costs for the Backshop Subfamily is not possible using a single method because expenditures in this Subfamily are coded to many unrelated Functions. Furthermore, each ResCen may use multiple Functions. Therefore grouping ResCens together by Function into Subcategories within the Backshop Subfamily to conduct a separate statistical analysis is not possible.

To provide insight into the Avoidable Cost structure within the Backshop Subfamily, costs were grouped by Function and then by the MoE Subfamily in which the Function typically is utilized. Using this approach, costs in this Subfamily can be categorized as in Table 8-7.

Table 8-7: Expenditures in the Backshop Subfamily Related to other MoE Subfamilies

Related MoE Subfamily	FY07 Expenditure (millions)	Share of Backshop Subfamily
Capital, Reimbursable, or Commuter (Unallocated)	$149,962,674	74.1%
Support	$41,903,220	20.7%
Locomotive Maintenance	$5,495,062	2.7%
Car Maintenance	$3,623,068	1.8%
Miscellaneous	$1,289,223	0.6%
Turnaround Service	$81,812	0.0%

The main expenditures within this Subfamily are related to heavy repairs and overhauls, both of which are types of Capital work, and become part of Amtrak's capital assets. Thus, such expenditures are included in Capital Subfamily #701 and follow that Subfamily's allocation and Avoidable Cost methods. Removing these expenses leaves Support and Car and Locomotive Maintenance as the largest Subfamily costs.

Grouping Backshop Subfamily costs by Function allows Avoidable Cost statistical results from the other directly related MoE Subfamilies to be extrapolated to this Subfamily. For example, to estimate the avoidability of MoE-Support costs within the Backshop Subfamily, the Avoidable cost equation for Support Subfamily #204 is used. Because the relationship between MoE-Support costs and activity can be assumed to be the same between this Subfamily and the MoE-Support Subfamily, then the results from the statistical analysis of costs and activity in the MoE-Support Subfamily can be applied to estimate Avoidable Costs for MoE-Support Functions in the Backshop Subfamily.

The same approach is applied to each of the major Subfamily costs identified in the Backshop Subfamily. The matching statistical results used are as follows:

Table 8-8: Approach Used Within the MoE-Multiple Subfamily

Turnaround Service	Subfamily #201 Avoidable Cost Equation
Locomotive Maintenance	Subfamily #202/203 Avoidable Cost Equation
Car Maintenance	Subfamily #202/203 Avoidable Cost Equation
MoE Support	Subfamily #204 Avoidable Cost Equation

This approach allows the statistical analyses from closely related MoE Subfamilies to be used to estimate Avoidable Costs within the Backshop Subfamily. Through this approach, Avoidable Cost can be estimated for approximately 25 percent of all activity-related costs and 97 percent of non-Capital costs in the Backshop Subfamily.

Costs, which are associated with miscellaneous Functions that cannot be analyzed using the stated approach, are treated as Fixed within the Backshop Subfamily with respect to Amtrak Routes. Component work is not specifically tied to a type of service or equipment and supports the entire MoE Family and is, therefore, treated in the same manner as MoE-Support costs. Expenditures, associated with the Reimbursable business such as equipment repair expenditures for Commuter agencies, are not allocated to Amtrak trains and are automatically excluded from Avoidable Costs estimates. Capital expenditures within the Backshop Subfamily become part of Amtrak's capital assets and are included in the Capital Subfamily #701 and follow its allocation and Avoidable Cost method.

Summary

The Backshop Subfamily is composed of ResCens that perform several activities normally associated with different Subfamilies within the MoE Family. To calculate Avoidable costs for this Subfamily, functions within the Backshop Subfamily that are associated with another MoE Subfamily use that Subfamily's statistically estimated equation parameters. For example, functions associated with the Car Maintenance Subfamily use that Subfamily's equations. Thus, the various functions use another Subfamily's statistically estimated equation parameters, are classified as fixed, or are excluded from the analysis.

Table 8-9 summarizes the Avoidable Cost estimation approach for this Subfamily by Function.

Table 8-9: Grouping of Functions by Subfamily within Multiple #207

Function	Function Description
Use the Avoidable Cost Equation for MoE Turnaround - #201	
FN1828	Car Turnaround Service
Use the Avoidable Cost Equation for Locomotive Maintenance/Car Maintenance - #202/203	

Function	Function Description
FN1821	Locomotive Electric Turnaround Service
FN1822	Locomotive Electric Program Service
FN1823	Locomotive Electric Bad Orders
FN1824	Locomotive Electric Light Overhaul
FN1825	Locomotive Electric Modifications, Conversions, and Testing
FN1826	Locomotive Electric Wreck & Accident
FN1827	Locomotive Warranty
FN1862	Locomotive Diesel Turnaround Service
FN1863	Locomotive Diesel Program Service
FN1864	Locomotive Diesel Bad Orders
FN1865	Locomotive Diesel Light Overhaul
FN1866	Locomotive Diesel Modifications, Conversions, and Testing
FN1867	Locomotive Diesel Wreck & Accident
FN1829	Car Program Maintenance
FN1830	Car Bad Orders
FN1831	Car Modifications, Conversions, and Testing
FN1832	Car Light Overhaul
FN1833	Car Wreck & Accident
FN1834	Car Warranty
FN1836	Freeze Damage Repair
Use the Avoidable Cost Equation for MoE Support - #204	
FN1131	Training Amtrak
FN1182	Light Duty
FN1234	SAP Payroll Adjustments
FN1801	MoE Managerial
FN1806	MoE Shop Facility
FN1807	MoE Shop Equipment
FN1808	MoE Supervisory, Clerical & Office
FN1810	Component WIP Inventory
FN1811	Component WIP Inventory (Balance Sheet)
FN1812	Mechanical Shop-Snow, Ice, & Exceptional Weather Exposure
FN1814	MoE Shop Overhead
FN1815	MoE-Vacation/Holiday/Nonproductive Labor
FN1816	MoE Material Control
FN1835	Component Rework
FN1844	Vehicle And Equipment Repairs
FN1875	Environmental Activities
FN1889	MoE Special Projects

Function	Function Description
FN5000	Project Support–MoE (Operation costs that support capital projects but not considered as capital expenses)
FN6831	Transfers–MoE
Fixed Costs	
FNxxxx	All other Functions
Capital and Direct Functions Excluded from Avoidable Cost Analysis	
FN1997	MoE Reimbursable
FN2036	Maryland DOT
FN2302	Recollectable MoE
FN3000	Equipment–Remanufacture
FN3001	Equipment–Overhaul
FN3002	Equip-Wreck Repairs
FN3004	Equip-Other Modifications
FN3021	Amtrak NJT Joint Benefit Capital Program
FN3071	Keystone Corridor Improvement Program
FN3075	LIRR Life Safety Capital
FN3077	SEPTA Joint Benefit Capital
FN3501	Road Land & Other WIP

8.3   Transportation Operations (OPS) Family

8.3.1 Onboard Service Subfamily

Family: **Ops - Transportation - #300**
Subfamily: **OBS - #301**
Approach: **Depends on Subcategory (see below)**

Scope

The ResCens in the OBS Subfamily provide food, beverage, and other passenger services on board Amtrak trains in addition to operating the commissaries that stock the trains with supplies. The OBS Subfamily consists of four subcategories of ResCens, established to differentiate and track separate activities and costs.

Subfamily expenditures for FY07 were $231.4 million and account for 5.6 percent of Amtrak's total expenses.

Avoidable Cost Approach

Varying missions and activities within this Subfamily prevent the implementation of a single Avoidable Cost approach, and instead Avoidable Costs for each Subcategory are identified and calculated differently.

301_1-Crew: This Subcategory consists of ResCens that incur the direct and indirect costs of the train crewmembers that provide customer service as well as their immediate supervisors. Costs in this Subcategory totaled $136.5 million in FY07. OBS crew labor costs are directly assigned to trains and are Avoidable if a Route is eliminated. However, under collective bargaining agreements, OBS crews are financially protected in the event of certain service reductions or eliminations, making the final Avoidable Costs less than they would be without these labor protections.

A brief description of the approach used for estimating Avoidable Costs for the OBS Crew Subcategory follows. Two Avoidable Cost percentages are calculated, one for OBS wages and one for OBS fringe benefits, for each crew base and Route combination by using data including years of service and wage rates for OBS crew members at each crew base. These Avoidable Cost percentages represent the share of total costs coded to the relevant Functions at a ResCen that are avoided if a specific route is eliminated. Because an individual crew base may contain multiple ResCens, an Avoidable Cost percentage for a crew base applies to all corresponding ResCens at that crew base. Just as in other Subfamilies, Avoidable Cost percentages were calculated for both the short term and the long term.

