Middle Level

RAILROAD MUSEUM OF PENNSYLVANIA

Real Trains. Real History. Real Excitement.

The Empire Builders

Curriculum Guide

Grades 5-8/Ages 10-14

Tours:

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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.

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Wayne S. Spilove, Chairman
Barbara Franco, Executive Director
David W. Dunn, Museum Director

Trailways, Railways & Roadways

Middle Level

Grades 5-8/Ages 10-14

Museum Tour

Students use vintage maps, photos and primary sources to explore the trials and tribulations of travel between Philadelphia and Pittsburgh during several time periods. Students will employ critical-thinking and problem-solving skills to compare and contrast how the technology of travel and the experiences of travelers have evolved over two centuries. Primary sources, vintage vehicles and artifacts from the Museum's historic collection provide the context for this informative program.

The *Trailways, Railways and Roadways* program is divided into four eras, corresponding to a vintage map from each specific year listed below. Each of the following sections coincides with the four stops made along the actual museum tour:

1796 -- Pioneer Trails

1835 – The Main Line of Public Works

1871 – Riding the Pennsy

1930 – The Lincoln Highway

Pioneer Trails

Background Information

The idea of a horse-drawn carriage used for transporting passengers is very old, originating in Europe. This concept was brought over to America, where many stagecoach lines began appearing in the early 1700s. However, these stagecoaches never exceeded ten miles per hour and required frequent stops and overnight stays. Furthermore, some stagecoaches did not go far enough for some early travelers, who had to ride on horseback or walk the rest of the way.

In colonial America, inland travel was slow, difficult, and expensive. Travelers in Pennsylvania's sparsely settled western frontier used old Indian paths and French and Indian War supply routes. The "King's Highways" established by Pennsylvania's colonial government improved upon existing Indian paths, but they were hardly suited to anything beyond wagons and carriages. Although a 1683 law required citizens to help with the construction of roads and bridges, or pay a fee if they declined, maintenance was sporadic at best.

After the Revolutionary War, new technologies coincided with various campaigns to exploit the western markets of the Ohio and Mississippi River valleys. Both state and speculative interests spurred settlement of western Pennsylvania, increasing the need for a faster and easier means of moving goods between Pittsburgh and Philadelphia. What was required as nothing short of a transportation revolution, or what politicians called "internal improvements." Beginning in the 1790s, Pennsylvania and other states embarked on massive road-building campaigns to improve inland trade and to open new markets in hard-to-reach areas.

Turnpike Era

Many types of building methods were used during what historians now call the "turnpike era." Turnpikes were built in Pennsylvania in the late 1700s and early 1800s. These new roads quickened travel times, but required travelers to pay tolls every few miles to go any farther. Many early roadways used wood in their construction, including "corduroy" roads and "plank" or "puncheon" roads, but neither of them afforded travelers much comfort.

Stone was the chief material used to build the most important roadway of the turnpike era. Opened in 1794, the Philadelphia and Lancaster Turnpike was the nation's first major toll road. Originally, it was made of broken limestone and gravel which compacted and became firmer over time. By 1820, the road was dug up and re-laid with crushed stone using a successful design employed by John McAdam (from whom the term "macadam" was derived) in England. Despite its enormous costs to build, the turnpike turned a profit for its investors and inspired the formation of other companies to build paved roads. By 1828, Pennsylvania led the nation with over 3,110 miles of chartered turnpike roads, most of which were stone-surfaced.

Crossing Rivers

Because of the numerous rivers and streams impeding westward travel, many people also had to pay a ferry boat operator to cross the rivers, as few could be spanned by bridges at that time. These ferries were basically flatboats that hauled stagecoaches and wagons from one side of the river to the other. By the mid 1800s, ferries disappeared as bridges began spanning these shores.

The Big Picture

All in all, travel westward between Philadelphia and Pittsburgh around 1800 took three weeks (about 20 days) in good weather. To make matters worse, the last established stagecoach stop was in Shippensburg. A traveler has to complete the journey over the mountains of western Pennsylvania either on foot or on horseback. In 1804, the first stage service across the Appalachian Mountains was established. By 1820, the entire length of the "Pennsylvania Road" – made up of the Philadelphia and Lancaster Turnpike and various western Indian paths and war routes – was paved with stone, using the McAdam method, linking Philadelphia with Pittsburgh.

End of the Road…For Now

However, by the 1830s, these turnpikes and early wagon roads had to contend with new developments in transportation – canals and railroads. By the end of the 19th century, the railroad became the prime mover of goods and people across the state, transporting freight much faster and more efficiently than a horse-drawn wagon. Finally, by the middle of the 20th century, it was the highway system that beat them all. But with rising gas prices and environmental concerns, what the future has in store for Pennsylvania's transportation is anyone's guess.

Discussion Questions

In 1800, how long did a trip from Philadelphia to Pittsburgh take?

How long did the journey take?

What dangers did travelers face?

In 1800, what other forms of transportation were required to make the trip besides the wagon?

Why could a trip across the state not be made entirely by wagon?

How would it feel or sound to ride on a corduroy or plank road for many hours?

What were the advantages of corduroy or plank roads over dirt roads?

What other techniques for road construction were used at this time?

What are most roads made of today?

Activity – Wagons West!

