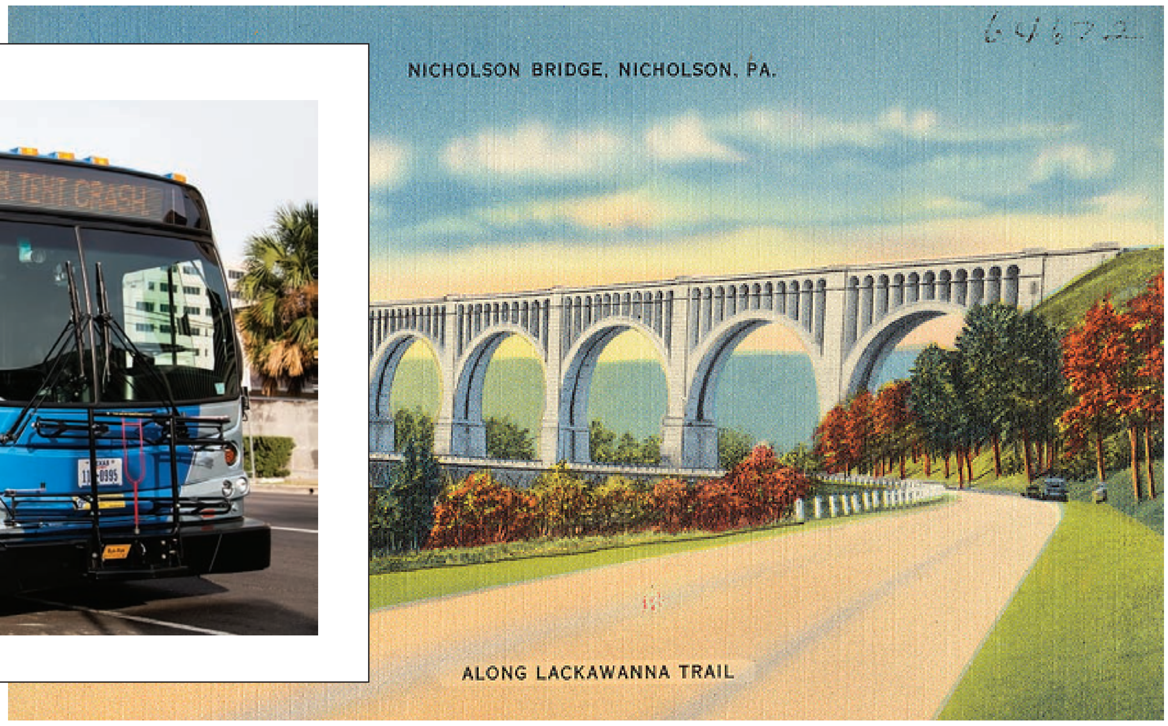
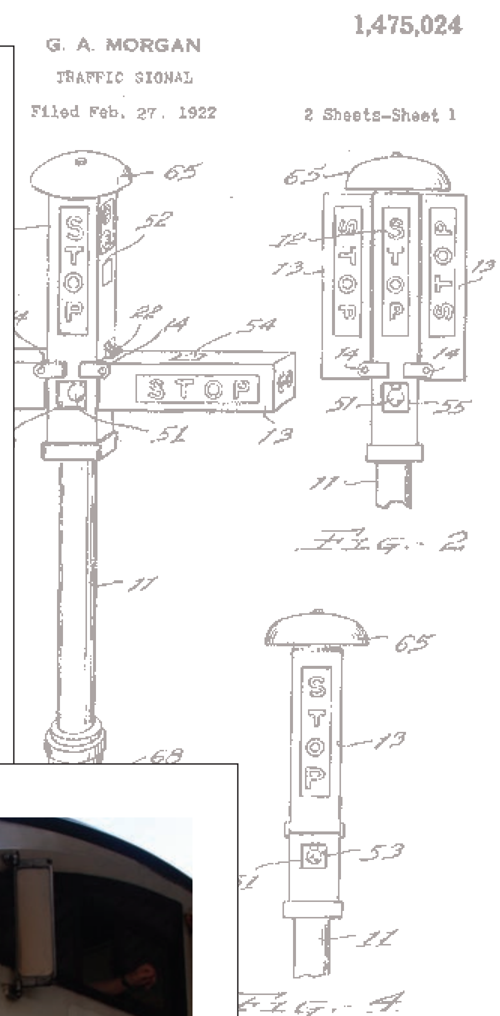
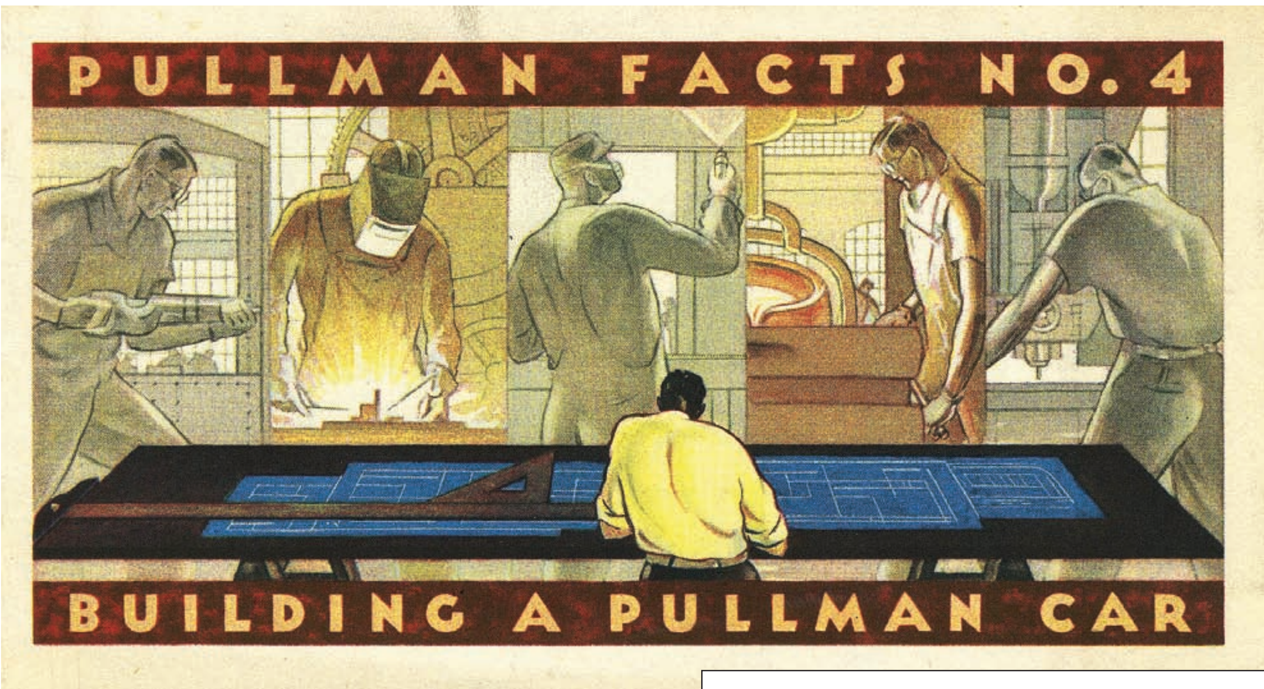
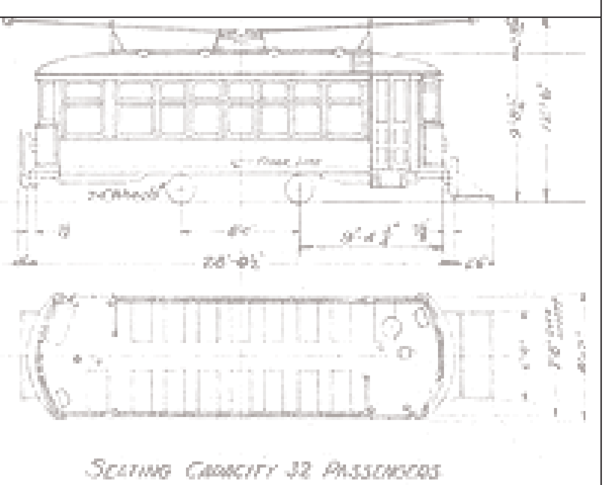
CELEBRATING 100 YEARS OF SAFETY AND SECURITY

1914 2014









A SPECIAL COMMEMORATIVE PUBLICATION FROM APTA

Celebrating 100 Years of Safety and Security Innovation

BY MICHAEL P. MELANIPHY
APTA President & CEO

I am pleased to present you with this special commemorative issue, which celebrates the 100th anniversary of APTA's Safety and Security Awards. In the pages that follow, you will read about the many innovations that over the past 10 decades have helped shape our industry and make it even safer and more secure for our employees and passengers alike. Many thanks to everyone who submitted these entries to APTA throughout the past year.

I am fortunate that my work takes me all over the country where I am able to see first-hand how these innovations are being implemented. As I tour our members' facilities, both public and private, I continue to be impressed.

The hard work of our members is truly inspiring. Our industry is demonstrating daily its unwavering commitment to making safety "job number one." Wherever I go, people take this seriously. It's *what* we do. It's not the *other* thing we do.

Our industry is demonstrating daily its unwavering commitment to making safety "job number one."

One of the hallmarks of our industry is our safety culture. And we will continue to make the safety, security, and wellness of our passengers and workforce a top priority. Throughout the history of public transportation in North America, APTA and its member organizations have consistently advocated safety as a core value.

More than 10.7 billion trips were taken on public transportation last year. We're clearly proud of that record. But we cannot afford to be complacent. At APTA, it is our responsibility to push the envelope, to make sure that we are vocal advocates and active instigators for safety improvements. As I stated in testimony before the House of Representatives last February, the people involved in the operations and management of commuter and passenger railroads and the professionals working at public transportation systems in general, are completely committed to the safety of their systems, passengers, and employees.

Federal Funding Protects Safety

We need to properly maintain our existing infrastructure in an era of burgeoning ridership. This means that increased federal funding is crucial to our industry to ensure our systems stay safe and secure. APTA continues to make the case to Congress that investment in public transportation is an investment in America's future.

Research is an integral component of a safety culture. This is why we are urging Congress to restore the funding it cut for the Transit Cooperative Research Program, which gives our industry a proven way to review and make recommendations on safety issues.

Continued federal support is also needed for FTA's Technical Assistance and Standards Program, which has enabled the industry and its federal partners to advance public transportation standards that have improved safety and reduced costs. One of the best ways to ensure these protocols is through the establishment of a nationwide adoption of safety standards.

We've been working closely with FTA on a number of matters. Building on its comprehensive October 2013 Advance Notice of Proposed Rulemaking (ANPRM), FTA anticipates proposing a number of rules related to safety, transit asset management, and maintaining a state of good repair in the coming year. Among these will likely be an announcement of interim and proposed permanent provisions to govern FTA's Safety Certification Training Program, proposed updates to its State Safety Oversight Program, proposed rules to govern both national and individual agency safety plans, and a new regulation on Transit Asset Management.