Avoidable Costs for a particular Route at a particular ResCen are calculated as follows:
1. Wage Avoidable Costs for that Route are calculated by multiplying wage Avoidable Cost percentages by wage Function Fully Allocated Costs.
2. Fringe benefit Avoidable Costs for that Route are calculated by multiplying fringe benefit Avoidable Cost percentages by fringe benefit Function Fully Allocated Costs.
3. Costs coded to Accounts for crew meals and layovers are treated as 100 percent avoidable because they would cease to be incurred if a Route is eliminated.
4. Costs coded to some Functions are treated as fixed where a crew base serves multiple routes, but 100 percent avoidable in the long run if a crew base serves a single route.
5. Avoidable Costs for a Route at the ResCen are then the sum of avoidable wages, avoidable fringe benefits, and other 100 percent Avoidable Costs

Total Avoidable Costs for the Route are calculated by summing Avoidable Costs for that Route at each ResCen serving the Route.

For a more complete discussion of Amtrak labor protection provisions and the Avoidable Cost method for this Subcategory as well as an example, see Section 6.4, Adjusting for Labor Protection Provisions.

301_2-Supplies: This Subcategory consists of the costs of food, beverage, linen, nonconsumables, and other supplies used by passengers or crews on board Amtrak trains. Costs in this Subcategory totaled $52.3 million in FY07. These supply costs are directly assigned to

trains and are fully avoidable if a train is eliminated. Further, each Route has a dedicated Supplies ResCen in the OBS Supplies Subcategory. If a Route is eliminated, costs at this Supplies ResCen are 100 percent avoidable, whereas costs at the rest of the ResCens in the Subcategory are fixed.

301_3-Commissary Management & Support: This Subcategory consists of the outsourced commissary costs paid to Gate Gourmet, Inc. for the operation of Amtrak's 11 commissaries, as well as Amtrak's internal commissary and contract management costs. Costs in this Subcategory totaled $32.9 million in FY07. A reduction or elimination in service would result in a corresponding reduction in contract fees paid. This reduction would be immediate because any reduction or elimination in service would be a planned action and outsourced commissary costs are 100 percent avoidable in both the short and long run. Amtrak's internal commissary and contract management costs are fixed relative to the elimination of a single Amtrak route.

301_4-Support: This Subcategory consists of ResCens that incur costs for management support of OBS labor. These costs include the costs to operate the crew assignment system, crew dispatching and other systemwide OBS management costs. Costs in this Subcategory totaled $9.2 million in FY07. Although it is reasonable that OBS management support costs might decline if a single Amtrak Route were eliminated, no significant relationship could be established between levels of train activity and OBS-Support ResCen costs through statistical analysis; hence, the hypothesis that costs within the Support Subcategory are partially Avoidable could not be proven. This lack of a statistically significant relationship, along with the support nature of the Subcategory, support treating OBS Support costs as fixed.

Summary

The OBS Subfamily is broken down into four Subcategories, which are treated separately with regard to the calculation of Avoidable Costs. Cost in Crew Subcategory 301_1, are Avoidable subject to labor protection provisions. Costs in Supplies Subcategory 301_2 are Avoidable. Depending on the Account number, some costs in Commissary Management & Support Subcategory 301_3 are Avoidable while others are fixed. Finally, Costs in Support Subcategory 301_4 are fixed because OBS management support will continue to be necessary to facilitate the entire OBS Subfamily if any single Amtrak route is eliminated.

8.3.2 Trainmen and Enginemen (T&E) Subfamily

Family: **Ops - Transportation - #300**
Subfamily: **T&E - # 302**
Approach: **Depends on Subcategory (see below)**

Scope

The T&E Subfamily consists of the direct and indirect labor costs incurred to operate passenger trains. Enginemen are the engineers who operate locomotives, while trainmen are the conductors in overall control of trains. Together T&E are referred to as the road crew. Amtrak T&E crews work on both Amtrak trains and commuter trains operated by Amtrak. Only costs related to

operating Amtrak trains are potentially Avoidable. The T&E Subfamily consists of two Subcategories of ResCens. These Subcategories were established to differentiate and track separate T&E activities and costs.

Subfamily expenditures for FY07 were $272.3 million and account for 6.6 percent of Amtrak's total expenses.

Avoidable Cost Approach

Varying missions and activities within this Subfamily prevent the implementation of a single avoidable cost approach, and therefore Avoidable Costs for each of the two Subcategories are identified and calculated differently.

302_1-Crew: This Subcategory consists of ResCens that incur the direct and indirect costs of the train road crews and their immediate supervisors. Costs in this Subcategory totaled $260.3 million in FY07. T&E crew labor costs are directly assigned to trains and are Avoidable if a Route is eliminated. However, under collective bargaining agreements, T&E crews are financially protected in the event of certain service reductions or eliminations, making the final Avoidable Costs less than they would be without these labor protections.

The following is a brief description of the approach used for estimating Avoidable Costs for the T&E Crew Subcategory. Two Avoidable Cost percentages are calculated, one for T&E wages and one T&E fringe benefits, for each crew base and Route combination by using data including years of service and wage rates for OBS crew members at each crew base. These Avoidable Cost percentages represent the share of total costs coded to a Function at a ResCen that are avoided if a specific route is eliminated. Because an individual crew base may contain multiple ResCens, an Avoidable Cost percentage for a crew base applies to all corresponding ResCens at that crew base. Just as in other Subfamilies, Avoidable Cost percentages were calculated for both the short term and the long term.

Avoidable Costs for a particular Route at a particular ResCen are calculated as follows:
1. Wage Avoidable Costs for that Route are calculated by multiplying wage Avoidable Cost percentages by wage Function Fully Allocated Costs.
2. Fringe benefit Avoidable Costs for that Route are calculated by multiplying fringe benefit Avoidable Cost percentages by fringe benefit Function Fully Allocated Costs.
3. Costs coded to Accounts for crew meals and layovers are treated as 100 percent avoidable because they would cease to be incurred if a Route is eliminated.
4. Costs coded to some Functions are treated as fixed where a crew base serves multiple routes, but 100 percent avoidable in the long run if a crew base serves a single route.
5. Avoidable Costs for a Route at the ResCen are then the sum of avoidable wages, avoidable fringe benefits, and other 100 percent Avoidable Costs

Total Avoidable Costs for the Route are calculated by summing Avoidable Costs for that Route at each ResCen serving the Route.

For a more complete discussion of Amtrak labor protection provisions and the Avoidable Cost method for this Subcategory as well as an example, see Section 6.4, Adjusting for Labor Protection Provisions.

302_2-Support: This Subcategory consists of ResCens that incur costs for management support of T&E labor. Costs incurred at these costs include the costs to operate the crew assignment system, crew dispatching and other systemwide T&E management costs. Costs in this Subcategory totaled $12.0 million. Although it is reasonable that T&E management support costs might decline if a single Amtrak Route were eliminated, no significant relationship could be established between levels of train activity and T&E-Support ResCen costs through statistical analysis; hence the hypothesis that costs within the T&E Support Subcategory are partially Avoidable could not be proven. This lack of a statistically significant relationship along with the support nature of the Subcategory support treating T&E Support costs as fixed.

Summary

The T&E Subfamily is broken down into two Subcategories, which are treated separately with regard to the calculation of Avoidable Costs. Costs in Crew Subcategory 302_1 are Avoidable subject to labor protection provisions. Costs in Support Subcategory 302_2 are fixed because T&E management support continues to be necessary to facilitate the entire T&E Subfamily if any single Amtrak route is eliminated.

8.3.3 Yard Subfamily

Family: **Ops- Transportation - #300**
Subfamily: **Yard - #303**
Approach: **Mixed-Statistical**

Scope

The Yard Subfamily performs activities that support the movement of train equipment in preparation for revenue service, including the movement of trains between the yard and station, the makeup and breakup of trains, the movement of equipment to and from mechanical facilities, and managerial activities related to scheduling the equipment moves and overseeing yard operations. The Yard Subfamily consists of four Subcategories, each composed of groups of ResCens with similar missions and activities.

Subfamily expenditures for FY07 were $55.9 M and account for 1.3 percent of Amtrak's total expenses.

Regression Data

Cost and activity data were available for this Subfamily for the period from 2005 through 2007. No cost data were available for ResCen 6099; therefore, this ResCen was not included in the analysis. In the case of ResCen 5175, data were only available for 2005. ResCen 7113 and ResCen 7120 were removed from the dataset because they pertain exclusively to commuter rail

operations. In addition, Philadelphia ResCens 5216 and 5220 were excluded from the analysis because, while numerous trains pass through the Philadelphia yard, no costs are actually incurred related to these trains because no activity is required to support these pass-through movements. Costs are only related to trains that begin or end at this point. However the activity data are for both types of trains and the cost and activity data are not reported on a consistent basis.

