



RAILROAD MUSEUM OF PENNSYLVANIA

Real Trains. Real History. Real Excitement.

Workin' on the Railroad Curriculum Guide

Preschool-Grade 4/Ages 3-10

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Our mission is to collect, interpret and preserve significant objects related to Pennsylvania's railroading history and to educate the public about that history through exhibits, special events, research and other programs.

Our education programs satisfy specific Pennsylvania Academic Standards in many subject areas, including Pennsylvania and United States History (8.2 C-D & 8.3 C-D); Geography (7.3 A-D & 7.4 A-B); Economics (6.4 D & G); Civics & Government (5.3 C-D); Health (10.3 A); Science & Technology (3.4 B-C & 3.6 C); Language Arts (1.1 – 1.6); and Arts & Humanities (9.2).

The Railroad Museum of Pennsylvania is administered by the Pennsylvania Historical & Museum Commission with the active support of the Friends of the Railroad Museum of Pennsylvania.

Edward G. Rendell, Governor
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Workin' on the Railroad

Primary Level Program

Version "A"

Preschool-Grade 1/Ages 3-6



Museum Tour

Through hands-on interaction and role-play, students will begin to explore continuity and change over time, as well as conflict and cooperation among social groups. Students visit the station, build a section of track, shovel coal into a locomotive's firebox, and board a passenger coach.

The "A" version of *Workin' on the Railroad* is divided into four parts, coinciding with the four stops made along the actual museum tour:

The Track Worker

The Fireman

The Stationmaster

The Conductor

Background Information

The Track Worker

What is a “railroad”?

A railroad is a form of transportation. It is a means of moving people and things from one place to another.

Continuity: Railroads have been used for nearly two hundred years. They are still used today.

Change: Automobiles, airplanes and ships also carry goods and people.

How does a railroad work?

Railroads use tracks to pull long strings of cars carrying goods or people.

Continuity: Railroads still use tracks. Long strings of rail cars are still pulled by locomotives.

Change: Newer materials are being used in track laying, making passenger’s rides smoother and allowing for faster trains. Concrete ties have replaced wooden ones. Steel spring clamps have replaced spikes. And miles of rails can be welded together in long, continuous strings of steel. Computers help control traffic, running the signals and even the trains themselves.

Who builds the track?

Track workers, or “Gandy Dancers,” built and repair the tracks.

How are tracks built?

Originally, all work was done by hand, using simple tools like picks, shovels and hammers, as well as pack animals like horses and mules.

Continuity: Trains still run on tracks. People still assemble the tracks.

Change: Today, tracks are laid mainly by machines, with people at the controls.

The Fireman

What moves a train?

Train cars have wheels and roll on tracks. They are pulled along these tracks by locomotives.

Who drives a train?

Engineers drive the locomotives that pull the trains.

Continuity: Engineers are still needed to operate today’s locomotives.

Change: Today, steam locomotives have been replaced with ones powered by electricity.

What is a “fireman” on a railroad?

A fireman keeps the steam locomotive fired up and operating smoothly for the engineer.

What did the fireman do?

The fireman maintains the fire burning in the locomotive, adding fuel (wood, coal or oil) as needed. In the locomotive's firebox, hot gases convert water into steam in the boiler. The high-pressure steam is used to drive the locomotive's wheels. The fireman adds water as needed. He also regularly greases or oils the locomotive's many metal parts.

Continuity: A locomotive may have more than one person riding in the cab of the locomotive as a part of a train crew, but these workers are no longer called "firemen".

Change: Locomotives no longer use steam for power, so they do not have fires in them.

The Stationmaster

What is a train station?

A "station" is where people go to board and get off a train.

What do people do there?

Tickets can be purchased to ride a train at a station.

Who is in charge of a train station?

A stationmaster is the boss of the station.

What does he or she mainly do there?

In addition to caring for the station and passengers, the stationmaster also sells train tickets.

Continuity: You can still go to a station today to purchase tickets and board trains.

Change: With the decline in passenger rail travel, many stations have been torn down. People often must travel to a larger town or city to board a train. Today, one may also buy tickets *electronically* from vending machines or computers.

The Conductor

Who is in charge of a passenger train?

The conductor is the "boss" of the passenger train.

What else does he or she do?

He helps passengers get on and off the train, collects and punches tickets, oversees the train schedule and supervises the train crew.

Continuity: Passenger trains still have conductors today. They still have similar duties.

