



U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

**Federal Funding Support for Positive
Train Control Implementation**

OST

Report No. ST2018038

March 28, 2018





Federal Funding Support for Positive Train Control Implementation

Requested by the Chairman of the Senate Committee on Commerce, Science, and Transportation

Federal Railroad Administration | Federal Transit Administration | ST2018038 | March 28, 2018

What We Looked At

Over the last decade, several fatal rail incidents have led the U.S. rail industry and congressional leaders to commit to implementing PTC systems. The Rail Safety Improvement Act of 2008 (RSIA) requires PTC systems to be implemented across a significant portion of the Nation's rail system. The Department of Transportation was tasked with overseeing PTC implementation and funding support, including grants and loans. At the request of the Senate Committee, we reviewed DOT's oversight of Federal funds for PTC projects and the recipients' use of the funds. Specifically, we were asked to (1) identify railroads that received DOT funding or financing to support PTC projects, (2) describe those PTC projects, (3) assess oversight of PTC funding allocations, and (4) determine whether recipients have used awarded funds "completely and efficiently."

What We Found

As of the end of fiscal year 2017, approximately 60 percent of the U.S. rail systems required to implement PTC are receiving financial support from the Federal Government. Specifically, 29 rail systems have received Federal assistance for projects that vary greatly based on the type of railroad, needs for interoperability, and available communication systems. According to estimates provided to us by the funding recipients, DOT has provided \$2.9 billion to date to implement PTC. However, our work focused on approximately \$2.3 billion obligated as of September 30, 2017, since this was the actual amount available to recipients. Of this amount, the Department obligated \$1.3 billion through various Federal grants, and the Build American Bureau issued approximately \$1 billion through a loan. More than half of the recipients reported spending over 50 percent of their funds, and about 40 percent reported spending over 75 percent. However, although the deadline for PTC implementation is the end of this year, only 4 of 37 funding recipients have completely expended their Federal funds.

Our Recommendations

We are not making recommendations; the data gathered are informational and meant to be responsive to the congressional request.

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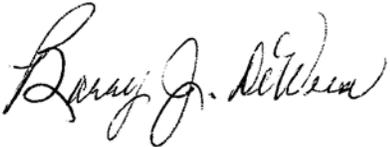
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Memorandum

Date: March 28, 2018

Subject: ACTION: Federal Funding Support for Positive Train Control Implementation | Report No. ST2018038

From: Barry J. DeWeese
Assistant Inspector General for Surface Transportation Audits 

To: Federal Railroad Administrator
Federal Transit Administrator

In September 2008, a Metrolink commuter train collided head-on with a Union Pacific freight train near Chatsworth, CA, resulting in 25 fatalities and over 100 injuries. The National Transportation Safety Board (NTSB) found that the Metrolink engineer had been texting, ran past a red stop signal, and crashed into the oncoming train. NTSB officials stated the crash could have been prevented through the use of positive train control (PTC)—an advanced technological system designed to automatically prevent train-to-train collisions, over speed derailments, and other incidents.

Over the last decade, several fatal rail incidents have led the U.S. rail industry and congressional leaders to commit to implementing PTC systems. The Rail Safety Improvement Act of 2008 (RSIA)¹ required PTC systems to be implemented across a significant portion of the Nation's rail system by December 31, 2015.

Citing funding and technical challenges, the industry was unable to meet this deadline, and Congress extended it by 3 years—to December 31, 2018—with the possibility of an additional 2-year extension if a railroad meets the statutory criteria set forth in the Positive Train Control Enforcement and Implementation Act of 2015.²

Since the enactment of the RSIA, the Department of Transportation (DOT) has been tasked with overseeing PTC implementation and funding support, including grants and loans. By the end of fiscal year 2017, 29 rail systems had received financial assistance, including grants and loans, from the Federal Railroad Administration

¹ Pub. L. No. 110-432 (2008).

² 49 U.S. Code § 20157.

(FRA) and Federal Transit Administration (FTA), and a loan from the Build America Bureau (BAB).³ In response to a request from the Chairman of the Senate Committee on Commerce, Science, and Transportation, we reviewed DOT's oversight of Federal funds for PTC projects and the recipients' use of the funds. Specifically, we were asked to complete the following objectives: (1) identify railroads that received DOT funding or financing to support PTC projects, (2) describe those PTC projects, (3) assess oversight of PTC funding allocations, and (4) determine whether recipients have used awarded funds "completely and efficiently."

We conducted this audit in accordance with generally accepted government auditing standards. We interviewed FRA, FTA, and BAB staff at DOT Headquarters, and spoke to FTA Region VI staff in Fort Worth, Texas. Additionally, we coordinated with all 3 agencies, and 10 FTA regional offices. We also surveyed funding recipients to acquire the financial documentation and information needed to conduct this review. Exhibit A details our scope and methodology. Exhibit B lists the entities we visited or contacted. Exhibit D presents estimates of Federal funding and financing obligated for PTC implementation by end of fiscal year 2017.

We appreciate the courtesies and cooperation of DOT representatives and rail agencies during this audit. If you have any questions concerning this report, please call me at (202) 366-5630.

cc: The Secretary
DOT Audit Liaison, M-1
FRA Audit Liaison, RAD-43
FTA Audit Liaison, TBP-30

³ The enactment of the Fixing America's Surface Transportation (FAST) Act led to the July 2016 creation of BAB to oversee various grant and credit programs administered by the Department. BAB is responsible monitoring and reviewing the Railroad Rehabilitation and Improvement Financing (RRIF), Transportation Infrastructure Finance and Innovation Act (TIFIA), and Private Activity Bonds (PAB) programs as well as the recently enacted Infrastructure for Rebuilding America (INFRA) grant program.

Results in Brief

Over 60 percent of U.S. rail systems required to implement PTC have received Federal funding support.

In total, 41 rail systems had been identified by FRA as subject to congressional requirements for PTC implementation. FRA identified eight other rail systems that have requested and obtained FRA approval of exceptions to the mandate, based on the parameters outlined in the Code of Federal Regulations (CFR). Of the 41 rail systems, all at various phases of PTC implementation, 25 had received Federal financial assistance as direct recipients. In addition to these 25 rail systems currently subject to the statutory mandate, 4 other rail systems have received PTC financial assistance as follows: 1 rail system's future operation will be subject to the statutory mandate, and 3 rail systems are each implementing PTC technology because they are tenant railroads that operate on a PTC-equipment track segment.

PTC projects have wide-ranging implementation needs.

The scope of PTC projects receiving Federal funding varies greatly depending on the railroad type, interoperability requirements, and available communication systems. For example, some funding recipients may seek to acquire wireless communications equipment, while others have obtained financial assistance to purchase onboard equipment for locomotives. Additionally, recipients have been at varying stages of implementation when applying for Federal funding and may also be supplementing Federal PTC funds with State or local monies.

DOT's oversight of financial support for PTC varies.

Each DOT organization follows its established oversight mechanisms of grant or loan procurement activities for the funding program paying for the PTC activity—including monthly or quarterly review of post-award financial reports, DOT officials conducting regular phone calls, meetings, and email correspondence with funding recipients, and on-site monitoring visits and meeting. When a PTC project is a component of a larger overall grant or loan, funding recipients may not be required to capture or report PTC-specific expenditures to DOT beyond typical project- and grant-level tracking means. In addition, the Department's financial and management systems requirements for recording project expenditures do not always provide the granularity necessary to precisely identify PTC costs. As a result, it is difficult for FRA and FTA to extract PTC-specific spending from Federal awards for other types of activities, and the two DOT agencies must rely on the rail systems to provide accurate information about PTC when needed.

Federal funding for PTC has not been fully expended, and rail systems remain concerned about future funding shortfalls and delays.

According to estimates provided to us by the funding recipients, DOT has provided \$2.9 billion to date to implement PTC. However, about \$2.3 billion had been obligated as of September 30, 2017, with only 4 of 37 funding recipients completely expending their Federal funds. However, it is important to note that some recipients received their awards with funding appropriated at different points in time over a 10-year period, which makes it challenging to compare progress across rail systems. Still, approximately 1 year before the extended implementation deadline,⁴ only 64.8 percent of funding recipients had spent over 50 percent of their PTC monies, and only 40.5 percent had spent over 75 percent. Eight more recent grant recipients reported having spent none of their respective funding allocations. Some recipients when discussing the procurement of PTC equipment and services noted concerns about challenges to the competitive bidding process. In addition, some funding recipients reported having to delay maintenance and repairs due to the PTC mandate and also are concerned that Federal and State funds will not be available for the additional operations and maintenance costs of PTC. For example, one rail system estimated the additional operation and maintenance costs of PTC to exceed \$300,000 annually while others expressed concern regarding whether additional assistance will be available for operations and maintenance. In 2016 the American Public Transportation Association estimated the operation and maintenance of PTC would cost commuter railroads about \$100 million a year and stated that many rail systems were still uncertain about the magnitude of future long-term costs. Officials at FRA and FTA said they are aware of this concern, but they too are not sure whether additional funding will be allocated to support ongoing operational and maintenance costs after full PTC implementation.

We are not making recommendations. The data gathered are informational and meant to be responsive to the congressional request.