In the case of certain yards, yard activities are spread among multiple yard ResCens, however, the activity data available for use in the statistical analysis were totals across the entire yards. To make the activity data consistent with the cost data for individual ResCens, regions were created by combining cost data from multiple ResCens. The following ResCens were combined to form regional data:

New York, NY: RC5375, RC5406
Albany, NY: RC5377, RC5426, RC5427
Boston, MA: RC5575, RC5616
Washington, DC: RC5806, RC5819
Chicago, IL: RC6206, RC6209, RC6151
Los Angeles, CA: RC6591, RC6706
Portland, OR: RC6593, RC6604

Activity statistics were selected for testing on the basis of whether they measured activities that would logically affect costs at the ResCens in this Subfamily.

Statistical Model and Results

A preliminary examination of scatter plots of cost against activity suggested that a linear form equation best captures the relationship between these variables. Linear, log-log and log-linear specifications all were tested to identify the best statistical relationship between costs and activity. For this Subfamily, the linear form equation provided the best explanation of changes in costs relative to activity. As a result, the analysis focused on identifying the best linear equations for the short and long run. The best model was selected through examining regression statistics and using professional judgment regarding which types of train activities would logically drive ResCen costs for this Subfamily. The best specification was found when using a linear model and FTT as the activity statistic.

The overall statistical results for the panel dataset are provided in the following table.

Equation	Cost = Constant + B * FTT
Observations	46
R-square	0.782

The short-run (fixed–effects) model results are provided in the following table.

	Coefficient	**Significance Level**

Constant	2,685,018	99%
FTT	80	99%

The long-run (between-effects) model results are provided in the following table.

	Coefficient	**Significance Level**
Constant	-1,111,238	81%
FTT	472	99%

The statistical results show that yard costs rise linearly with increases in train activity as measured by FTT. The model does not indicate that any economies of scale exist for the Yard Subfamily. Yard costs change more dramatically in the long run compared to the short run, indicating that there are some costs that can be avoided in the long run, but not the short run due to a similar change in activity levels.

These regression equations are used to generate predicted ResCen costs before and after a route is eliminated. Avoidable Costs are calculated by applying the percentage change in predicted cost to actual ResCen costs.

8.3.4 Fuel Subfamily

Family: **Ops-Transportation-#300**
Subfamily: **Fuel-#304**
Approach: **Avoidable**

Scope

The Fuel Subfamily consists of ResCens that incur costs for diesel fuel used to power both Amtrak trains used in passenger service and also certain commuter trains. Costs incurred in this Subfamily are the costs of just fuel. No labor or other costs are recorded in the Subfamily.

Subfamily expenditures for FY07 were $121.2 million and account for 2.9 percent of Amtrak's total expenses.

Avoidable Cost Approach

Costs in the Fuel Subfamily are fully avoidable. If a Route is eliminated, it will immediately cease to consume fuel and to incur fuel expenses.

8.3.5 Transportation–Multiple Subfamily

Family: **Ops-Transportation-#300**
Subfamily: **Transportation-Multiple-#305**
Approach: **Mixed-Detailed**

Scope

The Transportation-Multiple Subfamily represents those ResCens within the Ops-Transportation family that do not perform one primary activity, but rather perform multiple transportation-related activities using various Functions that are typically used in other Subfamilies within the Ops-Transportation family such as the T&E, OBS, Transportation Support, Station Operations, and Yard Subfamilies.
.
Subfamily expenditures for FY07 were $35.0 million and account for 0.8 percent of Amtrak's total expenses.

Transportation-Multiple Avoidable Cost Approach

The Fully Allocated Cost methodology for the Transportation-Multiple Subfamily relies upon the allocation methodologies used in the T&E, OBS, Transportation Support, Station Operations, and Yard Subfamilies. Expenses coded to certain Functions in the Transportation-Multiple Subfamily are allocated with the same rules used to allocate costs coded to the same Functions in other Ops-Transportation Subfamilies. This approach ensures that similar types of expenditures are allocated in a consistent manner within the entire Ops-Transportation Family.

The Avoidable Cost approach for the Transportation-Multiple Subfamily utilizes a similar strategy. Estimating Avoidable Costs for the Transportation-Multiple Subfamily at the aggregate level is not possible because costs in this Subfamily are coded to many unrelated Functions. Furthermore, each ResCen may use multiple types of Functions, and therefore, it is not possible to group ResCens together by Function into Subcategories within the Transportation-Multiple Subfamily to conduct a separate statistical analysis.

To provide insight into the avoidable cost structure within the Transportation-Multiple Subfamily, costs were grouped by Function and then by the Transportation Subfamily in which the Function typically it utilized. Using this approach, costs in this Subfamily can be categorized as in Table 8-10.

Table 8-10: Expenditures in the Transportation-Multiple Subfamily Related to other Transportation Subcategories

Related Subcategory	Subcategory #	FY07 Cost (Millions)	Share of Transportation-Multiple Subfamily
T&E-Crews	302_1	$15,764,963	45.0%
Transportation Support	308_0	$6,585,634	18.8%

Related Subcategory	Subcategory #	FY07 Cost (Millions)	Share of Transportation-Multiple Subfamily
OBS-Support	301_4	$4,404,783	12.6%
Yard-Train and Equipment Moves	303_4	$3,454,443	9.9%
Fuel	304_0	$3,178,807	9.1%
Stations-Shared	502_0	$1,635,690	4.7%

The main costs within this Subfamily are related to T&E Crews, Transportation Support and OBS Support activities. Together these activities account for more than 75 percent of all costs within the Transportation-Multiple Subfamily. Locomotive maintenance accounts for a much smaller portion, as do costs direct to specific non-NTS customers.

Grouping Transportation-Multiple Subfamily costs by Function allows Avoidable Cost statistical results from the other directly related Subfamilies to be extrapolated to this Subfamily. For example, to estimate the avoidability of Yard costs within the Transportation-Multiple Subfamily, the avoidable cost equation for Yard Subfamily #303 is used. Because the relationship between Yard costs and activity can be assumed to be the same between this Subfamily and the Yard Subfamily, the results from the statistical analysis of costs and activity in the Yard Subfamily can be applied to estimate Avoidable Costs for Yard Functions in the Transportation-Multiple Subfamily.

The same approach is applied to each of the major Subfamily groupings identified in the Transportation-Multiple Subfamily, including those for which avoidable costs have not been estimated statistically, such as T&E and Fuel. Fuel costs are fully avoidable and T&E costs are avoidable subject to labor protection provisions. Whether based on statistical analysis or professional judgment, the method for estimating the avoidability of costs coded to each Function will follow a consistent approach. The avoidable cost approaches used for various Subfamily groupings are in Table 8-11.

Table 8-11: Approach Used in the Transportation-Multiple Subfamily

Related Subcategory/Subfamily	Subcategory #	Approach Used
T&E-Crews	302_1	Avoidable Subject to Labor Protection
Transportation Support	308_0	Subcategory #308 Avoidable Cost Equation
OBS-Support	301_4	Subcategory #301_4 Avoidable Cost Equation
Yard-Train and Equipment Moves	303_4	Subcategory #303_4 Avoidable Cost Equation
Fuel	304_0	Avoidable
Stations-Shared	502_0	Subcategory #502_0 Avoidable Cost Equation

This approach allows the statistical analysis from closely related Transportation Subcategories and Subfamilies to be used to estimate avoidable costs within the Transportation-Multiple Subfamily as well as using the results from Subfamilies whose Avoidable Costs were not

statistically estimated. Costs associated with miscellaneous Functions that cannot be analyzed using the above approach are treated as Fixed within the Transportation-Multiple Subfamily. Expenditures at ResCens dedicated to a commuter agency and all other costs associated with commuter agencies are not allocated to Amtrak routes and are excluded from Avoidable Cost estimates.

Summary

The Transportation-Multiple Subfamily is composed of ResCens that perform several activities normally associated with a single Subfamily within the Ops-Transportation Family. To calculate avoidable costs for this Subfamily, Functions within the Transportation-Multiple Subfamily are associated with another Subcategory and either (1) use that Subfamily's statistically estimated equation parameters or (2) use that Subfamily's assigned avoidable cost category. For example, functions associated with the Yard Subfamily will use that Subfamily's avoidable cost equations.

Table 8-12 summarizes the Avoidable Cost estimation approach for the Transportation-Multiple Subfamily by Function and Account.

