

5.1 Historical Context of Railroads and Industry in WWI Mobilization

U.S. Military Buildup for the War

The United States was actively involved in World War I for less than two years, from its declaration of war against Germany on April 6, 1917 to the signing of the armistice on November 11, 1918. However, during this short period, intensive mobilization of the economy and its resources occurred as the country geared up for participation in a war of global proportions. Originally the war was perceived as a European conflict with the United States adopting a position of non-intervention. Despite not getting directly involved, the United States initially provided money and supplies to both sides. After the sinking of the *Lusitania* by a German U-boat in 1915 and the subsequent submarine attacks on U.S. merchant ships en route to England, the United States declared war on Germany.

The United States' entrance into war required an immediate mobilization effort of considerable magnitude. Mobilization involved not only the recruiting and training of troops, but the production and/or procurement and distribution of weapons, ammunition, uniforms, equipment, and supplies. At the time, the country had no standardized war plan, not having been involved in a war of such consequence since the Civil War. As a result, the country's armed forces were negligible with inadequate training facilities. Most of the military weapons and supplies manufactured in America had been sent to the European allies, so there were no stockpiles for immediate use by national troops. Additionally, many American industries and banks were hurting financially due to large debts owed to them by the European nations at war.

Organization of the U.S. Wartime Economy

As the United States entered the war, mobilization relied on raising funds and manpower as well as production and distribution of supplies and equipment. The war required massive federal spending as it shifted national production from civilian goods to war goods. Money was raised through the selling of Liberty Bonds and the raising of taxes. Unwilling to rely on private industry to supply the country's war needs, the federal government (under President Woodrow Wilson) created a number of federal agencies to centrally control the nation's economy in an effort to expedite and coordinate wartime production and distribution. The agencies included the War Industries Board, the Food Administration, the Fuel Administration, the Railroad Administration, the War Labor Board, and the Committee on Public Information. Each had an important role in serving the war effort, but the first four were generally considered the most important as they were directly responsible for supplying the country and its armed forces (and continuing to supply the European allies) with equipment, food, and fuel, as well as a method of distribution.

The War Industries Board was charged with converting the nation's industries to wartime production by means of allocating supplies, fixing prices, standardizing goods, and promoting mass production. Utilizing the nation's existing private manufacturing facilities and available natural resources, the board mobilized the economy by contracting out increased production of

all types of needed munitions, equipment, and supplies. Industrial companies like Bethlehem and U.S. Steel, E.I. duPont de Nemours, Atlas Powder, Midvale Steel and Ordnance, All Steel Wheel, American Car & Foundry, American Metal Works, Baldwin Locomotive Works, Pusey and Jones, and Ford Motors stepped up production at their existing facilities. Other companies were converted from their own private enterprises to production of wartime materials, and when no suitable facility existed, the government built one. The War Industries Board oversaw every industrial pursuit from steel production to bullet manufacturing to bomb loading. Increased production of munitions and weapons not only supplied our own troops, but a quarter of it continued to go to the European allies.

The Food and Fuel Administrations each controlled the prices, production, and distribution of their respective resources. At the time the United States enter the war, it was one of the leading agricultural producers in the world. The Food Administration initiated a voluntary program of food conservation so that the nation could continue to feed its civilians and its growing armed forces as well as its European allies. The Fuel Administration promoted conservation of fuel, such as coal, gasoline, and heating oil. Shortages of coal during the winter of 1916-17 necessitated measures to ensure there would be an abundance of fuel for wartime industries, military, and civilian consumption. Daylight savings time was introduced to aid in wartime fuel conservation.

The Railroad Administration nationalized the country's railroad system to alleviate congestion in the transport of war goods, fuel, and troops. Prior to its formation, the nation's railroad companies formed the Railroad War Board, agreeing to support the war effort by coordinating the operation of their lines. Within six months, the inadequacies of this system became obvious due to the large amount of war-related traffic using the lines. Freight yards, terminals, and ports experienced incredible congestion almost resulting in a complete shut-down of the rail system. This increased traffic coupled with a seriously depleted workforce due to military conscription and the overall financially poor state of many of the railroad companies hampered initial wartime distribution of necessary supplies and ordnance. It quickly became obvious that a coordinated national railroad system would be a vital component of war mobilization.