Change: Unlike other railroaders, conductors still perform many of the same duties today.

Conflict and Cooperation: Until the late 1960s, railroads rarely hired women to work as conductors, engineers and other railroaders. However, women did work desk jobs, mainly as office receptionists and telegraphers. During World Wars I and II, women were hired to fill in for men sent overseas to fight.) Today, women have many more opportunities for promotion and to serve as engineers, conductors and other frontline positions in railroad companies.

Discussion Questions

What is a railroad?

What do trains do?

Does a train go to your house?

Where do you have to go to board a train?

What do you have to buy to ride a train?

Activity – Using Maps

Using a US map, locate for your students the part of the country in which they live. Then locate places where various popular products are made. Discuss how these items can be delivered to their homes.

Use the cafeteria menu or the contents of a student’s lunchbox to talk about freight trains and the foods they haul. Again, using a US map, locate the sources of these foods. Indicate which foods could be grown locally and what our diets might be like if people had to be totally dependent on locally grown foods (and not things like Florida citrus, for example).

Activity – “A Working Railroad”

Turn your classroom into a *working* railroad to simulate the jobs, the functions and the dangers of a railroad running through your town. Have them design their own tickets, make a simple map of the train’s route around the classroom, and come up with a name for their railroad. Designate specific areas of the room as stops, including a station, a source for coal and water, a business or industry, and a roundhouse or freight yard.

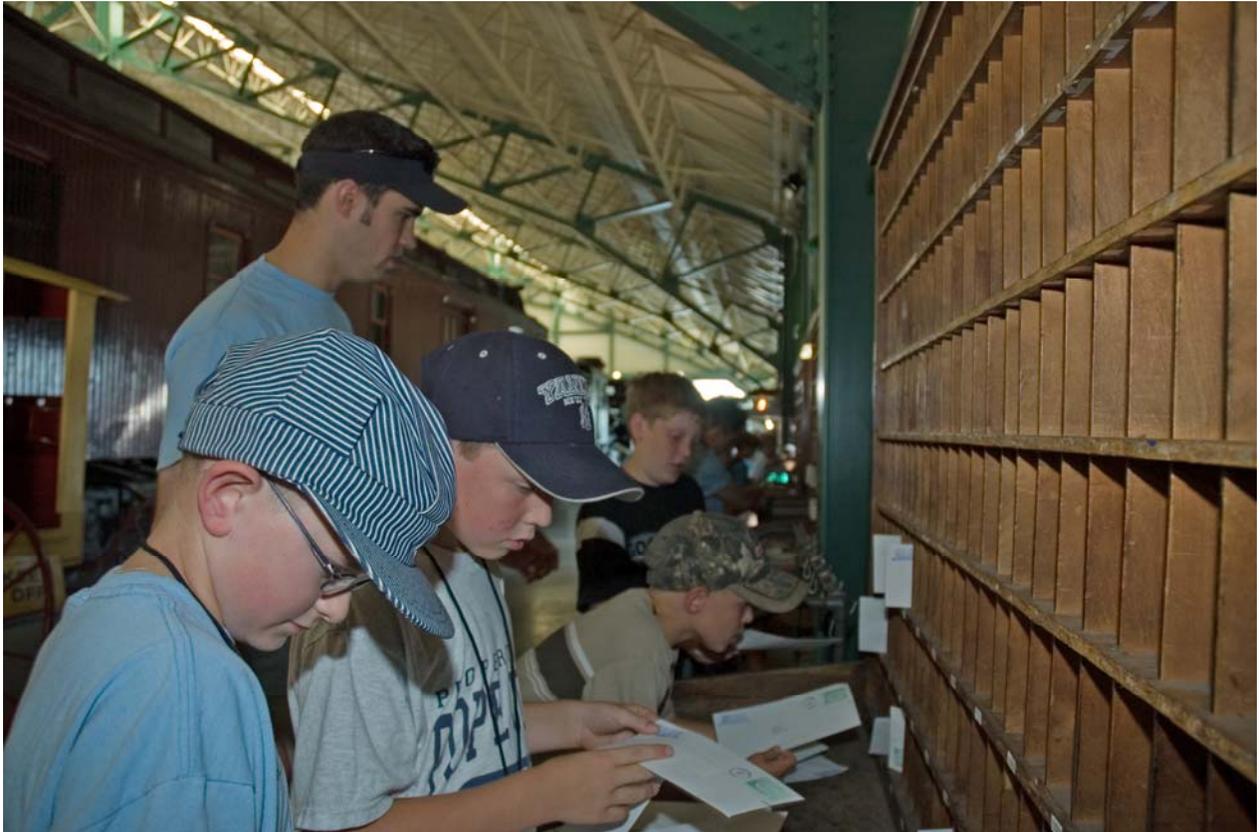
- ✓ Have several students serve as a passenger train (one engine and a couple coaches) and a freight train (one engine, various different freight cars and caboose) by making a line and following a designated path (or paths) around the room. Assign “cargoes” to the different “cars” on each train. If you like, set their trips to music.
- ✓ Have one or two students serving as “crossing gates” and an automobile attempting to cross the tracks in front of your “moving” train. Discuss the proper way for automobiles and people to cross the tracks.
- ✓ Have a stationmaster “sell” tickets to passengers and have these passengers “board” a train. (They can simply line up behind the student acting as a locomotive.) On the train, have a conductor “collect” and/or “punch” tickets from passengers.
- ✓ As a freight train, have them deliver cargo or empty cars (students) to specific businesses, like an automobile dealership or a grocery store or a farm, or industries, like a saw mill or a grain silo or a factory or a coal mine.
- ✓ To further illustrate how challenging running a railroad can be, have these two trains obey traffic signals or try to pass one another on one or more tracks. Discuss with them how trains accomplish this safely on today’s railroads and the dangers of trains (and kids) not obeying the rules, particularly ones involving safety.