Increased federal funding is crucial to our industry to ensure our systems stay safe and secure.

The interdependent nature of these rules will call on public transit agencies, metropolitan planning organizations, and the businesses that support them to be broadly conversant across what may have once been considered disparate disciplines to build safe, sustainable, and forward-thinking public transportation systems.

We're also working with FRA on the issue of Positive Train Control that amends certain Rail Safety Improvement Act of 2008 regulations.

These are just some of the many areas where APTA is working with its partners—and on behalf of its members—to ensure our systems are safe and secure.

Volunteers and Resources

APTA and its very active safety and security committees, and safety staff, continually create forums such as workshops, seminars, meetings and webinars so we can help our members better shape their business practices.

At the same time, we know that we have to have frank discussions when things go wrong. This is critical—because it's the only way we will learn from our mistakes. Sharing best practices, developing solutions together, and continuously innovating are imperative to the success of our industry today—and for tomorrow. This is why APTA's safety audit program and peer reviews are such valuable resources. Simply put, if we don't have the resources to train and maintain, then we cannot sustain.

So as we celebrate those who have contributed to who we are and where we are today, we hope you enjoy your journey back in the pages that follow. You'll read about everything from the invention of vacuum-operated windshield wipers to cat's eye road reflectors to wheel slip prevention equipment.

If we don't have the resources to train and maintain, then we cannot sustain.

These innovations were the work of many talented, dedicated, and visionary individuals. Because of their foresight and ambition, our industry has made tremendous strides over the last century. I am confident we will continue this legacy over the next 100 years.

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(202) 496-4800
www.apta.com

APTA appreciates the submissions, vignettes, facts, photos, illustrations, and other information for this publication supplied by its members and partners. APTA's safety and security team was instrumental in reviewing and compiling the submissions.

Cover and page 8 illustrations courtesy of Pullman State Historic Site

A Brief History of APTA's Safety & Security Awards

From Industrialists to Celebrities, Safety Takes Center Stage

The 100-year history of APTA's Bus and Rail Safety & Security Awards began with Anthony Nicholas Brady, an American businessman who acquired Brooklyn Rapid Transit and became an important figure in the transportation systems of major U.S. cities, including Philadelphia and Washington, D.C. (See innovation 89 on page 5.)

In 1914, following Brady's death in 1913, his family authorized the American Museum of Safety to award a gold medal annually to the American electric railway company that had the most positive efforts during the year for the safety and health of the public and its employees. In doing so, the museum worked with the American Electric Railway Association, a predecessor organization of APTA, to appoint a committee from its own membership to formulate the conditions of competition. This initiative marked the beginning of APTA's awards program.

The program went on hiatus from 1917-25 because of World War I. The program broadened to include both bus and rail systems in 1927 and split the entries into three classes based on size: Gold medal, more than 5 million vehicle miles per year; Silver medal, between 1 million and 5 million vehicle miles per year; and Bronze medal, fewer than 1 million vehicle miles per year.

In 1930, the bronze medal was divided into two categories, one for systems with a population of 300,000 or more and one for systems with a population of 300,000 or fewer.

In 1941, the American Transit Safety Awards superseded the American Museum of Safety and the Anthony N. Brady Memorial Awards. The award was changed to a silver plaque with six categories based on population, ranging from 600,000 or more to 30,000-100,000. Honorable mentions were added to the program in 1943.

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In 1946, the American Transit Association (ATA, predecessor to APTA) began producing safety-themed movies that encouraged the public to drive safely on America's roadways. The first movie, titled "It's Wanton Murder," featured a serviceman who had served his country only to come home and lose his life in a car accident. Lowell Thomas, a famous newsman of the time, narrated both that film and its successor, "Driven to Kill." Thomas received a plaque for his participation in this program at the 1948 American Transit Safety Awards Banquet. Bob Hope also received recognition from ATA for narrating a safety film titled "Chain Reaction."

In 1991, APTA presented the Bus Safety Awards in six competitive divisions, each named after past DOT secretaries and based on the service characteristics and operating environment of the public transit systems. Classifying variables included weather, population, number of buses in service, bus vehicle miles operated, and the general traffic conditions of the service area.

From 1993-1999, APTA also presented

APTA'S SAFETY & SECURITY AWARDS
CONTINUED ON PAGE 15

100 Years of Safety, 100 Safety Innovations

Honoring the Legacy of Safety in Public Transportation

Throughout the history of public transportation in North America, APTA, its predecessor organizations, and its members have consistently made safety a core value and top priority of the industry.

From the development of the first closed track system in 1872 to the initial implementation of PTC in 2014, individuals, public transit agencies, businesses, federal and state agencies, and non-profit organizations have invented or perfected devices, processes, and practices that make riding buses, trains, streetcars, and vans the safest mode of transportation.

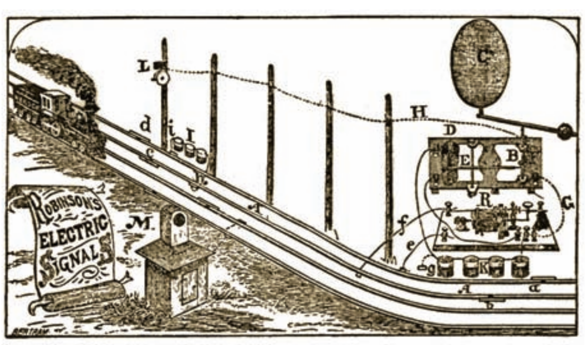
But in that time, what happened when? A year ago, with the approach of the 100th anniversary of APTA's awards program—known as the Bus and Rail Safety & Security Excellence Awards—the association's safety and security team and hundreds of members who serve on safety- and security-related committees set out to find the answer to that question.

The following timeline tracks 100 of public transportation's most important safety milestones. It was developed during the past year based on members' submissions and additional research. To learn more, go to www.apta.com and search for safety timeline.

100 Closed Track Circuit, 1872

William Robinson
Philadelphia and Erie Railroad, Erie and Kinzua, PA

After designing and installing the first open track circuit, Robinson, an inventor and electrical engineer, realized that—although the system worked perfectly—it could also display a "clear" signal even when the block was occupied by a train or a portion of a train. He then developed the closed track circuit, where the presence of a locomotive or railcars would cut the power energizing the relays that would cause a "clear" signal to be displayed. Only when the block was completely cleared of the train would energy be restored to the relays and the signal display other than "danger" or "occupied."

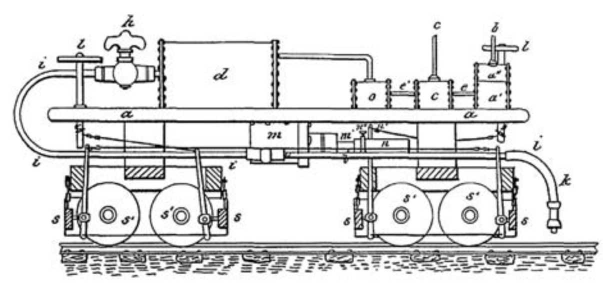


This is the basis for automatic block signal systems, the fail-safe detection of track occupancy through changes in electrical current. Without this invention, the safety and efficiency of railroads never would have progressed to the level it has achieved today.

99 Automatic Air Brake System for Railcars, 1872

Westinghouse
Pennsylvania Railroad, Pittsburgh

Westinghouse developed the first automatic air brake system, which had a built-in safeguard whereby the brakes on the entire train would apply automatically if the train should separate or if air pressure should escape due to leakage in the system. This design set the stage for future air brake systems for the rail and bus industries.



98 Streetcar Fender, 1890

Various cities, North America

Copyright: Historical Society of Western Pennsylvania

Attached to the front of electric streetcars, the fender would "scoop up" inattentive pedestrians and keep them from being swept under the wheels and crushed. Numerous manufacturers supplied them as OEM equipment, among them Providence, Parmenter, Universal, and Berg. Initial cities adopting this feature include Detroit (1906) and San Francisco (1912).

97 Amalgamated Association of Street and Electric Railway Employees, 1892

Indianapolis

The Amalgamated Association of Street and Electric Railway Employees, now named the Amalgamated Transit Union (ATU), was founded. The ATU has the largest membership among unions that represent public transit workers throughout the U.S. and Canada. The union has its origins in a meeting of the American Federation of Labor in 1891 at which AFL President Samuel Gompers was asked to invite the local street railway associations to form an international union.

Gompers contacted local street urban railway unions and arranged for a convention of street railway workers. The convention in Indianapolis was attended by 50 delegates from 22 locals. Many of the smaller unions were affiliated with the AFL, four larger locals were affiliated with the Knights of Labor, and two were independent.

93 Center Line Safety Stripe, 1911

Trenton, MI

The first white center line to safely divide a road surface was introduced by Edward N. Hines, road commissioner for Wayne County, MI, when the line was painted on River Road near Trenton.

96 Laminated Glass, 1903

Edouard Benedictus, France

Laminated glass was “discovered” in a laboratory accident by Benedictus, a French chemist. It was used in automobiles and greatly reduced injuries sustained in accidents. Safety glass became standard for all Ford vehicles in the U.S. following World War II.

92 SAE Handbook on Standardization, 1911

U.S. Society of Automotive Engineers New York

The U.S. Society of Automotive Engineers’ first *SAE Handbook on Standardization* issued standards and specifications for sparkplugs and carburetor parts, and eventually standardized all automobile parts. These standards became essential for public transit agencies to improve interchangeability, reliability, quality control, cost efficiency, and safety in reliability of parts.

91 Speedometer and Odometer, 1911

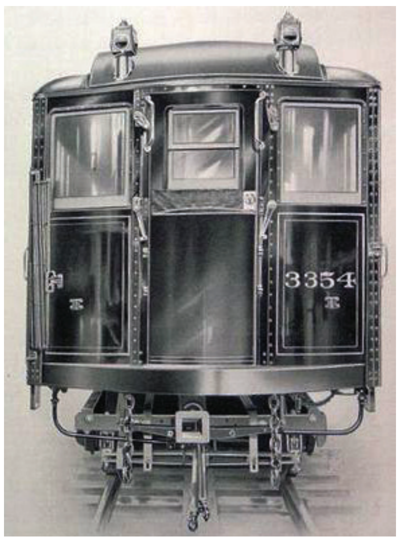
W.H. Grossman, Germany

Grossman built a mechanical speedometer that not only measured but also indicated an automobile’s speed. Speedometers work by measuring the rotation speed of the vehicle’s transmission; they use a flexible cable attached to a pointer on an indicator display. The odometer is then connected by gears to the speedometer spindle and measures distance traveled. The speedometer became commonplace on transit buses by 1925.

95 All-Steel Rail Passenger Car, 1904

American Car and Foundry, New York

ACF built the first all-steel passenger car in the world for New York’s Interborough Rapid Transit (IRT) in 1904 and for the London Underground the following year. This was a much safer material than the combustible wood subway cars. It was referred to as the “Gibbs Car” after IRT Chief Engineer George Gibbs, who designed and built the first prototype after manufacturers refused to build a steel car.