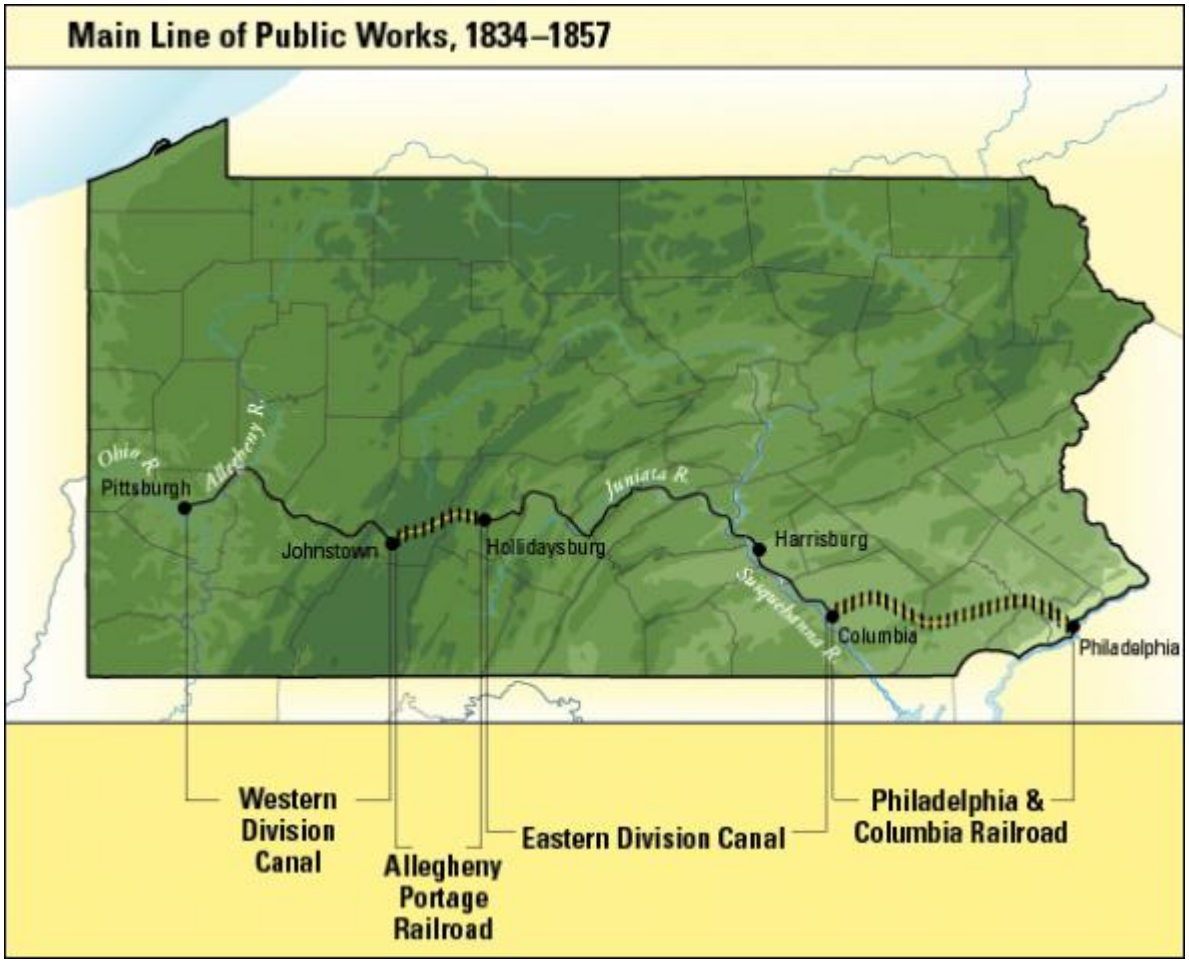
Have students mark an area on the floor approximately the size of a wagon bed (about 10 to 12 feet long by 4 to 6 feet wide by 2 feet high). Use tape or chalk to outline the area.

Ask the students to imagine that they are members of a family from Philadelphia moving west to buy land and settle in the rich farmlands of Somerset County in the early 1800s. Divide the class into small groups. Assign each group the task of deciding what to bring. Each group might make up a different list, which may include household items, foodstuffs, basic farm or garden tools, clothing, children's things, etc. Discuss their lists.

Divide the items into <u>three</u> lists:

1. Must-take items or essentials;
2. Items that are useful but could do without (like a special piece of furniture, etc.)
3. Fun items, toys, "extra" clothes.

With the measured area in sight, the class should come to agreement on what will be included. What is a necessity? Why? What things on the list can be left behind? Come to an agreement on what should stay and what should go. Once a final list is completed, estimate the measurement of the items that will be taken on the journey. Or have students measure similar items at home and report back the next day. Decide what will be taken so that all will fit, including people. Will everyone ride? How did you go about choosing what to take? If members of the group disagreed, how did you make the decision? How do you think members of an early settlement family made their decisions?



Background Information

The Main Line of Public Works was an awkward system of early railroads, inclined planes and canals built by the Commonwealth of Pennsylvania. The system opened in 1834 and was eventually sold to the Pennsylvania Railroad in 1857. Although cumbersome and complicated by today's—and even early 19th century—standards, the Main Line did reduce the trip across the state from about three weeks by wagon to around 4 ½ days. For about $10 a ticket, travelers used the following modes of transportation to get from Philadelphia to Pittsburgh after 1834:

Philadelphia and Columbia Railroad

(82 miles from Philadelphia to Columbia, PA in Lancaster County)

Opened in 1832, the Philadelphia and Columbia Railroad was the first leg of the journey between Philadelphia and Pittsburgh. It was 82 miles long and took up to seven or eight hours. At each end was an inclined plane – the Belmont Plane in Philadelphia and the Columbia Plane in Columbia – later bypassed by level rail lines. At first, passengers rode in wooden passenger cars pulled by horses moving at about six miles per hour (mph). By the late 1830s, the railroad began using first-generation steam locomotives, which could travel at around 20 mph. For the first ten years, private owners of horse-drawn rail cars shared the tracks with the state-owned locomotives. This became increasingly unsafe and impractical. Conflicts prompted a law that abolished the use of horses for power on the Philadelphia and Columbia on April 1, 1844.

Eastern Division Canal

(43 miles along the Susquehanna and Juniata Rivers to Hollidaysburg, PA)

At Columbia, passengers descended an inclined plane to the eastern shore of the Susquehanna River. Here, they would board canal boats that were pulled through channels of water by horses at speeds of less than five miles per hour. Bound for Hollidaysburg farther west, their trip took about fifty hours and covered nearly 170 miles.

Allegheny Portage Railroad

(36 miles from Hollidaysburg to Johnstown, PA)

Once in Hollidaysburg, passengers traveled by train to the base of the Allegheny Mountains. Here, they would ride the Allegheny Portage Railroad (APRR), a series of ten inclined planes on either side, pulled in rail cars by cables up the steep grades, powered by mules and later by stationary steam engines. In between each plane, a passenger train carried them to the next level. The 36-mile trip from Hollidaysburg to Johnstown over the Alleghenies took about six hours.

Although the Allegheny Portage Railroad was considered an engineering marvel at the time, passengers constantly lived in fear of their coaches careening down the hill. The hemp ropes that pulled them decayed all too early and broke all too often. Engineers were constantly tinkering to make it safer. The hemp was later replaced by stronger but more expensive wire rope conceived by John A. Roebling, who later designed suspension bridges in Pittsburgh, Cincinnati and Brooklyn. Despite improvements, the APRR barely lasted 20 in service, as new routes were being surveyed for building a railroad over Allegheny Mountain without the use of planes.

Western Division Canal

(103 miles from Johnstown to the terminus in Pittsburgh, PA)

Once in Johnstown, passengers would board another canal boat bound for Pittsburgh. This final leg of the journey covered 104 miles and taking thirty hours to complete. If everything went according to schedule and plan, a typical journey between Philadelphia and Pittsburgh on the entire Main Line of Public Works took 4 ½ days.

Travel on the Canals

When the option was jarring, dusty and muddy travel by stage, the silent, brightly painted and comfortable canal boats were a thrilling alternative. However, during the summer, the crowded boats afforded passengers no escape from the heat, not to mention mosquitoes and flies. Withdrawing to the less crowded roof of the boat, which served as the upper deck, put one in danger of low bridges. Inside, the canal boats were lined with cushioned benches and dinner tables in the center. At night, the boat was divided into men's and women's sides by a screen or curtain. The benches became beds and overhead hammocks could be pulled down.

