JOHNSTOWN LOCAL FLOOD PROTECTION PROJECT HAER No. PA-413

Beginning on the Conemaugh River approximately 3.8 miles downstream from the confluence of the Little Conemaugh and Stoneycreek rivers at Johnstown, Pennsylvania, then up the Conemaugh River to the confluence, then dividing and proceeding approximately 1.6 miles north northwest up the Little Conemaugh River to a point opposite Woodvale, Pennsylvania, and, also proceeding approximately 4.3 miles from the confluence south up the Stonycreek River to a point near the community of Ferndale, Pennsylvania.

Johnstown vicinity
Cambria County
Pennsylvania

HAER
PA
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Philadelphia Support Office
U.S. Custom House
200 Chestnut Street
Philadelphia, PA 19106

HAER
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Johnstown vicinity
Cambria County
Pennsylvania

USGS Johnstown, Pennsylvania, Quadrangle, Universal Transverse Mercator Coordinates: 17.673630.4470000 to 17.674750.4470090 to 17.678340.4467250 to 17.677100.4462120

Dates of Construction: 1938-1943

Engineer: U.S. Army Corps of Engineers, Pittsburgh District

Present Owner: U.S. Army Corps of Engineers, Pittsburgh District

Present Use: Flood protection project

Significance: The Johnstown Local Flood Protection Project (JLFPP) is a significant example of a specialized engineering structure designed by the U.S. Army Corps of Engineers in 1937-1938 and constructed at a cost of $8.89 million between 1938 and 1943. It was then the second largest flood control structure of its type and upon completion was said to be the best river channel improvement project in the country.

Project Information: The Pittsburgh District of the U.S. Army Corps of Engineers was authorized by the 1991 Energy and Water Development Appropriations Act (P.L. 101-514) to rehabilitate the JLFPP. The $32 million major rehabilitation includes the non-federally constructed walls that were incorporated into the original project and will ensure the continued structural reliability of the project. Under Section 106 of the National Historic Preservation Act, the District and the Pennsylvania State Historic Preservation Officer (PASHPO) determined that the JLFPP is eligible for listing in the National Register of Historic Places. Further consultation under Section 106 regarding the adverse effects of the rehabilitation on historic properties led to approval of a mitigation plan that included documentation of the JLFPP for inclusion in the Department of the Interior's Historic American Engineering Record (HAER).

Compiled for the U.S. Army Corps of Engineers, Pittsburgh District by
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General Description of the Johnstown Local Flood Protection Project[1]

The Johnstown Local Flood Protection Project (JLFPP) consists of 8.8 miles of stream channel improvements built by the federal government along the Conemaugh, Little Conemaugh, and Stonycreek rivers between 1938 and 1943 with the intent of protecting the City of Johnstown, Pennsylvania, from flows equivalent to the level experienced during the infamous St. Patrick's Day Flood of 1936. The project was authorized under the 1937 amendments to the landmark Flood Control Act of 1936.[2] Unlike other federally constructed local flood projects authorized after 1941, which are turned over to local authorities for operation and maintenance, the JLFPP is one of only a few such projects nationwide (and the only one in the Pittsburgh District of the U.S. Army Corps of Engineers) that continues in federal ownership.

Located in Cambria County, southwestern Pennsylvania, Johnstown lies within a narrow, steep valley formed by the confluence of the Stonycreek and Little Conemaugh rivers. These two "rivers" (for most of the year, they are actually little more than rocky-bottomed streams) join at "the Point" in downtown Johnstown to form the Conemaugh River. After flowing northwest from Johnstown and passing through the flood gates of the Conemaugh Dam, a U.S. Army Corps of Engineers flood control project located between Tunnelton and Blairsville, Pennsylvania, the Conemaugh River continues its westward course to join Loyalhanna Creek and thus form the Kiskiminetas River. The Kiskiminetas, in turn, flows into the Allegheny River some 18 miles above Pittsburgh, where it unites with the Monongahela River to form the Ohio River, a tributary of the Mississippi River system.

The JLFPP widened and deepened constricted river channels, paved graded sideslopes with concrete, added concrete walls where necessary, and incorporated existing masonry and concrete walls where structurally feasible. The project was planned, designed, and constructed by the Pittsburgh District of the U.S. Army Corps of Engineers (the District). Construction progressed upstream in six sections or units (Units 1-6) and was carried out by private firms under contract to the District.

The JLFPP takes in the most heavily developed stretches of the Little Conemaugh, Stonycreek, and Conemaugh rivers as they flow through Johnstown. Units 1-3 on the Conemaugh River were built on industrial and railroad land and apparently affected few existing structures or residential areas. The Little Conemaugh River section (Unit 4) was also built along industrial and railroad land. Unit 5 on Stonycreek River is in the downtown section of Johnstown. A number of residences and businesses had to be removed when the channel was widened in this area. The Unit 6 section on the Stonycreek River was built mainly in small community and

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[1]With the introduction of some new data, editing, and rewriting for the sake of consistency, much of the information contained in this historical narrative is derived from earlier studies of the Johnstown Local Flood Protection Project undertaken by the U.S. Army Corps of Engineers, Pittsburgh District, particularly Patricia H. Baker and Jeffrey L. Holland (with contributions by Frederick L. Richards), *Phase I Cultural Resource Reconnaissance of the Johnstown Local Flood Protection Project, City of Johnstown, Cambria County, Pennsylvania* (Pittsburgh: U.S. Army Corps of Engineers, 1995), pp. i, 20-48, 53-60, and 240-245; Patricia H. Baker, *Records Search for Archaeological Potential Behind Selected Flood Walls in the City of Johnstown Cambria County, Pennsylvania* (Pittsburgh: U.S. Army Corps of Engineers, 1996); U.S. Army Corps of Engineers, Pittsburgh District, *Cultural Resources Effect Determination and Mitigation Plan, Johnstown Local Flood Protection Project Rehabilitation* (Pittsburgh: U.S. Army Corps of Engineers, 1996), pp. 1, 9, 14-15; Joseph L. Arnold, *The Evolution of the 1936 Flood Control Act* (Fort Belvoir, Virginia: Office of History, U.S. Army Corps of Engineers, 1988).

[2]The legal history of the project's authorization is discussed in detail in U.S. Army Corps of Engineers, Pittsburgh District, *Johnstown, Pennsylvania Local Flood Protection Project, Major Rehabilitation Evaluation Report, Main Report* (Pittsburgh: U.S. Army Corps of Engineers, 1994), pp.1-2.

industrial settings where few existing walls were located. One section of wall to be rehabilitated is the WPA-built masonry wall located just upstream from the Central Avenue bridge.

The structural improvements of the JLFPP are of two basic configurations: concrete-paved sideslopes without walls and concrete-paved sideslopes in combination with walls. As a cost-saving measure during the original project construction, some existing masonry and concrete walls, including building foundations, were incorporated into the structural "line of protection" where these walls appeared to be structurally sound. The subsequent failure of some of these pre-project walls led to the authorization of a major rehabilitation to replace or reinforce them all to maintain the functional integrity of the entire project.

In addition to the wall and sideslope structures, the JLFPP also includes a small number of channel bottom modifications, including several small spillways and one short stretch of concrete channel bottom lining on either side of the Walnut Street bridge. Six vehicle access ramps were also built into the sideslopes for channel maintenance, and 55 sets of steps were created for inspection access.

Before construction of the JLFPP, 7,839 linear feet of masonry walls already had been built along the river banks, either to provide a measure of flood protection for Johnstown or as part of building foundations fronting on one or another of the city's three rivers. Ten sections (1,045 feet) of these older masonry walls have been replaced with concrete walls since 1943. In addition to these masonry walls, 8,450 linear feet of existing concrete walls had been built prior to 1938. Most of these walls date to the 1930s and were built by the City of Johnstown or by private individuals or companies. In order to retain automobile traffic passing along State Route 56/403, the Works Progress Administration (WPA) also erected a vertical concrete balustrade wall on top of an existing concrete retaining wall on the left bank of the Conemaugh River. This wall begins just upstream from the Fourth Avenue bridge and continues to the Washington Street bridge. It was built just after the St. Patrick's Day Flood of 1936. The WPA also constructed a 795-foot masonry wall above the Central Avenue bridge in response to the 1936 flood.

Description of the Johnstown Local Flood Protection Project's Six Units

The following descriptions use the District's station numbering system. Station numbers represent the number of feet upstream from a surveyed reference point in the middle of the river channel. The station number is expressed in feet as hundreds + units, and each river has its own reference point. For example, Station 1+94 on the Conemaugh River is 194 feet upstream of the Conemaugh River reference point (Station 0+00), and Station 96+00 on Stonycreek River is 9,600 feet upstream of its Station 0+00 (i.e., its mouth at "the Point"). These stations are shown in the graphic documentation as numbers in the stream channels.

Unit 1 begins at a point about 0.5 miles downstream from the Johnstown Sewage Treatment Plant at Station 1+94 on the Conemaugh River and extends upriver to a point just upstream of Laurel Run at Station 43+67. The right bank of the project is located in West Taylor Township, while the majority of the left bank is located in Lower Yoder Township. A small upstream section is located within Johnstown's city limits. Both river banks are bordered by railroad tracks. The Dornick Point Railroad bridge crosses the JLFPP in Unit 1, and the Laurel Run culvert is also found here. The project consists of concrete sideslopes on both banks of the river. A metal railing tops the left bank slope.

Unit 2 extends from Station 43+67 on the Conemaugh River to a point about halfway between the Coopersdale and Ten Acre Railroad bridges at Station 113+67. A small section at the beginning of the unit on the right bank is located in West Taylor Township, while the remainder of the unit is located within Johnstown's city limits. Railroad tracks also line both banks of the river in this unit, except along a portion of the left bank,

where it is bordered by the plant of Bethlehem Steel Company's Wire Mill Division. The Coopersdale bridge crosses the JLFPP in this unit, and the St. Clair Run culvert is also found here. The project consists of concrete sideslopes on both banks of the river. A vertical concrete wall tops a section on the right bank, upstream end.

Unit 3 continues upstream from Station 113+67 on the Conemaugh River to incorporate the confluence of the Stonycreek and Little Conemaugh rivers at "the Point." This unit then continues upstream to Station 8+00 on the Little Conemaugh River and to Station 10+00 on the Stonycreek River. It is wholly contained within Johnstown's city limits. The flood protection project at the downstream end of the unit is primarily concrete sideslopes along both banks. Approximately at the center of Cambria City, cut-stone ("derrick stone") walls partially covered by concrete sideslopes become prevalent. A balustrade wall section tops the sideslope along the left bank from the Washington Street bridge almost to the Fourth Avenue bridge. One building foundation in Cambria City, the 1915 St. Casimir's Society No. 531 social club, or Dom Polski building, is built into the flood protection wall.[3] The Ten Acre Railroad bridge, Fourth Avenue bridge, the Bethlehem Steel Company's foot bridge, Stone Arch Railroad bridge, and the Washington Street bridge all cross over the JLFPP in this unit. Unit 3 also contains the Hinkston Run culvert.

Unit 4 begins at "the Point" in Johnstown at Station 8+00 and extends up the Little Conemaugh River to a position just upstream of the Conrail Railroad bridge at Station 83+85. This unit also is located wholly within the Johnstown city limits. The project here consists of concrete sideslopes that partially cover cut-stone walls and building foundations along both river banks in the downstream half of the unit between "the Point" and the C & B Railroad bridge. Concrete sideslopes are also found on the left bank in the upstream end of the unit above the First Street bridge. Sideslopes topped with vertical walls are found on the right bank from the Walnut Street bridge to the upstream end of the unit. On the left bank, the flood protection walls are built of cut stone that has been partially covered by sloped concrete walls. On the left bank at the far end of the unit the wall is sloped concrete alone. The Johns Street, Walnut Street, C & B Railroad, First Street, and Conrail Railroad bridges all cross over the JLFPP in this unit.

Like Unit 4, Unit 5 also begins at "the Point" in Johnstown but extends up the Stonycreek River from its junction with Unit 3 (Station 10+00) to a point just above the Hickory Street bridge at Station 96+00. This unit is also wholly contained within Johnstown's city limits and parallels the city's most heavily urbanized section. The project in Unit 5 consists either of concrete sideslopes, alone or in combination with older cut-stone walls, or concrete walls. Between the Napoleon Street and Haynes Street bridges there are a series of older stone walls that serve as both building foundations and as flood protection. These walls may have been built in sections (as needed for foundation support and stabilization), or as a single unified wall prior to 1886 and later modified as newer buildings were constructed.

From the Incline bridge upstream to the Route 56 bridge no. 2 in the lower end of Unit 5, an exposed rock face on the left bank at the base of the hill acts as a natural flood wall, and no structural features were necessary. From the Haynes Street bridge to the upstream end of the unit, the project consists either of concrete sideslopes or combinations of sideslopes and concrete walls. Proceeding upstream in Unit 5, the Route 56 bridge no. 1, Incline bridge, Route 56 bridge no. 2, Napoleon Street, Franklin Street, Haynes Street, Route 56 bridge no. 3, and the Hickory Street bridge all cross over the JLFPP.

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[3]In addition to Johnstown proper, this portion of the Conemaugh River Valley was long made up of a number of independent adjacent and nearby boroughs, of which Cambria City was one. Others included East Conemaugh, Woodvale, Conemaugh, Prospect, Millville, Morrellville, Grubbtown, and Moxham.

Unit 6 continues up the Stonycreek River from its junction with Unit 5 at Station 96+00 to a point upstream of the Ferndale bridge at Station 213+00. The project in Unit 6 consists of concrete sideslopes from Unit 5 to the Central Avenue bridge. Above this bridge, a WPA-built cut-stone wall on the left bank extends from Station 163+75 to Station 171+70, and a corresponding section of a stone and earth dike rises above the natural embankment on the right bank. Along the left bank from this wall upstream to the end of the unit, the riverbank is unimproved. Along the right bank, between Stations 187+00 and 208+00 is another stone and earth dike. The B & O Railroad bridge, Horner Street, Central Avenue, and Ferndale bridges cross over the JLFPP in Unit 6. The Cherry Run and Solomon Run culverts are also found here.

Johnstown's Historical Context

The earliest Euro-American residents of the Johnstown area arrived just prior to the American Revolution, but the plan for a town at the site was the work of a later Swiss immigrant named Joseph Schantz, who took up farming at the confluence of the Little Conemaugh River and the Stonycreek River about 1794. In 1800, he laid out a plan for a town that he called Conemaugh, after a Native American village that reportedly occupied the same site. Schantz's plan for the town apparently anticipated the creation of Cambria County from Somerset County in 1804, and Schantz lobbied for his new settlement to become the county seat. The location of the town in the more remote southern part of the new county apparently worked against its selection; Ebensburg was named as the county seat. Disappointed, Schantz moved to a farm in Somerset County in 1807 where he died eight years later. The town he founded continued to grow slowly, however, and was incorporated in 1831. In 1834, the anglicized pronunciation of Schantz's name, Johns, was given to the town in his honor.[4]

Being passed over as the county seat was only a temporary setback to Johnstown's prosperity, for its future was not in politics but industry. An early trade in "Juniata iron" was established by the end of the first decade of the nineteenth century. The iron bars were formed in small forges along the Juniata River and were hauled by trail to Johnstown and loaded onto wooden "arks" that were floated down the Conemaugh, Kiskiminetas, and Allegheny rivers to Pittsburgh. The arks used in the trade were constructed in the Conemaugh Valley, from the rich stands of timber on its hillsides. A forge was constructed on the Stonycreek River as early as 1808, but it was washed away in a flood the same year and was never rebuilt. A number of small manufacturing concerns were established between 1800 and 1820, but the value of the valley's coal, iron, and clay deposits was not fully realized until transportation improvements could be made to reach such isolated settlement in the 1830s.[5]

In the 1820s, plans were formulated for a canal linking Philadelphia and Pittsburgh. As the head of navigation west of the Alleghenies, Johnstown was the terminus of the western end of the canal. In 1831, the western canal was completed from Pittsburgh to Johnstown. The difficult task of crossing the Allegheny mountains was accomplished by an elaborate portage railroad which transported canal boats on railroad cars on a series of stepped rail lines. The project was completed in 1834, immediately increasing the traffic through Johnstown.[6]

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[4]Kim E. Wallace, ed. *The Character of a Steel Mill City: Four Historic Neighborhoods of Johnstown, Pennsylvania* (Washington, D.C.: Historic American Building Survey/Historic American Engineering Record, National Park Service, 1989), pp. 5-7.

[5]Ibid., p. 7.

[6]Ibid., pp. 7-8.

The canal brought a diversified economy to Johnstown, as merchants, hostelers, and craftsmen moved in to serve travelers and permanent residents. The coming of the railroads in the 1850s spelled the end of the canal era, however, and in 1857, the state-owned canal was sold to the Pennsylvania Railroad. For some towns along the canal, the new railroad meant economic disaster, but for Johnstown, where the new railroad paralleled the canal, the transition was not difficult. In addition, the presence of natural resources that could be exploited for industrial use increased the importance of the town.

Coal from local outcroppings was utilized for fuel as early as the 1820s, and was being advertised for domestic use in the Johnstown newspaper by the 1840s.[7] Iron mines and small forges had been in operation in the vicinity since the early 1800s, and blast furnaces producing pig iron were established in the area during the 1840s, but it was the need for iron rails for the nationwide railroad boom of the 1850s that defined Johnstown's future. In 1854, the same year that the Pennsylvania Railroad was completed through Johnstown, George S. King founded the Cambria Iron Company.[8] A promotional pamphlet for the company published in 1853 did not exaggerate when it claimed that:

> in no part of the United States are found so many advantages for the manufacture of iron, as at Johnstown.... Millions of tons of iron can be made here without going three-quarters of a mile for any portion of the coal, ore, and lime, or for the stone and brick for the furnace building and hearths.[9]

Although it faltered financially in 1854, the Cambria Iron Works was revived in the late 1850s by capital from the Philadelphia-based firm of Wood, Morrell & Company.