The Role of Railroads in Military Supply Networks

The nation's railroads played a significant part in the nation's mobilization for war. With many of the nation's roadways unimproved or substandard and the evolution of the airplane in its infancy, the railroads were the only choice of transportation for large and heavy loads of freight throughout the country. Approximately 90 railroad companies were taken over by the Railroad Administration, with their tens of thousands of miles of track reaching throughout the country and connecting with smaller spurlines to the nation's industries (Huddleston 2002:ix).

Such was the importance of the nation's railroad system to the mobilization effort that the government sanctioned the upgrading of railroad infrastructure to accommodate wartime traffic. Construction of new bridges and yards, increased track capacity, laying of new lines, and enlargement and improvement of rail facilities were but a few of the upgrades that individual railroad companies undertook for the war effort (Schafer & Solomon 1997:59). The government

also spearheaded a program to standardize rail gauge size as well as the design of new rolling stock to increase economy and production and to improve maintenance (Huddleston 2002:25).

The government used the existing railroad system almost exclusively for hauling wartime materials, including coal, food, equipment, supplies, and weapons. In 1917, the nation's railroads transported the largest amount of traffic in their history, including outbound troops (Sciabarra 1980). European-bound freight of all types was transported via rail to ports at New York, Philadelphia, Baltimore, Boston, Portland, and Norfolk. The railroad also moved freight destined for points within the United States. Most of this freight was associated with the wartime industries and included construction materials, raw resources, fuel, and finished products. Intensive programs in shipbuilding, submarine fabrication, and airplane manufacturing each relied heavily on the nation's rail system. The railroad also played an important part in the fabrication and distribution of ordnance, which included weapons, ammunition, combat vehicles, and maintenance tools and equipment. In this way the nation's railroads served wartime industries and met the demands of the Allies, providing a significant contribution to the mobilization effort.

Army Ordnance Department

A considerable amount of the nation's wartime industrial efforts went toward equipping its army, as well as those of the Allies. A major concern of the Army involved the development and manufacture of effective modern ordnance. Ordnance included small arms, heavy artillery, tanks, and ammunition. Ordnance would play an important part in the waging and eventual outcome of the war, with the army investing over \$4,000,000,000 (or 29% of its total expenditures) in munitions (Ayes 1919). Prior to the war, the United States already produced certain quantities of munitions for the Allies. However, once involved the nation needed to increase quantities to arm its own military.

When the United States entered World War I, neither its army nor its ordnance facilities were up to the task before them. The army consisted of approximately 200,000 troops that had historically been supplied by six government arsenals and two private industries (Bethlehem Steel and Midvale Steel) knowledgeable in munitions manufacture. Although the nation did produce munitions for the Allies prior to 1917, the quantity was negligible considering what it would be manufacturing for itself within two years. The ranks of the U.S. Army swelled to 5,000,000 troops by the end of the war, each needing weaponry and ammunition. Within two years, the entire U.S. ordnance manufacturing industry was developed. So important was this industry that by the end of the war, the number of ordnance manufacturing plants increased to approximately 8,000 in the United States (Williams 1921:21). The need for munitions resulted in the conversion of thousands of private commercial businesses and plants to industrial production under government contracts. When an ordnance manufacturing need was not met in an existing plant, the army designed and built new facilities.

Philadelphia Ordnance District

To expedite production and distribution, the Army divided the country into 12 ordnance districts, which were generally located on the eastern seaboard and extended to the Midwest (with a 13th

later added in Toronto, Canada). The Philadelphia District encompassed all ordnance facilities in eastern Pennsylvania, southern New Jersey, and all of Delaware. The Philadelphia District was a major producer of ordnance, accounting for one-fifth of the total munitions used in the war (Williams 1921:6). Manufacturing facilities in this district had contracts to produce a wide variety of ordnance materials, including Remington rifles, .45 caliber pistols, field guns, bolos, bayonets, howitzers, grenades, trucks, tanks, scopes, sighting instruments, helmets, and numerous castings, fittings, and parts (Williams 1921:61-66). Also, the district provided raw resources and manufactured materials, such as coal, steel, brass sheet, zinc slab, iron ore, lamp black, timber, steel carbon, tin plate, and asbestos strips, for use in munitions production.