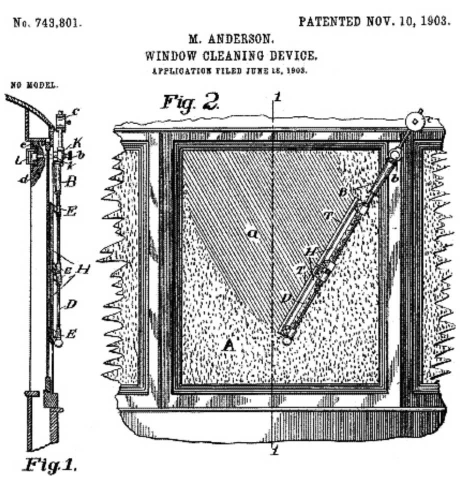


Railcar manufacturers of the time were unwilling to undertake such an experimental proposition. Steel was deemed too heavy for any practical applications. Conventional wisdom of the day (since proven to be false) held that an all-steel car would vibrate apart and wood dampened the railcar’s vibration and that steel cars would be loud and poorly insulated. With a large backlog of orders for wooden cars, manufacturers had no incentive to explore the new technology.

94 Windshield Wipers, 1904

New York

Real estate developer Mary Anderson applied for a patent for a swinging arm with a rubber blade following a road trip to New York during which she witnessed streetcar operators stop to remove ice and water from their windshields. The device consisted of a lever that could be operated manually from inside a car, causing a spring-loaded arm with a rubber blade to swing across the windshield and then back again to its original position, thus removing droplets of rain or flakes of snow from the windshield’s surface.



At the time Anderson applied for her patent, cars were not very popular. Henry Ford had not yet manufactured his Model A, and he would not create his famed Model T until 1908. She was teased by many people who thought the movement of the windshield wipers would distract drivers. By 1913, however, mechanical windshield wipers were standard equipment on thousands of cars; they became standard issue on public transit vehicles by 1916.

The Top 10

WHILE ALL SAFETY INNOVATIONS protect public transit riders, employees, and systems, some have had such widespread, lasting impact that they have permanently changed the entire industry.

APTA members in both agencies and the business sector, along with the association’s safety and security team, have determined that the following 10 innovations have transformed public transportation. The 10 innovations are ranked in order, leading to number 1, the invention deemed to have had the greatest positive impact on the industry.

To learn more about each, see the descriptions in the chronological timeline on these pages.

1914 2014

HONORING PUBLIC TRANSPORTATION SAFETY INNOVATION

10. Display of Safety Messages on Destination Signs, 2013
Capital Metropolitan Transportation Authority, Austin, TX
See innovation 6.

9. Fatigue Risk Management Program, 2013
Washington Metropolitan Area Transit Authority, Washington, D.C.
See innovation 3.

8. Positive Train Control, 2014
Metrolink, Los Angeles
See innovation 1.

7. Birney Safety Car, 1916
Multiple cities including Memphis, TN; Richmond, VA; Seattle, WA; and Little Rock, AR
See innovation 82.

6. Altoona Bus Research and Testing Center, 1987
Pennsylvania Transportation Institute, State College, PA, and FTA, Washington, D.C.
See innovation 25.

5. Advances in Computer-Controlled Train Operations, 1965
Various companies including Westinghouse, Alstom, Adtranz, and Bombardier
See innovation 44.

4. Automatic Air Brake System for Railcars, 1872
Westinghouse
Pennsylvania Railroad, Pittsburgh
See innovation 99.

3. Introduction of Random Drug and Alcohol Testing, 1987
FRA, Washington, D.C.
See innovation 26.

2. Modern Railroad Track Structure Design, 1930-1957
U.S. and Internationally
See innovation 50.

1. Closed Track Circuit, 1872
William Robinson
Philadelphia and Erie Railroad, Erie and Kinzua, PA
See innovation 100.

WHAT'S NEXT FOR SAFETY & SECURITY

Adopting a Performance-Based Approach

Public transportation has always been one of the safest ways to travel, but we are determined to do better. DOT asked for FTA to have safety authority, and Congress responded in MAP-21. This historic change for the transit industry will yield safety dividends for generations to come, as we help transit agencies adopt a flexible, performance-based approach to managing safety that fosters sound policies, more efficient practices for managing risks, and a strong safety culture.

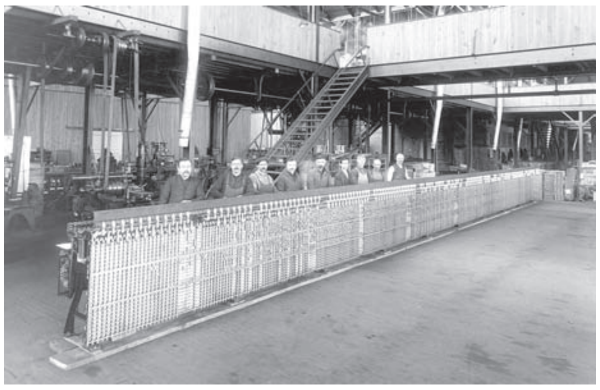
In the GROW AMERICA Act, the administration has proposed more tools to make that authority more responsive to industry needs and effective at keeping riders and transit workers as safe as possible. Together, our efforts will result in greater accountability for safety at the federal, state, and local level—and ensure that safety remains our very highest priority.

— DOT Secretary Anthony Foxx

90 Electric Interlocking Machine, 1913

Grand Central Terminal, New York City

New York City's famed Grand Central Terminal opened for service using state-of-the art electric interlocking equipment. This largest of North American passenger terminals used this equipment until 1993, when the latest state-of-the-art processor based central control systems, teamed with a geographically distributed system of 17 Vital Processor Interlocking Control systems, were placed in service as part of a major terminal refurbishment project.



89 Anthony N. Brady Memorial Awards, 1914

American Electric Railway Association

The family of Anthony N. Brady authorized the American Museum of Safety to establish a safety awards program for the American electric railway industry, working in partnership with APTA's predecessor association, the American Electric Railway Association. Brady, a 19th-century American businessman, owned controlling interest in public transit systems in several cities, including Brooklyn, NY, Philadelphia, Washington, D.C., and Paris.

88 Citywide Safety Awareness Campaign, 1914

Boston Elevated Railway and Boston Chamber of Commerce
Boston

Several organizations, including the Boston Elevated Railway and smaller railway companies, conducted one of the largest and most carefully planned safety awareness campaigns to date, initially focusing on reducing the number of children killed on train tracks, which numbered about 25,000 over the preceding 20-year period.

The "safety first" message was posted on more than 1,000 storefronts, at stations, in newspapers, and on trolley cars, including large, illuminated signs on Boston Elevated Railway cars.

BOSTON SAFETY CAMPAIGN—SAMPLES OF DASHER POSTERS

87 Laminated Glass, Process, 1914

Safetee Glass Company
Harrisburg, PA

American inventor and engineer Frank Shuman invented a process for making laminated safety glass, which was soon manufactured by the Safetee Glass Company and became known as "safetee glass."

86 Use of Radio in Railroad Communication, 1914

Scranton, PA

Technical World magazine (February 1914) described the scene when wireless two-way radio was first successfully used on board a moving train. “One of the passengers peeked into the cubby-hole, then exclaimed in tones of amazement, ‘Wireless, by jinks!’ Then the amazed traveler rushed back through the length of the train, spreading the incredible information that a wireless operator was on board receiving news bulletins just as was done on ocean liners.”

85 Largest Reinforced Concrete Bridge in North America, 1915

Nicholson, PA

When new, this bridge was 245 feet high, 2,375 feet long, and 186 feet high at the arches, and it contained more than 163,000 yards of concrete and 2.27 million pounds of reinforcing steel. It was constructed using innovative engineering practices, which set a precedence for large-scale concrete construction. Although the bridge is no longer in industrial use, it has retained its structural integrity and is still used for tours.

84 Federal Aid Road Act, 1916

Washington, D.C.

A joint congressional committee issued a report starting that federal aid for road improvements was consistent with several constitutional objectives by regulating commerce, providing for the common defense, and promoting the general welfare. This report led to the act.

83 Dead-Man Control, 1916

Birney Safety Car, Multiple Cities

Part of the equipment first introduced by the Birney Safety Car, the “dead man” would bring a streetcar to a stop automatically in the event of the operator’s incapacitation. This device removed power from the streetcar’s motors if the controller handle was released for any reason. The streetcar would then coast to a stop or it could be braked to a stop by the motorman.

82 Birney Safety Car, 1916

Multiple cities including Memphis, TN; Richmond, VA; Seattle, WA; and Little Rock, AR

This lightweight streetcar, introduced by Charles Birney, was known as a “safety car” or the “Birney Safety Car” and was designed to be operated by one man instead of a two-man crew. It is considered to be the first mass-produced standard streetcar (albeit with minor variations) in North America.

In addition to the dead-man control safety feature (see innovation number 83), the Birney Car also introduced pneumatically balanced and interlocked doors. If a door was stuck open or a passenger or other object blocked the door, the motors could not be started. These safety features, among others introduced by this model, are standard today.

81 Electric Coupler System, 1917

Ohio Brass (now WABTEC) Mansfield, OH

The company’s patent U.S. 1,353,557 focused on the development of electric coupler portions, which eliminated the need for brakemen to wedge themselves between railcars to make up trainline cables.

80 Removal of Wooden Equipment from Subway Routes, 1918

Brooklyn Rapid Transit Company (BRT), Brooklyn, NY

BRT’s “Malbone Street Wreck” was a catastrophic subway accident that prompted three important safety improvements. First, the accident put additional pressure on BRT to remove wooden railcars from routes that operated in subways. The other two are noted below.

79 Deadman’s Switch and Trippers on Trackside, 1918

BRT, Brooklyn, NY

The Malbone Street Wreck also resulted in the transit company implementing “dead-man’s switches” in train cabs and, for the first time on a large scale, “trippers” on the trackside, which served as emergency devices for stopping trains.

78 Fageol Safety Coach, 1920

Fageol Motors, Oakland, CA

Public transit buses were built on converted motor trucks, resulting in poor riding quality, high centers of gravity, and low-performance engines. The Fageol Safety Coach, built by Frank and William Fageol, was the first bus not based on a heavy truck chassis and so had a lower center of gravity, better springs, and more powerful engine. This innovation in design enabled the vehicle to be driven with greater control and safety.

77 Highway Research Program, 1920

Washington, D.C.

The federal government created a national program as part of the National Research Council to investigate and devise solutions for deteriorating roads created by heavy use. The highway research program was organized as a clearinghouse and forum for all branches of highway engineering.

76 Hydraulic Four-Wheel Brakes, 1921

Adopted nationally and internationally

Malcolm Loughhead (who later changed his last name to Lockheed and became famous in the aeronautics industry) invented hydraulic four-wheel brakes. The first automobile to offer the new brakes was the Duesenberg Model A in 1922. This innovation provided safer braking and reduced overheating of brakes on buses.

75 Vacuum-Operated Windshield Wiper, 1921

Tri-Continental Corp., Buffalo, NY

This company devised the first vacuum-operated windshield wiper, which replaced hand-operated wipers. See innovation 94.