Cambria Iron Works, located next to the Conemaugh River just below Johnstown, produced iron rails for the railroads, and was the first large-scale rolling mill in western Pennsylvania outside of Pittsburgh. Prior to this, iron ore was formed into pig iron or iron bars and shipped to Pittsburgh to be forged into finished products. The rails at Cambria Iron were produced from pig iron made at four nearby blast furnaces. Johnstown Iron Company was also established in the early 1850s, and was Cambria's only rival in Johnstown. This company operated Johnstown Furnace.[10] By the early 1860s, Cambria had purchased all of Johnstown Iron Company; within 10 years it was the nation's leading manufacturer of steel rail, and Cambria County's largest employer. In addition to steel rail, the plant produced a variety of iron products including angles, billets, machine and track bolts, railroad car axles and wheels, and wire cable.[11]

Ancillary industries to iron and steel production arose to meet the demand of Cambria Iron, and in many cases were purchased or initiated by the company to consolidate its control over the local economy. Iron and coal mines, and brick, cement, and clay industries produced products used directly by the mills. Other industries not

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[7]Nathan Daniel Shappee, "A History of Johnstown and the Great Flood of 1889: A Study of Disaster and Rehabilitation." (Ph.D. dissertation, University of Pittsburgh, 1940), p. 13.

[8]Wallace, *Character*, pp. 9-10.

[9]quoted in Ibid., pp. 10.

[10]Gray Fitzsimons, ed., *Blair County and Cambria County, Pennsylvania: An Inventory of Historic Engineering and Industrial Sites*. (Washington, D.C.: Historic American Buildings Survey/Historic American Engineering Record, National Park Service, 1990), p. 65.

[11]Ibid., pp. 64-65, and Wallace, *Character*, pp. 11-12.

directly related to iron and steel production were nevertheless owned by Cambria Iron Company. At the company store, Wood, Morrell, & Company in Johnstown, residents could purchase shoes and boots from a company-owned shoe factory, cloth and cereal products from its woolen and grain mills in Woodvale, meat raised on company farms and prepared at its slaughterhouse, and furniture from its furniture factory and planing mill. The Johnstown Mechanical Works was purchased by Cambria Iron in 1864 and included a blacksmith shop, machine shop, and foundry. It produced railroad cars, pumps, plank flooring, weatherboarding, boxes, and could "in short, make everything that a business community desires to be done."[12] The Johnstown Street Rail Company moved to Johnstown in 1883, leasing space from Cambria Iron in its vacated Woodvale mill. They produced oddly shaped rails for street cars from steel blooms purchased from Cambria. Outgrowing the facilities at Woodvale, they built a factory south of town and laid out a village to support it, called Moxham after one of the company founders.[13]

William Rosensteel's tannery, originally located in Woodvale but moved to Laurel Run in 1889, was one industry that was not directly connected with the Cambria Iron Company. Rosensteel brought African-American workers from Maryland to perform the often difficult and unappealing labor. Another tannery between Johnstown and Millville was noted as "by far the largest establishment of its kind" in the region. Other businesses that thrived in the town included hotels, saloons, breweries, mercantile shops, lumber yards, and small manufacturing establishments. In 1878, Gautier Steel Company, of Jersey City, New Jersey, formed a partnership with Cambria Iron and moved its plant to the east bank of the Little Conemaugh River near downtown Johnstown, on the site of the abandoned Pennsylvania Canal basin. The plant specialized in the manufacture of steel barbed wire and other agricultural products. Gautier Steel became a division of Cambria Iron in 1881.[14]

The iron and steel mills at Johnstown, along with the mines that supported them, provided a wealth of jobs to the community. By 1880, the various departments of the Cambria Iron Company employed about 4,000 men. This labor supply came largely from Welsh and German farm families in the surrounding countryside, and from excess canal and railroad workers. Many German immigrants set up as merchants. Irish workers were employed on the railroads and went to work in the factories when those jobs were reduced. By the 1870s, Slavic and southern European immigrants were providing unskilled labor for the mills and mines. The Panic of 1873 brought decreased wages and labor strife, prompting many of Johnstown's native workers to emigrate to the Midwest and West, leaving poor-paying factory and mining jobs to the arriving immigrants. Slavic and other eastern Europeans were generally all referred to as Hungarians or "Huns" among the Anglo-European groups. The term lumped together Russians, Poles, and even Swedes. The Slavs generally lived in company tenements on the edge of Cambria City in an area known as "Rotten Row." They suffered a great deal from prejudice and poverty. Some African Americans also worked in the less desirable jobs in factories, tanneries, and other industries. By the time of the Johnstown Flood of 1889, the boroughs of Cambria City and Prospect were primarily settled by immigrants, while Johnstown, Conemaugh, and Woodvale were populated primarily by native-born residents.[15]

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[12]quoted in Ibid., p. 17.

[13]Ibid., p.19.

[14]Ibid., pp. 16, 17; Shappee, "A History of Johnstown," p. 130; and Fitzsimons, *Blair County and Cambria County*, p. 301.

[15]Shappee, "A History of Johnstown," pp. 71-72, 84-87.

Mill workers were housed in boarding houses, company-owned tenements and houses, and in independently constructed dwellings. Living conditions were often poor. Expansion of mill operations sometimes caused severe housing shortages, and men could be found four and six to a single room. Most dwellings did not have adequate drainage or sanitary facilities. Waste was generally thrown into streets, alleys, creeks, or, as likely as not, into the city's rivers to be swept away by the next freshet. The health hazards of such dumping were not perceived or were disregarded during the period prior to the flood of 1889. Houses were inadequately insulated, and soot and dust from the mills settled all over them, impairing the health of their occupants and imposing the pervasive gritty, gloomy appearance that Johnstown shared with many another industrial town.[16]

The population growth brought by the Cambria Iron Company resulted in the expansion not just of Johnstown, but also of various boroughs and villages reaching into all areas of the Conemaugh River Valley. Although economically connected, the various jurisdictions in the valley long resisted political consolidation. Johnstown, the oldest and largest of the communities, styled itself as the cultural and social center of the area, although improvements to the town infrastructure came slowly. Expansion of the city boundaries and efforts at civic improvement began in the 1850s. In that year, the population of Johnstown stood at 1,269. Thirty-nine years later, on the eve of the Johnstown Flood, the city population had increased to 10,253. Cambria County as a whole grew from 17,773 inhabitants in 1850 to 66,375 in 1890.[17]

Following the Civil War, more civic improvements were made, including the installation of gas street lights and better sewers, and the construction of a new city hall. Despite these efforts, money was frequently unavailable for needed work, and the patchwork of political jurisdictions resulted in an inconsistent and disjointed approach. The most successful public works efforts were those supported by the Cambria Iron Company and the Pennsylvania Railroad. For example, because they needed a consistent supply of power and water for the mills, Cambria Iron Company provided financial backing for the Johnstown Water and Gas Company, which also provided services to the public. The influence of the city's industries on public facilities in Johnstown is reflected in the development of the suburb of Moxham in 1888, which was laid out, complete with street car lines, by the Johnstown Street Rail Company.

Because of the high, steep hills, which hemmed in settlement in the Conemaugh Valley, and as the demand for space increased, property was developed as close to the banks of the rivers as possible in many places. An 1854 survey of the width of the rivers in Johnstown by Henry Wilson Stoney provided a reference point for measuring encroachment on the banks of the town's waterways. He measured these distances again in 1907, and found that the distance from the property lines to the river had decreased greatly during the approximately 50 years.[18]

During the 1880s, riverbank encroachments decreased the carrying capacity of the rivers and also increased backwater levels, thereby increasing the likelihood of flood damage. Floods in 1880 and 1883, although not gauging as high, caused more damage and flooded more area than did the flood of 1873. The occurrence of damaging floods during almost every year from 1880 to 1888 resulted in a great deal of discussion among the leaders and citizens of Johnstown as to what could be done to mitigate the damage created by these inundations. Apart from chastising upstream landowners for over-cutting timber and urging stricter enforcement against

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[16]Ibid., pp. 174-175.

[17]Ibid., p. 126.

[18]Ibid., pp. 108, 114-115, 194, 202-204.

channel obstructions, however, little more was done. The integrity of the South Fork Dam, on the upper reaches of the Little Conemaugh, had also been questioned for some years, but having held through a number of threatening instances, few feared its failure.[19]

The potential disaster finally came to pass at the end of May 1889 in the most famous flood in American history. It was the awesome power of the wave, the rapid nature in which it struck, the tragic loss of over 2,200 lives, and the extensive and often distorted media coverage of the event that impressed the Johnstown Flood of 1889 on the nation's consciousness. On Friday May 31, after torrential rains had swollen the South Fork Reservoir and the waters around Johnstown, the dam gave way, releasing 20 million gallons of water into the Conemaugh Valley. As it crashed down the narrow valley towards Johnstown it swept away trees, boulders, houses, railroad tracks and cars, and any other obstacle it encountered. The village of Woodvale, above Johnstown was completely obliterated, and just before reaching the downtown area, the wave ripped apart the Gautier Works of the Cambria Iron Company, where it picked up miles of barbed wire that added to the destructive force of the debris.[20]

As the wave swept through town it destroyed most of the buildings in downtown Johnstown, then crashed into the nearly vertical side of Yoder Hill, created a backwash into town, and drove water up the Stonycreek River. The debris piled up against the stone arch railroad bridge just below "the Point", holding the water for some 20 minutes and creating a lake in downtown Johnstown. Water soon found its way over, around, and through the bridge, and swept through the lower part of town and out through the Conemaugh Gap, leaving acres of standing water, mud, and twisted debris. Some 80 people who survived the original onslaught but were trapped in the wreckage were killed during the night when the pile of debris left at the railroad bridge caught fire. The removal of the mass of material left at the railroad bridge was a major undertaking, and extensive blasts of dynamite were required to shake the mass loose. The bridge remained in place, however, and it was not significantly altered during the construction of the later channel improvement project between 1938 and 1943.[21]

Very few buildings in downtown Johnstown survived the 1889 flood. Those that did were generally constructed of stone or brick. These include Alma Hall, which served as a shelter for hundreds of Johnstown residents during the flood recovery, the Cambria Iron Office Building at 317 Washington Street near the Walnut Street bridge, and the Franklin Street United Methodist Church. Despite the devastation, the city set about rebuilding quickly, calling on public spirit and determination in the face of adversity to overcome the great sense of loss. Many of the public and private buildings in the downtown area were constructed during the decade following the flood. These buildings, including the Cambria Library (now the Johnstown Flood Museum), Saint Marks Episcopal Church, and several large commercial buildings, have come to represent the indomitable spirit of the Johnstown community.[22]

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[19]Ibid. pp. 228-231 and David McCullough, *The Johnstown Flood*, 2d. ed. (New York: Simon & Schuster, Inc., 1987), pp. 65-66. The South Fork Dam originally was constructed for the Pennsylvania Canal.

[20]Wallace, *Character*, p. 25.

[21]Ibid., and McCullough, *The Johnstown Flood*, p. 149.

[22]Wallace, *Character*, p. 28, and Jonathan Daily, "Downtown Johnstown Historic District, National Register of Historic Places Registration Form" (Harrisburg, Pennsylvania: Bureau for Historic Preservation, 1992).

Johnstown's economy was supported during the recovery by the rebuilding process itself, and by construction of new residential developments that took shape in the hills high above the town. Cambria Iron Company, for example, developed the Westmont subdivision on the top of Yoder Hill. Because access to the development was difficult, sales in the new borough were slow until the company installed an incline plane cable car system to carry vehicles and people to the summit. The Johnstown Incline Plane is still operated today as a tourist attraction.[23]

Although in the past the individual boroughs in the valley had protected their independence and had resisted consolidation, the need for cooperation in the wake of the flood prompted reconsideration of incorporation measures. Relief agencies felt that enforcing sanitary codes required a broad-based authority; business leaders felt that a single community could be more effectively marketed; and a general interest addressing the "common engineering problem" of flood control under a "single intelligent management" was expressed. In November of 1889, the boroughs of Millville, Cambria City, Prospect, Woodvale, Grubbtown, and Conemaugh were incorporated into Johnstown.[24]

The political reorganization did encourage growth. During the early twentieth century the street car system was expanded to reach outlying boroughs, neighborhood parks were built, and a general prosperity pervaded the city. From 1900 to 1910 the population of Johnstown and surrounding boroughs increased from 43,804 to 70,295.[25] The steel and coal industries prospered, and by the 1920s, 90 percent of the city's wage earners were employed by those industries. Cambria Iron was relatively progressive in its treatment of workers. Company-built housing was typically spread out through the city to discourage the development of slums, and wages were adequate. However, not all workers shared in the prosperity. Eastern European immigrants were reviled, and often were crowded into unhealthy tenements where disease was rampant. The enclosing hills of the valley held in the black smoke of the continually operating furnaces, often casting a dark pall over the city. These conditions were only exacerbated by the Great Depression that followed the stock market crash of 1929.

Bethlehem Steel, which had bought out Cambria Iron Company in 1922, was able to maintain near capacity output for some months following the crash, but as the demand for steel decreased, lay-offs and wage reductions were necessary. The payroll at Bethlehem was cut by over 50 percent by 1931. Many workers were employed one or two days a week, discouraging them from leaving town, but hardly providing enough to even survive. Thousands of families entered the rolls of public relief. In the many close-knit ethnic neighborhoods, residents looked after each other as well as they could, and institutions such as churches and clubs provided food and services. Many residents supplemented store-bought food with vegetables from backyard gardens and rented rural plots. Middle and upper class residents also suffered privation and bankruptcy during this period, although many were kept employed to keep the factories operating at minimum levels, and their situation was mitigated somewhat by accumulated savings.

The difficult economic times of the 1930s opened working class ears to accusations of graft, corruption, and insensitivity on the part of Bethlehem Steel by Eddie McCloskey, who published his viewpoints in a populist paper called *The Derby*. In 1931, promising to create jobs, lower utility rates, and break up Bethlehem Steel's influence peddling in local government, McCloskey was elected mayor of Johnstown. He fought hard for the working class, but his impetuousness and intransigence rankled the city council and other officials, and many

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[23]Wallace, *Character*, pp. 32-33.

[24]Ibid., pp. 30, 32.

[25]Ibid., pp. 33, 46.

of his efforts at reform were blocked. With the election of Franklin D. Roosevelt in 1932, however, many of McCloskey's ideas resonated with the national economic reform effort. With over 22,000 unemployed workers in 1932 and its relief agencies unable to handle the load, Cambria County looked expectantly to the Roosevelt administration to provide jobs for its residents.

The Civil Works Administration (CWA), established in 1933 as an emergency organization, provided money to the state for infrastructure improvements, and soon jobs were available repairing roads and bridges throughout the state. The short-lived CWA was superseded by the Works Progress Administration (WPA) in 1935. The WPA set up its District 11 office in the old Cambria Iron Hospital building, and by June of 1936 had spent almost $4 million in Cambria County on highway improvements and construction, conservation, improvements to public buildings, public utilities, white collar projects and recreational facilities. Many small projects were undertaken in each community in an effort to employ men in their own neighborhoods, thus benefiting the community and creating a sense of self-worth in the workers. An average of 4,200 workers were employed each month by the WPA between September 1935 and June 1936.

Other civic improvements were undertaken by the WPA after the 1936 St. Patrick's Day Flood, including construction of a wastewater treatment facility, a golf course club house, and a stone and concrete band shell at Roxbury Park which is an excellent example of the quality stone work of the city's Italian and Slavic immigrants. The WPA also employed hundreds of teachers, writers, artists, and clerks for educational and administrative projects.

The steel industry began a slow recovery in 1937, but throughout the Depression, union organizers had been working to expand their membership in the still non-union steel industry. During the summer of 1937, many of Bethlehem's steel workers walked off the job. Support for the Steel Workers Organizing Committee (SWOC) was only moderate, however, and through the efforts of Mayor Shields and his Citizens Committee, which used deputized citizens and public information outlets to encourage a return to work, the strike fizzled without concessions on the part of Bethlehem Steel. However, over the next several years the union won several victories, and Bethlehem Steel was forced to recognize union representatives under the Wagner Act and other federal legislation protecting workers' rights.[26]

The demand for industrial products during World War II revived the fortunes of Johnstown once again. Bethlehem Steel Corporation's steel production saw a dramatic increase in 1944, and another increase in the early 1950s was also realized. The 1960s saw more modernization than growth, as technological advances in steel production created foreign competition problems for Bethlehem Steel. The 1970s ushered in clean air enforcement by the Environmental Protection Agency, forcing Bethlehem Steel to comply. The high costs of renovations and upgrades threatened to shut down certain operations at the Johnstown plant in 1973, but they were saved when an upturn in business during 1974 prompted Bethlehem Steel to continue the operation of all facilities at its Johnstown plant.[27]

The massive 1977 flood, along with natural disasters at other Bethlehem Steel Corporation plants and mines that year, caused a large shutdown of facilities and the layoff of workers at the Johnstown plant; the work force went from 11,400 prior to the 1977 flood, to only 2,100 workers by 1983. Bethlehem Steel has suffered

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[26]The Depression era in Johnstown's history is discussed by Curtis Miner, *Forging a New Deal: Johnstown and the Great Depression, 1929-1941* (Johnstown, Pennsylvania: Johnstown Area Heritage Association, 1993).