The Philadelphia District was also a major center for the production of ammunition and explosives and the loading of munitions. Numerous facilities produced ammunition for the war effort, including high explosive shells, shrapnel, adapters, boosters, mortars, and bombs. High levels of explosives in the form of black powder, smokeless powder, sulfuric acid, nitrite acid, ammonium nitrate, toluol, benzol, solvent naphtha, fulminate of mercury, and TNT (trinitrotoluene) were also produced in plants in this district. Four of the country's largest producers of explosives were located in the Philadelphia District: Atlas Powder Company, Hercules Powder Company, Trojan Powder Company, and E. I. duPont de Nemours and Company. DuPont, headquartered in Wilmington, supplied the Army with the smokeless powder that was used in high explosive shells, cartridge bullets, machine guns, and bombs. Within their three New Jersey plants, at Carney's Point, Parlin, and Haskill (and later at Old Hickory in Tennessee), DuPont produced 1,466,761,219 pounds of military explosives of all kinds, which comprised 40% of all the explosives made for the Allies during the war (Williams 1921:372-374).

Loading Plants

Another important industrial pursuit of the ordnance division involved loading munitions. The Army Ordnance Divisions in New York, Baltimore and Philadelphia handled the majority of loading for the army, since it was advantageous to have the loading plants in relatively close proximity to the explosives manufacturer. All types of ammunition were loaded, including shells of various sizes, mortars, boosters, grenades, and eventually bombs. Within the Philadelphia District, loading plants were primarily located throughout New Jersey and Pennsylvania.

After the United States entered the war, the Army decided to use the highly explosive amatol in place of TNT in their munitions (Hunter 1919:72). TNT production could not keep up with the war demands, and amatol was a mixture of ammonium nitrate with TNT to make its production go further. Amatol was used to load all types of high explosives, including drop bombs. Because of the volatility of this explosive, loading plants were generally located in rural areas far away from populations. Rural areas also provided vast expanses of unoccupied land that could support the many separate buildings needed for such activities.

5.2 History of the Mt. Pleasant to Port Penn Railroad

The U.S. Government and Marlin-Rockwell Corporation

As early as February 1918, the Army contacted the Marlin-Rockwell Corporation with a proposal to establish an experimental loading plant for the loading of aerial drop bombs. The existing loading plants in the country were involved with the loading of other types of munitions, such as shells, grenades, and the bags used in high-caliber artillery. The Marlin-Rockwell plant would be the first (and only) aerial drop bomb loading plant in the United States. Marlin-Rockwell, which already had a contract with the Army to provide machine guns for the war, had recently purchased the patent rights to a heavy drop bomb that the Army was interested in producing for use in aerial missions. The Barlow bomb, developed by Lester Pence Barlow of the Frankfurt Arsenal in Philadelphia, was a revolutionary new bomb with an electric timing device that did not require contact for explosion. Instead the bomb detonated with full power six feet from the ground, above troops heads, providing more destructive power than a contact bomb (GlobalSecurity.org). Marlin-Rockwell produced these bombs in their Philadelphia plant, but the Army wanted the company to load them also. A subsidiary company, the Marlin-Rockwell Loading Company, was formed on April 1, 1918 to undertake this task (US Select Committee 1919b:1522).

On May 22, 1918, the United States Government executed a contract with the Marlin-Rockwell Loading Company for the construction of the bomb loading facility (Order Number War-Ord. P3542-1231Tw; US Select Committee 1919b:1472). The loading company agreed to furnish plans, specifications, and general designs for, and to construct on the chosen site a plant for the loading, assembling, and packing of aerial munitions with high explosives. Shipping facilities for water transportation would also be provided. The munitions to be loaded at this plant included the Barlow bomb, a heavy fragmentation drop bomb, and the Mark I, II, III, IV and V, high-capacity demolition bombs. The government agreed to finance the construction of the plant and provide all materials and explosives. The contract specified that this plant would have a daily loading capacity of 5750 drop bombs, including 500 Barlow bombs, 1,000 Mark I, 500 Mark II, 3,000 Mark III, 500 Mark IV and 250 Mark V bombs (US Ordnance Dept 1920:38). The total projected output of this plant according to the contract was for 50,000 Barlow bombs, 100,000 Mark I, 50,000 Mark II, and 200,000 Mark III bombs (US Ordnance Dept 1920:38).