74 First Patented Traffic Signal, 1923

Cleveland

While driving through Cleveland streets, inventor, community leader, and newspaper publisher Garrett Augustus Morgan realized how unsafe intersections were and was determined to make driving safer. He subsequently patented a traffic signal in November 1923, making it the first such device to be patented, but not invented.

Morgan’s signal was a T-shaped pole with arms (but no lights) that had three signs, one or more of which popped out at a time: Red for stop, green for go, and a second red for stop in all directions. This last signal, controlled by an electric clock mechanism, allowed pedestrians to cross the street. The traffic signal became popular and was used throughout the country. Morgan sold his device to the General Electric Corp. for $40,000, then a substantial sum.

73 First Signal Command System for Elevators, 1924

Otis Elevator Co., New York

The company developed the first signal command system for elevators and installed it in the Standard Oil Company building in New York. The system was the first step toward fully automatic elevator controls, which improved the reliability and safety of elevators in public transit stations.

WHAT'S NEXT FOR SAFETY & SECURITY

Launching SMS Pilot Program

The Federal Transit Administration is using its new safety regulatory authority from MAP-21 to introduce Safety Management Systems, or SMS, to the transit industry—a proven best practice that is already working well around the world in aviation, maritime, and freight railroads, but has never been systematically applied to transit.

In the coming year, we will initiate the first transit industry SMS pilot program to help participating agencies build their safety competencies and reduce or eliminate safety risks. Building upon their existing safety foundations, this pilot program will enable transit agencies, states, planning organizations, and others to share and analyze safety data more efficiently and measure safety performance more accurately.

SMS is all about making transit systems safer for everyone—and holding everyone accountable for safe operations.

— FTA Acting Administrator Therese McMillan

72 Uniform Road Signs, 1925

Washington, D.C.

The U.S. Joint Board of State and Federal Highway Officials adopted uniform road signs based on standard shape and color schemes for certain categories. For example, stop signs became octagonal and caution signs were required to display black letters on yellow backgrounds.

71 Safety Glass Windows as Standard Equipment, 1926

General Motors, Detroit

Safety glass was first offered as standard equipment in General Motors' Cadillac car. The public transit industry followed suit shortly after with bus and rapid transit rolling stock designs.

70 Antifreeze for Internal Combustion Automobile Engines, 1926

Union Carbide, West Virginia

The first antifreeze for automobile engines, called Prestone, was introduced by Union Carbide Co. It sold for $5 a gallon and it kept engines from overheating in summer and freezing in winter. It was quickly adopted by public transit vehicles.

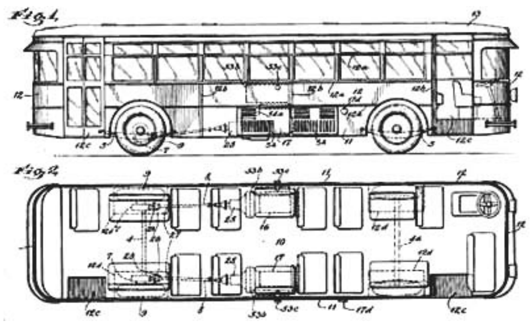
69 First Designated Pedestrian Crossing, 1926

London

The first designated pedestrian crossing is installed at Parliament Square. It consists of two parallel white lines across the road.

68 The Twin Coach, 1927

Oakland, CA



The Fageol brothers devised the "twin coach," a revolutionary bus design that featured the first instance of a bus's entrance door placed in advance of the front axle and driver-controlled, pneumatic doors. The Fageol Company subsequently established a plant for its "Twin Coach" Company in Kent, OH.

67 Centralized Traffic Control System for Rail, 1927

General Railway Signal Co./New York Central Railroad, Rochester, NY

In July, the first centralized traffic control system in the world went into service between Stanley and Berwick, OH, on the Ohio Division of the New York Central Railroad (NYCR). An account from the NYCR's J.J. Brinkworth illustrates the achievement:

"The dispatcher was there and he was just filled up with enthusiasm on this new gadget called centralized traffic control .... Along about 10 o'clock, he just yelled right out loud, 'Here comes a non-stop meet.' We all gathered around the machine and watched the lights that you know all about, watched the lights come towards each other and pass each other without stopping. That, to me ... was history on American railroads, the first non-stop meet on single track without train orders ... and you never saw such enthusiasm in your life as was in the minds and hearts of that crew."

66 Brill Bullet Car Design, 1929

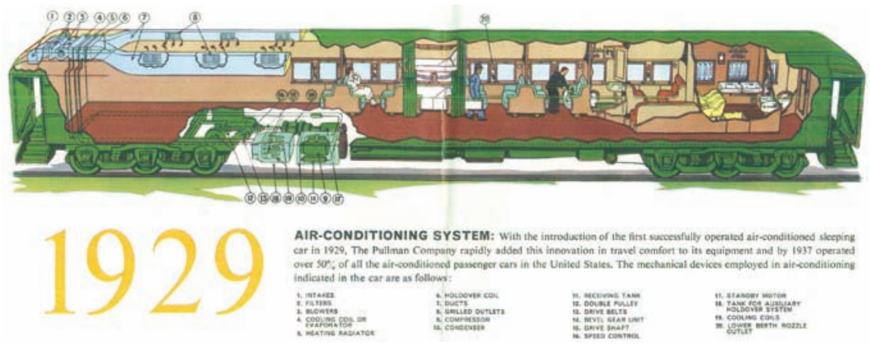
J.G. Brill Co., Philadelphia

To address stability and smoothness concerns, Brill, in conjunction with Westinghouse and General Electric, devised a new railcar design resulting in the aluminum and steel wind-tunnel-developed slope roof "bullet cars." The railcars were better able to handle rough track, improving smoothness. The first order was placed by the Philadelphia and Western Railroad.

65 First Air-Conditioned Railcar, 1929

Pullman Inc., Chicago

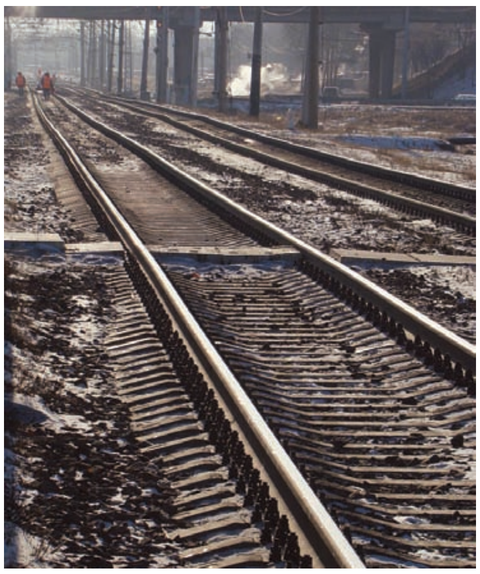
The first air-conditioned Pullman railcar was operated between Chicago and Los Angeles. This innovation improved the riding environment onboard passenger railcars for both the passengers and rail personnel.



64 Continuous Welded Rail, 1930

Central of Georgia Railroad, Savannah, GA

The U.S. Committee on Welded Rail Joints (composed of members from the American Bureau of Welding and the American Electric Railway Engineering Association with the cooperation of the National Bureau of Standards) began a detailed investigation of the thermite welding process with the goal of improving and standardizing welded rail joints.



The Central of Georgia Railroad was the first to use welded rail for tunnel trackage, and the Delaware and Hudson Railroad is credited with the first open-track installation of thermite rail welds in 1933. These efforts resulted in the development of continuous welded rail, which has become common on main lines since the 1950s. See innovation 50, Modern Railroad Track Structure Design.

63 Cat's Eye Road Reflector, 1933

Percy Shaw, Yorkshire, England

The cat's eye road reflector is a simple, inexpensive device that has saved countless lives. These glass and rubber reflectors are set on the roadway at regular intervals and reflect oncoming light, mimicking the reflectivity of a cat's eyes and helping drivers see the road at night. Shaw invented the reflector after he had been driving on a dark, winding road on a foggy night; he was saved from driving off the side of the hill by a cat whose eyes reflected his car's lights. Shaw was awarded the Order of the British Empire by Queen Elizabeth II in 1965 for the invention.

WHAT'S NEXT FOR SAFETY & SECURITY

Driving Continuous Improvement

The rail industry has experienced remarkable safety improvement over the past decade, attributable to FRA's rigorous oversight and the industry's hard work. Total train accidents decreased nearly 50 percent and employee on-duty fatalities have plummeted to new record lows.

But this trend must continue, as we drive continuous safety improvement. We must supplement our traditional safety efforts with proactive approaches that identify and mitigate risk before an accident occurs. System Safety Program requirements and creative partnerships between management and labor that successfully implement innovative programs like Confidential Close Call Reporting (C3RS) and Clear Signal for Action (CSA) will help drive us to the next level of safety. Additionally, at FRA, we are pursuing innovative ways to effectively implement proven new technology into railroad operations.

Rail is the transportation mode of opportunity. As its role grows to meet future freight and passenger mobility needs, all of us in this great industry must ensure that safety is always the top priority. With that commitment, we can ensure the next 10 years are, once again, even safer than the last 10.

— FRA Administrator Joseph C. Szabo

APTA's Safety, Security Resources Feature Services, Standards, Support, Best Practices

NEED SOME GUIDANCE on the best ways to strengthen the safety culture at your agency? Want the latest best practices for implementing emergency management policies? Need a team of objective peers and experts to take a confidential look at your operations? Want to benchmark the latest safety- and security-related standards?

Find information and programs to help answer these questions and more at APTA's Safety and Security Management Resource Center, which showcases the association's wide range of programs and initiatives. A summary follows:

Safety Management/Audit Programs

More than three decades ago, several North American rail transit systems and the FTA asked APTA to develop and implement a standardized format for rail system safety and to provide an auditing service that would enable a system to determine the degree to which the standardized elements for rail transit system safety were being addressed.

As a result, APTA inaugurated its Rail Safety Audit Program in 1989; FTA subsequently adopted it in 1996 as the base guideline for its federal state safety oversight requirements. In addition, dozens of rail and bus systems of every type in North America and Asia currently participate in APTA safety audit programs.

Peer Review Panels

Public transit organizations frequently need to address operational or organization issues where a third party perspective from highly experienced professional industry peers can prove extremely valuable. The APTA Peer Review Program is a long-standing support service of APTA that provides a highly successful and credible tool to assist problem solving or strategy development on literally any aspect of a transit system's functions.

The concept of peer reviews is to assist the requesting agency in addressing issues through subject matter experts from within the transit industry. Transit organizations freely provide the time and availability of their staff with the needed skillsets to participate as peer review panel members. The requesting agency assumes the travel and incidental expenses for all members of the peer review panel members as well as an APTA administrative fee.

A peer review panel will typically consist of three to five members plus an APTA staff advisor to facilitate the review, but numbers can be fewer or greater depending on the needs of the requesting agency and the complexity of the issues to be addressed. Upon the conclusion of the review, the peer review panel will provide a summary of findings and recommendations to the agency requesting the review, and the findings and recommendations are subsequently formalized into a written report to the transit agency. The peer review and reports are provided on a confidential basis.