Workin' on the Railroad

Primary Level Program

Version "B"

Grades 2-4/Ages 7-10



Museum Tour

Through hands-on interaction and role-play, students will explore continuity and change over time, as well as conflict and cooperation among social groups. Students sort mail in the Railway Post Office, inspect freight cars, load suitcases into a baggage car and learn and practice signaling techniques.

The "B" version of *Workin' on the Railroad* is divided into four parts, coinciding with the four stops made along the actual museum tour:

The Brakeman

The RPO Clerk

The Freight Conductor

The Baggage man

Background Information

The Brakeman

Who is the brakeman? What does the brakeman do on a train?

The brakeman has many duties on a train. He assists with coupling and uncoupling rail cars, setting train brakes, opening and closing track switches and inspecting equipment.

- 1.) The brakeman helps connect rail cars to one another. At first, “link-and-pin” couplers were used. A brakeman had to stand between the two cars to drop a pin into the links of each car as one approached the other. This was extremely dangerous, resulting in thousands of railroaders losing fingers, limbs or even their lives. Only after the passage of the Railway Safety Appliance Act of 1893, which required the use of Eli Janney’s automatic “knuckle” couplers and other safety devices, did the conditions of these workers improve.
- 2.) The brakeman was also required to secure, or “tie down,” the train’s brakes. In the early days, the brakemen jumped from car to car—rain or shine—turning the brake wheels of each car to stop the entire train. On passenger trains, one brakeman had the responsibility of tying down two cars; on freight trains, which might have five or six brakemen, each man had to tie down eight to ten cars. With the invention of air brakes in 1869 by George Westinghouse, the engineer could apply the brakes from the engine cab, making the brakeman’s job much easier and safer. The Railway Safety Appliance Act of 1893 required them to use air brakes, automatic couplers and other safety devices on all their trains.
- 3.) The brakeman operates track switches or turnouts. Since the early days of railroading, “turnouts,” also known as “switches,” were used to redirect trains onto sidings or other tracks. Quite often, when the train was stopped, brakemen would have to get out and throw a lever to make the switch points move. This was often difficult and dangerous, especially in rail yards, where brakemen known as “pin pullers” had to uncouple moving freight cars as they rolled onto their proper storage tracks. Some turnouts were operated remotely from towers, where a series of levers connected to ropes and pulleys aligned the tracks. Today, much of this is done electronically, although hand switching is still performed.
- 4.) The brakeman is responsible for the safety of the train. In the past, the brakeman rode in the caboose, looking out for defects like “hotboxes,” or overheated axle bearings. He would also watch for dragging equipment shifting loads. If he found anything, the brakeman would have to signal the engineer, by lantern or flag, to slow down or stop. He might also set a warning device, like a “fusee” (a red flare capable of burning for 5-10 minutes, even underwater) or “torpedo” (device creating a loud bang when run over by a train), a mile or two behind to warn approaching trains. Radios and phones went into regular use after World War II.

