

**United States Department of the Interior  
National Park Service**

## National Register of Historic Places Multiple Property Documentation Form

This form is used for documenting property groups relating to one or several historic contexts. See instructions in National Register Bulletin *How to Complete the Multiple Property Documentation Form* (formerly 16B). Complete each item by entering the requested information.

  X   New Submission                                 Amended Submission

### A. Name of Multiple Property Listing

Road and Highway Resources of Southeastern Pennsylvania, 1681-1970

### B. Associated Historic Contexts

(Name each associated historic context, identifying theme, geographical area, and chronological period for each.)

Transportation From Settlement to 1792

The Turnpike Era, 1792-1830

Roads in the Canal and Railroad Eras, 1830-1880

The Good Roads Movement and the Formative Years of the Pennsylvania Department of Highways, 1880-1916

The Golden Age of Pennsylvania Highway Construction, 1916-1941

Wartime and Post-World War II Road Construction, 1942-1956

The Interstate Highway Era, 1956-1970

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### D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.

\_\_\_\_\_  
Signature of certifying official

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
State or Federal Agency or Tribal government

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

\_\_\_\_\_  
Signature of the Keeper

\_\_\_\_\_  
Date of Action

**United States Department of the Interior  
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Road and Highway Resources of Southeastern Pennsylvania, 1681-1970

Pennsylvania

\_\_\_\_\_  
Name of Multiple Property Listing

\_\_\_\_\_  
State

### Table of Contents for Written Narrative

Create a Table of Contents and list the page numbers for each of these sections in the space below.

Provide narrative explanations for each of these sections on continuation sheets. In the header of each section, cite the letter, page number, and name of the multiple property listing. Refer to *How to Complete the Multiple Property Documentation Form* for additional guidance.

### Page Numbers

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(If more than one historic context is documented, present them in sequential order.)

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#### **F. Associated Property Types**

(Provide description, significance, and registration requirements.)

Road Corridor Historic Districts  
Individual Bridges

#### **G. Geographical Data**

Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties, Pennsylvania

#### **H. Summary of Identification and Evaluation Methods**

(Discuss the methods used in developing the multiple property listing.)

#### **I. Major Bibliographical References**

(List major written works and primary location of additional documentation: State Historic Preservation Office, other State agency, Federal agency, local government, university, or other, specifying repository.)

**Paperwork Reduction Act Statement:** This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).

**Estimated Burden Statement:** Public reporting burden for this form is estimated to average 250 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, PO Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Project (1024-0018), Washington, DC 20503.

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**E. STATEMENT OF HISTORIC CONTEXT**

**Introduction**

Between 1996 and 1999, the Pennsylvania Department of Transportation (PennDOT) completed the Historic Highway Bridge Inventory and Evaluation, which evaluated more than 12,000 bridges on the National Bridge Inspection Standards (NBIS) for National Register of Historic Places (NRHP) eligibility. As a result of the survey, 612 bridges were determined to be eligible for NRHP listing. A number of bridges were determined to be NRHP eligible under Criterion A in the area of transportation and others were found to be contributing resources to established or proposed historic districts. However, most bridges were primarily evaluated for, and found to be NRHP eligible under, Criterion C for Engineering (Lichtenstein & Associates 1999).

The purpose of this Multiple Property Documentation Form (MPDF) is to present a road and highway transportation context in order to evaluate roads, highways, and bridges in Southeastern Pennsylvania for NRHP eligibility under Criterion A, Association with Events, the primary event being Transportation. Southeastern Pennsylvania is composed of Bucks, Chester, Delaware, and Montgomery counties plus the city and county of Philadelphia (Figure 1). These five counties were the first area settled after the founding of the English colony of Pennsylvania in 1681 and they continue to form the Pennsylvania portion of Greater Philadelphia. The context covers the time period from the founding of the colony of Pennsylvania to 1970, when the Pennsylvania Department of Highways (PDH), which had overseen much of Pennsylvania’s road and bridge construction since 1903, became PennDOT. The context addresses the development of both major and local roads, but it does not discuss the street plan of the city of Philadelphia, which is a topic beyond the scope of this history. Additionally, although the context will reference the building and expansion of the Pennsylvania Turnpike, turnpike resources will not be evaluated as part of this MPDF. Pennsylvania Turnpike resources were evaluated for NRHP eligibility between 2001 and 2005 (Kuncio *et al.* 2005)

**Transportation From Settlement to 1792**

European exploration and settlement occurred in Southeastern Pennsylvania prior to the founding of the colony in 1681. The Dutch had explored the area since 1609 and had made



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settlements in the mid-seventeenth century. Swedes reached the Delaware Bay in 1638 and established Upland (now Chester) along the Delaware River in 1644. The English government began making land disbursements in the 1670s, even prior to William Penn’s arrival. All three cultures established trapping outposts, gristmills and sawmills, and small settlements, primarily along streams in proximity to the Delaware and Schuylkill rivers (Oberman and Kozakowski 1976:13). However, William Penn’s founding of Philadelphia in 1681 began the development of a systematic road network: “English colonization set in motion a complex, contingent, and negotiated process of continuous adaptation and innovation which established a centralized Euro-American road system” in Southeastern Pennsylvania (Kaja 2011:23). The road system connected Philadelphia, which quickly grew to be America’s largest and most important city and its leading port, to the North American interior and the eastern seaboard. Philadelphia, in turn, connected the road system of Southeastern Pennsylvania and those served by it to the trans-Atlantic trading world. The road system hastened territorial expansion, community formation, and market growth (Kaja 2011:4-5).

Philadelphia, established at the fall line of the Delaware River, was from its founding the economic, commercial, social, and cultural hub of Southeastern Pennsylvania, as well as southern New Jersey and northern Delaware (Lichtenstein & Associates 1999:4). It was also the point of entry for settlers from throughout Europe attracted to Penn’s “Holy Experiment,” a colony founded on tolerance and religious freedom. The colony’s earliest settlers predominantly came from the British Isles and Germany, fanning out from the city to the surrounding counties of Philadelphia, Bucks, and Chester (Figure 2; Holme 1687). By 1700, Philadelphia’s population had grown to 10,000, with another 10,000 residents living in the hinterlands (Oberman and Kozakowski 1976:16).

The new residents to the area found a land with dense stands of trees, streams for water power, and fertile farmland. In the hinterlands of Philadelphia they cleared land for farms and established the proto-industries needed in a predominantly agricultural society – sawmills to process lumber into boards; gristmills, fulling mills, flaxseed oil mills, and cider mills to process agricultural products; tanneries to make leather; iron mills to produce pig iron and finished products, including agricultural implements; and blacksmiths and potteries. One historian estimates that by as early as the late seventeenth century, there was a mill of some sort approximately every two miles along permanent streams in Southeastern Pennsylvania (Lemon 1972:115).

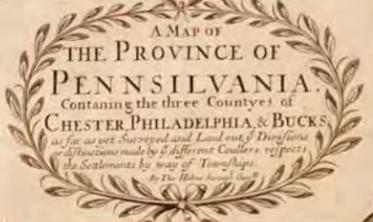
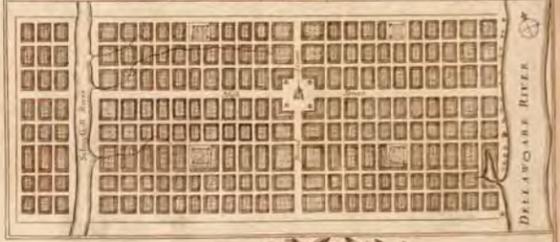
Penn had envisioned his colony as an orderly society. As one of his first acts, Penn had Philadelphia’s street plan laid out as a grid, a scientific approach to settlement that he sought to extend

# A MAP OF THE IMPROVED PART OF THE PROVINCE OF PENNSILVANIA IN AMERICA.

Begun by W<sup>illiam</sup> Penn Proprietor  
Governour thereof Anno 1681.



## THE CITY OF PHILADELPHIA.



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into the original three counties. In 1685, he established a road along the Philadelphia (later Montgomery) and Bucks County line and then attempted to lay out a grid off that, with the roads running northwest to southeast called Street roads and intersecting roads at 90 degree angles. In Penn’s vision, smaller land owners and other residents would live in agricultural villages surrounded by outlying rectangular agricultural fields, replicating the grid pattern into the hinterlands. However his plans were stymied by settlers who preferred living on nucleated, irregularly-shaped farms; built mills and other industries at the best source of water power; and established churches and meetinghouses at points central to the greatest concentration of worshippers (Lemon 1972:112). This dispersed, irregular settlement pattern would profoundly affect road development in Southeastern Pennsylvania.

When English settlers arrived, existing transportation systems already in place included navigable streams, Native American land routes, and crude roads cleared by earlier settlers. In the very earliest settlement period (1680-1700), waterways were the most reliable method of transportation. The most important waterway was the Delaware River, navigable from Delaware Bay to the falls at Trenton, New Jersey (Auerbach and BCC 1979). The three earliest county seats were established on the river – Philadelphia (Philadelphia County), Chester (Chester County), and Bristol (Bucks County) – an indication of the waterway’s importance. The Schuylkill River was also navigable to the falls north of Philadelphia, but due to its shallow and rocky nature it never was a major avenue of transportation. Other streams were navigable by shallow draft boats, including the Frankford, Pennypack, Poquessing, Neshaminy (Auerbach and BCC 1979), French, Christiana, and Brandywine creeks (Kaja 2011:135; Schooler 1980:3).

Native Americans who inhabited Pennsylvania at the time of Penn’s arrival had established a vast array of land transportation routes. The land paths were “a patchwork of crisscrossing trails” connecting villages throughout the Mid-Atlantic region (Kaja 2011:31). Those leading out of Philadelphia were so numerous that one historian likened them to “sticks of a lady’s fan” (Wallace 1987:90). Five led from the Delaware River inland to the Susquehanna River and six major trails went east from the Delaware into present-day New Jersey. The Native American trails were, in almost all cases, “dry, level, and direct,” following ridges or river terraces. Directness was sacrificed only in order to maintain a moderate grade. Wind gaps in mountain ranges created manageable crossing points at low altitudes, and the shallow depths of most rivers, creeks, and streams in Southeastern Pennsylvania furnished numerous fording places. Colonists would expropriate and improve upon many of these paths as one part of their road transportation system (Kaja 2011:31-34). For example, the Falls Path,

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which followed the west bank of the Delaware River, would become the Bristol Pike. The Lenape Path, which ran from Philadelphia to New Hope and then to New Jersey, would become the basis for the York Road (Wallace 1987:45, 90).

Euro-American roads existed prior to Penn’s arrival, but they were rudimentary at best. A 1679 Chester County court order, for example, stated that “The highway to be cleared as followeth, viz: the way bee made cleare of standing and lying trees, at least ten feet broad, all stumps and Scrubs to be close cut by ye ground” (quoted in Futhey and Cope 1881:1021). Penn and the governing bodies of Pennsylvania recognized that the existing land routes had to be upgraded to allow greater movement of goods to and from the wharves, docks, and market houses of Philadelphia (Kaja 2011:57). As early as 1683, the Pennsylvania General Assembly passed legislation requiring the county court in every county to appoint highway overseers with the power to summon inhabitants to make and mend highways and bridges. Generally speaking, residents were required to perform four to six days of service in building and maintaining roads. Residents had the option of paying a fine instead; the money collected was used to hire laborers to undertake the work (Kaja 2011:127-128).

The Pennsylvania General Assembly formalized responsibility for road building in the Act of 1700. Following the tradition of English governance, each county’s Court of Quarter Sessions was made responsible for road and bridge construction and improvements. The courts heard petitions from citizens requesting the construction of new roads and bridges or the realignment of existing roads. The court would appoint four to six citizens to act as viewers, who would determine whether the requested road or bridge was necessary or if the course and placement of a road or bridge should be altered. The court reviewed returns and “confirmed” roads, i.e., conferred full legal status and established legally binding rights-of-way. The court also ordered the clearance of roads, assessed damage to personal property, and assigned final compensation to aggrieved petitioners. Construction and maintenance of roads fell to local governmental authorities, generally at the township level (Jackson 1994:216; Kaja 2011:104, 127).

County Courts of Quarter Sessions were not the only governmental unit involved in road building. Major roads, known as King’s Highways, were the province of the colonial governor or the provincial council. King’s Highways were those major roads connecting Philadelphia to important market towns, county seats, and other eastern seaboard cities. King’s Highways radiated out of Philadelphia in all directions like spokes from a hub (much as the earlier Indian trails had), reflecting the city’s dominant role in the region’s trade, commerce, and culture. They provided a means for

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residents in Philadelphia's hinterlands to transport their goods to Philadelphia and for imported goods to reach those living outside the city. King's Highways were extended west and north as settlement expanded away from Philadelphia, connecting to regionally important towns like Lancaster, Reading, and Easton. King's Highways also linked Philadelphia with other cities along the eastern seaboard, such as New York, Wilmington, and Baltimore (Lichtenstein & Associates 1999:4-5). The widths of King's Highways varied depending upon the anticipated volume of traffic and the ground along which they passed, but most were expected to be between 40 and 100 feet wide (Kaja 2011:128).

The first King's Highway ordered to be built by William Penn was the Chester-Philadelphia-Bristol Road parallel to the Delaware River; its course is approximated by U.S. Route 13. It would extend to Trenton at the Falls of the Delaware and south to Baltimore by way of New Castle and Wilmington, Delaware. In 1697, several other King's Highways were authorized, including the Grays Ferry, Darby, and York roads, and one toward Lancaster. York Road extended north from Philadelphia through Bucks County, crossing the Delaware River at New Hope (Jackson 1994:216). It was completed in 1711. The Lancaster Road, also known as the Great Wagon Road, was in place by 1721. Another King's Highway ran through Bucks County to Easton, Northampton County, and the Egypt Road went to Phoenixville, Chester County (Jackson 1994:216; Oberman and Kozakowski 1976:24).

Local roads connected individual and communal settlements to one another, to main highways leading to county seats or Philadelphia, to social institutions such as churches, meeting houses, and schools, and to sites of economic production like mills, iron works, taverns tanneries, stream side docks, and ferry crossings (Kaja 2011:132-133; Lichtenstein & Associates 1999:5). Local roads had diverse widths, although statutes decreed they "not exceed fifty feet" (Kaja 2011:128). Connections to mills, iron works, other industrial sites, and taverns and inns were of particular importance to residents of Southeastern Pennsylvania. These sites served as "points of exchange" where local farmers could sell foodstuff and dry goods in exchange for credit, which would be used to buy needed items such as lumber, shingles, and iron or iron products, as well as imported goods like sugar, coffee, and tea (Kennedy 2000:589). Larger industrial concerns with numerous employees, such as iron works, established company stores that carried virtually every good that consumers might want. These facilities depended upon local farmers to meet their food, clothing, and dry goods needs. Beginning in the 1730s, one such store existed for every 80 households in the Pennsylvania countryside; by the mid-eighteenth century, 90 percent of Pennsylvania's population lived within five miles of a mill,

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industry store, or tavern. Many of these “market centers” would form the basis of early towns in Southeastern Pennsylvania (Kennedy 2000:591-594). Consequently, roads were developed to connect to these market centers, and towns would develop at crossroads where important roads met, around taverns and churches, and at ferry crossings and river landings (Lemon 1972:114).

Local roads were established through a petition to the Court of Quarter Sessions. Successful petitions demonstrated that new roads or alterations to existing ones would benefit groups, neighborhoods, townships, the county, or even the colony. Invariably, the petition contained language that a particular road was “much needed” to improve commerce, communication, or access to polls (Kaja 2011:109-111). Frequently the phrase “to mill and market” appeared, a reflection of the importance that grain growing played in the economy of Southeastern Pennsylvania during this period (Kaja 2011:191-192).

Seventeenth and eighteenth century roads generally followed the path of least topographical resistance and for that reason were rarely straight. The earliest roads generally paralleled streams, with fords and bridges established at right angles to waterways (Lichtenstein & Associates 1999:5). Where fording was not possible, settlers established ferries; numerous ones plied the Delaware, Schuylkill, and Brandywine rivers, as well as the Neshaminy and Cristiana creeks (Kaja 2011:137). Away from streams, roads paralleled property boundaries, following the high ground wherever possible and avoiding obstacles or the need for cuts and fills (Lemon 1972:115-119). King’s Highways and even local roads could extend long distances, but they were generally built incrementally, when there was a perceived need to connect two points.

Southeastern Pennsylvania experienced a heavy influx of new arrivals from Germany and the British Isles between 1730 and 1760. Pennsylvania’s population jumped from 21,000 in 1700 to 108,000 in 1750 (Kaja 2011:99). The population increase, combined with intra-regional movement of the second generation of established residents, meant that by 1760 nearly all the land in the counties of Southeastern Pennsylvania had been claimed, except for the rough uplands (Lemon 1972:222-224). Consequently, people had moved further into Pennsylvania’s hinterlands north and west of Philadelphia and the original three counties. The new settlers formed new communities and expanded existing ones, and they pushed to be integrated into Southeastern Pennsylvania’s market economy (Kaja 2011:100). The Susquehanna River was reached early in the eighteenth century (Kaja 2011:142). The City of Lancaster was laid out in 1730 and Reading in 1748. Both became important county seats and market towns, and roads were upgraded and extended to connect them and the

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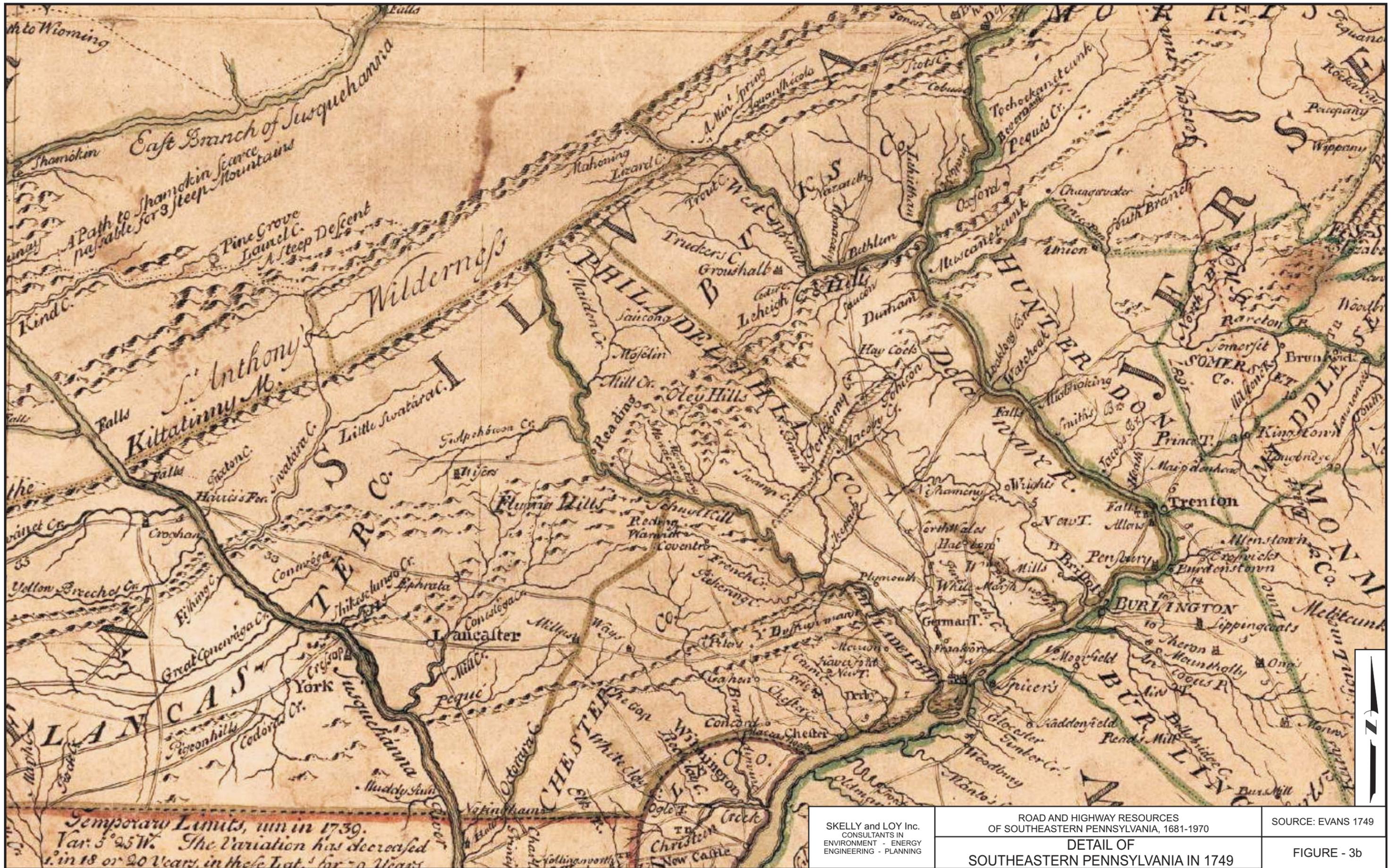
Susquehanna River to Philadelphia and the Delaware Bay (Kaja 2011:142). Other immigrants pushed into the interior of the country, moving southwestward from Philadelphia into Maryland, Virginia, and the Carolinas, giving rise to the Great Wagon Road, an extension of the Philadelphia to Lancaster Road that turned southwest into the Shenandoah Valley (Kaja 2011:96). It was in place as early as 1714 and realigned in 1714 and 1767 to shorten the distance between Philadelphia and Lancaster (Kaja 2011:141, 166).

Major roads had been sufficiently developed that by as early as 1738 stagecoach travel was in place between Philadelphia and Trenton. By the early 1750s service had been extended to New York, Baltimore, and Annapolis. Philadelphia to Lancaster stagecoaches began in the 1760s, if not earlier. A stagecoach route through Norristown to Bethlehem was established on the Bethlehem Road, and another went west to Reading *via* Norristown, Trappe, and Pottstown (Hunsicker 1923:109; Kaja 2011:172-173).

Figure 3 (Evans 1749) shows major roads through the region in 1749. Philadelphia's importance is obvious at a glance; nearly all roads emanate from and to it. There are two roads south into Maryland, one through Derby (Darby) and another through Chester. Roads run west to Lancaster with a branch to Harris's Ferry (Harrisburg) on the Susquehanna River and northwest to Reading *via* Plymouth. To the north and northeast, roads connect to Bethlehem by way of White Marsh and to the Delaware River *via* Hatboro. To the east, a road follows the Delaware River to Trenton *via* Bristol.

To meet the needs of its expanding population and economy, Pennsylvania experienced "a frenzy of road building in the 1750s, 1760s, and 1770s that more than doubled the number of roads laid out and cleared in the previous six decades" of the colony's existence (Kaja 2011:159). A portion of construction was linked to territorial expansion and conflict between the English and the French. Although fighting during the French and Indian War (1756-1763) occurred on Pennsylvania's western frontier, far from Philadelphia, the road system of Southeastern Pennsylvania played a part in the war. In 1755, the existing road system enabled Benjamin Franklin to supply General Edward Braddock with wagons and provisions during his ill-fated campaign to drive the French from the Ohio Valley (Kaja 2011:261). Braddock's successor, General John Forbes, recognized the need for accessible supply lines to connect his army with the rich countryside of Southeastern Pennsylvania. To that end, he ordered improvements not only of existing roads from the Susquehanna River west to the Forks of the Ohio in Western Pennsylvania, but he used his influence to see that roads east of the river were upgraded as well. England supplied Forbes's army through Philadelphia, using the local firm of





SKELLY and LOY Inc. CONSULTANTS IN ENVIRONMENT - ENERGY ENGINEERING - PLANNING	ROAD AND HIGHWAY RESOURCES OF SOUTHEASTERN PENNSYLVANIA, 1681-1970 DETAIL OF SOUTHEASTERN PENNSYLVANIA IN 1749	SOURCE: EVANS 1749 FIGURE - 3b
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Plumstead and Franks, who, in turn, worked closely with inland traders who oversaw the hiring of wagons, handled provisions, and managed the freighting of goods from inland towns to western forts. All this was made possible by the road system (Kaja 2011:268, 273-274). By the war's end in 1763, Forbes Road connected Philadelphia and the new town of Pittsburgh and the Ohio Valley by way of Bedford and Ligonier (Lichtenstein & Associates 1999:6-7). In the decades after the war, the route enabled Philadelphia firms to help establish and provision settlements along the roads (Kaja 2011:291).

Following the French and Indian War, a number of roads received public highway status, including the roads between Philadelphia and Bristol, Philadelphia and Strasburg, and Philadelphia and Reading. The stated reason for each was to provide an avenue "commodious" enough to accommodate wheeled vehicles (Kaja 2011:330).

With settlement expanding and the number of roads multiplying, the Pennsylvania General Assembly moved to reform the colony's road laws. The Road Law of 1762 codified the locally-based system of road administration and firmly established townships as the principal units for financing and maintaining roads. Indeed, township formation was often linked to a desire for new roads in a particular locality (Kaja 2011). Under the law, residents elected township road supervisors (rather than having overseers appointed by the Court of Quarter Sessions), who had the power to levy a small road tax to purchase materials and hire the hands necessary to build roads. Residents had the option of paying the road tax in cash or "working off" the tax through statutory labor, which committed them to spending a specified number of days each year doing labor-intensive road building or maintenance such as grubbing, clearing, ditching, and grading using hand tools and draft animals. Consequently, roads in any location were only as good as the township supervisor's understanding of road building and his ability to enforce the provisions of the law. The Road Law of 1762 would govern road building in Pennsylvania for more than a century (Kaja 2011:104; Lichtenstein & Associates 1999:5-6).

On the eve of the American Revolution, Pennsylvania's road system extended 300 miles west, 100 miles north, and 60 miles south of Philadelphia (Kaja 2011:126). Combined with the river system, it bound Pennsylvania's interior, the western frontier, and the East Coast to Philadelphia. The number of local roads had also greatly increased, as settlers sought to connect to each other, to local taverns and industries, to county seats and other market towns, or to roads that led to one of them (Kaja 2011:192).

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In contrast to the French and Indian War, Southeastern Pennsylvania experienced a great deal of fighting during the American Revolution. A number of the war's most famous events, including the encampment at Valley Forge, the crossing of the Delaware River to attack Trenton, and the Battle of the Brandywine, occurred in and around Philadelphia (Figure 4; Lewis 1807). In Chester County, British troops camped along the Gap-Newport Road during the Battle of Brandywine (Schooler 1980:26); in Bucks County, Lower York Road from Lahaska to Coryell's Ferry (New Hope) was used on several occasions by the Continental Army under Washington during its 1777 Philadelphia campaign (Auerbach and BCC 1979). Major road building was put on hold during the hostilities, although the area's roads were well-traveled by troops and those seeking to secure provisions and armaments.

The abeyance of major road construction continued in the years immediately after the revolution, as there was limited capital available in the new United States. The Commonwealth of Pennsylvania struggled to find revenue to build or improve state highways (the former King's Highways). In 1784, the Pennsylvania Legislature authorized the establishment of a lottery, with half of the money raised earmarked for improving navigation on the Schuylkill River and the other half for "putting the roads from the city of Philadelphia to the western parts of this state in good order and repair" (Kaja 2011:347, 353).

In contrast, by the late 1780s the development of local roads in Southeastern Pennsylvania had returned to pre-war levels. The process for establishing local roads remained the same (and would be so for more than a century), with local residents petitioning the Court of Quarter Sessions for roads to connect to mills, taverns, stream side landings, and public roads leading to county seats, market towns, and Philadelphia (Kaja 2011:343). Because of the great number of local roads established, a later history of road development described Southeastern Pennsylvania as covered with "an intricate and complicated system of cross-lanes and byways" (Uhler 1916:792). Another historian echoed this theme, noting that over the first 100 years of its existence "[Southeastern Pennsylvania] became covered with a network of crooked roads," many of them local roads which received relatively low volumes of traffic (Davis 1905).

Despite the difficulty faced in raising funds for road improvements, as the end of the eighteenth century neared, the road system was indisputably the primary means of moving goods and people in Southeastern Pennsylvania. State highways connected the county seats and towns of Southeastern Pennsylvania to Philadelphia, important cities in neighboring counties and states, and each other.



A MAP of the COUNTRY from  
*RARITON RIVER* in *EAST JERSEY*  
to  
*ELK HEAD* in *MARYLAND*  
Shewing the several Operations of the American  
and British Armies, in 1776 & 1777.  
SCALE.  
5 4 3 2 1 0 5 10 15 20 25 Miles.

Original published in Survey made by Order of the Parliament.

Published by C.F. Wayne Philadelphia.

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Emblematic of the shift from riverine to road primacy, the county seat of Bucks County had been moved inland from the Delaware River to Newtown as early as 1726 (Auerbach and BCC 1979). Chester County's courthouse was moved from Chester to West Chester in 1786 (Schooler 1980:4). With the area's population and inland economy now more fully developed, and access to all portions of Southeastern Pennsylvania assured by the intricate road network, residents sought a greater degree of local governmental administration. Accordingly, the northern portion of Philadelphia County was split off into Montgomery County in 1784, with the county seat at Norristown; it included two-thirds of the former Philadelphia County (Bean 1884:454). Delaware County was created out of Chester County in 1789, with the county seat at Chester.

Figures 5 and 6 depict the major roads of Southeastern Pennsylvania at the end of this first period of development. Figure 5 (Adlum and Wallis 1791) concentrates on the major inland transportation routes. These included:

- a road south from Philadelphia through Chester to Maryland;
- the Philadelphia to Lancaster Road, a part of the Pennsylvania Road to Pittsburgh;
- an alternative westbound route through West Chester and Strasburg;
- a road on the east bank of the Schuylkill River to Reading;
- a road passing through Jenkintown, Willow Grove, and Hatboro in Montgomery County (Bean 1884:455) and then splitting into two branches before uniting again on the way to Bethlehem;
- an off-shoot of the Bethlehem Road extending to Easton and to New Jersey; and
- a route east from Philadelphia along the Delaware River to Trenton.

Figure 6 (Howell 1792) showed a number of additional roads, including:

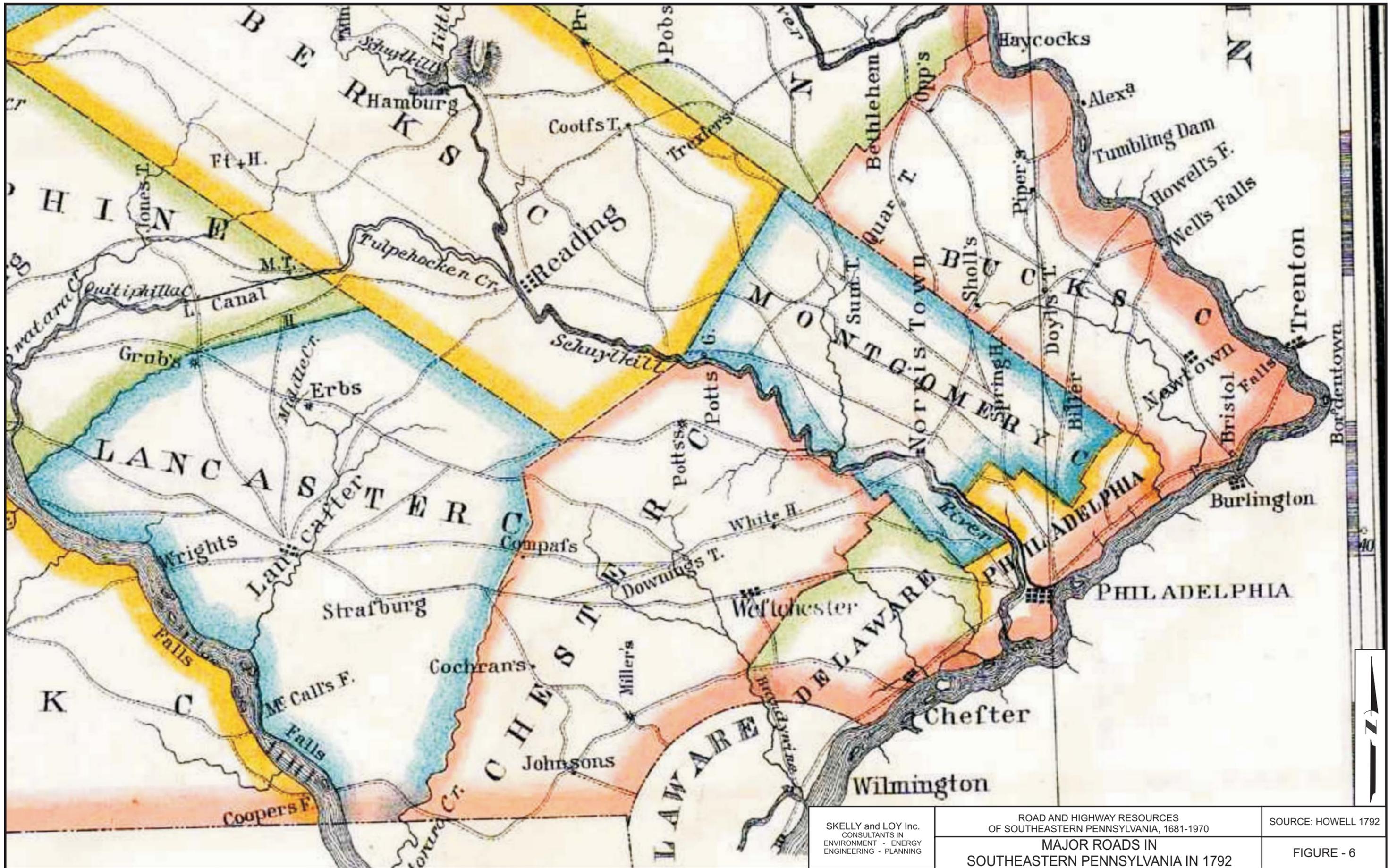
- a road from the Strasburg Road southeast into Delaware, with one branch crossing through Oxford (Johnson's), Chester County and a second to Newport and Wilmington;
- two roads running northwest through Montgomery County, one to a tavern on the Easton to Reading Road (which would become Kutztown) and the second connecting to a road leading to Trexlertown;



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ROAD AND HIGHWAY RESOURCES  
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**MAJOR INLAND TRANSPORTATION ROUTES  
 IN 1791**

SOURCE: ADLUM AND  
 WALLIS 1791  
**FIGURE - 5**



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ROAD AND HIGHWAY RESOURCES  
OF SOUTHEASTERN PENNSYLVANIA, 1681-1970  
MAJOR ROADS IN  
SOUTHEASTERN PENNSYLVANIA IN 1792

SOURCE: HOWELL 1792  
FIGURE - 6

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- two roads running northeast through Montgomery County and Doylestown in Bucks County, one ending at Howell’s Falls and the second at Well’s Falls; and
- a road from Philadelphia through Bucks County, also ending at Well’s Falls.