Sectional Canal Boats

Four years after the Main Line opened in 1834, "sectional" canal boats were developed that could be carried on rail cars overland between the Eastern and Western Division canals. For passengers, these new boats permitted them to board, deposit their belongings, and never leave (if they so desired) until they arrived in Pittsburgh several days later. For operators, longer boats meant more riders and, thus, more income. But to get around tight curves with longer boats, they had to be easily taken apart into smaller sections and floated onto railroad flat cars. And they had to be able to be hoisted up the inclined planes of the Allegheny Portage Railroad as well. Of course, on the other side of the Alleghenies, the process had to be reversed. While somewhat impractical, it was a novelty enjoyed by a few of the more prosperous passengers.

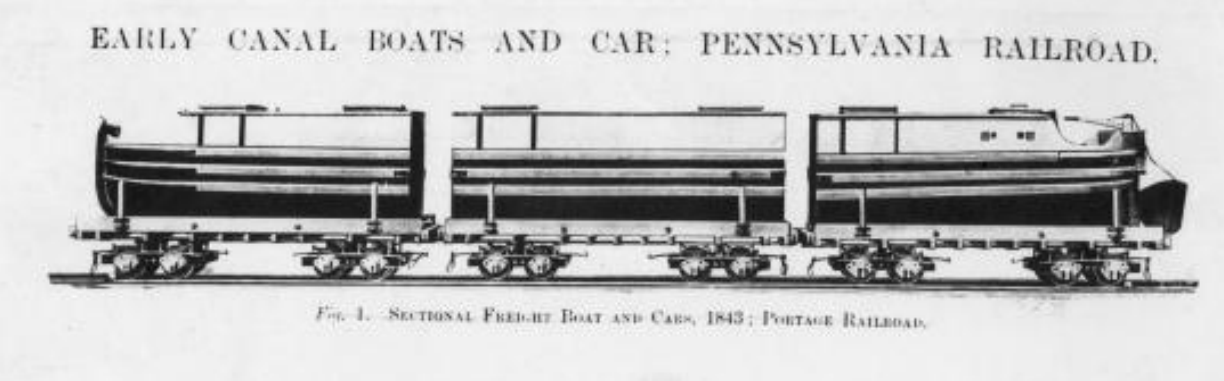


Fig. 1. Sectional Freight Boat and Cars, 1843; Portage Railroad.

End of the Line

While the Main Line system gave Pennsylvania its first fast transportation system, helping unify the state, it was never terribly profitable. In fact, it quite often lost money. The cost of maintaining the Portage Railroad was high, and the volume of goods could not complete with New York's Erie Canal. (In 1844, the Erie Canal moved more than 350,000 tons of goods. Pennsylvania's Main Line only moved 75,000 tons in that same year.)

The Pennsylvania Railroad (PRR), a private company, chartered in 1846, spelled doom for the Main Line of Public Works. Although work began on the New Portage Railroad, a $2.14 million state project to bypass several inclined planes with a more direct route, the PRR completed the Horseshoe Curve near Altoona in 1854, finishing off the first all-rail route across the Alleghenies, linking Philadelphia and Pittsburgh. With powerful locomotives now able to cross the state directly, it was not long before goods and passengers migrated from the canal system to the new railroad. The New Portage Railroad opened in 1856, but it was two years too late.

With the Pennsylvania Railroad cutting travel time across the state to less than 15 hours, citizens began to complain to their legislature about the high cost of maintaining the Main Line of Public Works. As a result, the state put it up for sale in 1855, and sold the entire Main Line system – the canals and the portage railroads – to the Pennsylvania Railroad in 1857 for $7.5 million. Although the PRR continued to use stretches of the canals for freight until 1901, it immediately began scrapping the Allegheny Portage Railroad. The only reusable section of the original Main Line of Public Works was the Philadelphia and Columbia Railroad. After being slightly rerouted, it became the PRR's Philadelphia-to-Harrisburg route, still in use today by Amtrak.

Discussion Questions

What was the purpose of the Main Line of Public Works?

What three forms of travel made up this system?

What made building the Main Line of Public Works difficult in the 1820s and 30s?

How long did the journey from Philadelphia to Pittsburgh take in 1835?

What was travel like on the Main Line of Public Works?

What were some of the problems and dangers encountered?

What made the Main Line of Public Works obsolete within 20 years of its opening?

Activity – Using Maps

Find a topographical map of your town or region. Study the map, pointing out landscape features like mountains, rivers and valleys. Determine the best route to get from East to West or from North to South. If a river or mountain blocks the way, choose another route or form of transportation available in 1800 to overcome the obstacle.

Activity – "The Great Debate"

Hold a debate set in the 1820s about the coming of a railroad. Split the class into two groups: *supporters* and *opponents*. Have groups brainstorm and write down their views. Open the debate with the teacher or a student as moderator. Compare and contrast the views of students living today with those of people of the 1820s.

Activity – Using Primary Sources

Read both Charles Dickens' and Philip Nicklin's accounts of their trips on the Main Line of Public Works. Explain some things about the ride they enjoyed. What were some things that made them uncomfortable? Were there any dangers involved? Would you have been courageous enough to make the same trip?

Charles Dickens, author of *A Christmas Carol*, *Oliver Twist*, and *A Tale of Two Cities*, traveled throughout the United States, including Pennsylvania, in the mid-1800s. In *American Notes for General Circulation* (1842), he reveals what travel was like on the Main Line of Public Works.

> *The train calls at stations in the woods, where the wild impossibility of anybody having the smallest reason to get out, is only to be equaled by the apparently desperate hopelessness of there being anybody to get in. It rushes across the turnpike road, where there is no gate, no policeman, no signal: nothing but a rough wooden arch on which is painted "When the bell rings, look out for the locomotive." On it whirls headlong, dives through the woods again, emerges in the light, clatters over the frail arches, rumbles upon the heavy ground, shoots beneath a wooden bridge which intercepts the light for a second like a wink, suddenly awakens all the slumbering echoes in the main street of a large town, and dashes on haphazard, pell-mell, neck-or-nothing, down the middle of the road. There – with mechanics working at their trades, and people leaning from their doors and windows, and boys flying kites and playing marbles and men smoking and women talking and children crawling and pigs burrowing, and unaccustomed horses plunging and rearing, close to the*

very rails – there – on, on, on – tears the dragon of an engine with its train of cars; scattering in all directions a shower of burning sparks from its wood fire; screeching, hissing, yelling, panting; until at last the thirsty monster stops beneath a covered way to drink, the people cluster round, and you have time to breathe again.