⁴ Federal PTC funding information was collected for a 10-year scope prior to the end of fiscal year 2017. The extended congressional deadline for PTC implementation is December 31, 2018.

Background

Since the 2008 fatal rail crash that led to the enactment of the RSIA, several other fatal rail incidents have strengthened the Department’s commitment to implementing PTC nationwide (see table 1).

Table 1. Examples of PTC-Preventable Crashes

Date	Location	Incident
September 2008	Chatsworth, CA	A distracted engineer ran a Metrolink train through a red signal, causing a collision that killed 25 and injured 135.
May 2011	Mineral Springs, NC	Human error contributed to the rear-end collision of two freight trains, killing two crew members and injuring two more
June 2012	Near Goodwell, OK	Human inattentiveness contributed to the collision of two freight trains, killing three crew members.
December 2013	Bronx, NY	An engineer fell asleep and caused a Metro-North passenger train derailment that killed 4 and injured 61.
May 2015	Philadelphia, PA	A distracted engineer accelerated into a sharp curve, causing an Amtrak derailment that killed 8 and injured 185.
December 2017	Near DuPont, WA	A derailment caused 3 deaths and over 60 injuries. The National Transportation Safety Board’s investigation is expected to last 12 to 24 months.

Source: OIG

The RSIA required Class I railroad main lines handling poisonous-inhalation-hazard materials and any railroad main lines with regularly scheduled intercity and commuter rail passenger service to fully implement PTC.⁵ A fully functioning PTC system must be able to precisely determine the location and speed of trains, warn train operators about potential problems, and take action if the operator does not respond to a warning. A PTC system is made up of more than 20 major components in various stages of development, which must then be integrated and installed across the rail network.

⁵ The RSIA defines main lines as those carrying 5 million or more gross tons of freight annually and authorizes FRA to define the term “mainline” by regulation for passenger routes or segments over which limited or no freight railroad operations occur.

Over 60 Percent of U.S. Rail Systems Required To Implement PTC Have Received Federal Funding Support

As of the end of fiscal year 2017,⁶ approximately 60 percent of the U.S. rail systems required to implement PTC are receiving financial support. FRA identified the rail systems⁷ as subject to the congressional mandate for PTC implementation. Under its regulations, FRA approved requests from eight rail systems for a full mainline track exception for territory that provides limited intercity or commuter rail passenger service.⁸ Of the 41 rail systems still required to implement PTC, per the statutory mandate, 25 are receiving Federal financial support. In addition to those subject to the statutory mandate, four others are implementing PTC and receiving Federal assistance—either because the rail system’s future operations will be subject to the statutory mandate or because the rail system is a tenant railroad that operates on a track segment already required to have PTC. By the end of fiscal year 2017, 29 rail systems had received financial support from such sources as FRA, FTA, and BAB.

A rail system can receive Federal support from multiple sources, whether as a direct recipient or through another grantee. Some railroads, such as Amtrak, receive funds both directly and indirectly. At the end of fiscal year 2017, the 29 rail systems mentioned above had received Federal assistance from 37 different funding recipients. Nineteen received funding from FRA, 25 from FTA, 7 from both FRA and FTA, and 1 was funded through a loan from BAB.⁹

Rail systems were at different points of implementation when they applied for Federal funding and may have used State or local money to pay for some PTC-related projects. For the purpose of this audit, we will refer to all direct recipients of PTC funding as “funding recipients” and rail systems (whether railroads, commuter rail, etc.) as “rail systems.” Table 2 identifies the rail systems that we identified as recipients of Federal PTC funds.

⁶ As requested, we reviewed DOT’s funding and financing for implementation of PTC since 2008. For timely reporting purposes, the scope of this review includes funding that had been obligated by September 30, 2017 (end of fiscal year 2017).

⁷ For the purpose of our review, we refer to all direct recipients of PTC funding as “funding recipients” and rail operators as “rail systems,” whether railroads, commuter rail, etc.

⁸ As implemented by 49 CFR § 236.1019.

⁹ This was a \$967.1 million loan issued to the New York Metropolitan Transportation Authority in May 2015 for the implementation of PTC on both the Metro-North Railroad (Metro North) and the Long Island Rail Road (LIRR). It is the largest RRIF loan ever issued by DOT.

Table 2. Rail Systems and Funding Recipients That Have Received PTC Funding

Rail System		Funding Recipient(s)
1	Alaska Railroad	Alaska Railroad
2	National Railroad Passenger Corporation (Amtrak)	Illinois Department of Transportation (DOT)
		Michigan DOT
		Pennsylvania DOT
		New York DOT
		National Railroad Passenger Corporation (Amtrak)
3	California High-Speed Rail Authority*	California High-Speed Rail Authority
4	Denton County Transportation Authority (DCTA) A-Train	DCTA
5	Fort Worth and Western Railroad*	Fort Worth and Western Railroad
6	Kansas City Southern Railway (KCS)	KCS
7	Long Island Rail Road (LI)	New York Metropolitan Transit Authority (MTA)
8	Maryland Area Regional Commuter Train Service (MARC)	Maryland DOT
9	Massachusetts Bay Transit Authority (MBTA)	MBTA
10	Metro-North Commuter Railroad (MNCW)	New York MTA
		Connecticut DOT
11	Metro Transit Northstar Commuter Rail (NSCR)	NSCR
12	Nashville Regional Transportation Authority (NRTX) / Nashville and Eastern Railroad (NERR)	NRTX
13	San Diego Northern Railway (SDNX) – North County Transit District (NCTD) Coaster	North County Transit District
		California DOT
14	Northeast Illinois Regional Commuter Rail Corp. (Metra)	Metra
15	Northern Indiana Commuter Transportation District (NICD)	NICD
16	Peninsula Corridor Joint Powers Board (PCMZ)	PCMZ
17	Providence and Worcester Railroad Company*	Providence and Worcester Railroad Company
18	Regional Transit District Commuter (RTDC) – Denver RTD	RTDC – Denver RTD
19	San Joaquin Regional Rail Commission (ACEX) - Altamont Corridor Express (ACE) Commuter Rail	ACEX – ACE Commuter Rail
20	Sounder Commuter Rail /Pacific Northwest Corridor	Washington State DOT

	Rail System	Funding Recipient(s)
21	South Florida Regional Transportation Authority (SFRV) – Tri-Rail	Florida DOT
22	Southeastern Pennsylvania Transportation Authority (SEPTA)	SEPTA
		Pennsylvania DOT
23	Southern California Regional Rail Authority (SCAX) – Metrolink	SCAX
		Riverside County Transportation Commission
		Orange County Transportation Authority
24	Terminal Railroad Association of St. Louis (TRRA)	Missouri DOT
25	TriMet Westside Express Service (TMEV)	TMEV
26	Trinity Railway Express (TRE)	Dallas Area Rapid Transit (DART)
		Fort Worth Transportation Authority
27	Twin Cities and Western Railroad Company*	Twin Cities and Western Railroad Company
28	Utah Transit Authority FrontRunner Commuter Rail (UFRC)	UFRC
29	Virginia Railway Express (VREX)	County of Prince William
		Potomac and Rappahannock Transportation Commission

Note: The railroad marked with an asterisk (*) is not required to implement a PTC system by the December 31, 2018 deadline. The three railroads marked with a double asterisk (**) are each a tenant railroad on one or more host railroads that are subject to the statutory PTC implementation mandate, and, as tenant railroads, are required to equip certain locomotives with an onboard PTC apparatus.

Source: OIG analysis

PTC Project Descriptions Highlight Wide-Ranging Implementation Needs

PTC implementation projects vary greatly based on the type of railroad, needs for interoperability,¹⁰ and available communication systems. For example, some funding recipients may seek to acquire wireless communications equipment, while others have obtained financial assistance to purchase onboard equipment for locomotives.

¹⁰ Commuter railroads often run on tracks owned by Class I freight railroads, and freight trains run on commuter-owned track as well. All tenant railroads equipped with PTC must be interoperable with the PTC system installed by the host railroad.

Rail systems were at different points of PTC system implementation when they applied for Federal funding, and may use State or local money to pay for other PTC-related projects. The list below outlines railroads and associated projects that have received Federal funds for PTC. The following provides a summary of information provided by the rail systems on PTC-related projects.

Alaska Railroad

PTC. The costs of PTC program includes installation of equipment required for the back office system, wayside equipment, communications infrastructure, onboard hardware equipment, software, and program integration costs, previously called Collision Avoidance System (CAS).

Altamont Corridor Express (ACE)

San Joaquin Regional Rail Commission PTC. The ACE project consists of the Installation and Implementation of PTC Apparatus on Locomotives and Cab consistent with Union Pacific Railroad requirements. The Interoperable Electronic Train Management System (I-ETMS) is a requirement of UPRR, with all equipment from Wabtec being installed by Wabtec with testing to begin in June 2018. Back office server services are being procured with a redundant system as a requirement to ensure engineer credentials will be available at all times to allow for PTC operation at all times. All trackside construction and PTC system integration have been completed by UPRR the host railroad ACE operates over.