Table 8-12: Grouping of Functions and Accounts by Subcategory
within Transportation-Multiple - #305

Function	Function Description
Use the Avoidable Cost Equation for OBS-Support - #301_4	
FN1301	OBS Management & Supervision.
Use the Approach for T&E-Crew - #302_1	
FN1615	Extra Board Guarantee-Engine Crew Operations
FN1616	Extra Board Guarantee-Trainmen
FN1617	T&E Overhead
FN1633	Passenger Train Enginemen
FN1635	Passenger Train Trainmen
FN1642	Qualifying Enginemen
FN1643	Qualifying Trainmen
Use the Avoidable Cost Equations for Yard-Train and Equipment Moves - #303_4	
FN1622	Yard Engine Crew Operations
FN1623	Yard Trainmen Operations
All Fuel Accounts Are Avoidable	
510411	All Functions with fuel Accounts
Use the Avoidable Cost Equations for Transportation Support - #308	
FN1002	Division Administrative
FN1131	Training Amtrak

Function	Function Description
FN1601	Transportation Management & Supervisors
FN1689	Train Operations-Special Projects
FN1122	Divisional Service Centers
FN1123	Product Line Management & Support
FN1125	Special Trains Miscellaneous
FN1234	SAP Payroll Adjustments
FNxxxx	All Other Functions
Use the Avoidable Cost Equations for Stations-Shared - #502	
FN1231	Station Services-Ticketing
FN1241	Station Services-Management & Supervisors
FN1271	Station Services-Station Operations
FN1281	Station Services-Building Maintenance
FN1288	Station Services-Special Projects
FN1291	Passenger Inconvenience

8.3.6 Train Movement Subfamily

Family: **Ops-Transportation - #300**
Subfamily: **Train Movement - #306**
Approach: **Mixed-Statistical**

Scope

The Train Movement Subfamily performs activities associated with managing the movement of moving passengers from endpoint to endpoint, including the management of train dispatching, signal or interlocking operations, and connecting bus service. The Subfamily includes the CETC offices, CNOC, block operators at various locations, and staff responsible for setting and enforcing operating rules and standards.

Subfamily expenditures for FY07 were $69.2 million and account for 1.7 percent of Amtrak's total expenses.

Regression Data

Cost and activity data were generally available for this Subfamily for the period from 2005 through 2007. Data for a number of ResCens in this Subfamily, however, were found to be flawed and otherwise unsatisfactory. For example, no costs or activity data was available for RC6000, Tri-Rail Dispatching, while for RC5151—Blocks and Towers-N PHL—the data consisted entirely of zeros and negative values. ResCens with no data or with either zero or negative costs or activity levels were removed from the regression dataset before analysis.

Activity statistics were selected for testing based on whether they measured activities that would logically affect costs at the ResCens in this Subfamily.

Statistical Model and Results

A preliminary examination of scatter plots of cost against activity suggested that a linear equation form best captures the relationship between these variables. Linear, log-log, and log-linear specifications all were tested to identify the best statistical relationship between costs and activity. For this Subfamily, the linear form equation was better able to explain the changes in cost as a result of changes in activity. As a result, final analysis focused on identifying the best short- and long-term linear equations. The best model was selected through examining regression statistics and using professional judgment regarding which types of activities would logically drive ResCen costs for this Subfamily. The best specification was found when using a linear model and TUT as the activity statistic.

The overall statistical results for the panel dataset are provided in the following table.

Equation	Cost = Constant + B * TUT
Observations	75
R-square	0.617

The short-run (fixed-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	787,236	99%
TUT	3.66	99%

The long-run (between-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	-91,551	20%
TUT	8.38	99%

These results indicate that a linear relationship exists between costs within the Train Movement Subfamily and TUT and suggests the lack of any economies of scale for this Subfamily. The larger coefficient for TUT in the long-run equation, versus the short-run equation, provides evidence that the potential for costs savings is higher in the long run.

These regression equations are used to generate predicted ResCen cost before and after a route is eliminated. Avoidable Costs are calculated by applying the percentage change in predicted costs to actual ResCen costs.

8.3.7 Train Movement–Host RR Subfamily

Family: **Ops - Transportation - #300**
Subfamily: **Train Movement-Host RR - #307**
Approach: **Mixed-Statistical**

Scope

The Train Movement Host RR Subfamily captures costs incurred by Amtrak for goods and services provided by the freight railroads, including infrastructure access, leasing locomotives, purchased fuel, repairs to Amtrak rolling stock, dispatching and signal services, and station costs. Also included are incentive payments to host railroads for schedule adherence.

Subfamily expenditures for FY07 were $91.9 million and account for 2.2 percent of Amtrak's total expenses.

Regression Data

Cost and activity data for this Subfamily were available for the period from 2005 through 2007. ResCens that had missing values for either cost or activity were eliminated from the regression dataset. Among those ResCens eliminated were RC0816 and RC7965. Activity statistics were selected for testing based on whether they measured activities that would logically affect costs at the ResCens in this Subfamily.

Statistical Model and Results

A review of scatter plot of cost against activity suggested that a linear equation best captures the relationship between these variables. Other functional forms were also tested, including log-log and log-linear. For this Subfamily, the linear form equation was better able to explain changes in cost as a result of changes in activity. As a result, final analysis focused on identifying the best short and long term linear equations. The best model was selected through examining regression statistics and using professional judgment as to which types of activities would logically drive ResCen costs for this Subfamily. Statistical tests provided guidance on which specification captured most of the variation in costs relative to a particular activity. The best fit was found when using FTT as the activity statistic.

The overall statistical results for the panel dataset are provided in the following table.

Equation	Cost = Constant + B * FTT
Observations	66
R-square	0.254

The short-run (fixed–effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	1,006,152	99%
FTT	407	99%

The long-run (between-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	-207,923	8%
FTT	609	97%

These results indicate the existence of a linear relationship between costs and FTT within the Host Railroad Subfamily and suggest the lack of any economies of scale for this Subfamily. The larger coefficient for FTT in the long-run equation as compared to the short-run equation provides evidence that the potential for costs savings is higher in the long run.

These regression equations are used to generate predicted ResCen cost before and after a route is eliminated. Avoidable Costs are calculated by applying the percentage change in predicted costs to actual ResCen costs.

8.3.8 Transportation Support Subfamily

Family: **Ops-Transportation - #300**
Subfamily: **Transportation Support - #308**
Approach: **Mixed-Statistical**

Scope

The Transportation Support Subfamily performs supervision and support for the operation of passenger train service. The Subfamily includes the costs of general and assistant superintendents, railroad and assistant foremen, and other transportation-related activities. ResCens in the Transportation Support Subfamily support other Ops–Transportation ResCens that directly perform transportation services.

Subfamily expenditures for FY07 were $80.7 million and account for 1.9 percent of Amtrak's total expenses.

Regression Data

Cost and associated activity data for this Subfamily were available for the 3-year period running from 2005 through 2007. Data for a number of ResCens were found to be flawed and/or otherwise inappropriate or unsatisfactory. ResCens supporting Commuters with costs, but no Amtrak route activity were removed from the analysis. In addition, data associated with non-variable activities, such as management activities, were also eliminated from the analysis dataset. ResCens with no data or with either zero or negative costs or activity levels were removed from the regression dataset prior to analysis. Two ResCens with negative costs were eliminated from the dataset. To create a balanced dataset when using three years worth of data, ResCens with zero costs in one year were removed across all years. Activity statistics were selected for testing based on whether they measured activities that would logically affect costs at the ResCens in this Subfamily.

Statistical Model and Results

A preliminary examination of scatter plots of cost against activity suggested that a log form equation best captures the relationship between these variables. Along with a log-log form equation, other functional forms, such as linear and log-linear, were also tested. In the end, a log-log equation was better able to explain the changes in cost as a result of changes in activity in this Subfamily. As a result, final analysis focused on identifying the best short and long term log-log form equations.

The best model was selected through examining regression statistics and using professional judgment as to which types of train activities would logically drive costs at ResCen in this Subfamily. Statistical tests provided guidance on which model specification best explained the variation in costs relative to a particular activity. The best fit was found when using the activity statistic TCM (Total Car Miles) as the explanatory variable.

The overall statistical results for the panel dataset are provided in the following table.

Equation	$Ln(Cost) = Constant + B * ln(TCM)$
Observations	207
R-square	0.2859

The short-run (fixed-effects) model results are provided in the following table.

	Coefficient	**Significance Level**
Constant	5.64	94%
TCM	0.40	98%

The long-run (between-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	1.79	64%
TCM	0.63	99%

These results demonstrate the existence of a positive relationship between Transportation Support costs and TCM. The equation is specified in log-log form, which shows there are economies of scale for this Family. The larger coefficient for TCM in the long-run equation versus the short-run equation indicates that more costs savings can be made in the long run relative to the short run.

These regression equations are used to generate predicted ResCen costs before and after a route is eliminated. Avoidable Costs are calculated by applying the percentage change in predicted costs to actual ResCen costs.