[27]Sharon Brown, *Historic Resource Study: Cambria Iron Company* (Washington, D.C.: U.S. Department of the Interior, National Park Service, 1989), p. 130.

additional problems since 1983, but because of the innovation of the Johnstown community in their desire to save jobs, Bethlehem Steel continues to survive today despite stiff world competition.[28] However, the 1990s has seen the Bethlehem Steel Corporation sell off most of its holdings in Johnstown to other steel manufacturers, such as BRW Steel, Johnstown Wire Technology, and J. Pitt Steel. Bethlehem Steel was bought out by Veritas in late 1994, and under the Bethlehem Steel name, now owns and operates only half of the Lower Works.[29]

Floods in Johnstown's History and Some Early Attempts at Flood Management

Johnstown, Pennsylvania, is the city most closely associated in American history with the tragic consequences of flooding. Although the city was an important center of iron and steel manufacturing from the mid-nineteenth century onward, its reputation rests largely on the tragic "Johnstown Flood" of May 31, 1889 that claimed the lives of 2,209 individuals and physically devastated the city. The 1889 flood resulted not from a natural catastrophe but from the failure of a man-made earthen dam located in the mountains above Johnstown at the posh South Fork Fishing and Hunting Club, a country retreat patronized by many of the wealthy industrialists of the period.[30] Although the 1889 flood was thus a man-made disaster, it deeply sensitized every resident of the town to the awe-inspiring power of raging water. Even before the 1889 flood, however, damaging high water had been a perennial Johnstown problem. The first flood recorded by white settlers occurred in 1808 and wiped out the iron forge of John Holiday on the Stonycreek River. Fall floods between 1816 and 1820 were commonly known as "pumpkin floods" because pumpkin crops were often swept down the river from upstream farms. A local history of Johnstown chronicles damaging floods in Johnstown in the years 1832, 1847, 1859, 1861, 1867, 1873, 1875, and in seven of the nine years between 1880 and 1888. Between 1889 and 1942, water crested at flood stage 21 times, 14 of those occurring between 1913 and 1930. Naturally occurring floods therefore continued to plague Johnstown's residents long after the city had been rebuilt following the 1889 disaster. Significant floods took place in 1894, 1907, and 1924, for example, but the most significant flood prior to 1977 was the St. Patrick's Day Flood in March 1936.

Several factors contribute to Johnstown's flood potential. The Conemaugh River valley, where the city lies, is located on the western slope of the Allegheny Ridge, the eastern continental divide of the United States. This long mountain ridge slows down prevailing storms from the west and southwest, resulting in large amounts of rain and snowfall in the area. Average annual rainfall in Johnstown in 1939 was 47.5 inches, nearly 12 inches more than in Pittsburgh, 67 miles to the west. The drainages of the Little Conemaugh and Stonycreek rivers, which come together at "the Point" in Johnstown to form the Conemaugh River, are both steep and fan-shaped. Prior to the construction of the JLFPP, the portions of these channels in Johnstown had been too narrow and shallow to handle peak flows without the occurrence of flood damage. Deforestation caused by extensive settlement of the area, especially following the Civil War, and dangerous encroachment by development over the flood plains, also contributed to rapid runoff problems.

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[28]Ibid., pp. 130-133.

[29]This information was reported by Dean Shaver to Patricia H. Baker and Jeffrey Holland in 1995. See Baker and Holland, *Phase 1 Cultural Resource Reconnaissance*, p. 29.

[30]Eliza Smith Brown, ed., "Historic Structures Report, South Fork Fishing & Hunting Club and Clubhouse Annex." 2 vols. (Pittsburgh: Landmarks Design Associates, Inc., Architects; and Wallace, Roberts, & Todd for the National Park Service, Denver Service Center, the Southwestern Pennsylvania Heritage Preservation Commission, and the 1889 South Fork Fishing & Hunting Club Historical Society, 1993).

Although the 1889 disaster is regarded primarily as a result of the failure of the South Fork Dam, there is evidence that the increased frequency of flooding after 1880 was in part a result of the narrowing of the river channels through the encroachment of construction and by the deposition of debris along the banks. The flood of 1873 crested at 10.5 feet over flood stage, inundating only the lower part of Main Street. In 1880, however, a flood of 9 feet covered the downtown area from "the Point" to Union Street. During a flood of 14 feet in 1884, water reached Walnut Street. Although gauge readings on the Stonycreek River during a flood in 1888 were only slightly higher than in 1873, water was 1.5 feet deep over all of lower Johnstown. The speed with which the water rose was also remarkable. In 1885, the Stonycreek River rose 3 feet in 45 minutes.

In-filling along the rivers in Johnstown is also well-documented. The old Pennsylvania Canal and the canal basin were filled in by the Pennsylvania Railroad and the Cambria Iron Company, respectively. Cambria Iron Company used facility waste to fill in the basin, located on the Little Conemaugh River just upstream from the downtown section of Johnstown. By 1877, this area had been completely filled, and the company began to sell houses on the newly created land. The Gautier Works were also built on this fill. In 1873, fill was added at the base of Franklin Street to secure additional land for the railroad freight tracks. Other land on the Stonycreek River was filled to make land for a railroad switching yard. To protect its tenements in Woodvale, Cambria Iron Company constructed a 6-foot wall in the river and filled the area behind it with waste from the mill. In some cases, hot semi-metallic "cobble" was dumped along the river, which solidified into a solid, immovable mass.

Municipal dumping and lax enforcement of city regulations also contributed to the physical restriction of the river channel. Dirt from city streets was dumped at "the Point," making a previously sloping area level enough for the construction of a baseball field. The city also created "made land" by filling areas between the river banks and islands in the Conemaugh River, further restricting its flow. An 1882 statute set the width of the Little Conemaugh River at 110 feet and the Stonycreek River at 175 feet, but encroachments on this boundary were rarely punished.[31]

Before 1882, the city only cleared natural obstructions that formed in the river channels during high water. Local boys were paid 50 cents a day to clean out stones from the channels, and contracts were let periodically for removal of sand bars. These physical obstacles were modest, however, since redeposited sand was usually balanced by increased channel widths scoured out in other locations. Industrial waste, on the other hand, was dumped in quantities, filling in large areas where the river had carved a wide berth. The frequency of damaging floods during the 1880s prompted discussions among the citizens and leaders of Johnstown. The 1882 city ordinance set the channel boundaries as stated above, but the ordinance was not rigorously enforced. In part, this lax enforcement was a result of the location of borough lines, which ran down the center of the waterways. This made cooperation among various boroughs necessary for effective channel boundary maintenance, and, apparently, such cooperation was rarely achieved. Townships adjacent to the city did not have the authority to establish channel lines, and political influence often was used to circumvent the law.[32] Although private citizens did not contribute as much as industry did to river channel encroachment, the stream

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[31]Much of the information on historic river channel encroachments is discussed by Shappee, "History of Johnstown," pp. 195-202, 229-230.

[32]U.S. Army Corps of Engineers, Pittsburgh District, "The Johnstown Channel Improvement Project." Document prepared by the Public Relations Office, U.S. Army Corps of Engineers, Pittsburgh District, and provided to Tom Nokes of the Advertising Club of Johnstown, 26 November 1943. Record Group 77, Entry 46, Box 207, Publicity/Press file. Mid-Atlantic Division, U.S. Archives, Philadelphia, Pennsylvania.

banks were nevertheless popular places for disposing of all manner of household waste, and the accumulative effect was no doubt significant. The *Johnstown Tribune* noted that a continuous dump from Chestnut Street to "the Point" on the Stonycreek River produced "loud and pestiferous stinks."[33]

Long before the onset of the JLFPP, river walls had been constructed by individual property owners along the streams. Some of these walls violated the 1882 ordinance concerning the minimum channel width, but, again, action seldom was taken against the violators. In 1886, walls were constructed on both sides of the Little Conemaugh River between Walnut and Johns Streets that created a bottleneck in the channel. The Johnstown and Millville councils ordered the walls to be dismantled, and this was carried out.[34] They do not appear on the 1886 Sanborn Insurance Company map of the city.

The 1886 Sanborn Insurance Company maps for Johnstown suggest that retaining walls had been constructed in only a few places, primarily where buildings had risen adjacent to the riverbanks. Walls are not usually labeled on the maps, but they appear to be represented as straight lines, whereas the natural riverbank is shown as an irregular line. Based on this interpretation, retaining walls or walls constructed as foundations for buildings had been erected before 1886 along the right bank of the Stonycreek River from below the current Haynes Street bridge to below the First United Methodist Church, on the right bank of the Little Conemaugh River from just below the Conemaugh & Blacklick (C & B) Railroad bridge to just below the Walnut Street bridge, and on the left bank of the Conemaugh River just below the Bridge Street bridge, where a saloon was located. The entire city is not represented on these maps, however, so there may have been other such walls as well. Only the right bank of the Stonycreek River seems to have had substantial walls that were not supporting buildings. The primary purpose of this wall apparently was to provide usable space adjacent to the river, not flood protection. This impression is reinforced by a Civil War-era map which shows that, at that time, Stony Creek Street (now Vine Street) ran along the riverbank with no development between it and the river.[35] There are few pictures of Johnstown prior to the flood of 1889, and no evidence about the types of raw materials or construction techniques used in building these walls.

Concern about the safety of the South Fork Dam had been voiced since 1881, when a rumor that the dam had broken during a spring freshet spread throughout the town. Although two men from Cambria Iron Company inspected the dam and declared it safe, the prospect of the water behind the dam pouring down the Little Conemaugh gorge was frightening enough to keep many Johnstown residents uneasy during the frequent floods of the next eight years. The *Johnstown Tribune* declared that there was no cause for alarm. It was thought that even if a break did occur, the water impounded by the dam was too far away to cause extensive downstream damage. In 1887, the newspaper reported that a dam break would only affect Johnstown if it occurred coincidentally with a great flood in the valley, which, it was thought, was "one of the possibilities not worth worrying about".[36]

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[33]quoted in Shappee, "History of Johnstown," p. 201.

[34]ibid., pp. 201-202.

[35]McCullough, *The Johnstown Flood*, p. 129.

[36]Ibid., pp. 63, 66.

Despite such assurances, at least some of Johnstown's residents were aware of the potential for disaster and the need for preventative action. The frequency of floods during the 1880s prompted a series of concerned letters to the *Johnstown Tribune*. In an eerie foreshadowing of events in 1889, one citizen wrote in 1887 concerning an obstruction that was forming in the river near the stone railroad bridge being built below "the Point":

> If it is found that the new bridge will leave less space for water than the old one does, an injunction should be applied for immediately. Imagine an ice gorge at this bridge, with a volume of water as we saw the other day behind it. Our city would be doomed, for in a very few minutes the whole valley in which Johnstown lies would be converted into a huge reservoir.... The loss of life and destruction of property would be appalling.[37]

A month following the flood of 1889, Pennsylvania Governor James Beaver wrote to the Secretary of War to report that a great deal of debris still clogged the rivers at Johnstown, creating a flood hazard from only a normal freshet. Acting on an earlier request from the governor, President Benjamin Harrison ordered engineering troops to Johnstown to construct bridges and to assist in organizing debris removal. This became the first instance in which federal troops were assigned to emergency disaster relief. Governor Beaver also asked for help from the U.S. Army Corps of Engineers to increase the water-carrying capacity of the river channels. The Corps concurred on the severity of the problem and suggested that "what is needed is a new permanent course of ample section, to be secured in part by dredging, and in part by water-tight embankments."[38] It was explained to the governor that the Corps could not undertake such a project, however, as its legal mandate authorized it only to provide navigation improvements.

In 1890, Johnstown began a series of actions intended to alleviate its flooding problem by passing an ordinance that prohibited refuse disposal and obstructions in the river. When another flood hit the city only two years after the 1889 flood, the city also hired an engineer, J. J. R. Croes, to develop recommendations for channel improvements and to establish the channel widths necessary for adequate flood protection. Between 1891 and 1894, the city established the minimum channel widths that Croes had recommended. These included a 125-foot bottom width on the Little Conemaugh River, a 225-foot bottom width on the Stonycreek River, and a 260-foot bottom width on the Conemaugh River. In contrast, the 1882 city statute had set the widths at 110 feet on the Little Conemaugh and 175 feet on the Stonycreek River.[39]

In 1893, Johnstown also secured the right to extend the city's limits across the rivers to include both banks, making enforcement of the regulations easier. Between 1891 and 1937, the city also conducted other studies to identify measures needed to keep the river channels clear. A series of retaining walls apparently were built along the rivers during this period, but, based on the current level of knowledge, the extent of Johnstown's participation in these improvements is uncertain.

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[37]quoted in Shappee, "History of Johnstown," p. 230.

[38]quoted in Leland Johnson, *The Headwaters District: A History of the Pittsburgh District, U.S. Army Corps of Engineers* (Pittsburgh: U.S. Army Corps of Engineers, 1977), p. 186.

[39]U.S. Army Corps of Engineers, Pittsburgh District, Engineering Division Files, 11-2-240a, Johnstown Flood Protection Project, 1937-1956 (Pittsburgh: U.S. Army Corps of Engineers) and Shappee "History of Johnstown," pp. 199-200.

Sanborn maps indicate that between 1891 and 1895, a retaining wall was constructed from the C & B Railroad bridge to, or close to, "the Point" on both sides of the Little Conemaugh River. The 1891 Sanborn map shows that a stone cutter's shop, which may have been involved in the construction of these walls, was located just below the Walnut Street bridge on the left bank. On the Stonycreek River, portions of the wall along the right bank appear to have fallen or been dismantled between 1891 and 1895. In the latter year, the upstream end of the wall appears to have been at Spencer's slaughterhouse at the intersection of Levergood and Vine streets, whereas earlier maps suggest that it extended above the slaughterhouse to an undetermined point that is off the maps. On the upstream side of the Franklin Street bridge, a marble shop had been built directly atop the retaining wall; in 1895, the riverbank was represented as an irregular line, but the marble shop was still standing. Perhaps fill had been added between the shop and the river. Downstream from the Franklin Street bridge a wall seems to have been built to a point near the southeast corner of the Methodist Church, beyond which the bank is again represented on the map as an irregular line. With the exception of these two wall sections, no other retaining walls are apparent on the 1891 and 1895 Sanborn maps.

The 1913 Sanborn maps are the first that clearly show the location of retaining walls along the riverbanks. On the Little Conemaugh River, a wall is shown on the left bank from the C & B Railroad bridge to the Walnut Street bridge. This wall abutted the northwest corner of the Cambria Steel Company's offices. Below the Walnut Street bridge on the left bank and extending about halfway to the current Johns Street bridge, buildings had been constructed along the river, creating an irregular wall that may have replaced or been built over portions of the 1891-1895 wall. Where no buildings had been constructed on the bank, the depiction of the wall segment is regular, suggesting some sort of retaining wall. On the right bank between Walnut Street and Johns Street a "stone river wall" is marked. This was apparently the wall constructed between 1891 and 1895, and that was later incorporated into the JLFPP.

On the Stonycreek River, a foot bridge had been constructed by 1913 that extended from Haynes Street on the left bank to the New Senate Hotel on the right bank. A retaining wall is depicted on the right bank on either side of this bridge. Moving downstream on the right bank, there is a gap in the wall in front of several lots, then another wall begins two properties upstream from the old slaughterhouse, which, by 1913 had been replaced by a livery. This wall extended to the Franklin Street bridge, then continued on the other side of the bridge past a fire house and the Methodist Church to the downstream end of the Methodist Church parsonage (rectory). Judging from photographs displayed in this church, the wall segment in front of the fire house and church was constructed between 1905 and 1913, probably when the new church building was constructed in 1912.[40] The 1913 Sanborn map also shows that another section of wall continued downstream from the church, and formed the foundation of four contiguous buildings that were part of a marble works. The same map also shows a wall on the upstream side of the First Street bridge on the left bank of the Little Conemaugh River; apparently, this wall was later incorporated into the JLFPP. No additional walls are indicated, although others may have existed.

The bleak economic conditions in Depression-era Johnstown were further magnified by the devastating St. Patrick's Day Flood of March 17, 1936, which destroyed 77 buildings, and damaged thousands more. Although the loss of life was small compared to the 1889 Johnstown Flood (25 people were killed), property damage was considerably more, due to the extensive growth of the city since that year. Nearly one-third of the city was

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[40]Information provided by Pastor Allan Brooks, September 1, 1994; see Baker and Holland, *Phase I Cultural Resource Reconnaissance*, p. 34.

inundated by the waters.[41] The 1936 flood resulted, not from the failure of a man-made dam, but from the relentless onslaught of Mother Nature. Three days of heavy rains combined with run-off from a cold winter's deposits of ice and snow to raise the river to 14 feet over the sidewalks in the downtown area. Besides the damage to industrial facilities, residential structures, and commercial enterprises, millions of dollars in damage occurred to public facilities such as downtown bridges, sidewalks, and roads..

The need for a systematic program of flood control for Johnstown, which had been discussed periodically since 1889, was galvanized by the St. Patrick's Day Flood. On March 25, 1936 the American Legion post at Johnstown wrote to Senator Joseph Cuffey requesting federal relief for slum clearance and home building, as well as for flood prevention. The resolution emphasized the benefit of flood protection to downstream communities including Pittsburgh, and declared that it would be "unthinkable" that Johnstown not be included in the Omnibus Bill sponsored by Senator Copeland of New York.[42] Aid in the form of WPA projects was immediately forthcoming for flood clean-up and repairs. Later, several projects directly related to flood prevention were approved. These included channel clearance and dredging projects, construction of retaining walls along the left bank of the Stonycreek River, and construction of the balustrade wall along the left bank of the Conemaugh River below "the Point."[43]

The passage of the federal Flood Control Act of 1936 authorized the appropriation of federal money for projects whose primary purpose was flood control, and it was a significant development in the effort to secure the political cooperation and money necessary for such an ambitious undertaking in Johnstown.[44] Through the efforts of Mayor Daniel Shields, who made several trips to Washington to lobby for aid, and the Chamber of Commerce, which encouraged a letter-writing campaign, President Franklin D. Roosevelt was convinced to visit Johnstown in August 1936. Before leaving, the President promised $300,000 for a comprehensive survey to be undertaken by the U.S. Army Corps of Engineers.