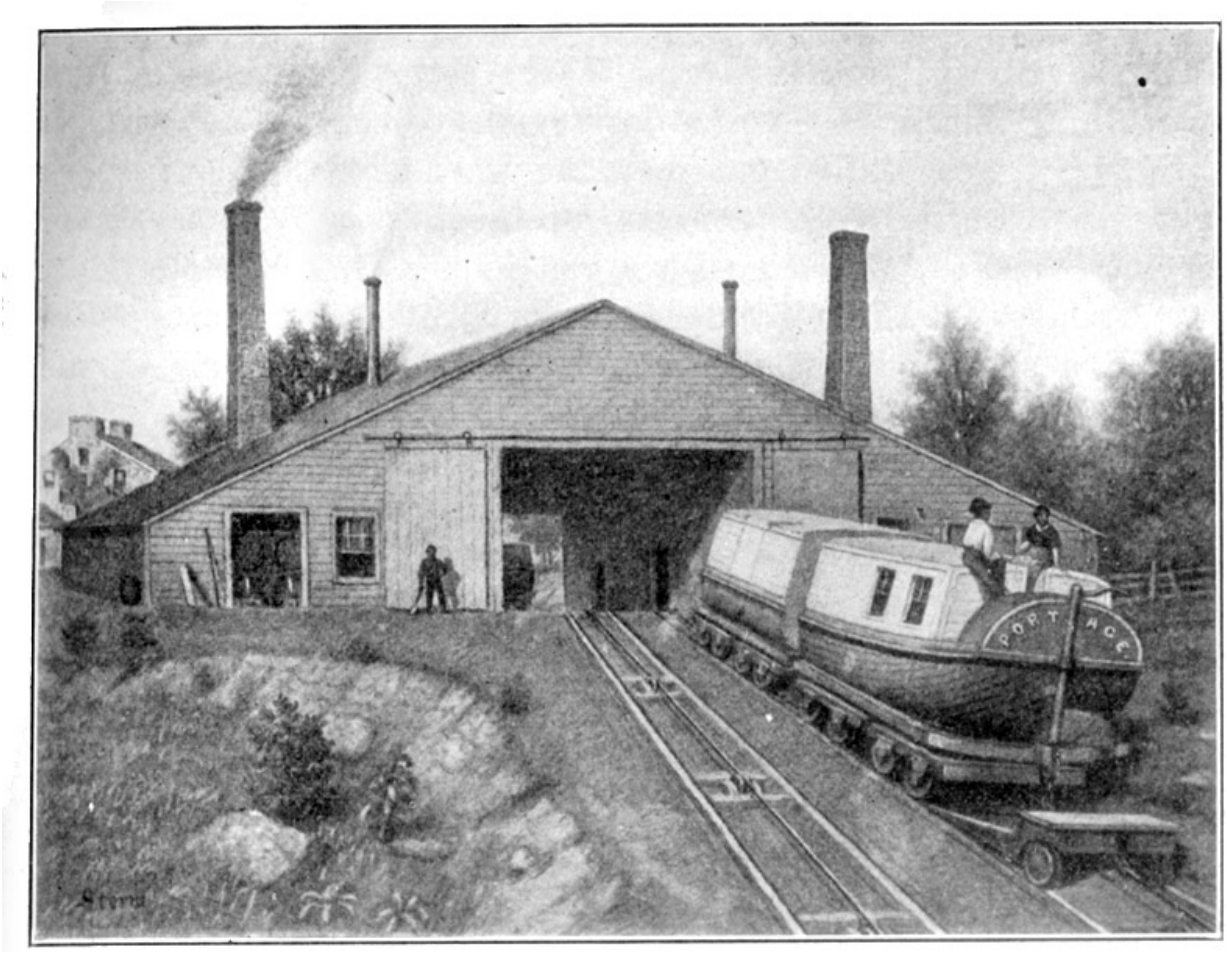
Below is an excerpt from author Philip H. Nicklin's trip on the Allegheny Portage Railroad from Johnstown to Hollidaysburg on August 21, 1835:

Yesterday at Johnstown we soon despatched the ceremony of a good breakfast, and at 6 a.m. were in motion on the first level, as it is called, of four miles in length, leading to the foot of the first inclined plane. The level has an ascent of 101 feet, and we passed over it in horse-drawn cars with the speed of six miles an hour. This is a very interesting part of the route, not only on account of the wildness and beauty of the scenery, but also of the excitement mingled with vague apprehension, which take possession of every body in approaching the great wonder of the internal improvements of Pennsylvania. In six hours the cars and passengers were to be raised 1,172 feet of perpendicular height, and to be lowered 1,400 feet of perpendicular descent, by complicated, powerful and frangible [breakable] machinery, and were to pass a mountain, to overcome which, with a similar weight, three years ago, would have required the space of three days. The idea of rising so rapidly in the world, particularly by steam or a rope, is very agitating to the simple minds of those who have always walked in humble paths.

As soon as we arrived at the foot of Plane No. 1, the horses were unhitched and the cars were fastened to the rope...The stationary steam engine at the head of the plane was started and the cars moved majestically up the steep and long acclivity in the space of four minutes...The cars were now attached to horses and drawn through a magnificent tunnel 900 feet long...Now the train of cars were attached to a steam tug to pass a level of 14 miles in length. This lengthy level is one of the most interesting portions of the Portage Railroad, from the beauty of its location and the ingenuity of its construction. It ascends almost imperceptibly through its whole course...and passes through some of the wildest scenery in the state...The valley of the little Conemaugh river is passed on a viaduct of the most beautiful construction. It is one arch, a perfect semicircle with a diameter of 80 feet...The 14 miles of this second level are passed in one hour, and the train arrives at the foot of the second plane...The third level is passed by means of horses. The third plane has a length of 1,480 feet, and a perpendicular height of 130 [feet]. The fourth level is passed by means of horses. The fourth plane has a length of 2,196 feet, and a perpendicular height of 188 [feet]. The fifth level is three miles long, rises 26 feet and is passed by means of horses. The fifth plane brings you to the top of the mountain, 2,397 feet above the level of the ocean, 1,399 feet above Hollidaysburg, and 1,172 feet above Johnstown. At this elevation in the midst of summer, you breathe an air like that of spring...Three short hours have brought you from the torrid plain, to a refreshing and invigorating climate. The ascending apprehension has left you, but it is succeeded by the fear of the steep descent which lies before you; and as the car rolls along this giddy height, the thought trembles in your mind, that it may slip over the head of the first descending plane, rush down the frightful steep, and be dashed into a thousand pieces at its foot.

The length of the road on the summit of the mountain is one mile and five-eighths, and about the middle of it stands a spacious and handsome stone tavern. The descent on the eastern side of the mountain is much more fearful than the ascent on the western, for the planes are much longer and steeper, of which you are made aware by the increased thickness of the ropes; and you look down instead of up.

There are also five planes on the eastern side of the mountain, and five slightly descending levels, the last of which is nearly four miles long and leads to the basin at Hollidaysburg; this is traveled by the cars without steam or horse, merely by the force of gravity. In descending the mountain you meet several fine prospects and arrive at Hollidaysburg between twelve and one o'clock.