Even as the contract was executed, the explosives formula for the Barlow bomb was not yet approved, so the number and types of buildings to be constructed at this plant were not actually known. Regardless, the estimated cost of plant construction was set at between \$1,250,000 and \$1,500,000 (US Select Committee 1919b:1473). This included the loading plant itself, plus an access railroad to get materials into the site and docks and wharf facilities for the shipping out of finished bombs. A proposed residential development for the supervisors and workers was under a separate contract to the United States Housing Corporation as wartime emergency housing construction. The Marlin-Rockwell Loading Company then contracted with the firm of Fred T. Ley & Co., of Springfield, Massachusetts, for the actual construction of the plant (US Select Committee 1919a:475). All plans were to be approved by the Chief of Ordnance of the U.S. Army, and the construction was to be under the supervision of the Construction Division of the Army (US Select Committee 1919a:473).

Marlin-Rockwell Bomb Loading Plant

For the Marlin-Rockwell loading plant, a rural marshy site consisting of 200 acres was purchased (with another 656 acres on option) along the Delaware River approximately 20 miles south of Wilmington, Delaware near the small community of Port Penn (US War Dept 1920:168). This site was chosen for its proximity to Wilmington. It was close enough to the city to attract a large workforce and it was also relatively close to Atlas Powder Co.'s Perryville (Maryland) plant, which would supply the ammonium nitrate to go into the loaded bombs (U.S. Select Committee 1919b:1488). Additionally it provided abundant cheap land with river access, as the loaded bombs were to be shipped out the main channel of the Delaware River and then to France. The site was isolated with little population and no farm buildings in the vicinity in the event of an explosion. It was anticipated that up to 2,000,000 pounds of explosives would be stored there (U.S. Select Committee 1919b:1489).

Considerable planning and money went into this proposed plant, but it was never completed. Between the execution of the contract in May 1918 and the signing of the armistice in November 1918, the plant underwent numerous redesigns based on the continually changing recipe of explosives to be used in the bombs, but no plans were ever approved. Additionally, there was a power struggle between Marlin-Rockwell/Fred T. Ley representatives and the Construction Division of the Ordnance Department as to who was ultimately responsible for supervising the work at this site.

During the summer of 1918, approximately 2,000 local workers were on site building roads, grading the terrain, laying the railroad, repairing the breached dike along the Delaware River (destroyed that spring in floods), and constructing bunkhouses and a wharf (US Select Committee 1919b:1496). Finally, the Army abandoned the Barlow bomb completely in the summer of 1918 due to cost and malfunctions, and replaced it with the British Cooper bomb. At the time of the armistice, the loading plant consisted of mostly undeveloped land. Several temporary buildings had been constructed, including 30 workers' bunk houses, an administration building, and a commissary. The power house and dock were begun, but not finished. The dike along the river was repaired, some local roads improved, and an access railroad built.

Mt. Pleasant to Port Penn Railroad

One of the few construction projects completed at the bomb loading facility was the laying of a permanent access railroad to haul in materials for plant construction. The railroad was a necessary part of the proposed loading plant because of the isolated locale of the site and the limited number of unimproved roads in the vicinity. Prior to the railroad's construction, freight was shipped via boat on the Chesapeake & Delaware canal to disembark at the dock at St. Georges, or by rail to the station at Mt. Pleasant, and then hauled to the site by motor trucks at considerable expense and inconvenience. After the line was completed, freight could be hauled directly to the site without transfer, as it was connected to the larger integrated nationwide rail system under the control of the Railroad Administration. In its brief existence, the access line transported a significant amount of freight to the site, including building materials and supplies for plant construction.