In November 1936, city engineer H. Lee Wilson submitted a report to the Pittsburgh District of the Corps of Engineers outlining a plan for the prevention of floods of the level that had been experienced the previous March. Wilson's report discussed three options that included construction of a system of reservoirs above Johnstown, major channel improvements, or a combination of moderate channel improvements and the building of smaller capacity storage reservoirs. The study concluded that the combination plan was the most cost-effective.[45] The Pittsburgh District rejected plans that relied on reservoir construction because of a lack of suitable sites and determined that an extensive rechannelization would be able to handle flows equal to those experienced during the St. Patrick's Day Flood. Between 1938 and 1943, the banks of the Conemaugh, Little Conemaugh, and Stonycreek rivers were paved with concrete and the channel dredged to accommodate more water. The project cost $8.9 million, and established Johnstown in the minds of many as a "flood-free city", and so it remained until 1977 when a 500-year flood far exceeded the design limits of the project.

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[41]Ramon Cooper, "The Flood and the Future: The Story of a Year in City Government at Johnstown, Pennsylvania, 1936." (Johnstown, Pennsylvania: Johnstown Area Heritage Association Archives, 1937), pp. 1-4.

[42]Joseph B. McDade to Joseph Cuffey, 25 March 1936, Fulton I. Conner Collection, Box 10, Folder 2, Johnstown Area Heritage Association Archives, Johnstown, Pennsylvania.

[43]Cooper, "The Flood and the Future," pp. 17, 84.

[44]Arnold, *Evolution of the 1936 Flood Control Act*, p. vii.

[45]H. Lee Wilson, "Report on Flood Control for City of Johnstown, Pennsylvania, 1936," Johnstown Area Heritage Association Archives, Johnstown, Pennsylvania.

The Flood Control Act of 1936 and the Evolution of the Role of the Federal Government in Local Flood Protection

The federal Flood Control Act of 1936 was an outcome of the devastation suffered in the Northeast during the 1936 St. Patrick's Day Flood, and it was the 1937 amendments to this act that authorized the design of the JLFPP. The Johnstown project, however, was one of many flood control projects undertaken by the Corps of Engineers under the auspices of this act, which represented a major change in thinking about the role of the federal government and of the Corps in establishing modern local flood protection measures.

The traditional role of the federal government in flood control was long limited by the belief that the benefits of such efforts were limited to local protection, and were hence beyond the scope of federal power. Proponents of a plan of nationalized internal improvements sought to expand federal power by loosely construing the Commerce Clause of the Constitution, which gave the Congress the right "to regulate commerce...between the several states." In 1824, the Supreme Court ruled in *Gibbons v. Ogden* that improvements to navigation along the nation's waterways was a legitimate pursuit of the federal government under the Commerce Clause. Throughout the nineteenth century, Congress used this power to fund a variety of projects which often faced criticism as "pork barrel" spending. In general, the projects were carried out by the U.S. Army Corps of Engineers. In 1902, partially in response to these criticisms, the Board of Engineers for Rivers and Harbors was established within the Corps to independently review proposed river and harbor projects.

Until the Progressive Era of the early twentieth century, any flood control benefits that resulted from federal river improvements were seen as secondary to the primary purpose of benefiting navigation, although levee projects on the Mississippi were eventually funded with federal money based on the national importance of the river, which was often referred to as the "nation's highway." In 1850, two surveys of the Mississippi Valley were conducted using federal funds to "determine the most practicable plan for securing it from inundation." One survey was conducted by a prominent civilian engineer, Charles Ellet, Jr., and one by two members of the U.S. Corps of Topographical Engineers, Captain A. A. Humphries and Lieutenant H. L. Abbott. Ellet's report recommended that a series of reservoirs on the river's tributaries was the most effective method of flood control, while Humphries and Abbott's report argued that levees were sufficient for the desired protection, in addition to being significantly less costly and more practical. Humphries became Chief of Engineers in 1866, and through his influence and the continued opposition to the expense of reservoir projects, the Corps of Engineers did not engage in reservoir construction as part of its river navigation improvement programs. Reports generated by the Corps in response to floods between 1866 and 1926 were labeled navigation reports, with recommendations included for flood control measures that could be undertaken by local authorities. If a reservoir was seen as the only solution to flooding problems, the project was generally regarded as impractical.

Until 1879, levee construction on the Mississippi was primarily the responsibility of local levee districts organized in the 1840s. A Corps of Engineers study undertaken in the wake of the Mississippi flood of 1874, however, determined that the resultant levee system was not sufficiently unified or effective. Congress finally created the Mississippi River Commission in 1879, which began a program of levee building along the Mississippi that slowly came to be recognized as primarily for the purpose of flood control. Local levee districts still spent more than three times the money spent by the federal government, but the federal effort had helped improve the works substantially. The floods of 1912 and 1913, however, showed that a considerable federal effort was necessary to effectively control the river. In a sense, Congress's hand was forced by its previous efforts, which would go to waste if the system was not improved.

At the same time that levees were being constructed along the Mississippi, floods in Ohio and Pennsylvania were causing extensive damage, prompting calls for improvements at both local and national levels. In response to the 1907 flood which caused extensive damage in Pittsburgh, the Pittsburgh Flood Commission was established. In 1912 the Commission produced a report advocating a comprehensive system of flood control measures involving reservoirs, levees, flood walls, and reforestation. Such programs were being encouraged by proponents of multipurpose water resource projects, the most prominent of whom was Senator Francis G. Newlands of Nevada. Newlands influenced Theodore Roosevelt to create the Inland Waterways Commission in 1907, which produced a study of water resources that recommended a system of multipurpose river development under a permanent executive commission. Newlands sponsored a bill that would have created such an agency, but despite his persistent efforts over the next seven years, the legislation was never passed. In 1916, however, Congress finally approved the creation of a House Committee on Flood Control, which was to aid in the distribution of funds to flood-stricken areas. The effect of this committee, however, was to create a permanent forum for flood control issues. This slow movement towards increased involvement of the federal government in flood protection culminated in the passage of the Flood Control Act of 1917.

The Flood Control Act of 1917 provided money for flood control on the Lower Mississippi and Sacramento rivers, the first time that projects intended primarily for that purpose had been funded by the federal government. The act also provided for surveys of flood-prone areas by the Corps of Engineers to study how flood control might be integrated with navigation, water power, and "other uses as may be properly related to or coordinated with the project." The Flood Control Act of 1917 required that local interests provide money for the acquisition of rights-of-way, as well as one-third of the funds necessary for construction of the project.

After World War I, federal interest in river improvements shifted to hydroelectric power, and in 1926 Congress approved a $7.3 million Corps of Engineers survey of 180 rivers and tributaries. These surveys, known as the "308 reports" for the House document number authorizing them, came to be the basis for a comprehensive program of water resources development by the federal government. The devastating flood of 1927, which affected seven states and caused an estimated $436 million in direct and indirect damages, made clear the value of such a program. The scope of the program and the level of funding to be provided by the federal government were the subject of much debate in Congress; the result was the Flood Control Act of 1928, which approved a plan for the Mississippi River that called for a mixture of spillways, floodways, levees, and channel clearing, but which failed to address the question of a comprehensive federal program for other river systems in the rest of the country.

The need for a national comprehensive flood control plan gained momentum in the 1930s, as the need for jobs, an emphasis on resources conservation, and the damage caused by the floods of 1936 created a desire for more extensive federal involvement. Although it was developed largely outside the New Deal Program, the Flood Control Act of 1936 benefited from the goals of the Roosevelt administration. Roosevelt was interested in preserving the resources of the country, particularly its soils, forests, and landscapes, and the multipurpose use of river basins was a part of that plan. The fact that the Flood Control Act of 1936 made almost no attempt to integrate other aspects of water and land conservation almost kept it from securing Roosevelt's approval.

Flood control was a part of a number of early New Deal programs, although not as part of a coordinated effort for a nationwide system. Instead, individual projects were approved through several different programs, including the Tennessee Valley Authority, the Civilian Conservation Corps, the Public Works Administration, and the Bureau of Reclamation. Many of these projects were aimed primarily at reforestation and erosion control and benefited flood control only indirectly.

During 1933, a number of bills and proposals were put forward by senators from the South and West that would institute river valley agencies similar to the Tennessee Valley Authority, and the prospect arose that charges of pork barrel politics might endanger all of the proposals if coordinated legislation was not proposed. Senator George Norris proposed that a Presidential committee submit a comprehensive report to guide Congress in developing a plan to maximize the utilization of river resources. That report, prepared by the Committee on Water Flow and known as the Norris-Wilson resolution, prioritized the river basins to be studied in more detail and called for a sharing of authority over river development by various federal agencies. The report was criticized by the Secretary of War, George H. Dern, who pointed out that a comprehensive river basin survey had already been authorized in 1926, and the Corps of Engineers' "308 reports", which were nearly completed, provided most of the required information. Dern maintained that these reports could serve as a blueprint for a system of river basin development that could be overseen by the Corps, which was already highly qualified to do the work. The powerful Rivers and Harbors Committee, which had traditionally worked with the Corps on river improvements, also objected to the usurpation of their power represented by the Norris-Wilson resolution, which would have put much of the authority for river development under the Secretary of the Interior.

In 1934, President Roosevelt created the National Resources Board, which became the National Resources Committee (NRC) a year later. Water resources issues were handled by the Water Resources Committee (WRC), a branch of the NRC. Although a plan for coordinating river basin development was expected from the WRC, its chairman, Morris L. Cooke, emphasized rural electrification to the exclusion of other water resource issues. Cooke expected the NRC to develop priorities for water resources projects as part of a national resources program. NRC chairman Charles E. Merriam had no inclination to work with Congress, however, and when $4.8 billion dollars were authorized in 1935 under the Emergency Relief Act, the Congressional Flood Control Committee decided to bypass the NRC and secure some of this money for flood control.

Riley Wilson, the chairman of the Flood Control Committee, submitted a bill (H.R. 6803) to authorize $600 million for flood control in the spring of 1934. The Flood Control Committee looked to the Corps of Engineers, which was less susceptible to charges of political favoritism, for guidance on which projects to include in its proposal. The projects to be undertaken were distilled from the Corps' "308 reports", which had been first selected on the basis of being primarily for flood control, and then prioritized on the basis of optimal economic value. The bill emerged from Committee a year later but was not considered by the House. Instead, Wilson changed his approach, submitting a new version of the bill, trimmed of the less vital projects and with a budget of $370 million. H.R. 8455 was also different from its predecessor in that it was a regular appropriations bill and did not require that the money come from that allocated by the Emergency Relief Act. Riley hoped that he could speed a flood control bill through ahead of the slow moving NRC. A series of floods in New York, Texas, and the Northwest in 1935 boosted support for the bill, but by the time it got to the Senate, the addition of millions of dollars in amended projects, the hefty price tag, and the last minute nature of the review, resulted in its being sent back to the Commerce Committee for consideration during the next session.

Just as the Commerce Committee was to consider H.R. 8455 in March of 1936, the worst flooding in recorded history hit much of the eastern United States. New York, Massachusetts, Connecticut, New Hampshire, Maryland, Pennsylvania, and the Ohio Valley all were hard-hit. The severity of the floods and the size of areas affected virtually guaranteed the passage of some sort of federal flood control legislation. Guidance for the legislation fell into the hands of Senator Royal S. Copeland of New York, Chairman of the Senate Commerce Committee. Copeland insisted on two provisions for any flood control legislation: that the projects be limited to those that demonstrated a favorable cost/benefit analysis on the basis of flood control alone; and requirements for local contributions to prevent undeserving projects from being included. His opposition to government involvement in hydroelectric power was absolute, and a number of projects that required power generation for economic feasibility were rejected. As the committee grappled with issues over which projects to include, what the scope of the legislation ought to be, and what amount of local contributions should be made, General

Markham of the Corps of Engineers was called upon again and again to make recommendations. As the committee jumped back and forth on various issues, Markham finally stated that if the Corps could be given a limited scope and a set figure for expenditures, they could present a plan of action within 48 hours. The committee finally settled on a price tag of roughly $300 million, no multipurpose projects, and local contributions based on those adopted in the 1917 Flood Control Act.

The lack of provisions in the act for soil conservation and reforestation as elements of comprehensive flood control were troubling to President Roosevelt, who felt strongly that any legislation should integrate land and water conservation issues. The NRC and the Soil Conservation Service sought the President's help in including these elements in any flood control bill. When the bill was introduced to the Senate, Copeland had added two amendments to placate the concerns of the White House. One amendment, by Senator Carl Hayden of Arizona, provided authority to the Soil Conservation Service to plan upstream flood control projects, and the second recognized the National Resources Committee as an advisor to the President on all matters related to river basin conservation and development. The bill passed both houses easily and was signed by the President on June 22, 1936.

The Flood Control Act of 1936 was significant in several respects. It established broad power for the federal government in matters of flood control, powers that were to be administered primarily by the Corps of Engineers. This legislation launched hundreds of projects throughout the United States that would establish the Corps as the principal government agency overseeing flood control and water resources in general. It approved reservoir and channel projects to promote flood control as well as the construction of levees, a recognition of the advantages of a mixed approach to controlling flood waters. Finally, in limiting cooperation between federal agencies with an interest in water resources, it set the stage for another level of water resources legislation that incorporated multi-use projects, flood plain management, and interagency cooperation.

Construction of the Johnstown Local Flood Protection Project

The JLFPP was the largest channel improvement project undertaken by the Pittsburgh District of the U.S. Army Corps of Engineers under the Flood Control Act of 1936, and was one of the largest projects of its type in the United States.[46] Flood control on larger rivers generally involved the construction of levees and flood walls, accompanied by dredging and bank protection using riprap, rather than complete reconstruction of the river channel. The project most similar to that at Johnstown during this period was the extensive improvements to the Los Angeles River and its tributaries in Los Angeles County, California, which included the rectification of some channels using trapezoidal, concrete-lined revetments such as those employed at Johnstown. The Los Angeles work was conducted with funds appropriated through the Emergency Relief Act of 1935. The nearly $14 million allocated for this project represented well over half of the $22 million available for all flood control projects under that appropriation. The Los Angeles project included in its costs 50 new bridge designs, and over 30 miles of concrete and brick conduit channels, as well as 21.8 miles of trapezoidal paved bank channels.[47]

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[46]U.S. War Department, *Annual Report of the War Department for the Fiscal Year Ended June 30, 1937: Report of the Chief of Engineers, U.S. Army, 1937* (Washington, D.C.: U.S. Government Printing Office, 1937); *Annual Report of the War Department for the Fiscal Year Ended June 30, 1938: Report of the Chief of Engineers, U.S. Army, 1938* (Washington, D.C.: U.S. Government Printing Office, 1938); *Annual Report of the War Department for the Fiscal Year Ended June 30, 1939: Report of the Chief of Engineers, U.S. Army, 1939* (Washington, D.C.: U.S. Government Printing Office, 1939).

[47]R.E. Cruse, "Engineering and Design for Los Angeles Flood Control," *The Military Engineer* 29(1937): 282-287.

Planning for flood protection for Johnstown developed out of the need for a multicomponent reservoir system to prevent flooding at Pittsburgh, which had been studied as part of the Corps' "308 reports", and which was authorized for construction by the Flood Control Act of 1936. No specific protection for Johnstown was included in that plan, but preliminary surveys for the Pittsburgh reservoir system had been conducted to determine how improvements in the Conemaugh River basin might be incorporated into the flood protection system for Pittsburgh, while at the same time benefiting Johnstown.[48]. Although the Flood Control Act of 1936 did not appropriate funds for construction, money was made available for the preparation of detailed plans and project estimates through the Emergency Relief Appropriation Act of October 15, 1936. Money for a survey to determine the most feasible solution to the Johnstown flooding problem was allocated through this act in the amount of $300,000, as President Roosevelt had promised during his visit to Johnstown in August 1936.[49]

At least some survey of the Johnstown area had taken place prior to the allocation, as Lt. Col. Covell, the Corps of Engineers' District Engineer, had shown a potential dam site on the Stonycreek River to President Roosevelt during his Johnstown visit.[50] Further investigations were conducted at that site, along with 31 others on the Little Conemaugh and Stonycreek rivers. The Corps' investigation was directed at finding a site for the construction of a large reservoir that could be justified on the basis of providing downstream protection as authorized in the 1936 Flood Control Act, while also providing a solution to flooding at Johnstown. Of the sites studied, 23 were eliminated, in many cases because of the presence of extensive mines that could have flooded and compromised the stability of the reservoir. Nine reservoir sites were determined to be feasible, and in the report submitted to the Chief of Engineers on May 1, 1937, it was recommended that one or more of these sites be considered in combination with channel improvements in Johnstown.

The most economical plan for total flood protection in Johnstown involved construction of a reservoir on the Stonycreek River at Hollsopple at a cost of $11,408,000, along with channel improvements at a cost of $7,600,000.[51] Because channel improvements for Johnstown were not a specific part of the Flood Control Act of 1936, and the possibility existed that the reservoir site would be economically infeasible, the Commonwealth of Pennsylvania pressed for an amendment to include improvements for the protection of Johnstown. That provision was included in the Amendment to the Flood Control Act of 1936 approved on August 28, 1937.

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48 The Johnstown Area Heritage Association archives contains a 1937 press release from the U.S. Army Corps of Engineers, Pittsburgh District, Engineering Division Files 11-2-240a, Johnstown Flood Protection Project, 1937-1956, "Channel Improvements, Local Cooperation;" see also, James F. Bogardus, "Address on Flood Control for Johnstown presented at Joseph Johns Auditorium," *Johnstown Democrat*, 15 December 1937.