Riding the Pennsy

Background Information

In 1846, the Pennsylvania Railroad was chartered to construct a rail line from Harrisburg to Pittsburgh. The new railroad opened on February 15, 1854, using the Rockville Bridge (*above*), the ingenious "Horseshoe Curve," the tunnels at Gallitzin and other engineering feats. In 1857, the PRR purchased the Main Line of Public Works from the state at auction for $7.5 million. This included the canals, the Allegheny Portage Railroad and the old Philadelphia and Columbia Railroad. Within a short time, travel and shipping across Pennsylvania had become seamless.

The 1860s and 70s was a great period of expansion for the PRR, with the railroad buying up and leasing older rail lines. These new routes gave the PRR access to New York, Baltimore and Washington, DC. At that time, the PRR's bread-and-butter was still its Philadelphia-to-Pittsburgh main line. A typical ride across the state in the 1870s could take as little as fifteen hours, covering 355 miles, for a mere $8 a ticket.

Crossing rivers and climbing mountains were no trouble for the railroads during this era. Trains could use sturdy bridges to cross the rivers and streams, and locomotives were much improved over the wood-burners of the 1830s and 40s. Most were coal-burners, which could pull much longer strings of cars and could travel at impressive speeds of around 50 miles per hour. Coaches and other rail cars were made mainly of wood. Ventilation was provided by open windows and "clerestory" vents in the roofs; heat was provided by stoves in each car. The primitive nature of these early railroads set the stage for a dramatic increase in their frequency and severity by the latter half of 19th century. Arguably, expansion outpaced innovation and safety in the first several decades.

Competition and complaints drove the railroad industry to improve. Steam from the locomotive would soon be used to provide heat and hot water for the coaches, and eventually as power generators for lighting and air compressors for brakes. They began to agree on standards that continue to this day, including a uniform track gauge of 4 feet 8-1/2 inches between the rails, and better couplers and other fittings needed to freely exchange cars among railroads. Standard time zones, established by the railroads in 1883, replaced the fragmented system by which, as a PRR timetable once explained, "Philadelphia local time…is seven minutes faster than Harrisburg time, thirteen minutes faster than Altoona time, and nineteen minutes faster than Pittsburgh time." Other creature comforts were addressed after the Civil War in the form of sleeping and dining cars. Safety became a top priority, with improved signaling, speed restrictions and the use of steel (replacing wood and iron) in the construction of coaches, locomotives and bridges.

Pennsylvania's railroads of today can trace their origins to these humble beginnings. Although the Pennsylvania Railroad no longer exists, its former main line is still an important cross-state link, composed of Amtrak's Philadelphia to Harrisburg "Keystone Corridor" and Norfolk Southern's Pittsburgh Subdivision. Today, a trip across the state can be made in about 7 ½ hours by Amtrak's *Pennsylvanian* trains or similar services.

Discussion Questions

How long did the journey from Philadelphia to Pittsburgh take after the Pennsylvania Railroad was completed in 1854?

What steps did the PRR take to acquire the property to complete its future right-of-way from Philadelphia to Pittsburgh? What feats of engineering were required to finish the new railroad?

In the 1870s and 80s, the loss of life due to railroad accidents reached its peak. What were the causes of many of these accidents?

Activity – Scheduling a Train Trip

Today, Amtrak still uses this same route as its sole New York-to-Chicago thoroughfare. Have your students look on the Amtrak webpage (www.amtrak.com). Use the fare finder to determine how much it would cost to travel from Pittsburgh to Philadelphia. You may wish to use a paper Philadelphia-to-Pittsburgh timetable instead, which can be obtained from any Amtrak station or local travel agency. Compare and contrast the journeys *then* (1796, 1835 and 1871) and *now* (early 21st century).

Activity – "The Making of a Railroad Empire"

Building a railroad to blaze new trails through crowded cities and untapped wilderness was a massive undertaking in the 19th century. This small-group activity places the fate of a fledgling railroad company in the early years of the industry squarely in the hands of the students. Who is going to pay for it? Who is going to build it? Where will you build it? How do you cross that river or cut through that mountain—all without the aid of heavy machines or power tools?

1. Come up with a plan: Mix up and place the following steps on a chalk or bulletin board:
   a) Seek investors and other sources of money
   b) Get maps and pictures of the area
   c) Choose the best route
   d) Survey the route
   e) Hire the laborers
   f) Clear the route
   g) Prepare the roadbed
   h) Lay the track
   i) Build bridges and tunnels
2. Choose your route: Study a local, county or state map. Assign each group a different region, consisting of at least two specific towns, to be connected by their new railroad. This new railroad will haul both freight and passengers. Are there any obstacles (i.e., mountains, rivers, etc.) blocking your way? How many stops will you have?
3. Advertise the new railroad: Have students develop some marketing material for their new companies. Ask them to come up with a unique name and a logo their new railroad. Then have them design and draw a poster and brochure for their company. Show them ads from airlines or cruise lines from magazines or newspapers as a way to not only compare and contrast them with railroads but also as a means of illustrating how these companies try to entice people to pay money to become their passengers.

The Lincoln Highway

Background Information

In 1912, the only improved roads in the United States were confined to the areas around towns and cities. A road was considered "improved" if it was graded, especially with either gravel or brick. (Asphalt and concrete were still years away in many cases.) Most of the nation's 2.5 million miles of roads were just dirt: bumpy and dusty in dry weather, impassable in wet weather. Worse yet, some roads spread out aimlessly from the center of town. To get from one place to another, it was much easier to take the train.

In 1913, construction began on the nation's first transcontinental road, the Lincoln Highway. When completed, this new road would run from New York City to San Francisco, stretching some 3,389 miles. In Pennsylvania, much of the Lincoln Highway was constructed by improving and linking up pre-existing roads, including the early turnpikes, like the Chambersburg and Bedford Turnpike, and Forbes Road. Making a trip from Philadelphia to Pittsburgh was now much easier still. On a good road such as the Lincoln Highway, early automobiles of the era, like Henry Ford's Model T could achieve a speed of over 30 miles per hour and could make the trip from Philadelphia to Pittsburgh in about eight hours.

The creation of the Lincoln Highway had a significant impact on how people traveled. No longer were they held to the schedules of railroads. Instead, more and more people chose to tour America at their own leisurely pace by driving themselves. As the automobile became more popular, the face of the roadside changed. Filling stations, tourist cabins, motor courts, and restaurants lined the Lincoln Highway to service travelers. As competition for business increased, entrepreneurs became creative in their attempts to solicit customers. They built unique structures, like the Coffee Pot diner (1927) and the S.S. Grand View Point Hotel (1932) in Bedford, and later the Haines Shoe House (1948) near York.

The Lincoln Highway was also crucial to the development of commercial traffic. During World War I, railroads were unable to handle the amount of freight being sent to the eastern seaboard ports. The alternative was to use trucks on the Lincoln Highway.