The presence of roads between these cities and towns did not necessarily mean that they were well constructed. Travel journals from the eighteenth century are replete with passages concerning the poor condition of Pennsylvania’s roads, including its major roads. Road beds were natural earth, built and maintained to the greatest extent possible by township road supervisors and local residents. Wagons and other wheeled vehicles cut deep ruts into the roads, and rain and snow created quagmires of mud, particularly in the Spring, when melting snow and frost saturated the roads. Large streams generally were not bridged and pedestrians and wheeled vehicles either had to ford them or be ferried across. Forging could be dangerous during high water and difficult due to mud during low water (Durrenberger 1931:28-29).

While the roads may have been substandard, road development in this first period of Southeastern Pennsylvania’s history would set the stage for most later road development. The major transportation routes established during this period would remain among the region’s major transportation routes until the construction of the interstate highway system in the mid and late twentieth century. These roads might be modified, realigned, or upgraded, and portions might be vacated, but they would continue to function as the major transportation routes throughout the nineteenth and twentieth centuries. In a similar way, local roads would continue to be built, modified, or vacated using the procedures first established under the Act of 1700 and modified in the Road Law of 1762. Residents would petition the Court of Quarter Sessions using the formulaic language that had been in place since the founding of the colony. The court would review the petitions and appoint viewers, who would assess the necessity of the new roads or of the modifications to existing ones. And the townships and counties would continue to be the governmental units responsible for the construction and maintenance of most roads and bridges until the PDH was founded in 1903.

**Bridges Prior to 1792**

Bridges were the most expensive and labor-intensive part of road construction, particularly at major streams. During the seventeenth and eighteenth centuries, King’s/State

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Highways, because of their importance as overland trade and communication routes, were more likely to have bridges built at difficult fords and stream crossings than local roads (Lichtenstein & Associates 1999:5). Because most industries and mills used water as their power source, and because they played such a vital role in the local community as market centers, early bridges were also likely to be built over streams near mills and iron works. Because of the expense involved in their construction, the Act of 1762 provided procedures for townships to petition the county government for relief if the cost of building a bridge was too high for a township to finance. The Court of Quarter Sessions could order the county government to pay for a new bridge or take over the maintenance of an existing one (Lichtenstein & Associates 1999:6).

Bridges in southeastern Pennsylvania in the period prior to 1790 were either constructed of wood and stone. Wood bridges could be as simple as a tree thrown across a stream or as elaborate as wood-sided truss, or covered, bridges. None remain from this early transportation period. Stone arch bridges were more permanent in nature and were not uncommon during this period. Immigrants from Great Britain and Northern Europe brought basic artisanal stone masonry skill with them to America, as well as published design treatises on stone arch bridge construction (Jackson 1994:213). Southeastern Pennsylvania had abundant concentrations of sandstone, limestone, gneiss, and marble available to use as building material (Commonwealth of Pennsylvania 1986:29).

The nation’s oldest known stone arch bridge is on Frankford Avenue over Pennypack Creek in Philadelphia, built in 1697 on the King’s Highway between Philadelphia and Bristol (Lichtenstein & Associates 1999:5). It is listed in the NRHP. Two other stone arch bridges constructed prior to 1790 remain in Southeastern Pennsylvania, a NRHP eligible bridge from 1777 on the Old Bethlehem Pike in Springfield Township, Bucks County and a NRHP listed bridge from 1789 in Upper Merion Township, Montgomery County.

**The Turnpike Era, 1792-1830**

Local road construction “exploded” across the state in the 1790s, “even in the more densely settled counties of Southeastern Pennsylvania” (Kaja 2011:357). County road networks were improved and expanded “on an unprecedented scale,” with existing roads modified, extended, or even vacated in

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favor of new routes (Kaja 2011:358-359). At the state level, the number of centralized improvement projects “increased exponentially,” as the Pennsylvania General Assembly passed legislation naming roads and bridges that needed to be constructed or repaired. State-level funding for internal improvements, however, remained in short supply. In an effort to raise capital, the legislature turned to the private sector, passing laws authorizing the incorporation of companies to build and maintain turnpikes (Kaja 2011:360).

The first turnpike authorized was the Philadelphia and Lancaster Turnpike in 1792. The legislation establishing the turnpike company would set the standard for all subsequent turnpike companies authorized by the General Assembly. It laid out the company’s organizational model; created bylaws governing capital accumulation and accounting; outlined the rights and responsibilities of landowners, company officers, and turnpike employees; determined tolls; and set limitations on what goods and vehicles were permitted to travel on the turnpike road (Kaja 2011:370).

Leading merchants in Philadelphia and Lancaster had pushed for an improved “artificial road” - i.e., one that was more than graded earth - on a relatively straight line between those two important Pennsylvania cities, one that would bypass the existing Lancaster Road (Lichtenstein & Associates 1999:8). The project was also supported by the Society for the Improvement of Roads and Inland Navigation, formed in 1789 by members of the Philadelphia elite. The influential society met regularly and made formal reports on internal improvements to the Pennsylvania legislature (Kaja 2011:274-375). These lobbying efforts succeeded, and the Philadelphia and Lancaster Turnpike was authorized and constructed between 1792 and 1794. The nation’s first “scientific road,” the well-drained, approximately 62 mile long highway ran from the west bank of the Schuylkill River in Philadelphia to a stone arch bridge over the Conestoga Creek in Lancaster (Jackson 1994:218). The turnpike was finished with a macadam stone roadbed, a layer of small broken stones placed on a convex, well-drained earth roadbed, which would be compacted by traffic (Durrenberger 1931:90). All streams were crossed by stone arch bridges (Durrenberger 1931:91), including a three span stone arch bridge over the East Branch Brandywine Creek in Downingtown (Jackson 1994:218). The Philadelphia and Lancaster Turnpike cost almost one half-million dollars (approximately \$32.5 billion dollars today). The state-chartered private company that financed and operated the turnpike raised the money by issuing stock to investors. Investments would be recouped and profits generated through the collection of tolls to be paid by those wishing to use the road (Futhey and Cope 1881).

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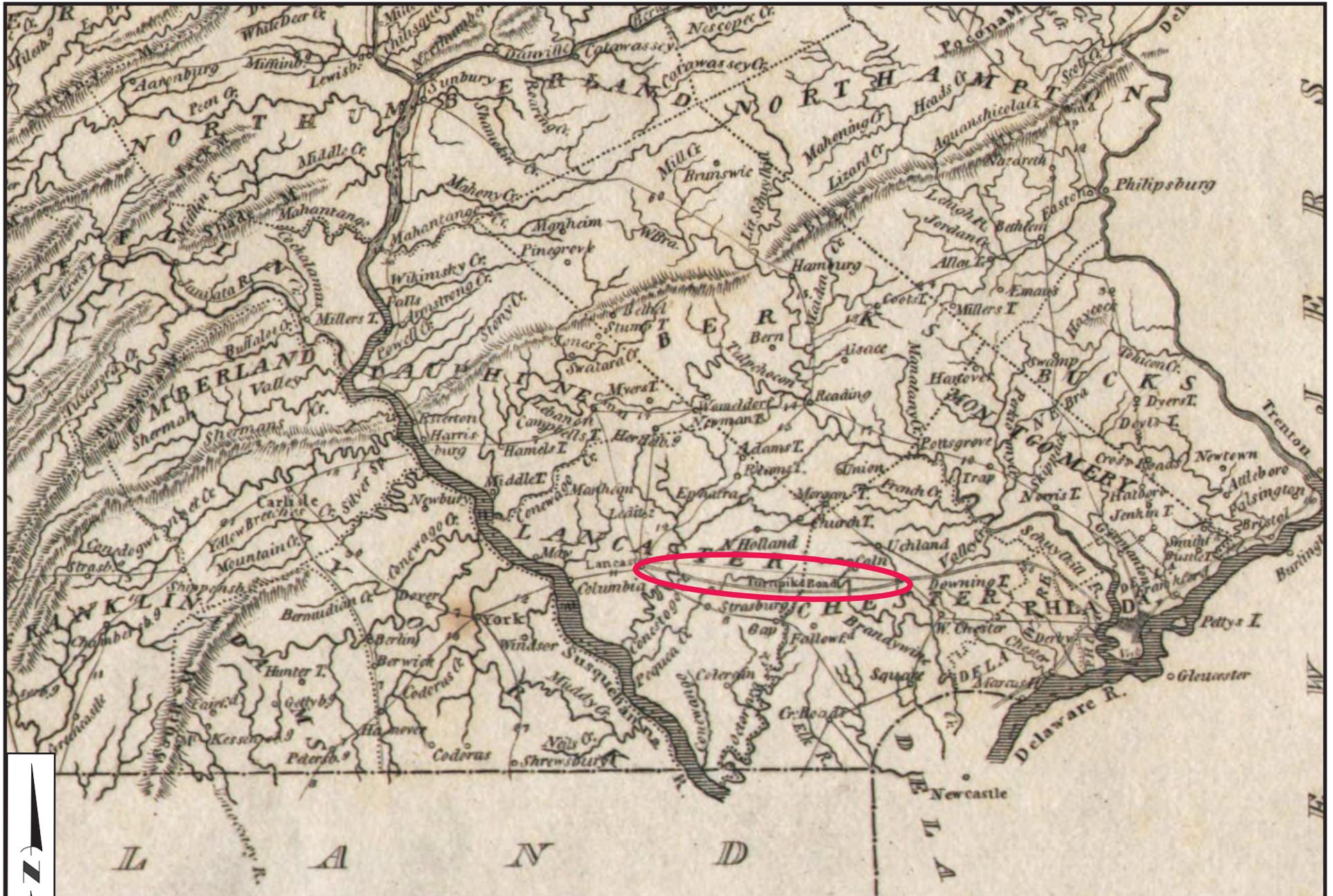
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The Philadelphia and Lancaster Turnpike's macadam surface improved travel by preventing wagon wheels from cutting ruts into the road and by reducing the detrimental effect of inclement weather, both of which wreaked havoc on earthen roads (Lichtenstein & Associates 1999:8). The turnpike was an instant success with teamsters and stage lines, which required dependable, all-weather transportation, and it turned a profit almost immediately upon completion.

The Philadelphia and Lancaster Turnpike passed through fertile and valuable farmland and connected Philadelphia, Pennsylvania's largest and most important city, with Lancaster, an important market town in southcentral Pennsylvania with easy overland connections to Wilmington, Baltimore, Harrisburg, and the Shenandoah Valley. It became part of the leading thoroughfare between Philadelphia and the western part of Pennsylvania, thanks to existing and improving connections west of Lancaster and the Susquehanna River (Lichtenstein & Associates 1999:80). Development sprouted along its route. The turnpike became lined with public houses and inns, as many as one per mile in places (Futhey and Cope 1881). It ran through Philadelphia, Delaware, Chester, and Lancaster counties and the communities of Paoli, Downingtown, Coatesville, and Parkesburg. It is approximated today by old U.S. 1 and 30.

A map dated to 1804 (Figure 7; Lewis 1804) shows the locations of both the original Lancaster Road and the Philadelphia to Lancaster Turnpike. It appears that the turnpike improved and approximated the original alignment of the Lancaster Road between Philadelphia and Downingtown, an important milling center on the East Branch Brandywine Creek. The turnpike then swung south onto a new alignment that paralleled the existing Lancaster Road.

Inspired by the success of the Pennsylvania and Lancaster Turnpike, the Pennsylvania General Assembly was inundated with requests for turnpike company charters. Prior to 1803, most turnpike companies were chartered to build roads east of the Susquehanna River, with improved connections to Philadelphia the primary goal. But "turnpike mania" soon spread to all parts of the Commonwealth (Durrenberger 1931:54), aided by the Pennsylvania legislature, which began subscribing to turnpike company stock in 1806. Appropriations for this purpose remained limited until 1811, when "an act to encourage the construction of certain great leading roads, within this commonwealth, and the erection of bridges over the Susquehanna" was passed and \$825,000 was appropriated to carry it out. The legislation began the era of cross-state, trunk-line turnpikes in Pennsylvania (Durrenberger 1931:55, 108). By 1821, a total of 84 separate turnpike companies in the state operated more than 1,800 miles of roads that required almost \$6 million to build (Durrenberger 1931:55; Jackson



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LANCASTER ROAD AND THE PHILADELPHIA  
 AND LANCASTER TURNPIKE IN 1804

SOURCE: LEWIS 1804

FIGURE - 7

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1994:199). Approximately \$4 million of that cost came from private investors, with the remainder contributed by the state government. Pennsylvania led the nation in turnpike mileage. In the words of historian Donald C. Jackson, "Pennsylvania's road building initiative represented a dramatic commitment to improving overland transportation" (Jackson 1994:199).

Turnpikes used stock companies to raise funds because building good, hard-surfaced roads and durable bridges were expensive propositions and large amounts of capital were scarce (Lichtenstein & Associates 1999:9-10). Most of that money was for construction. In the Mid-Atlantic, including Southeastern Pennsylvania, most turnpikes, but not all, used crushed stone to create an all-weather road surface (Durrenberger 1931:87). Those that did not still featured raised and shaped roadbeds, ditches for draining, and attempts to reduce grades (Durrenberger 1931:84). For those that did, quarrying, breaking, placing, and replacing the stones along a roadway represented a time-consuming and expensive process that required most of a turnpike company's capital. Turnpike legislation usually stipulated that a turnpike right-of-way be between 50 and 60 feet wide, but only a portion was meant to be covered with stone. The remainder would retain an earthen surface, to be used as a "Summer road," when the dry weather would not turn the roadway into deep, mud-filled ruts (Jackson 1994:207-208). The turnpikes were built by contractors, who were responsible for acquiring labor and materials and completing the work on time and in accordance with a signed contract (Kaja 2011:362).

In contrast to the Philadelphia and Lancaster Turnpike, most other turnpikes chartered in Southeastern Pennsylvania after 1800 were not long-distance roads or new construction. Rather, the legislature granted private turnpike companies the right to take control over important public roads or rights-of-way, pay for the cost of upgrading and maintaining the roadbed, and then charge travelers a toll for using the improved highways (Jackson 1994:202). Most Southeastern Pennsylvania turnpikes connected two regionally important but not too far distant market towns, although these turnpikes sometimes became part of regional, cross-state, or interstate routes (Lichtenstein & Associates 1999:8). The goals of the turnpikes were the same as the earlier roads: to provide a means to integrate the residents of Southeastern Pennsylvania into the market economy and to continue Philadelphia's role as America's largest and most important port.

By 1830, turnpikes extended into all parts of Pennsylvania. A continuous line of turnpikes connected the Delaware River across from Trenton to Steubenville, Ohio *via* Pittsburgh, a distance of 353 miles. Two stone surface roads ran from Harrisburg to Pittsburgh, one *via* a southern route

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through Chambersburg, Bedford, and Greensburg (approximated by U.S. 30) and a second, northern route through Lewistown, Huntingdon, Hollidaysburg, and New Alexandria (approximated by U.S. 22). Turnpike mileage peaked in Pennsylvania at approximately 2,400 miles (Durrenberger 1931:55-56).

Many turnpike and bridge companies, however, found that income from tolls was not enough to recoup heavy capitalization and maintenance costs. Few ever paid dividends to their investors, and of those that did, an average rate of return was two to three percent (Durrenberger 1931:113-114). Financial difficulties were exacerbated beginning in the 1830s, when private investors and the state turned their efforts and funding to two new transportation technologies, canals and railroads. These technologies began carrying much of the long-distance freight that had previously been hauled over Pennsylvania's turnpikes. By as early as 1831, more than half of the 270 turnpike and toll bridge companies in the Commonwealth had never raised enough capital to complete construction, and a majority of the completed turnpikes were in receivership or not paying dividends to investors. Increasingly, turnpike companies abandoned their routes and the roadways reverted back to public ownership (Lichtenstein & Associates 1999:9-10).

**Early Nineteenth Century Turnpikes in Southeastern Pennsylvania**

In addition to the Philadelphia and Lancaster Turnpike, many other turnpikes were authorized in Southeastern Pennsylvania during the period 1791-1830. By the end of the period, Philadelphia was connected to every part of the state by hard-surfaced roads. Turnpike roads through Reading, Sunbury, Bellefonte, Philipsburg, and Franklin connected with the northwest corner of the state. Two routes ran northward to the New York state line, one that passed through Allentown, Berwick, and Lycoming and Bradford counties to Elmira, New York. The second passed through Bethlehem and Wind Gap and then branched, with one branch passing through Wilkes-Barre and Montrose and the second following the Upper Delaware River (Durrenberger 1931:56-57).

Among the most noteworthy Southeastern Pennsylvania turnpikes constructed during this era were the following:

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- The Germantown and Perkiomen Turnpike, a 26 mile long highway that upgraded the road north from Philadelphia to Reading by improving a 26 mile stretch through Germantown, Chestnut Hill, and Norristown to a new bridge over Perkiomen Creek at Collegeville, where existing roads connected to Pottstown and Reading (Durrenberger 1931:53; Jackson 1994:219). It opened in 1799 and approximates U.S. 422.
- The Frankford and Bristol Turnpike, Bucks County's first turnpike. Chartered in May 1803, it ran from Front Street and Germantown Road in Philadelphia through Bristol and on to the ferry crossing of the Delaware River at Morrisville (Durrenberger 1931:53; Ely 1926:19). It approximates U.S. 13.
- The Cheltenham and Willow Grove Turnpike Road Company, which organized nearly concurrently with the Frankford and Bristol. The road improved the York Road, terminating at Willow Grove in Montgomery County. In 1838 or 1839, the Doylestown and Willow Turnpike extended the highway to Doylestown. It extended up the York Road a decade later (Bean 1884:456; Ely 1926:19). It approximates U.S. 611.
- The Bustleton and Smithfield Turnpike, chartered in 1804, originally ran from Bustleton to the Buck Tavern in Southampton Township, Bucks County. It would later be extended through Churchville to Richboro and then to Pineville (Ely 1926:20).
- The Chestnut Hill and Spring House Turnpike Road, also chartered in March 1804. The following year, an act was passed to extend the turnpike over the Bethlehem Road through upper Bucks County. North of Line Lexington, a branch passed through Sellersville, Quakertown, and Coopersburg on the way to Allentown, Lehigh County (Ely 1926:20; Jackson 1994:227). It approximates old U.S. 309.
- The Downingtown, Ephrata, and Harrisburg Turnpike, also known as the Horseshoe Pike, was chartered in 1803 to connect the named cities (Futhey and Cope 1881:1029-1030). Sixty-seven miles in length, it was completed in 1819 (Durrenberger 1931:53). It approximates U.S. 322.
- The Gap and Newport Pike, begun in 1809, took over the existing road between Gap, Lancaster County and Newport, Delaware. It was primarily used to bring grain to the mills in Wilmington (Durrenbeger 1931:53; Futhey and Cope 1881:1029-1030). It approximates U.S. 41.
- The Pennsylvania, Brandywine, and New London Turnpike, chartered in 1810, passed through Chadds Ford, Kennett Square, Oxford, and into Maryland. It approximates old U.S. 1 (Winthrop 1986:15).

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- The Little Conestoga Turnpike, authorized in 1812, diverged to the northwest off of the Philadelphia and Lancaster Turnpike in East Whiteland Township, Chester County and continued on to Reading (Futhey and Cope 1881:1029-1030; Kaja 2011:360; Winthrop 1986:16).

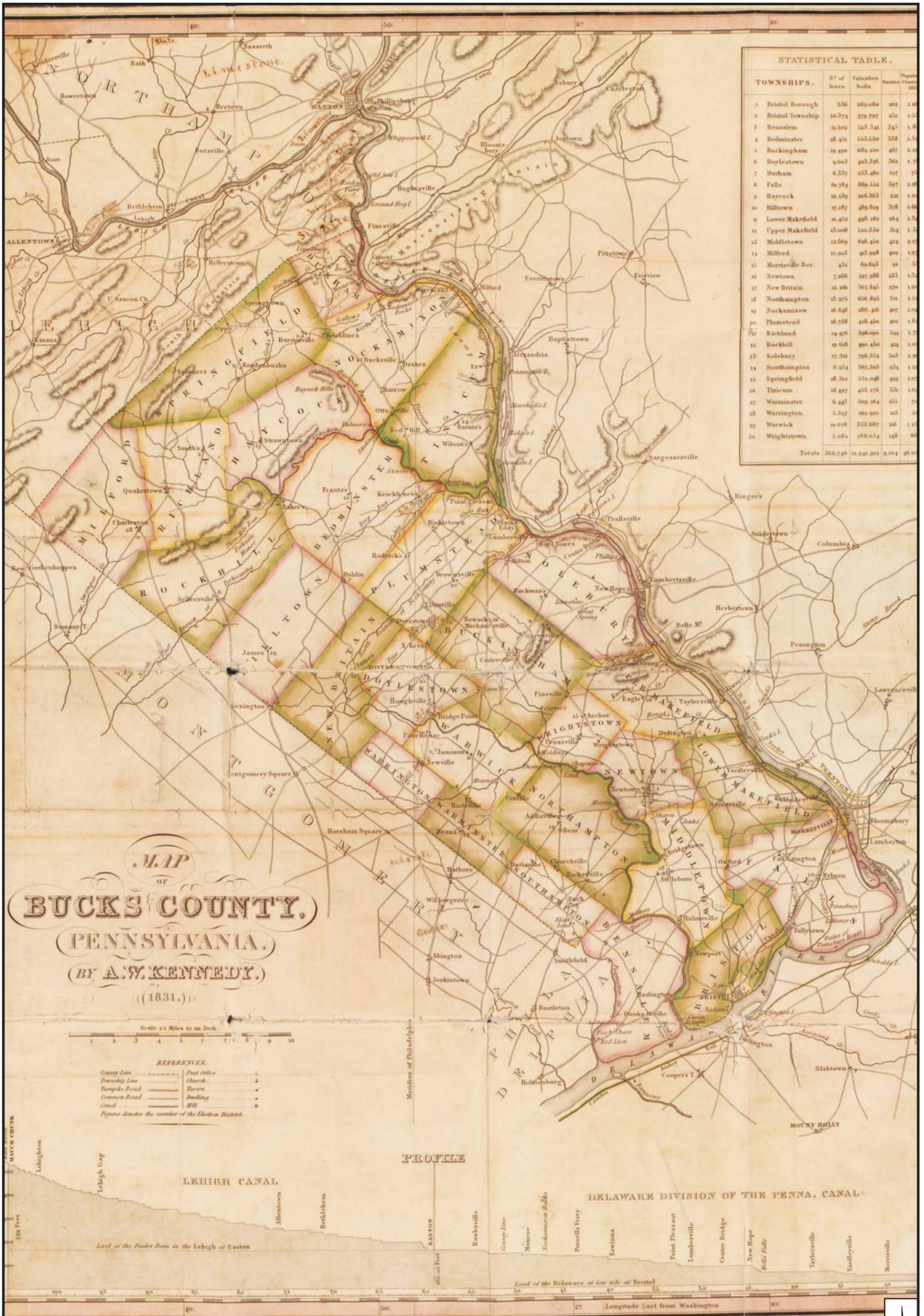
Not all major roads built during this period were turnpike roads. The 40 foot-wide State Road was laid out at the end of 1830. The east-west route began at New Hope, Bucks County, passed through Doylestown and the Montgomery County townships of Montgomery, Gwynedd, Whitpain, Norriton, and Upper Merion to Norristown and Bridgeport. From there, it extended west through West Chester to the Maryland state line (Bean 1884:457). It approximates U.S. 202.

Additionally, local roads continued to be built in great numbers during the period 1790-1830. Citizens in the five counties of Southeastern Pennsylvania continued to petition for new roads and bridges. Consequently, by the middle of the period, all counties had well-developed road systems, as is illustrated on the earliest county maps, called the Melish-Whiteside maps, which were completed between 1817 and 1822. The maps for Bucks, Chester, Delaware, and Montgomery counties are included as Figures 8 through 11.

**Bridges in the Turnpike Era**

Many bridges over smaller streams on Southeastern Pennsylvania’s turnpikes and other roads during this period were constructed of stone, thanks to the abundance of building stone in the area. These bridges were key components of the region’s highway system (Jackson 1994:214). Treasury Secretary Albert Gallatin, a staunch proponent of internal improvements, remarked in 1808 that “in the lower counties of Pennsylvania, stone bridges are generally found across all the small streams” (Jackson 1994:211).

Larger streams were crossed using a variety of methods. Some were forded or crossed by pile trestle type structures resembling simple maritime wharves. These structures were also built across mud flats and bogs (Jackson 1994:212). None of these structures survive. In other cases, multiple span stone arch bridges were erected, such as the six span structure built by Montgomery County officials over Perkiomen Creek near Collegeville (Jackson 1994:214), which remains in place today. The largest streams—the Delaware, the Schuylkill, and the



According to Act of Congress 1825 by U.S. Tanner in the Clerk's Office of the Eastern District of Pennsylvania. Published by U.S. Tanner, No. 111 Chestnut St. Philadelphia 217 1830



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Figure 10

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Figure 11

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Brandywine, for example—had ferry crossings. These often became bottlenecks where teamsters, wagoners, and other travelers waited for boats. To alleviate the bottleneck at the Schuylkill River ferry on the Philadelphia and Lancaster Turnpike at Market Street, the Schuylkill River Permanent Bridge Company was chartered in 1798 for the purpose of building a bridge to replace the ferry. The wood truss arch covered bridge, designed by Timothy Palmer, was completed in 1805, the first recorded covered bridge in America. Although called the “Permanent Bridge,” it is no longer extant (Lichtenstein & Associates 1999:9).

The erection of the Permanent Bridge began a period of privately built toll bridges over major streams, including the Delaware and Schuylkill rivers and important creeks (Durrenberger 1931:32-33; Lichtenstein & Associates 1999:9). In 1812, German engineer Lewis Wernwag constructed “the Colossus,” a single arch, 340 foot wood truss bridge, at a ferry site connecting the area then known as Fairmount with the west bank of the Schuylkill River. It was destroyed by fire in 1838 (McCain 2012). Wernwag also built a wood covered bridge over the Delaware River in 1814 between New Hope and Lambertville, the second such bridge over the Delaware. The first had linked Morrisville and Trenton in 1806 (DRJTBC 2013). Neither bridge is extant. Engineer James Finley, known as the “Father of the Modern Suspension Bridge,” erected an iron chain suspension bridge at the Schuylkill River falls in 1808; it collapsed under heavy snow in 1816 (Sayenga 2008).

The designs of the great timber bridges were copied by local millwrights and carpenters who built covered bridges over smaller tributaries for decades thereafter (Lichtenstein & Associates 1999:9).

The PennDOT Bridge Inventory and Evaluation, completed in 1999, identified 22 bridges built during the Turnpike Era, 1790-1830. All are stone arch bridges. Delaware and Montgomery counties have six bridges each, Bucks County has five, Chester three, and Philadelphia two. They range in length from 17 to 453 feet.

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**Roads in the Canal and Railroad Eras, 1830-1880**

**Growth of Canals and Railroads**

In 1817, New York State began constructing an “artificial waterway” between the Hudson River on the east and Lake Erie on the west. Opened in 1825, the Erie Canal was an immediate success, dropping freight rates between Buffalo and New York City from \$100 to \$5 per ton and cutting transportation time by two-thirds (Durrenberger 1931:132). Thanks to time and cost savings wrought by the canal, New York City became the pre-eminent trans-shipment point for goods going to or coming from the growing western portion of the United States. It soon surpassed Philadelphia as America’s leading port and largest city, titles it would never relinquish.

Not to be outdone, other Mid-Atlantic states moved to recapture a greater share of the western trade, investing heavily in both canals and another promising new technology, the railroad. Virtually overnight, Pennsylvania’s state government shifted its financial support from turnpikes to the two new technologies. The goal was to connect Philadelphia with the Ohio River at Pittsburgh, a gateway to the west (Lichtenstein & Associates 1999:10-11). As with development of King’s Highways and turnpike roads, the City of Philadelphia remained a focal point of the expanding transportation system.

The Commonwealth of Pennsylvania entered the canal building business in the mid-1820s, proposing an ambitious program to link Philadelphia to Pittsburgh with a canal, along with feeder canals servicing other portions of the state. The spine of the system, completed in 1834, was known as the Main Line of Public Works. The multi-modal route consisted of a railroad line from Philadelphia to Columbia, York County; a canal from Columbia to Hollidaysburg, Blair County; a unique portage railroad of inclined planes crossing the Allegheny Ridge to Johnstown, Cambria County; and a canal continuing west to Pittsburgh (Lichtenstein & Associates 1999:11). It cost the Commonwealth in excess of \$10 million (Durrenberger 1931:133).

A triumph of engineering, the Main Line of Public Works greatly reduced travel time between Western Pennsylvania and Philadelphia, helping Philadelphia retain its standing as a major port and Pennsylvania’s most important city. However, the state canal system failed to

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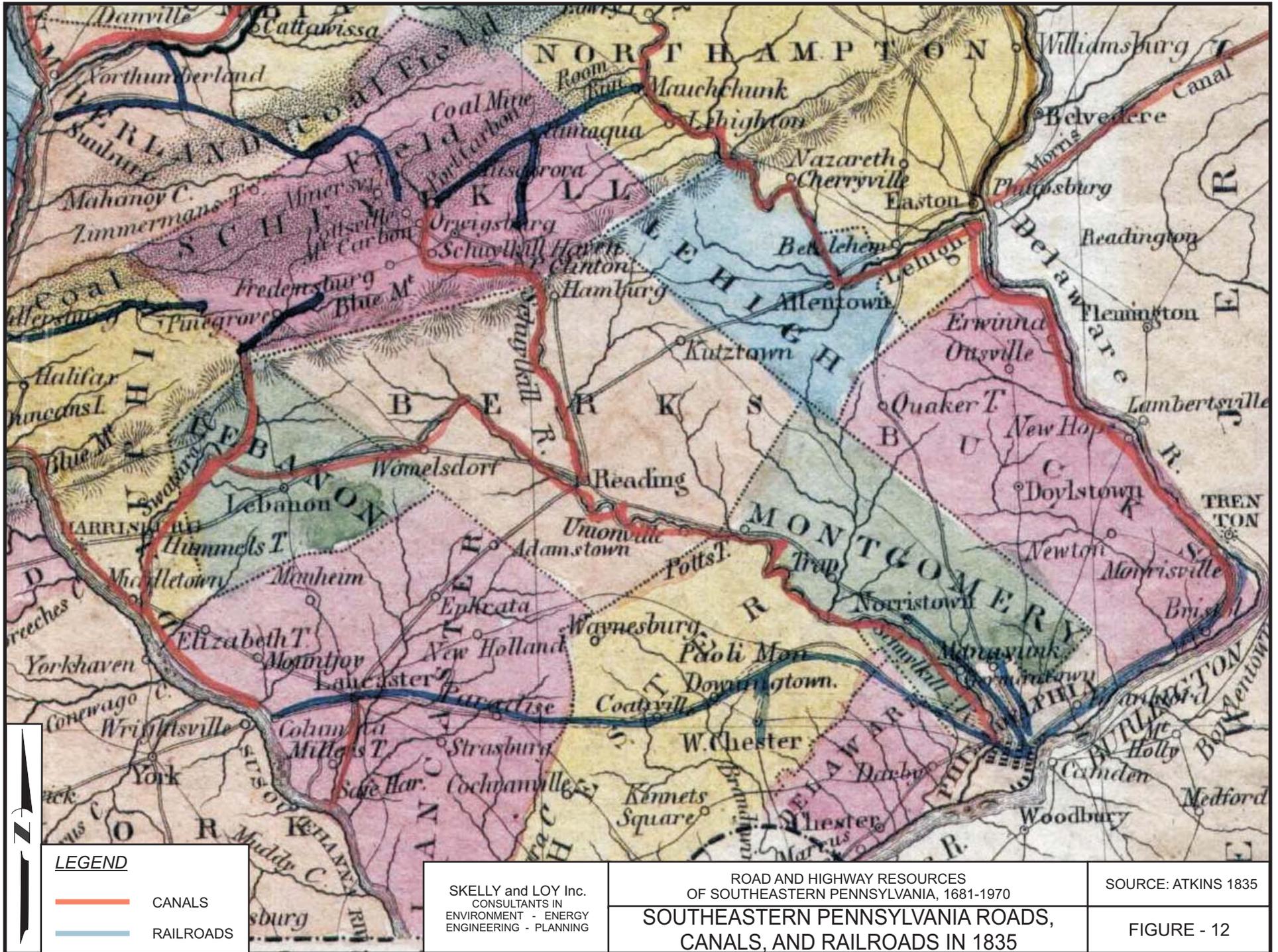
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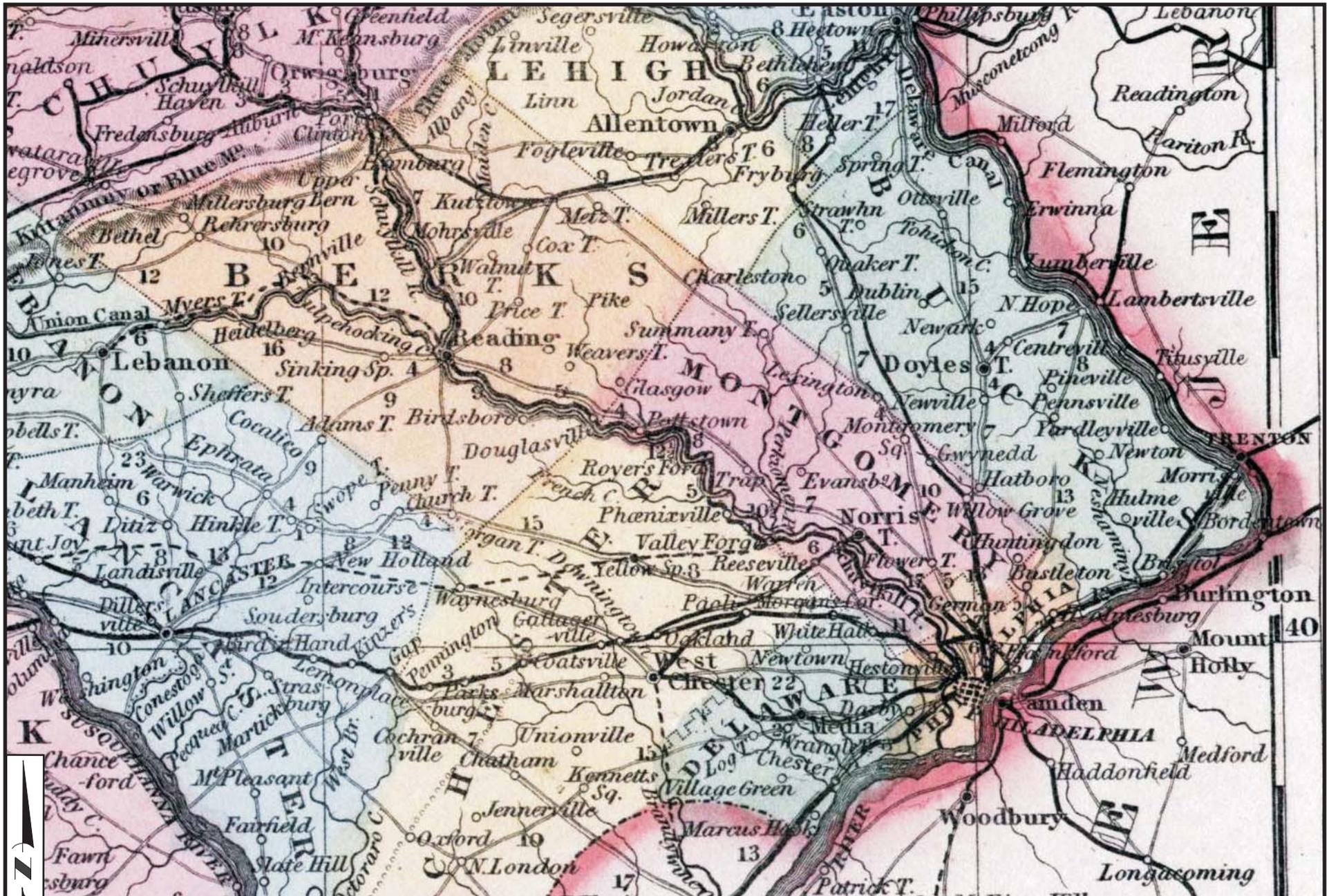
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live up to expectations. Construction and maintenance costs greatly exceeded estimates, in part because of the difficulty of raising and lowering boats across the mountains. Other problems included bottlenecks at the many locks, which slowed traffic; floods and freshets that washed out canal sections, shutting canals down; winter freezes that made year-round transport impossible; and the time-consuming process of transferring goods and passengers between canal boats and railroads. The state sold the Main Line of Public Works in 1857 (Lichtenstein & Associates 1999:11).