49U.S. War Department, *Annual Report of the War Department for the Fiscal Year Ended June 30, 1936: Report of the Chief of Engineers, U.S. Army, 1936* (Washington, D.C.: U.S. Government Printing Office, 1936), pp. 6-9; *Annual Report of the War Department for the Fiscal Year Ended June 30, 1937: Report of the Chief of Engineers, U.S. Army, 1937* (Washington, D.C.: U.S. Government Printing Office, 1937), p. 7.

50 D. Lee Hooper, Memorandum to L.D. Worsham, 9 October 1940, U.S. Army Corps of Engineers, Pittsburgh District, Engineering Division Files 11-2-240a, Johnstown Flood Protection Project, 1937-1956, "Definite Reports, Correspondence."

51W.E.R. Covell to Chief of Engineers, U.S. Army, 18 October 1938; D. Lee Hooper memorandum to L.D. Worsham, 9 October 1940; Col. R.G. Powell to Chief of Engineers, U.S. Army, 25 October 1938, U.S. Army Corps of Engineers, Pittsburgh District, Engineering Division Files 11-2-240a, Johnstown Flood Protection Project, 1937-1956, "Definite Reports, Correspondence"; see also, Bogardus, "Address on Flood Control."

The District Engineer's report was reviewed by the Commonwealth of Pennsylvania, and comments were received from Mr. Dixon, the Chief Flood Control Engineer, who suggested studying the feasibility of constructing three small reservoirs on the Stonycreek River and its tributaries. He also recommended concrete lining for the channel improvement. Pennsylvania's suggestions were considered by the Corps and were noted in a memorandum of March 2, 1938 that reported only one dam site, the Shade Creek site, as suitable. The Commonwealth suggested further modifications based on this report, and disagreed with some of its findings, prompting the District to arrange for an independent consultant, approved by the Commonwealth, to review its findings. The report was reviewed by Mr. William P. Creager who concurred with the District that supplemental reservoirs were not economically justified.

The District and the Commonwealth agreed that construction of the channel improvements should not be delayed any further by the reservoir question, and bids were put out for the work. The Corps accepted the Commonwealth's suggestion that concrete be used to pave the sideslopes, which was determined to be more economical than the grouted rock paving that had been originally proposed.

The Corps' Division Engineer at Cincinnati concurred with the plan outlined in Lt. Col. Covell's letter of October 18, 1938, although he felt that construction of a reservoir above Johnstown was necessary to supplement the Conemaugh Reservoir (downstream from Johnstown) for flood protection at Pittsburgh, and to further protect Johnstown from peak run-off levels. He recommended that a reservoir be constructed at the Hollsopple site. He further stated that initial construction should begin on the proposed channel improvements, but that the final plan for the project should not be determined until results of hydraulic model studies being conducted at the Corps' Vicksburg, Mississippi lab were received.[52]

The proposed channel improvements were to consist of deepening and widening of the channel in all three of Johnstown's rivers, the construction of 1:1.5 sideslopes with concrete facing, and the construction of concrete flood walls where the slopes could not be expanded. The improvements were to be constructed in six sections (three on the Conemaugh, two on the Stonycreek, and one on the Little Conemaugh rivers), totaling 9.25 miles of paved channel. The total amount of channel affected was reduced somewhat to about 8.8 miles before completion.[53]

As planned by the District, the Johnstown flood protection channels were designed to carry peak flows equivalent to those experienced during the St. Patrick's Day Flood of 1936: 81,000 cubic feet per second (cfs) in the Conemaugh River, 61,000 cfs in the Stonycreek River, and 30,000 cfs in the Little Conemaugh River. The Conemaugh River was not required to carry the combined peak flow from both rivers, as it was determined that these peak flows would not occur simultaneously. The minimum widths of the channels at the surface of maximum floods was designed to be 225 feet on the Stonycreek River, 125 feet on the Little Conemaugh River, and 260 feet on the Conemaugh River. The depth of water in the channels during a maximum flood would be 18.5-25 feet in the Stonycreek River, 12.5-14 feet in the Little Conemaugh River, and 25-26.5 feet in the Conemaugh River. These channels would reduce the flood stage during a flood equivalent to that of 1936 by

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[52]U.S. Army Corps of Engineers, *Flood Control Project for Johnstown, Pennsylvania, Model Investigation* Technical Memorandum No. 2-303 (Vicksburg, Mississippi: U.S. Army Corps of Engineers Waterways Experiment Station, November 1949).

[53]*Johnstown Tribune*, 27 November 1943.

13.5 feet, with water contained within the channels and minimal overflow.[54] By the end of June 1938, detailed surveys and testing had been conducted for the entire project. Model tests at Vicksburg, in which peak flows were tested on a scale model of the project, had shown that the project would perform as designed.

Detailed plans and specifications had been prepared for the first 5,000 feet of the project, which would begin about 0.5 miles below the Dornick Point Railroad bridge on the Conemaugh River, at the downstream end of the improvement, and move upstream in sections.[55] Bids were received July 29, 1938, and construction in Unit 1 was begun in August by Freeland, Inc. of Pittsburgh. Work on this section was completed in October of the following year.[56] One year later, construction was begun on Unit 2 by Al Johnson Construction Company of Minneapolis, Minnesota. The work on this section was officially completed on November 7, 1940. Unit 3, which reached 400 feet above "the Point" on the Stonycreek River and 200 feet above "the Point" on the Little Conemaugh River, was begun on November 17, 1939, and completed on July 9, 1941. The work was contracted to the E. J. Albrecht Company of Chicago, Illinois.[57]

As previously noted, land flanking the Conemaugh River section of the project, including Units 1-3, was generally characterized by industrial and railroad use. Construction of the JLFPP therefore probably affected few buildings or structures in these units, but improvements were made to the foundations of the Dornick Point, Coopersdale, and Ten Acre bridges, and to the Bethlehem Steel Company's foot bridge. The existing WPA wall along the left bank, known as the balustrade or safety wall, was incorporated into the flood protection project. Modifications also were made to a pumping station and to a power line tower within the channel on the right bank.

In order to construct the paved sideslopes, the river was diverted to the side of the channel opposite the bank under construction. The concrete paving was laid in slabs, with alternate slabs laid first; the intervening gaps were then filled. Ramps were constructed for heavy equipment access and for trucks needed to remove excavated material. Working conditions were difficult in the winter and spring months when snow and ice, then spring run-off, created wet, muddy conditions that tested both men and machines.[58]

Construction of Unit 4 on the Little Conemaugh River commenced on June 30, 1940. Leo Butler Company of Silver Springs, Maryland, oversaw the construction of 7,200 feet of channel improvement from "the Point" to near Third Street in Woodvale. This work was completed in August 1941. Building foundations and existing

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[54]Roy S. Kelley to Ray Cooper, 7 March 1956, U.S. Army Corps of Engineers, Pittsburgh District, Engineering Division Files 11-2-240a, Johnstown Flood Protection Project, 1937-1956, "Publicity"; and "Definite Project Report, May 1937;" see also U.S. War Department, *Annual Reports of the War Department for the Fiscal Year Ended June 30, 1941: Report of the Chief of Engineers, U.S. Army, 1941* (Washington, D.C.: U.S. Government Printing Office, 1941), pp. 1,480-1,481.

[55]U.S. War Department, *Annual Report of the War Department for the Fiscal Year Ended June 30, 1938: Report of the Chief of Engineers, U.S. Army, 1938*, pp. 1,272-1,273.

[56]*Johnstown Tribune*, 27 November 1943; Col. R. G. Powell to Chief of Engineers, 25 October 1938.

[57]*Johnstown Tribune*, 27 November 1943.

[58]National Archives and Records Administration, Record Group 77, Entry 111, Box 315, "Inspection Reports," Suitland, Maryland.

river walls were located along this section of the river. Once again, these were incorporated into the design wherever possible, and it appears that, in general, there was little impact on existing buildings, structures, and other features along the river.[59]

The right bank of Unit 4 from the Walnut Street bridge to "the Point" has a derrick stone wall topped with a concrete parapet installed by the Corps during project construction. Existing stone walls were also located along the left bank of the Little Conemaugh River from the Walnut Street bridge to "the Point." A continuous wall, probably constructed between 1891 and 1895, is included in this section. Maps, pre-construction photographs, and field inspections indicate that portions of this wall were modified during the twentieth century as buildings were constructed along the riverbank.

Unit 5, located on the Stonycreek River from near its confluence with the Little Conemaugh River to a point 350 feet upstream of the Hickory Street bridge, was constructed by S. J. Groves & Sons Company of Minneapolis, Minnesota. Construction began on June 24, 1941, and was completed on November 25, 1942. Previously built stone flood walls as well as building foundations were located in parts of this unit prior to construction of the flood protection project. The most significant sections of these earlier walls were along the right bank between the Walnut Street and Napoleon Street bridges. They appear to have been constructed in sections as needed to support buildings and to stabilize riverside properties. The work in Unit 5 widened the channel in a reach of the river that had been constricted by the erection of earlier residential and commercial structures, a number of which had to be removed during project construction. Unit 6, the final and largest section of the project, was begun in July of 1943 and was completed in November of that year, again by the S. J. Groves & Sons firm.

The final cost of the project was $8.89 million, more than $1 million over the original budget. In all, 2.75 million cubic yards of fill were excavated. In addition, 156,631 cubic yards of concrete were placed, enough to pave a 20-foot wide road from Johnstown to Pittsburgh, a distance of 67 miles; 11 bridges were modified to accommodate the flood protection project. Other tasks of the completed project included the relocation of two railroads, one highway, one water line, and one sanitary sewer; the installation of 17 water line crossings, six sewer line crossings, 14 special drainage outlets, and 810 pipe outlets; improvements to 28 culverts, one street, and five streams; and the protection of seven houses. Access to the flood protection channel was provided by six roadway ramps and by 55 sets of steps constructed into the sideslopes.[60]

Following the final inspection of the project, Col. Gilbert Van B. Wilkes, District Engineer of the Corps of Engineers, Pittsburgh District, declared the project the largest and best channel improvement in the United States, based on a review of 26 similar projects. The *New York Times* reached the same conclusion. The project was cited as a possible model for other flood control projects, in particular, one in Cumberland, Maryland. A review of local flood protection projects in the late 1940s discussed a number of levee and flood wall construction projects along the Ohio, Connecticut, and Tennessee rivers that were significantly larger in extent and cost than the Johnstown project, but levee and flood wall construction is distinctly different from the type of local flood protection work undertaken at Johnstown. More revealing of the size and significance of the

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[59] *Johnstown Tribune*, 27 November 1943.

[60] *Johnstown Tribune*, 27 November 1943; *Johnstown Democrat*, 29 November 1943; U.S. Army Corps of Engineers, Pittsburgh District, "The Johnstown Channel Improvement Project." Document prepared by the Public Relations Office, U.S. Army Corps of Engineers, Pittsburgh District, and provided to Tom Nokes of the Advertising Club of Johnstown, 26 November 1943, Record Group 77, Entry 46, Box 207, "Publicity/Press file," U.S. Archives and Records Administration, Mid-Atlantic Division, Philadelphia, Pennsylvania.

Johnstown project is a comparison with other flood protection projects throughout the country. The review listed 29 such projects constructed between 1937 and 1944. Only three channel improvement projects are included, the most costly of which, in Michigan, involved an expenditure of $261,000, a paltry sum compared to the amount devoted to the Johnstown project.[61]

In addition to the increased safety and the widespread attention the project brought to Johnstown, completion of the JLFPP also spurred renewed local interest and confidence in the economic and social revitalization of the city and resulted in the formation of the "Flood-Free Johnstown" committee, a local civic group composed primarily of area businessmen. The "Flood-Free Johnstown" committee enthusiastically embarked on a national campaign to promote the social and business advantages of the city through newspaper articles. Perhaps overwhelmed by the euphoria surrounding the completion of so large a project and by the District Engineer's reassurances that "the flood troubles of the City of Johnstown are at an end", a conscious attempt was made to put Johnstown's watery past out of mind. Even commemorative markers attached to the sides of buildings to show the high water marks of the 1889 and 1936 floods were removed (though other flood markers, including the 1977 flood, can be seen today at various places throughout the city). The town's radio station proudly signed off with the statement "Station WJAC, Johnstown, Pennsylvania, a worthwhile station in a worthwhile city, now flood-free."[62] Johnstown men serving overseas during World War II were told that they could focus their thoughts entirely on the war effort as the danger of flooding at home had been eliminated.

The JLFPP did indeed protect Johnstown's residents, businesses, and industry from major flooding until 1977. High water resulting from Hurricane Hazel in 1954 and from Hurricane Agnes in 1972, for example, caused relatively few problems in Johnstown. The flood protection project, however, had been designed to control a flood at the level of the 1936 flows, which were projected to occur once in every 60 years. The 1977 flood, however, was a a massive event that could be expected to occur only once every 500 years. Johnstown again was flooded and the myth of a truly "flood-free Johnstown" was dispelled forever. Nevertheless, the JLFPP greatly ameliorated the effects of the 1977 flood by reducing the flood level in Johnstown by an estimated 11 feet. The economic benefits of this reduction in flood damage have been estimated at $322-332 million.

As a local flood protection project, consisting almost entirely of channel improvements, and one that did not involve the construction of expensive dams, the JLFPP ranks as an impressive national achievement. Beyond its engineering significance, however, the JLFPP is also a tangible product of the 1930's "paradigm shift" in the national consciousness that welcomed (indeed demanded) the federal government's participation in the construction, operation, and maintenance of local flood protection projects -- previously, a non-traditional role for both the U.S. Government and the Corps of Engineers. Beyond these considerations, however, the project is also a physical reminder of the determined "shoulder to the wheel" approach of a nation struggling to extricate itself from the economic and psychological depths of the Great Depression. The JLFPP attracted the support of prominent national and state political leaders of the day, including President Franklin D. Roosevelt, Pennsylvania Senator James J. Davis, and Pennsylvania Governor Edward Martin. The spirits of Johnstown's residents, many of whom in the 1930s were still haunted by memories of personal loss on that fateful day in 1889 and who had more recently experienced the devastation of the 1936 St. Patrick's Day Flood, were bolstered (perhaps too much so) by a new feeling of confidence and safety, by the attention the new flood protection project had focused on their community, and, perhaps most of all, by a sense that "Washington" had cared. Furthermore, after the Japanese attack on Pearl Harbor in 1941 and the beginning of American participation in World War II, completion of the JLFPP took on added significance. The city's industrial mills

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[61]Harold K. Barrows, *Floods: Their Hydrology and Control* (New York: McGraw-Hill Book Company, Inc., 1948), p. 391.

[62]*Johnstown Tribune*, 30 November 1944.

and her workers were vital to a successful American war effort, and completion of the flood protection project during the uncertain early years of the war exemplified the continuing commitment of the federal government and the ability of its private contractors to complete such necessary domestic improvements even in the face of shortages in equipment, materiel, and manpower. The JLFPP, little changed in physical appearance from those days, remains as a significant example of the cooperation of federal, state, and local government in achieving local flood protection.

The JLFPP has therefore played important multiple roles in Johnstown's history since construction began in 1938. With the exception of the "500-year flood" of 1977, which greatly exceeded the project's design capacity, the JLFPP has provided decades of flood-free years to Johnstown, continues to play an important role in community revitalization efforts, and remains a significant and prominent feature of the city's landscape.

Sources of Information/Bibliography

Engineering Drawings:

The Pittsburgh District Engineering Division's files maintain the collection of original "as-built" drawings of the JLFPP. These drawings are on 30-inch by 40-inch (76.2-centimeter by 101.6-centimeter) linen or mylar. The collection consists of about 284 drawings of the original project and early maintenance dating between 1938 and 1949, and about 54 drawings of subsequent maintenance work dating between 1949 and 1989. Representative drawings from the original as-built collection are reproduced in the accompanying graphic documentation.

Historic Views:

The Pittsburgh District Engineering Division's files maintain the collection of about 1,200 historic construction and early maintenance photographs of the JLFPP project dating from 1938 through 1949. These photographs are black and white prints with an image size of about 6 3/8 inches by 9 3/8 inches (16.2 centimeters by 23.8 centimeters). Copies of selected originals are included in the accompanying photographic documentation.

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_____ *Annual Report of the War Department for the Fiscal Year Ended June 30, 1937: Report of the Chief of Engineers, U.S. Army, 1937.* Washington, D.C.: U.S. Government Printing Office, 1937.

_____ *Annual Report of the War Department for the Fiscal Year Ended June 30, 1938: Report of the Chief of Engineers, U.S. Army, 1938.* Washington, D.C.: U.S. Government Printing Office, 1938.

_____ *Annual Report of the War Department for the Fiscal Year Ended June 30, 1939: Report of the Chief of Engineers, U.S. Army, 1939.* Washington, D.C.: U.S. Government Printing Office, 1939.

_____ *Annual Report of the War Department for the Fiscal Year Ended June 30, 1941: Report of the Chief of Engineers, U.S. Army, 1941.* Washington, D.C.: U.S. Government Printing Office, 1941.