National Railroad Passenger Corporation (Amtrak)

Advanced Civil Speed Enforcement System (ACSES)–Vital Train Management System Interoperability. For interoperability with freight carriers operating on the Northeast Corridor (NEC), Amtrak will install an I-ETMS overlay that will allow freight trains and some commuter trains to operate on the NEC without ACSES equipment. Freight trains will be required to be equipped with an onboard 4-aspect cab signal, Locomotive Speed Limiter (LSL), and I-ETMS while commuter trains will require Automatic Train Control (ATC; 9-aspect cab signal and speed control) equipment and an onboard I-ETMS system.

WAS-NYP ACSES Upgrades. This project is for the next-generation ACSES system. This project will deliver "on board" geometry database at point of origin, automate the delivery of ACSES trip data at the end of each locomotive run,

reduce transponder cost by eliminating the need for the current number of transponders and develop graphic design tools to enhance in-house engineering.

WAS-NRO ACSES Installation. Continue installation of ACSES between New Rochelle, NY, and Washington, DC, to provide PTC on locomotives. PTC is technology that enforces positive stops without human intervention. The ACSES system includes transponders, encoders, wayside radios and Aspect Display Units (ADU). ADUs will provide engineers with distance to target speed for a speed restriction and other important data.

Michigan Line ITCS Installation. Extend Incremental Train Control System (ITCS) on the Michigan Line in the States of Indiana and Michigan. This extension will be from Milepost (MP) 150 to MP 143 on the east end of the Michigan line and from MP 215 to MP 240 on the west end of the Michigan line. Upgrades to intermediate signals and crossings are also included in this project. Upgrades will ensure interoperability with proposed freight PTC, which is technology that enforces positive stops without human intervention.

PTC EQI Development. The scope of work is to develop new onboard equipment for long-distance trains that will be usable with the various PTC schemes being implemented by the freight railroads.

Porter–Kalamazoo ITCS Servers Backup PWR. PTC back-up power supply for ITCS servers—Porter to Kalamazoo. Purchase and install natural gas generators at ITCS locations. Install new gas lines. Test and put in service.

PTC Chicago Terminal—I-ETMS Installation. This project will provide PTC I-ETMS capability in the Chicago terminal area and with an option in the New

Orleans terminal area. A vendor will be contracted to design, implement, test, and commission an I-ETMS system at the Chicago and New Orleans terminal areas and obtain FRA certification. In addition this project will upgrade the signal system in the Chicago I-ETMS territory to a state of good repair. Design of I-ETMS and signal upgrade work is minimal. The extent of Amtrak force account involvement will be determined once the vendor estimates the level of effort of the work and the availability of Amtrak resources is known. Amtrak and vendor will jointly test and commission the signal system upgrades and the I-ETMS system.

Host Railroad Territory I-ETMS PTC Non-Wayside. Nationwide I-ETMS PTC Initialization and Operation. Design, install, and test an I-ETMS-compliant PTC system to perform Amtrak train and crew initialization on host railroads from Amtrak's back-office server in order to operate Amtrak trains on host railroads' PTC territory. This project will include the office, communication, and onboard segments of I-ETMS along with Wi-Fi communication at select locations to the initializing trains. The wayside segment will be provided by the host railroad.

Amtrak PTC Wireless Communication and Key Management Service.

Research and development of secure wireless network communications for PTC. Development of a plan to implement the secure wireless communications within 18 months of award of grant. There will be interoperability with railroads that operate on the NEC. Once the specifications are fully developed, it will implement, test, and commission the design.

Springfield Line PTC Installation Wayside. PTC Springfield line design. Amtrak is committed to the extension of PTC on the remainder of the main stem and on its tributary routes, including the Springfield line (New Haven (CT)– Springfield).

PTC Amtrak-Owned Installation. Installation of PTC on the Amtrak system. This includes upgrades to Central Instrument House, radio transmission equipment, and wayside interface units.

PTC. The project would accelerate the installation of PTC equipment on Amtrak's diesel and cab car fleets by training additional personnel on installation procedures, providing additional I-ETMS equipment kits, and the necessary labor required to install the kits. Locomotive kits include Train Management Computer, Display, 220MHz Radio System, Global Positioning System (GPS) Receiver, Event Recorder and Wilmore 15A Converter. Estimated cost is about \$80,000 per locomotive. In cases where two systems (I-ETMS and ACSES) are required on a locomotive, the cost estimate is \$180,000 per locomotive. This project touches on the safety aspect of the Strategic Plan. The PTC system itself is intended to prevent future accidents from happening. In order to continue to provide reliable service and not to diminish the utility and flexibility of Amtrak's fleet, all Amtrak locomotives and cab cars must be equipped.

Dearborn to Kalamazoo: Service Development Program. This development program involves rehabilitation of track and signal systems, following the purchase of 135 miles of track between Kalamazoo and Dearborn, MI, to significantly increase reliability and decrease trip time on the Chicago–Detroit–Pontiac corridor. The signal improvements components include replacement of the existing signal system and installation of PTC, i.e., ITCS.

Hudson Line PTC Implementation (NYDOT). Through this project, the New York DOT and Amtrak propose to deploy ACSES along the 94-mile Hudson line. The work included will result in the full deployment of PTC on the Hudson line. This project will include the installation of the remaining 8 miles of fiber optic cable, completing the communication backbone along the Hudson line; procure a PTC system integrator to further develop and finalize the PTC deployment plan; collect terrain data; set up needed information technology (IT) infrastructure; obtain the necessary spectrum; and construct the full PTC system along the Hudson line. The intended outcome of this grant application project is the implementation of a safe, reliable, secure system that provides for a seamless

transition at logical locations from the ACSES system to the I-ETMS systems used by adjacent freight carriers for the Empire and Adirondack Corridors. This project will implement PTC on 94 miles of the Hudson line from Poughkeepsie to Hoffman. The fiber-optic cable and related components will serve as the PTC communication system. The transportation challenges addressed are the reliability, efficiency, and security of transferring PTC information along the Hudson line. The outcome is a state-of-the-art communication system installed by the most practical and economical method to successfully facilitate the remainder of the PTC implementation on the Hudson line at a reduced initial capital cost, decreasing the overall PTC implementation cost.

Illinois High Speed Rail. Illinois High Speed and Intercity Passenger Rail service on multiple corridors that includes infrastructure improvements specifically along the Chicago–St. Louis corridor. These improvements include the refurbishment, replacement, or extension of mainline track, second mainline track, passing sidings, structures, drainage systems, grade crossings, fencing, passenger stations, signal/communications/PTC, rolling stock (next generation locomotives and passenger cars), and professional services (environmental, design, construction, and program management). Specific PTC elements are allocated below. PTC for locomotive build (FR-HSR-0052) is unknown as this is a lump sum contract with no milestone payments associated with PTC or control systems in general.

Keystone Corridor ABS/ Centralized Control Project. The purpose of the project is to complete preliminary engineering (PE), National Environmental Policy Act (NEPA) clearance and final design (FD) for a modernized signal system on the Keystone Corridor in the State of Pennsylvania. The current signal system in the project limits is an Automatic Block Signal (ABS) system, which is signaled for one direction on three of the four tracks. The system is designed for a maximum speed of 80 mph. Maximum speed is expected to stay at its current limit because of the number and severity of curves within the project limits. The project will provide for a high-density signal system to support intercity passenger rail operations, whereas in the event of a failure in the signal block, the entire block will not “tumble down.” As a result, train delays will be reduced and operational flexibility will be enhanced. As an additional benefit, increased work windows for maintenance and capital improvements on the line will be markedly improved.

The original grant agreement only encompassed PE and NEPA (the project did not go to final design) and the project limits extended from MP 1.9 (Zoo interlocking) to MP 68.1 (Cork interlocking). Amendment no. 1, processed in March 2013, reduced the project limits to instead encompass only MP 19.9 (Paoli) to MP 1.9 (Zoo) because Amtrak completed the design and construction of the ABS system for much of the Cork-to-Zoo corridor prior to award of the

cooperative agreement. Additionally, the level of design expanded from preliminary engineering to final design.

California High Speed Rail Authority

California High-Speed Train System—San Francisco to San Jose Project Section: Communications-Based Overlay Signal System/PTC System (CBOSS/PTC) Project. The project will produce a detailed design development plan for implementing PTC in the Caltrain corridor, which when constructed would provide a safer and more functional work environment while reducing costs during construction of the San Francisco-to-San Jose section of the California high-speed rail system. The development of the CBOSS/PTC product supports the California high-speed rail system because the solution will be implemented in advance of California high-speed rail construction. This funding will support identifying the necessary interoperable interfaces that the California High-Speed Rail Authority must specify for its automatic train control system procurement; it will also reduce the Authority's technical risks and project-cost contingencies for the shared corridor design and implementation.

Denton County Transportation Authority (DCTA; A-train)

PTC Implementation/Preliminary (Denton County). General engineering support to develop PTC technical specifications and special provisions for use by DCTA in the procurement of a design build to construct the entire PTC system. Development of procurement documents.