Continuity: Brakemen continue to assist with coupling and uncoupling rail cars.

Change: In the past, brakemen coupled and uncoupled cars by hand. Today, this is still performed in this manner; however, coupling and uncoupling can also be performed electronically from the engine. Also, coupler technology has evolved from link-and-pin style devices to the more modern and safer “knuckle” couplers.

Continuity: Brakemen still assist with setting track switches, inspecting the brakes and other equipment on the train, and protecting the train.

Change: In the past, brakemen had to run from car to car, turning the brake wheel on each and every freight car to stop the entire train. Today, engineers can stop the train by activating air brakes by pulling a lever in the cab of the locomotive. Brakemen must still periodically inspect the brakes when the train is stopped, checking for leaks and other wear.

Conflict: The work of a brakeman, especially in the early days of railroading, was very dangerous. Loss of life and limb was commonplace. And railroad companies, bent on expansion and earning a profit, were reluctant to change their ways to protect their workers. And, at the time, there were no federal laws requiring railroads to make safety concerns a priority. This did not stop workers from organizing and walking off the job in protest.

Cooperation: The modern labor movement grew out of severe unrest between railroad workers and their employers during the late 19th century over issues such as improving safety on trains, shortening the work day and creating more reasonable pay and benefits. In addition to organizing into unions and striking, citizens also lobbied and petitioned the U.S. Congress to enact laws to extend various rights to workers. Finally, in 1893 the Railway Safety and Appliance Act forced railroads to invest in newer technology, like knuckle couplers and air brakes, to protect brakemen and other railroad workers, as well as travelers and bystanders. Other laws designed to protect workers were soon to follow.

Where do brakemen ride on the train?

Historically, brakemen rode in either the caboose and/or the engine of the train. Caboose first appeared in the 1840s as nothing more than a converted box car with windows. The term “caboose” is believed to have come from a nautical term for a galley or a cook shack. By the 1850s, the caboose became both the train crew’s sleeping and eating quarters and a storehouse for tools and supplies. A raised upper deck, called a “cupola,” was added, giving the train crew better visibility the rest of the train. Other types of cabooses were developed, including those with bay windows, which offered crews a side view of the train, as freight cars got taller.

Continuity: Brakemen often still accompany the engineer and conductor on freight trains and remain important members of the train crew.

Change: Making the brakeman’s job even easier and safer was the elimination of the caboose from the end of freight trains. Today, if a brakeman is needed on a train, he rides in the cab of the locomotive with the engineer and conductor. A small box with a flashing light called an “End-of-Train Device” (EOTD) or “Flashing Rear-End Device” (FRED) is attached to the rear coupler of the last car of the train. This electronic device provides the train crew important data about the train. The latest generation of FREDs and EOTDs even assist in stopping the train!

The Freight Conductor

Who is the freight conductor?

The conductor is the “boss” of the train. On a freight train, a conductor assists in making up trains, oversees the schedule and supervises the crew. Originally, the conductor’s office was the caboose. The first caboose appeared in the mid-1840s as nothing more than a box car equipped with windows. The term “caboose,” originally nautical term for a galley or a cook shack, was soon applied. By the 1850s, the caboose had a stove and became the train crew’s sleeping and eating quarters, as well as, a storehouse for tools and supplies. Soon, raised upper decks, called “cupola,” began to appear, giving the crew added visibility. Eventually, other types of cabooses were designed, including those with bay windows, which offered crews a side view of train’s with very tall freight cars. By the late 1980s, almost all cabooses had been retired.

Continuity: Freight trains still have conductors today. They still perform similar duties.

Change: Unlike other parts of the railroad, the conductor and his job have changed very little over the years. However, conductors no longer ride in cabooses at the rear of the train. Today, they ride in the locomotive cab with the engineer. The caboose has been replaced by an “End-of-Train Device” (EOTD) or “Flashing Rear-End Device” (FRED), developed in the late 1960s. An EOTD or FRED is a small metal box with a flashing light attached to the rear coupler of the last car. It reveals the trains’ location, monitors the brake-pipe pressure and transmits that information by radio to the cab. It also informs the crew if the rear end is stopped or moving.

The RPO Clerk

What is a Railway Post Office (RPO) car?