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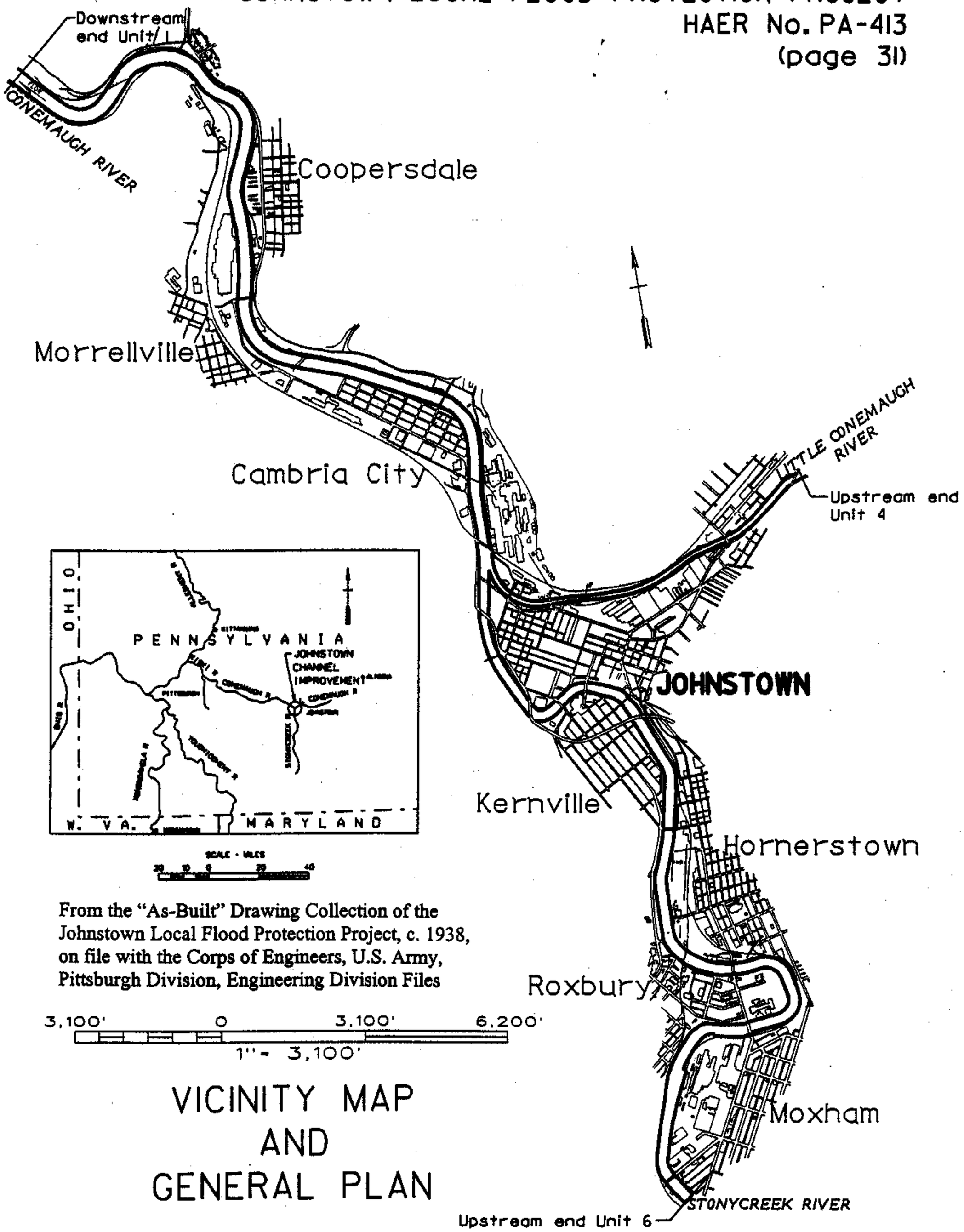
Likely Sources Not Yet Investigated:

The well-maintained archives of the Johnstown Area Heritage Association, located at the Johnstown Flood Museum, contain many record groups beyond those referenced here that may be helpful to future researchers. Among these are the Johnstown Flood Records and several privately collected and arranged newspaper clipping collections. The Jack Ringold Collection, for example, provides Johnstown-area newspaper clippings from 1937 to 1945 and therefore overlaps the period of construction of the Johnstown Local Flood Protection Project (1938-1943). The organization and activities of the "Flood-Free Johnstown Committee" are chronicled in a large scrapbook assembled by the committee's secretary/chairman, Tom Nokes. Some of the newspaper clippings from this scrapbook have been cited here under the newspaper's name since they are not unique to this collection; however, the scrapbook also contains copious ephemera on the day-to-day organization, operation, and meetings held by the committee that may be of interest to other researchers. For the 1977 flood in Johnstown, the George Hand collection of newspaper clippings is also important as are the many technical reports prepared on the causes, prediction of, and responses to this 500-year flood. Many of these reports are available at the library of the University of Pittsburgh, Johnstown. The Larry Olek Collection in the Johnstown Area Heritage Association archives is also appropriate for study of the 1977 flood.

Supplemental Material:

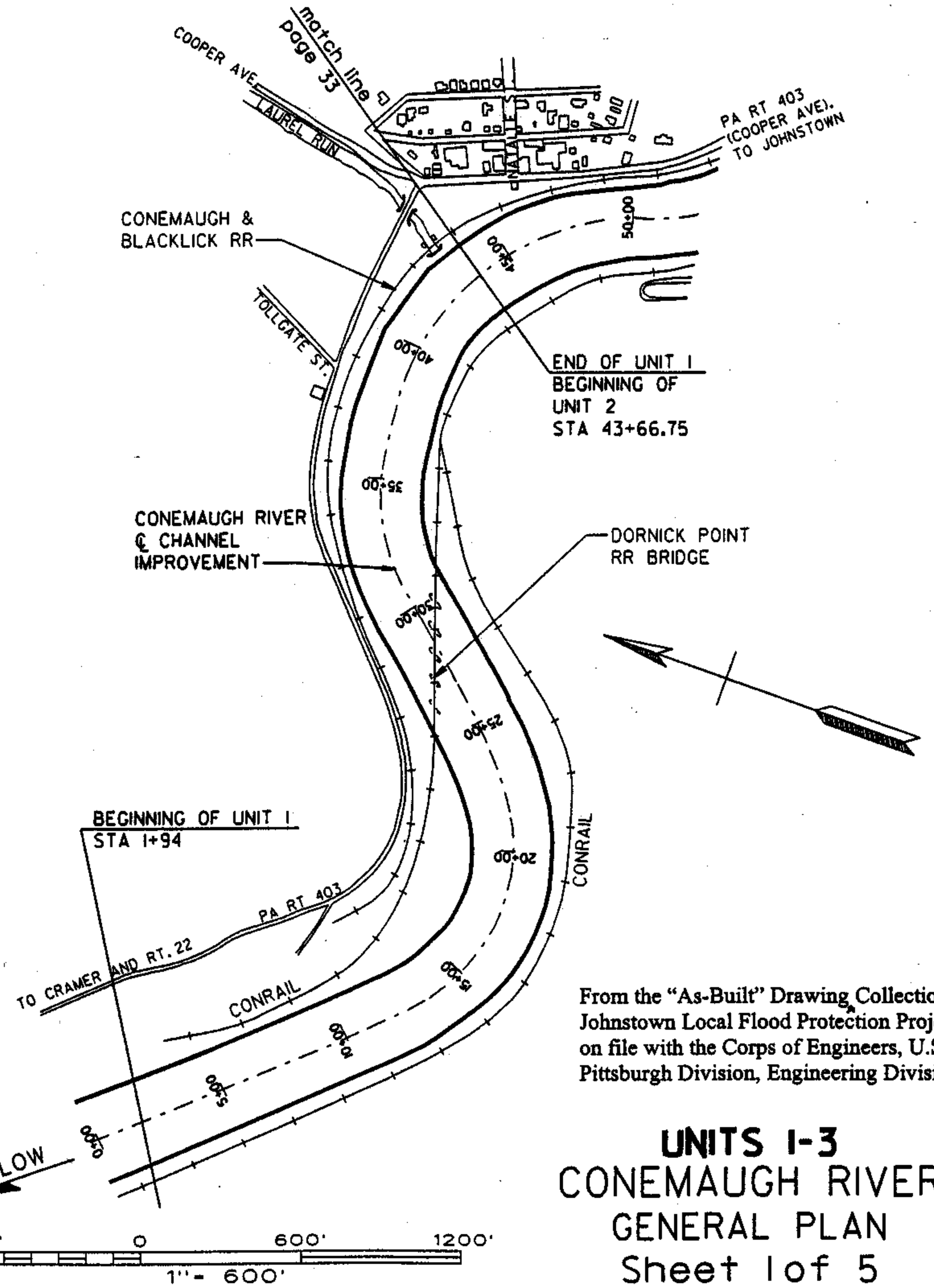
None



From the "As-Built" Drawing Collection of the Johnstown Local Flood Protection Project, c. 1938, on file with the Corps of Engineers, U.S. Army, Pittsburgh Division, Engineering Division Files

3,100' 0 3,100' 6,200'
1" = 3,100'

VICINITY MAP AND GENERAL PLAN



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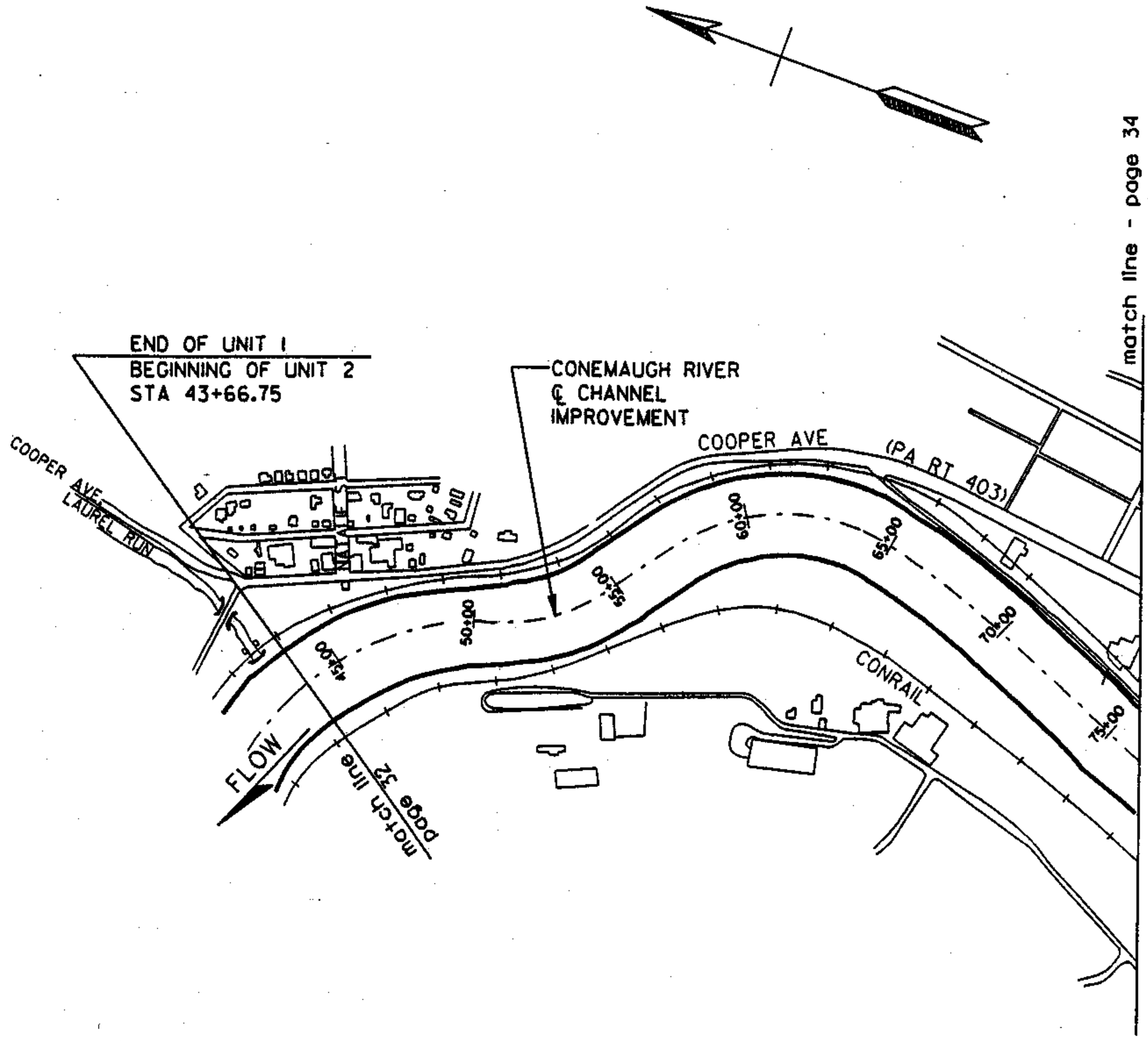
UNITS 1-3
CONEMAUGH RIVER
GENERAL PLAN
Sheet 1of 5



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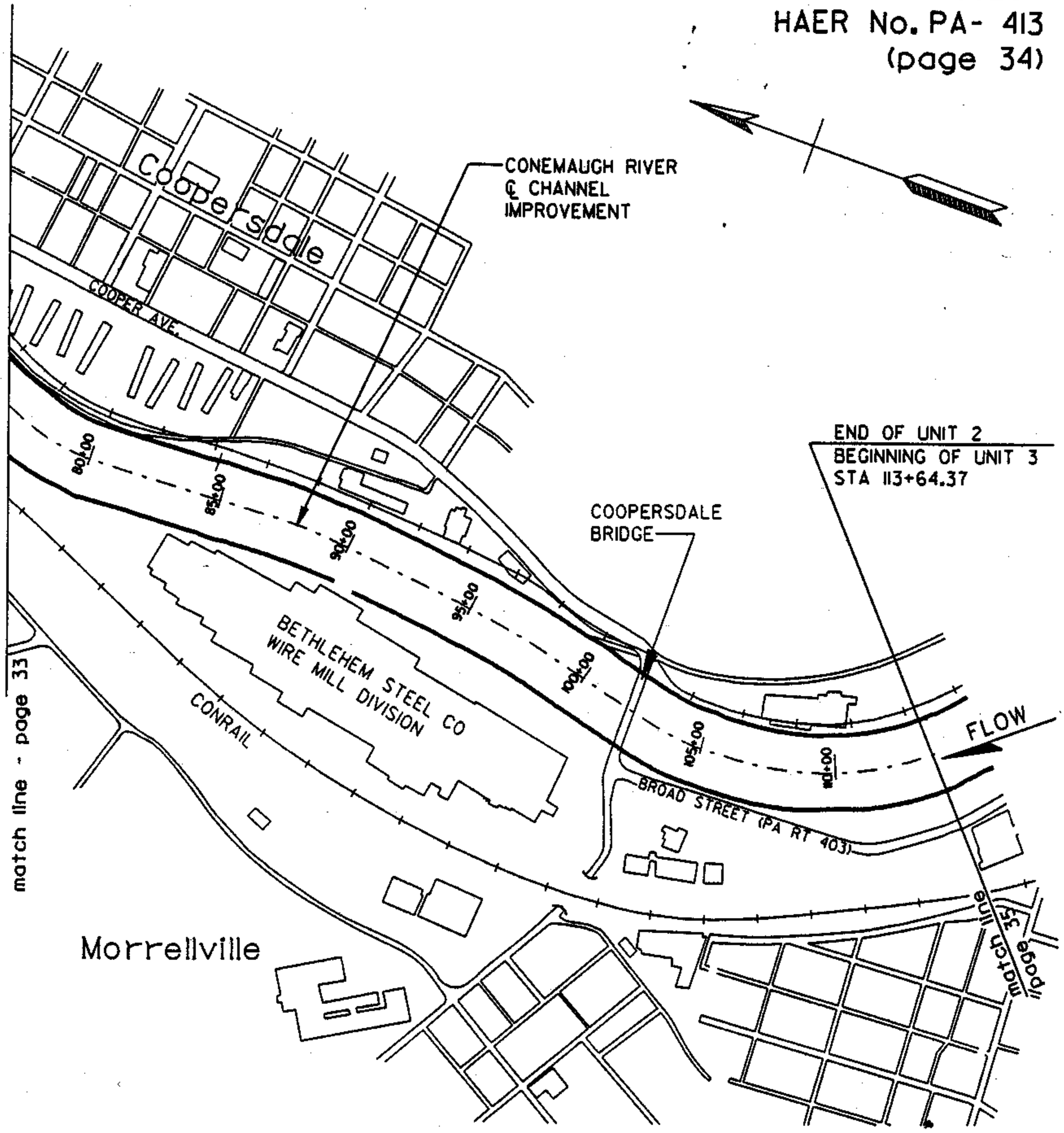
UNITS 1-3
CONEMAUGH RIVER
GENERAL PLAN
Sheet 2 of 5

JOHNSTOWN LOCAL FLOOD PROTECTION PROJECT
HAER No. PA- 413
(page 34)