Design/Consulting Phase. DCTA required a means of enhancing the onboard equipment and wayside signal system to protect against over-speed operation, movement over a switch improperly lined train-to-train collision, and incursion into a work zone. To accomplish this, DCTA required the installation of office systems, onboard systems, and wayside signal system modifications to implement an FRA-type approved Enhanced Automatic Train Control (E-ATC) system. Grant funds will pay for design and preliminary engineering services for the development of conceptual design package and proposed development for design-build integration contract

Implementation. DCTA required a means of enhancing the onboard equipment and wayside signal system to protect against over speed operation, movement over a switch improperly lined, train-to-train collision, and incursion into a work zone. To accomplish this, DCTA required the installation of office systems, onboard systems, and wayside signal system modifications to implement an FRA-

type approved E-ATC. Notice to proceed for the E-ATC project was issued to Alstom (formerly GE Transportation Systems Global Signaling) on November 13, 2015.

Denver Regional Transportation District (RTD)

RTD Eagle P3. The Eagle P3 project is a new intercity rail line comprised of RTD's University of Colorado A line, Northwest Rail (B) line Westminster segment, Gold (G) line, and Commuter Rail Maintenance Facility. The project comprises elements of design, build, finance, operation, and maintenance (DBFOM). I-ETMS PTC system is installed throughout the Eagle P3 lines to achieve compliance with the RSIA. The University of Colorado A line opened in April 2016, and the B line opened in July 2016. The opening date for the G line is scheduled in 2018. The project is a joint public-private partnership that received Federal funding through DOT.

Fort Worth and Western Railroad

Fort Worth and Western Railroad PTC Implementation Project. Freight rail project needed to sustain uninterrupted freight service to 88 rail-served customers through 8 counties in North Central Texas. As a tenant railroad under 49 CFR § 236.1006, this project serves to equip 9 locomotives with onboard PTC equipment, procure a crew initialization back office server, install Wi-Fi equipment at 3 railyards, train 4 mechanics to maintain PTC onboard equipment, and train 60 trainmen to operate PTC-equipped locomotives and track.

Kansas City Southern Railway Company (KCSR)

Analog-Digital Communications Upgrade for PTC. As a foundational step to implementing PTC, KCSR needed to enhance existing wireless communications capabilities specifically the microwave backbone. KCSR's microwave system is essential to back hauling critical data needed for the proper operation of the PTC messaging system. The intent of this project was to convert the outdated analog system to digital and replace other aged infrastructure deemed not adequate to provide reliable communications.

Long Island Rail Road (LIRR)

Long Island Rail Road PTC Project. All operating territory controlled by LIRR must be compliant with PTC regulations, including all manual block territories, cab signal territories, and wayside signal territories. Therefore, this project would affect all LIRR right of way infrastructure. In addition to Automatic Speed Control (ASC) territories, the LIRR service area includes, (i) Manual Block signaling (a.k.a. “Dark Territory”), (ii) Automatic Block signaling (ABS) and, (iii) Controlled Manual Block (CMB) signaling. The LIRR was required to submit a PTC Development Plan for FRA approval to develop ACSES II as an overlay on ABS and CMB signaling.

While the LIRR developed a PTC implementation strategy to implement ACSES II on its existing signal systems, to limit PTC system reliability risks associated with ABS and CMB 1 signaled territory, and to increase safety benefits, the LIRR will progress implementation of the original Type Approved system as an overlay to ASC on LIRR’s heaviest traveled ABS/CMB segment of Babylon to Patchogue.

Additionally the LIRR will implement ASC in sections of Manual Block territory to increase safety

Maryland Area Regional Commuter (MARC)

MARC PTC. The MARC PTC project will support implementation and development of PTC for MARC as mandated by 49 CFR part 236, subpart I. PTC will prevent collisions, signal run through, and ensure proper train spacing on tracks operated by MARC. Implementation includes all diesel locomotives and cab cars.

Compliance Testing of VETMS at Speeds Up to 125 mph. The Vital Electronic Train Management System (VETMS), referred to as I-ETMS, is a communications-based PTC system implemented to support freight and passenger rail operations mandated by the RSIA of 2008. The object of this project is to be able to operate trains safely at speeds between 110–125 mph.

Massachusetts Bay Transportation Authority (MBTA)

MBTA PTC Project. Installation of PTC systems on both the north and south sides. This grant represents Phase I of the entire project and is the initial stage of implementation for PTC. Phase I of the project includes design and an

implementation plan, which addresses the development of the 220 MHz spectrum. Phase I is of independent utility, as it will allow for the MBTA to remain in compliance with the current FRA regulations and move the commuter rail network towards greater safety and reliability.

Metrolink

PTC. Installation of a PTC system throughout Metrolink's five-county territory (Los Angeles, Orange, San Bernardino, Riverside and Ventura Counties) as a Rung-1 interoperable system with the [Southern California Regional Rail] Authority's railroad partners.

Metro-North Commuter Railroad

PTC Program Implementation (CDOT). For Metro-North Railroad (MNRR), PTC can be deployed as an overlay to the existing cab signal system technology and will utilize the system currently being employed by Amtrak, an ACSES or an advanced modification of that system called ACSES II. The systems work by sending a special frequency originating from the train engine to transponders located along the right-of-way, where switches, signals, stations, code change points, curves work zones and temporary speed restricted areas are, to name a few. This transponder signals the train to change speed and enforce the speed change or stop the train. The system is designed to monitor train activity, prevent collisions, control headway spacing, convey and enforce speed restrictions, advice of hazards, and inoperable grade crossings. This is a radio-based system.

Metro-North Railroad PTC Project. All operating territory controlled by MNR will require compliance with the PTC regulations. MNR's East of Hudson operation consists of three major rail lines emanating from Grand Central Terminal (GCT) in New York City: (1) The Hudson line, which terminates in Poughkeepsie, NY, (2) the Harlem line, which terminates in Wassaic, NY, and the New Haven line, which terminates in New Haven, CT. In addition, the New Haven line has three branch lines: the New Canaan Branch, the Danbury Branch, and the Waterbury Branch. The Beacon Line runs from Beacon, NY, through Brewster, NY, and on to Danbury, CT. MNR owns the Beacon Line section up to the New York/Connecticut State line. Additionally, on the West of Hudson operation, Metro-North maintains the right-of-way for the Port Jervis Line from Suffern, NY, to Port Jervis, NY.

Metro Transit Northstar Commuter Rail

Commuter Rail (NSCR) Northstar Commuter Rail Project. The Northstar Corridor Rail Project established a 40-mile commuter rail line between Big Lake, MN, and downtown Minneapolis plus a four-block light-rail extension in downtown Minneapolis. Revenue service began on November 16, 2009. The Northstar service uses operating easements purchased from the BNSF Railway Company to run six inbound and six outbound weekday trains and three roundtrip trains each weekend day on a set schedule. Per the Metropolitan Council's Commuter Service Agreement with BNSF, the railroad operates the trains, performs the mainline track and signal maintenance, and dispatches the service. Metro Transit staff maintain the rolling stock, stations, and facilities. Northstar participates in the cost of dispatching as well as track and signal maintenance.

Nashville Regional Transportation Authority (NRTX) / Nashville & Eastern Railroad (NERR)

PTC for the Music City Star Commuter Rail (NERR host). Funding to cover a portion of the costs to implement a PTC system on the Music City Moves commuter rail line. PTC systems are integrated command, control, communications, and information systems for controlling train movements with safety, security, precision, and efficiency. The commuter rail line operates on 33 miles of track that Nashville & Eastern Railroad Authority owns. NERR is responsible for the maintenance and operation on the line. The current agreement between these entities for commuter services and upgrades to the rail line is through September 15, 2036, and staff is looking into amendments of this agreement and operational changes that will address PTC implementation and satisfactory continuing control of the PTC assets.

North County Transit District Coaster

Implementation of PTC–San Onofre to San Diego (North County). PTC is an integrated command, control, communications, and information system that controls train movements, thus promoting safety for all who use the rails. The PTC project started in August 2011. In July 2017, NCTD began the initial Revenue Service Demonstration (RSD) testing phase. After success with this phase, NCTD was cleared to begin the extended RSD phase of PTC, which commenced on all Coaster trains effective December 16, 2017. By way of background, RSD is when a

railroad is operating revenue trains (passenger carrying) with the PTC system in full operation. The Coaster trains that operate PTC have the full benefits of PTC during this RSD Phase. NCTD will continue in extended RSD until FRA certifies NCTD's PTC system. Full compliance with FRA certification is due by December 31, 2018, and NCTD is on track to meet that deadline.

Northeast Illinois Regional Commuter Rail Corp. (Metra)

PTC. Metra is implementing a PTC system under a single project funded through various Federal, State, and local grants. The project includes the purchase and installation of wayside components, onboard components, and back-office components. Metra operates in the Chicago terminal, one of the most complex operating environments in America. To ensure functionality of PTC and interoperability, Metra is employing a system integrator firm as part of PTC installation. The wayside components are comprised of wayside interface units installed in signal bungalows and connected to signal and control point systems, radios, antennas, antenna poles, and base stations. Onboard equipment includes cabinets housing the electronic hardware, the actual electronic hardware and software, hard-wire connections to the propulsion and braking systems, a GPS receiver, and a wireless communication receiver and transmitter. Lastly, the back office is comprised of servers, work stations, and connections to the communications network along the right-of-way via existing internet connections.