By 1925, when the transcontinental route was completed, the United States began simply numbering the highways and eliminating name designations. As a result, in Pennsylvania, the Lincoln Highway began to be referred to on maps as simply "Route 30". In 1940, the Lincoln Highway itself received competition in the form of the Pennsylvania Turnpike, or "I-76." With tunnels blasted through the mountains, I-76 provided an even quicker and easier route across the state.

Discussion Questions

What were roads like during the early 20th century, during the early years of the automobile?

What were some of the dangers involved in driving an automobile across the state before the Interstate system was created?

What kinds of services for automobile travelers sprang up all along the Lincoln Highway?

Describe the similar kinds of services that exist today on America's highways and toll roads.

Activity – Calculating Travel Costs

Use the toll mileage calculator on the Pennsylvania Turnpike webpage (www.paturnpike.com) to compare the modern turnpike highway of today with the Lincoln Highway of 1930, both of which still connect Pennsylvania's two largest cities of Philadelphia and Pittsburgh. Address the following questions:

- How much does it cost today to travel between Philadelphia and Pittsburgh?
- What is the distance is between Pittsburgh and Philadelphia on I-76?
- How many miles you could go on a 15-gallon tank of gas assuming you have a car that gets 30 miles to the gallon? Figure out how much it would cost to fill up your car (using today's prices).
- Compare and contrast a similar trip on the Lincoln Highway in 1930.
- Compare and contrast a similar trip by railroad today, using the Amtrak webpage (www.amtrak.com).
- Compare and contrast a similar trip on an airplane in the present day, using the United Airlines webpage (www.united.com).

Activity – Trekking on the Lincoln Highway

1) Have students use the available primary and secondary sources, as well as other resources, including the internet, newspapers, brochures, maps, postcards, and advertisements to plan a typical Pennsylvania vacation in the 1930s.

   a) Organize students into "travel groups" of a similar or diverse design – for example, a family similar to one of their own, groups of women, immigrants, African Americans or other minorities or ethnic groups.

   b) Have students, in their small groups, agree on and document the following:

      i) budget and time available for this trip.
      ii) itinerary of sights to see and places to eat and sleep;
      iii) daily mileage, driving time and gasoline needs and costs;
      iv) priority listing of the necessary clothes, tools, equipment and supplies to bring with them;
      v) sampling of driving games to occupy their time in the car, at roadside stops, etc.

   c) Plan at least one calamity along the way – i.e., a flat tire, a closed auto camp, running out of gas, lodging or car service denied, etc. Have groups document how they might resolve the situation in the context of the 1930s.

   d) After groups have addressed all of the information above in their vacation plans, have them present their work to the rest of the class.

   e) Compare and contrast car travel and changes in cultures, places and communities in Pennsylvania between the 1930s and today:

      i) What is the same about planning and taking vacations in 1930 and today? What is different?

      ii) How have roads and roadside services in Pennsylvania changed? What remains the same?

      iii) What was the decision-making process of each travel group? What factors influenced their decisions and choices?

      iv) How did problems, either encountered or imagined, change between 1930 and today?

Vocabulary

Automobile – A usually four-wheeled vehicle with its own power system (an internal-combustion engine) designed for passenger transportation on streets and other roadways.

Canal – A manmade waterway used for irrigation, shipping, or travel.

Canal Basin – Essentially large holding ponds or ports at the beginning or end of a canal, the basins often looked like large warehouses or modern day airports as boats loaded with agricultural produce and industrial goods, and often hundreds of passengers, all waiting to be hauled on the next leg of the journey.

Canal Boat – A boat used to carry freight or passengers on a canal, which is drawn by horses walking on the towpath running alongside the waterway.

Corduroy Road – Also known as a "log road," a type of road made by placing sand-covered logs perpendicular to the direction of the road over a low or swampy area. Although better than travel over impassable mud or dirt roads, corduroy roads offered travelers a bumpy ride in the best of conditions and were hazardous to horses when loosened logs began to roll and shift.

Fare – The money a person pays to travel by public transportation.

Ferry – Before many bridges were completed across Pennsylvania's waterways, wagons, goods and people were often charged a fee to be floated across rivers and other waterways by boat.

Highway – A main roadway linking major towns and often bypassing areas with stop-and-go traffic.

Hotel – A business that provides temporary overnight lodging for travelers. Sometimes, other services like food and entertainment are offered as well.

Inclined Plane – a type of railway in which rail cars connected to cables are pulled up a very steep slope either by mule or stationary steam engine.

Inn – A business that provides overnight lodging, food and drink for travelers.

Lock – A device for raising and lowering boats between different water levels on canals.

Map – A drawing or picture showing selected features of the Earth's surface, usually drawn to a given scale.

Menu – A list of dishes served at or available for a meal.

Passenger - A person riding in or on a vehicle.

Passenger Car - A railroad car built to carry many people from one place to another.

Plank Road – Also called "puncheon" roads, these early roadways were made of thick, flat wooden boards placed in the direction of the road and supported by crossbeams. Although they were easier to drive over than corduroy roads, plank roads were more costly to repair and maintain.

Rail – Part of a railroad track, consisting of two long, slender pieces of steel, iron or wood running parallel to one another upon which a train's wheels roll.

Railroad – A permanent roadway using parallel steel rails over which trains or other wheeled vehicles roll, also called *tracks*; a transportation company that uses some form of wheeled vehicles which roll on tracks.

Right-of-Way – A piece of property owned by a railroad or set aside for railroad use by the government as a main pathway upon which tracks are built.

Stagecoach – A carriage pulled by horses that carried passengers and mail and runs on a schedule between established stops. These carriages were called stagecoaches because the distances between stops were known as "stages" of the journey.

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

Through Passenger – A passenger that goes non-stop past principal stations on a line of travel.

Timetable – A printed schedule of arrival and departure times and destinations.

Towpath – A path along a canal or river used by animals for towing boats.

Trail – A marked or beaten path, as through woods or wilderness.

Turnpike – A road one must pay a fee, called a "toll," to use.

Wagon Road – An open way for a four-wheeled vehicle transporting goods or passengers.

Way Passenger – A passenger picked up or dropped off at a stop between the principal stations on a line of travel.

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Wrecks & Remedies

Middle Level

Grades 5-8/Ages 10-14

Museum Tour

Students gain an understanding of the dangers of train travel, the injuries sustained and the steps taken to reduce the risks. Students will investigate the causes of real-life railroad disasters and come up with innovations to improve safety onboard trains. Their conclusions will be compared to the actual remedies that grew out of clashes between labor and industry at the turn of the 19th and 20th centuries. Primary sources, vintage vehicles and artifacts from the Museum's historic collection provide the context for this informative program.

The *Wrecks and Remedies* tour offers a unique opportunity for teachers and students, as well as museum staff, to mix and match different types of accidents with different eras in American history. As an introduction, a brief summary of the different factors leading to these accidents is provided. The rest of this part of the Curriculum Guide is divided into the most common types of accidents, with several examples given for each one, including:

Boiler Explosions Collisions Bridge and Structural Collapses Poor Track Conditions

Excessive Speed Crossing Accidents Runaways and Other Equipment Failures

Baackground Information

Most railroad accidents can be attributed to one or more of the following factors:

Human Error – Most, if not all, accidents on railroads can be attributed to human error at some point, considering the fact that people built and operate the tracks and the trains.