By drawing upon the knowledge and experience of our dynamic industry, the APTA Peer Review Program is truly a process of "industry helping industry" and is a service wherein all parties benefit from the sharing of information, experience, and knowledge.

APTA Security Standards Working Groups

APTA has played a major role in creating and developing standards by working with hundreds of industry volunteers who serve on numerous working committees.

These consensus-based standards make a positive, lasting impact on the security and operational environment of agencies and are used to protect riders, customers, services, facilities, and vehicles by specifically addressing such issues as infrastructure security, security risk management, emergency management, enterprise cyber security, and control and communication cyber security. Published Security Standards and Recommended Practices are currently available on the Security Standard's section of APTA's website.

Bus Safety Program MAP-21 Assessments

The Bus Safety Program Assessment is an extension of the peer review program and complements APTA's long-standing Bus Safety Management Program. Its purpose is to provide bus agencies with a focused, on-site review resulting in an assessment of their safety program and to establish a framework from which they can meet FTA's MAP-21 safety plan regulations.

Emergency Response Preparedness Program (ERPP)

APTA established the ERPP following catastrophic events of recent hurricane seasons and as a tool to connect agencies and help them prepare for and respond to future catastrophes. This outreach program helps agencies identify emergency managers and potential resources that may assist with temporary transit needs arising from emergencies.

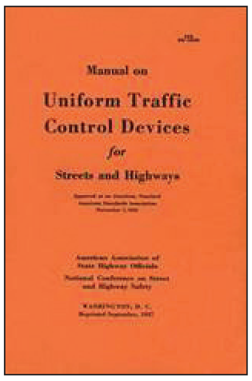
Public Transportations-Information Sharing & Analysis Center (PT-ISAC)

The PT-ISAC establishes the transportation sector's specific information and intelligence requirements for incidences, threats, and vulnerabilities. As such, the ISAC collects,

RESOURCES CONTINUED ON PAGE 15

62 Manual on Uniform Traffic Control Devices (MUTCD), 1935

Joint Committee, American Association of State Highway and Transportation Officials and National Conference on Street and Highway Safety



The committee published the first edition of MUTCD, which standardized the use and design of traffic control devices. The first edition set the standard for types of signs by classifying them as regulatory, warning, or guide signs. Regulatory signs were set as black lettering on white rectangles (except the STOP sign was designated as black on yellow or yellow on a red octagon), warning signs set as diamond shaped, and caution signs as square shaped. See innovation 72.

The manual also promoted using standardized symbols on signs because nighttime roadway illumination was becoming more common, and adopted the three-color traffic control signal as the standard for traffic control light lenses. The manual has been revised approximately every decade to reflect growth and change.

61 Grade Separated Highway-Rail Crossings, 1935

Nationwide

Road builders and city planners began adopting viaducts for automobiles as a solution to the increasingly hazardous at-grade, highway-rail crossings.

60 Automatically Actuated Crossing Gate Signal, 1936

Western-Cullen-Hayes Inc., Chicago

This company, a manufacturer of electrical grade crossing warning equipment track hardware and safety accessories, developed the first automatically actuated crossing gate signal installed in North America.

59 Standard Bus Design, 1936

New York City

To respond to then-Mayor Fiorello LaGuardia's order that motorbuses replace electric traction vehicles, more than 700 buses were purchased in New York City and a standard was established in bus design, including such features as two doors, a rear-mounted engine and transmission, and a hoodless front end. This design improvement led to safer vehicle operation resulting from the better vision and line of sight by the bus operator.

58 First Industry Developed Standardized Street Railway Car (PCC Car), 1936

Pittsburgh Railways, PA

The Pittsburgh Railways received the first Electric Railway Presidents Conference Committee streetcar in July and placed it into service the next month. The PCC was a lightweight, streamlined streetcar with significantly advanced design and technology compared to older vehicles. They were designed to reduce costs, enable safer operation, and help stem ridership declines on street railways. Nearly 5,000 were built in the U.S. and Canada, with the last deliveries in 1952. About 20,000 vehicles based on the standard PCC design were also built in Belgium, Italy, Spain, Czechoslovakia, and Poland.

57 Flashing Turn Signal Lamps, 1939

General Motors, Detroit

Flashing turn signal lamps were first developed by the Guide Lamp Division of General Motors. The public transit industry began to adopt this innovation during World War II.

56 First Street with a Designated Bus Lane, 1939

Chicago

Chicago city code began to specify bus lanes as early as 1863: When a bus lane is designated and indicated by appropriate signs or markings, it shall be unlawful for any vehicle other than a bus or a vehicle servicing a bus to enter or use such lane, except when making a right hand turn. The first designated bus-only lane was built in 1939.

55 Two-Way Mobile FM Radio, 1940

Hartford, CT

A major advance in police radio occurred in 1940 when the Connecticut State Police began operating a two-way, frequency modulated (FM) system in Hartford. The statewide system developed by Daniel E. Noble of the University of Connecticut and engineers at the Fred M. Link Company greatly reduced static, the main problem of the amplitude modulated (AM) system. FM mobile radio became standard throughout the country following the success of the Connecticut system. The ability to have two-way radio communication on board public transit vehicles provided enhanced safety, security, and operations effectiveness.

54 Major Changes in Fire Codes, 1942

Boston

On Nov. 28, 1942, Boston's packed Cocoanut Grove nightclub burned after a patron accidentally ignited artificial palm fronds in a downstairs lounge. Possible exit doors were sealed or swung inward, and the main entrance featured a revolving glass door. With 492 deaths, the fire is the deadliest nightclub fire in U.S. history and the cause of major changes in fire codes and laws, including instituting emergency lighting and occupant capacity placards in nightclubs and other meeting places. These improvements in fire codes also led to enhanced safety for passengers and employees in public transit stations and facilities.

53 Decelostat Wheel-Slip Prevention System, 1942

WABCO (Westinghouse Air Brake Company), Duncan, SC

WABCO Passenger Transit patented this system to prevent loss of braking due to slippery rail conditions. This equipment was an important safety improvement and has been improved many times in the intervening years.

52 MacPherson Strut Front Suspension System, 1950

Earle S. MacPherson, General Motors, Detroit

Automotive engineer MacPherson devised this system, which mounted the shock absorber, suspension spring, and wheel spindle (shaft) assembly on each front wheel, an innovation that became the standard suspension system for most automobiles. This innovation led to the improved operational safety and smoothness of ride of public transit buses.

51 Tinted Glass for Automobiles, 1950

Buick, General Motors, Detroit

Tinted glass automobile windows first became available on Buick model autos. The product was designed initially to reduce glare and aid vision for drivers and began to be adopted as a safety feature for buses beginning in the late 1950s.

50 Modern Railroad Track Structure Design, 1930-1957

U.S. and Internationally

Modern track structure is composed of three major technology innovations: pandrol clips, concrete ties, and thermite welding. These innovations were adopted by the public transportation industry beginning in 1930 and have contributed to a substantial decline in track-related train accidents.

The development of the concrete tie was patented in 1877 by Joseph Monier and first used on the Alford and Sutton Tramway in 1884, followed by the Reading Railway in 1896, but proved unsuccessful and was not revisited until after World War II, when modern pre-stressed concrete tie methods were developed to rebuild French and European railroads.

While the thermite welding process had existed since the late 1890s, it took the research carried out by a Joint Committee on Welded Rail Joints—which included representatives of the American Electric Railway Engineering Association—to standardize its application for rail installation in the U.S. The Central of Georgia Railroad was first to use welded rail for tunnel trackage in 1930. See innovation 64. The Delaware and Hudson Railroad is credited with the first open-track installation of thermite rail welds in 1933. See innovation 47.

49 Automobile Power Steering, 1951

Chrysler, Detroit

The first power steering system was devised, using hydraulic pressure to minimize the effort required to turn the steering wheel. The technology would transfer to transit bus design in the coming years. This innovation led to significant improvements in driving control as well as improved ergonomics and reduced shoulder injuries of public transit operators.

48 First Use of Remote Control to Move Railroad Passenger Cars, 1955

Penn Central, Metro North, Amtrak, NY

This technology was demonstrated between New Rochelle and Rye, NY, and controlled from Larchmont, NY. This innovative practice greatly reduced the risks of worker injury associated with the tasks of repositioning cars in the yard. It is common practice today.

47 Pandrol Clip, 1957

Per Pande Rolfsen, Norway

Railroad engineer Rolfsen patented this clip as a means of fastening rails to ties. The resilient design provided greater stabilization of the lateral and longitudinal forces acting on the rail. The design worked especially well in restraining continuous welded rail and was suitable for use on wood or concrete ties.

46 GM's "New Look" Coach, 1959

General Motors, Detroit

This bus revolutionized the field with advanced stress-skin aluminum construction and virtually indestructible build quality, along with the Allison V-Series automatic transmission and air suspension. With this model, GM pioneered its standard—and now famous—"fishbowl" windshield design, which reduced glare and improved visibility for the operator. GM continued to produce the highly successful model until 1986, with only some modifications.

45 Federally Mandated Safety Standards for Automobiles, 1959

Washington, D.C.

Congress passed legislation requiring all automobiles to comply with new safety standards, including seat (lap) belts. The shoulder harness requirement came in 1968. Although seat belt use for passengers on urban public transit service has not been practical, the use of seat belts for transit operators has been found to greatly improve the safe operation and control of the bus in collisions.

WHAT'S NEXT FOR SAFETY & SECURITY

Deploying PTC

As a technology leader for many years in this industry, we believe firmly in the power of technology to shape the future. In particular, technology can drive improvements in safety, productivity, and efficiency.

In recent years, investments by Wabtec and the industry have included a commitment to develop and deploy positive train control technology in the U.S., and we are working with our customers to help the industry realize its potential benefits.

— **Raymond T. Betler**
President and CEO
Wabtec Corp.

44 Advances in Computer-Controlled Train Operations, 1965

Various companies including Westinghouse, Alstom, Adtranz, and Bombardier

Use of computers to augment train movement and signalization progressed rapidly during the last half of the 20th century as speed and the power of processors, software, and peripheral devices expanded the use and reliability of automated systems.

Beginning in 1965 on the Westinghouse-developed Sky Bus automated people mover system in Pittsburgh, the concept of automated control was augmented by programmable logic controllers for larger automated guideway transit applications, exemplified by Vancouver's SkyTrain (British Columbia Rapid Transit Company) and the Toronto Transit Commission's Scarborough Line.

The use of computer controls was adapted to even more complex system applications in heavy rail environments with the opening of the Bay Area Rapid Transit District automatic train operations system in 1972. In 2006, the Canarsie Line of New York City's Metropolitan Transportation Authority demonstrated further capabilities as a communications-based train control system by modern-day standards.