Northern Indiana Commuter Transportation District (NICD)

PTC Engineering/Design; Signal System; Construction; Program Management. This project covers the engineering and design of a radio frequency network to be used in installation of PTC. NICTD was 2/3 complete with a cab signal system; however, 14.4 miles of the commuter route travel on Metra lines, and so NICD must convert to the same radio frequency PTC system as Metra. This task includes the purchase of equipment as well as the oversight of the installation of the PTC equipment.

Peninsula Corridor Joint Powers Board

CBOSS/PTC. This project implements Caltrain's Advanced Signal System along the Caltrain corridor to meet the requirements of Federal regulations. CBOSS/PTC

is an advanced train control system, utilizing sensors on trains, switches, tracks, and signalized crossings to allow for automated collision prevention and improved manual accident prevention. The project includes provision for a backup central control facility that is integrated with existing communications and control facilities to be used in the event of the failure of the main CBOSS/PTC system.

Providence and Worcester (P&W) Railroad Company

Acquisition of Eight ACSES Onboard P&W Locomotives. This project consist of acquiring 8 ACSES onboard kits, the installation of a total of 10 ACSES kits, then static and dynamic testing of each locomotive to allow interoperability on the NEC with host Amtrak and Metro North.

Souder Commuter Rail (SCR)

Pacific Northwest Rail Corridor Program. This project is a high speed intercity passenger rail program that will expand travel choices and foster economic growth along the 300-mile Amtrak Cascades corridor in Washington State. The program will improve existing infrastructure and equipment with the goal of adding two additional round trips daily between Portland, OR and Seattle, WA, improve on-time performance and schedule reliability and provide shorter travel times.

South Florida Regional Transportation Authority (SFRTA) – Tri-Rail

Tri-Rail Positive Train Control Installation. The purchase and installation of an interoperable PTC system meeting the requirements of the RSIA of 2008 on 21 cab control cars and up to 14 locomotives for push pull commuter trains. It is not anticipated at this time that any of these dollars will be used for wayside or back-office infrastructure. Since the PTC system is required under the RSIA it is anticipated the life expectancy and maintenance of this system is at least as long as the law requires it. Installation of established I-ETMS PTC technology on the South Florida Rail Corridor (SFRC), where Tri-Rail, Amtrak, and CSXT trains all operate.

Downtown Miami Link PTC. Project management and installation oversight for the implementation of cab signaling equipment and software for the Tri-Rail fleet

and PTC upgrades necessary for revenue service on Tri-Rail's Miami Downtown Link. Engineering and design services for the implementation of cab-signaling equipment/software for the Tri-rail fleet and PTC upgrades necessary for revenue service on Tri-Rail's Miami Downtown Link. Material procurement and installation services for implementation of cab-signaling equipment/software for Tri-Rail fleet and PTC upgrades necessary for revenue service on Tri-Rail's Downtown Miami Link. Integration activities to other onboard components, including other PTC equipment. Includes necessary equipment to perform installation and departure tests for cab signaling equipment. Installation of established E-ATC PTC technology on the Tri-Rail fleet.

Southeastern Pennsylvania Transportation Authority (SEPTA)

PTC. SEPTA's system-wide ACSES II (PTC) project cost approximately \$156 million to complete. SEPTA primarily used its FTA formula funds (sections 5309/5337 and 5307) for this project, which is substantially complete.

West Trenton Line Separation Project. SEPTA completed a passenger-freight rail separation project (SEPTA-CSX West Trenton Line Separation) needed to achieve compliance with RSIA. Prior to 2016, SEPTA and CSX shared operations on a 6-mile segment of the West Trenton Regional Rail Line. Since SEPTA and CSX were implementing inherently different PTC systems (ACSES II and I-ETMS), separation was required for the two operators to comply with RSIA. This grant project was completed in 2017. The project was a joint public-private partnership that received funding through a DOT TIGER Grant.

Elwyn to Wawa Service Restoration PTC & OnBoard Survey Map. In May 2017, SEPTA was selected to receive a competitive FRA PTC-implementation grant in the amount of \$5.8M to support a \$7.25M project. The FRA PTC-implementation grant will allow SEPTA to install PTC on a restored segment of rail line between Elwyn and Wawa (on the existing Media-Elwyn Regional Rail Line). In addition, the project will allow SEPTA to develop and install an onboard survey map, which will contain the physical characteristics of the railroad and inform the train of the speeds and restrictions associated with its location. The onboard survey map will provide the same information as the ACSES II transponders but will be triggered by the survey map encoded in the train's onboard computer (OBC). By having both wayside and vehicle notification systems, the ACSES II PTC will be even more safe and reliable. FTA will administer this grant as stated in Federal Register Notice dated 11-9-17—Fiscal Year 2017 PTC Grant Program Project Selections.

Chestnut Hill East Automatic Train Control (ATC) Project. Implementation of an ATC system was a priority for SEPTA beginning in the 1990s, and just over half of SEPTA Regional Rail was operating with ATC in 2008. Following the passage of RSIA, SEPTA expedited its efforts to install ATC on the remainder of the railroad. The Chestnut Hill East ATC project was funded with Federal funds.

Chestnut Hill West Signals, Interlocking, & ROW Improvements.

Implementation of an ATC system was a priority for SEPTA beginning in the 1990s and just over half of SEPTA Regional Rail was operating with ATC in 2008. Following the passage of RSIA, SEPTA expedited its efforts to install ATC on the remainder of the railroad. The Chestnut Hill West Signals, interlocking & right-of-way (ROW) Improvements project was funded with Federal funds. This project also included additional scope related to the ATC installation.

Cynwyd Line Signal, Access, & ROW. Implementation of an ATC system was a priority for SEPTA beginning in the 1990s and just over half of SEPTA Regional Rail was operating with ATC in 2008. Following the passage of RSIA, SEPTA expedited its efforts to install ATC on the remainder of the railroad. The Cynwyd Line Signals, Access & ROW Improvements project was funded with Federal and State funds. This project also included additional scope related to the ATC installation.

Norristown Line Signals, Interlocking, & ROW Improvements.

Implementation of an ATC system was a priority for SEPTA beginning in the 1990s, and just over half of SEPTA Regional Rail was operating with ATC in 2008. Following the passage of RSIA, SEPTA expedited its efforts to install ATC on the remainder of the railroad. The Norristown Line Signals, Interlocking, & ROW Improvements project was funded with Federal and State funds. This project also included additional scope related to the ATC installation.

Terminal Railroad Association of St. Louis (TRRA)

Installation of PTC on the Terminal Railroad Association of St. Louis. The project is installing onboard PTC equipment on the locomotives in TRRA's fleet. The project will enable five of those locomotives to conduct fully compliant PTC operations.

TriMet Westside Express (TMEV)

FY2017 PTC Project. This project will implement two PTC safety modifications on the 15-mile-long Westside Express commuter-rail corridor from Wilsonville to

Beaverton, OR. The first modification is designed to positively stop a train in advance of a malfunctioning grade crossing, and the second modification will stop a train prior to a work zone or limit speed throughout the work zone.

Trinity Railway Express (TRE)

Regional PTC (DART). The PTC system is comprised of four major subsystems: back office, onboard, wayside, and communications. The back-office system provides the PTC dispatcher user interface (DUI) system and database of movement authorities and temporary speed restrictions, and tracks database maintenance facilities. A new back-office system will be procured, installed and tested. Onboard systems determine train position; enforce maximum safe operating speeds if a train engineer fails to do so; prevent unauthorized entry to work zones, interface to train braking, propulsion, and speed sensing; and provides train engineer user interface to the PTC onboard system. The train management computer will be upgraded, and a new computer display will be installed and tested. The wayside system consists of interface to the existing vital signaling. They will be upgraded to provide interface via wire and wireless transmission capability with approaching trains. The communications systems consist of backhaul communications between wayside locations and the PTC office to train communications, and train initiation communications at yards and terminals. A new fiber optic network will be installed to interconnect all the wayside system, onboard system and back-office locations. In addition, 220MHz radios will be installed at base stations and in the locomotives to facilitate wireless communications.

Twin Cities & Western Railroad Company (TCWR)

PTC. The Twin Cities & Western Railroad Company is executing a project that will include the installation of PTC hardware on locomotives, along with the implementation of necessary software to support PTC operations. This will allow TCWR to support PTC operations over BNSF and Canadian Pacific PTC-equipped track, which is shared with Northstar and Amtrak commuter operations in the Twin Cities metro area. This project will support implementation and testing of PTC systems, including initial activation and licensing fees of hosted back-office systems and PTC-equipped locomotives.

Utah Transit Authority FrontRunner Commuter Rail (UFRC)

FY 2017 PTC. The Utah Transit Authority (UTA) FrontRunner E-ATC PTC system will build upon existing investments in UTA's signal infrastructure. The project includes six elements of UTA's PTC implementation strategy (1) developing a two-step solution for no-code proceed situations, (2) upgrading onboard equipment, (3) developing the vital software design, (4) systems integration testing, (5) employee training, and (6) installation of a locomotive and cab car operator simulator.

Virginia Railway Express (VRE)

Virginia Railway Express PTC. The RSIA mandates that VRE implement a PTC system. As a tenant railroad, VRE must coordinate and comply with the host railroad's PTC Safety Plan and interoperability strategy. The project elements include developing and implementing a project implementation plan, purchasing and installing I-ETMS onboard equipment on 20 locomotives and 21 cab control cars; establishing communications hot-spots for crew initialization at VRE maintenance and storage and other layover facilities; procuring a third-party-hosted back-office service, purchasing various software licenses to support new systems; provide train and maintenance crew training; shared implementation costs with the host railroads; project oversight and engineering support.