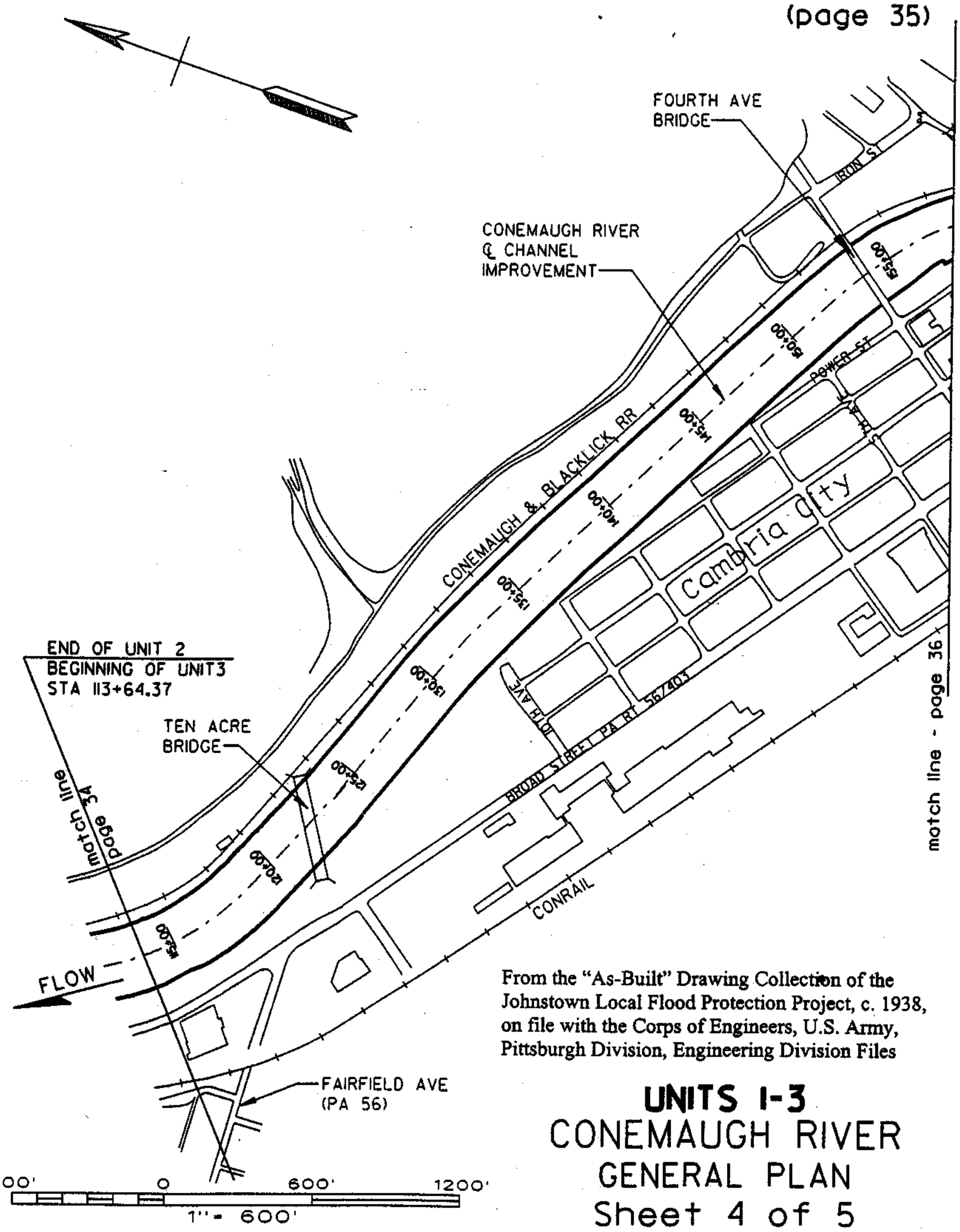


From the "As-Built" Drawing Collection of the
Johnstown Local Flood Protection Project, c. 1938,
on file with the Corps of Engineers, U.S. Army,
Pittsburgh Division, Engineering Division Files

600' 0 600' 1200'
1" = 600'

UNITS 1-3
CONEMAUGH RIVER
GENERAL PLAN
Sheet 3 of 5

JOHNSTOWN LOCAL FLOOD PROTECTION PROJECT
HAER No. PA- 413
(page 35)



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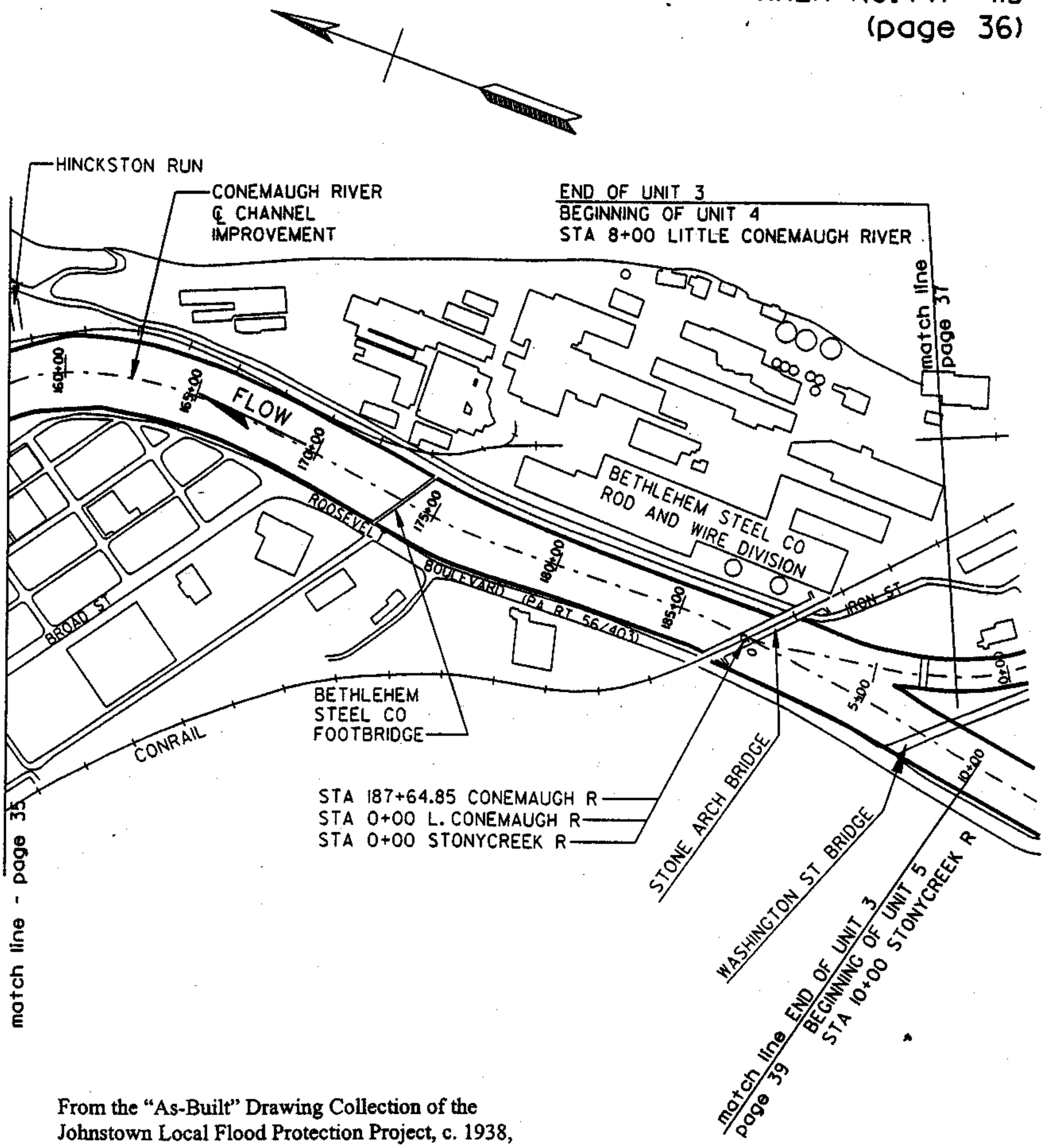
UNITS 1-3
CONEMAUGH RIVER
GENERAL PLAN
Sheet 4 of 5



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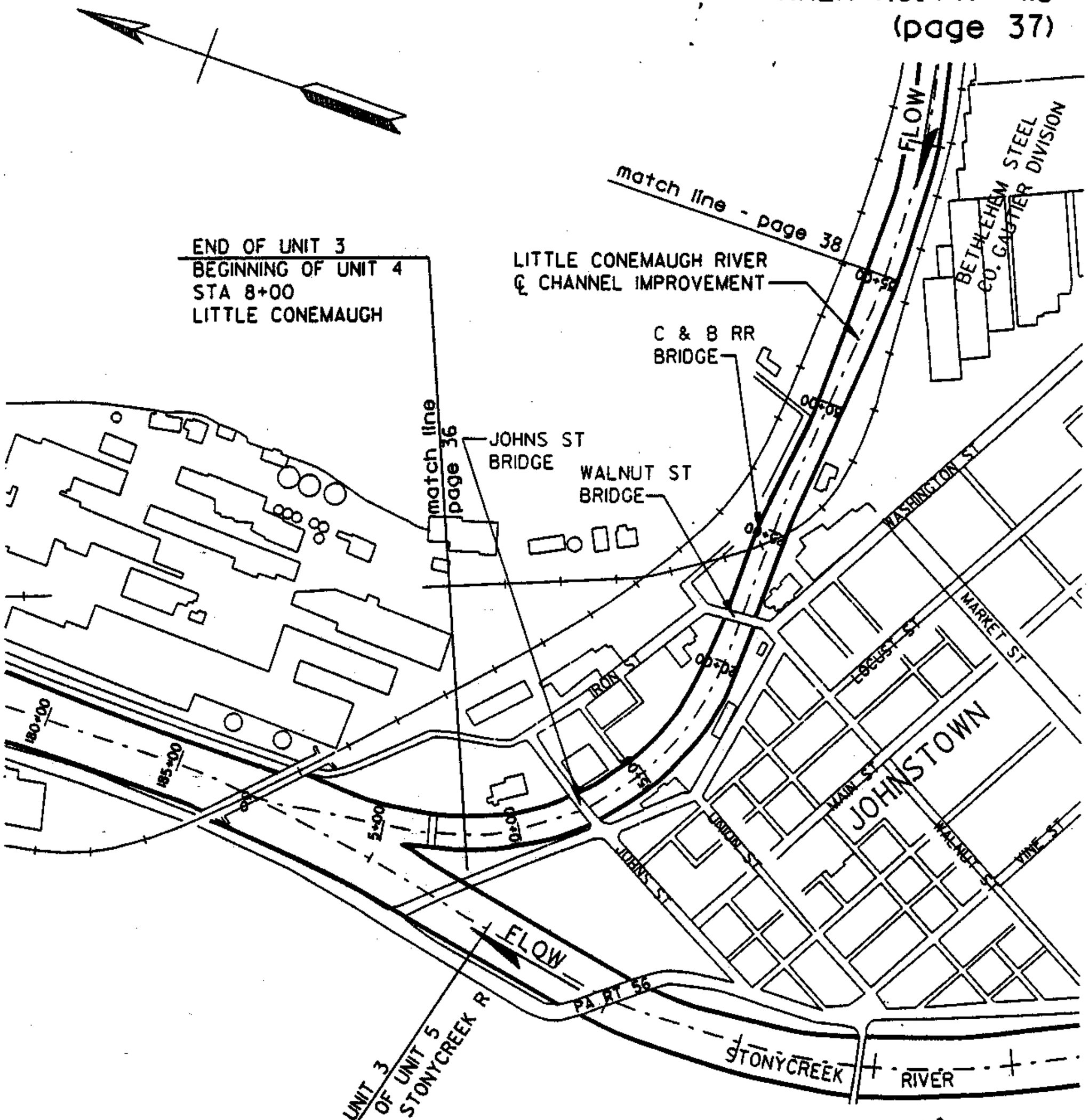
Pittsburgh Division, Engineering Division Files

600' 0 600' 1200'
1" = 600'

UNITS 1-3
CONEMAUGH RIVER
GENERAL PLAN
Sheet 5 of 5

JOHNSTOWN LOCAL FLOOD PROTECTION PROJECT
HAER No. PA- 413
(page 37)



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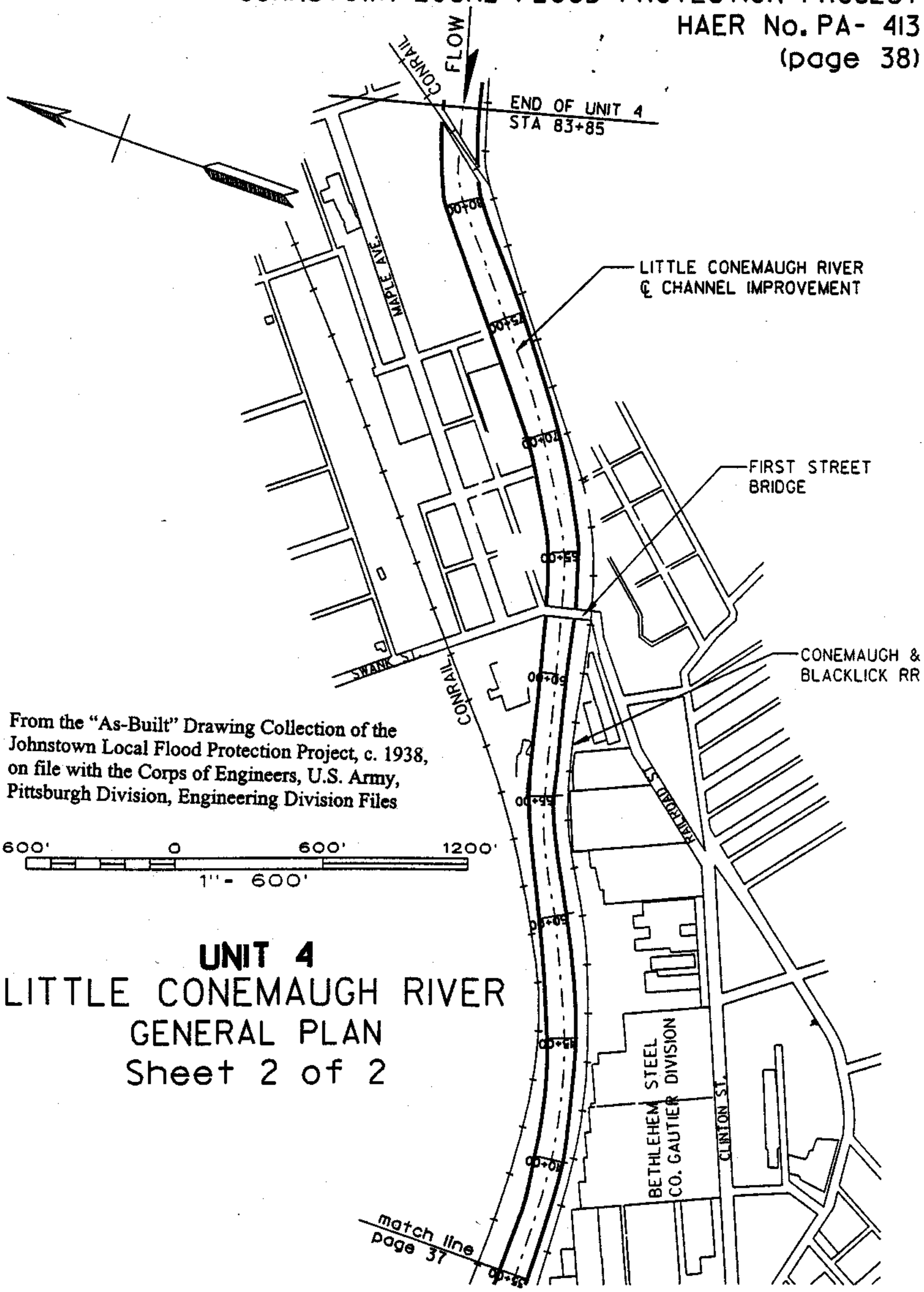
UNIT 4
LITTLE CONEMAUGH RIVER
GENERAL PLAN
Sheet 1 of 2

600' 0 600' 1200'
1" = 600'

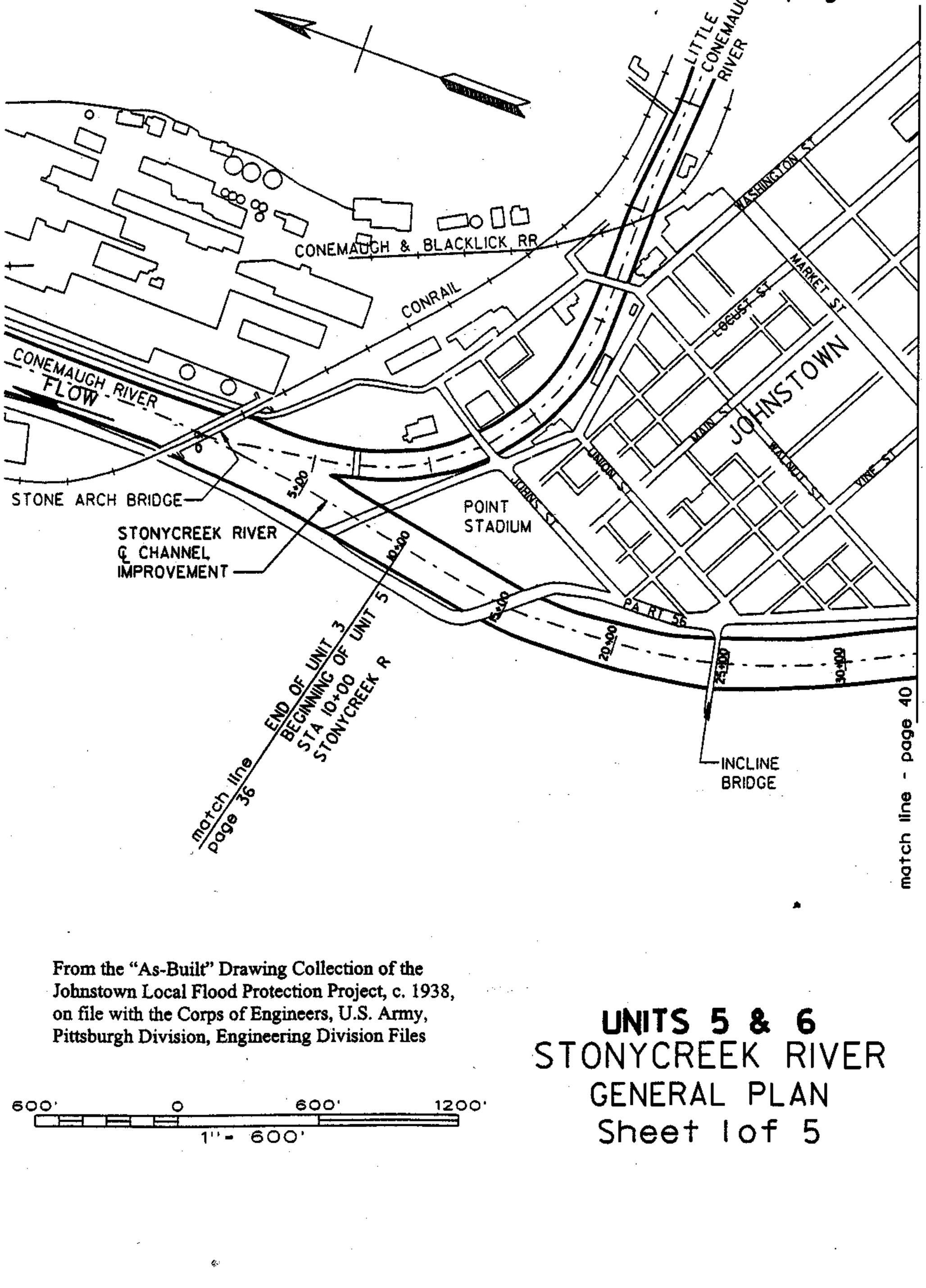


From the "As-Built" Drawing Collection of the Johnstown Local Flood Protection Project, c. 1938, on file with the Corps of Engineers, U.S. Army, Pittsburgh Division, Engineering Division Files