Other Pennsylvania canals developed to bring anthracite coal to market. Pennsylvania's anthracite coal fields had been mined since the 1760s for local use, but large scale exploitation of coal as a home heating fuel and a power source for industry awaited a cost-effective means of transporting the heavy, bulky material to urban markets. The potential profit to be made from the coal trade encouraged private investors and the state to pump huge sums of capital into canals to ship the mineral. The first of the important Pennsylvania coal canals was the Schuylkill Navigation Canal, built between 1816 and 1825. The 108 mile long canal connected Philadelphia with Reading and Pottsville, Berks County, in the southern anthracite coal field. The canal followed the Schuylkill River, passing through Berks, Chester, and Delaware counties and the communities of Fricks Locks, Lawrenceville, Springville, Phoenixville, Norristown, Conshohocken, and Manayunk on its way to Philadelphia. The Schuylkill Navigation Canal opened up urban Philadelphia as a market for coal and as a port for trans-shipment of the coal up and down the eastern seaboard (Lichtenstein & Associates 1999:10-11). Leased to the Reading Railroad in 1870, the canal continued to haul anthracite coal until 1931, when flood damage and silting caused by coal dust shut the system down (Reading Area Community College 2011; Shank 1997:11). An 1835 map (Figure 12; Atkins 1835) shows the interplay of canals, railroads, and roads in Southeastern Pennsylvania at the height of the canal era.

In all, more than 1,000 miles of canals were built in Pennsylvania (Durrenberger 1931:133). But canal building ended nearly as quickly as it had begun. By the 1840s, railroads had conclusively demonstrated their superiority as a transportation system. Railroads were faster than canals or roads, could carry much more cargo, could operate year-round, and were not as constrained by topography. By 1860, railroads had spread to all parts of the Commonwealth, and Pennsylvania had surpassed all states in total railroad mileage, a position it would hold into the twentieth century. Figure 13 (Young 1856) shows the extent to which





**LEGEND**

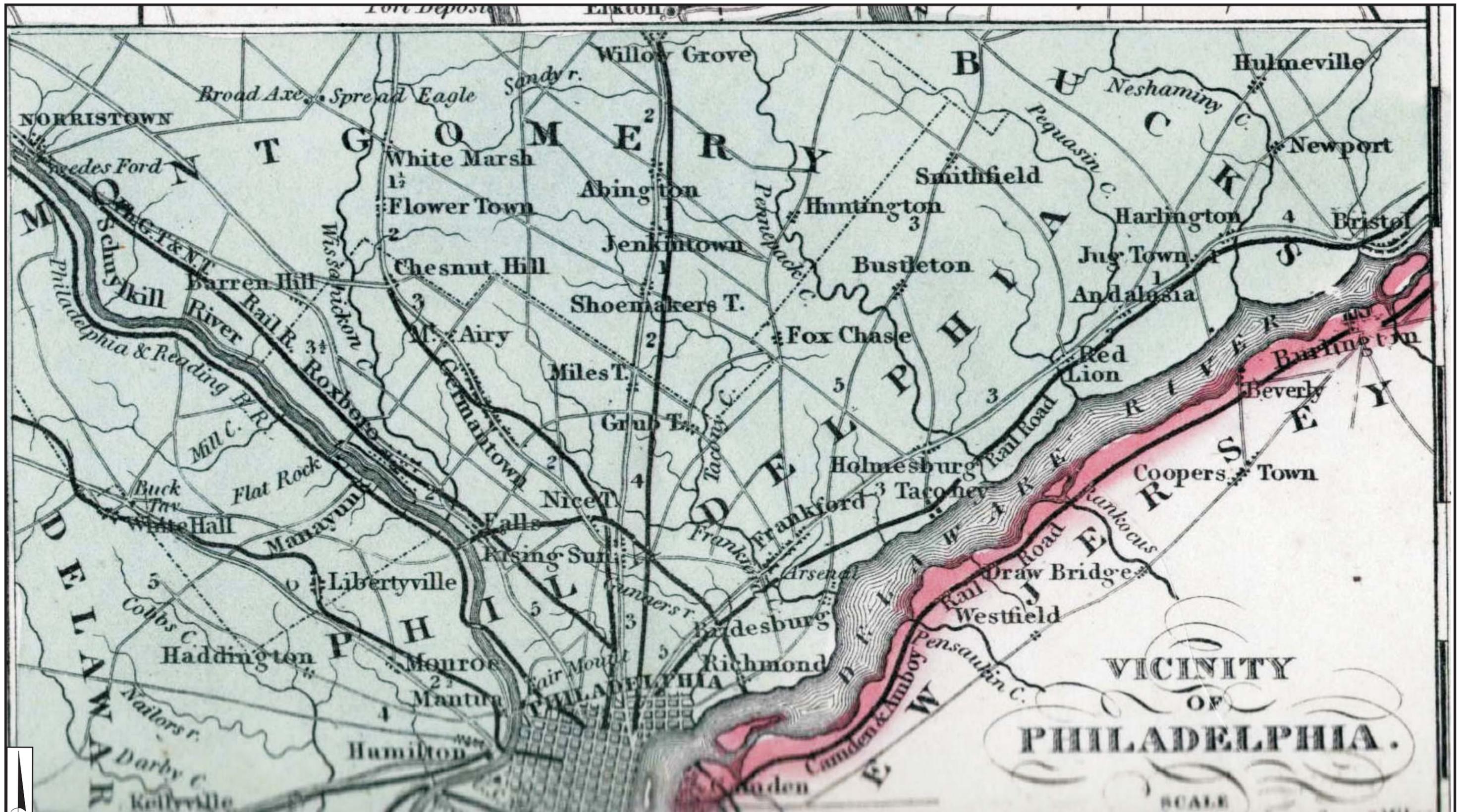
- ROADS
- RAILROADS

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ROAD AND HIGHWAY RESOURCES  
OF SOUTHEASTERN PENNSYLVANIA, 1681-1970  
**SOUTHEASTERN PENNSYLVANIA  
ROADS AND RAILROADS IN 1856**

SOURCE: YOUNG 1856

FIGURE - 13a



<b>LEGEND</b> ROADS RAILROADS	SKELLY and LOY Inc. CONSULTANTS IN ENVIRONMENT - ENERGY ENGINEERING - PLANNING	ROAD AND HIGHWAY RESOURCES OF SOUTHEASTERN PENNSYLVANIA, 1681-1970	SOURCE: YOUNG 1856
		<b>SOUTHEASTERN PENNSYLVANIA</b> DETAIL OF ROADS AND RAILROADS IN 1856	FIGURE - 13b

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railroad lines had expanded in Southeastern Pennsylvania since the 1830s. By 1880, Pennsylvania's railroads were part of a vast national system that could deliver coal and ship and receive goods to virtually any parts of the country. Freed from dependence on water power and the inefficiencies of moving large and heavy goods by canals or overland roads, industries grew up in all corners of the state. With new industries, small towns with rail connections grew into urban centers, and other smaller rail towns were founded overnight wherever a railroad company decided to place a depot, locomotive or railroad car shops, or switching yards (Lichtenstein & Associates 1999:12). Perhaps a measure of how important railroads had become in long distance travel is the fact that by the 1870s and 1880s it was difficult to find a statewide map of Pennsylvania that showed roads. Generally, the only transportation system shown was the railroads.

As it had been with the early road system and Main Line of Public Works, Philadelphia was the major hub in the state's railroad network. The Pennsylvania Railroad (PRR), the most important railroad in the Commonwealth, and one of the most significant in the nation between its chartering in 1846 and its demise in 1968, was headquartered in Philadelphia. By 1880, the PRR extended from New York City on the east to St. Louis and Chicago in the west. It had an enormous presence in Southeastern Pennsylvania. Its main line and branches operated in all five counties. Its main line west from Philadelphia roughly paralleled the Philadelphia and Lancaster Turnpike, passing through Media, Paoli, Downingtown, Coatesville, and Parkesburg. East of Philadelphia, the PRR paralleled the Bristol Pike and the west bank of the Delaware River between Philadelphia and Morrisville (Burgess and Kennedy 1949:241, 249; Lichtenstein & Associates 1999:12-14).

The Reading Railroad also had a substantial presence in Southeastern Pennsylvania. Opened in 1842 to transport coal from Pottsville to Philadelphia, the Reading's main line followed the east bank of the Schuylkill River until just north of Phoenixville, where it crossed to the west bank before crossing back at Port Kennedy and continuing through Bridgeport, Norristown, and Conshocken. Its leased line, the Wilmington & Northern, began in Birdsboro, Berks County, entered Chester County near Supplee, and wound through Coatesville, Embreeville, and Chadds Ford on its way to Wilmington (Lichtenstein Consulting Engineers 2000:41). The Reading's important route to New York Harbor passed through Neshaminy Falls, Woodbourne, and Yardley, and its North Penn Line connected Philadelphia with

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Bethlehem *via* Jenkintown, Glenside, Ambler, Lansdale, Perkasio, Rock Hill, and Quakertown. North Penn branches linked to Hatboro, Doylestown, Warminster, Ivyland, Wycombe, Buckingham, Lahaska, and New Hope (Auerbach and BCC 1979).

**Southeastern Pennsylvania Roads in the Canal and Railroad Eras**

The period between 1830 and 1880 is often referred to as the Farm to Market era in road histories, because roads chiefly functioned as a means for farmers in Pennsylvania’s rural counties to get goods to market or to a railroad station for shipment into the local, regional, or national markets. This designation diminishes the importance of roads during the period. Roads continued to be the primary means of reaching important community places, such as train depots, post offices, stores, grist and sawmills, blacksmith shops, houses of worship, schools, and local fraternal or Grange meetings, as well as neighboring farms and nearby towns. Local roads continued to be proposed and improved because farms were constantly being subdivided, new religious congregations were forming, new schools were being built, and new businesses were forming. The pace of local road construction was slower than in earlier periods, but new roads continued to be built and existing ones continued to be used.

Canals and railroads had a devastating effect, however, on long distance, trunk line turnpikes. The Main Line of Public Works cut the 30 day overland trip between Philadelphia to Pittsburgh to five to six days. When completed in 1852, the PRR’s main line cut it to as little as 15 hours. Canals reduced transportation costs by as much as 10 fold compared to turnpikes and railroads reduced them by a similar amount or more over canals. As a consequence, long distance traffic, the major source of turnpike revenue, quickly transferred to the newer forms of transportation (Durrenberger 1931:140). Lacking funds, turnpike maintenance was neglected and some turnpikes or parts of them became abandoned (Durrenberger 1931:142-143). The poorer-built turnpikes in the northern and northwestern portions of the state were the first to be abandoned (Durrenberger 1931:160).

The rise of canals and railroads, however, did not signal the demise of turnpikes. Surprisingly, the number of turnpikes chartered in the Mid-Atlantic between 1830 and 1860 actually exceeded the number chartered in the first three decades of the nineteenth century. Requests for turnpike charters continued to be made in Pennsylvania until about 1875. Most

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proposed mid-nineteenth turnpikes were short feeders to canal or rail heads (Durrenberger 1931:139-140, 154) or routes connecting two neighboring market towns. They generally improved existing roads and were championed by local merchants or professionals, who secured funding through subscription drives (Lichtenstein & Associates 1999:8). Canals and railroads did not replace the roads; rather, they supplemented and expanded upon the existing highway network. Canals and railroads “might have served as the nation’s transportation arteries, but roads were the capillaries that pumped life into many regional economic systems” (Jackson 1994:229).

For example, in Bucks County, the road from Willow Grove (Montgomery County) to Philadelphia was macadamized prior to 1846, as was the Easton Road (U.S. 611) northwest from Willow Grove to Doylestown in Bucks County. In 1848, the Hatboro and Warminster Pike was incorporated to improve York Road north from Willow Grove to Hatboro, a distance of approximately 4.5 miles. The improved, 45-foot-wide road contained a 20-foot-wide stone section that could better withstand punishment from wagon wheels (Turner 1909:566-567). Also chartered in 1848 was the Byberry and Bensalem Turnpike, which had a length of just over five miles (Davis 1905). The Hartsville and Centerville Turnpike, established in 1856, improved an 8.5 mile road between Warminster and Centerville and included a 16-foot-wide stone portion (Turner 1909:568-569). The six-mile long Buckingham and Doylestown Turnpike was completed in 1848 from Doyletown to Lahaska; the Lahaska and New Hope Turnpike was organized in 1853 to extend the improved road to the Delaware River (Turner 1909:572-574). Similarly, three separate turnpikes were chartered between Buckingham and Newtown: the 1859, 11-mile-long Centerville (now Buckingham) and Pineville Turnpike; the 1857 Richboro and Pineville Turnpike; and the Wrightstown and Newtown Turnpike (Kirk 1926:21-24). A turnpike was completed between Doylestown and Dublin (approximating SR 0313) in 1875 (Davis 1905).

The situation was much the same in Montgomery County. One history estimated that by 1884 Montgomery County had 200 miles of turnpike roads, constructed at a cost of upwards of two million dollars (Bean 1884:457). Among the turnpikes listed as constructed between the late 1840s and the 1860s are the Sumneytown and Springhouse in 1848; the five-mile-long Fox Chase and Huntingdon Valley, which was then extended to Richborough, Bucks County in 1850; the Conshohocken and Plymouth turnpike, completed in 1849 and extended another 7.5

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miles to a tavern on the Butler Road in 1855; the 12-mile-long Perkiomen and Sumneytown in 1849; the Hatboro and Warminster, 4.5 miles of the York Road, in 1850; the Bridgeport and King of Prussia, on State Road, in 1853; the Skippack Pike in 1854; the Limerick and Colebrookdale in 1855; the Willow Grove and Germantown, a plank road and turnpike in 1857; the Gerysville Pike and the Harleysville and Souderton Pike, both completed before 1866; the Harleysville and Ledarachsville in 1868; and the Norristown and Centre Square, also in 1868.

In Chester County, the Philadelphia-Chester Turnpike and the Philadelphia and Lancaster Pike were well-maintained and frequently traveled, although profits were marginal due to the loss of most of its long-distance freight traffic (Lichtenstein & Associates 1999:10). After 1873, sections of the Philadelphia and Lancaster Turnpike were sold off or abandoned (Durrenberger 1931:143). The West Chester and Wilmington Plank Road Company, organized in 1854, constructed a plank road from West Chester southwest to Dilworthtown. In 1858, it was converted to a macadamized road (Thomson 1898:499). According to one history, much of State Road in Bucks, Montgomery, and Chester counties was converted in the 1850s to a turnpike known as the Baltimore, Philadelphia, and New London Turnpike (Ashmead 1884:195).

Two roads in the above discussion are referred to as Plank Roads, which one history described as the “last desperate stand” of toll roads as a factor in transportation (Durrenberger 1931:144). Plank roads were generally existing roads or former turnpikes that were graded where necessary and then finished with a surface of wood planks. Plank roads were meant to serve as branch lines to other forms of transportation. Like turnpikes, they were built by private stock companies who charged tolls for their use. Their chief appeal was economy: plank roads could be built for half the cost of a macadamized road and one-quarter the cost of railroads. The Pennsylvania General Assembly passed a turnpike and plank road law in 1849; between then and 1857, the legislature chartered 315 companies. Most proposed roads were for less than 10 miles and only rarely did one exceed 30 miles. By law, they had to be at least 40 feet wide, although the entire width did not need to be planked. Grades were restricted to no more than three percent, meaning that portions of some existing turnpikes had to be re-aligned to meet this standard (Durrenberger 1931:144-148).

The Plank Road movement foundered on economics. Proponents contended the road surface would last ten years. In reality, planks resting on earth rarely lasted more than five

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years and became dangerous when holes developed. The cost of maintaining the roads became prohibitive. When the financial panic of 1857 hit the country, the plank road movement effectively died (Durrenberger 1931:150-151).

Most turnpikes in Pennsylvania were on their last legs by the 1870s. Maintenance took most of their capital and few paid noteworthy dividends. Under Pennsylvania law, turnpikes could be abandoned based on a majority vote by the turnpike company's stockholders, with maintenance and upkeep reverting to the townships or boroughs through which the roads passed. The trunk line turnpikes, which were generally operated by a number of different turnpike companies, gradually abandoned or sold their roads except for short stretches near cities and villages (Durrenberger 1931:160), where guaranteed traffic would result in tolls. For this reason, turnpikes would remain in Southeastern Pennsylvania until the early twentieth century. In 1903, most of Pennsylvania's remaining turnpike mileage was concentrated in just eight of Pennsylvania's 67 counties, including Bucks, Chester, and Montgomery (Durrenberger 1931:161).

Public sentiment was turning against toll roads. Pennsylvania was an industrial powerhouse and one of the wealthiest states in the nation. There was a growing belief that roads were a public utility that the state and its counties should be able to build and maintain them free of charge. Moreover, with roads providing predominantly short distance travel and railroads long distance routes, turnpike tolls placed their heaviest burden on farmers, their chief patrons and a politically important constituency. Consequently, in the late nineteenth century, the state began condemning turnpikes and "freeing" them for use by the public. The process involved a minimum of 25 taxpayers petitioning the Court of Quarter Sessions that it would be in the public interest that a road should be free of tolls. The court would then appoint five viewers to view the road, condemn it, and assess damages to the owners. Once the court confirmed the viewer's report, it became the county commissioners' duty to make the payments (Durrenberger 1931:161-164).

The turnpike condemnation process is a reminder that local road construction and maintenance remained the province of Pennsylvania's counties and townships. Even in the late nineteenth century, the provisions established under the Road Law of 1762 remained in place. Citizens wanting a new road or bridge would petitioned the Court of Quarter Sessions that the requested improvement was "greatly needed" in a particular locale. The court, as it had always

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done, appointed viewers to inspect the site and determine whether the improvement was indeed necessary. The viewers filed their report with the court, who decided whether the road or bridge should be built. If the court agreed, the road or bridge was confirmed (Lichtenstein & Associates 1999:31).

However, a number of subtle changes had been made in the process. As the nineteenth century progressed, county commissioners played a comparatively greater role in constructing and maintaining bridges, particularly long-span bridges. Bridges were expensive to build and the county had the ability to levy taxes and a duty to manage the county's budget. Once the court found that a bridge was necessary, it was common for the citizens to then petition the county commissioners to build and maintain the structure, rather than the township (Lichtenstein & Associates 1999:31-32).

A greater role was also being played by bridge fabrication companies, particularly during the last quarter of the nineteenth century. Great advancement had been made in metal truss bridge technology for long span bridges during the second half of the nineteenth century, often by the railroads or the bridge companies that built bridges for railroads. This technology began to be applied to road bridges as well beginning in the late 1850s. Bridge manufacturers or their agents would lobby township and county officials, hoping to have their firm selected to build one of their cast or wrought iron bridges (Lichtenstein & Associates 1999:5-6).

Early in the period, there was a great deal of experimentation with metal truss types, as foundrymen and engineers worked out details and means of transferring stresses among the members. Bridge companies would patent connection and fabrication details in a bid to build a better bridge—and to distinguish themselves from the competition. During the last quarter of the nineteenth century, however, a better understanding of engineering principles, improvements in metallurgy, and refinements in iron fabrication resulted in increasing use of standardized truss designs. The Pratt truss emerged as the most popular of the pin-connected truss configurations because of its simplicity of design and economy of fabrication (Lichtenstein & Associates 1999:6-7).

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**Bridges in the Canal and Railroad Era**

PennDOT’s Bridge Inventory and Evaluation identified 59 bridges remaining in Southeastern Pennsylvania from the period 1830-1880. The vast majority (47 of 59) were either stone arches or brick arches with stone spandrel walls and parapets. Four others were wood trusses originally constructed in the 1830s to carry roads over the Delaware Canal in Bucks County, and they represent important examples of wood truss technology. There were also eight examples of early metal girder and truss bridge technology. Only one is listed in the NRHP, a wrought iron lattice through girder bridge constructed in 1869. Six others were determined eligible for NRHP listing as a result of the project.

Additionally, there were 19 covered bridges built between 1830 and 1880. All were previously listed in the NRHP and therefore were not included in the bridge inventory project. Eleven were located in Bucks County (Zacher 1994:67-73), seven were found in Chester County, including one on the Chester/Delaware county line (Zacher 1994:74-79), and one was standing in Philadelphia’s Fairmount Park (Zacher 1994:85). These represent but a fraction of covered bridges that once were located in the region. Inspired by bridges like the Schuylkill River Permanent Bridge and the Colossus, craftsmen in Southeastern Pennsylvania copied and adapted the bridge designs for other, smaller stream crossings. Wood truss bridge technology proliferated in the mid-nineteenth century (Jackson 1994:214) and the bridges provided service until the late nineteenth and early twentieth centuries, when heavier and larger vehicles required that many be replaced.

Masonry arch bridges are overrepresented from this period in PennDOT’s bridge inventory because, as vehicles increased in size, they were able to continue to carry traffic to a greater extent than competing bridge technologies from this period, iron and wood truss bridges.

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**The Good Roads Movement and the Formative Years of Pennsylvania Department of Highways, 1880-1916**

With the exception of several hundred remaining miles of turnpikes and a number of private toll bridges, in the late nineteenth century all roads and bridges in Pennsylvania were built and maintained by county and municipal governments. Pennsylvania's more than 2,600 local governmental divisions operated under laws and local ordinances that provided counties, cities, boroughs, and first-class and second-class townships a varying degree of authority to levy road taxes and oversee the construction and maintenance of roads and bridges. Most rural areas still used local labor and materials to provide minimal upkeep to their highways (Lichtenstein & Associates 1999:28). As a consequence, most rural roads were poorly maintained dirt roads, deeply rutted from use, and often impassible during rainy seasons. Innumerable publications wrote of the poor condition of most rural roads in Pennsylvania, including Southeastern Pennsylvania, describing them as virtually (or actually) impassible in winter and spring (e.g., Clayton 1925:81). Heavy, steam-powered agricultural traction engines were also punishing the wood and light iron truss bridges that then predominated on the roads of Southeastern Pennsylvania (West Chester Daily Local News 1908). However, the United States was about to enter an era of unprecedented road construction and improvement that would profoundly affect transportation in Southeastern Pennsylvania and throughout the nation.

One major factor was the Good Roads Movement, a grassroots campaign to improve roads and bridges that began during the 1880s. Groups pushing for good roads were many and varied and included proponents of rural mail delivery, who sought to end rural isolation; the railroads, who wanted improved access to stations and depots; and especially bicycle enthusiasts. In 1887, the safety bicycle was introduced into the United States from England, creating a bicycle craze. By the mid-1890s, affluent city dwellers were buying more than one million per year. Cycling groups organized cross-country rallies, road races, and weekend excursions, and through these activities gained first-hand knowledge of the poor conditions of rural roads and the need to improve them. The League of American Wheelmen (LAW), an outspoken proponent and powerful political lobby, led the call for good roads (Lichtenstein & Associates 1999:25-26).

The Good Roads Movement was national in scope but was most active in and around urban areas in the northeastern United States, including Pennsylvania. Good road advocates promoted model road legislation calling for state aid for local roads. Advocates stressed that improved rural

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roads would raise land values, open new markets for farm products, provide greater access to manufactured goods, increase political participation by farmers, and improve education. The platform eventually drew the support of the Pennsylvania Grange and farmers cooperatives (Lichtenstein & Associates 1999:26).

After more than a decade of activism, in 1903, advocates finally succeeded in passing good roads legislation in Pennsylvania. The Road Law of 1903, also known as the Sproul-Roberts Act, sought to improve rural roadways on the Rural Free Delivery (RFD) system. The RFD system, begun by the federal government in 1896, provided direct mail service to farmers and other rural dwellers. By 1903, the RFD system had expanded to a program of more than 8,600 mail carriers traveling 200,000 miles a day and reaching almost five million people nationwide. The United States Post Office had ruled that RFD routes would be established only where roads and bridges were reasonably well-maintained and fit for travel. The Road Law of 1903 provided second-class townships<sup>1</sup> with state aid covering three-quarters of the cost of reconstructing roads on RFD routes. To administer the state aid, the law created the Pennsylvania Department of Highways. The PDH also approved all state-aid road work, hired engineers to provide technical expertise to township supervisors building the roads, and oversaw the maintenance of roads after improvements had been made. Routes to be improved would be selected based on petitions from the townships to the State Highway Commissioner. No state aid was available to counties, cities, boroughs, or first-class townships (Lichtenstein & Associates 1999:27-28).

**The Sproul Act of 1911**

By 1910, slightly less than 2,000 of the approximately 100,000 miles of roads in Pennsylvania had been improved with and without state aid. Only five counties, including Delaware and Montgomery in Southeastern Pennsylvania, reported more than 10 percent of their road mileage as improved, with an improved road defined as any road that at a minimum had been graded and covered with a semi-permanent earth or gravel surface. The state aid

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<sup>1</sup> In 1899, the Pennsylvania Legislature defined second-class townships as those having less than 300 persons per square mile. Supervisors of second-class townships were primarily concerned with maintaining roads and bridges. They could not pass ordinances, lay fines, or care for public health and safety (Lichtenstein & Associates 1999:27).

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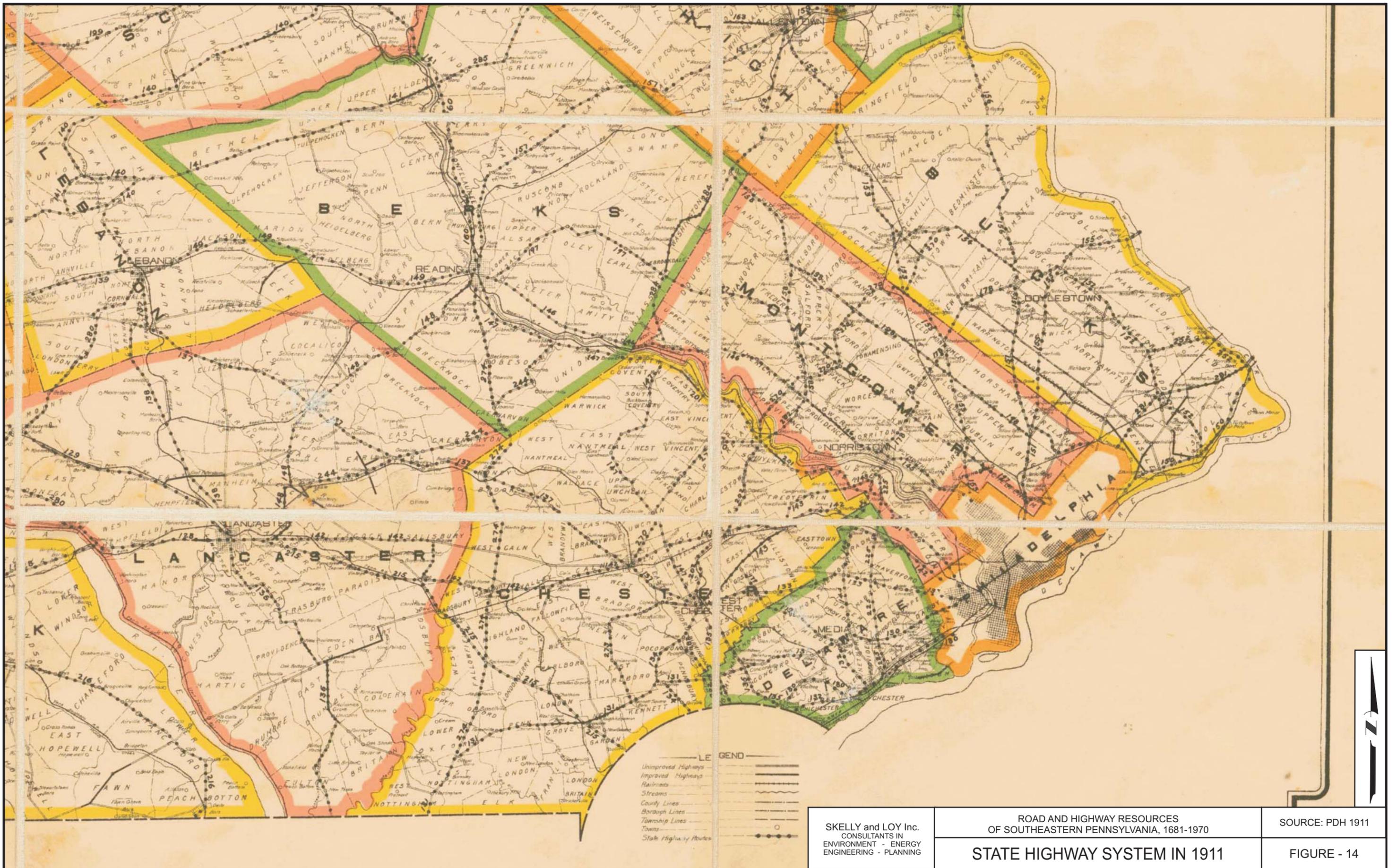
road program lacked coordinated planning efforts between the various townships, and the PDH had no control over which second-class townships chose to avail themselves of state aid (Lichtenstein & Associates 1999:37).

Unsatisfied with these results, state highway department engineers, good roads reformers, and automobile industry interests pressed forward a plan for an integrated system of state highways to connect Pennsylvania's county seats and principal cities and towns. Additional links would complete interstate, cross state, and through trunk lines. Roads designated as part of this proposed system would be taken over by the PDH and improved and maintained by its own personnel. In this manner, there would be greater coordination in road planning and construction, and the PDH would have greater control over where and how state funds were spent.

State Senator William C. Sproul of Chester, Delaware County, a long-time advocate of good roads, championed the cause, sponsoring a bill calling for the establishment of a State Highway System. Passed in 1911, the landmark Sproul Act reordered how roads were planned and constructed in Pennsylvania, taking authority for road construction and maintenance away from counties and townships, where it had rested since the founding of the colony, and transferring it to the state government. The law created a State Highway System comprising 296 specified routes and approximately 8,500 miles, which would be improved and maintained by the PDH. Eighty percent of those miles were unimproved dirt roads (Lichtenstein & Associates 1999:37). Figure 14 (PDH 1911) shows the State Highway System routes in Southeastern Pennsylvania.

Like the Road Act of 1903, the Sproul Act was designed primarily to assist rural counties and townships. State aid funding under the act was available only to second class townships. It was not permitted for use on roads within the boundaries of the state's approximately 700 cities, boroughs, and first-class townships. Thus, the PDH's activity was concentrated on the longer stretches of country roads and not on the shorter sections of the routes passing through more densely developed areas (Lichtenstein & Associates 1999:38).

In order to most efficiently administer the Sproul Act, the PDH reorganized and expanded, establishing 15 districts, each headed by an engineer who was in charge of all new road construction, including bridges, and maintenance in an area of several counties. The central office in Harrisburg functioned as a "management division" to establish department



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SOURCE: PDH 1911

STATE HIGHWAY SYSTEM IN 1911

FIGURE - 14

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policy, set engineering standards, and provide operational support to the districts (Lichtenstein & Associates 1999:38).