DOT's Oversight of Financial Support for PTC Varies

DOT's oversight of Federal support for PTC implementation is generally dictated by the type of funding program, which is typical for all projects supported by the Department. Both Federal formula funding and discretionary grant programs can support projects with PTC elements, and some discretionary grants are awarded solely for PTC. Federal formula funding is apportioned to States and urbanized areas based on population and other factors, and are not subject to DOT's discretion. Discretionary grants permit the agencies to exercise judgment in selecting recipients through a competitive grant process. (See table 3 below for a list of grants, loans, and programs that support PTC implementation.) Each DOT organization follows its own established oversight mechanisms for grant or loan procurement activities. These include a combination of recurring reviews of financial reports; regular phone calls, meetings, and emails with funding

recipients; and onsite monitoring visits. In addition, BAB monitors financial plans and reviews credit worthiness throughout the span of a project to minimize the Federal Government’s risk.

Table 3. Grants, Loans, and Programs That Have Funded PTC Implementation

Funding or Financial Assistance Program	Oversight Agency	Legal Citation
American Recovery and Reinvestment Act of 2009	FRA	Pub. L. 111–5
Amtrak National Network Grant	FRA	49 U.S.C. § 24319
Fixed Guideway Modernization	FTA	49 U.S.C. § 5309
FTA Revenue Bond	FTA	Pub. L. 105-178, § 3011
High-Speed Intercity Passenger Rail Grant	FRA	Pub. L. 110-432, Div. B
New Starts	FTA	49 U.S.C. § 5309
PTC Implementation Grant	FTA	FAST Act, Pub. L. 114-94, §
Railroad Rehabilitation & Improvement	BAB	45 U.S.C. § 822
Railroad Safety Technology Grant	FRA	49 U.S.C. § 20158
Research and Development Grant	FRA	Pub. L. 115-31 and previous
State of Good Repair Formula Grant	FTA	49 U.S.C. § 5337
Transportation Infrastructure Finance and Innovation Act (TIFIA) Loan	BAB	FAST Act, Pub. L. 114-94, § 2001
Transportation Investment Generating Economic Recovery (TIGER) Grant	FTA	Pub. L. 115-31 and previous
Urbanized Area Formula – Economic Recovery	FTA	49 U.S.C. § 5307
Urbanized Area Formula Grant	FTA	49 U.S.C. § 5307

Source: OIG

However, DOT cannot readily identify the funding support or the PTC projects on which the funds were spent when they are part of a larger federally funded program. More specifically, DOT’s financial and grant management systems do not always provide the granularity necessary to precisely identify PTC costs when the federally funded scope of work is broader than just PTC implementation. For example, grant management systems generally track expenditures by broader budget codes like “signals,” which may include signaling for PTC and non-PTC projects. As a result, it is difficult for FRA and FTA to extract PTC-specific spending from Federal awards for other types of activities, and the two agencies must rely on the rail systems to provide more accurate and detailed information.

We obtained estimates from FRA and FTA on how much funding has been used for PTC but found that either the grantees had provided the information or the agencies' estimates were incorrect.

DOT Agencies Turn to Funding Recipients for Accurate Information About PTC Funds

Officials at the rail systems confirmed that they have more detailed information about expenditures and provided the information used in our review. More specifically, we found that the grantees' financial systems generally capture more data than DOT's grant management systems regarding expenditures and budget line items, which may include funding from local, State, and Federal entities. Each funding recipient uses its own financial tracking mechanisms to document all of its grants and issue reports to DOT agencies. These mechanisms range from internal controls for price and cost analyses to accounting software for tracking budgets, expenditures, and work progress.

However, most funding recipients do not have special procedures for tracking PTC-related funding. FTA and FRA require funding recipients to connect expenses to particular budget line items, which do not specifically track PTC spending. To respond to our information request, some grantees utilized information from their more detailed tracking software while others consulted invoices or other supplementary information to compile PTC costs.

In some instances, funding recipients transferred money from one project to another, when that was allowed by the scope of the grant. We identified eight funding recipients that shifted funding between projects or to other projects to meet changing operational or budgetary needs, e.g., to account for projects completed under budget or that proceeded more slowly than anticipated, or to supplement PTC-funding to meet the statutory deadline. Five of the eight transferred funds from non-PTC projects to projects with PTC implementation components. Two reported that they had moved funds from PTC to other projects. One funding recipient reported that it served as a pass-through for funds to another State agency to complete a PTC-implementation project.

Federal Funding for PTC Has Not Been Fully Expended, and Rail Systems Remain Concerned About Future Shortfalls and Delays

According to estimates provided to us by the funding recipients, DOT has provided \$2.9 billion to date to implement PTC. However, about \$2.3 billion had been obligated as of September 30, 2017, which was the focus of our work since this was the actual amount available to recipients for reimbursement. Of this amount, the Department has obligated \$1.3 billion through various Federal grants, and BAB issued approximately \$1 billion through a loan. Funding recipients rely on various departmental funding programs to support PTC work, such as formula grants, discretionary grants, and loans.¹¹ Exhibit D provides detailed estimates of Federal funding obligated for PTC implementation by end of fiscal year 2017.

Federal funding grants ranged widely, depending on size of the rail system, the quantity and scope of projects, or the amount of funding requested. For example,

- Providence and Worcester Railroad received just under \$1 million for a single project to purchase and equip locomotives with on-board kits.
- Southeastern Pennsylvania Transportation Authority received approximately \$181 million for a total of seven projects that included installing signals, interlocking, and right-of-way improvements throughout multiple rail lines.
- On average, those using Federal funding grants received \$36.1 million. In addition, two rail systems secured financial loans from the Department—approximately \$967 million went to the New York Metropolitan Transportation Authority and, subsequent to the data collection portion of our review, Massachusetts Bay Transportation Authority borrowed \$382 million.¹²

¹¹ Formula grant programs are noncompetitive awards based on a predetermined formula. Unlike a formula grant, a discretionary grant awards funds on the basis of a competitive process. The Department reviews applications, in part through a formal review process, in light of the legislative and regulatory requirements and published selection criteria established for a program. Additionally, the Department is authorized to provide credit assistance, direct loans and loan guarantees to finance development of railroad infrastructure.

¹² On December 8, 2017, BAB issued two loans to the Massachusetts Bay Transportation Authority. One was a RRIF loan for \$220 million, and the other was a TIFIA loan for \$162 million, for a total of \$382 million.

While the 2018 Deadline for PTC Implementation Is Approaching, Not All Obligated Funds Have Been Spent

While approximately \$2.3 billion has been provided for PTC projects, only 4 of 37 funding recipients have completely expended their Federal funds, and the extended deadline for PTC implementation is approaching at the end of this year. More than half of the recipients reported spending over 50 percent of their funds, and about 40 percent reported spending over 75 percent.

It is important to note that funding and financial assistance was made available at various points over the last decade, which makes it challenging to compare spending at rail systems. For example, FRA's Railroad Safety Technology Grants provided funds specifically for PTC implementation—\$50 million in fiscal year 2010, \$11 million in fiscal year 2015, and \$25 million in fiscal year 2016. However, our analysis noted that nearly \$15 million of the \$25 million awarded in August 2016 had not been obligated to the grantees.¹³ Similarly, out of the \$197 million authorized for PTC implementation under the FAST Act, approximately \$190 million had not been obligated to the grantees, even though award selections were announced last May. Since grantees have yet to receive these dollars, we excluded unobligated grant awards from our analysis of Federal funds provided to rail systems for PTC implementation. Exhibit D provides the status of individual awards for the fiscal year 2016 Rail Safety Technology and fiscal year 2017 FAST Act grant programs.

During our review of FTA and FRA grant funding, we noted that a number of recent PTC-specific grants had been announced but were not documented in DOT's grant management systems. These grants had not yet been officially obligated and were technically still in the award process. We analyzed the status for grants in the two most recent announcements for PTC-specific funding: fiscal year 2016 FRA Railroad Technology Grants and fiscal year 2017 PTC Implementation Grants (see tables 4 and 5). FTA and FRA explained that once selections for grants are made, the grantee must complete Federal grant requirements (e.g., those required by environmental laws and authorizing legislation). Only when these requirements have been completed can the grant be officially obligated. The DOT agencies stressed that most grants are eligible for pre-award authority, allowing pre-award expenditures on approved programs to be reimbursed after the funds are obligated. However, it is important to note that we did not include unobligated grants in our analysis since grantees have yet to officially receive the funding.

¹³ The scope of this review includes funding obligated by September 30, 2017 (the end of fiscal year 2017).