The access railroad was built between the bomb loading plant site at Port Penn and Mt. Pleasant. At Mt. Pleasant, it connected to the Delaware Division of the Pennsylvania Railroad, a major eastern trunk line that carried a lot of freight during the war. The line was not built on a direct route, but wound through low-lying farmland for a total length of 8.5 miles.

Along its length, the government planned to build a residential development for the plant workers. Three alternative housing plans were designed by the United States Housing Corporation, under direction of the Bureau of Industrial Housing and Transportation of the United States Department of Labor. Each design was located along the rail line, with a railroad station and separate siding for the delivery of village freight and supplies (US Dept of Labor 1919:308; Figure 4). Like the plant, the residential development was never constructed due to the end of the war and the subsequent cancellation of the project.

Railroad Design and Condemnation

In the summer of 1918, Marlin-Rockwell engineers surveyed several potential route options for the rail line into the bomb loading plant. The designs were for a single-track, broad-gauge railroad with a right-of-way of approximately 65 feet in width. The route options were submitted to the Railroad Administration for approval (US Select Committee 1919b:1528). The route chosen was circuitous and followed the high ground along the drainage divide between Scott Run and Augustine Creek. It was designed to avoid crossing water whenever possible and to cross “cheaper” properties to reduce costs. The line crossed 31 parcels along its length and encompassed 65.47 total acres of right-of-way.

As part of the original contract, Marlin-Rockwell was charged with obtaining title to any land involved in the project; however, due to time constraints, the Army’s Real Estate Section took over this task on August 1, 1918 and opted to secure property rights through condemnation instead of purchase (US Select Committee 1919b:1509). Even as the railroad construction began at the beginning of August, the government did not have full rights to the properties, as the condemnation proceedings continued through mid-August. In the haste to design and construct this railroad, an accurate survey had not been made and there were discrepancies between the legal description of the condemned land and the land on which the railroad was actually laid. These discrepancies caused considerable delay in payments due to the property owners, which totaled \$32,270 (US War Dept 1920:149), and in the end, the owners were never actually paid for their land by the government due to the end of the war and the eventual dismantling of the railroad (US War Dept 1920:168). Instead, the land reverted to the owners after the materials at the plant site were disbursed by salvage and the railroad dismantled.

Construction of the Railroad

Construction of the line began in August 1918 and continued through September with the work performed by local civilians (US Select Committee 1919b:1523). On September 10, 1918, Maj. William B. Gray, of the Army Construction Division, was ordered to the Marlin-Rockwell plant site to oversee its construction, much to the dismay of Marlin-Rockwell and their contractor, Fred T. Ley. Gray reported that at the time of his arrival not much work had been accomplished and money was being wasted on incompetent management. Approximately two miles of rough