Inadequate Technology – In the early days of railroading, primitive methods of building the tracks and trains, as well as the crude materials used, not only contributed to the causes of accidents but also increased the likelihood that many people were not going to be able to escape with their lives. Although the technology has improved, and safety is a priority on railroads, greater speeds and traffic have not entirely eliminated accidents, nor lessened their severity in certain circumstances.

Failing Infrastructure - In the early days of railroading, primitive methods of, and crude materials used in, building bridges, tunnels and tracks not only contributed to the causes of accidents but also increased the likelihood that many people were not going to be able to escape with their lives.

Poor Communication – In the early days of railroading, flags, lanterns and a locomotive's whistle and bell were the only means of communication between workers on the train and people on the ground. The invention of the telegraph and its widespread use by railroads provided some advanced warning and expedited the arrival of assistance when accidents occurred. Telephones and radios were gradually improving communication even more by the time railroad traffic expanded to all parts of the country.

Excessive Speed – As with automobiles on the roadways, there is very little to stop a train from going beyond a safe speed for a given route. Many sections of track, particularly curves, were not built to eliminate certain physical forces. Often, accidents involving excessive speed caused derailments or collisions with other trains. In most cases, these accidents resulted in serious injuries or even death to passengers or bystanders. Equipment failure causing a loss of control or the failure of the engineer to adhere to posted speed restrictions were often to blame for trains exceeding their posted speed restrictions.

For this program and its curriculum connections, we have divided this section according to the most common types of railroad accidents, their cause and their outcomes.

Boiler Explosions

Example #1: Explosion on the William & North Branch (1905)
On October 6, 1905, steam locomotive No. 16 *The Henry McCormick* had just stopped in Ringdale, Pennsylvania, to take on water. At 7:30 p.m., its boiler exploded, sending pieces of the locomotive flying in all directions. Engineer David Davis was killed instantly, and fireman Cleon Karschner died that Saturday of his injuries at a local hospital. Fortunately, none of the passengers were injured.

Example #2: San Antonio, Texas – Boiler Explosion (1912)
The largest boiler explosion in American history occurred at the Southern Pacific roundhouse in San Antonio, Texas, on March 18, 1912. On that day a steam locomotive had just undergone heavy repairs in the Southern Pacific Railroad shops when its steam pressure was raised just before putting the engine back into service. The resulting explosion destroyed the engine and many of the surrounding buildings. In all, 26 people were killed and 32 injured. One chunk of the boiler weighing 16,000 pounds was blown about 1,500 feet away, while another weighing 900 pounds flew 2,250 feet, ripping out the side of a house.

Collisions

Example #1: The Great Train Wreck of 1856
On July 17, 1856, two North Pennsylvania Railroad trains collided near Fort Washington, PA. One train was carrying 1,500 Sunday school children to a picnic. Upon impact, the passenger train's boiler exploded, and the train with the children derailed. Fifty-nine were instantly killed, and dozens more died later from injuries. The passenger train's conductor committed suicide the same day, although he was later absolved of any responsibility for the accident. The excursion train was a ½ hour late in leaving the station. The delay, poor communication and signaling were blamed for the collision.

Example #2: Western Maryland Wreck of 1905
On June 17, 1905, Western Maryland Railway train No. 5 collided head-on with a double-headed freight train near Patapsco, MD. The freight train's crew shrugged off the warning of the flagman, claiming that his watch was wrong. They entered the turnout leading onto the mainline track before the passenger train was completely out of the way. The accident resulted in 26 deaths and 20 injuries, including the crew of the freight train.

Example #3: Tyrone Collision (1913)
On July 30, 1913, two Pennsylvania Railroad trains collided at the station at Tyrone, PA. The engineer of Chicago mail train No. 13 ran through a stop signal. His locomotive rear-ended and crushed the last coach of train No. 15, the *Pittsburgh Express*. The first postal car was thrown across the track and into the depot. The engineer was killed, and 163 passengers were injured. All-steel cars on both trains were credited with saving lives.

Bridge and Structural Collapses

Example #1: Utica Bridge Collapse (1858)
On May 11, 1858, on the New York Central line, a 40-foot wooden bridge near Utica, New York, collapsed under the weight of two passing trains, a westbound freight train and the eastbound *Cincinnati Express*. The passenger cars tumbled into the creek below, killing nine people and wounding fifty-five others in the impact.

Example #2: the Ashtabula Bridge Disaster (1876)
On the evening of December 29, 1876, as the Lake Shore and Michigan's *Pacific Express* crossed the Ashtabula River, the bridge collapsed, dropping the second of two locomotives and 11 passenger cars into the frozen creek 150 feet below. The fiery crash killed 92 and injured 64 more. The investigation that followed determined the Howe truss bridge was faulty and not able to handle such a load.

Poor Track Conditions

Example #1: The Angola Horror (1867)
On December 18, 1867, near Angola, New York, the Buffalo-bound *New York Express* of the Lake Shore and Michigan Southern derailed due to poor track maintenance, and it plunged forty feet off a truss bridge into Big Sister Creek. The next car was also pulled from the track and sent rolling down the far embankment. Nearly 50 people were killed in the crash and from the fires that ensued. Forty more were injured.

Example #2: Pennsy Troop Train Wreck (1945)
On May 21, 1945, near Piqua, Ohio, eight of the 17 cars of a westbound Pennsylvania Railroad passenger train derailed and plunged down a 20-foot bank, injuring 24 of the 400 US soldiers on board. At first, a broken rail was seen as the cause, but it was later determined that the train had been moving too fast for the track conditions and lifted off the track in areas where no ballast existed. Poor track maintenance due to wartime personnel shortages was blamed for the accident.

Example #3: The Great Chatsworth Train Wreck (1888)
On the evening of August 10, 1888, near Chatsworth, Illinois, a 15-car train of fully-occupied Pullman sleepers and coaches on the Toledo, Peoria and Western bound for Niagara Falls came to a wooden trestle over a shallow culvert just before midnight. The engineer discovered that it was on fire, but it was too late to stop the double-headed train with 600 people on board from crossing the weakened structure. The lead engine made it across the burning trestle at 35 miles per hour, but under the weight of the second locomotive the wooden span collapsed, toppling into the creek, dragging nine of the ten cars with it into the ravine. The cars in the front half telescoped into one another, and killing 84 and injuring 279. A crew of track workers had been burning weeds earlier that day and had failed to completely douse the fire upon completion of their work day. The remaining embers started a blaze which quickly spread to the bridge on that dry summer evening.