8.3.9 Power- Electric Traction Subfamily

Family: **Ops-Transportation-#300**
Subfamily: **Power-Electric Traction-#309**
Approach: **Avoidable**

Scope

The Power-Electric Traction Subfamily consists of three ResCens that incur costs to power electrified train service on the NEC and the Keystone route. Amtrak purchases power from 10 power vendors as well as from commuter agency Metro North. Costs incurred in this Subfamily are the costs of electric power only; no labor or other costs are recorded in the Subfamily.

Subfamily expenditures for FY07 were $100.2 million and account for 2.4 percent of Amtrak's total expenses.

Avoidable Cost Approach

Costs in the Power-Electric Traction Subfamily are fully avoidable. If a Route is eliminated, it will immediately cease to consume electric power and to incur further electric power expenses.

8.4   Sales and Marketing

8.4.1 Sales Subfamily

Family: **Sales & Marketing - #400**
Subfamily: **Sales-#401**
Approach: **Mixed-Detailed**

Scope

The Sales Subfamily is responsible for such activities as field sales and sales administration, travel agent services, and commercial account services and includes expenditures for travel agency commissions, credit card commissions, and airline system access fees.

Subfamily expenditures for FY07 were $23.9 million and account for 0.6 percent of Amtrak's total expenses.

Avoidable Cost Approach

The Sales Subfamily is classified as having Mixed Avoidable Costs and will utilize a Mixed-Detailed approach. In many industries, sales and related activities are considered part of G&A, implying that sales systems and staff levels would remain constant even if a single Route were eliminated. After conducting a statistical analysis that was unable to isolate a significant relationship between levels of train activity and Sales ResCen costs, the hypothesis that costs within the Sales Subfamily are avoidable is rejected, at least for the case in which costs are aggregated to the ResCen level. The presumption is that most costs in this Subfamily should be treated as fixed.

However, some specific costs in the Sales Subfamily can be tracked and eliminated as completely avoidable. Using Account data contained in the expense records, the costs of travel agent commissions and their reservation system access fees are entirely avoidable. If a Route is eliminated, no tickets are sold and no commission is paid. The accounts to track these costs, $8.0 million (33.7 percent of FY07 cost) are completely avoidable while the remaining costs are considered fixed. The accounts are:

553241 Commissions-Travel Agents ($2.7 million),
553245 System Access Fees-Airlines ($4.4 million), and
553246 Interline Commission Expense ($0.9 million).

Although $8.0 million in costs occur for these Accounts, avoidable costs are calculated at the Route level and only a portion of these total costs will be avoidable for any single route.

Summary

The costs in the Sales and Marketing Subfamily are Fixed except those costs paid to travel agents and associated fees. These costs, captured by unique Accounts in the expense records, are completely avoidable in both the short and long run.

8.4.2 Information & Reservations Subfamily

Family: **Sales & Marketing - #400**
Subfamily: **Information & Reservations - #402**
Approach: **Mixed-Detailed**

Scope

The Information & Reservations Subfamily provides reservation services to both the general public as well as interacting with outside travel agency reservations and information service systems. The Subfamily captures the costs of RSCC as well as the costs of the operating information systems required for Amtrak reservation services.

Subfamily expenditures for FY07 were $83.6 million and account for 2.0 percent of Amtrak's total expenses.

Avoidable Cost Approach

The Information & Reservation Subfamily is classified as having Mixed Avoidable Costs and will utilize a Mixed-Detailed approach. In many industries, sales and related activities are considered part of G&A, implying that sales systems and staff levels would remain constant even if a single Route were eliminated. After conducting a statistical analysis that was unable to isolate a significant relationship between levels of train or passenger activity and sales costs, the hypothesis that costs within the Information & Reservations Subfamily are avoidable is rejected, at least for the case in which costs are aggregated to the ResCen level. The presumption is that most costs in this Subfamily should be treated as fixed.

Although no significant statistical relationship between train or passenger activity and Information & Reservations ResCen cost was found, some costs are considered long-term avoidable. Presumably, RSCCs are currently managed and staffed efficiently, and that given a reduction in call volume resulting from the elimination of a Route, over time, staffing levels would be reduced by the staffing cost allocated to that Route. In the short run, staffing levels would not adjust and RSCC customer service phone agents would each handle fewer calls. However, the wages paid to agents, allocated by RSO to Routes, is considered long-run avoidable for an individual Route.

These costs are isolated in APT using Function 1221 Reservations in combination with several wage accounts:

500010 Wages ($16.8 million),
500013 Other Wages ($1.3 million),
500014 Overtime Wages ($1.7 million),
500018 Part-time Wages ($3.0 million),
500019 Part-time Overtime Wages ($0.2 million), and
500020 Other Part-time Wages ($0.2 million).

Although $23.3 million in costs occur for these functions, avoidable costs are calculated at the Route level and only a portion of these total costs will be avoidable for any single route.

Summary

The costs in the Information and Reservations Subfamily are fixed except for the wages paid to RSCC customer service phone agents. These costs, captured by unique Accounts in the expense

records, are long-term avoidable as staffing levels at the RSCCs would be reduced by the costs allocated to the eliminated Route.

8.4.3 Marketing Subfamily

Family: **Sales & Marketing - #400**
Subfamily: **Marketing - #403**
Approach: **Mixed-Detailed**

Scope

The Marketing Subfamily performs marketing and sales support activities for Amtrak's core passenger rail business. Activities include market research, customer relations, general advertising, telephone directory advertising, production of timetables, and sales promotions. Some marketing efforts are focused on specific Amtrak routes.

Subfamily expenditures for FY07 were $57.5 million and account for 1.8 percent of Amtrak's total expenses.

Avoidable Cost Approach

The Marketing Subfamily is classified as having Mixed Avoidable Costs and will utilize both a Mixed-Detailed approach for some short-run accounts as well as a Mixed-Statistical approach for long-run avoidable costs. Conducting a statistical analysis for the Subfamily yielded mixed results. The analysis was unable to isolate a significant relationship between levels of train activity and Marketing ResCen costs for the short-run, rejecting the hypothesis that these costs are avoidable. However, using the between-effects model did isolate a significant relationship between levels of train activity and long-run Marketing ResCen costs. The statistical results of unavoidable short-run costs are confirmed intuitively as in many industries, marketing, sales, and related activities are considered part of G&A, implying that staff levels would remain constant even if a single Route were eliminated. This assumption, while strong in the short term, could be relaxed over time as staff levels may be able to readjust and fixed costs can be lowered.

However, some specific short-run costs in the Marketing Subfamily can be tracked and eliminated as completely avoidable. Using Account data contained in the expense records, the costs of advertising billed by an outside advertising agency would be avoidable immediately. If a Route is eliminated, no further costs are incurred advertising on its behalf. Even though the total for the account, 553201 Advertising, is large relative to the entire family at $42.8 million, avoidable costs are calculated at the Route level and only a portion of these total costs will be avoidable for any single route.

Additionally, some ResCens within the Marketing Subfamily are dedicated to individual Amtrak Routes and don't share costs among routes. In the short run, these ResCens would follow an approach consistent with the rest of the Subfamily: mostly fixed costs with Account 553201 Advertising being fully avoidable. In the long run, however, these ResCens are fully avoidable five years after their only route was eliminated. The other ResCens in the Subfamily will utilize the statistically estimated long-run equation to calculate avoidable costs.

Regression Data

The ResCens 1011, 1012, 1013, 1075, 1134, and 1141 were excluded from the analysis because they are responsible for higher level planning and coordination of marketing.

Statistical Model and Results

Linear, log-log, and linear-log functional forms were tested for the Marketing Subfamily. The log-log relationship was found to have the best statistical fit for this Family.

The overall statistical results for the panel dataset are provided in the following table.

Equation	Ln(Cost) = Constant + B * ln(TUT)
Observations	36
R-Square	0..40

The long-run (between-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	8.05	98%
TUT	0.49	99%

Long-run marketing costs rise at a decreasing rate with increases in passenger activity. This indicates that the Marketing Subfamily exhibits economies of scale in the long run.

Calculation Method

In the short run, the Advertising Account 553201 will be treated as 100 percent avoidable as signified by Avoidable Cost Code "A." All other short-run costs in this Subfamily will be 100 percent fixed as signified by Avoidable Cost Code "F."

In the long run, those ResCens that are focused on a single route will be considered 100 percent avoidable as signified by Avoidable Cost Code "A." The remaining ResCens will utilize the statistically estimated between effects equation to calculate long-run avoidable costs as signified by Avoidable Cost Code "M."

Summary

The Marketing Subfamily will use a Mixed approach for both short- and long-run avoidable costs. In the short-run, all costs are considered Fixed with the exception of fees paid to outside advertising agencies. In the long run, a Mixed-Statistical approach is used, with the exception of

several route-specific advertising ResCens which will be fully avoidable in the long run if that route is eliminated.