Table 4. Status of FY 2016 Railroad Technology Grant Recipients

	Grantee	State	Grant Allocation	Status
1	American Short Line and Regional R.R. Association	DC	\$2,500,000	Not Obligated
2	Amtrak	DC	\$2,640,000	Not Obligated
3	Caltrain	CA	\$2,880,000	Not Obligated
4	Capital Metropolitan Transportation Auth.	TX	\$3,000,000	Not Obligated
5	Fort Worth and Western Railroad	TX	\$2,560,000	Obligated
6	Missouri DOT	MO	\$3,000,000	Obligated
7	North Carolina DOT	NC	\$771,070	Not Obligated
8	Providence and Worcester Railroad Co.	MA	\$965,832	Obligated
9	Metrolink	CA	\$2,400,000	Obligated
10	Sonoma-Marín Area Rail Transit/SMART	CA	\$3,000,000	Not Obligated
11	Twin Cities and Western Railroad Co.	MN	\$1,100,000	Obligated
Total			\$24,816,902 Allocated	\$14,791,070 Not Obligated

Status is as of September 30, 2017. Source: OIG.

Table 5. Status of FY 2017 FAST Act PTC Funding Recipients

	Grantee	State	Grant Allocation	Status
1	Capital Metropolitan Transportation Authority	TX	\$9,760,000	Not Obligated
2	Florida DOT	FL	\$1,840,000	Not Obligated
3	Illinois DOT	IL	\$18,870,000	Not Obligated
4	Mass. Bay Transportation Authority	MA	\$7,820,000	Not Obligated
5	Maryland Transportation Authority	MD	\$9,440,000	Not Obligated
6	Missouri DOT	MO	\$12,020,000	Not Obligated
7	New Jersey Transit	NJ	\$10,000,000	Not Obligated
8	New York State DOT	NY	\$33,750,000	Not Obligated
9	Oregon DOT	OR	\$1,200,000	Not Obligated
10	Peninsula Corridor Joint Powers Board	CA	\$21,680,000	Not Obligated
11	Regional Transportation Authority/Metra	IL	\$20,200,000	Not Obligated
12	Rio Metro Transportation Authority	NM	\$3,600,000	Not Obligated
13	South Florida Regional Transportation Authority	FL	\$31,630,000	Not Obligated
14	Southeastern Pennsylvania Transportation Authority	PA	\$5,800,000	Not Obligated
15	Southern California Regional Rail Authority	CA	\$3,200,000	Not Obligated
16	Tri-County Metropolitan District of Oregon	OR	\$2,700,000	Obligated
17	Utah Transit Authority	UT	\$3,520,000	Obligated
Total			\$197,030,000 Allocated	\$190,810,000 Not Obligated

Status is as of September 30, 2017. Source: OIG.

PTC Recipients Are Subject to Federal Guidelines for Contracting

Funding recipients usually expend grant and loan funding via contractors that provide construction services, or to purchase and install equipment. In carrying out these activities, PTC recipients are subject to Federal contracting guidelines including those for competition and competitive bidding. These guidelines are outlined in FTA and FRA's best practices manuals and in individual grant agreements. The Department's requirements for grantee procurement systems are laid out in the Code of Federal Regulations, which requires all grantee procurement activities to "be conducted in a manner providing full and open competition."¹⁴ Because competition is a key element in ensuring expenditures are efficient, we asked grantees how they ensured these disbursements were made competitively.

In our survey of their grant activities, 19 funding recipients referenced these specific requirements when describing their procurement systems. Some are also subject to State requirements that have similar provisions. In addition, 10 grantees expressed concerns about challenges to the competitive bidding process, typically in places where systems have to be compatible with a host railroad. In these cases, recipients may not have been able to competitively bid all of the PTC components, which may limit the benefits of competitive procurement.

Funding Recipients Are Concerned About Future PTC Funding Shortfalls and Delays

Some funding recipients are concerned about future shortfalls and delays in grant funding to support PTC, which could result in funds being shifted from other projects. Most funding recipients stated general concerns about budgeting for PTC implementation, which has led some to divert funds from other safety priorities. Of the funding recipients we surveyed, 12 of 34 respondents said PTC implementation was having a negative effect on other funding priorities or general rail service. One recipient pointed out that the \$15.8 million in PTC-specific grants it received was minimal compared to the \$310 million in Federal and State funds it had to divert to implement PTC, which delayed investment in state-of-good-repair projects elsewhere in the system. According to the recipient, these challenges reduced capital funds to a 15-year low.

¹⁴ 49 CFR § 18.36 and 2 CFR § 200.320.

Other funding recipients expressed concerns about the uncertainty of ongoing operating and maintenance costs after PTC implementation and how that will affect their operational budgets. In 2016 the American Public Transportation Association estimated the operation and maintenance of PTC would cost commuter railroads about \$100 million a year and stated that many rail systems were still uncertain about the magnitude of future long-term costs. Officials at FRA and FTA said they are aware of this concern, but they too are not sure whether additional funding will be allocated to support ongoing operational and maintenance costs after full PTC implementation.

Conclusion

PTC is one of the most complex and costly safety mandates ever undertaken by the railroad industry. Recent accidents, although rare, remind us that they can and do occur and have a profound impact on lives and communities. While the U.S. rail industry and Congress are committed to implementing PTC nationwide, progress has been slower than anticipated, and ensuring that the rail industry has a sense of urgency will be a key watch item for the Department. Given the potential impact on safety projects throughout the Nation's rail systems, the Department must also be mindful of industry concerns that the costs of operating and maintaining the PTC system, once implemented, could crowd out other safety-critical projects.

Agency Comments and OIG Response

We provided the Department of Transportation with our draft report on March 16, 2018, and received its formal response on March 26, 2018. DOT's response is included in its entirety as an appendix to this report.

Exhibit A. Scope and Methodology

We conducted this performance audit between July 2017 and March 2018 in accordance with generally accepted Government auditing standards as prescribed by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Our objective was to assess FRA's and FTA's oversight of Federal transportation funding for PTC projects. The initial phase of the audit focused on (1) identifying railroads that received DOT funding or financing to support PTC projects and (2) to describe those PTC projects. The second phase focused on (1) assessing FRA's and FTA's oversight of PTC funding allocations and (2) to determine whether recipients have used awarded funds "completely and efficiently."

To conduct our work, we reviewed Federal laws, regulations, policies, procedures, and other guidance to understand the requirements for positive train control. We interviewed FRA and FTA headquarters staff and requested all data on PTC funding from their respective agencies, including a list of all funding recipients.

We reviewed the information provided and used FRA's project management tool and FTA's Transit Award Management Systems to verify the information and access project descriptions that corresponded with funding allocations. Due to the lack of detail in each agency's tracking tools, we developed a data collection instrument (DCI) to collect information from all 10 of FTA's regional offices regarding grants issued to railroads that are implementing PTC.

To assess whether funding recipients had used their awards completely and efficiently, we developed another DCI and a survey for all PTC funding recipients. We conducted three information sessions to explain or request and address any questions or concerns prior to initiating the data request. We coded and analyzed the responses to the seven open-ended questions that we posed to funding recipients. We reviewed the data and survey responses as they were received and followed-up as necessary. Using the information provided, we developed exhibits and tables, which were then sent to funding recipients for verification and confirmation.

Exhibit B. Organizations Visited or Contacted

DOT Facilities

Office of the Secretary
Build America Bureau, Headquarters
Federal Rail Administration, Headquarters
Federal Transit Administration, Headquarters
Federal Transit Administration, All 10 Field Offices

Other Organizations

Alaska Railroad Corporation
Amtrak
California Department of Transportation
California High-Speed Rail Authority
Capital Metro
Connecticut Department of Transportation
Dallas Area Rapid Transit
Denton County Transportation Authority
Fort Worth & Western Railroad
Fort Worth Transportation Authority
Illinois Department of Transportation
Maryland Department of Transportation
Massachusetts Bay Transportation Authority
Metra – Northeast Illinois Regional Commuter Railroad Corporation
Michigan Department of Transportation
Minnesota Department of Transportation

Missouri Department of Transportation
Nashville Regional Transportation Authority
New Jersey Transit
New York Department of Transportation
New York Metropolitan Transportation Authority
North County Transit District
Northern Indiana Commuter Transportation District
Orange County Transportation Authority
Peninsula Corridor Joint Powers Board
Pennsylvania Department of Transportation
Prince William County / Potomac and Rappahannock Transportation Commission
Providence and Worcester Railroad Company
Regional Transportation District, Denver
Riverside County Transportation Commission
San Joaquin Regional Rail Commission
Southeastern Pennsylvania Transportation Authority
Southern California Regional Rail Authority
South Florida Regional Transportation Authority
The Kansas City Southern Railway Company
TriMet
Twin Cities and Western Railroad Company
U.S. Government Accountability Office
Utah Transit Authority
Washington State Department of Transportation

Exhibit C. List of Acronyms

ABS	automatic block signal
ACES	Advanced Civil Speed Enforcement System
ADU	aspect display unit
ASC	automatic speed control
BAB	Build America Bureau
CAS	collision avoidance system
CBOSS	communication-based overlay signal system
CFR	Code of Federal Regulations
CMB	controlled manual block
DCI	data collection instrument
DOT	Department of Transportation
DUI	dispatcher user interface
(E-)ATC	(enhanced) automatic train control
FAST Act	Fixing America's Surface Transportation Act
FD	final design
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GAO	Government Accountability Office
GPS	Global Positioning System
HSIPR	High-Speed Intercity Passenger Rail
I-ETMS	Interoperable Electronic Train Management System
INFRA	Infrastructure Rebuilding America
IT	information technology
ITCS	Incremental Train Control System
LSL	locomotive speed limiter
MP	milepost
NEC	Northeast Corridor
NEPA	National Environmental Policy Act
NTSB	National Transportation Safety Board

OBC	onboard computer
OIG	Office of Inspector General
OST	Office of the Secretary of Transportation
PAB	private activity bonds
PE	preliminary engineering
PTC	positive train control
ROW	right-of-way
RRIF	Railroad Rehabilitation Improvement Financing
RSD	Revenue Service Demonstration
RSIA	Rail Safety Improvement Act
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIGER	Transportation Investment Generating Economic Recovery
USC	United States Code
VETMS	vital electronic train management system

Note: The above list does not include the acronyms for the rail systems discussed in this report.