The PDH issued standard plans to the district engineers for the construction of bridges on the state routes. District engineers were encouraged to use the standard plans whenever practicable, but the final choice of bridge type and design was left to the engineer, due to their knowledge of local conditions. Pre-1919 specifications for bridges on Pennsylvania state highway routes were for short-span structures, most measuring under 30 feet in length. For bridges in the 20 to 30 foot range, the two preferred bridge types were encased steel stringers and reinforced-concrete T-beams, with concrete arches also an option where sufficient vertical clearance was available. When replacing existing bridges, district engineers were encouraged to reuse old stone abutments if "of good square stone, well laid," otherwise abutments and piers were to be rebuilt with concrete. When longer bridges were required, district engineers were encouraged to submit the plans to the state bridge engineer for approval (Lichtenstein & Associates 1999:38-39).

The State Highway System was increased by 1,200 miles to a total of 9,700 miles of roadway in 1913. The task of improving the State Highway System was enormously expensive. PDH administrators regularly noted that they lacked the necessary capital to improve all of the designated state highway routes. Much of the department's funding was being used to maintain earth- and stone-surfaced roads with little left over to upgrade the routes to the "permanent" bituminous- or concrete-surfaced highways and concrete or steel bridges that the department's engineers desired (Lichtenstein & Associates 1999:39). As a consequence, bridge building by the PDH was limited following the passage of the Sproul Act (PDH 1918:15). In some cases, counties provided funding so portions of the State Highway System within their boundaries could be improved. In many cases, the counties floated bonds in order to obtain the necessary funding (PDH 1918:14). For example, the PDH's report for the years 1914-1917 noted that Chester and Delaware counties contributed \$70,000 toward construction of a "modern highway" between Wawa, Delaware County to the Maryland state line by way of Oxford, Chester County (PDH 1918:13), a distance of nearly 40 miles. This was an early improvement on the predecessor of U.S. 1.

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**The Lincoln Highway and Other Tourist Trails in Southeastern Pennsylvania**

In the early twentieth century, the Good Roads Movement was in part aided by and a reaction to the growing use of the automobile. As automobile ownership increased the concept of personalized long distance travel grew along with it, as did the need for accurate road maps to other cities and tourist destinations. This need was often met by trail associations, which promoted travel on specified routes or “trails” that generally linked major cities and attractions. Tourist trails utilized existing roads, which they marked and described in informational books and brochures for the convenience of travelers. Tourist trails usually crossed through several states.

The most famous trail association was the Lincoln Highway Association, founded in 1913 to promote a paved coast-to-coast route from New York to San Francisco. The Lincoln Highway Association was backed by wealthy automobile and automobile parts manufacturers Henry Joy of Packard Motor Car Company and Carl Fisher of the Prest-O-Lite Company, a headlight maker. Although they began with the intention of paving the entire route, the astronomical cost of the venture soon led them to pave only a few short demonstration sections and concentrate their efforts on promotion. The Lincoln Highway Association successfully promoted the idea of long-distance road travel to the nation and it spawned numerous imitators. By 1924, at least 250 marked trails crisscrossed the United States (Lichtenstein & Associates 1999:40-41).

In Pennsylvania, tourist trail association primarily promoted automobile tourism through printed materials such as maps and magazines. Following the model used by the Lincoln Highway Association, they also recruited businessmen to advertise roadside fuel, food, lodging, and automobile repair shops. The PDH had already undertaken the job of identifying and mapping Pennsylvania’s automobile routes as part of establishing the State Highway System in 1911. The trail associations merely adopted the PDH’s numerically designated state routes and promoting them along with the name of their particular trail. In other states, where state highway departments had yet to be formed or were in the earliest stages of development, trail associations played a much more active role, often being the first organizations to designate cross-state automobile routes (Lichtenstein & Associates 1999:42).

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A number of tourist trails passed through Southeastern Pennsylvania. The Lincoln Highway followed U.S. Route 1, entering Bucks County from New Jersey at Morrisville. West of Philadelphia, the Lincoln Highway followed the predecessor to U.S. 30 west through Delaware and Chester counties on its way to Pittsburgh. The Lincoln Highway Association promoted the Pennsylvania portion as one of the best maintained cross-state highways in the nation (Lichtenstein & Associates 1999:41).

The Lackawanna Trail, established in 1917, followed State Route (SR) 2 (predecessor to U.S. 611) between Philadelphia and Easton on its way to Binghamton, New York. It was used as a route between Philadelphia and summer resorts in the Poconos. North of Scranton, it followed the former main line of the Delaware, Lackawanna & Western Railroad. That portion of the road was one of the first federal-aid projects in Pennsylvania (Lichtenstein & Associates 1999:70-71).

A branch of the William Penn Highway, the predecessor to U.S. 422, ran between Philadelphia and Reading by way of Conshohocken, Norristown, and Pottstown. The road also was used by a second tourist trail, the Ben Franklin Highway. The main line of the William Penn Highway followed SR 3 between Easton and Pittsburgh (Lichtenstein & Associates 1999:71, 76).

SR 12 was also known as the Baltimore Pike. It followed the predecessor to U.S. 1 from the Maryland border to Philadelphia by way of Oxford and Kennett Square in Chester County and Media in Delaware County (Lichtenstein & Associates 1999:76).

**Rail-Based Transportation and Development in the Late Nineteenth and Early Twentieth Centuries**

Concomitant with the Good Roads Movement and the passage of the Road Act of 1903 and the Sproul Act were other transportation trends that would directly affect road and bridge construction in Southeastern Pennsylvania. Beginning in the late nineteenth century, commuter railroad lines and streetcar car routes dispersed population away from center city Philadelphia to an expanded residential zone of more distant neighborhoods and nearby suburbs. The many railroads that serviced Philadelphia started the movement in the last quarter of the nineteenth century, allowing primarily the upper class to escape the city for “country estates.” Among the

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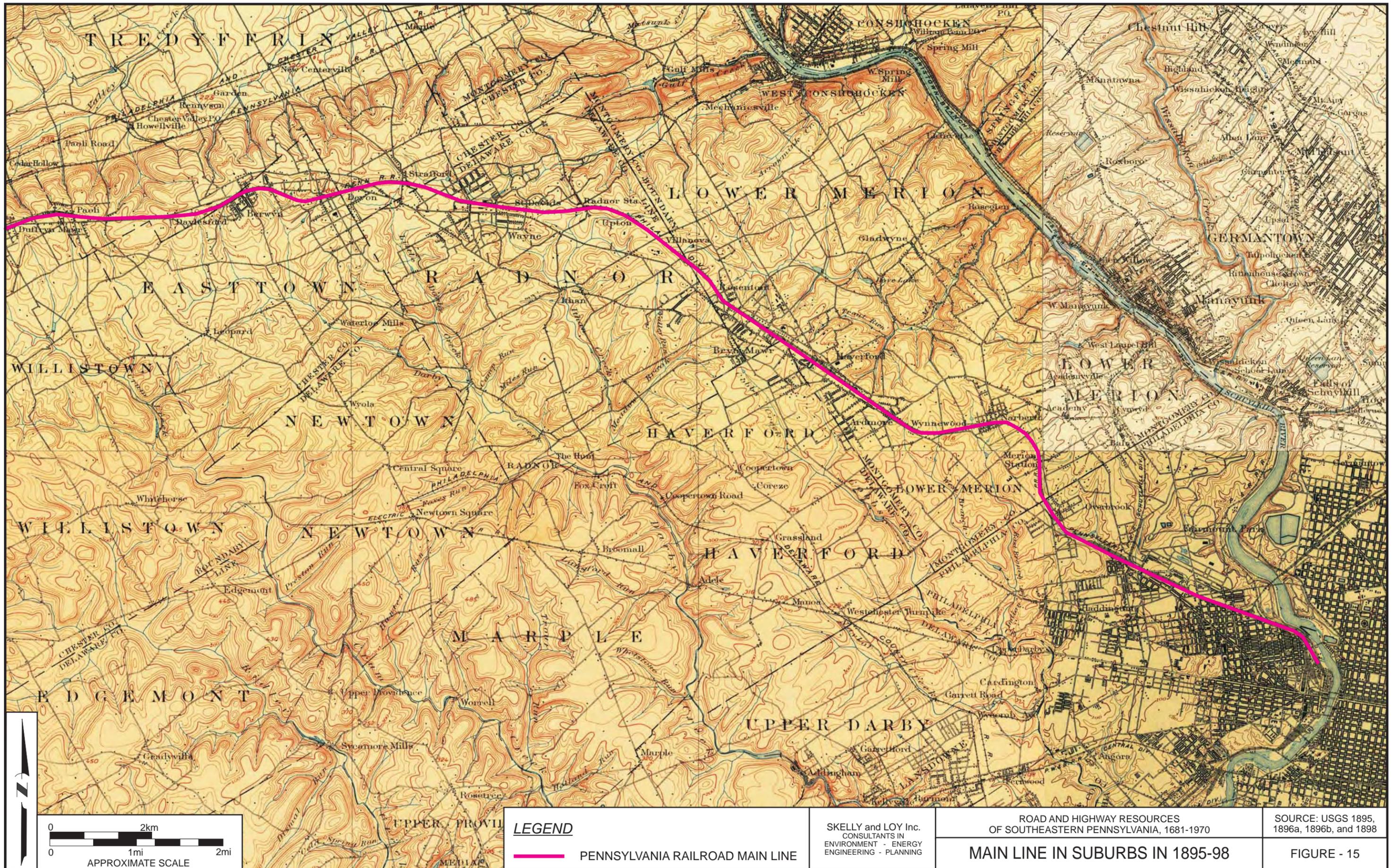
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best known of Southeastern Pennsylvania’s nineteenth century railroad suburbs were the communities along the PRR’s main line west of Philadelphia in Delaware, Montgomery, and Chester counties, a route which largely paralleled the Philadelphia and Lancaster Turnpike (Ames and McClelland 2002:16). Communities that were either founded or expanded along the main line included Merion, Ardmore, Radnor, Wayne, Strafford, Devon, Berwyn, Daylesford, Paoli, and Malvern (Figure 15; United States Geological Survey [USGS] 1895, 1896a, 1896b, and 1898). In Montgomery and Bucks counties, early railroad suburbs along the Reading Railroad included Jenkintown, Ambler, Langhorne Manor, and Ivyland Borough (Auerbach and BCC 1979).

The more affordable electric streetcar and interurban lines allowed middle class as well as upper class professionals to live outside the city. Horse-drawn streetcar operations began in Philadelphia in the late 1850s. In 1892, the Philadelphia Traction Company opened the first electric streetcar line. By 1917, 38 streetcar companies operated more than 2,000 miles of track in Southeastern Pennsylvania. Streetcar lines connected Philadelphia to the other county seats in Southeastern Pennsylvania, as well as to Allentown, Easton, Lancaster, Harrisburg, and Delaware Water Gap (Springirth 2008:11).

Streetcar lines allowed people to travel in 10 minutes the same distance they could walk in 30 minutes. They transformed land use development patterns in Southeastern Pennsylvania, making possible a greater radial outward growth from Philadelphia. Streetcars created a tremendous expansion of the suburbs, with the northern reaches of Philadelphia County and the portions of Bucks, Delaware, and Montgomery counties in close proximity to the city all experiencing population increases with the advent and development of streetcar lines. Within just a few years of their founding in the 1892, electric streetcars connected Philadelphia with boroughs, villages, and newly-founded suburbs in the surrounding counties. Growth occurred first in outlying rural villages and then along the residential corridors created by the streetcar routes (Ames and McClelland 2002:18). For example, Bristol’s population nearly tripled between 1870 and 1910 as both railroad and streetcar lines connected it to Philadelphia, and industrial concerns began moving into Lower Bucks (O’Bannon *et al.* 1995:10). Streetcar lines were a preferred mode of commuter travel for many years due to their convenience, speed, comfort, and timeliness (DVRPC 1997:12-13).



**LEGEND**

 PENNSYLVANIA RAILROAD MAIN LINE

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ENGINEERING - PLANNING

ROAD AND HIGHWAY RESOURCES  
OF SOUTHEASTERN PENNSYLVANIA, 1681-1970  
**MAIN LINE IN SUBURBS IN 1895-98**

SOURCE: USGS 1895,  
1896a, 1896b, and 1898  
**FIGURE - 15**

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Streetcar lines were operated by private companies and they usually utilized existing roads and streets to carry their tracks. Electrified streetcars carried predominantly passengers but they also hauled freight. They were powered by heavy traction motors set over axles, a weight load that challenged area roads and bridges.

The following are some of the more important streetcar lines in Southeastern Pennsylvania during the late nineteenth and early twentieth centuries:

- The Philadelphia and Bristol Passenger Railway Company began operations in 1897. It reorganized in 1909 as the Trenton, Bristol & Philadelphia Street Railway and provided service between Philadelphia, Bristol, Morrisville, and Trenton. Buses replaced streetcars in 1931 (Springirth 2008:7).
- The Newtown Electric Street Railway Company began streetcar service between Langhorne and Newton and extended service from Newtown to Bristol via Hulmeville in 1899. The line was extended to Doylestown the following year. In 1917, it became known as the Pennsylvania – New Jersey Railway Company. There were also branches from Newtown to Yardley and from Yardley to both Lambertville, New Jersey and to Morrisville and Trenton. The service between Bristol to Doylestown was abandoned in 1923 and from Newtown to Yardley and Lambertville the following year. The branch to Morrisville and Trenton hung on until 1934 (Springirth 2008:7).
- Philadelphia Rapid Transit offered service from Philadelphia to Doylestown via Willow Grove. At Doylestown, passengers could transfer to the Philadelphia & Easton Electric Railway Company, which began service in 1904 between Doylestown and Easton, Northampton County. It faced no direct competition from a railroad and thus was fairly successful providing a portion of the route to the Delaware Water Gap. The company was reorganized as the Philadelphia and Easton Transit Company in 1921. Service ended in 1926 (Springirth 2008:8).
- Lehigh Valley Transit began operating an interurban line from the Chestnut Hill section of Philadelphia via Lansdale, Montgomery County to Bethlehem in 1903. The line passed through the towns of Sellersville, Perkasio, and Quakertown, with a branch line to Richland. In 1912, a more direct connection to Philadelphia was built, the Philadelphia & Western Railway, which passed through Norristown. Norristown to Bethlehem service lasted until 1951 (Springirth 2008:8).
- Norristown was also serviced by the Reading Transit & Light Company, which offered service south to Conshohocken and north to Trappe and Pottstown in Montgomery County and Boyertown and Reading in Berks County. The company was founded in 1893 to electrify Reading's horse-drawn lines (Springirth 2008:8).

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- The Philadelphia & West Chester Traction Company was described by one history as “the most aggressive developer” of streetcar car lines in Southeastern Pennsylvania. In 1899, it had built a streetcar line from Philadelphia to West Chester (Jones 2011). It also subsidized the construction of the 69<sup>th</sup> Street Terminal in suburban Upper Darby, Delaware County, which became a transfer point for numerous streetcar lines (Oberman and Kozakowski 1976:61).
- Heading west from West Chester, the West Chester Street Railway Company connected to Coatesville; from there, the Conestoga Traction Company went to Lancaster (Springirth 2008:9).
- In 1923 the West Chester Street Railway Company took over a branch from Kennett Square to Avondale and West Grove and a second connection to Wilmington, Delaware. The company ended operations in 1929 (Springirth 2008:9).
- The Montgomery and Chester Electric Railway began service between Phoenixville and Spring City in 1898 (Schooler 1980:20). The Phoenixville, Valley Forge & Strafford Electric Railway Company offered service from Phoenixville to Valley Forge in 1912 and to Strafford in the following year. It ceased operations in 1924 (Springirth 2008:9).
- In Phoenixville, the Montgomery and Chester Electric Railway Company opened a line to Spring City in 1899. Service ended in 1924 (Springirth 2008:9).

**Bridges During the Good Roads and Pennsylvania Department of Highways Era**

In general, roads and bridges were better in cities during the period 1880-1916, in part because they often had professionally-trained engineers overseeing transportation development efforts and a tax base that made funding the improvements possible. For example, Philadelphia created the Department of the Chief Engineer and Surveyor in 1863 to approve all plans for streets, bridges, sewers, and other public works projects, such as eliminating or improving railroad grade crossings. In 1887, Philadelphia's city government combined the street, sewer, and water departments into a single Department of Public Works headed by the city's chief engineer, who emphasized planning, economy, and business-like management of public works. Philadelphia bridge engineers usually worked with the streets department and designed their bridges in conjunction with projects to pave and widen city streets.

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By the late 1890s, city and some county engineers increasingly were influenced by the City Beautiful Movement. In the City Beautiful Movement, Progressive reformers sought to inspire moral and civic virtue through grand and monumental architecture and meticulously planned communities. The rehabilitating influence of a clean, orderly environment was intended to correct urban decay and elevate citizens. In transportation, the City Beautiful Movement embraced parks and parkways, wide boulevards, and monumental and aesthetically pleasing bridges, particularly reinforced concrete arch bridges. Ideally, the transportation improvements would be part of urban master plans devised along with other civic improvements, such as sewer and water systems, public transit, and new residential, commercial, and entertainment districts (Lichtenstein & Associates 1999:28; Ricketts 2006).

Philadelphia embraced the City Beautiful Movement, moving into the forefront of American road and bridge building practice, both in terms of the application of new materials like concrete and reinforced concrete and with an emphasis on bridge aesthetics. George S. Webster, Philadelphia's Chief Engineer from 1894 to 1909, and Bridge Engineer H. H. Quimby oversaw the design of a number of important city bridges beginning with the Falls Bridge over the Schuylkill River (1894-95), a pin-connected K-truss bridge originally intended to carry a second deck as part of a streetcar line through Fairmount Park. By the first decade of the twentieth century, Webster had introduced concrete and reinforced-concrete arch bridges, reporting that they were particularly well-suited to the new suburbs where the ornamental balustrades, textured spandrel walls, and scored abutments and piers produced "an attractive outline in harmony with the surroundings." An early example of a reinforced concrete arch bridge was the 1904 Frankford Avenue Bridge over Poquessing Creek. In 1908 Webster capped his career with the city public works department with the construction of the Walnut Lane Bridge over Wissahickon Creek in Fairmount Park, a massed concrete open-spandrel arch bridge (Lichtenstein & Associates 1999:28-29).

Outside urban areas, counties were less likely to employ trained civil engineers. Recognizing this and the expense involved in building bridges, especially large bridges, the state passed various legislation to assist the counties. In 1895 the Pennsylvania legislature passed Act 101, which provided assistance in rebuilding county bridges destroyed by fire, flood, or other natural disasters. Counties requesting assistance petitioned the Court of Common Pleas of Dauphin County (the location of Harrisburg, the state capital), stating that the bridge

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had been destroyed by flood, fire, or other casualty, and providing the estimated cost of replacing the bridge. The court would appoint five viewers, who would visit the location of the destroyed bridge and recommend, among other things, the cost and needs of the planned bridge for both travelers and local residents. If the majority of the viewers favored rebuilding the bridge and the court agreed, a state government agency called the Board of Public Grounds and Buildings was to “immediately...proceed and have prepared in conformity with the report of the viewers such plans and specifications of the proposed bridge as may be necessary.” After advertising for bids, the board was to “proceed to let the contract for the rebuilding of such bridge to the lowest and best bidder, and on behalf of the Commonwealth enter into the contract for the same.” The state government would then pay for the bridge, which the county would then be responsible for maintaining (Commonwealth of Pennsylvania 1895:129-133; Harshbarger 2010).

After the legislature created the PDH in 1903, the new state agency took steps to ensure that information concerning good road and bridge building practices was reaching local governments. This included disseminating information of road and bridge building and using best practices to construct “object lesson roads” in conjunction with the federal Office of Public Roads (later the Bureau of Public Roads [BPR]). In 1908, the PDH established the state's first standard bridge designs, specifications for smaller culvert and drainage structures from 4 feet to 20 feet long, typical of those used on township roads that were improved with state aid. The 20-foot-long bridges were encased steel stringer bridges with the deck slab poured to the bottom of the beam flanges. Townships were urged to contact the PDH for special assistance with bridges longer than 20 feet, including encased steel stringer, thru girder, and truss bridges, and reinforced concrete arch, slab, and T-beam bridges. Just prior to America’s entry into World War I the PDH released the first standard designs for these bridge types. The PDH’s chief bridge engineer advocated that all bridge construction be supervised by an engineer or experienced foreman because the selection of bridge type and design were dependent on local conditions and knowledge of the cost of material and labor (Lichtenstein & Associates 1999:36-37).

The Sproul Act of 1911 required the PDH to take over certain township roads but not county-owned bridges on those same routes. Because the counties owned most of the longer bridges in the more populous sections of the state, including Philadelphia and its surrounding

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counties, the PDH did not for some years take direct responsibility for a large number of long-span bridges. Bridge maintenance and replacement remained the responsibilities of the counties, although the PDH played an advisory role and offered state aid to the counties that owned and maintained bridges on the state routes. The PDH also had only a supervisory role over bridges on township-controlled roads. The PDH bridge unit focused its efforts on replacing short span bridges and culverts on the State Highway System and designing bridges for locations such as fords, ferries, at-grade railroad crossings, and highways on new alignments where no bridges had existed before (Lichtenstein & Associates 1999:38).

Spurred by the growth of streetcar lines and automobile traffic, as well as by the funding available under the Road Law of 1903 and the Sproul Act of 1911, many Pennsylvania counties began replacing older wooden bridges, stone bridges, and light metal trusses. Some Pennsylvania counties began appointing or electing county engineers to oversee local road and bridge construction, a process that had historically been managed by township supervisors or county commissioners. County engineers were most likely to be employed in counties with urban areas within their boundaries or those with larger populations and wealth that could afford higher property tax rates and more extensive road and bridge construction programs (Lichtenstein & Associates 1999:30). There was no guarantee, however, that these appointed or elected officials were trained civil engineers.

**Bucks County Engineers**

The first designated Bucks County Engineer, A. Oscar Martin, was an architect by training, having entered Drexel Institute in 1892. After graduation, he spent nearly three years in the offices of prominent architects in New York City, Philadelphia, and Buffalo before returning to his hometown of Doylestown. Precisely when he became Bucks County engineer is unclear. A biographical sketch of him, completed in 1905, makes no mention of it (Davis 1905), and the populations census between 1900 and 1930 listed his occupation as architect (U.S. Census 1900a, 1910a, 1920a, and 1930a). Most likely, Martin became county engineer around 1906, the date of the earliest bridge plan by him in the collection of the Bucks County Historical Society (BCHS) (BCHS 2012). Bucks County engineer may have been a part-time occupation. Although censuses listed his occupation as architect, *Engineering and Contracting*

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magazine in 1917 and his draft card in 1918 (Ancestry.com 2012) referred to Martin as county engineer. According to a local historian, Martin served as Bucks County engineer until 1923 (Auerbach 2011).

PennDOT’s Statewide Inventory and Evaluation of Historic Highway Bridges, completed between 1996 and 1999, identified 34 extant bridges as designed by the county engineer, ranging in date from 1907 to 1938. Twenty-one of the bridges date before 1924 and presumably were designed by Martin. Martin was an early proponent in Southeastern Pennsylvania of using reinforced concrete for bridges. Extant bridges in Bucks County designed by Martin included reinforced concrete arches, T-beams, slabs, and deck girders. They were used to replace wood bridges and light iron trusses (Trenton Evening Times 1914). Many of the bridges featured metal pipe railings, a common bridge railing at the time. Due to the early use of and experimentation with reinforced concrete bridge technologies, a number of Martin’s early bridges were determined eligible for NRHP listing during the bridge inventory. The same is true for a 1910 encased steel stringer bridge determined NRHP eligible as an early example of its type. By the late 1910s and early 1920s, however, Martin’s designs largely reflected common bridge types and designs of the era.

Martin was apparently succeeded as county engineer by Fred McPeek, a contractor from Riegelsville. It is not known how long he served or who succeeded him.

**Chester County Engineers**

The first person designated county engineer in Chester County was Nathan R. Rambo. Rambo was not educated or trained as a civil or structural engineer. Born in 1869 and educated in West Chester public schools, he began training with Chester County Surveyor Walter A. MacDonald in the late nineteenth century, eventually becoming his chief assistant. MacDonald died in office in 1904 and Rambo was appointed to fill his term. Rambo was re-elected county surveyor five times and served until 1919 (Dorchester 2009), when he was replaced by a professional engineer.

Rambo’s obituary credited him with planning and building 85 bridges in Chester County (West Chester Daily Local News 1952). PennDOT’s Statewide Inventory and Evaluation of Historic Highway Bridges identified 52 bridges attributed to him, the earliest from 1901 and the

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latest from 1919. Thirteen had previously been listed in or determined eligible for NRHP listing. Bridge plaques identified him as “County Engineer,” but it is not clear if he actually designed the bridges or merely oversaw the letting and building of the structures by contractors. He is perhaps best known locally for his association with masonry arch bridges. The bridge inventory identified 16 stone arch bridges plus seven brick arches with stone parapet walls, a total of 23 bridges, built during his tenure in office. Of the 14 bridges attributed to him from the first decade of the twentieth century (1901-1910), 10 were either stone or brick arches with stone parapets.

Interestingly, the choice of stone for bridges may not have originated with Rambo. As early as 1894, the Chester County Board of Commissioners considered erecting masonry bridges, because they were “the most substantial and in the long run [were] the cheapest” (West Chester Daily Local News 1894). The sentiment was reiterated at least twice in the early twentieth century. In 1901 it was reported, “After the county has tried all sorts of experiments with bridges in recent years, building of iron and timber, there is a tendency in the board toward returning to the old style of stone arch.” The limiting factor was that “not many men in these days know how to build a bridge of common stone” (West Chester Daily Local News 1901). Similarly, in 1907, it was noted that “There is in this Board a sentiment in favor of stone arch bridges, which will last forever and require no paint” (West Chester Daily Local News 1907). A year later, an unidentified commissioner noted that “the day of wooden or even iron bridges [was] over” in Chester County (West Chester Daily Local News 1908).

According to the West Chester press, elements of the Chester County government were wary of reinforced concrete bridges, which architects and bridge builders bidding on bridge projects were pushing. However, those bridge types had “not yet had time to demonstrate fully their durability against heavy travel and the elements” (West Chester Daily Local News 1908). This wariness may have extended to Rambo and could explain why only one extant bridge from Rambo’s tenure as County Surveyor, an arch from 1908, was constructed of reinforced concrete.

Eventually Chester County began building concrete encased steel stringer bridges and steel stringer bridges with concrete jack arches (West Chester Daily Local News 1917a and 1917b). At the time of PennDOT’s bridge inventory, there were 12 remaining steel stringer bridges with concrete jack arches built during Rambo’s tenure, the second highest total after

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stone arch bridges; there were also eight encased steel stringers. These bridges date mainly from the 1910s, after steel rolling technology had advanced to the point where it was possible to design longer steel beams. There were also eight extant steel girder bridges from Rambo's tenure, the earliest dating to 1907 and the latest to 1915. These bridges were examples of common bridge types being recommended by the PDH during this period. In all cases, the steel bridges had stone substructures. There could be a number of reasons for this. Rambo was clearly comfortable with stone and he may simply have preferred it. It could also be because the material was locally available and familiar to the contractors who had been awarded the substructure work, or it could be in keeping with PDH guidance to re-use stone abutments if they were "of good square stone, well laid" (Lichtenstein & Associates 1999:38-39).

**Delaware County Engineers**

Delaware County seems to have hired civil engineers on a project-by-project basis for road and bridge work in the early twentieth century. Among the longest serving was Albert Foster Damon, Jr., who received a Civil Engineering degree from Penn State in 1894 and who worked throughout the Greater Philadelphia area (Damon 2013). Others included H. H. Quimby, a bridge engineer with the City of Philadelphia and James B. Long (Delaware County Commissioners 1912-1917). No remaining bridges from prior to 1916 were attributed to the county engineer during PennDOT's Historic Highway Bridge Inventory and Evaluation.

**Montgomery County Engineers**

Montgomery County retained the services of a professional county engineer since at least the early twentieth century. In January 1903 the Montgomery County Commissioners appointed John H. Dager as county engineer (Montgomery County Commissioners 1905). Dager appears to have worked on a project basis. His appointment specified that he would be paid five dollars per day when employed plus expenses. That his situation was different from those called county engineers in other counties is made clear in the commissioners' minutes of January 2, 1905, when it was noted that Dager would receive a salary of five dollars per day

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and expenses when employed, “except on intercounty work that is to be paid same as is paid by the other counties” (Montgomery County Commissioners 1905). Dager apparently was a trained engineer. The 1880 census contains the first reference to him as a “civil engineer” (U.S. Census 1880:16), an occupation listed in many subsequent censuses and city directories. According to the 1910 census, he was self-employed (U.S. Census 1910b:13B). This is consistent with the commissioners’ minutes, which does not list Dager as county engineer after 1908-1909 and which indicate that the county used a number of men as consulting engineers during the 1910s (Montgomery County Commissioners Minutes 1909, 1915-1920).

Only two bridges attributed to the county engineer and built prior to 1917 were identified in PennDOT’s Historic Highway Bridge Inventory and Evaluation. One is a short, undistinguished stone arch bridge. The second is a two span, reinforced concrete arch from 1915. Neither was determined eligible for NRHP listing.

**Philadelphia City Engineers**

In contrast to the other counties in Southeastern Pennsylvania, Philadelphia employed trained civil engineers to design roads and bridges beginning in the late nineteenth century. Philadelphia’s George S. Webster was born in 1855. He received his early education from the Friends Select School in Philadelphia, then was awarded a Bachelor of Science from the University of Pennsylvania in 1875, and a Sc.D. from Penn in 1910. Webster served in the engineering corps for the 1876 Centennial Exposition held in Philadelphia, then became assistant engineer for the U.S. Coast and Geodetic Survey from 1876 to 1877. Later in 1877 he began his employment with the city of Philadelphia, beginning as assistant engineer and extending until 1921, by which time he was chief engineer and president of the board of surveyors. In his city roles he designed many noteworthy bridges, including the concrete bridge over Wissahickon Creek and both the Gray’s Ferry Bridge and the Passyunk Avenue Bridge over the Schuylkill River. In addition, he designed and built the first sewage treatment plant in Philadelphia in 1908 and was a member of the Board of Engineers for the Delaware River Bridge Joint Commission (Tatman 2013).

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City bridge engineer H.H. Quimby was born in 1858. At the time of the 1880 census, Quimby was working as a draftsman in Phoenixville (U.S. Census 1880a:16). The 1900 census listed him as a civil engineer living in Upper Providence Township, Montgomery County (U.S. Census 1900b:269A). By 1910 he was clearly working for the city of Philadelphia (U.S. Census 1910c:4A), and in 1915 Quimby was the chief engineer for the city's Department of Rapid Transit (Lehigh University 1915:1).

**The Golden Age of Pennsylvania Highway Construction, 1916-1941**

As the twentieth century progressed, the number of automobiles utilizing Pennsylvania's roads exploded. In 1911, when the Sproul Act was passed, there were 10,000 registered motor vehicles in Pennsylvania. Ten years later, that number had grown to more than 700,000 (Public Works 1921:390); only three states had more registered cars (Clayton 1925:94). The automobile, which had begun in the 1880s as "an impractical curiosity" of the rich, was seen as an indispensable necessity by most Americans in 1920 (Lichtenstein & Associates 1999:21). The automobile revolution affected all aspects of American life, including settlement patterns. To an even greater extent than rail-based transportation, the automobile dispersed residential development to the peripheries of America's cities. Residential developments no longer needed to be sited along railroad or streetcar lines. Businesses and warehouses could move away from the center city and railroad corridors, as rubber tired trucks could haul freight.

The rise in automobile ownership and use overwhelmed Pennsylvania's roads and, indeed, roads throughout the country. The automobile's popularity created a need for better designed, engineered, and finished roads, bridges, and tunnels (Ames and McClelland 2002:22). The federal agency in charge of road construction, the BPR, became increasingly frustrated over the slow progress in highway building throughout the country. The solution, it was felt, was federal legislation that would create a uniform highway policy and funding system. The result was the landmark Federal-Aid Road Act of 1916.

The Federal-Aid Road Act of 1916 provided \$75 million in federal money for roads and bridges, to be matched on a dollar-for-dollar basis by the states. Funds were to be apportioned among the states on the basis of population and total mileage of postal department certified roads. Federal aid road and bridge projects had to be initiated and supervised by state highway department officials, a

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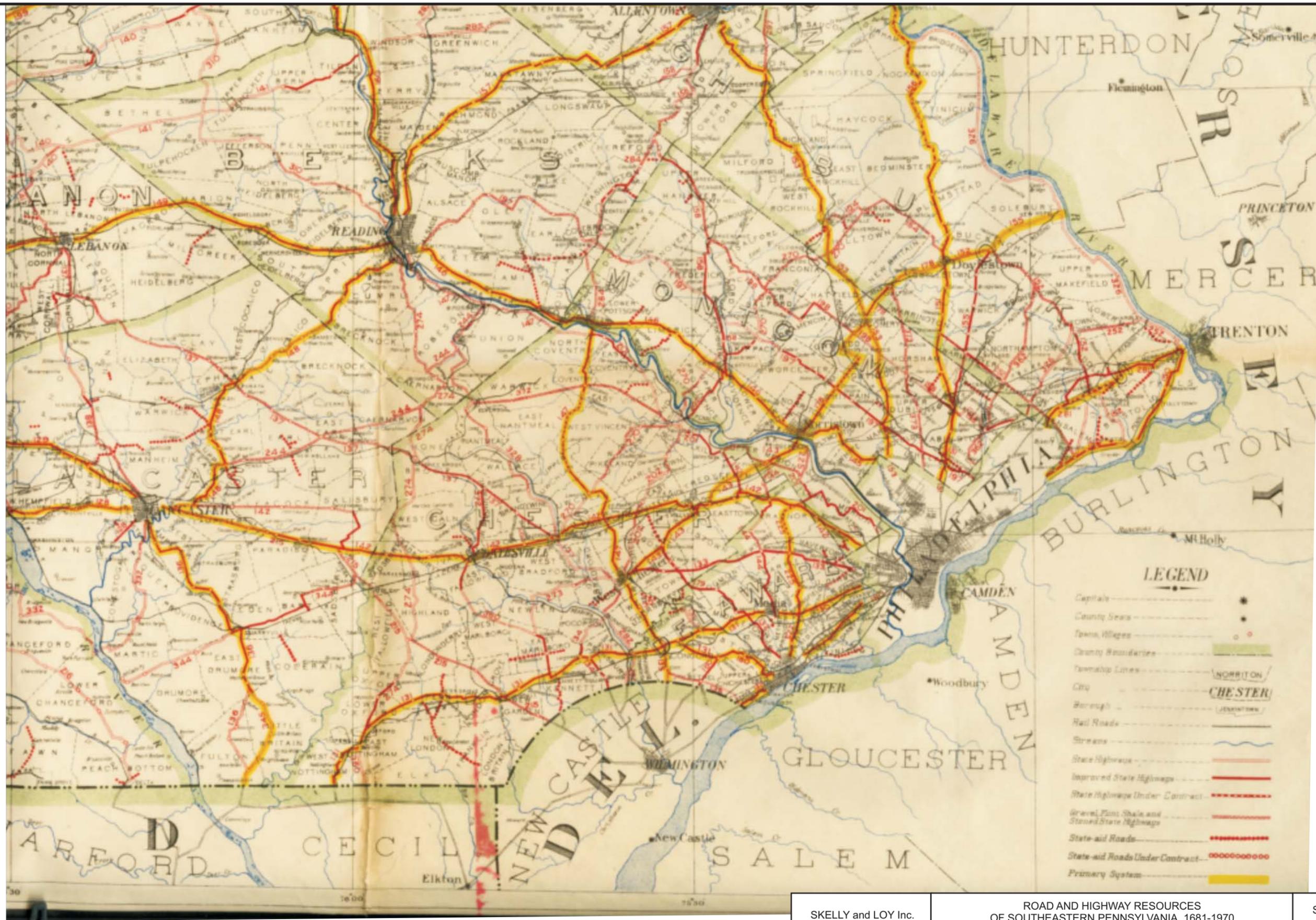
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system already in place in Pennsylvania. The law also charged the BPR with developing technical standards for road and bridge construction in cooperation with state highway departments, and with approving all project plans and specifications. The funding was earmarked, as it had been in predecessor laws, for rural roads. Funding was not available for roads in cities, boroughs, or first-class townships (Lichtenstein & Associates 1999:43-44).