43 Pneumatic Differential Engine for Actuation of Passenger Doors on Buses, 1965

Vapor Bus International

This company introduced the pneumatic differential engine for actuation of passenger doors on transit buses, a safety improvement over conventional door design that provided maximum velocity and minimum force in the midpoint of its range of motion.

42 Grade Crossing Predictor, 1966

Stanford Research Institute (SRI), Menlo Park, CA

SRI patented the grade crossing predictor, the current standard for newly constructed grade crossings. As a component in the grade crossing active warning system connects to rails, it activates a crossing's warning devices (lights, bells, gates, and so on) at a consistent interval prior to the arrival of a train at a grade crossing.

41 National Transportation Safety Board (NTSB), 1967

Washington, D.C.

Congress consolidated all federal transportation agencies into a new U.S. Department of Transportation (DOT) and established the NTSB as an independent agency in DOT. By doing so, Congress envisioned that a single organization with a clearly defined mission could more effectively promote a higher level of transportation safety than individual modal agencies working separately.

40 Air Open-Spring Close Door System for Bus Exit Door, 1967

Vapor Bus International

The company first offered the air open-spring close door system for bus exit doors, a popular exit door design that allows door panels to gently close once passengers have alighted safely. This feature is still ordered by many public transit agencies on new buses as a means of safe door operation.

39 Exact Bus Fare, 1969

Metropolitan Transportation Authority, New York City

Before tokens and smart cards, MTA bus drivers did something that today seems remarkable: They gave change. When the MTA instituted the "exact-change policy" on Aug. 31, officials praised the change for speeding up service, preventing robberies, and reducing accidents caused by distracted drivers. One bus driver called it the "best thing" since air conditioning.

38 Automatic Slack Adjuster, 1970

Bendix, Chicago

The company introduced the automatic slack adjuster for bus and railcar air brakes, greatly reducing incidents caused by severely worn or "soft" brakes. The Chicago Regional Transportation Authority was one of the first public transit agencies to adopt this technology.

37 Laser-Guided Drilling Techniques for Rail Tunneling, 1970

Flathead Tunnel, Northwest Montana

The Flathead Tunnel opened. At approximately seven miles long, it was the second largest tunnel in the U.S. at the time. Among other engineering innovations, workers used new laser beam technology to provide safer, more accurate tunnel drilling.

36 Sensitive-Edge Seals, 1974

Vapor Bus International

The company introduces "sensitive-edge" seals on bus exit doors, which detect passengers or objects obstructing the doors.

WHAT'S NEXT FOR SAFETY & SECURITY

Renewed Common Commitment

While I'm sure there will be many useful technologies brought to bear for greater safety, the most fundamental step will be continued engagement with all those involved in system operations to renew our common commitment to safety as our fundamental responsibility to our riders and employees.

With that joint commitment of labor, management, and board members, new innovations and technologies will improve safety performance. Without it, our goal will not be achieved.

— Mortimer Downey
President, Mort Downey Consulting
Chair, Safety and Security Committee, Washington Metropolitan Area Transit Authority

35 Electronic Alertness System for Locomotive Engineers, 1975

Vapor Bus International

The company introduced Plus 1, an electronic alertness system for locomotive engineers that monitors multiple controls and sounds an alarm if no actions are detected within a pre-set time interval.

34 First Wheelchair-Lift Equipped Fixed Route Bus, 1977

San Diego Metropolitan Transit System

Wheelchair lifts on public transit buses were initially only available in few U.S. cities, with San Diego being the first. Since the Americans with Disabilities Act was passed in 1990, however, all new bus models are required to be fully wheelchair accessible, a requirement about 98 percent of U.S. buses currently meet, according to APTA's *Public Transportation Fact Book*.

33 First Large Bus System Commits to Fully Accessible Fleet, 1978

King County Metro Transit, Seattle

The King County Council voted to make Metro Transit the first large public transit system committed to a fully accessible bus fleet and ordered 143 New Flyer buses with wheelchair lifts. Currently, its fleet of 1,400 buses is 100 percent equipped with wheelchair lifts.

32 Fire Standard for Fixed Guideway Transit and Passenger Rail Systems, 1983

National Fire Protection Agency (NFPA), Washington, D.C.

Prior to 1983, there was no national standard for fire and life safety in public transit systems. Standards available for buildings were not always appropriate and needed to be modified by individual public transit agencies. Recognizing the gap, the NFPA's Fixed Guideway Transit Systems Technical Committee initiated its work to develop fire safety standards to strengthen fire-life safety for all transit agencies and customers.

31 Hazard Communication Standard, 1983

Occupational Safety & Health Administration (OSHA), Washington, D.C.

OSHA issues the Hazard Communication Standard, which requires employers to inform and train millions of workers who are exposed to or handle toxic substances. This standard has also helped to strengthen the work environments of transit maintenance personnel in working with hazardous products in a safe manner.

30 First Application, Communications-Based Train Control, 1985

Toronto Transit Commission, Ontario, Canada

The TTC's Scarborough rapid transit (RT) line was the first to implement the intermediate capacity transit system technology developed by the Urban Transportation Development Corp.

Rather than the standard and relatively larger subway cars used by the other lines of the Toronto subway, the Scarborough RT rolling stock consisted of smaller vehicles with steerable trucks, powered by linear induction motors. The line was also the first to apply a moving block communications-based train control system for automatic train protection. The system included several safety features, including these three: high-resolution train location determination independent of track circuits; continuous high capacity, bidirectional train-to-wayside data communications; and train-borne and wayside processors performing vital functions.

29 Rail Safety Audit Program, 1986

APTA
Washington, D.C.

APTA initiated the Rail Safety Audit Program (RSAP) and developed the Manual for the Development of Rail Transit System Safety Program Plans, which formed the basis of APTA's modal safety management programs, currently for rail, commuter rail and bus transportation systems. The program was subsequently adopted in 1996 by FTA as the base guideline for its state safety oversight (Part 659) requirements.

28 Computerized Safety Information and Data Analysis System (SIDAS), 1986

Washington Metropolitan Area Transit Authority (WMATA), Washington, D.C.

After an in-depth study conducted by WMATA's Office of Safety and Fire Protection, officials discovered an immediate need for computerizing safety data. They reported on the initiative at the 1987 APTA Annual Rapid Transit Conference. Innovative in its time, the data analysis system contained bus and rail accident/incident databases to more effectively capture contributing factors and potentially unsafe conditions. In addition, the system allowed analysis of occupational safety and health data, material safety data sheets (MSDS) and chemical information, safety and fire protection inspections, safety and fire protection training records, and accident/incident recommendation follow-up procedures.

27 First Driverless Application of Communications-Based Train Control, 1986

SkyTrain, Vancouver, British Columbia, Canada

The Intermediate Capacity Transit System was developed by Ontario's Urban Transit Development Corp. as a public transit system that was lighter and smaller, and therefore less expensive to build and run, than a full-fledged heavy-rail subway but capable of higher capacities and shorter headways than a streetcar line. SkyTrain was the first major deployment of this technology, which included short-headway, fully automated (driverless) operation using moving-block communications-based train control technology providing automatic train protection, automatic train operation, and automatic train supervision functions.

26 Introduction of Random Drug and Alcohol Testing, 1987

FRA, Washington, D.C.

The Amtrak/Conrail accident at Chase, MD, resulted in the FRA introducing random drug and alcohol testing for passenger and freight train operators. Later the same year, DOT followed suit for its safety-sensitive employees. These moves led to industry-wide rules adopted in 1990 for drug- and alcohol-free workplaces.

25 Altoona Bus Research and Testing Center, 1987

Pennsylvania Transportation Institute, State College, PA, and FTA, Washington, D.C.

This facility and the FTA's New Model Bus Testing Program housed there are designed to promote the production of better public transit vehicles and components and ensure that industry customers purchase safe vehicles, able to withstand the rigors of service. FTA established the bus testing program in response to the requirements of the Surface Transportation and Uniform Relocation Assistance Act of 1987, which requires that all new bus models be tested before they can be purchased with federal funds. More recently, vehicle testing and minimum safety standards for FTA-funded vehicles were also mandated by MAP-21.

24 First Prototype Ergonomically Designed Bus Operator Workstation, 1989

BC Transit, Vancouver, British Columbia, Canada

Leading the movement to design a modern ergonomic driver workstation to reduce musculoskeletal and soft tissue repetitive motion injury, BC Transit retrofitted a trolleybus based on ergonomic principles designed to fit most drivers, an initiative quickly adopted by bus operations in Seattle, Portland, and Sacramento. In 1991, the Canadian Urban Transit Association commissioned an ergonomic study of bus drivers' workstations and New Flyer Industries produced the first OEM production bus with designed ergonomic features; it swept the industry.

WHAT'S NEXT FOR SAFETY & SECURITY

Using and Adopting Technologies

Regarding a future perspective of bus safety: Since World War II we've seen rapid and growing expansion of cars and car travel—faster than actual road capacity. Now we are being challenged by our actual ability to provide that capacity, resulting in more crowded buses on crowded roadways.

To spin out of this, public transit will need to increase its efforts to attract even more riders with expanded use of technologies, ranging from smartphones showing where a bus is located to route deviation requests that will guide buses to riders to intelligent traffic signals that can "see" a bus and enable transit to move through traffic more efficiently.

In the coming years, public transit safety professionals will seek out more ways to help prevent collisions utilizing many of the same devices recently validated by the Google/MIT autonomous car—forward collision avoidance, blind spot detection, object detection, and tools that will help vehicle operators remain alert.

— Sue Stewart
Transit Safety Officer
King County DOT/Metro Transit
Chair, APTA Bus Safety Committee

23 Priority Alarm System for Bus Operators, 1991

Bach-Simpson, GO Transit, Toronto, Ontario, Canada

Bach-Simpson provided the first priority alarm system to GO Transit, allowing operators to send a priority signal to a dispatcher or control center in an emergency. The system also included a “passenger assist” feature for passengers to press in an emergency.

22 Blood-borne Pathogens Standard, 1991

OSHA, Washington, D.C.

OSHA issued this standard to protect millions of workers potentially exposed to HIV/AIDS and hepatitis B. This standard has helped to guide the training provided to public transit personnel who are required to regularly deal with human waste cleanup and disposal.

21 Tilt-Train Technology, 1991

Amtrak, Northeast Corridor

Amtrak tested and then implemented tilt-train technology on its Northeast Corridor (the Acela Express) between Washington, D.C., and Boston. This technology allows higher speeds on existing tracks because it automatically tilts as it enters curves and counters the centrifugal force passengers would otherwise feel. A computer automatically turns the wheel and axle assembly to follow the curve, making for a safer, smoother ride.

20 Confined Spaces Standard, 1993

OSHA, Washington, D.C.

This standard requires safe procedures and permits for entry into confined spaces, including underground vaults, tanks, storage bins, manholes, pits, silos, process vessels, and pipelines. The standard prevents more than 50 deaths and 5,000 serious injuries annually for the 1.6 million workers who enter confined spaces.

19 APTA Becomes Standards Development Organization, 1995

Washington, D.C.