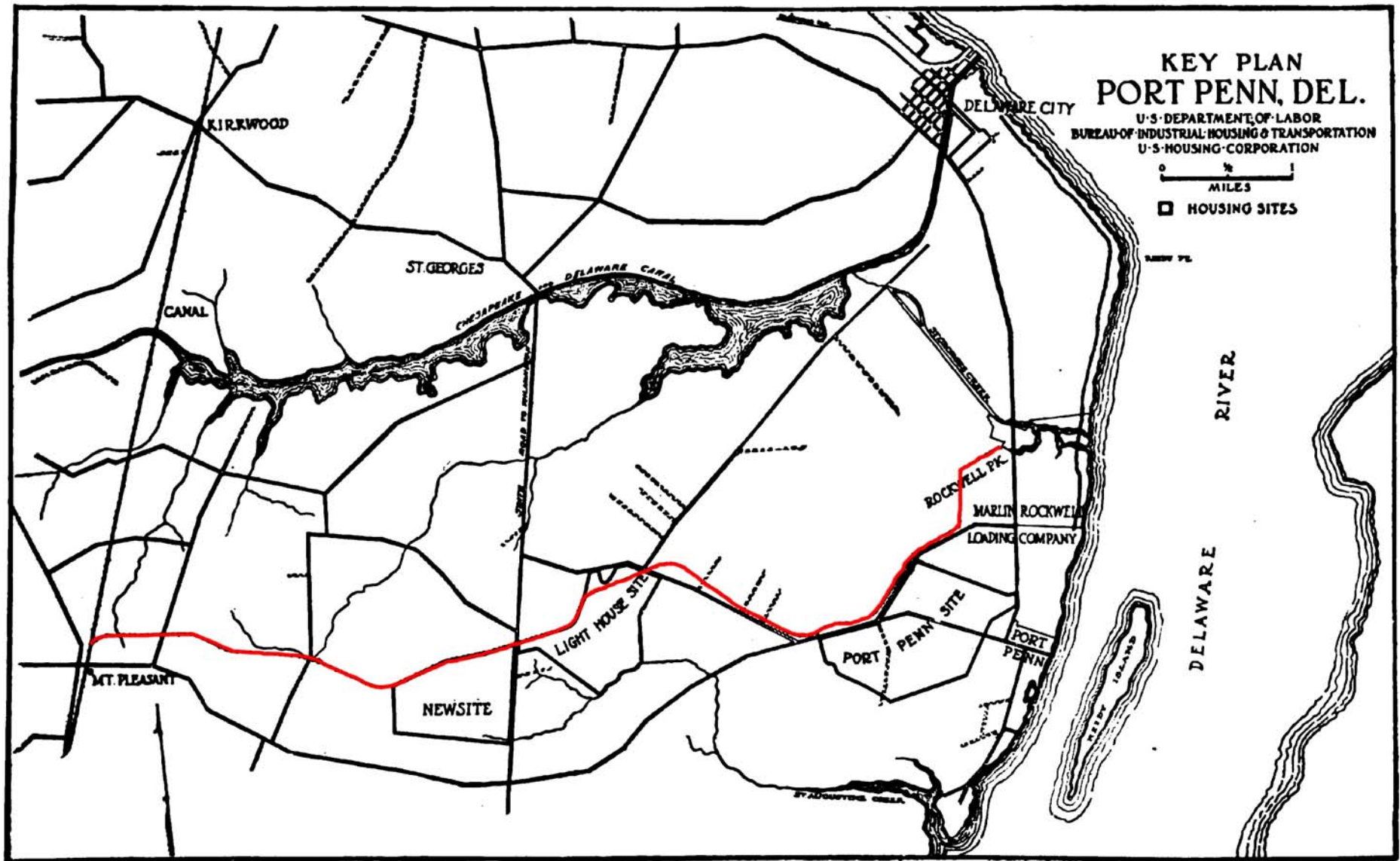


Figure 4: Proposed designs for a residential development associated with the Marlin-Rockwell bomb loading plant near Port Penn, 1918. This plan shows the three proposed village designs (New Site, Light House Site and Port Penn Site), each located along the access railroad between Mt. Pleasant and the bomb loading plant north of Port Penn (highlighted in red). From U.S. Department of Labor's *Report of the United States Housing Corporation, Volume II: War Emergency Construction (Housing War Workers)*.

grading were in place and two miles of track laid (US Select Committee 1919b:1673). Although some sidings were laid near the connection to the Pennsylvania Railroad at Mt. Pleasant, no tracks or switches were in place to connect them to the access line, so that a locomotive crane was required to do the shifting (US Select Committee 1919b:1654). There were shortages of tools for the workers as well as parts to complete the line. Also, there was no locomotive on site to haul materials and supplies on the section that had been completed. Gray took over control and immediately requisitioned frogs and switches from the Middletown Ordnance Department and procured a locomotive from the Pennsylvania Railroad (US Select Committee 1919b:1654).

The railroad was completed by the end of September 1918. Steam shovels and hand-labor built the grade, which was composed of earthen fill excavated from borrow pits running adjacent to the grade. Limited ballasting in some areas provided drainage and stability, but final ballasting was never completed to prepare the grade for winter weather. The government and Marlin-Rockwell Loading Company jointly provided the materials to construct the railroad, such as the ties, rails, switches, etc. The rails used were fabricated by Bethlehem Steel for the Russian government to build its Trans-Siberian Railroad, but a halt was put on shipping due to the Russian Revolution, and the rails were never delivered. The U.S. government then purchased the rails to use for army construction (US Select Committee 1919b:1523).