To match the federal funds, the Pennsylvania legislature appropriated an unprecedented \$25 million dollars for new road and bridge construction, more than enough to cover its matching share. Another \$20 million for maintenance was added from the Motor Licensing Fund. Additionally, in 1918 the state's voters overwhelmingly approved a 30-year, \$50 million state bond issue for road improvements. In 1921, the legislature enacted a state fuel tax to provide still more funds. The state fuel tax was passed, in part, because of lessons learned during World War I, when traffic tore apart "war emergency routes," which included cross-state truck routes like the Route 1/Lincoln Highway and regional routes into military bases, troop encampments, defense plants, and ports (Lichtenstein & Associates 1999:44).

The passage of the Federal-Aid Road Law of 1916 and the money appropriated for road improvements spurred the PDH to a level of intensive activity that would last until the advent of World War II. The PDH had full control over approximately 10,000 miles, or 11 percent, of the state's roads and supervisory control through the aid it provided to second class townships of about 85 percent of the Commonwealth's 100,000 miles of roads. The remaining roads were controlled by the counties, first class townships, or boroughs and cities (Clayton 1925:93; Eldridge *et al.* 1919:70).

To implement its road building and maintenance program, in 1922 the PDH designated approximately 3,300 miles of the State Highway System as primary roads (Figure 16; PDH 1922). These roads would be the PDH's priority. Primary roads would form a trunk line system of main arterial highways connecting the state's major population centers and county seats, as well as the primary road system of neighboring states (Clayton 1925:93). All roads on the primary highway system would have a minimum width of 18 feet for travel lanes, with a berm of two feet on either side plus two additional feet for gutters. All would be hard surfaced. Where heavy truck traffic was anticipated roads would be finished with concrete; where only a small amount of passenger traffic was expected, the road would have a bituminous bound macadam surface (ENR 1917:704; PDH 1923; Public Works 1921:390). Where necessary, portions would be constructed on new alignments to reduce curvature



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ROAD AND HIGHWAY RESOURCES  
 OF SOUTHEASTERN PENNSYLVANIA, 1681-1970  
**STATE HIGHWAY SYSTEM AND  
 PRIMARY ROADS IN 1922**

SOURCE: PDH 1922

FIGURE - 16

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and grade. In all cases, once roads were improved, continued PDH maintenance was paramount (ENR 1921:103).

The remaining roads in the State Highway System were designated secondary roads. Secondary roads were locally important highways that would act as feeders to the primary road system (BPR and PDH 1928:41; Public Works 1921:390). They would be “intelligently maintained...until such future time as traffic and importance justif[ied] their absorption as primary routes” (ENR 1917:704). To ensure that local roads not directly under the PDH’s control were built and maintained according to its standards and practices, the PDH’s Township Division acted in a supervisory capacity over township road officials, providing engineering experience and skill (ENR 1922:562). This approach, plus the PDH’s willingness to spend money where it was most needed, made Pennsylvania a national leader in highway mileage under contract, completed, and intensively maintained during the early 1920s (ENR 1921:102 and ENR 1922:561).

The PDH took a number of steps to determine where and in what order highway improvements would be made. In the early 1920s the PDH completed a survey of narrow bridges on important arteries; these were slated for replacement or widening. New bridges were to be 34 feet wide, in order to meet anticipated future traffic needs (Municipal and County Engineering 1922:197; PDH 1923:9). This was followed by one of the nation’s first comprehensive traffic surveys, designed to identify which state routes were the most heavily traveled and which had the highest amount of truck traffic, which caused the most damage to roads (BPR and PDH 1928). Not surprisingly, the heaviest vehicular traffic in the state was in Southeastern Pennsylvania; the highways of Philadelphia and its surrounding counties carried one-sixth of all the traffic on the state highway system. Most traffic originated in the City of Philadelphia, the economic and cultural hub of the region. The most heavily used highways were the major east-west routes out of the city, today’s Routes 1, 13, and 30. North and south routes, the predecessors of Routes 611, 309 and 422, also carried substantial amounts of traffic (Figure 17). These same routes to and from Philadelphia also had the highest and heaviest amount of truck traffic, with U.S. 1/ Lincoln Highway between Philadelphia, Trenton, and New York City the most heavily subscribed (BPR and PDH 1928:17, 19-20, 26, 51, 54). Because of these facts, it was “logical that a considerable part of the highway replacement program should be planned for the primary system of this section” (BPR and PDH 1928:28). The report further recommended that heavy traffic secondary highway routes in the vicinity of Philadelphia should receive a higher priority for upgrades and replacements than primary routes in less populous portions of the state (BPR and PDH 1928:75). In



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1931, the PDH reported that all main highways comprising the primary system had been improved with “high-type” roads (Tebbs 1931:892).

**Automobile Suburbs, 1917 to 1940**

The introduction of affordable, mass-produced automobiles and the improved roadway system of Southeastern Pennsylvania began the area’s third stage of suburbanization, the automobile suburb. The automobile enabled developers to build suburban communities wherever land was available, rather than being tied to existing railroad or streetcar routes. Automobile related suburbs predominantly featured single-family houses on spacious lots. The automobile also allowed workers to commute longer distances than they had previously, further expanding the suburban zone away from the city. The onset of the Great Depression in 1929 and of World War II in 1941 delayed the development of more automobile suburbs, but the process would resume following the war (Ames and McClelland 2002:18).

Figures 18 and 19 (Oberman and Kozakowski 1976) graphically illustrate the effect transportation improvements had on development in Southeastern Pennsylvania in the 30 year period between 1900 and 1930. Philadelphia and the portions of Delaware and Montgomery counties in the immediate vicinity of the city had become quite densely developed by 1930. Delaware County’s population had increased by nearly 200 percent and Montgomery County’s had almost doubled. Population growth was much more modest in more rural Bucks and Chester counties, increasing by 36 and 32 percent, respectively. However, Coatesville, home to integrated steel mills and linked to Philadelphia by the PRR main line, a streetcar line, and U.S. 1 saw above-average growth during the period, rising from the thirteenth largest city in the Delaware Valley in 1900 to the seventh in 1930, a process undoubtedly related in part to neighborhood development in outlying areas (Oberman and Kozakowski 1976:69, 72).

**Pennsylvania Road Building During the Great Depression, 1929-1940**

The stock market crash of October 1929 and the ensuing Great Depression had minimal impact on road building in Pennsylvania. Federal highway aid was one of the few existing programs in place for distributing federal funds to state and local governments when the

**FIGURE 4  
DEVELOPMENT AND  
TRANSPORTATION PATTERNS  
1900**

INFORMATION DATE: 1885 - 1905

**LEGEND**

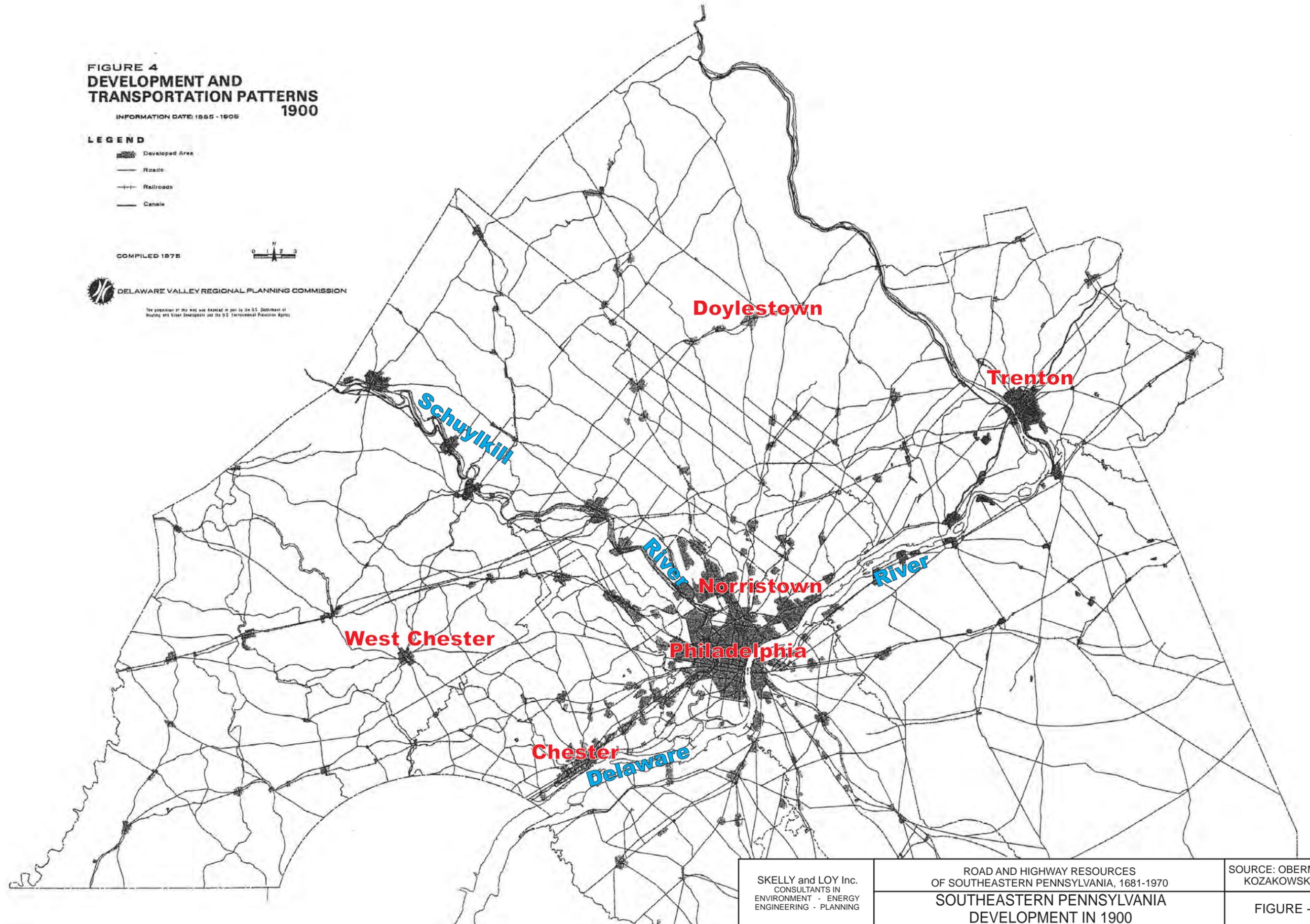
-  Developed Area
-  Roads
-  Railroads
-  Canals

COMPILED 1975



DELAWARE VALLEY REGIONAL PLANNING COMMISSION

The preparation of this map was assisted in part by the U.S. Department of Housing and Urban Development and the U.S. Environmental Protection Agency.



<p>SKELLY and LOY Inc. CONSULTANTS IN ENVIRONMENT - ENERGY ENGINEERING - PLANNING</p>	<p>ROAD AND HIGHWAY RESOURCES OF SOUTHEASTERN PENNSYLVANIA, 1681-1970 SOUTHEASTERN PENNSYLVANIA DEVELOPMENT IN 1900</p>	<p>SOURCE: OBERMAN AND KOZAKOWSKI 1976 FIGURE - 18</p>
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**FIGURE 6  
DEVELOPMENT AND  
TRANSPORTATION PATTERNS  
1931**

INFORMATION DATE 1923 - 1939

**LEGEND**

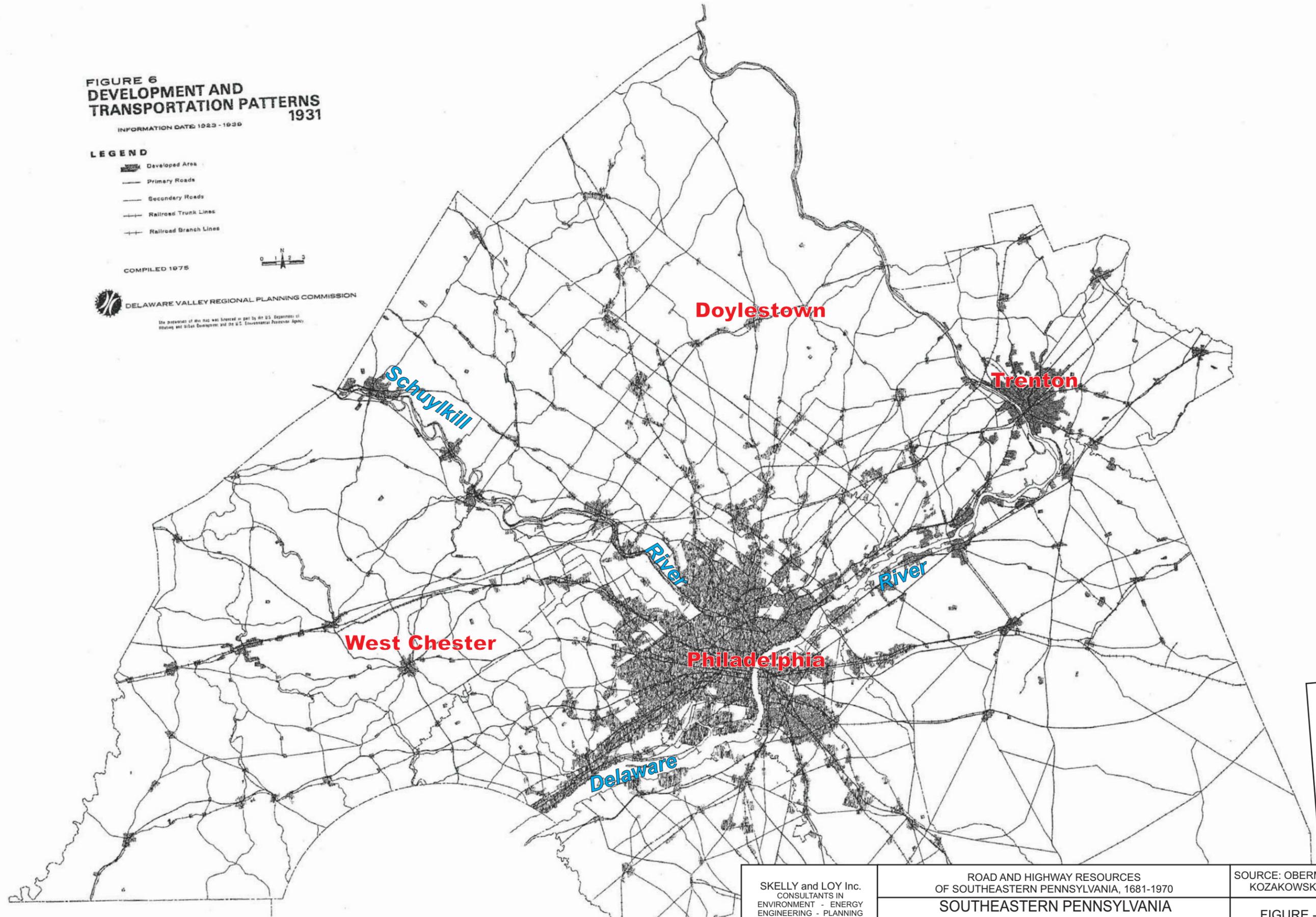
-  Developed Area
-  Primary Roads
-  Secondary Roads
-  Railroad Trunk Lines
-  Railroad Branch Lines

COMPILED 1975



DELAWARE VALLEY REGIONAL PLANNING COMMISSION

The preparation of this map was financed in part by the U.S. Department of Housing and Urban Development and the U.S. Environmental Protection Agency.



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ROAD AND HIGHWAY RESOURCES  
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SOUTHEASTERN PENNSYLVANIA  
DEVELOPMENT IN 1931

SOURCE: OBERMAN AND  
KOZAKOWSKI 1976

FIGURE - 19

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depression hit, and the money continued to flow to the states. State-generated road user revenues such as motor vehicle registration fees and gasoline taxes remained surprisingly stable (Lichtenstein & Associates 1999:47).

However, unemployment in Pennsylvania reached critical proportions in 1931 with more than 900,000 people out of work. Pennsylvania Governor Gifford Pinchot saw road building as a means of putting some of the unemployed back to work. Promising "to get farmers out of the mud" and to create thousands of jobs in the process, Pinchot secured legislation which added more than 20,000 miles of township roads to the State Highway System, bringing the total mileage of roads under direct state control to more than 30,000 miles (Lichtenstein & Associates 1999:47). Figure 20 shows the highway system in Southeastern Pennsylvania after the "Pinchot Roads" had been brought into the system ([need map](#)).

With its direct responsibilities greatly expanded, the PDH mobilized, hiring contractors to pave roads and build bridges, filling crews with laborers from the unemployment pools. The resulting Pinchot Roads were lightly built 16 foot-wide roads covered with stone, slag, or gravel. While not up to the highest road building standards of the day they did provide unemployment relief and improved rural secondary roads (Lichtenstein & Associates 1999:47). Adding Pinchot Roads to the State Highway System was not without problems. In 1935, Harry K. Ellis, Chester County's engineer, noted that because the Pinchot Roads were being improved, use of those roads had increased and many bridges along those roads were not adequate for the new traffic ([Citation](#) 1935). To rectify the situation, in 1935 a new law transferred to the PDH the responsibility for county and township bridges on all state highway routes, including bridges located on the rural route system of Pinchot Roads (PDH 1936:3).

The Pinchot Road legislation continued the trend of the PDH taking on greater and greater responsibility over Pennsylvania's roads and bridges. Another law passed in 1931 authorized the PDH to provide special funding to municipalities and counties to improve sections of the State Highway System that passed through boroughs and cities, which were excluded from the federal-aid program. Five years later, in 1936, the PDH took over the connecting sections of state highway in first-class townships, boroughs, and cities, and extended its obligations to maintain urban bridges. By the same law, the department was authorized to acquire the state's remaining private toll bridges (Lichtenstein & Associates 1999:49).

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Figure 20

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At the federal level, the Roosevelt administration made large federal highway appropriations available in 1933, 1934, and 1935 through the regular federal-aid system and also through New Deal legislation. For the first time federal funding was made available to urban roads and secondary farm-to-market roads not on the federal-aid system. Additionally, federal funds were made available beginning in 1935 through the Public Works Administration (PWA), Works Progress Administration (WPA), and Civilian Conservation Corps (CCC) for hiring thousands of workers to build roads and bridges for state, county, and municipal highway projects. Bridges built under New Deal programs did not differ from other standard-design PDH bridges of the period, and the department's bridge plans and records do not differentiate WPA-built bridges from those built using other funding and employment sources. There is no available record of how many bridges were built by WPA workers, but the number was considerable. PennDOT's Historic Highway Bridge Inventory and Evaluation identified more than 1,250 state-owned bridges built from 1936 to 1940, more than for any other five year period between 1911 and 1956, including more than 100 in Southeastern Pennsylvania (Lichtenstein & Associates 1999:48-49).

An additional component of the New Deal highway program was the elimination of hazardous railroad grade crossings by separating vehicular and train traffic. From 1932 to 1941, the federal government made available several hundred million dollars to the states to build more than 2,100 grade-crossing elimination bridges and to install thousands of automated train-activated protective signaling devices. The PDH used the funding to supplement its existing grade crossing elimination program, which had been a priority of the department since its inception. A total of 507 dangerous intersections statewide were eliminated (Lichtenstein & Associates 1999:49).

The acceptance of the Pinchot Roads into the State Highway System was the last great addition to the system in the pre-World War II era. But more miles were added by accretion after that. In the 11 year period between 1931 and 1942, the State Highway System grew from 13,000 to more than 40,000 miles, and the PDH's responsibility over bridges had increased from 4,300 to 17,300. The PDH also maintained 44,400 miles of roads in second-class townships, giving it direct or indirect supervision of nearly 85,000 miles (PDH 1938, 1942).

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**Bridges During the Golden Age of Pennsylvania Highway Construction**

Each succeeding piece of twentieth century road legislation transferred increasing authority over road construction and maintenance to the PDH. To ensure that those local roads and bridges it did not control were built and maintained to accepted professional standards, the PDH offered engineering advice and standard design plans. And in 1919, the Pennsylvania legislature passed a law designed to professionalize county engineers.

Public Law 163 of 1919 authorized the county commissioners to appoint “a competent civil engineer, who shall be styled the county engineer.” The county engineer would “prepare plans, specifications, estimates of all engineering work undertaken by such county.” Appointed county engineers would serve four year terms (Public Law 163 1919).

Public Law 163 of 1919 is an example of a Progressive Era reform. Reformers in the Progressives Era (1870 to the Great Depression) sought to bring order to urban-industrial society by stressing efficiency and scientific management. Progressives attacked societal problems through experts trained in particular fields. They favored appointing knowledge-based professionals to run government departments, rather than leaving the task to elected officials, who they equated with patronage and waste (Wiebe 1967:164-195).

The appointment of Harry K. Ellis as Chester County engineer typifies the Progressive Era intent of the law. In 1920, the newly-elected county commissioners replaced long-time county surveyor Nathan Rambo, an elected official with no formal education or training in engineering, with Ellis, a native of Phoenixville with a civil engineering degree from Lehigh University. Ellis’s status as a professional civil engineering and his ability to design and especially inspect bridges were fundamental reasons behind his appointment (West Chester Daily Local News 1920a and 1920b). Formerly, the Court of Quarter Sessions had appointed bridge inspectors (Coatesville Times 1920), a practice in keeping with earlier Pennsylvania transportation laws. In announcing Ellis’s appointment, the newspaper pointedly noted that (West Chester Daily Local News 1920b):

the Commissioners had practically decided to appoint an expert engineer on bridge work, with a view of having efficient inspections and save the county expense by embracing in one officer the duties now spread over numerous appointments of amateurs by former Commissioners for political purposes.

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Ellis’s credentials were impeccable. Prior to being selected as Chester County’s engineer, he had held positions with the Montgomery and Chester Electric Railway Company, Phoenix Iron and Steel Company, Pencoyd Iron Works in Philadelphia, the Phoenix Bridge Company, the Philadelphia Department of City Transit, and the Philadelphia Department of Public Works, where he was assistant engineer in charge of bridge maintenance (Phoenixville Daily Republican 1962).

PennDOT’s Statewide Inventory and Evaluation of Historic Highway Bridges attributed 14 bridges in Chester County to Ellis, the earliest from 1922 and the latest from 1933. Most are examples of common types and designs from the 1920s and 1930s. Unlike Rambo, who seemed reluctant to build reinforced concrete bridges, Ellis regularly used the material. Remaining bridges attributed to Ellis include concrete arches, slabs, T-beams, and thru girders.

There were also three noteworthy bridges attributed to Ellis. The first, the 1929 reinforced concrete open spandrel arch Gay Street Bridge in Phoenixville, was replaced in 2009. The other two bridges were welded Pratt pony trusses, each erected in 1933. Ellis reported that he built several welded truss bridges out of expediency during the Great Depression, using the county’s maintenance crews, a welding kit, and stock structural steel shapes (citation).

Ellis served until 1936 when, “in a surprise move,” the Chester County Commissioners abolished the county engineer position. The stated reason acknowledged the PDH’s now dominate role in bridge construction and maintenance: “The Commissioners announced that the state has taken over the maintenance of so many bridges and highways in the county that they no longer deem it necessary to employ a full-time engineer” (Phoenixville Daily Republican 1936). Ellis took a position with Bethlehem Steel, where he worked until he retired (Phoenixville Daily Republican 1962).

Delaware and Montgomery counties also appointed county engineers following passage of Public Law 163 of 1919. In 1920, Delaware County hired Alonzo H. Yocum for the yearly salary of \$3,600 per year (Delaware County Minutes 1920). Yocum, a native of Darby, had a civil engineering degree from Drexel University. Since 1895 he had worked primarily in the construction field. He was no stranger to the Delaware County government, having been elected to a four year term as Delaware County Surveyor in 1911 (Jordan 1914:1085-1086).

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Yocum was still working as the county engineer in 1930; by 1940, however, the census listed him as working in construction again (U.S. Census 1930b:6A, 1940:12A).

Montgomery County’s engineer, Warren F. Cressman, was also hired in 1920, for a salary of \$3,300 per year. The following year that salary was increased to \$4,000 per year. Cressman had worked for the PDH as a draftsman during the 1900s and as an assistant engineer during the 1910s. A native of Bucks County, Cressman moved to Norristown after being hired by Montgomery County (U.S. Census 1920b:12A, 1930c:19A). Based on information in PennDOT’s Historic Bridge Inventory and Evaluation, Cressman worked as Montgomery County engineer into the 1940s.

The PDH was now the dominant player in bridge construction. Armed with the information gained from the inventory of narrow bridges and the traffic survey in the early 1920s, the PDH designed more than 1,400 new bridges for the State Highway System, which was expanded to 12,000 miles. The PDH relied primarily on standard design bridges, from the simplest steel stringer bridge to Pratt and Parker truss designs (Lichtenstein & Associates 1999:45). By the mid-1920s, the PDH bridge unit reported that they were maintaining or paying for the replacement of most of the county-owned bridges (PDH 1923:11, 18). Many of the county bridges were wood truss (covered) bridges, light metal truss bridges, stone arch bridges, and wood stringer bridges dating to the pre-automobile era. Additionally, the PDH was making surveys and preparing or approving plans for construction of county and township roads not on the State Highway System to ensure that they acted as feeders to the main system. To clarify bridge ownership questions and to make it easier for the PDH to bring county-owned bridges on state highway routes up to standards, in 1929 the Pennsylvania legislature passed a law authorizing the PDH to take over all county and township bridges on state highway routes. The law transferred more than 2,000 bridges to state ownership and greatly reduced the role of the county engineer over road and bridge construction and maintenance (Lichtenstein & Associates 1999:46).

In the 1930s, the PDH continued to rely on standard design bridges. For the narrow, lightly built Pinchot Roads, the PDH’s typical bridge was a standard low-cost steel stringer composed of I-beams with welded angle cross-bracing between the beams. The bridge had a timber laminated deck and welded steel railings composed of angles and channels. Where possible, the PDH preferred to reuse existing stone abutments and piers with new concrete

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caps added. When a new substructure was required, abutments or piers were built with stone, if locally available, or concrete otherwise. The PDH bridge unit prepared standard plans for every span length up to 76 feet. The depth of I-beams could be from 6 to 36 inches depending on the length of the span and the loading. By mid-1933, more than 460 low-cost steel stringer bridges had been built. The standard steel stringer design proved so successful that it continued to be built in great numbers through the mid-1950s (Lichtenstein & Associates 1999:47-48).

The extent of the bridge building program in Pennsylvania between the years 1917 and 1941 is reflected in the results of PennDOT's Historic Highway Bridge Inventory and Evaluation. At the time it was completed in 1999, there were a total of 10,770 bridges statewide built prior to 1957, the cutoff year of the survey. Of that total, 6,256, or 58 percent, dated to the period 1917 to 1941. By contrast, just 17 percent were built prior to 1917. In Southeastern Pennsylvania, 1,278 bridges were identified as being constructed before 1957; 679, or 53 percent, were built between 1917 and 1941, compared to 384, or 30 percent, before 1917.

**Wartime and Post-World War II Road Construction, 1942-1956**

Mobilization for World War II temporarily halted improvements to Pennsylvania's highway system. The federal Office of Defense Mobilization restricted road-building supplies such as steel and asphalt in June 1941, and gas rationing sharply curtailed tax revenues for highway construction and maintenance beginning in April 1942. State highway departments worked with reduced staffs after employees left for the armed services. Nationally, federal aid highway projects fell from an all-time high of 12,936 miles in 1941 to only 3,035 miles in 1945, and wartime traffic and deferred maintenance would exact a heavy toll on the nation's roads (Lichtenstein & Associates 1999:50).

Available federal funding concentrated on National Defense Highway Projects, which were designed to improve access to military installations, including army and navy industrial plants throughout the state. In Southeastern Pennsylvania, a wartime project of note was the construction of the Industrial Highway (Essington Avenue) from Chester to Philadelphia, begun in 1943. The Industrial Highway consisted of a 36-foot-wide divided roadway with raised medians and several large continuous steel stringer bridges. The highway served the factories and shipyards along the Delaware

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River near the present location of the Philadelphia Airport. The improvements occurred in the City of Philadelphia and in Delaware County (Roads and Streets 1944:41-45).

Once it became clear that the Allies would win the war, planning began in earnest for highways in the post-war period. The process had actually begun prior to the United States' entry into the conflict. In 1939, the federal BPR had sponsored the publication of *Toll Roads and Free Roads*, a master plan advocating a system of toll-free, limited-access, interstate express highways designed to link the nation's principal metropolitan areas, cities, and industrial centers. The report was meant, in part, to counter the phenomenal success of the Pennsylvania Turnpike, which opened in 1940 between Irwin, Westmoreland County and Carlisle, Cumberland County and immediately turned a profit. As a result, turnpike authorities were founded in many other states, particularly in the Northeast. In publishing the report, the BPR tacitly acknowledged the value of high-speed, limited-access expressways like the Pennsylvania Turnpike, but contended that the number of lanes to be constructed should be based on traffic studies and that drivers should be able to use those roads free of charge. The BPR saw limited access expressways around and between major cities as a remedy to urban traffic congestion.

In order to construct an interstate highway system, the BPR proposed a fundamental realignment of federal highway policy away from its traditional emphasis on rural roads to a more comprehensive approach that addressed both urban and rural highways. The Federal Aid Highway Act of 1944 put the policy in motion, providing \$125 million earmarked for planning, acquiring right-of-way, and constructing limited-access expressways in urban areas. It also established a large fund to upgrade U.S. highways, which had suffered from heavy use and deferred maintenance during the war. Pennsylvania's share was \$24 million, to which the Pennsylvania legislature added a one cent liquid fuels tax increase in 1945 (Lichtenstein & Associates 1999:51-53). Forty-five percent of the funds were to be spent on the nascent system of interstate highways, 30 percent on roads feeding into this system, and 25 percent on selected roads in metropolitan areas (Oberman and Kozakowski 1976:93).

With the increased funding, the PDH launched the nation's largest postwar highway and bridge building program. The keystone of the plan was a series of new four-lane, limited-access highways and bypasses to relieve traffic congestion around Pennsylvania's largest cities. At-grade intersections would be removed through grade separation, road relocation, or intersection elimination. Between 1944 and 1945 the PDH and its consultants laid out Philadelphia's bypass, the Schuylkill Expressway, as well as projects in Pittsburgh, the Lehigh Valley, and the Harrisburg-York area. By the end of 1954

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the department had more than 100 miles of access-controlled highway, most of it short stretches of urban expressways and bypasses (Lichtenstein & Associates 1999:52-53).

It would take the PDH and the City of Philadelphia until 1959 to finish the Schuylkill Expressway. The new highway ran from Valley Forge on the north through the heart of Philadelphia and South Philadelphia to the Walt Whitman Bridge, which spanned the Delaware River. Construction through Philadelphia’s urban core involved challenging engineering and the construction of many bridges to carry the line over existing streets and rivers (ENR 1959:46). At Valley Forge, the Schuylkill Expressway connected with the Pennsylvania Turnpike, which between 1948 and 1950 was extended from Carlisle to Valley Forge, Montgomery County. The turnpike passed through the center of Chester County along the way, much as the Philadelphia and Lancaster Turnpike and PRR main line had done in earlier eras. In 1952, the Pennsylvania Turnpike Commission began constructing its Delaware River Extension to take the highway to the New Jersey state line. Completed in 1954, the highway passed through Montgomery and lower Bucks counties, exiting the state near Bristol. In 1954, the Pennsylvania Turnpike Commission began building an express highway north from its east-west main line in Montgomery County toward the New York state line. It would be completed to Clarks Summit, just north of Scranton, in 1957 (Kuncio *et al.* 2005:23-31).

While limited access highways were Pennsylvania’s most high-profile post-war projects, they were not its only ones. One engineering journal described the condition of Pennsylvania’s highways at the end of World War II as “chaotic,” due largely to “enforced neglect” (Schmidt 1954:61). War-time restrictions on road material, combined with heavy war-time traffic, had punished Pennsylvania’s highways. In Southeastern Pennsylvania, the problems were particularly acute on roads leading to and from Philadelphia, where the seaport and airport had been war department installations for the duration (Shroyer 1943:370).