8.5   Stations

8.5.1   Stations–Route and Shared Subfamilies

Family: **Stations-#500**
Subfamily: **Stations-Route-#501**
Subfamily: **Stations-Shared-#502**
Approach: **Mixed-Statistical**

The Stations-Route Subfamily performs station service activities at station ResCens dedicated to a single route. These activities include ticketing, baggage and express services, stationmaster and usher activities, station cleaning and maintenance, snow and ice removal, making passenger inconvenience payments, and training and supervision of staff. The Stations-Shared Subfamily performs similar activities at stations ResCens serving multiple routes. Additional activities performed at shared stations include operating first class lounges and providing Red Cap and porter services.

Expenses for the Station-Route Subfamily for FY07 were $34.0 million (0.8 percent of Amtrak's total expenses), while those for the Stations-Shared Subfamily were $155.7 million and (3.7 percent of total expenses) in the same year.

Regression Data

While the Stations Family is divided into two Subcategories; Route and Shared stations, for statistical analysis both Subfamilies combined into a single dataset, but then divided between the staffed and unstaffed categories or groupings. Most staffed stations are represented by one ResCen, but a few very large stations are represented by multiple ResCens. Because activity measures are for the entire station, for consistency between stations with single and multiple ResCens it was necessary to treat multiple-ResCen stations as a single observation for estimation purposes. Below is a list of ResCens whose costs were combined to correspond with available activity statistics.

Chicago	*Philadelphia*	*Washington*	*Los Angeles*
2725	2412	2402	2882
0302	1167	2416	2883
0305	2411	2417	2884
2711	2413	2418	

In contrast, multiple unstaffed stations can be represented by a single ResCen. In these cases the cost and activity data are summed for the station group "managed" by each ResCen. Due to the

differences in the data and fundamental differences in the operations of staffed and unstaffed stations, the Family was analyzed as two separate categories or groupings.

The variable chosen to represent activity levels for the Stations Family is TBD. TBD is available at the station level in cases with multiple ResCens for a single location rather than at the ResCen level. This provided an additional reason for combining ResCens for some larger stations as noted above.

Statistical Model and Results

Linear, log-log, and linear-log functional forms were tested for the Station Family. The linear relationship was found to have the best statistical fit for both staffed and unstaffed groupings. The most appropriate model was selected through examining regression statistics. The statistical tests provided guidance on which specification captured most of the variation in avoidable costs relative to a particular activity.

Staffed Stations. For staffed stations, long-run avoidable costs were found to be larger than short-run avoidable costs.

The overall statistical results for the panel dataset are provided in the following table.

Equation	Cost = Constant + B * TBD
Observations	594
R-square	0.87

The short-run (fixed-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	730,518	99%
TBD	0.53	99%

The long-run (between-effects) model results are provided in the following table.

	Coefficient	Significance Level
Constant	203,275	99%
TBD	3.13	99%

The statistical results for staffed stations show that costs rise linearly with increases in passenger activity. There do not appear to be any economies of scale for the Staffed Stations Subfamily. Staffed station costs change more dramatically in the long run compared to the short run,

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indicating that some costs occur that cannot be avoided within a year of a change in activity levels.

Unstaffed Stations. For unstaffed stations, long-run avoidable costs were found to be statistically equivalent to short-run avoidable costs. A Hausman test was used to verify that the random-effects results equal the fixed-effects results. The random effects results, shown below, represent the best estimate of both long- and short-run avoidable costs for unstaffed stations.

The overall statistical results for the panel dataset are provided in the following table.

Equation	Cost = Constant + B * TBD
Observations	63
R-square	0.234

The short-run and long-run (random-effects) model results are provided in the following table.

	Coefficient	**Significance Level**
Constant	36,391	99%
TBD	0.22	99%

The results for unstaffed stations show that costs rise linearly with increases in passenger activity. There do not appear to be any economies of scale for the unstaffed stations Family. Short-run and long-run avoidable costs are statistically equivalent, indicating that all costs that can be avoided are avoidable within a year of a change in activity levels.

In all of the cases above, these regression equations are used to generate predicted ResCen costs before and after a route is eliminated. Avoidable Costs are calculated by applying the percentage change in predicted costs to actual ResCen costs.

8.6   General & Administrative Family

8.6.1 Corporate Administration Subfamily

Family: **General & Administrative - #600**
Subfamily: **Corporate Administration - #601**
Approach: **Fixed**

Scope

The Corporate Administration Subfamily performs managerial and administrative functions that are properly considered corporatewide in scope. Expenses included in the Corporate Administration Subfamily are expenses such as the president's salary, expenses of the inspector

general's office, and similar costs that support the *overall* mission of the entire Amtrak enterprise rather than a subset of operations.

Subfamily expenditures for FY07 were $224.7 million and account for 5.4 percent of Amtrak's total expenses.

Avoidable Cost Approach

For the purpose of estimating Avoidable Costs, the Corporate Administration Subfamily is classified as having Fixed Costs. Expenditures in the Corporate Administration Subfamily are for corporatewide activities and are not tied to a particular Route. Avoidable Costs relative to a particular Route would not be significant or measurable; therefore, costs incurred at ResCens in this Subfamily are 100 percent Fixed.

8.6.2 *Centralized Services Subfamily*

Family: **General & Administrative - #600**
Subfamily: **Centralized Services - #602**
Approach: **Fixed**

Scope

The Centralized Services Subfamily performs services for other portions of the Amtrak enterprise and is properly considered corporatewide in scope. These services include computer services, payroll operations, human resources, and employee services available corporatewide. Centralized Services costs represent services provided to and benefiting all employees and businesses operating under the Amtrak corporate umbrella.

Subfamily expenditures for FY07 were $234.6 million and account for 5.6 percent of Amtrak's total expenses.

Avoidable Cost Approach

For the purpose of estimating Avoidable Costs, the Centralized Services Subfamily is classified as having Fixed Costs. Expenditures in the Centralized Services Subfamily are for corporate-wide activities and are not tied to a particular Route. Avoidable costs relative to a particular Route are not significant or measurable, therefore, costs incurred at ResCens in this Subfamily are 100 percent fixed.

8.6.3 *Qualified Managerial & Services Subfamily*

Family: **General & Administrative - #600**
Subfamily: **Qualified Managerial & Services - #603**
Approach: **Fixed**

Scope

The Qualified Managerial & Services Subfamily performs high-level managerial and supporting activities related to a subset of the total Amtrak enterprise. Although the ResCens in this Subfamily perform missions similar to the other G&A Subfamilies, because they do not support the entire operation, they are not considered corporatewide and their allocation method needs to reflect this.

Subfamily expenditures for FY07 were $107.4 million and account for 2.6 percent of Amtrak's total expenses.

Avoidable Cost Approach

For the purpose of estimating Avoidable Costs, the Qualified Managerial & Services Subfamily is classified as having Fixed Costs. Expenses in the Qualified Managerial & Services Subfamily are for support activities and are not tied to a particular Route. Avoidable costs relative to a particular route are not significant or measurable, therefore, costs incurred at ResCens in this Subfamily are 100 percent fixed.

8.6.4 Direct Customer (Non-NTS) Subfamily

Family: **General & Administrative - #600**
Subfamily: **Direct Customer (Non-NTS) - #604**
Approach: **Fixed**

Scope

The Direct Customer (Non-NTS) Subfamily performs functions that support only Commercial or Commuter customers such as managing commuter operating contracts, real estate assets, and other support to customers outside of Amtrak's train operations. These ResCens are exclusively outside the NTS and have specific non-NTS customers.

Subfamily expenditures for FY07 were $9.4 million and account for 0.2 percent of Amtrak's total expenses.

Avoidable Cost Approach

For the purpose of estimating Avoidable Costs, the Direct Customer (Non-NTS) Subfamily is classified as having Fixed Costs. Costs incurred at ResCens in the Direct Customer (Non-NTS) Subfamily are related to businesses other than Amtrak's core business of providing intercity passenger train service, therefore, they are 100 percent fixed with respect to any Amtrak Route.

8.6.5 Subsidiary Subfamily

Family: **General & Administrative-#600**
Subfamily: **Subsidiary-#605**
Approach: **Mixed-Detailed**

Scope

The Subsidiary Subfamily represents ResCens[45] associated with Amtrak's five Subsidiary Companies, namely Chicago Union Station Company (CUS), Passenger Railroad Insurance Limited (PRIL), Penn Station Leasing, LLC (PSL), Washington Terminal Company (WTC), and 30th Street Limited, L.P. (TSL). The subsidiaries and their activities are diverse: CUS owns and operates Chicago Union Station and various nearby real estate parcels; PRIL is an offshore captive insurance company that allows Amtrak to acquire insurance coverage that cannot be readily obtained domestically; PSL is a subsidiary established for the purpose of acquiring New York Penn Station from Amtrak and leasing it back to the parent company; WTC owns various parcels in the vicinity of Washington's Union Station, although not the station itself; TSL was established for the purpose of rehabilitating and leasing 30th Street Station in Philadelphia, although the station itself is owned by Amtrak.