Although the line was part of the emergency war effort and an industrial access line at that, it was built to the Pennsylvania Railroad Company's specifications for a first-class railroad (US Select Committee 1919b:1651). The combination of heavy rails (67 and 80 lbs), tightly spaced ties (12-inch instead of 2-foot centers), fencing of the line, and circuitous route requiring right-of-way through 31 properties resulted in a cost of almost \$50,000 per mile. The track and right-of-way totaled \$395,305.76 and the fencing another \$15,938.57 (US Select Committee 1919b:1652). According to the testimony of Maj. William Gray at the Hearings for the Select Committee on Expenditures in the War Department, construction of the railroad was greatly overpriced and it could have been completed for 25% less than it was (US Select Committee 1919b:1652).

Use of the Railroad

Despite the initial problems associated with the construction of the line, it was used heavily in the brief time it existed prior to the end of the war, transporting construction materials to the bomb loading plant site. In the few months it operated, a variety of freight was hauled by the railroad, the majority consisting of construction materials to build the facility's buildings and sewer and water systems. The main materials included lumber, brick, terra cotta tiles, and reinforced steel. Some machinery for the bomb loading plant and equipment for the proposed power plant were also delivered. Additionally all of the supplies and equipment for outfitting the bunkhouses, administration building, and commissary were hauled by rail. Because the plant was never completed and the explosives recipe for the bomb loading was never finalized, no bombs or explosives were ever delivered to the site.

Completion of the railroad allowed all manner of freight to be delivered easily and quickly to the site. Materials and equipment were still being delivered by rail at the signing of the armistice in November 1918. After the armistice, approximately 500 rail carloads of freight were delivered with a value in excess of \$500,000 (US Select Committee 1919b:1541). This freight was unloaded and stored until army salvage decided what to do with it.

Dismantling of the Railroad

After the armistice, the army cancelled the construction contract for the Marlin-Rockwell bomb loading plant. The plant, its freight, the railroad, and the uncompleted dock facilities sat abandoned through the winter of 1918-19. In March 1919, the Philadelphia District Ordnance Office's Salvage Board organized to outline a program for disbursing of immense quantities of raw materials, equipment, and freight and for deciding how to dismantle factories, railroads, and wharves. This could be done only after the Philadelphia District Claims Board settled all monetary debts to its contractors and their subcontractors. After claims were settled, salvage began. Salvage was a slow process as each facility within the district was stripped of wartime equipment and materials, which included everything from office equipment to explosives. These were sold or auctioned off to private companies, many with industrial interests (Williams 1921:172).

By the summer of 1919, the salvage operations at the Marlin-Rockwell bomb loading plant were under way (US Select Subcommittee 1919a:476 & 1919b:1542). Materials were shipped off the site via the access railroad, to its connection with the Pennsylvania Railroad at Mt. Pleasant, and then transported throughout the country. Testimony during the Congressional Subcommittee Hearings indicated that the railroad should remain intact as an access line if the plant site was developed in the future for manufacturing (US Select Subcommittee 1919b:1662). However, given the remote location of the site and fact that no industrial facilities were built there, the land was never used for industrial production of any kind. The lack of interest in the site resulted in the eventual removal of the access railroad.

It is not known when the access railroad was dismantled. A perusal of meeting minutes of the Philadelphia District Ordnance Salvage Board from 1921 to 1924, archived at the Philadelphia branch of National Archives, indicated that the rails and ties were not salvaged or sold during this period. This may be because the railroad had already been dismantled prior to these years or perhaps because the army did not sell off such materials but stockpiled them for reuse elsewhere. The railroad does appear to have been dismantled by 1928, as a New Castle County road map from that year does not show a rail line between Mt. Pleasant and Port Penn, but does show other railroads throughout the county (Price & Price 1928). Certainly the line was gone by 1932, as aerial photography from that year showed that where the corridor crossed farmland, it had been plowed over and returned to cultivation.