It had also become apparent that many roads built 20 or more years earlier were too light and too narrow for post-war traffic demands (Schmidt 1954:61), in large part due to a tremendous increase in automobile traffic. Consumers, following 16 years of economic depression and war, were releasing pent-up demand, leading to a record number of cars on the road. Between 1948 and 1950 more than 45 million vehicles used Pennsylvania's roadways, a significant portion of them trucks carrying increasingly heavy loads to and from Pennsylvania's industries. The growing number of cars and trucks created congestion, especially in urban areas like Philadelphia and on important regional routes

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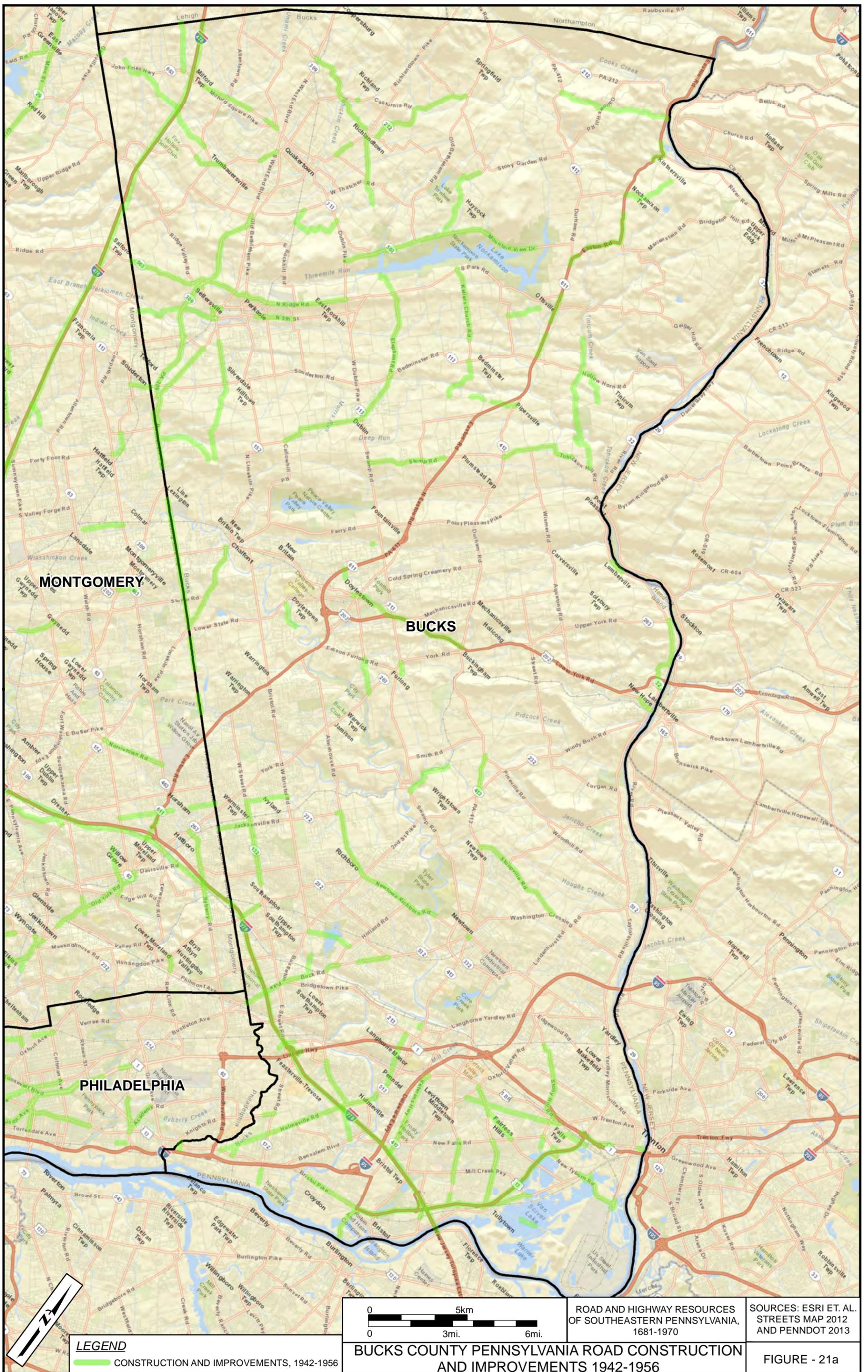
in Southeastern Pennsylvania, such as U.S. Routes 1, 13, and 30 (Lichtenstein & Associates 1999:54-55).

To bring its roads up to date, the PDH took a number of steps. In 1950 the PDH released a 12-year master plan, with the goal of bringing Pennsylvania’s roads up to standards adequate for 1962 traffic and maintenance. The plan proposed more money for local road construction and recommended that grants be increased to townships, boroughs, and cities, with 20 percent of the funding earmarked for construction (ENR 1951:30). On its heels, the PDH launched a program to reconstruct roads, including widening them when necessary, eliminating severe vertical and horizontal curves, and adding extra climbing lanes for trucks and buses on long ascending grades (Schmidt 1954:61). The PDH also designed over 1,000 new bridges. Most were steel stringer and reinforced concrete structures, but the PDH also began using prestressed box beam bridges as well (Lichtenstein & Associates 1999:54). The road and bridge programs even survived a political purge in the mid-1950s that temporarily left the PDH with a shortage of experienced engineers (Cronk 1957:67, 1958:63).

Geographic Information System (GIS) mapping recently made available by PennDOT makes it possible to get a visual representation of road projects undertaken within a given time frame. Figures 21a through 21e shows road construction and improvements in Southeastern Pennsylvania between the end of World War II and 1956. Many of the road projects were for relatively short sections of existing roads, but there were exceptions. In addition to the Schuylkill Expressway, U.S. 13 east of Philadelphia appears to have been substantially re-built, undoubtedly due to the presence of the new development of Levittown in Lower Bucks County. In Upper Bucks County, U.S. 309 was substantially realigned. Long stretches of U.S. 29 were improved in Montgomery County, as was U.S. 322 south of U.S. 1 in Delaware County. In Chester County, SR 41 north of U.S. 1 was upgraded.

**Bridges in the Wartime and Post-World War II Road Construction Period**

The PennDOT Historic Highway Bridge Inventory and Evaluation identified 224 bridges as built in Southeastern Pennsylvania between 1942 and 1956. The vast majority were designed and built by the PDH. There was an extensive reliance on standard design bridges, which included steel stringers, girders, and trusses and reinforced concrete slabs, T-beams, arch and deck culverts, and rigid frame bridges.



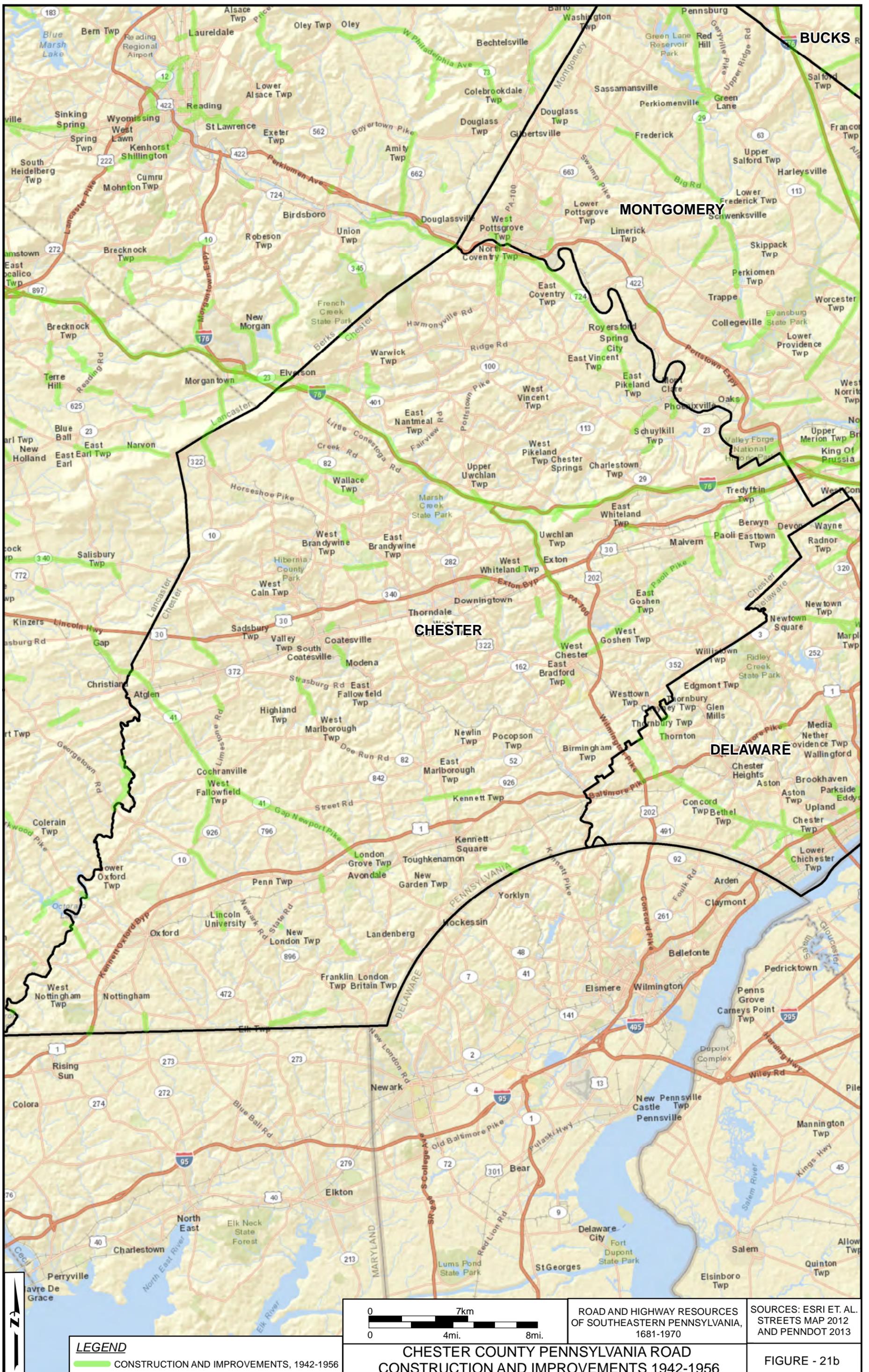
ROAD AND HIGHWAY RESOURCES OF SOUTHEASTERN PENNSYLVANIA, 1681-1970

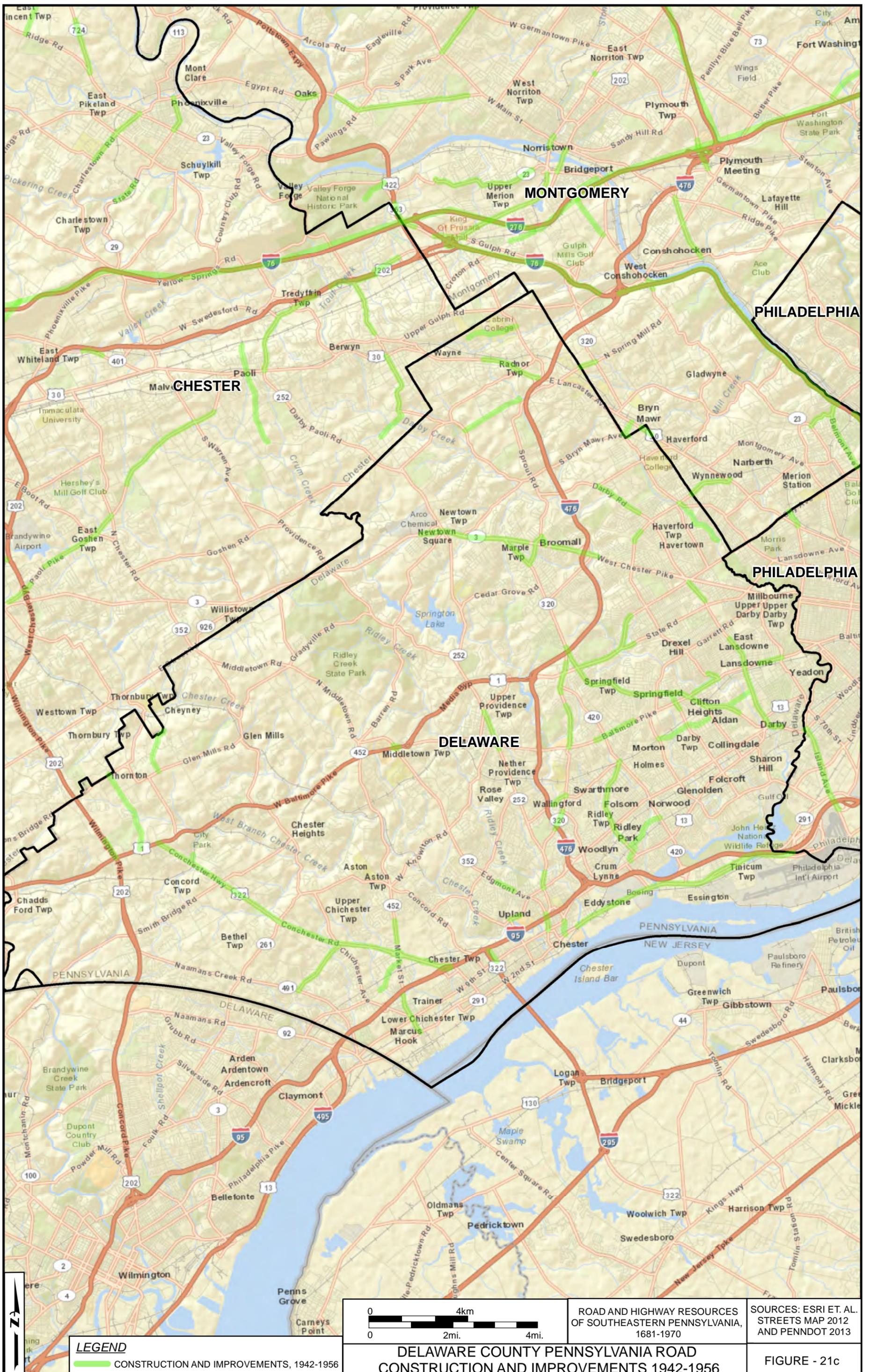
SOURCES: ESRI ET AL. STREETS MAP 2012 AND PENNDOT 2013

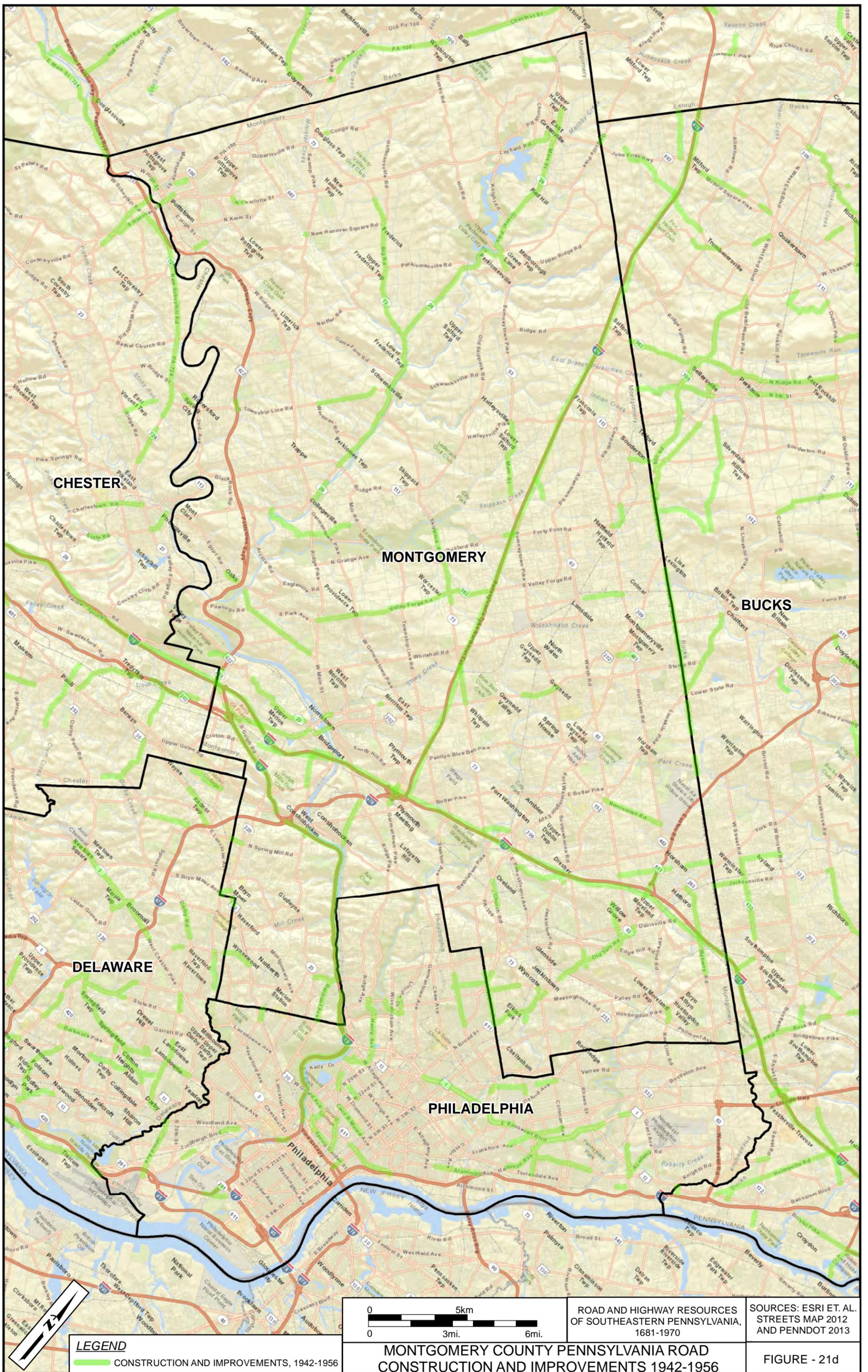
**BUCKS COUNTY PENNSYLVANIA ROAD CONSTRUCTION AND IMPROVEMENTS 1942-1956**

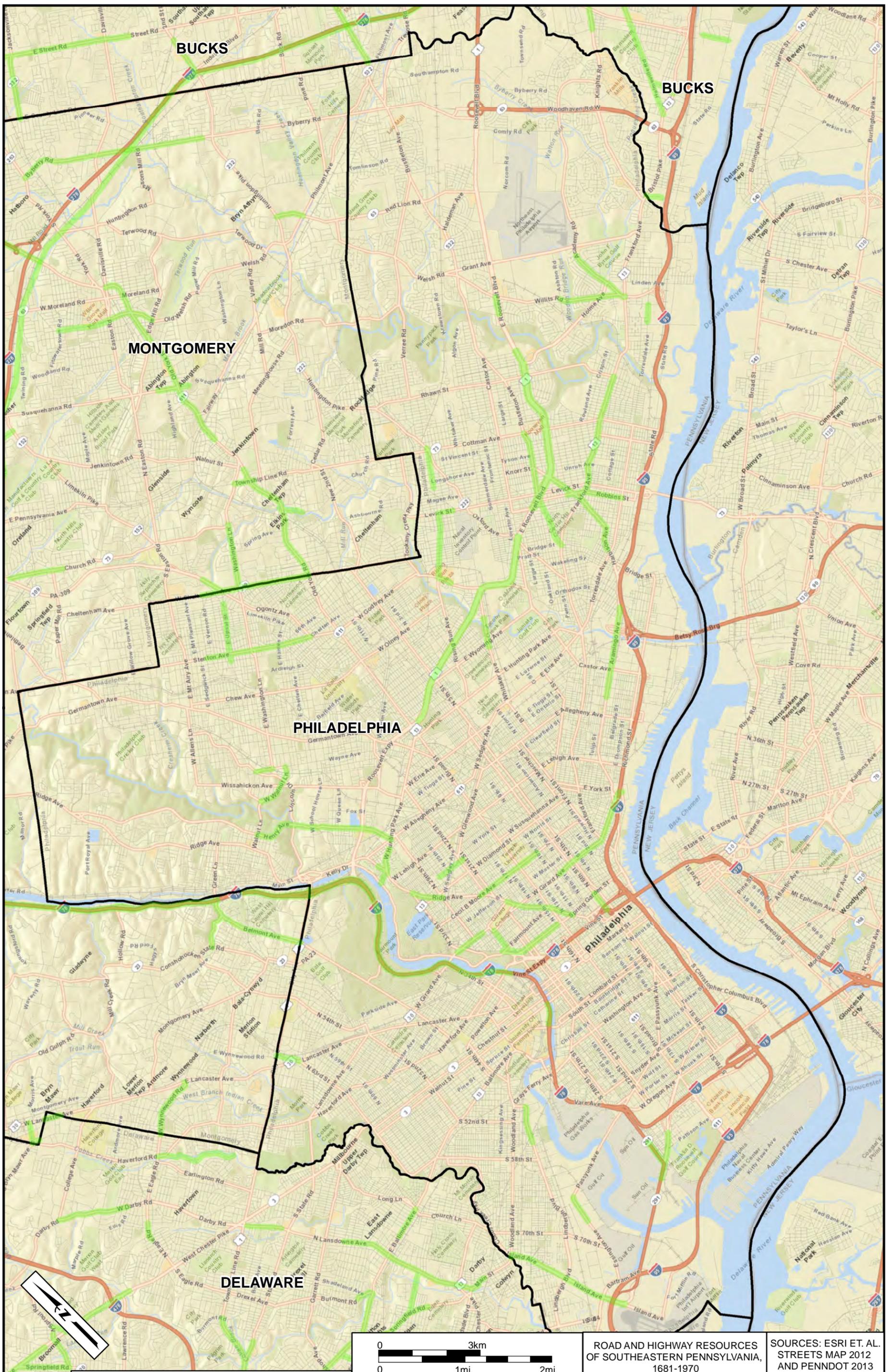
**FIGURE - 21a**

**LEGEND**  
 CONSTRUCTION AND IMPROVEMENTS, 1942-1956



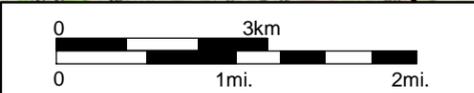






**LEGEND**

CONSTRUCTION AND IMPROVEMENTS, 1942-1956



ROAD AND HIGHWAY RESOURCES  
OF SOUTHEASTERN PENNSYLVANIA,  
1681-1970

SOURCES: ESRI ET. AL.  
STREETS MAP 2012  
AND PENNDOT 2013

**PHILADELPHIA COUNTY PENNSYLVANIA ROAD  
CONSTRUCTION AND IMPROVEMENTS 1942-1956**

FIGURE - 21e

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A notable exception to the use of standard design bridges was the 1949-1950 construction of Philadelphia’s Walnut Lane Bridge, the first prestressed concrete beam bridge built in the United States. The design and construction of the bridge resulted from a partnership between Gustave Magnel, a Belgian engineer and professor; the Preload Corporation of New York; and Edward R. Schofield, Principal Assistant Engineer at the Philadelphia Department of Public Works. Magnel had experimented widely with prestressed concrete beams and designed prestressed concrete bridges in Europe during the 1930s and 1940s. After the war, he met with representatives of the Preload Corporation, who agreed to produce beams using his patented prestressing system. At about the same time, Schofield of the City of Philadelphia was looking for a bold new design for a bridge in the city’s Fairmount Park. A shortage of structural steel made him receptive to other materials. Schofield enthusiastically embraced the idea of using prestressed concrete beams (Zollman 1981a:18-19). The beams were cast in place at the bridge site and then post-tensioned. Each girder was I-shaped, 2.0 m (6.6 ft) deep, and 48.8 m (160.0 ft) long. The bridge was formally dedicated on Armistice Day in November 1950, but it was not opened to traffic until February 1951 (Wierzbicki 1988:5-6).

Spurred by the success of the Walnut Lane Bridge, engineers across the country began experimenting with prestressed concrete as a building material for bridges. In 1949 and 1950, Concrete Products of America (CPA), a corporation with manufacturing plants in Pottstown and Pittsburgh, began experimenting with box shaped prestressed concrete beams. To reduce the weight of the beams, CPA placed hollow cardboard tubes in the beams to create voids and poured the concrete around them. The precast, pretensioned, factory-produced beams could then be shipped to a bridge site and erected. The PDH adopted the hollow box beams in the early 1950s for small span bridges. CPA’s innovations helped create the precast, pretensioned bridge beam industry, which would become a hallmark of post-war American bridge technology (Anderson 1981:201-205; Zollman 1981b:51-53). They were placed throughout the state, including in Southeastern Pennsylvania. Those in Southeastern Pennsylvania date from the mid and late 1950s, after the technology was in widespread use in the state. None were determined eligible for NRHP listing during PennDOT’s Historic Highway Bridge Inventory and Evaluation.

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Adding the 224 bridges built in Southeastern Pennsylvania between 1942 and 1956 brings the total number of bridges identified in the bridge inventory as being constructed between 1917 and 1956 to 894, or 70 percent of all bridges built before 1957. The breakdown by county is given below:

- Bucks County, 224 bridges, or 71 percent of the county's pre-1957 bridges;
- Chester County, 205 bridges, or 70 percent of the county's pre-1957 bridges;
- Delaware County, 108 bridges, or 80 percent of the county's pre-1957 bridges;
- Montgomery County, 235 bridges, or 70 percent of the county's pre-1957 bridges;  
and
- City of Philadelphia, 122 bridges, or 61 percent of the county's pre-1957 bridges.

Bridge construction dates by decade for Southeastern Pennsylvania and its counties are given in Tables 1 through 6.

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**TABLE 1.**  
**Southeastern Pennsylvania Bridges Inventoried by PennDOT**  
**by Decade and Century (n=1,277)**

**Seventeenth Century** - 1 (0.0008%)  
**Eighteenth Century** - 7 (0.5%)  
**Nineteenth Century** - 146 (11.4%)  
**Twentieth Century (Pre-1957)** - 1,123 (88.0%)

**Southeastern Bridges Inventoried by PennDOT by Decade (n=1,277)**

<b>Decade</b>	<b>Number</b>	<b>Percentage of Total</b>	<b>Percentage of Twentieth Century</b>
1690s	1	0.08%	
1770s	1	0.08%	
1780s	1	0.08%	
1790s	5	0.4%	
1800s	6	0.5%	
1810s	2	0.2%	
1820s	9	0.7%	
1830s	8	0.7%	
1840s	9	0.7%	
1850s	11	1.2%	
1860s	7	0.5%	
1870s	23	1.8%	
1880s	35	2.7%	
1890s	36	2.8%	
1900s	122	9.5%	10.9%
1910s	180	14.0%	16.0%
1920s	309	24.2%	27.5%
1930s	273	21.4%	24.3%
1940s	96	7.5%	8.5%
1950s	143	11.2%	12.7%

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**TABLE 2.**  
**Bucks County Bridges Inventoried by PennDOT by Decade and Century (n=315)**

**Eighteenth Century** - 2 (0.6%)  
**Nineteenth Century** - 44 (14.0%)  
**Twentieth Century (Pre-1957)** - 269 (85.4%)

**Bucks County Bridges Inventoried by PennDOT by Decade (n=315)**

<b>Decade</b>	<b>Number</b>	<b>Percentage of Total</b>	<b>Percentage of Twentieth Century</b>
<b>1770s</b>	1	0.4%	
<b>1780s</b>	0	0.0%	
<b>1790s</b>	1	0.4%	
<b>1800s</b>	2	0.7%	
<b>1810s</b>	0	0.0%	
<b>1820s</b>	1	0.4%	
<b>1830s</b>	5	1.9%	
<b>1840s</b>	2	0.7%	
<b>1850s</b>	4	1.5%	
<b>1860s</b>	0	0.0%	
<b>1870s</b>	8	3.0%	
<b>1880s</b>	15	5.6%	
<b>1890s</b>	7	2.6%	
<b>1900s</b>	21	6.7%	7.8%
<b>1910s</b>	34	10.8%	12.6%
<b>1920s</b>	53	16.8%	19.7%
<b>1930s</b>	86	27.3%	32.0%
<b>1940s</b>	17	5.4%	6.3%
<b>1950s</b>	58	18.4%	21.6%

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**TABLE 3.**  
**Chester County Bridges Inventoried by PennDOT by Decade and Century (n=294)**

**Eighteenth Century**           -       0       (0.0%)  
**Nineteenth Century**         -       19      (6.5%)  
**Twentieth Century (Pre-1957)** -       275     (93.5%)

**Chester County Bridges Inventoried by PennDOT by Decade (n=294)**

<b>Decade</b>	<b>Number</b>	<b>Percentage of Total</b>	<b>Percentage of Twentieth Century</b>
<b>1800s</b>	2	0.6%	
<b>1810s</b>	0	0.0%	
<b>1820s</b>	1	0.3%	
<b>1830s</b>	0	0.0%	
<b>1840s</b>	0	0.0%	
<b>1850s</b>	0	0.0%	
<b>1860s</b>	1	0.3%	
<b>1870s</b>	2	0.7%	
<b>1880s</b>	9	3.1%	
<b>1890s</b>	4	1.4%	
<b>1900s</b>	24	8.2%	8.7%
<b>1910s</b>	59	20.1%	21.4%
<b>1920s</b>	69	23.5%	25.1%
<b>1930s</b>	72	24.5%	26.2%
<b>1940s</b>	21	7.1%	7.6%
<b>1950s</b>	30	10.2%	10.9%

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**TABLE 4.**  
**Delaware County Bridges Inventoried by PennDOT by Decade and Century (n=135)**

**Eighteenth Century** - 0 (0.0%)  
**Nineteenth Century** - 10 (7.4%)  
**Twentieth Century (Pre-1957)** - 125 (92.6%)

**Delaware County Bridges Inventoried by PennDOT by Decade (n=135)**

Decade	Number	Percentage of Total	Percentage of Twentieth Century
1800	1	0.7%	
1810s	1	0.7%	
1820s	4	0.3%	
1830s	0	0.0%	
1840s	1	0.7%	
1850s	0	0.0%	
1860s	0	0.3%	
1870s	0	0.0%	
1880s	1	0.7%	
1890s	2	1.5%	
1900s	9	6.7%	7.2%
1910s	12	8.9%	9.6%
1920s	58	43.0%	46.4%
1930s	20	14.8%	16.0%
1940s	23	17.0%	18.4%
1950s	3	2.2%	2.4%

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**TABLE 5.**  
**Montgomery County Bridges Inventoried by PennDOT by Decade and Century (n=335)**

**Eighteenth Century** - 4 (1.2%)  
**Nineteenth Century** - 50 (15.0%)  
**Twentieth Century (Pre-1957)** - 281 (83.9%)

**Montgomery County Bridges Inventoried by PennDOT by Decade (n=335)**

<b>Decade</b>	<b>Number</b>	<b>Percentage of Total</b>	<b>Percentage of Twentieth Century</b>
<b>1780s</b>	1	0.3%	
<b>1790s</b>	3	0.9%	
<b>1800s</b>	1	0.3%	
<b>1810s</b>	0	0.0%	
<b>1820s</b>	2	0.6%	
<b>1830s</b>	2	0.6%	
<b>1840s</b>	7	2.1%	
<b>1850s</b>	6	1.8%	
<b>1860s</b>	2	0.6%	
<b>1870s</b>	7	2.1%	
<b>1880s</b>	7	2.1%	
<b>1890s</b>	16	4.8%	
<b>1900s</b>	25	7.5%	8.9%
<b>1910s</b>	35	10.4%	12.5%
<b>1920s</b>	73	21.8%	26.0%
<b>1930s</b>	87	26.0%	31.0%
<b>1940s</b>	24	7.2%	8.5%
<b>1950s</b>	37	11.0%	13.2%

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**TABLE 6.**  
**City of Philadelphia Bridges Inventoried by PennDOT by Decade and Century (n=199)**

<b>Seventeenth Century</b>	-	1	(0.5%)
<b>Eighteenth Century</b>	-	1	(0.5%)
<b>Nineteenth Century</b>	-	19	(9.5%)
<b>Twentieth Century (Pre-1957)</b>	-	178	(89.4%)

**City of Philadelphia Bridges Inventoried by PennDOT by Decade (n=199)**

<b>Decade</b>	<b>Number</b>	<b>Percentage of Total</b>	<b>Percentage of Twentieth Century</b>
<b>1690s</b>	1	0.5%	
<b>1790s</b>	1	0.5%	
<b>1800</b>	0	0.0%	
<b>1810s</b>	1	0.5%	
<b>1820s</b>	0	0.0%	
<b>1830s</b>	1	0.0%	
<b>1840s</b>	0	0.0%	
<b>1850s</b>	1	0.5%	
<b>1860s</b>	3	1.5%	
<b>1870s</b>	4	2.0%	
<b>1880s</b>	4	2.0%	
<b>1890s</b>	5	2.5%	
<b>1900s</b>	36	18.1%	20.2%
<b>1910s</b>	35	17.6%	20.0%
<b>1920s</b>	48	24.1%	27.0%
<b>1930s</b>	21	10.6%	11.8%
<b>1940s</b>	8	4.0%	4.5%
<b>1950s</b>	30	15.1%	16.8%

**The Interstate Highway Era, 1956-1970**

Prior to World War II, the Pennsylvania Turnpike Commission had proposed ambitious plans to construct limited access toll roads throughout the Commonwealth. The extensions built to the New Jersey state line between 1948 and 1954, an extension to Ohio by way of Pittsburgh completed in 1951, and the road north to Clarks Summit begun in 1954 were part of this plan. The Commission had also proposed toll highways between Philadelphia and Delaware; Harrisburg and the Maryland state line by way of Gettysburg; Pittsburgh and Erie; and east to west across Pennsylvania's northern tier (Kuncio *et al.* 2005:23-37).

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Congressional testimony on highway transportation funding begun in 1953, however, revealed that support for the BPR's concept of a free interstate highway system was on the rise, while interest in toll roads was beginning to wane. The political appeal of free interstate highways was two-fold. First, the proposed interstate highway system would be transcontinental in nature. According to proponents, such a system would knit the country together, providing a valuable unifying force and a vital component to the nation's national defense. A coordinated interstate system of free highways would allow unhindered movement of goods and materials in times of war. With WWII a recent memory and the Cold War in full swing, such an appeal had resonance. Toll highways, by contrast, were seen as being statewide or, at best, regional in nature. Critics feared it would be difficult to knit together a coherent system from such an atomistic approach. Second, the transcontinental system, it was believed, would help reduce congestion, particularly in urban areas. The expressways would whisk traffic around or through cities, while limited access would discourage local traffic from using the roads for short trips (Seely 1987:209).