A Railway Post Office, or “RPO,” is a special coach that receives, sorts and delivers mail. An RPO is literally a “post office” on train wheels. As early as the 1830s, the post office began using railroads to deliver its mail, although the first RPO did not arrive until 1864. The early RPO cars only delivered letters, but by 1869 the service was expanded to include packages. RPO cars traveled behind the tender of a locomotive and came in three sizes: a 60 foot car, a 30 foot car, and a 15 foot RPO-baggage car combination (for local mail). A 60-foot car had a crew of eight clerks, a 30-foot car had a crew of four, and a 15-foot car had one. At their peak in the 1920s, there were more than 4,000 trains with RPO cars and more than 13,000 clerks.

What does a clerk on the RPO car do?

An RPO mail clerk is responsible for processing mail transported in a Railway Post Office car. He opens large bags of mail, sorts them by town and by type of package – either letter mail, packages, or similar parcels – and then bags them again to be delivered to the appropriate station. Their work was very precise, with both speed and accuracy being essential. They were required to be prompt, make few errors, and work long hours (from as little as 5 to 6 hours to as many as 12 to 14 per day). RPO clerks were tested twice a year, and they had to score at least 97 percent to remain qualified to do their jobs. This made studying and practicing at home essential. Their work could also be dangerous. In addition to letter mail, RPOs often carried railroaders’ pay checks. Fear of robberies required RPO mail clerks to carry guns and be locked inside the cars while in transit.

Continuity: Mail was transported by bag on Amtrak until 2004; however, its future is uncertain.

Change: Today, mail is no longer sorted and bagged on the train. The last regular run of a Railway Post Office car was in 1977. (Coincidentally, the Railroad Museum's GG-1 Electric Locomotive #4935 pulled this final RPO train.) Today, bags of mail are sorted before they are placed on the trains. Once unloaded, they are placed in trucks to be taken to local post offices.

The Baggage man

What is a baggage car?

A baggage car is typically located towards the front, and behind the locomotive, of a passenger train. It is a rail car designed to carry and store passengers' suitcases and other luggage, as well as packages and bags of mail, while the train is in motion.

Who is the baggage man? What does he do?

A baggage man works at a train station. He or she is responsible for safely loading passengers' suitcases and other luggage, as well as packages and bags of mail.

Continuity: Train stations, like airports and bus terminals, still have workers who load and unload luggage and packages from baggage cars.

Change: Unlike other parts of the railroad, the baggage man and his job have changed very little in nearly 200 years. They have motorized vehicles to assist them in moving large numbers of bags and boxes to and from baggage cars.



Discussion Questions

Where is a baggageman typically stationed on a railroad?

What is the baggageman's primary job?

Who is known as the "boss" of a freight or passenger train?

What jobs do brakemen perform?

In the past, where did conductors and brakemen ride on a freight train?

What has replaced this car on a freight train?

What was the nature of the work that took place in an RPO?

Were there any dangers involved in RPO service?

Activity – Who Am I? What Am I?

Have students in your class perform a pantomime. Quietly assign each student a railroad word or the name of a railroader and have them stand in front of the class and silently act out that word. The child who correctly identifies the word gets the next turn.

Activity – At Your Service

Have students develop their own fictitious railroads.

- ✓ Have students plan a route from your town to other towns or cities miles away. They should consider what towns should be connected by railroad, based upon population (commuters from outlying towns to larger cities) and products (factories or industries that will need products transported). (You might also consider having the students draw their own maps with a "fictional" route, as well as towns and topography.)
- ✓ Now geography comes into play. Trains cannot go up steep hills. Will they go around a hill, or dig a tunnel through it? Rivers and streams will require bridges. Where will stations need to be built? They will need to keep in mind such obstacles and necessities as they design their route.
- ✓ Obtain a real timetable. Discuss it with your students so they know how to read it. Next, have them create a timetable for their railroad based upon three trains traveling and making round trips. They should also consider busy times of day, like rush hour, weekend and holiday schedules, etc. When will freight trains run, as opposed to passenger trains?
- ✓ When students know what kinds of products they may be transporting based on the industries or farms in the area, have them decide what kinds of freight cars will be needed on their trains.
- ✓ Have a contest to decide on the name of their railroad. Have them design a company logo for it. (Look at some of the names and logos for past and current railroad lines.)
- ✓ Have your students develop a brochure, an advertising poster or a radio commercial to market their new railroad, explaining why people and companies should use it. They may even wish to conduct interviews with fellow students pretending to be people who worked on or who have ridden on the train.