600' 0 600' 1200'
1" = 600'

UNIT 4
LITTLE CONEMAUGH RIVER
GENERAL PLAN
Sheet 2 of 2

JOHNSTOWN LOCAL FLOOD PROTECTION PROJECT
HAER No. PA- 413
(page 39)



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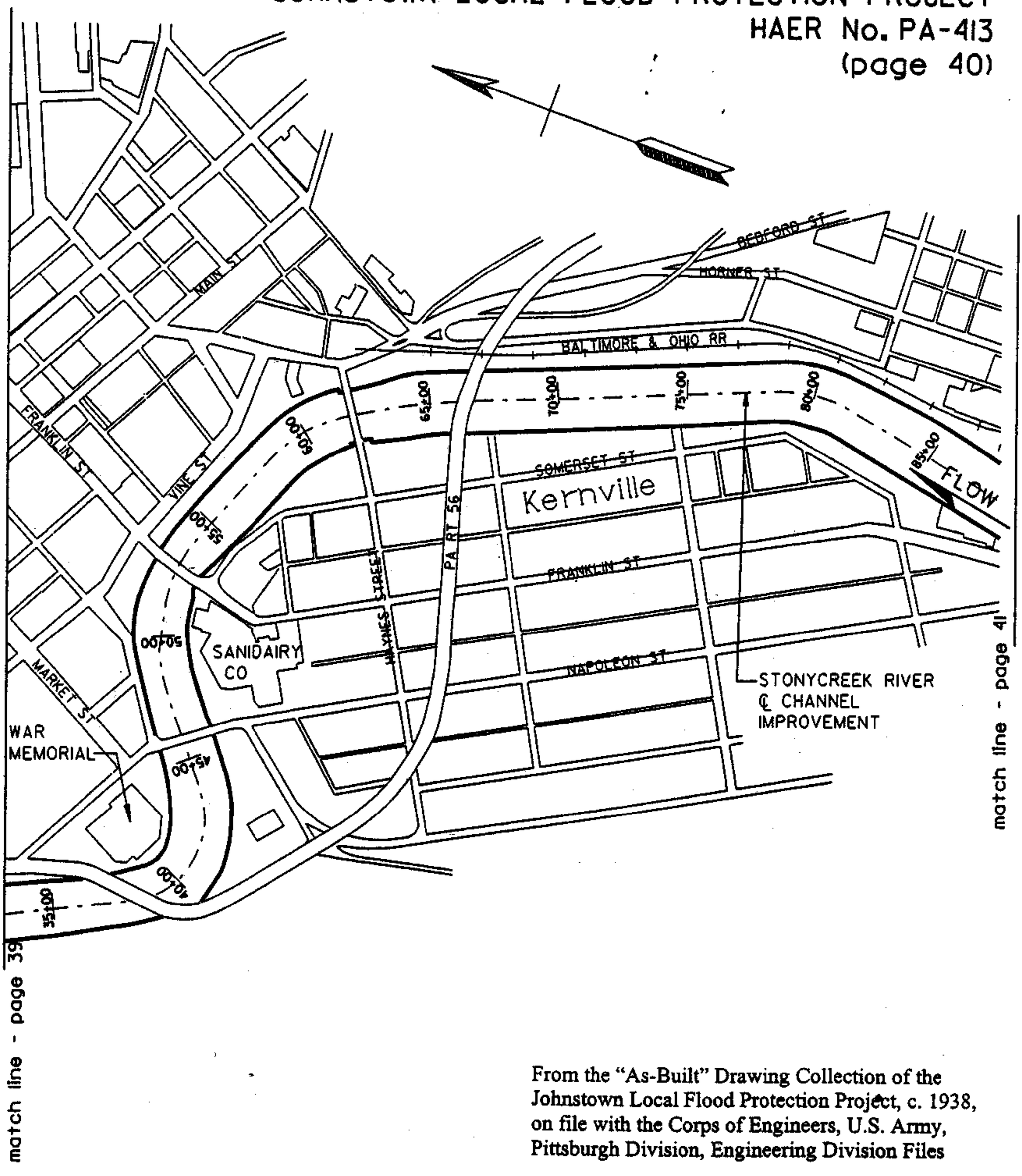
600' 0 600' 1200'
1" = 600'

UNITS 5 & 6
STONYCREEK RIVER
GENERAL PLAN
Sheet 1 of 5

JOHNSTOWN LOCAL FLOOD PROTECTION PROJECT
HAER No. PA-413
(page 40)



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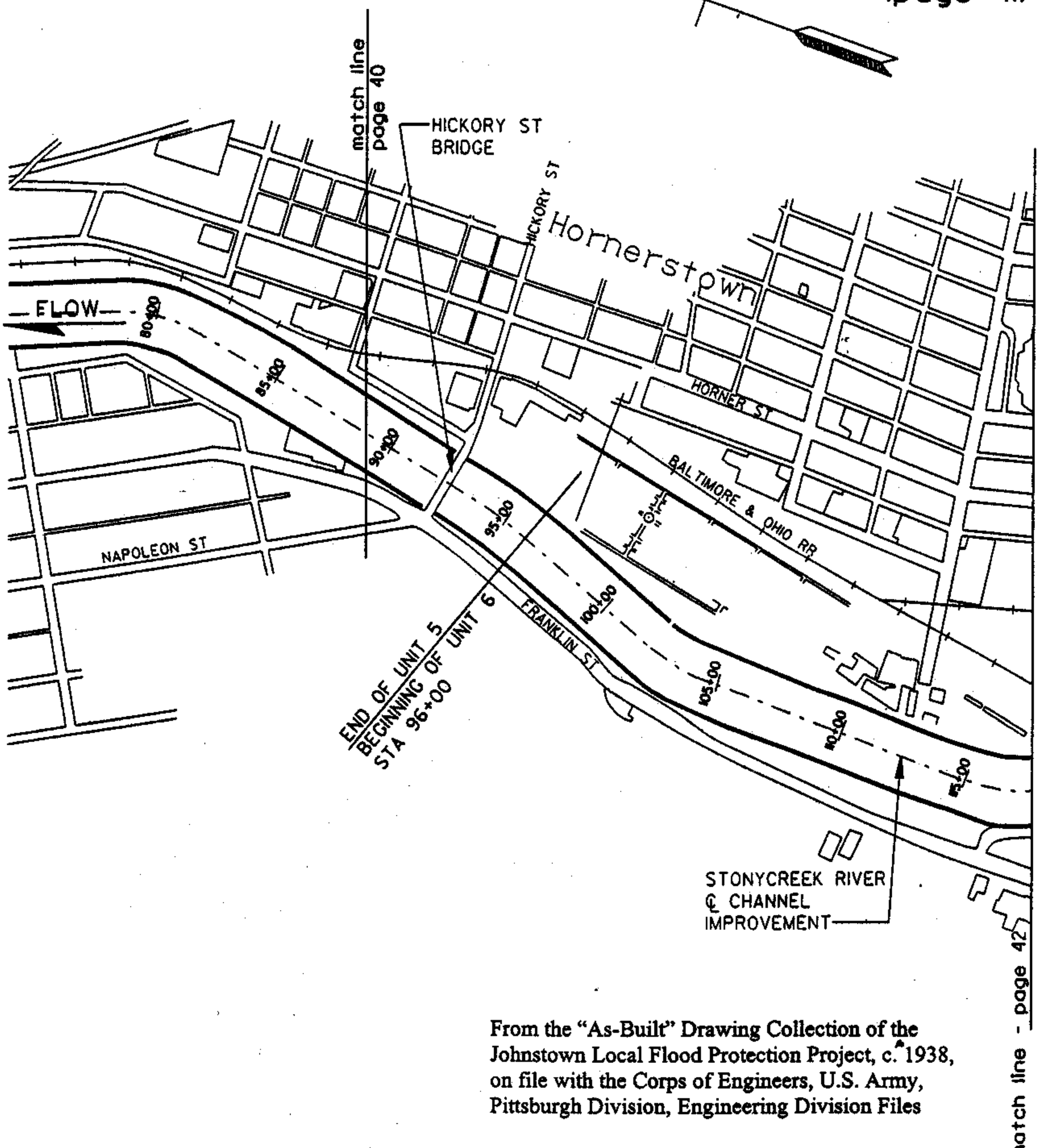
600' 0 600' 1200'
1" = 600'

UNITS 5 & 6
STONYCREEK RIVER
GENERAL PLAN
Sheet 2 of 5

JOHNSTOWN LOCAL FLOOD PROTECTION PROJECT

HAER No. PA-413

(page 41)



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600' 0 600' 1200'

1" = 600'

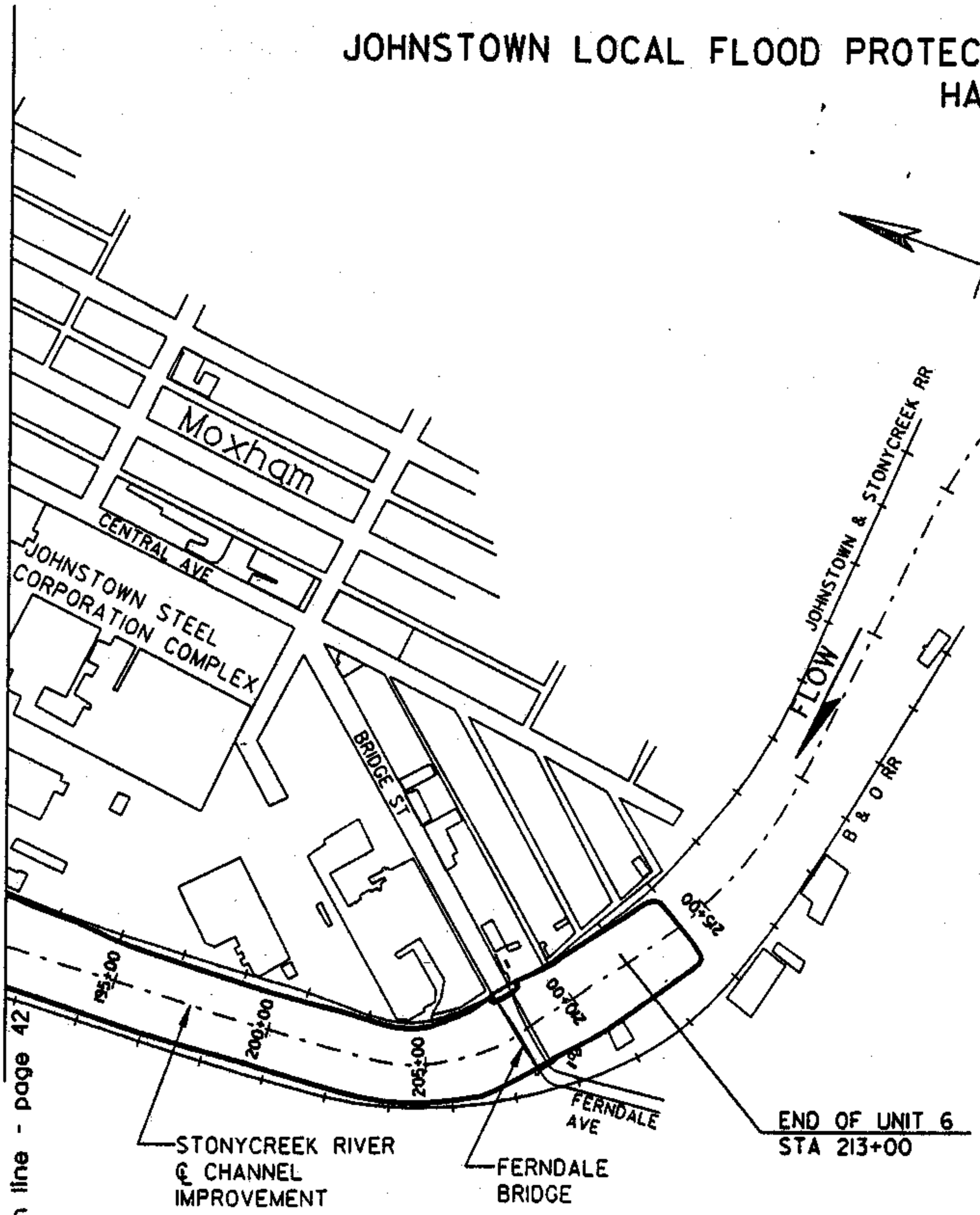
UNITS 5 & 6

STONYCREEK RIVER

GENERAL PLAN

Sheet 3 of 5

JOHNSTOWN LOCAL FLOOD PROTECTION PROJECT
HAER No. PA-413
(page 43)



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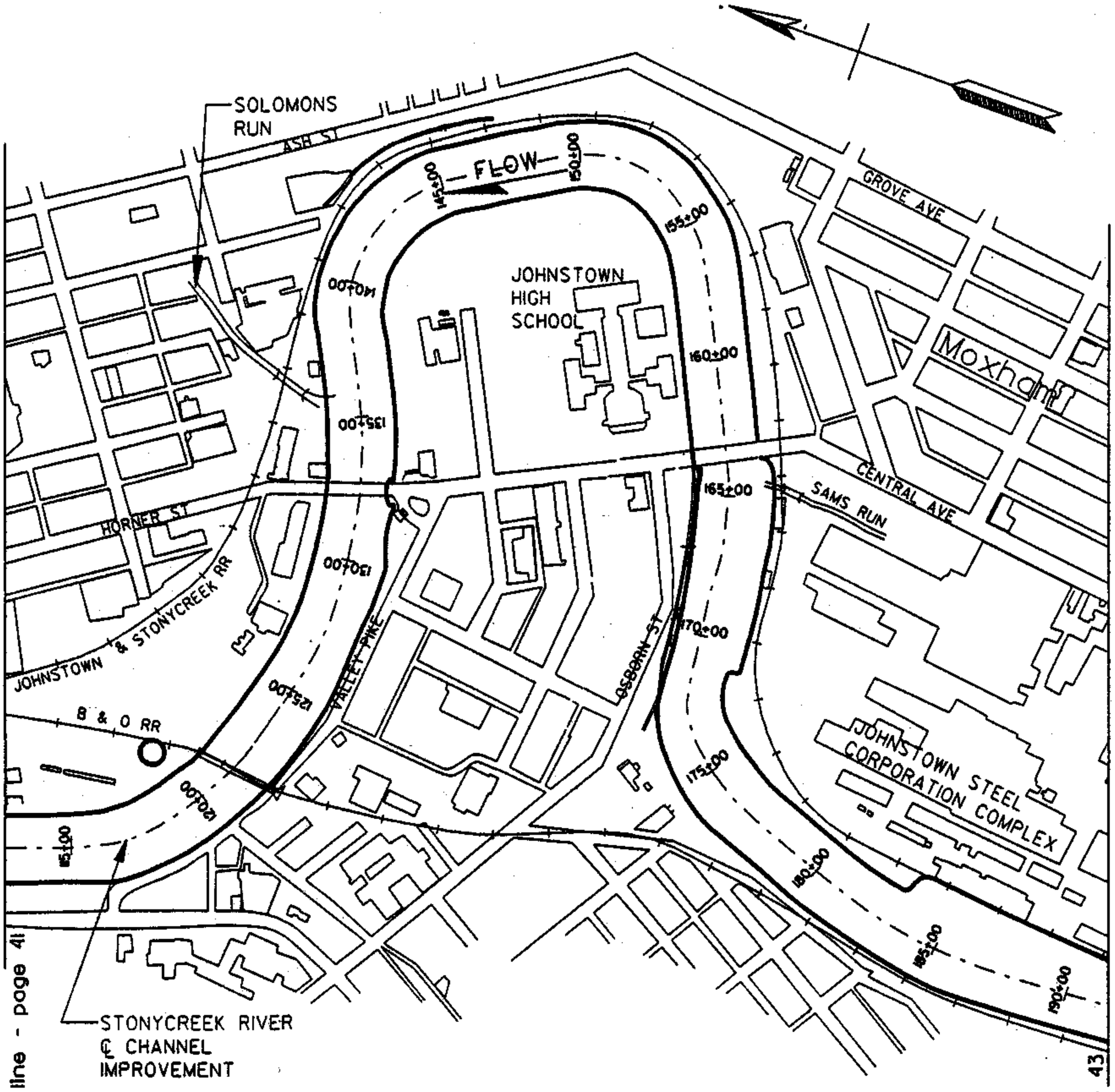
UNITS 5 & 6
STONYCREEK RIVER
GENERAL PLAN
Sheet 5 of 5



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600' 0 600' 1200'
1" = 600'

UNITS 5 & 6
STONYCREEK RIVER
GENERAL PLAN
Sheet 4 of 5