The free transcontinental interstate highway system had an important ally in President Dwight Eisenhower. As a young officer in 1919, Eisenhower had participated in the U.S. Army's first cross-country vehicular transportation exercise. The nightmarish conditions experienced on the trip left an indelible impression on him. Eisenhower described the journey as traversing "through darkest America by truck and tank." Road conditions ranged from "average to nonexistent." Breakdowns and accidents were frequent. Eisenhower began to see the need for better roads. Twenty-five years later, as the Supreme Allied Commander during World War II, he had experienced Germany's autobahn, which made him "see the wisdom of broader ribbons across the land" (quoted in Lewis 1997:89-90). Eisenhower, a conservative Republican, was initially put off by the projected cost of a national highway system, but he eventually came around to the opinion that it was in the national interest for the federal government to fund it (Seely 1987:214).

At the same time that political momentum was shifting to a free interstate highway system, a number of toll roads began experiencing financial problems. In 1955, Pennsylvania Turnpike revenues dipped for the first time. Neighboring West Virginia defaulted on its turnpike bond obligations, and truckers threatened to boycott the Ohio Turnpike due to the high cost of its tolls (Seely 1987:221). To some, this signaled that toll road construction had run its course and was perhaps not the ultimate solution to an interstate highway system.

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With the BPR and President Eisenhower both behind the free interstate concept, and toll roads experiencing their first financial difficulties, Congress had no difficulty passing the National System of Interstate and Defense Highway Act of 1956. The revolutionary transportation bill provided \$25 billion dollars to construct a 46,000-mile interstate highway system. All roads would be limited-access, high-speed divided highways, at least four lanes wide, with climbing lanes up steep grades. Construction funds would be allocated on a matching basis, with the Federal government providing 90 percent of the money and the states the other 10 percent. For the first three years of the program (1957-1959), one-half of the funding would be distributed on the traditional basis of a state's mileage of post roads, geographical area, and population, and the other half on the basis of population alone. Thereafter, funding would be allocated according to need. In the first year, \$825 million was made available; funding was pegged at \$850 million for 1958 and \$875 million for 1959. The system was to be completed by 1969 (Seely 1987:217).

At the assistance of the BPR, it was eventually decided that toll road authorities like the Pennsylvania Turnpike Commission would not be eligible to receive federal interstate highway funding. The highways the Commission had previously completed, however, could be folded into the interstate system. As a consequence, planning and construction of Pennsylvania's new interstate highways shifted to the PDH.

The only new interstate highway constructed in Southeastern Pennsylvania following passage of the National System of Interstate and Defense Highway Act of 1956 was Interstate 95 (I-95), the major highway along the East Coast. I-95 entered Delaware County from the south, roughly following the U.S. 13 corridor and the Delaware River through the cities of Chester and Philadelphia. Originally, the interstate was to follow the U.S. 13 corridor east of Philadelphia, but New Jersey requested an alternative alignment. Consequently, once I-95 passed over Neshaminy Creek the interstate turned northeast, skirting Levittown before exiting Pennsylvania near Yardley and Scudder Falls. Numerous state highways were realigned in order to link to the new interstate (Kitsko 2010; PennDOT 2013).

I-95 was completed in stages. Originally slated to be completed in 1960, the first section, the Scudder Falls Bridge over the Delaware River, did not open until 1961. In 1962, construction began on two sections, one south of Philadelphia between the Delaware state line and Eddystone, Delaware County, and one from U.S. 63 in Northeast Philadelphia to Neshaminy Creek. These sections opened in 1965. The portion between Kensington and U.S. 63 was built between 1967 and 1968. A connection to the Scudder Falls Bridge was in place by 1970. However, the portion through the City of

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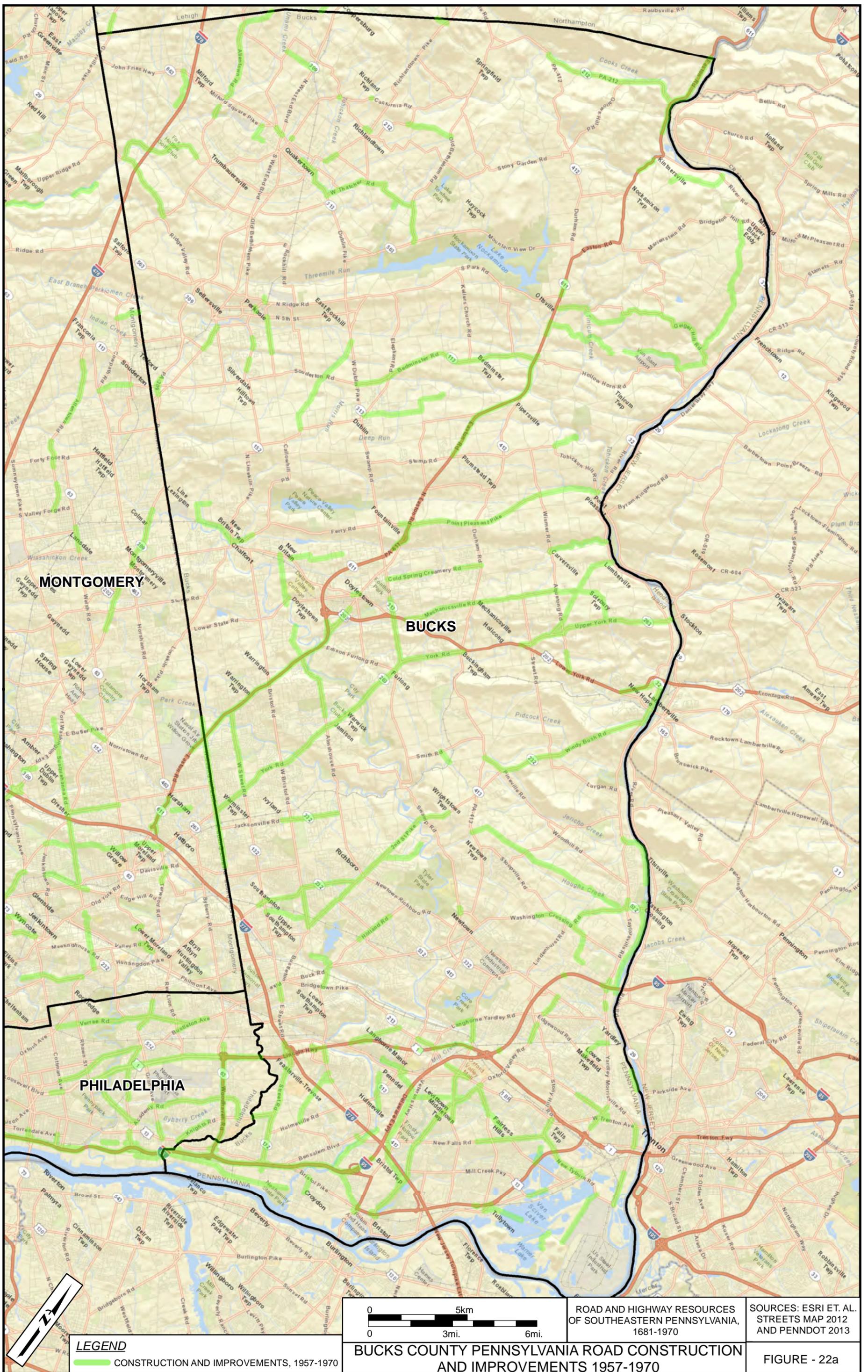
Philadelphia would not be completed until 1985. When first proposed, the cost to complete the highway was \$180 million. The final price tag was more than \$500 million (Kitsko 2010; PennDOT 2013).

The period between 1956 and 1970 in Southeastern Pennsylvania was also noteworthy for the construction, or the beginning of construction, of limited-access bypasses that shifted regionally important highways around population centers. Much of U.S. 30 was constructed on a new alignment around the towns of Downingtown and Coatesville (Figures 22a through 22e). Similarly, in southern Chester County, U.S. 1 from east of Kennett Square to the Maryland state line was reconstructed on a new alignment, bypassing the communities of Kennett Square, Avondale, West Grove, and Oxford. Bypasses were built around Media in Delaware County and Pottstown in Montgomery County, and they began around Doylestown and Langhorne in Bucks County (ESRI 2012; PennDOT 2013). In Philadelphia, the Roosevelt Expressway was constructed to provide a direct connection between the Schuylkill Expressway and center city (ENR 1960:42), and East Roosevelt Boulevard was built out to Northeast Philadelphia, the faster growing part of the city (ESRI 2012; PennDOT 2013). In all, between 1950 and 1973, more than 160 miles of federally funded highways were open for use in Southeastern Pennsylvania, including six limited-access highways (P.A.C. Spero & Company 1994:42; Oberman and Kozakowski 1976:94).

In 1970, the PDH was abolished and replaced by PennDOT. PennDOT was formed to consolidate transportation-related functions formerly performed in the departments of Highways, Commerce, Revenue, Community Affairs, Forests and Waters, Military Affairs, and other state agencies. The formation of PennDOT ended the role of the PDH over Pennsylvania’s roads and bridges, a function it had performed since its founding 63 years before.

**Impact of Post-World War II Highway and Housing Policies**

The new highway policies, along with federal housing legislation that made it easier to own homes, had far-reaching consequences for Southeastern Pennsylvania. Together, the new policies “hastened massive dispersion of population and business from [Philadelphia] and the transformation of the countryside” around it. The extent of the change is illustrated in Figure 23 (Oberman and Kozakowski 1976:94). By 1970, the urbanized or partially urbanized area around Philadelphia had sprawled to two or three times the radius of the urban area in



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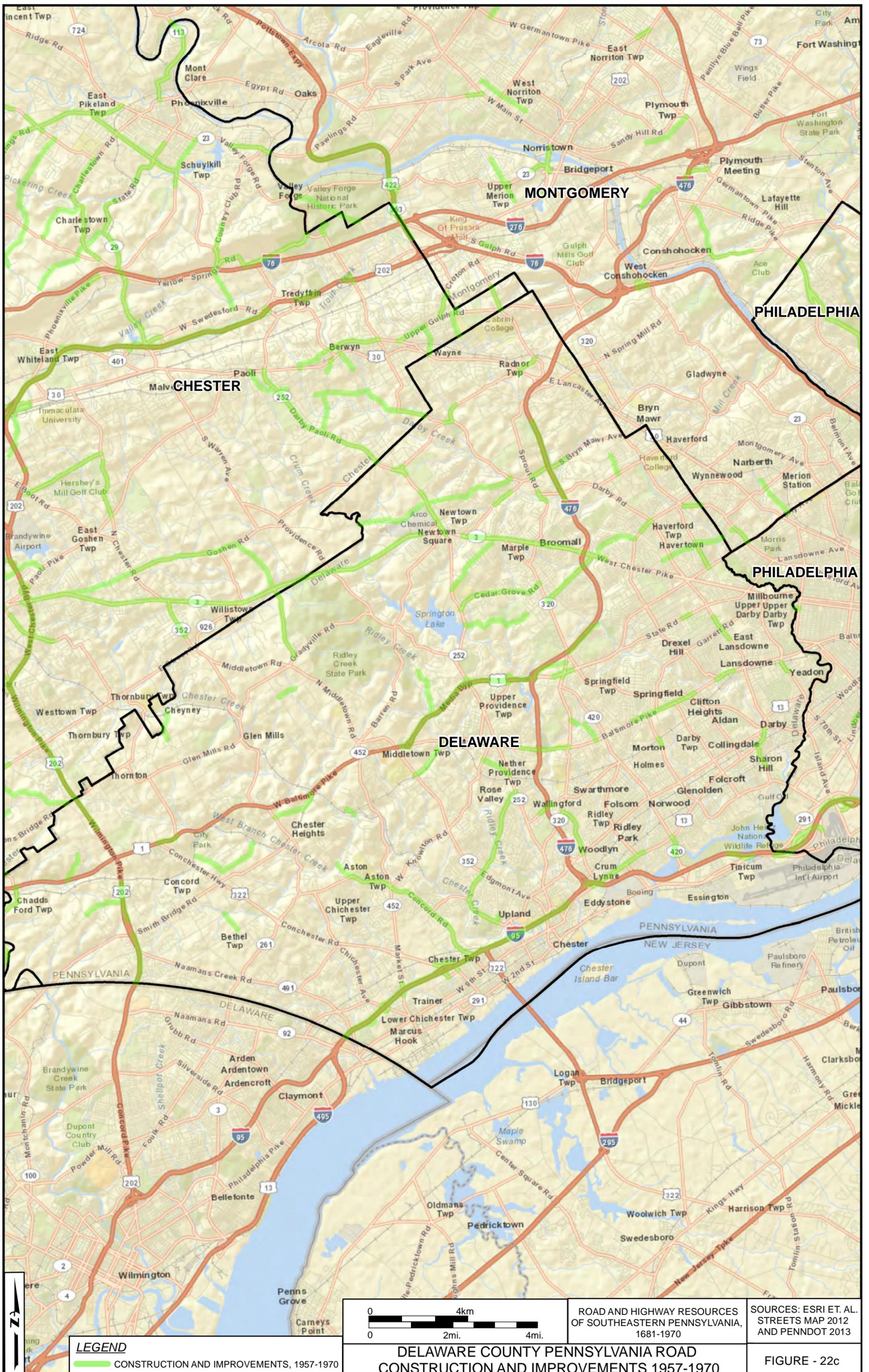
SOURCES: ESRI ET AL. STREETS MAP 2012 AND PENNDOT 2013

**BUCKS COUNTY PENNSYLVANIA ROAD CONSTRUCTION AND IMPROVEMENTS 1957-1970**

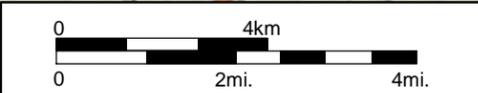
**FIGURE - 22a**

**LEGEND**  
— CONSTRUCTION AND IMPROVEMENTS, 1957-1970





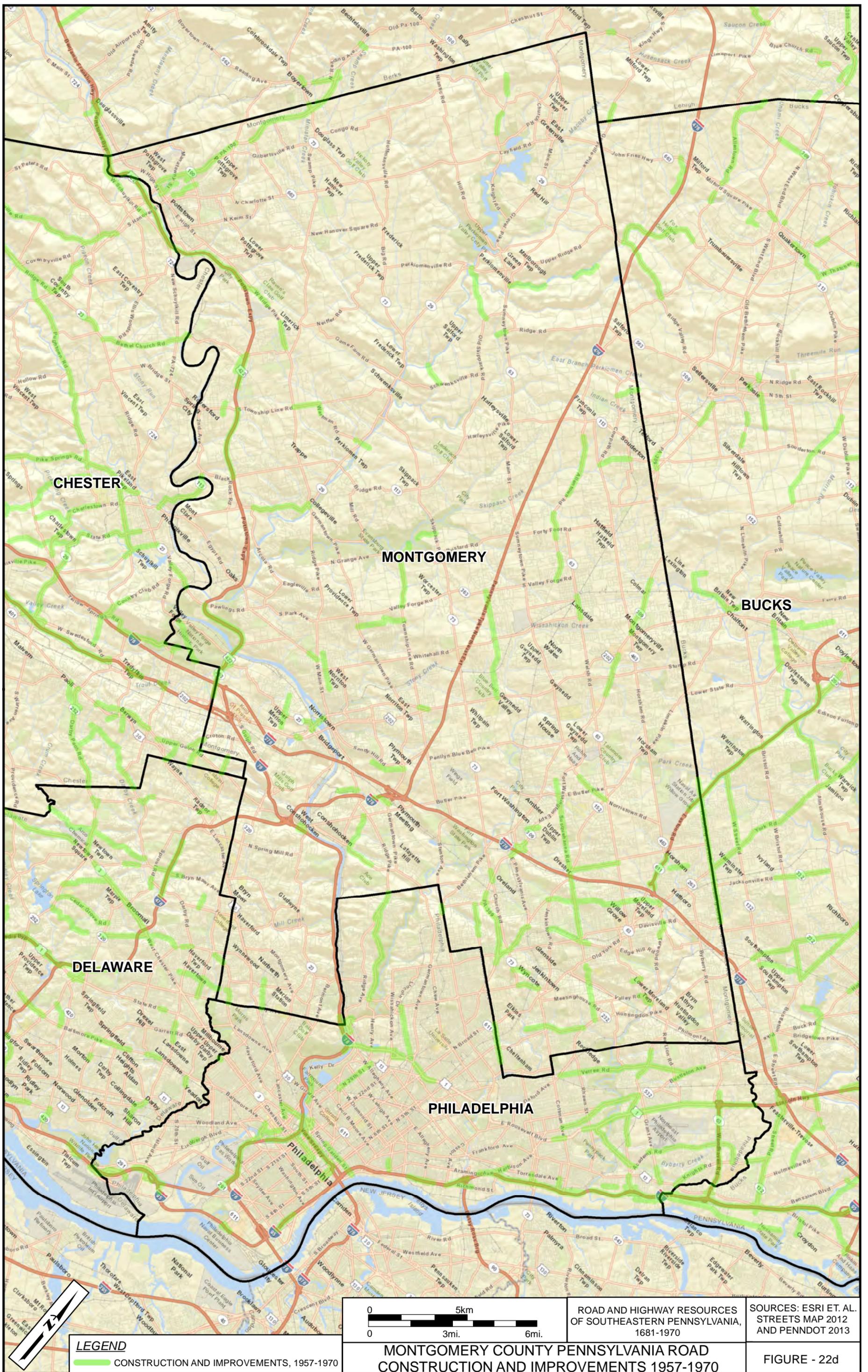
**LEGEND**  
 CONSTRUCTION AND IMPROVEMENTS, 1957-1970

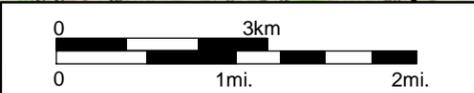
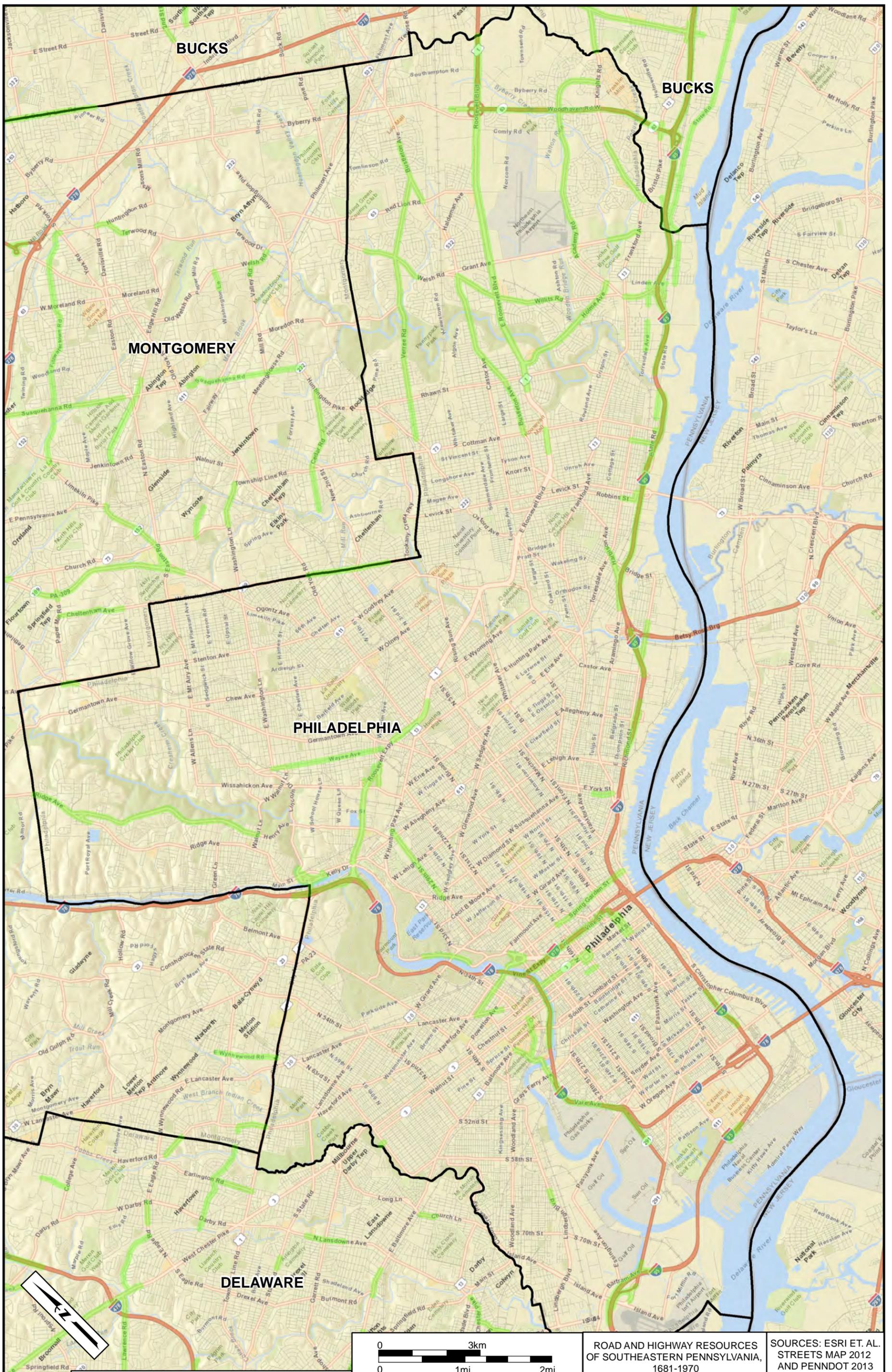


ROAD AND HIGHWAY RESOURCES OF SOUTHEASTERN PENNSYLVANIA, 1681-1970

SOURCES: ESRI ET. AL. STREETS MAP 2012 AND PENNDOT 2013

**DELAWARE COUNTY PENNSYLVANIA ROAD CONSTRUCTION AND IMPROVEMENTS 1957-1970**





ROAD AND HIGHWAY RESOURCES  
OF SOUTHEASTERN PENNSYLVANIA,  
1681-1970

SOURCES: ESRI ET. AL.  
STREETS MAP 2012  
AND PENNDOT 2013

**LEGEND**  
— CONSTRUCTION AND IMPROVEMENTS, 1957-1970

**PHILADELPHIA COUNTY PENNSYLVANIA ROAD  
CONSTRUCTION AND IMPROVEMENTS 1957-1970**

**FIGURE - 22e**

**FIGURE 7  
DEVELOPMENT AND  
TRANSPORTATION PATTERNS  
1970**

INFORMATION DATE: 1965 - 1972

**LEGEND**

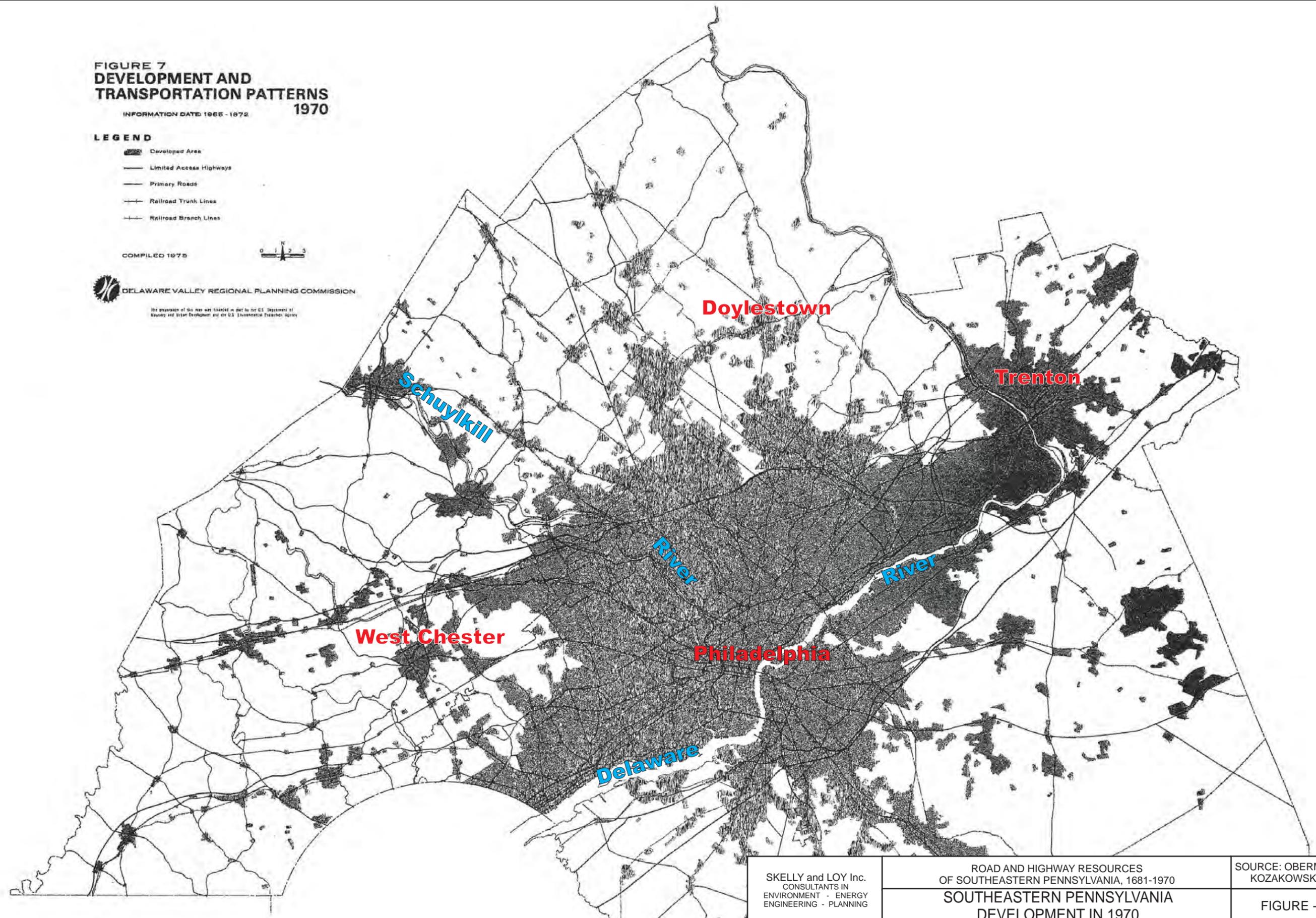
-  Developed Area
-  Limited Access Highways
-  Primary Roads
-  Railroad Trunk Lines
-  Railroad Branch Lines

COMPILED 1973



DELAWARE VALLEY REGIONAL PLANNING COMMISSION

The preparation of this map was financed in part by the U.S. Department of Housing and Urban Development and the U.S. Environmental Protection Agency.



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ROAD AND HIGHWAY RESOURCES  
OF SOUTHEASTERN PENNSYLVANIA, 1681-1970  
SOUTHEASTERN PENNSYLVANIA  
DEVELOPMENT IN 1970

SOURCE: OBERMAN AND  
KOZAKOWSKI 1976

FIGURE - 23

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1930, while the area in square miles was six to nine times as large (Oberman and Kozakowski 1976:79) Bucks County’s population more than doubled between 1950 and 1960, growing by 112 percent. In the same period, Montgomery County’s population grew by 46 percent, Delaware County’s by 34 percent, and Chester County’s by 32 percent (Jenkins 2002:352-354). Chester County’s population would double between 1940 and 1970 (Walls and Parker 2002:60). By 1970, all of Lower Bucks, portions of Middle Bucks, most of Delaware and Montgomery counties, and eastern Chester County had become developed (Oberman and Kozakowski 1976:82).

The trend would continue throughout the twentieth century. In 1940, 65 percent of the population of the Greater Philadelphia Metropolitan Area lived in the city; by 1990, just 35 percent did. The metropolitan Philadelphia area experienced a real loss in population during the period between 1940 and 2000, but the larger phenomenon was the restructuring of the population that remained. Much of it transferred from the city out to the surrounding counties (Jenkins 2002:352-354).

The transformation of the region is perhaps best symbolized by Levittown. Built adjacent to the new United States Steel Fairless Hills Works, the development straddled portions of Falls, Bristol, and Middletown townships in Lower Bucks County. Built beginning in 1951-1952, it would eventually grow into a community of 17,000 single family homes, shopping centers, recreation areas, and churches. While no other development of similar size has appeared in Southeastern Pennsylvania, the success of Levittown, combined with the federal highway and housing policies, fostered a trend toward large-scale residential development throughout the region. In order to assemble large enough tracts, developers moved increasingly further out into the countryside, where, among other things, land was cheaper. To induce buyers, developers often had to supply “extras” to make moving to the development enticing, such as commercial and recreational facilities, special police protection, schools, and churches. The success of these developments depended, in part, on infrastructure such as paved rural secondary roads. As commuters moved farther out from the city, entrepreneurs began siting businesses and industries along the major roads leading to these new suburbs,

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making many of the suburbs independent of central Philadelphia (Oberman and Kozakowski 1976:86-87).

By the 1970s, southeastern Pennsylvania had been transformed. The growth of suburban and exurban communities had expanded the developed area around Philadelphia exponentially, removing farmland from production and reordering historic transportation patterns. Jobs growth in suburban centers and in neighboring municipalities like Allentown-Bethlehem, Trenton, and Wilmington had “brought every corner of the region within reach of a substantial number of job opportunities” (Oberman and Kozakowski 1976:86-87). As the importance of center city Philadelphia declined as a place of employment and housing, ridership declined on streetcars, which had begun to be replaced by more maneuverable buses as early as the 1920s. Public transit services were cut back, and, eventually, most privately owned bus and streetcar lines were consolidated into the Southeastern Pennsylvania Transportation Authority (SEPTA). The result was greater congestion on the roads and highways of Southeastern Pennsylvania, and particularly so on the main regional arteries, such as SRs 1, 13, 30, 202, 309, 422, and 611 (Oberman and Kozakowski 1976:84, 87-88, 91, 96).

**Bridges in the Interstate Highway Era**

PennDOT’s Bridge Management System (BMS) database lists more than 800 bridges in Southeastern Pennsylvania with construction dates between 1956 and 1970, a reflection of the significant road and bridge building and replacement program undertaken by the PDH during that period. In keeping with the practice since the PDH first introduced standard designs in 1908, the vast majority of these bridges are standard design steel, reinforced concrete, and prestressed concrete structures.

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**F. ASSOCIATED PROPERTY TYPES**

The purpose of this MPDF is to provide a framework for evaluating roads and bridges in Southeastern Pennsylvania under NRHP Criterion A in the area of Transportation. Two associated property types have been developed for this MPDF, Road Corridor Historic Districts and Individual Bridges. The property types and their registration requirements apply to all Pennsylvania roads except those maintained by the Pennsylvania Turnpike Commission. Resources associated with the Pennsylvania Turnpike were evaluated for NRHP eligibility between 2001 and 2005 (Kuncio *et al.* 2005).

Bridge significance under NRHP Criterion C for Engineering was addressed during PennDOT's Historic Highway Bridge Inventory and Evaluation, completed between 1996 and 1999 (Lichtenstein & Associates 1999). Because those evaluations have been previously made, these associated property types and their registration requirements apply only to significance under Criterion A for Transportation.

**Property Type: Road Corridor Historic Districts**

The Transportation Research Board has developed three broad categories for roads (McCahon *et al.* 2012:4-12 – 4-15):

- Planned/Engineered Roads are highways, turnpikes, parkways, expressways, or superhighways that were built within discrete periods of time, that provided for relatively uniform geometry and appearance throughout their length, and that reflected then-current design criteria. They predominantly date to the twentieth century, but earlier examples were also built, like the Philadelphia and Lancaster Turnpike;
- Pre-Automobile or Early Automobile Era Roads and Road Segments are bypassed, abandoned, or lightly traveled automobile roads with minimal levels of subsequent improvements. They may retain original paving materials and geometric features; and
- Evolved Roads are roads that changed, or evolved, over time. They are an amalgam of engineered features over time. Evolved roads account for the vast majority of road and highway miles in the United States. By one estimate, there are approximately two million linear miles of roads on locations that have been in use for more than 100 years. An area

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with a long and rich transportation history like Southeastern Pennsylvania has hundreds of miles of such roads.

Planned Roads, Pre-Automobile or Early Automobile Era Roads and Road Segments, and Evolved Roads are all potentially eligible for NRHP listing as Road Corridor Historic Districts. A Road Corridor Historic District encompasses the historic alignment and extent of a historically significant road. Contributing resources may include the original alignment and grade, as well as bridges and other structures built during the period of significance. In order to be eligible for NRHP listing, a road must have a significant history that distinguishes it from the common history shared by other roads, and it must look like and function as it was intended to when the road achieved its period of significance. Upgrades added over time to keep the road current, such as guiderails, pavement striping, lighting, and traffic signals, are reversible without adverse effect to the historic character of the road and would not be included in an integrity assessment. The roadbed itself, in most cases, would be an uncounted landscape feature.

The statements of significance and registration requirements for Road Corridor Historic Districts vary depending on the era in which they were built. Listed in the following pages are the statements of significance and registration requirements based on the contexts developed in Section E.

**Property Type: Individual Bridges**

Bridges were built in all stages of road and highway development in Southeastern Pennsylvania. Streams and other natural features needed to be spanned. Southeastern Pennsylvania has two major rivers, the Delaware and Schuylkill, smaller rivers and large creeks like the Brandywine, Red Clay, and Neshaminy, and smaller creeks, runs, and springs. In the earliest period of road and highway development, the smaller streams were more likely to have bridges erected over them. Larger streams would have been crossed by ferries or at fords. Beginning with the Turnpike Era, however, even the Delaware and Schuylkill rivers began to be spanned, with stock companies building bridges and recouping the costs of construction and maintenance through tolls. Toll bridges would continue to be built in Southeastern Pennsylvania into the early twentieth century, when the PDH began “freeing” toll bridges and roads. The vast majority of bridges in Southeastern Pennsylvania, however, were not

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toll bridges. Rather, most bridges were built following the same process that was in place from the founding of the colony of Pennsylvania until the passage of the Road Act of 1903. Residents petitioned the Court of Quarter Sessions requesting that a bridge be built. The court would appoint viewers, who would field view the area in question and report on the necessity of the bridge. The court would review the viewers' report and either confirm or deny the requested bridge. If the court confirmed the need for the bridge, the county commissioners or township would be ordered to have it built.