Activity – The Railway Post Office

For one week, have students sort their own mail at home: advertising mail, personal mail, bills, magazines and catalogs. Have each student record the total numbers of items for each category. Make a chart or a graph to illustrate these figures. Discuss the results.

Stamps are miniature works of art, each one telling a story about history, geography or culture. Have students, either individually or in groups, design their own postage stamp recounting their visit to the Railroad Museum of Pennsylvania. Display their finished works when completed. For an even greater challenge, have students research a postage rate from a specific time period. Have them depict a kind of train that would have existed at that time. Was it steam, electric or diesel-powered? Was it freight or passenger or both?



Vocabulary

Baggage Car – A rail car that holds passengers’ luggage and even packages and bags of mail.

Baggageman – A railroad worker who loads and unloads a baggage car on a passenger train.

Ballast – Crushed stone underlying and supporting railroad tracks, also draining water away from them.

Brakes – Devices that help with controlling the speed and stopping the train.

Brakeman – A railroad worker who helps couple and uncouple rail cars, throws turnouts, checks the brakes and protects the train.

Caboose – A rail car attached to the rear of the train for use by the conductor and brakemen. Often, the caboose was the rolling office of the conductor, as well as crew quarters for the brakemen. Brakemen could also keep watch over the train from its specially located windows. Over the years, railroads have retired their cabooses in favor of a compact, electronic “end-of-train” device that can be clipped to the end of the last car of the train.

Coach – A rail car with seats to carry people.

Conductor – A railroad worker who is usually in charge of the train, but does not operate it. He or she ensures the safe and timely arrival of passengers or freight.

Coupler – The device on the ends of a rail car which allows it to be connected to another car. “Coupling” means connecting cars to one another to make up a train; “uncoupling” means removing or disconnecting one or more cars from a train.

Engineer – A railroad worker who runs the locomotive that pulls the train.

Fireman – A railroad worker who feeds the locomotives fire with wood or coal, adds water and greases the parts as needed.

Freight Train – A train that carries goods going to market or factories to be made into other goods.

Gandy Dancer – A railroad worker who builds the track. (The name “Gandy” may have come from the Gandy Manufacturing Company, which produced many of the tools used by railroad workers. The name “Dancer” referred to the rhythmic pattern in which track workers swung their hammers to maintain a quick pace and avoid hitting one another.)

Hotbox – An overheated wheel bearing which, if left undetected, can catch on fire, causing a wheel failure and possibly a derailment.

Locomotive – A vehicle on a railroad that pulls other train cars.

Passenger Train – A train carrying “passengers,” or people, from place to place.

Rail – The long, slender pieces of steel, iron or wood upon which a train’s wheels roll.

Rail Car – a vehicle used to move people and goods on tracks on a railroad; may be connected with other rail cars and a locomotive to form a train.

Railway Post Office (RPO) – A special rail coach that receives, sorts and delivers mail; literally, a “post office” on train wheels.

Spike – A large nail used to fasten rails to the wooden ties.

Station – A building located in a town served by a railroad where people may purchase tickets and await and board or exit a train.

Stationmaster – A railroad worker who is in charge of a train station, updates and maintains train schedules, assists travelers, and may assist with selling tickets, operating the telegraph and other duties.

Steam Locomotive – A locomotive that burns wood, coal or oil to convert water into high-pressure steam and then into motion.

Telegraph – A machine developed before the telephone for sending and receiving messages over long distances; uses a pattern of long sounds (“dashes”) and short sounds (“dots”) called “Morse Code”. Railroads relied upon telegraphs for much of their communication for more than a century until the widespread use of radio and modern telecommunications.

Tender – The rail car directly behind the steam locomotive used for storing extra fuel and water.

Ties – The pieces of wood lain beneath the rails to provide support.

Track – A path for railroads made up of rails, ties and stones.

Train – A long string of connected railroad cars behind a locomotive that runs on tracks.

Turnout – Often called a “switch”; a section of track with rails that pivot to allow for diverging routes.

Waybill – A piece of paper issued by the railroad that contains details of the shipment, route, and charges for goods transported in a specific freight car. The conductor of the freight train handles this paperwork and is responsible for carrying out their instructions.

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Many of these sources are available at the Railroad Museum of Pennsylvania. Contact us to inquire about these and other titles:

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