Exhibit D. Estimates of Federal Funding and Financing Obligated for PTC Implementation by End of FY 2017

	Funding Recipients	Estimated Total Cost of PTC Implementation	FTA Funds	FRA Funds	Total Federal Funds	% Federal Funds Expended
1	Connecticut DOT	\$180,000,000	\$144,055,237	\$3,836,100	\$147,891,337	17.5%
2	Maryland DOT	\$30,458,627	\$9,476,056	\$642,445	\$10,118,501	77.0%
3	New York DOT	\$54,214,286	\$-	\$3,000,000	\$3,000,000	0.0%
4	New York Metropolitan Transportation Authority	\$1,063,000,000	\$90,236,669	\$6,597,000	\$96,832,669	88.5%
5	Pennsylvania DOT	\$-	\$7,034,353	\$1,350,000	\$8,384,353	50.4%
6	Southern California Regional Rail Authority	\$240,365,079	\$19,168,366	\$9,005,446	\$28,173,813	92.5%
7	Amtrak	\$232,800,000	\$-	\$187,820,938	\$187,820,938	94.5%
8	California DOT	\$12,810,000	\$-	\$38,400,000	\$38,400,000	86.1%
9	California High-Speed Rail Authority	\$20,000,000	\$-	\$16,000,000	\$16,000,000	99.0%
10	Fort Worth & Western Railroad	\$3,648,496	\$-	\$2,538,768	\$2,538,767	20.0%
11	Illinois DOT	\$88,000,000	\$-	\$72,387,079	\$72,387,079	93.2%
12	Michigan DOT	\$168,965,682	\$-	\$152,772,015	\$152,772,015	100.0%
13	Missouri DOT	\$60,000,000	\$-	\$3,000,000	\$3,000,000	0.0%
14	Providence & Worcester Railroad Co.	\$1,300,000	\$-	\$965,832	\$965,832	0.0%
15	Kansas City Southern (KCS) Railway Company, MO*	\$300,000,000	\$-	\$1,867,449	\$1,867,449	73.3%
16	Twin Cities & Western Railroad Company	\$5,065,000	\$-	\$1,100,550	\$1,100,550	0.0%
17	Washington State DOT	\$7,909,170	\$-	\$6,382,182	\$6,382,182	100.0%
18	Alaska Railroad Corporation	\$171,100,000	\$77,211,524	\$735,000	\$77,946,524	89.5%
19	Dallas Area Rapid Transit (DART)	\$44,500,000	\$12,500,000	\$-	\$12,500,000	0.0%
20	Denton County Transportation Authority	\$20,000,000	\$13,588,430	\$-	\$13,588,430	68.7%
21	Florida DOT (SFRTA)	\$73,500,000	\$6,725,482	\$-	\$6,725,482	7.5%
22	Fort Worth Transportation Authority	\$-	\$17,000,000	\$-	\$17,000,000	0.0%
23	Massachusetts Bay Transportation Authority	\$492,028,418	\$2,560,000	\$-	\$2,560,000	74.0%
24	Metra - Northeast Illinois Regional Commuter Railroad Corporation	\$385,879,609	\$155,948,676	\$-	\$155,948,676	60.7%

Funding Recipients		Estimated Total Cost of PTC Implementation	FTA Funds	FRA Funds	Total Federal Funds	% Federal Funds Expended
25	Minnesota DOT (Met Council)	\$4,400,000	\$4,219,303	\$-	\$4,219,303	72.9%
26	Nashville Regional Transportation Authority (RTA)	\$25,000,000	\$2,425,445	\$-	\$2,425,445	0.7%
27	Northern Indiana Commuter Transportation District (NICTD)	\$117,767,416	\$11,073,177	\$-	\$11,073,177	75.5%
28	North County Transit District	\$87,292,969	\$7,668,038	\$-	\$7,668,038	87.5%
29	Orange County Transportation Authority	\$-	\$4,147,427	\$-	\$4,147,427	57.9%
30	Peninsula Corridor Joint Powers Board	\$231,000,000	\$27,433,269	\$1,250,000	\$28,683,269	96.5%
31	Prince William County/Potomac and Rappahannock Transportation Commission	\$14,192,000	\$8,442,714	\$-	\$8,442,714	68.7%
32	Regional Transportation District (RTD)	\$22,682,612	\$5,512,543	\$-	\$5,512,543	100.0%
33	Riverside County Transportation Commission	\$5,100,000	\$2,095,447	\$-	\$2,095,447	100.0%
34	San Joaquin Regional Rail Commission (SJRR)	\$9,000,000	\$6,400,868	\$-	\$6,400,868	52%
35	Southeastern Pennsylvania Transportation Authority (SEPTA)	\$310,000,000	\$187,271,060	\$-	\$187,271,060	95.6%
36	Tri-County Metropolitan Transportation District of Oregon (TriMet)	\$14,000,000	\$2,704,000	\$-	\$2,704,000	0.0%
37	Utah Transit Authority (UTA)	\$31,158,524	\$3,520,000	\$-	\$3,520,000	0.0%
Grant Funding Totals		\$4,527,137,888	\$822,618,085	\$509,653,804	\$1,332,271,888	76.45%
USDOT Loans Issued for PTC-Related Projects						
	New York Metropolitan Transportation Authority			\$967,100,000 (RRIF)	\$967,100,000	15.1%
	Massachusetts Bay Transportation Authority		\$162,000,000 (TIFIA)	\$220,000,000 (RRIF)	\$382,000,000	0%**
Total with MTA Loan		\$4,527,137,888	\$822,618,085	\$1,476,753,803	\$2,299,371,888	50.67%
Total, Including Both Loans		\$4,527,137,888	\$984,618,084	\$1,696,753,803	\$2,681,371,888	43.45%

*Kansas City Southern is a Class I railroad that indicated it had received funding to enhance wireless communications capabilities in preparation for PTC implementation, including a conversion from their analog system to a digital communications system.

** The TIFIA and RRIF loans to the Massachusetts Bay Transportation Authority were issued after the end of fiscal year 2017 and are therefore outside the scope of our review. We provide these details to acknowledge that additional financing was issued.

Source: OIG analysis of information provided by PTC funding recipients.

Exhibit D. Estimates of Federal Funding and Financing Obligated for PTC Implementation by End of FY 2017

Note: \$- as an implementation cost indicates an entity that received funds on behalf of a railroad operating within that State; e.g., Pennsylvania DOT does not own or operate its own railroad, but it received a grant from FTA that was used for SEPTA's system. Entities whose implementation costs were less than the total funds received partially funded other rail projects; e.g., California DOT provided funds to North County Transit District for Metrolink. Additionally, OIG noted several grants that were in process but not awarded by the end of fiscal year 2017. For example, Capital Metro is in the process of being awarded \$12,762,969 for PTC implementation, and New Jersey Transit expects to receive an award of \$10 million.

Exhibit E. Major Contributors to This Report

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Appendix. Agency Comments



U.S. Department
of Transportation

**Federal Railroad
Administration**

Memorandum

Subject: INFORMATION: Management Response to Office of
Inspector General (OIG) Draft Report on Federal Funding Support for
Positive Train Control Implementation

Date: March 23, 2018

From: Paul Nissenbaum 
FRA Associate Administrator for Railroad Policy and Development

To: Barry J. DeWeese
Assistant Inspector General for Surface Transportation Audits

The Federal Railroad Administration (FRA) remains committed to ensuring that the Positive Train Control (PTC) funding it has received is fully utilized to assist railroads in their implementation of PTC systems. As OIG noted in its draft report, FRA has competed and made PTC-specific funding selections for all three of its funding allotments--Fiscal Years 2010, 2015 and 2016-through the Railroad Safety Technology Grant program. Since OIG's September 30, 2017 data collection, FRA has now obligated a total of 20 of the 25 Railroad Safety Technology Grants, with only \$12.1 million of the FRA PTC grant funding remaining unobligated. The unobligated amount accounts for 0.4% of the total funding and financing the Department has provided to the industry for implementation of PTC systems. FRA expects to obligate the remaining funding by May 31, 2018.

FRA's ongoing efforts to award and oversee these funds will provide continued support to the railroad industry as it works towards meeting the federal PTC implementation mandate. The implementation of PTC systems will significantly enhance safety on our nation's rail network.

We appreciate the opportunity to respond to the OIG draft report. Please contact Trevor Gibson, Program Implementation Division Chief, at 202-493-6371, with any questions or if you would like to obtain additional details.

U.S. DOT IG Fraud & Safety Hotline

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