Subfamily expenditures for FY07 were $17.3 million and account for 0.4 percent of Amtrak's total expenses.

Avoidable Cost Approach

The Subsidiary Subfamily is unique in the APT system as the ResCens within the Subfamily are unrelated to the other members in terms of the function they perform. Two of the subsidiaries, CUS and TSL, are essentially station operations ResCens, PSL and WTC are Capital-related, while PRIL is related to the NTS. In this respect, Subsidiary is similar to the two Multiple subfamilies (#205 and #305) because it performs varied functions and activities, and hence a single avoidable cost method cannot be used.

In the case of the two Multiple Subfamilies, avoidable cost statistical results from other directly related Subfamilies could be extrapolated to those subfamilies by grouping the Multiple Subfamily expenses by Function. For example to estimate the avoidability of Turnaround expenses within the MoE-Multiple Subfamily, the avoidable cost equations for Turnaround Subfamily #201 were used. This assumes that the relationship between Turnaround Service activity and cost relationships are the same in MoE-Multiple Subfamily and the Turnaround Subfamily, and therefore, the results from the statistical analysis of the Turnaround Subfamily can be applied to estimated avoidable costs for Turnaround Service Functions in the MoE-Multiple Subfamily.

A variation of this approach is used for the Subsidiary Subfamily. In the Multiple Subfamilies, costs were investigated and then grouped at the Function level for purposes of estimating avoidable costs, while in the Subsidiary case, entire ResCens will be assigned the avoidable cost approach of its related Subfamily. In the Subsidiary Subfamily, four of the five ResCens perform activities that parallel that of other Subfamilies and would have been part of those Subfamilies except for having been setup as financially distinct, wholly-owned subsidiaries. This key distinction is what groups the ResCens as the separate Subsidiary Subfamily.

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[45] The Subfamily includes five Amtrak ResCens and 10 "pseudo-ResCens," five of which correspond to the subsidiaries themselves and five to virtual ResCens used to process elimination entries between the parent company and the subsidiaries.

Table 8-13: Subsidiaries and Related Subfamilies

Amtrak Subsidiary	Related Subfamily Avoidable Cost Approach
CUS	Stations
PRIL	none
PSL	Capital
TSL	Stations
WTC	Capital

Both CUS and TSL are similar to the ResCens in the Stations Family and will utilize the statistical equations for that Family to estimate avoidable cost. All the costs recorded at PSL and WTC are capital-related and will be dealt with in the Capital Family and are excluded from the avoidability analysis of the Subsidiary Subfamily.

Unlike the other Subsidiary ResCens, PRIL does not have a similar Subfamily from which to replicate an Avoidable Cost approach. Hence, a different approach is needed. A majority of the costs for this subsidiary are associated with Amtrak's accrual for self-insurance for passenger claims, insurance policies with outside companies, and professional fees. These expenses are fixed in the short term but would vary over time as fewer passengers translate into a lower overall exposure and risk, fewer claims, and lower overall subsidiary costs. Long-term PRIL costs would be fully avoidable with respect to a single route but fully-fixed in the short term.

Summary

The Subsidiary Subfamily will follow a similar approach to the MoE-Multiple and Transportation-Multiple Subfamilies by utilizing the Avoidable Cost approach of other subfamilies. The Subsidiary Subfamily will use the Avoidable Cost approaches from the Stations and Capital Subfamilies to estimate the Avoidable Costs of individual ResCens related to each approach.

8.7 Capital Family

8.7.1 Capital Subfamily

Family: **Capital - #700**
Subfamily: **Capital - #701**
Approach: **Mixed-Detailed**

Scope

As explained in Section 7.7 above – and in more detail by Appendix E – the Capital Family consists of a series of "synthetic" charges representing the capital costs of operating Amtrak's NTS and other businesses, calculated as an annualization over the depreciable lives of the

expenditures made (or capital lease engagements undertaken) to acquire or construct all Amtrak's physical property and equipment assets, as recorded on its books of account, viz:

- Passenger cars
    - Acela trainsets,
    - Talgo cars, and
    - All other passenger cars (high and low-level),
- Auto-carrying cars ,
- Materials handling cars,
- Passenger locomotives (electric and diesel),
- Railway work equipment and ROW machinery,
- Highway equipment,
- Other mobile property (shop machinery and computer equipment),
- Car and locomotive shops,
- Stations serving more than one NTS route,
- Stations serving a single NTS route,
- Office buildings, and
- Other fixed property.[46]

As noted in Appendix E, whereas the synthetic capital charges generally reflect a requirement for both a "return of" and a "return on" these Amtrak investments, their calculation with respect to land assets represents solely the "return on" element, thereby following the financial accounting convention of not recognizing an expense for depreciation of land values.[47]

Avoidable Cost Approach

In Section 8 of Appendix E Volpe proposed estimating the avoidability of these capital charges in case of an individual NTS route abandonment by collaboratively establishing with Amtrak staff a reasonable "disposition period" for each asset group that reflects the time horizon within which unused assets in the group could be sold, transferred to other train services or other business lines, or otherwise disposed. For purposes of having a base methodology, however, a simplified assignment of avoidable percentages to which capital charges in each of the broad asset categories is used. Importantly, avoidable in this sense does not refer to the extent to which Amtrak's need for physical property and equipment is ultimately variable with its service output on any individual NTS route. Rather, in the case of abandonment of such a route, avoidability

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[46] Land for transportation purposes, grading/other ROW expenditures, tunnels/subways, bridges/trestles/culverts, fences/snowsheds/signs, roadway buildings, water/fuel stations, communication systems, signals/interlockers, power plants, power transmission systems, public improvements, ties, rail, and ballast.
[47] In Section 3 of Appendix E, Volpe provided for calculation of a "return on" element both on land values and on a suggested allowance for working capital, the latter consisting principally in Amtrak's case of its current materials and supplies inventory. Although such inventory is a physical asset, the potential generation of a capital charge on the basis of any current assets is considered here as an option for Amtrak and has not been further treated in this report.

refers to the degree that Amtrak's physical assets, and their associated capital costs that were allocated to that route, could be:

1. Used alternatively, through the end of the service lives assumed in calculation of their respective capital charges, in support of other Amtrak routes or activities and in a way permitting postponement of necessary Amtrak property or equipment expenditures that would have generated annual capital charges at least as high as those on the reused assets, or,

2. Disposed of by sale to outside parties (commuter or freight railroads, non-railroad entities, etc.) at prices net of sale costs that would provide, when combined with their current annual capital charge multiplied by the number of years of their so far accumulated service life, a complete return of and return on their original acquisition cost (at the return-on-investment rate currently employed for capital charge purposes.[48]

In both these circumstances, the possibility of alternative use depends on the physical suitability of the asset in the alternative service although in some applications economical modifications may be made. Electric locomotives having to operate on electric power-equipped railway lines and Amtrak's particular high-level passenger cars being usable only at facilities without either excessively restricted overhead clearances or high-level platforms are notable and obvious examples of basic physical limitations that may preclude redeployment.

On this basis, capital charges for all the asset categories listed above, except the five types shown in Table 8-14, are treated as 0 percent avoidable within one year and 0 percent avoidable as well within five years. The table also gives the default value for the proportion of the capital charge to treat as avoidable for these assets. Applying 0 percent to all other categories recognizes what appears to be the questionable prospects both for selling the specialized rolling stock from a hypothetically discontinued Acela, Auto Train, or Talgo service at prices meeting the complete investment return standard noted above, and also for partially disposing of station, roadway, shop or office building assets in a manner meeting either the above sale or "alternative Amtrak use" standards in response to hypothetical discontinuance of a single NTS route. It is recognized that in the case of Acela service, for example, application of 0 percent will increase, relative to other routes, the reported difference shown using this methodology between avoidable and fully-allocated costs, the latter of course including the total capital charge calculated for Acela trainsets.[49]

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[48]The default assumption is that the sale proceeds would be such that the annual capital charge would be an accurate estimate of the *annual* avoidable cost, but if a different outcome is expected, the annual avoidable cost estimate would need to be adjusted.