In response to a need in the industry for accident-prevention standards and passenger car construction standards, APTA—with FRA’s encouragement—established the Passenger Rail Equipment Safety Standards (PRESS) Task Force to develop new and update existing Association of American Railroads standards for commuter and intercity rail passenger cars.

In a year, this multidisciplinary task force of industry volunteers produced the first volume of standards, which became the nucleus of the 49CFR Part 238 regulations. The PRESS documents spearheaded APTA’s standards program and continue to provide a high level of safety and survivability in new rail passenger car structure and systems.

18 Video-Based Driver Risk Management, 1998

DriveCam®

This program uses a patented video event recorder and software interface to capture driving behavior to improve fleet safety, identify passenger issues, and understand causes of crashes. Initially adopted in the transit industry by Laidlaw Transit in 2004, video-based driver risk management subsequently became an industry standard and is used by many agencies throughout the country.

17 Bus Simulator, 1999

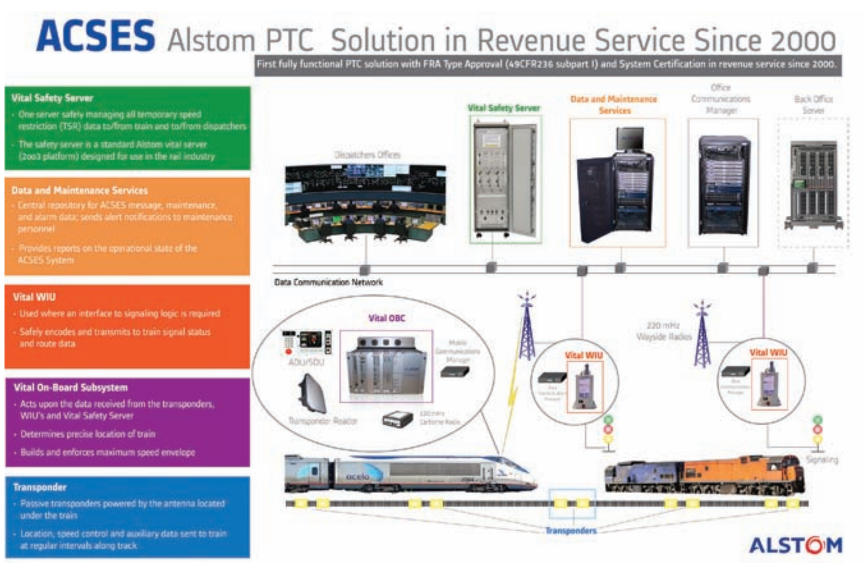
Metropolitan Transportation Authority, New York City

The FAAC MB-2000 bus simulator offered a variety of visual display options (with varying horizontal fields of view) and real mirrors—depending on the customer’s training requirements—and featured a fully enclosed bus cab, authentic bus dash, side instrument panel, seating configuration, and TrueFeel steering, which provided users with a more realistic feel for force feedback, camber recovery, tire scrub, curb strikes, and road vibration. The simulator also allowed instructors or students to switch to an overhead view and review street-level situations.

16 Advanced Civil Speed Enforcement System (ACSES II), 2000

Alstom Company, France

ACSES II is a continuous speed control system that transmits data from transponders and radios; its core functionality uses Alstom’s worldwide products for Positive Train Control (PTC) systems. ACSES II is in operation on the Northeast Corridor, the busiest rail segment in North America, which currently allows train travel up to 150 mph. It is the first fully functional PTC solution with FRA Type Approval (49CFR236 subpart I) and System Certification in revenue service since 2000.



15 Lane Departure Warning System, 2001

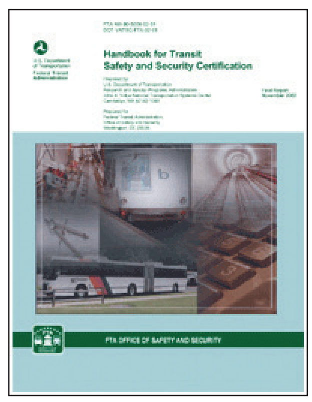
Nissan, Japan

Nissan became the first automaker to offer a lane departure warning system in an automobile. Toyota followed in 2002, and improved it in 2004 to allow the system to apply a small counter-steering force to avoid lane departure. Among other Intelligent Transportation Systems (ITS) being evaluated, several efforts are currently underway to investigate and develop similar applications for public transit.

14 FTA Handbook for Transit Safety and Security Certification, 2002

FTA, Washington, D.C.

FTA, APTA, and industry stakeholders collaborated to prepare this handbook, which supports efforts of the industry to achieve continuous improvement in safety and security performance. As such, it provides a guide for establishing a certification program that identifies key activities, incorporates safety and security more fully into projects, highlights resources necessary to develop and implement a certification program, and provides tools and sample forms for the user. Application of safety and security certification promotes an informed management decision-making process in project design, construction, testing, and initiation into revenue service.



WHAT'S NEXT FOR SAFETY & SECURITY

Using Technology to Respond to Events

Public transit agencies have been utilizing security technology to a great degree in new systems and retrofitting existing systems. These systems are generating an enormous amount of data and information. The challenge is being innovative in how to efficiently prioritize and use this information.

I believe the next innovative solution for security will be the use of operating systems to assist security professionals to prioritize and respond to technology-generated events. Denver RTD is responding to this need by installing NICE Situator software in its Security Command Center. This system will greatly improve the efficiency of our public safety technicians as we continue to expand operations.

— **David Genova**
Assistant General Manager, Safety, Security & Facilities
Regional Transportation District, Denver
Chair, APTA Rail Safety Committee

13 Communications-Based Train Control, 2003

People Mover, Bombardier, San Francisco

Bombardier introduces the first radio-based communications-based train control system on San Francisco International Airport's automated people mover. The technology was subsequently applied in public transit. See innovation 12.

12 Communications-Based Train Control, 2006

Metropolitan Transportation Authority, New York

New York's MTA completed a CBTC installation on its Canarsie Line, becoming the first public transit property in the U.S. to implement CBTC technology in a heavy rail environment. The Canarsie Line was MTA's pilot project for CBTC prior to its system-wide rollout. The agency's goals are to increase capacity, enhance safety, and improve the availability and maintainability of the signaling system.

The system was supplied by Siemens and was designed for semi-automatic train operations. While a train operator is retained in the lead cab of the train, train movements between stations are automatic under the control and protection of the CBTC system.

11 Rail Safety Improvement Act of 2008

Washington, D.C.

Congress enacted this legislation to improve railroad safety. Among its provisions is the mandate for PTC, which was developed in response to the Chatsworth, CA, train collision.

WHAT'S NEXT FOR SAFETY & SECURITY

A Systems Approach

The Safety Management Systems (SMS) concept is the innovative tool public transit has needed to drive improvements in safety. Building on the system safety and theory framework, SMS completes the system safety circle by providing a methodology to identify hazards and control risks while assuring that risk and safety controls are effective.

This systems management-based approach will serve to improve the culture of safety within each transit agency and result in a modernized, forward-thinking approach to proactive safety management. As FTA moves forward with the implementation of SMS, executives at all levels will need to embrace this innovative tool as an integral part of their leadership portfolio to effectively manage and improve safety in an industry that is so dynamic and diverse.

— Amber Reep
Transit Safety and Security Division Manager,
Transportation Safety Institute
U.S. Department of Transportation

10 Health, Safety, and Environment Self Certification for Contractors and Visitors, 2009

Bombardier Transportation

This computer-based training program certifies contractors and visitors prior to being on site, reducing the overhead required to organize and schedule typical instructor-led training programs. Using Bombardier's operations and maintenance site health, safety, and environment policies, a matrix identified policies that are "site unique" and those that apply to all sites.

Instructional designers and subject experts developed a storyboard breaking content into smaller modules and applying visual and interactive learning concepts, resulting in a visual, interactive, and modular training program that can be altered to accommodate changes. More than 1,000 contractors and site visitors have taken the courses.

9 Mirror Awareness Guide Device, 2011

Capital Metropolitan Transportation Authority, Austin, TX

One of the agency's most common collisions was mirror-to-mirror—more collisions occurred from vehicles overtaking buses rather than from oncoming traffic. To counter this problem, the agency developed its Mirror Awareness Guide (MAG) devices and affixed them to the streetside rear section of its buses. The device is the width of a bus mirror and set to the center height of the streetside exterior mirror.

The premise is simple: When overtaking vehicles approach the bus and begin to pass, drivers are more likely to notice the protruding MAG device, focusing their attention on the bus and causing them to pass with a wider safety cushion. If an overtaking driver fails to notice the MAG and travels too closely to the bus, the mirror will hit the device, producing a loud noise without harming their mirror or the flexible MAG. The MAG is inexpensive, installs quickly and easily, and reduces mirror-to-mirror accidents.

Apply for APTA's Awards

HAS YOUR SYSTEM OR BUSINESS made impressive strides in safety and security? Have you devised or implemented a practice that is effective, beneficial, innovative, and transferable? Are you ready to be recognized by your peers?

If so, it's time to apply for APTA's coveted Safety & Security Excellence Awards. APTA bestows awards separately for bus and rail systems.

There are four categories of bus awards. Three go to systems based upon annual ridership measured in unlinked passenger trips: fewer than four million passengers annually, more than four million but fewer than 20 million passengers, and 20 million or more passengers. A fourth category is open to private-sector organizations—either transportation management or contracted service providers—regardless of size.

The rail awards are divided into three categories: commuter/intercity/regional/high-performance rail, heavy rail, and light rail/streetcar.

Submit nominations materials online at www.apta.com. Nominations are limited to no more than five pages but may include additional supporting evidence attesting to the results achieved. All safety-related data and program summaries should be accurate and verifiable.

Along with the body of the nomination, submit a cover sheet with the signature of the agency's chief executive officer or equivalent, attesting to the legitimacy of all information included. No fee is required to submit a nominations packet.

Here's what to include with your application:

- A brief description and history of the safety or security issue or initiative and its impact on the public transit system;
- The program or project that was implemented to address the situation, along with specific goals and objectives identified to fix it;
- A summary of the specific results achieved and related benefits, specifically noting what the system was like before the intervention and what it was like after; results should correlate directly to the specific program or project; and
- A description of how this practice could be beneficially applied to other public transit systems.

Find previous winners and videos from the 2013 winners at www.apta.com and searching for 2014 safety awards video.

8 Alternating Blank-Out Signs at Rail Grade Crossings, 2012

Regional Transportation District, Denver

These new signs were installed at the five crossings on the RTD light rail area known as the Cascades, part of the corridor adjacent to the University of Colorado Denver, Metropolitan State University, and the Community College of Denver. These high-volume crossings have historically experienced some of the higher crash volumes of the entire RTD LRT system.

The "light rail transit approaching" symbol sign alternates with either a "no right turn" symbol sign or a "no left turn" symbol sign, depending on the location, regulating motorists by prohibiting turns across the tracks while warning them of approaching trains. Subsequent studies show that the signs decrease the frequency of violations and risky behaviors at at-grade crossings and provide a clear message to motorists.

