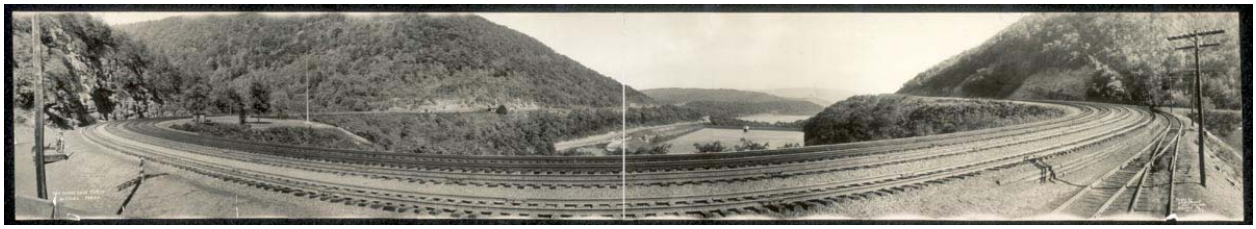
STUDENT HANDOUT 1

THE HORSESHOE CURVE, ALTOONA, PENNSYLVANIA



It's been nearly fifteen minutes since you emerged from the Allegheny Tunnel, more than two-thirds of a mile of darkness. Then the train cautiously but easily slips through repeated curves as it descends the Allegheny Front and suddenly, the Amtrak conductor's voice is heard. "Ladies and gentlemen, please look out the right side of the train, we are about to enter the world-famous Horseshoe Curve--the eighth wonder of the world!" In seconds, both ends of the train are easily seen; you're in the only place on earth where one single train goes both east and west--or west and east--at the same time!

There are other horseshoe-shaped railway curves; but, since it's opening in February 1854, this Pennsylvania Railroad [PRR] civil engineering marvel has attracted and captivated awe-struck visitors from throughout the world. Its massive size in a beautiful setting; its difficulty of construction against brutal twin odds of challenging terrain and primitive blasting powder and hand tools; and its perseverance as a symbol of industrial might and national pride--all combine to make the Horseshoe Curve one of America's most significant civil engineering wonders.

Mere words and statistics do not serve the true magnitude and magnificence of the Pennsylvania Railroad's--now Norfolk Southern's--Horseshoe Curve. It must be heard, felt, and smelled. The growling, throbbing multiple-unit diesels filling gorges with roars; the heavy rumbling of great steel wheels pounding the earth beneath your feet, their flanges shrieking; the permeating odors of brakes, diesel smoke, and steel couplers under strain--this and more is essence of that great and ancient curve on the Allegheny Front.

Built between 1852 and 1854, the Curve was the brainchild of J. Edgar Thomson, Surveyor and Chief Engineer of the Pennsylvania Railroad. The PRR managers refused to spend the money needed to complete this vital link. Thomson took out newspaper ads to explain that the Curve and tunnel would be a wise investment. In 1852 Thomson became the new PRR President and work on the Curve was started. Thomson employed many Irishmen from Cork, Mayo, and Antrim counties for the arduous task of completing the Curve. They used picks and shovels to cut away at the mountain and would oftentimes set up camp and live along the worksite. The final section of the Pennsylvania Railroad's construction from Altoona to Johnstown also included the 3,600 foot long Allegheny Tunnel. When opened, the best prior Philadelphia to Pittsburgh travel time of over 3 days was reduced to 13 hours.

When some images of the Curve are viewed, it can be seen that the surveyor reduced the steepness of the railroad's climb by using two sides of a deep valley formed by two mountains and that ended with the nose of yet another mountain. The line was run up along the side of one, across fill to a deep cut in the nose of another, over another fill to yet a final cut in the third mountainside. From the west or higher end of the Curve, the line scaled the faces of the mountains until it reached 2,161 feet above sea level at the Allegheny Tunnel at Gallitzin, Pennsylvania. This is a climb of nearly 1,000 feet from Altoona! The 220-degree curved portion of the Horseshoe Curve is 2,375 feet long, 1,800 feet wide, and has an outside radius of 637 feet. At the open end of the Curve, it is 1,800 feet wide, and through its entire length it gains 122 feet of elevation at a rate of 1.8 feet climb per 100 feet of track--a 1.8% grade.

A measure of the Horseshove Curve's success is the volume of people and supplies it has transported over the mountains throughout the years. Originally built to serve two tracks, it was expanded to three in 1889, four by 1900, and since 1981 is back to three tracks. At its peak during the 1920s, over 120 trains a

day rode the rails of the Horseshoe Curve. At times during World War II that number was doubled. The Horseshoe Curve, an 1854 marvel that was never replaced or significantly improved, still serves over 50 trains per day.

As early as 1879 the Pennsylvania Railroad developed a visitors' park and garden at the Horseshoe Curve. Day rail excursionists from a wide radius frequented the Curve. A small shelter was built for a resident watchman who was to insure visitor safety and to look after the grounds. The 100th anniversary of the Curve was celebrated in 1954 with a giant display of flashbulbs timed to light at once, while fireworks caressed the night sky.

The Horseshoe Curve is listed as a National Historic Landmark; it is in the Historic American Engineering Record of the Library of Congress; and the American Society of Civil Engineers declared it a Historic Civil Engineering Landmark, one of only 236 world-wide! National Park Service and related funding brought a massive $5.8 million face-lift in 1992 that would serve more fully the greatly increased tourist volume. In 2004 the 150th anniversary of Horseshoe Curve was celebrated. And the words of a 1916 passenger's guidebook still hold true:

> "As the locomotive mounts the grade on the western side, a glance backward discloses the remarkable resemblance to a giant horse shoe . . . When trains entering the Horse Shoe Curve round the point... and turn west, the bigness and wildness of the mountains loom up in stately majesty."