[49] As noted in Appendix E, the Uniform Rail Costing System (URCS) used by the STB for guidance in freight rate regulation cases treats as 100 percent variable with an individual railroad's service output (over an intermediate time period) all capital return allowances calculated for its rolling stock and as 50 percent variable the corresponding allowances for its rail lines and other fixed physical assets. This might appear to be in conflict with the percentages suggested here, but URCS is intended to answer a different basic question, which is, how, within the constraint of the ultimate capacity of a railroad's current network, its costs per unit of service output (freight ton-miles, for example) may be expected to vary with the amount of such output actually produced. In the absence of a car surplus producing more freight ton-miles, more cars are naturally required. Likewise, in the absence of ready-to-use excess capacity running more ton-miles on an existing network is likely to require some additional capital expenditures on fixed assets. By contrast, this methodology is concerned with what the effect on Amtrak's total

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Table 8-14: Avoidability Percentages for Amtrak Assets

Asset Type	Long-Term Avoidable Percent
Passenger cars and locomotives other than Acela trainsets and Talgo cars	50%
Materials handling cars	50%
Railway work equipment and ROW machinery	75%
Highway equipment	100%
Stations serving a single NTS route	75%

The possible significance of Amtrak physical assets having resale value as scrap has not been considered for purposes of these suggested percentages.

Discussion between Volpe and Amtrak staff has indicated that reduced service on an individual NTS route might well result in freed-up rolling stock simply being stored rather than immediately deployed on other routes, which are being operated to Amtrak's satisfaction within the capacity constraints of its present fleet. The avoidability percentages suggested for cars and locomotives, other than the Acelas and Talgos, are not meant to indicate that temporary rolling stock surpluses on Amtrak would always be negligible or would necessarily be obviated by easy sale to outside parties at favorable prices. However, a trade-off appears to be involved. On the one hand, equipment capital costs on an NTS route might be misrepresented as totally avoidable on the basis of an equipment demand from alternative Amtrak routes that is implicitly, but erroneously, assumed to be constant. On the other hand, these costs might be misrepresented as totally unavoidable when at some point in the future—the closeness of which isn't specified and would presumably depend on the relative size of the route in question—fleet renewal necessities will suddenly convert them to avoidable. In those asset categories where a positive avoidability percentage is used, the implicit decision is to err on the side of capital cost avoidability being overly specified at some points in time to avoid this specification being unstable and highly dependent on Amtrak's current fleet renewal situation.

8.8   Utilities Family

8.8.1 Utilities Subfamily

Family: **Utilities - #800**
Subfamily: **Utilities - #801**
Approach: **Fixed**

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costs would be if an entire segment of its service output were to stop running with concomitant freeing-up of the cars/locomotives and fixed facility capacity that had been involved.

Scope

The Utilities Subfamily includes utilities expenses such as gas, electric, and water provided at various terminals, stations, and support facilities. Most of Amtrak's utilities expenses are recorded at ResCens already in another Subfamily and are allocated by that Subfamily method. However, ResCens in the Utilities Subfamily support multiple departments and utility costs that cannot be attributed to a single ResCen or activity. The Washington Utilities ResCen, for example, incurs utilities costs for mechanical, transportation, and mechanical operations.

Subfamily expenditures for FY07 were $17.0 million and account for 0.4 percent of Amtrak's total expenses.

Avoidable Cost Approach

Utilities Subfamily costs at multipurpose facilities are properly allocated to the trains and businesses supported by those facilities, but the elimination of a single route will not result in significant or measurable cost savings. An exception to this general rule occurs if a facility supports only one route, in which case Amtrak would eventually dispose of the facility if that route were eliminated. Therefore, Utilities Subfamily costs are considered 100 percent fixed in the short run, and are fixed in the long run, unless a particular Subfamily ResCen supports only a single route.

8.9   Police, Security, & Environmental Safety Family

8.9.1   Police Subfamily

Family: **Police, Security & Environmental/Safety - #900**
Subfamily: **Police - #901**
Approach: **Fixed**

Scope

The Police Subfamily performs traditional patrolling and protection duties in support of Amtrak trains, facilities, and ROW. The Police Subfamily consists of two Subcategories: National and Regional/Local. The Regional/Local Subcategory provides the frontline policing duties, while the National Subcategory coordinates and supports the operation across the Amtrak network.

Subfamily expenditures for FY07 were $35.5 million and account for 0.9 percent of Amtrak's total expenses.

Avoidable Cost Approach

Although the Police Subfamily consists of two separate Subcategories, these categories are treated in the same manner with regard to avoidable costs. ResCens in the National Subcategory coordinate national policing services and their costs cannot be attributed to the activity level of a particular Route. While activities at ResCens in the Regional/Local Subcategory are focused on and around passenger stations, these ResCens also police Amtrak's infrastructure at other

locations, so their costs cannot be attributed to the activity level of a particular Route. Costs at ResCens in the Regional/Local Subcategory would likely be fixed and any avoidable costs for a particular route would not be significant or measurable. Therefore, costs for this entire Subfamily are considered 100 percent Fixed in both short and long term

8.9.2 Security Strategy & Special Operations Subfamily

Family: **Police, Security & Environmental/Safety - #900**
Subfamily: **Security Strategy & Special Operations - #902**
Approach: **Fixed**

Scope

The Security Strategy & Special Operations (SSSO) Subfamily works together with the Police Subfamily to provide traditional patrolling, intelligence, and counterterrorism efforts in support of Amtrak trains, facilities, and ROW. Additionally, the SSSO Subfamily manages all capital and grant projects related to security operations such as the installation of new security cameras on tunnels, bridges, and other rights of way as well as all projects funded by the Department of Homeland Security.

Subfamily expenditures for FY07 were $8.0 M and account for 0.2 percent of Amtrak's total expenses.

Avoidable Cost Approach

The SSSO Subfamily supports all Amtrak Routes through its national policing and coordinating security functions. Costs incurred at ResCens in this Subfamily are fixed with respect to activity levels and these costs are considered 100 percent Fixed.

8.9.3 Environmental & Safety Subfamily

Family: **Police, Security & Environmental/Safety - #900**
Subfamily: **Environmental & Safety - #903**
Approach: **Fixed**

Scope

The Environmental & Safety Subfamily performs activities to ensure and oversee environmental, health, and safety issues of Amtrak and its employees. These activities include reporting and safety compliance requirements by state and federal agencies as well as compliance with environmental regulations.

Subfamily expenditures for FY07 were $9.8 million and account for 0.2 percent of Amtrak's total expenses.

Avoidable Cost Approach

The Environmental & Safety Subfamily oversees safety matters for the entire Amtrak enterprise and especially its employees. These costs cannot be attributed to a single Route and any avoidable costs for a particular Route would not be significant or measurable. Therefore, these costs are considered 100 percent fixed.

9 Conclusions and Recommendations

This report provides background information on and a description of the recommended methodology for determining Amtrak's Avoidable and Fully Allocated Costs. It fulfills the Congressional mandate outlined in the 2005 Consolidated Appropriations Act. Once implemented, the methodology will provide Amtrak management and the FRA with useful cost information about Amtrak's routes and businesses. Since the methodology was developed collaboratively by the FRA, Amtrak, and the Volpe Center and in conjunction with Amtrak's APT system information system development, the likelihood is high that it will be successfully implemented and used by Amtrak stakeholders.

9.1 Recommendations

Even though Phase 1 of this task is complete, there is still work to do. Amtrak diligently continues to develop the information technology system to support implementation of the methodology. FRA and Volpe will continue to work with Amtrak to support this development where appropriate. Additional immediate follow-on activities are essential if the methodology is to be successfully implemented.

- *Validation.* Once implemented, the methodology must be validated to ensure that the recommended methodology has been faithfully and accurately executed in Amtrak's new information technology system and that it does not produce unintended results.
- *Updating Procedures.* Monthly and annual update procedures need to be defined and followed to ensure that the methodology maintains its accuracy and usefulness given the operational and financial system changes at Amtrak.
- *Documentation.* Various types of documentation need to be developed, including operations and user manuals. Amtrak should also make a strong effort to communicate information on the methodology to stakeholders who were not involved in the methodology development process.

9.2 Conclusions

The methodology described in this report is a great improvement over RPS in terms of allocation logic, internal consistency, and transparency. It will provide improved and timelier information on the Fully Allocated costs of Amtrak Routes and will estimate Avoidable Costs for those Routes. The methodology was developed within the constraints of Amtrak's current operational environment and financial and other informational technology systems. Several opportunities exist to refine the methodology and need to be explored once the Phase 1 methodology is implemented. These include improved sources of statistics for Amtrak's non-NTS businesses and new and refined statistics for Amtrak trains to facilitate the analysis of costs at the subtrain level. Strategies need to be developed for increasing the share of costs coded directly to trains and routes, in particular, fuel and passenger inconvenience costs. Finally, refinements can be expected to the equations used to estimate the avoidable costs of Amtrak trains once the methodology is implemented and more detailed data becomes available.