7 Rail Activation "Hold Point" Process, 2012

Utah Transit Authority, Salt Lake City

This process separates the phases of a rail project, especially in the final year of activation. Phases include construction and stand-alone testing, system integration, pre-revenue operations, and revenue operations. Each hold point requires specified certifiable items lists and processes that must be signed off by UTA's chief safety officer and others before proceeding. The process facilitated UTA's successful opening of four new rail lines (67 miles) in a one-year period. It is currently promoted as an FTA best practice for the industry.

6 Display of Safety Messages on Destination Signs, 2013

Capital Metropolitan Transportation Authority, Austin, TX

The agency developed safety messages for outside destination signs to reduce collisions, injuries, and damage to property. The messages also include warnings against distracted and impaired driving. While many agencies include safety messaging in their public relations materials, Capital Metro was among the first to use scrolling LED destination signs for this purpose.

5 Enhanced Visibility of Bus Fleet with Retro-Reflective Tape, 2013

Capital Metropolitan Transportation Authority, Austin, TX

The agency incorporated high-visibility (retro-reflective) tape into its bus livery for enhanced visibility, which is in line with the standard safety requirement of public school bus fleets. No such standard currently exists for public transit buses.

4 Confidential Close-Call Reporting for Rail Transit, 2013

WMATA, Washington, D.C.

WMATA's general manager/chief executive officer and officials of ATU Local 689 signed a memorandum of understanding to implement a non-punitive confidential close call reporting program to encourage employees to report events that would not have been identified otherwise. Similar programs have been adopted by other operators, primarily commuter and intercity rail systems. Confidential close call reporting had been implemented primarily by Class 1 freight railroads and Amtrak, in partnership with FRA.

3 Fatigue Risk Management Program, 2013

WMATA, Washington, D.C.

Over a two-year period, the agency developed and implemented its fatigue risk management system to ensure that employees have adequate rest for fitness for duty. For this and the confidential close-call call reporting program and for other policy and procedural changes, WMATA earned APTA's Gold Award for Safety Excellence in 2014.

2 Emergency Training Facility 2013

Massachusetts Bay Transportation Authority, Boston

The MBTA opened its Emergency Training Center, a state-of-the-art public transit emergency training facility that offers advanced training, exercise, and simulation capabilities in a realistic tunnel environment. The facility consists of multiple training areas, each dedicated to a different public transit mode (including heavy rail, light rail, and bus) and functions related to power, evacuation, law enforcement, and fire response.

The space was originally an underground streetcar station built in 1917 but closed in 1919 after being made redundant. It was used for a variety of purposes, including storage and to test station enhancements. MBTA received a grant from the Department of Homeland Security to convert the space into the training center. MBTA earned the 2014 APTA Rail Security Excellence Award.

WHAT'S NEXT FOR SAFETY & SECURITY

Growing Role of Volunteers and Education

The next innovation in public transportation safety isn't an app or a website. It's a far more personal approach: using volunteers to help educate the public about safety on and around our nation's public transit systems and railroads.

Most injuries and fatalities on transit systems involve trespassers on rail tracks, cars colliding with transit vehicles, or platform-related safety incidents. Operation Lifesaver, the only national organization dedicated to preventing deaths and injuries at rail crossings and around railroads and transit systems, relies on its cadre of trained volunteers to make safety presentations in communities across the U.S.

Operation Lifesaver Authorized Volunteers share important tips about staying safe when riding public transportation, sharing the roads, and walking and bicycling around transit lines. You, too, can be a public transportation safety innovator. Apply at http://oli.org/training/volunteer-for-oli.

— Joyce Rose
President, Operation Lifesaver, Inc.

1 Positive Train Control 2014

Metrolink, Los Angeles

In February, Metrolink successfully unveiled PTC in revenue service demonstration, becoming the first commuter rail service in the U.S. to roll out the complex system, a set of highly advanced technologies designed to automatically stop or slow a train before certain types of accidents occur.

Its implementation is mandatory for U.S. railroads—including commuter railroads—as stipulated by the Rail Safety Improvement Act of 2008. See innovation 11.

Make a Difference: Join a Committee

APTA COMMITTEES AND SUBCOMMITTEES are active in all areas of concern to the industry and are structured to provide interaction among members in a wide range of transit disciplines.

Committee membership is open to all employees of APTA members in good standing, and participation is encouraged and welcomed.

In general, committee and subcommittee members devise strategies, plans, and programs to improve the industry and foster information exchange.

A recap of the safety- and security-related committees follows:

Bus Safety Committee
The scope of this committee's work includes all aspects of public transit bus operational safety, including operator training, safety supervision, and the development of a Bus Safety Management Program.

Rail Safety Committee
This committee serves as a focal point for the development of plans, policies, and procedures designed to enhance the effectiveness of safety management activities.

Specifically, the committee is engaged in the support and development of the Rail Safety Audit Program (RSAP) as a process that helps public transit systems determine the degree to which their safety programs have been implemented.

Commuter Rail Safety & Security Subcommittee
The work of this subcommittee focuses on all aspects of commuter rail operational safety including operator training, safety supervision, and the development of a Commuter Rail Safety Management Program.

Risk Management Committee and Seminar
This committee brings together risk managers; claims, safety, and security officers; insurance brokers; and stakeholders to exchange pertinent information.

Each year the committee sponsors a seminar on current issues. The 2015 seminar is scheduled for June 23-26, in Salt Lake City. Planned sessions include reducing passenger violence and dangerous acts, the insurance market, ADA/legal updates, mitigating pedestrian accidents, dissecting primary and excess liability insurance policies, practical elements of mediating a lawsuit, and realizing tangible savings from vehicle video systems. The seminar also features a risk management roundtable and a pre-seminar workshop, "Risk Management 101," aimed at attendees who need new or refresher training.

To learn more, go to www.apta.com and search on committee descriptions and download and complete the Committee Interest Form.

APTA'S SAFETY & SECURITY AWARDS

CONTINUED FROM PAGE 3

an additional award, the International Award for Continuing Excellence, to a transit system that had demonstrated outstanding achievement in bus safety for a continuous period. The Toronto Transit Commission received this award each year it was given.

The Bus Safety and Security Awards are presented at the Bus & Paratransit Conference and the Rail Safety and Security Excellence Awards at the Rail Conference. To learn more, go to www.apta.com.

Bob Hope, left photo, and Lowell Thomas, right photo, received awards for narrating safety-themed movies produced by the American Transit Association.

RESOURCES

CONTINUED FROM PAGE 8

analyzes, and provides timely, actionable recommendations and solutions in counter-terrorism, suspicious activity reports, and security awareness, along with industry specific cybersecurity intelligence reports.

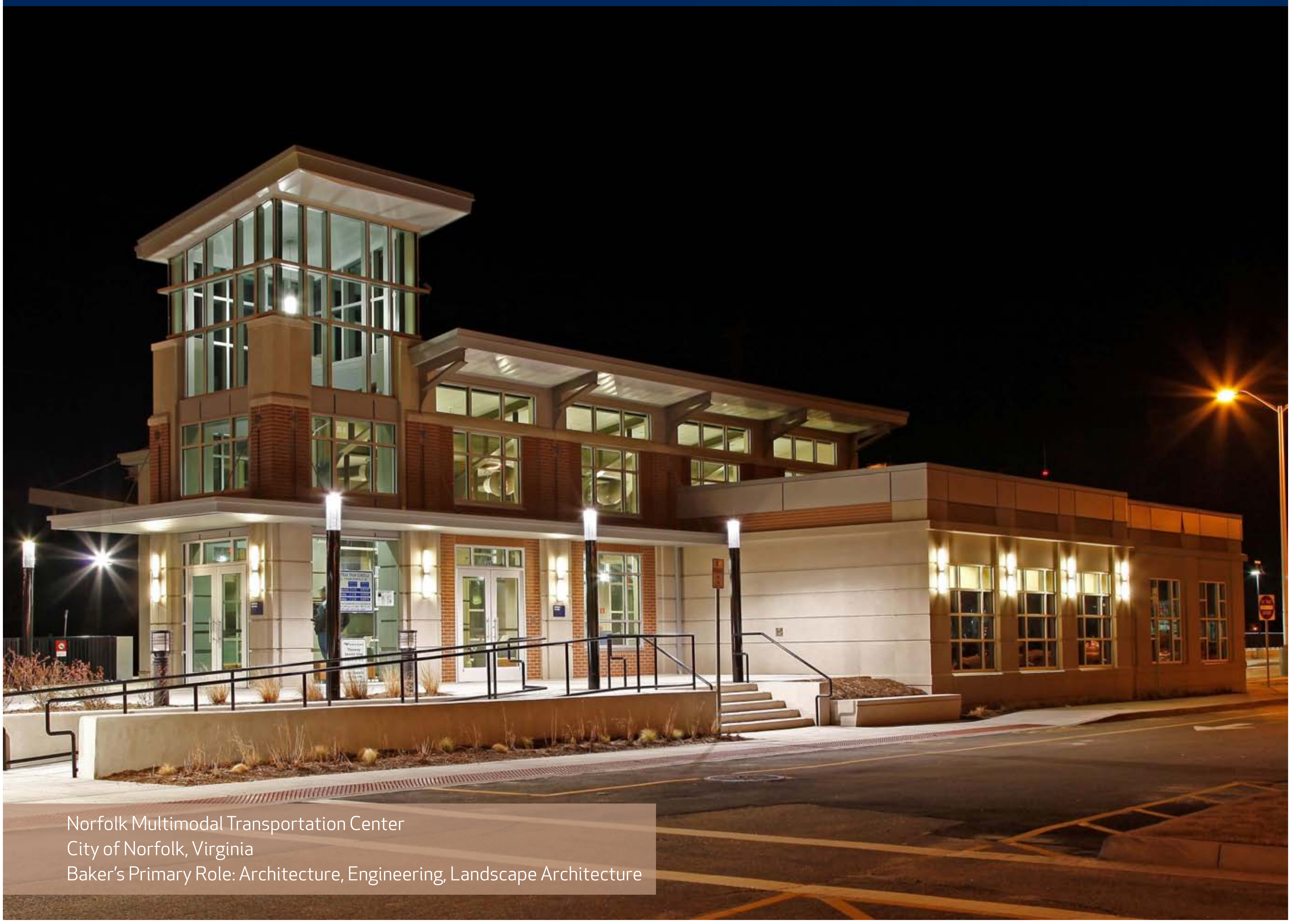
It also enables members to exchange information on cyber, physical, and other threats to defend critical infrastructure, supports the dissemination of technical sector details, and enables mutual information sharing and assistance during actual or potential sector disruptions.

Contact DHahn@apta.com to join the PT-ISAC.

To learn more about these programs and services, go to www.apta.com and click on Safety & Security under the Resource Library menu.

Michael Baker
INTERNATIONAL

We Make a Difference



Norfolk Multimodal Transportation Center
City of Norfolk, Virginia
Baker's Primary Role: Architecture, Engineering, Landscape Architecture

A Tradition of Excellence in Passenger Rail & Transit Services …
A Future of Innovation with Global Reach and Mobility

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