Excessive Speed

Example #1: The Wreck of the *Red Arrow* (1947)
On Tuesday, February 18, 1947, at 3:25 in the morning, the Pennsylvania Railroad's *Red Arrow* passenger train, pulled by two steam locomotives, was en route from Detroit to New York City. When it came to Bennington Curve near Gallitzin, Pennsylvania, the train jumped the tracks, sending ten of its fourteen cars down into a 150-foot ravine. Ultimately, 24 people were killed and 138 were injured in the accident. The cause of the accident was determined to be excessive speed around the curve. The prescribed speed around the curve was 30 miles per hour. The *Red Arrow* was rounding the curve at speeds in excess of 65 mile per hour. Snow, cold weather and the steepness of the ravine made rescues and retrieval of bodies extremely difficult.

Example #2: Wreck of the *Broker* (1951)
On February 6, 1951, at Woodbridge, New Jersey, the *Broker*, a Pennsylvania Railroad passenger train, derailed on a temporary trestle, killing 85 people and injuring over 500. Seven days before the accident, the railroad instructed crews operating in the area not to exceed 25 miles per hour, so that laborers working on the New Jersey Turnpike could set up a temporary trestle in order to work on upgrades to the main track. However, the engineer did not heed the speed restriction when he piloted his train full speed over the temporary span. Water shifting in the locomotive tender caused it to tip over, dragging the four overloaded passenger cars with it.

Crossing Accidents

Example #1: Accident on the Camden & Amboy Railroad (1855)
On August 29, 1855, horse-drawn carriage was struck at a railroad crossing. The driver failed to see the rear end of the train backing toward him until it was too late. He tried to stop, but his horses panicked and dashed right in front of the train. The driver of the carriage survived, although his horses were pulled underneath, derailing the last three cars and killing 23 passengers. The engineer later testified that he repeatedly blew his whistle as be backed toward the crossing, but the driver of the approaching carriage did not hear the whistle because he was hearing-impaired.

Example #2: Bourbonnais Train Accident (1999)
On March 15, 1999, Amtrak's southbound *City of New Orleans* passenger train collided with a semi truck loaded with steel in Bourbonnais, Illinois. The impact derailed 14 cars, killing 11 passengers, injuring 122 and resulting in over $14 million in damages. A National Transportation Safety Board (NTSB) investigation attributed the cause to the truck driver trying to beat the train across a grade crossing. The NTSB recommended increased enforcement of grade crossing signals, installation of event recorders at all new or improved crossings and procedural changes to provide emergency responders with accurate lists of all crewmen and passengers aboard the trains. The city of Bourbonnais erected a memorial near the site to remember those killed.

Runaways and Other Equipment Failures

Example #1: The Worst Hotbox Accident (1943)

The nation's worst hotbox accident occurred on September 6, 1943, when the Pennsylvania Railroad's *Congressional Limited* derailed in Philadelphia, Pennsylvania, due to a "hotbox," or an overheated axle bearing. The accident occurred as the signalman at Frankford Junction was telephoning the next tower to stop the train. Eighty passengers were killed, and 117 injured.

Example #2: The *Fed Ex* Wreck (1953)

On January 15, 1953, approaching Washington, DC's Union Station, the brakes partially failed on the Pennsylvania Railroad's *Federal Express* overnight train from Boston. Unable to stop, the 16-car train raced out of control through the interlocking, down a station stub and through the end-of-stub bumper before crashing into the station concourse, destroying the main newsstand and the stationmaster's office. The massive GG-1 electric locomotive pulling the train collapsed the floor and fell into the basement. Amazingly, no one was killed. President-elect Dwight D. Eisenhower's inauguration was scheduled the following week, leaving insufficient time to remove the locomotive. Therefore, workers simply built a wooden platform over the wreckage until the event was over. After the inauguration, the unit was cut up into three pieces, hauled to Altoona, PA, where it was reassembled and put back to work pulling trains for another three decades. GG-1 No. 4876 is currently awaiting restoration as part of the collection of the B&O Railroad Museum in Baltimore.

Discussion Questions

What were some of the most common causes of railroad disasters?

What kinds of conditions set the stage for the tremendous loss of life on railroads during the late 19th century?

What technological innovations were introduced during the next few decades that greatly improved safety and reduced the loss of life and limb?

What were some of the improvements that were made to trains, structures and personnel training in the aftermath of these accidents?

Despite all of the advances in technology, construction and safety, why do serious accidents and loss of life still occur on today's railroads?

Activity – Finding Fault

All accidents—whether on land, sea or air—have their own unique set of circumstances, yet most share some similar reasons for occurring. Either individually or in small groups, have students examine accidents in current events. Consider stories recounted in local newspapers, television news reports, the internet or other popular media. Compare and contrast the causes and outcomes of accidents involving automobiles, airplanes and trains. Share and discuss the findings.

- ✓ How do they differ?
- ✓ Which occur more frequently?
- ✓ Who is typically first to respond to each of these accidents?
- ✓ Which levels of government are involved in the investigation of each type, federal, state, local, or a combination?
- ✓ Who or what is most often to blame for each of these types of accidents?
- ✓ How do the responses to various types of accidents differ?
- ✓ Were there any changes to laws or infrastructure as a result of each type of accident?

Vocabulary

Boiler Explosion – An explosion resulting from a weakening of a steam locomotive's pressurized boiler. Most often, when an engine crew failed to keep water over the crown sheet (the protective metal roof of the engine's firebox), a boiler explosion was the most common result. Excessive engine pressures and cracks in the pressurized boilers of steam engines were also causes.

Crown Sheet – The protective metal roof of a locomotive's firebox over which most of its steam is generated. Failure of an engine crew to keep water over the crown sheet was the most common cause of boiler explosions.

Derailment – When the wheels of one or more rail cars fall off the tracks, often causing a more serious accident.

Grade or Level Crossing – Where a roadway intersects a railroad "at grade", or with the roadway sloped so that the rails and road are level with one another.

Hotbox – When the bearings at the end of an axle overheat (usually occurring when the grease and oil used to lubricate them dries out and catches on fire), the packing begins to burn and smoke, running the risk of melting the axle and throwing a wheel. This could result in a derailment or a more serious accident, if not detected and remedied in time.

Runaway – A train or rail car running out of control due to the failure of brakes or other circumstances.

Signal – A means of controlling the movement of trains by warning or advising the train's engineer or other railroad personnel of an approaching train or for the purpose of diverting a train to another line or route. Signals come in many forms. Whether it is a pattern of hand, flag or lantern movements, or the position or color of a mechanical set of lights or banners, signals provide a means of providing an easily identifiable, standardized warning to other railroad personnel.

Snakehead – A dangerous, and often deadly, situation that occurred on early railroads when the strap iron separated from a wooden rail and pierced the undercarriage and floor of a coach.

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

Telescoping – A dangerous, and often deadly, situation in which a passenger car crashes into the next coach. This was quite common during the early years of railroading when passenger cars were made mainly of wood.

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