The statements of significance and registration requirements for Individual Bridges vary depending on the era in which they were built. Listed below are the statements of significance and registration requirements based on the contexts developed in Section E.

**Transportation From Settlement to 1792**

**Registration Requirements: Road Corridor Historic Districts**

The significant roads during this period were the King's or State Highways, Planned Roads built to connect Philadelphia to outlying county seats, market towns, and important regional cities and towns. Therefore, to be eligible under Criterion A for Transportation, a Road Corridor Historic District must have been built as a King's or State Highway before 1792. Its construction as a King's or State Highway must be documented in either a county bridge docket, an act of the Provincial Council or General Assembly, or an order of the Provincial Governor or State Governor.

A Road Corridor Historic District constructed prior to 1792 would most likely be an abandoned or bypassed Pre-Automobile Road Segment; it could also be an archaeological resource, in which case it would also have significance under NRHP Criterion D. The road's location and design must be unchanged; it must be on its original alignment and retain the width, profile, and grade it had prior to 1793. If the width, profile, and grade are unchanged, then the pavement material and any further upgrades (such as guiderails, pavement striping, lighting, and traffic signals) would be considered reversible and not count against integrity. If the road's width, profile, and grade are unchanged, feeling and association will remain. Setting

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is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1792 and an original or historic setting would be difficult if not impossible to find.

Contributing resources would include structures built as part of the road, such as bridges and culverts that were constructed during the period of significance and that have not been widened or significantly altered; taverns, blacksmith shops, farriers, and other businesses built during the period of significance to service travelers along the road, provided they have integrity; and buildings and structures that were specifically mentioned as reference points during the petitioning, planning, and building of the King’s or State Highway, provided they have integrity.

**Registration Requirements: Individual Bridges**

An individual bridge construction on a King’s or State Highway can be eligible for NRHP listing even if the Road Segment on which it was built has lost integrity. To be eligible under Criterion A for Transportation, a bridge must have been built on a King’s or State Highway before 1792. Its location on a King’s or State Highway must be documented in either a county bridge docket, an act of the Provincial Council or General Assembly, or an order of the Provincial Governor or State Governor.

A bridge remaining from a King’s or State Highway constructed prior to 1792 would be a stone arch structure. The bridge’s location must be unchanged; the structure must be on the original alignment of the King’s or State Highway, even if subsequent upgrades to the highway have changed the location of the successor route. The bridge must retain its original design and materials: its stone substructure, arch, spandrel walls, and parapets. It must not have been widened. The original workmanship must be apparent; a bridge must retain its original random coursed or coursed stonework. Evidence of excessive repairs to any character-defining bridge component or components will compromise integrity. If the bridge’s design, materials, and workmanship remain, feeling and association will also. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1792 and an original or historic setting would be difficult if not impossible to find.

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**Other Potential Areas of Significance**

A Road Corridor Historic District or an Individual Bridges built prior to 1792 could also be found eligible under Criterion A for Military if there is evidence the road or bridge played a historically significant role in the American Revolution. Being in place during the Revolution and having troops move over or across it are not sufficient to establish historic significance. Rather, there must be evidence that the road or bridge played an important part in a significant battle. For example, a road or bridge may be significant if it can be demonstrated that control of a road or bridge was a strategic objective whose capture was a key to victory in battle, or that a bridge provided crucial cover for offensive fire or defensive position during a battle.

**The Turnpike Era, 1792-1830**

**Registration Requirements: Road Corridor Historic Districts**

The Turnpike Era is characterized by greater centralized state government involvement in road and bridge construction and by the chartering of turnpike companies to finance, build, and improve roads and bridges. To be significant under Criterion A for Transportation in association with the Turnpike Era, a Road Corridor Historic District must have been a Planned Road built as part of an important centralized improvement project ordered by the Pennsylvania legislature or it must have been constructed on a statewide or regionally significant turnpike by a state chartered turnpike company between the years 1792 and 1830. Statewide or regional significance is demonstrated by showing that the turnpike opened or greater increased settlement in an area or that it significantly improved communication and commerce between two regionally important towns or between a regionally important town and Philadelphia, as demonstrated by travelers' accounts, county or regional histories, or the movement of goods between the communities or between a community and Philadelphia.

A Road Corridor Historic District constructed during the period between 1792 and 1830 would most likely be an abandoned or bypassed Pre-Automobile Road Segment, although it

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could be an Evolved Road or an archaeological resource; if the latter, it would also have significance under NRHP Criterion D. Because turnpikes were “scientific roads” graded and surfaced to improve travel, retention of the road’s location and design from the period of significance is crucial. The road must be on its original alignment and retain the width, profile, and grade it had between 1792 and 1830. If the width, profile, and grade are unchanged, then the pavement material and any further upgrades (such as guiderails, pavement striping, lighting, and traffic signals) would be considered reversible and not count against integrity. If the road’s width, profile, and grade are unchanged, feeling and association will remain. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1830 and an original or historic setting would be difficult if not impossible to find.

Contributing resources would include structures built as part of the turnpike or government ordered improvement, such as bridges and culverts that were constructed during the period of significance and that have not been widened or significantly altered; taverns built during the period of significance to service travelers along the road that retain integrity; and buildings and structures that were specifically mentioned as reference points during the petitioning, planning, and building of the turnpike, provided they have integrity.

**Registration Requirements: Individual Bridges**

To be significant under Criterion A for Transportation in association with the Turnpike Era, a bridge must have been built as part of a centralized improvement project ordered by the Pennsylvania legislature or it must have been constructed on a historically significant turnpike by a state chartered turnpike company between the years 1792 and 1830. A bridge associated with the original Philadelphia and Lancaster Turnpike, the nation’s first scientific road, would be eligible for NRHP listing if it had integrity. A bridge on another turnpike would be eligible if it had integrity and there is evidence it was constructed on a turnpike with statewide or regional significance. Statewide or regional significance is demonstrated by showing that the turnpike opened or greater increased settlement in an area or that it significantly improved

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communication and commerce between two regionally important towns or between a regionally important town and Philadelphia, as demonstrated by travelers' accounts, county or regional histories, or the movement of goods between the communities or between a community and Philadelphia.

A bridge remaining from the Turnpike Era would mostly likely be a stone arch structure, although a wood truss bridge could remain on a bypassed section. In either case, the bridge's location must be unchanged; the structure must be on the original alignment of the historically significant turnpike, even if subsequent upgrades to the highway have changed the location of the successor route. The bridge must retain its original design and materials. In the case of a stone bridge, it must retain its stone substructure, arch, spandrel walls, and parapets. In the case of a wood truss, it must retain a preponderance of its original members. The bridge must not have been widened. The original workmanship must be apparent; a stone bridge must retain its original random coursed or coursed stonework and wood trusses must retain their original connections. Evidence of excessive repairs to any character-defining bridge component or components will compromise integrity. If the bridge's design, materials, and workmanship remain, feeling and association will also. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1830 and an original or historic setting would be difficult if not impossible to find.

**The Canal and Railroad Era, 1830-1880**

During the period 1830-1880, first canals and then railroads became the primary means of long-distance travel. Roads provided feeder routes to canal-side docks, canal wharves, and railroad depots. They also remained the avenues of local travel, a role they had played since the founding of the colony in 1681. Turnpike companies continued to be chartered, although they generally did not propose new construction. Instead, they usually sought to improve comparatively short sections of existing roads between neighboring or regionally important communities. Near the end of the period, plank roads were constructed as a less expensive alternative to macadamized or other stone-surfaced turnpikes.

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Because of grade restrictions placed in the plank road enabling legislation, these plank roads were sometimes built on new alignments.

### Registration Requirements: Road Corridor Historic Districts

To be significant under Criterion A for Transportation in association with the Canal and Railroad Era, a road must have been a Planned Road built between the years 1830 and 1880 and it must meet one of the following criteria: it was built by a turnpike company on a new road that provided direct and important access to a canal dock, canal wharf, or railroad depot; it was part of a turnpike-related improvement campaign to a road with statewide or regional significance; or it was built on a locally or regionally significant plank road constructed on a new alignment. Statewide or regional significance of a turnpike or plank road from this period is demonstrated by showing that the road significantly improved communication and commerce between two regionally important towns or between a regionally important town and Philadelphia, as demonstrated by travelers' accounts, county or regional histories, or the movement of goods between the communities or between a community and Philadelphia.

A significant road from this era could be an abandoned or bypassed Pre-Automobile Road Segment, an Evolved Road, or an archaeological resource; if the latter, it would also have significance under NRHP Criterion D. The road must be on its original alignment and retain the width, profile, and grade it had between 1830 and 1880. If the width, profile, and grade are unchanged, then the pavement material and any further upgrades (such as guiderails, pavement striping, lighting, and traffic signals) would be considered reversible and not count against integrity. If the road's width, profile, and grade are unchanged, feeling and association will remain. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1880 and an original or historic setting would be difficult if not impossible to find.

Contributing resources would include structures built as part of the road, turnpike, or plank road, such as bridges and culverts that were constructed as part of the significant road and that have not been widened or significantly altered; taverns, hotels, or other businesses

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such as blacksmith shops or farriers built during the period of significance to service travelers, provided they have integrity; and buildings and structures that were specifically mentioned as reference points during the petitioning, planning, and building of the road, provided they have integrity.

**Registration Requirements: Individual Bridges**

To be significant under Criterion A for Transportation in association with the Canal and Railroad Era, a bridge must have been built during the years 1830 and 1880 and it must meet one of the following criteria: it was built by a turnpike company on a new road that provided direct and important access to a canal dock, canal wharf, or railroad depot; it was part of a turnpike-related improvement campaign to a road with statewide or regional significance; or it was built on a locally or regionally significant plank road constructed on a new alignment. Statewide or regional significance of a turnpike improved during this period is demonstrated by showing that the turnpike significantly improved communication and commerce between two regionally important towns or between a regionally important town and Philadelphia, as demonstrated by travelers' accounts, county or regional histories, or the movement of goods between the communities or between a community and Philadelphia.

A road bridge remaining from the Canal and Railroad Eras could be a stone arch, a wood truss, or a metal truss or girder. In all cases, the bridge's location must be unchanged; the structure must be on the original alignment of the road leading to the canal dock, canal wharf, or railroad depot, the historically significant turnpike, or the plank road, even if subsequent upgrades changed the location of successor routes. The bridge must retain its original design and materials. In the case of a stone bridge, it must retain its stone substructure, arch, spandrel walls, and parapets. In the case of a wood truss, a metal truss, or a metal girder, it must retain a preponderance of its original members. The bridge must not have been widened. The original workmanship must be apparent; a stone bridge must retain its original random coursed or coursed stonework. A wood and metal truss must retain its original connection details, and metal girder its original lattice work or built up connections. Evidence of

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excessive repairs to any character-defining bridge component or components will compromise integrity. If the bridge's design, materials, and workmanship remain, feeling and association will also. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1880 and an original or historic setting would be difficult if not impossible to find.

In some cases, a road bridge from the Railroad and Canal Era may be significant under NRHP Criterion A for Transportation in association with the canal or railroad that it spans, if it can be demonstrated that the bridge was essential to the operation of that transportation system. Because this area of significance relates to the transportation function of the canal or railroad and not to the bridge's importance to the road system, the bridge would be evaluated as part of the NRHP assessment of the canal or railroad in question.

**The Good Roads Movement and the Formative Years of the Pennsylvania Department of Highways, 1880-1916**

This period began the shift back to highways and roads as the primary means of both local and long-distance travel. It is also the period when the PDH was formed and began to assert control over the road and bridge building process, a major shift to paradigm that had been in place since the founding of the colony.

**Registration Requirements: Road Corridor Historic Districts**

Road Corridor Historic Districts from the period 1880-1916 can be significant under Criterion A for Transportation for association with a number of different events:

- The Road Act of 1903 established a system of state aid for reconstructing roads on the RFD system in second class townships. A road reconstructed as part of this program would be eligible for NRHP listing if it has integrity. It must be demonstrated that the road had been on a RFD route and that it was improved between 1903 and 1911 using state aid. A significant road from this era could be an abandoned or bypassed Pre-Automobile or Early Automobile Road Segment, an Evolved Road, or an archaeological resource; if the latter, it would also have significance under NRHP

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Criterion D. The road must be on its original alignment and retain the width, profile, and grade it had after its improvement. If the width, profile, and grade are unchanged, then the pavement material and any further upgrades (such as guiderails, pavement striping, lighting, and traffic signals) would be considered reversible and not count against integrity. If the road's width, profile, and grade are unchanged, feeling and association will remain. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1916 and an original or historic setting would be difficult if not impossible to find.

Contributing resources would include bridges and culverts built as part of the improvement to the RFD route, provided they have not been widened or significantly altered. Because significance is focused on road improvements by the PDH, buildings along the road would not contribute to the Road Corridor Historic District, even if they were present when the improvement was made.

- Following passage of the Sproul Act of 1911, the PDH developed an 8,500 mile State Highway System, which it was responsible for improving and maintaining. The system was expanded to 9,700 miles in 1913. As with the Road Act of 1903, the improvements were to be made in second class townships. Because of funding limitations, however, few roads on the State Highway System were upgraded to bituminous or concrete surfaced highways. Those that were upgraded between 1911 and 1916 would be eligible for NRHP listing if they have integrity. Especially significant would be those sections of the State Highway System constructed or upgraded because a county provided a significant portion of the funding. Evidence would include references in a PDH biennial report or original plans. A significant road from this era could be an abandoned or bypassed Early Automobile Road Segment or an Evolved Road. The road must be on its original alignment and retain the width, profile, and grade it had after its improvement. Because only roads that were finished with bituminous or concrete surfaces are considered to be significant, the road must also retain the pavement placed between 1911 and 1916. Alignment, width, profile, grade, and pavement must be verified by original PDH plans. Subsequent upgrades such as guiderails, pavement striping, lighting, and traffic signals would be considered reversible and would not count against integrity. If the road's width, profile, grade, and surface are unchanged, feeling and association will remain. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1916 and an original or historic setting would be difficult if not impossible to find.

Contributing resources would include bridges and culverts built as part of the state improvement, provided they have not been widened or significantly altered. Because significance is focused on road improvements by the PDH, buildings along the road would not contribute to the Road Corridor Historic District, even if they were present when the improvement was made.

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- Streetcar lines generally used existing roads, so mere use of a road by a streetcar line is not a historically significant association. A road associated with a streetcar line is only eligible for NRHP listing if it was constructed and paid for between 1897 and 1916 by a regionally significant streetcar company. "Regionally significant" is defined as a streetcar route that played an important role in expanding suburban settlement patterns in the Greater Philadelphia area in the years between 1897 and 1916. A significant road from this era could be an abandoned or bypassed Pre-Automobile Road Segment, an Evolved Road, or an archaeological resource; if the latter, it would also have significance under NRHP Criterion D. The road must be on its original alignment and retain the width, profile, and grade it had when built. If the width, profile, and grade are unchanged, then the pavement material and any further upgrades (such as guiderails, pavement striping, lighting, and traffic signals) would be considered reversible and not count against integrity. If the road's width, profile, and grade are unchanged, feeling and association will remain. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1916 and an original or historic setting would be difficult if not impossible to find.

Contributing resources would include bridges and culverts built as part of the road, provided they have not been widened or significantly altered, and other buildings and structures related to the operation of the streetcar line that were constructed as part of the new road.

**Registration Requirements: Individual Bridges**

Individual Bridges from the period 1880-1916 can be significant under Criterion A for Transportation for association with a number of events:

- A bridge can be significant if it was constructed on a RFD route improved using state aid under the Road Law of 1903. The bridge's location must be unchanged; the structure must be on the original alignment of the RFD route, even if subsequent upgrades changed the location of successor routes. The bridge must be substantially unaltered. It must retain the character-defining features of its type and design. In the case of a stone bridge, it must retain its stone substructure, arch, spandrel walls, and parapets, and random coursed or coursed stonework. For a steel stringer or steel girder bridge, this would mean its original beams and substructure. For a metal truss, this would mean the truss's original connection details and a preponderance of its original members. For a concrete bridge this would mean the original structural members and substructure. Ideally, all bridges should also retain their original parapets, particularly if a bridge was a PDH standard design. The bridge must not have been widened. If a bridge's design and materials

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remain, the original workmanship will be apparent, as will feeling and association. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1903 and an original or historic setting would be difficult if not impossible to find.

- A bridge erected on the State Highway System between 1911 and 1916 would be eligible for NRHP listing if it was constructed on a section that was upgraded with a bituminous or concrete surface, as demonstrated through PDH biennial reports. The bridge must retain integrity, even if the road section no longer has it. The bridge's location must be unchanged; the structure must be on the original alignment of the State Highway System route, even if subsequent upgrades changed the location of successor routes. The bridge must be substantially unaltered. It must retain the character-defining features of its type and design. For a steel stringer or steel girder bridge, this would mean its original beams and substructure. For a metal truss, this would mean the truss's original connection details and a preponderance of its original members. For a concrete bridge this would mean the original structural members and substructure. Ideally, all bridges should also retain their original parapets, particularly if a bridge was a PDH standard design. The bridge must not have been widened. If a bridge's design and materials remain, the original workmanship will be apparent, as will feeling and association. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since the first two decades of the twentieth century and an original or historic setting would be difficult if not impossible to find.
- A bridge associated with a streetcar line is eligible for NRHP listing if the bridge was constructed between 1880 and 1916 on a regionally significant trolley line and it was built and paid for by the streetcar company. "Regionally significant" is defined as the streetcar route that played an important role in expanding suburban settlement patterns in the Greater Philadelphia area in the years between 1880 and 1916. Mere use of a bridge by a streetcar line is not a historically significant association; streetcar lines generally followed existing roads and would have been carried by existing bridges.

To be eligible for NRHP listing, a bridge's location must be unchanged; the structure must be on the original alignment of the streetcar line. The bridge must be substantially unaltered. It must retain the character-defining features of its type and design. In the case of a stone bridge, it must retain its stone substructure, arch, spandrel walls, parapets, and random course or coursed stonework. For a steel stringer or steel girder bridge, this would mean its original beams and substructure. For a metal truss, this would mean the truss's original connection details and a preponderance of its original members. For a concrete bridge, this would mean the original structural members and substructure. Ideally, all bridges should also retain their original parapets. The bridge must not have been widened. If a bridge's design and materials remain, the original workmanship will be apparent, as will feeling and

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association. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1916 and an original or historic setting would be difficult if not impossible to find.

- Bridges designed by a county engineer between 1880 and 1916 would be eligible for NRHP listing only if two conditions are met: the bridge was actually designed by the person designated as the county engineer and that the bridge was part of a county-wide road or bridge building program undertaken by the county. There must be documentary evidence that a bridge was designed by the county engineer, such as bridge plans naming him as the designer or a reference to the county engineer as the designer in county commissioner minutes. References in the minutes to specifications prepared by the county engineer do not constitute evidence of design; specifications are bidding documents used by outside engineers and contractors to develop a bridge design. Similarly, bridge plaques that include the name of the county engineer are not evidence of bridge design; a bridge plaque simply lists the name of county officials in office at the time the bridge was erected.

There must also be evidence that a bridge was designed as part of a county-wide program of road and/or bridge improvements. Design of an individual bridge or a series of unconnected individual bridges is not evidence of a significant association with the transportation history of the county. Evidence would include discussion of the bridge building in the writings or historical papers of the county engineer; discussion of the program in the county commissioners minutes; or discussion of the program in one or more county newspapers. The discussion must include a definite source and level of funding. Ideally, newspaper accounts should be collaborated by evidence from a county government source.

A bridge determined to be significant in association with a county-led road and/or bridge improvement program must have integrity. The bridge's location must be unchanged; the structure must be where it was originally placed. The bridge must be substantially unaltered. It must retain the character-defining features of its type and design. For a steel stringer or steel girder bridge, this would mean its original beams and substructure. For a metal truss, this would mean the truss's original connection details and a preponderance of its original members. For a concrete bridge, this would mean the original structural members and substructure. Ideally, all bridges should also retain their original parapets. The bridge must not have been widened. If a bridge's design and materials remain, the original workmanship will be apparent, as will feeling and association. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1916 and an original or historic setting would be difficult if not impossible to find.

Bridges designed by county engineers may also be significant under NRHP Criterion C for their engineering. Significance under Criterion C was largely assessed during PennDOT's Historic Highway Bridge Inventory and Evaluation. Significance under Criterion C is not covered by this MPDF.

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**Other Considerations**

Prior to 1903, local roads continued to be built through the process of petitions to the Court of Quarter Sessions. Between 1903 and 1916, road building increasingly became the province of the PDH. Consequently, a county designed and built road constructed between 1880 and 1916 is historically significant only if it is an example of innovative road building techniques. This would be addressed under NRHP Criterion C and is not a subject of this MPDF.

A road or bridge is *not* significant because it was part of the Lincoln Highway or other named tourist trail. Such trails were designated and promoted by private associations as a means of making travel easier and publicizing businesses along the routes. In some states, the associations were instrumental in getting the routes improved, but this was not the case in Pennsylvania. Following passage of the Road Act of 1903 and the Sproul Act of 1911, the PDH implemented road and bridge construction programs based on statewide priorities it had established. The designation of a road as a tourist trail was not one of the considerations.

A road bridge from the period 1880-1916 may be significant under NRHP Criterion A for Transportation in association with a railroad, particularly if the bridge carried a road over or under a commuter rail route or other improvement that enhanced railroad operations. However, because this area of significance relates to the transportation function of the railroad and not to the bridge's importance to the road system, the bridge would be evaluated as part of the NRHP assessment of the railroad in question.

**The Golden Age of Pennsylvania Highway Construction, 1916-1941**

This period began following the passage of the Federal-Aid Road Law of 1917 and ended with America's entry into World War II. It is characterized by increasing oversight of road and bridge construction by the PDH, until by the end of the period the state agency has direct or indirect control over the vast majority of highways in Pennsylvania. Early in the period, the PDH designated 3,300 miles of roads on the State Highway System as primary roads, which would be its priority for

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improvements. In 1931, the State Highway System was increased by 30,000 miles through the addition of the Pinchot Roads, the last great addition to the system. At the end of the period, New Deal programs provided a portion of the highway funding received by the state, but this did not change the PDH's priorities or design standards.

**Registration Requirements: Road Corridor Historic Districts**

- Roads constructed or upgraded between 1922 and 1931 on the 3,300-mile primary highway system are eligible for NRHP listing under Criterion A for Transportation if they retain integrity. A significant road from this era could be an abandoned or bypassed Early Automobile Road Segment or an Evolved Road. The road must be on its original alignment and retain the width, profile, and grade it had after its improvement. Also, because hard surfacing was an important component of upgrading the primary highway system, the road must retain the concrete or bituminous bound macadam surface placed between 1922 and 1931. Roads that were not hard surfaced would not be considered to be significant. Alignment, width, profile, grade, and surface material must be verified by original PDH plans. Subsequent upgrades such as guiderails, pavement striping, lighting, and traffic signals would be considered reversible and would not count against integrity. If the road's width, profile, grade, and surface are unchanged, feeling and association will remain. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1931 and an original or historic setting would be difficult if not impossible to find.

Contributing resources would include bridges and culverts built as part of the improvements, provided they have not been widened or significantly altered. Because significance is focused on road improvements by the PDH, buildings along the road would not contribute to the Road Corridor Historic District, even if they were present when the improvement was made.

- A Pinchot Road is significant under Criterion A for Transportation if it is an unaltered example of such a road brought into the State Highway System in 1931 and improved to PDH standards between 1931 and 1941. It must be a lightly built, 16-foot-wide road covered with stone, slag, or gravel. It can be an abandoned or bypassed Early Automobile Road Segment or an Evolved Road. The road must be on its original alignment and retain the width, profile, and grade it had after its improvement. Alignment, width, profile, grade, and pavement material must be verified by original PDH plans. Subsequent upgrades such as guiderails, pavement striping, lighting, and traffic signals would be considered reversible and would not count against integrity. If the road's width, profile, grade, and pavement are unchanged, feeling and association will remain. Setting is also an important aspect of integrity, because the Pinchot Roads program was designed to "get the farmers out of the mud," consequently, a rural setting similar to when the road was built is necessary.

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Retention of historic setting can be confirmed by comparing historic USGS maps and aerial photographs found at [www.pennpilot.psu.edu](http://www.pennpilot.psu.edu) with current conditions.

Contributing resources would include bridges and culverts built as part of the Pinchot Road improvements, provided they have not been widened or significantly altered. Because significance is focused on road improvements by the PDH, buildings along the road would not contribute to the Road Corridor Historic District, even if they were present when the improvement was made.

**Registration Requirements: Individual Bridges**

- A bridge constructed between 1922 and 1931 on the 3,300-mile primary highway system is significant under Criterion A for Transportation if it is a first generation bridge placed by the PDH as part of that improvement program, even if the road itself has lost integrity. Because so many bridges were erected as part of this improvement program, a bridge must retain *all* its original, unaltered elements in order to be eligible, including the substructure and all components of the superstructure, including the parapets. Additionally, a bridge’s location must be unchanged, even if subsequent upgrades changed the location of successor routes, and the bridge must not have been widened. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1931 and an original or historic setting would be difficult if not impossible to find.

Integrity of design, materials, and workmanship must be demonstrated by comparing the bridge as it is currently configured to historic bridge plans, the record of any alterations contained in subsequent bridge plans, or information contained in PennDOT’s Bridge Management System (BMS). If a bridge’s design, materials, and workmanship are unaltered, then the bridge will also have feeling and association.

- A bridge constructed on a Pinchot Road is significant under Criterion A for Transportation if it was placed by the PDH between 1931 and 1941 *and* it is an unaltered example of the typical Pinchot Road bridge, a steel stringer bridge composed of I-beams with welded angle cross-bracing between the beams, a timber laminate deck, and welded steel railings composed of angles and channels. Because so many Pinchot Road bridges were erected as part of the improvement program, bridges must retain *all* original, unaltered elements in order to be eligible for listing, including the substructure and all components of the superstructure, including the parapets. Additionally, the bridge’s location must be unchanged, even if subsequent upgrades changed the location of successor routes, and the bridge must not have been widened. Setting is also an important aspect of integrity, because the Pinchot Roads program was designed to “get the farmers out of the mud,” consequently, a rural setting similar to when the road was built is necessary.

Integrity of design, materials, and workmanship must be demonstrated by comparing the bridge as it is currently configured to historic bridge plans, the record of any alterations contained in subsequent bridge plans, or information contained in PennDOT’s BMS. If a

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bridge's design, materials, and workmanship are unaltered, then the bridge will also have feeling and association. Retention of historic setting can be confirmed by comparing historic USGS maps and aerial photographs found at [www.pennpilot.psu.edu](http://www.pennpilot.psu.edu) with current conditions. If a bridge's design, materials, workmanship are unaltered and the setting is substantially unaltered, then the bridge will also have feeling and association.

### Other Considerations

- Roads and bridges constructed with funding from New Deal programs would not be eligible for listing under Criterion A for Transportation. The New Deal provided additional sources of funding, but it did not alter the PDH's priorities or the types of roads and bridges it designed and constructed.
- A road bridge built between 1917 and 1941 may be significant under NRHP Criterion A for Transportation in association with a railroad, particularly if the bridge was built as part of large scale electrification programs undertaken by the PRR and the Reading railroads. However, because this area of significance relates to the transportation function of the railroad and not to the bridge's importance to the road system, the bridge would be evaluated as part of the NRHP assessment of the railroad in question.
- By the period between 1917 and 1941, streetcar lines were struggling financially. Improved roads led to the increasing use of buses, which had greater flexibility over route selection than did streetcars. Consequently, bridges built by streetcar lines in this period would not be eligible for NRHP listing.
- Public Law 163 of 1919 enabled counties to appoint, rather than elect, county engineers. However, with the PDH assuming greater and greater responsibilities over road and bridge construction, county engineers were designing and county forces were maintaining fewer bridges. Consequently, county engineer designed bridges from this era are not eligible for NRHP listing under Criterion A for Transportation.

### Wartime and Post-World War II Road Construction Era, 1942-1956

The period between 1942 and 1956 is marked by PDH control over nearly all road and bridge construction. Roads and bridges during this period are significant under NRHP Criterion A for Transportation if they have important associations with construction to improve access to war production facilities or construction of urban expressways. Thus, all potentially significant roads from this era are Planned Roads.

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**Registration Requirements: Road Corridor Historic Districts**

- To be significant in association with improved access to a war production facility, the road must have been built by the PDH between 1942 and 1945 as a new or substantially upgraded route leading to a significant military base, shipyard, or defense plant. There must be evidence of the strategic significance of the facility in published histories, engineering journal articles, or PDH or the United States War Department records. The road must be identified as having been specifically built as part of the war-related improvement program and the improvement must have been funded in whole or in part by the War Department. Improvements made to nearby routes that are not specifically related to improving the route to the facility are not significant and would not be eligible for NRHP listing. A significant road from this era could be an Evolved Road, but it must be on its original alignment and retain the width, number of lanes, profile, and grade it had after its improvement. Unlike the preceding era, where road pavement was an important consideration, roadway material is not a character-defining feature. Alignment, width, number of lanes, profile, and grade must be verified by original PDH plans. Subsequent upgrades such as guiderails, pavement striping, lighting, and traffic signals would be considered reversible and would not count against integrity. If the road's width, number of lanes, profile, and grade are unchanged, feeling and association will remain. Setting is not an important aspect of integrity; the Greater Philadelphia area has grown and developed substantially since 1945 and an original or historic setting would be difficult if not impossible to find.

Contributing resources would include bridges and culverts built as part of the state improvement, provided they have not been widened or significantly altered. Because significance is focused on road improvements by the PDH and War Department, buildings along the road would not contribute to the Road Corridor Historic District, even if they were present when the improvement was made.

- To be significant as an urban expressway, a road must have been specifically planned and built as part of the BPR's post-war policy of constructing urban expressways through and around major metropolitan areas. In Southeastern Pennsylvania, this would be the Schuylkill Expressway and associated roadways. Only the portion between the expressway's original termini would be eligible for NRHP listing, and only those portions that retain the original alignment, width, number of lanes, profile, and grade. Unlike the preceding era, where road pavement was an important consideration, roadway material is not a character-defining feature. Alignment, width, number of lanes, profile, and grade must be verified by original PDH plans. Subsequent upgrades such as guiderails (if not originally called for), pavement striping, lighting, and traffic signals would be considered reversible and would not count against integrity. If the road's width, number of lanes, profile, and grade are unchanged, feeling and association will remain. Setting is not an important aspect of integrity; the setting was predominantly urban when built and it remains predominantly urban today.

Contributing resources would include bridges and culverts built as part of the state improvement, provided they have not been widened or significantly altered. Because

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significance is focused on road improvements by the PDH and War Department, buildings along the road would not contribute to the Road Corridor Historic District, even if they were present when the improvement was made.

### Registration Requirements: Individual Bridges

- An individual bridge can be found eligible for NRHP listing under Transportation in association with a project to improve access to a war production facility even if the route has lost integrity. The bridge must have been built by the PDH between 1942 and 1956 on a route leading to a significant military base, shipyard, or defense plant. There must be evidence of the strategic significance of the facility in published histories or other public records. The bridge must be identified in records of the PDH or the United States War Department as having been specifically built as part of the war-related improvement program, and the improvement must have been funded in whole or in part by the War Department. Bridges placed on nearby routes that are not specifically related to improving the route to the facility are not significant and would not be eligible for NRHP listing. The bridge's location must be unchanged; the structure must be where it was originally placed. The bridge must be substantially unaltered. It must retain the character-defining features of its type and design. For a steel stringer or steel girder bridge, this would mean its original beams and substructure. For a metal truss, this would mean the truss's original connection details and a preponderance of its original members. For a concrete bridge, this would mean the original structural members and substructure. Ideally, all bridges should also retain their original parapets. The bridge must not have been widened. If a bridge's design and materials remain, the original workmanship will be apparent, as will feeling and association. Setting is not an important aspect of integrity; the area through which the roadway passed has continued to develop since 1956 and an original setting is not a character-defining feature.
- To be significant in association with an urban expressway, a bridge must have been specifically planned and built as part of the BPR's post-war policy of constructing urban expressways through and around major metropolitan areas. In Southeastern Pennsylvania, this would apply to bridges associated with the Schuylkill Expressway where the route or portions of it have lost integrity. The bridge's location must be unchanged; the structure must be where it was originally placed. The bridge must be substantially unaltered. It must retain the character-defining features of its type and design. For a steel stringer or steel girder bridge, this would mean its original beams and substructure. For a metal truss, this would mean the truss's original connection details and a preponderance of its original members. For a concrete or prestressed concrete bridge, this would mean the original structural members and substructure. Ideally, all bridges should also retain their original parapets. The bridge must not have been widened. If design and materials remain, the original workmanship will be apparent, as will feeling and association. Setting is not an important aspect of integrity; the bridges were built as urban bridges and presumably all retain their urban settings.

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### Other Considerations

A road or bridge constructed as part of a post-World War II subdivision eligible for listing under NRHP Criterion A may be a contributing resource to that subdivision. The resource to be evaluated would be the subdivision itself, using the standards developed by the Pennsylvania Historical and Museum Commission (PHMC) on its *Pennsylvania Historic Suburbs* website ([http://www.portal.state.pa.us/portal/server.pt/community/pennsylvania\\_suburbs/5864](http://www.portal.state.pa.us/portal/server.pt/community/pennsylvania_suburbs/5864)).

### Interstate Highway Era, 1956-1970

In the period that began with the passage of the Interstate Highway and Defense Act and ended with the transformation of the PDH into PennDOT, much of the federal and state road building efforts were focused on constructing the interstate highway system. In 2005, the Advisory Council on Historic Preservation adopted the Section 106 Exemption Regarding Effects to the Interstate Highway System, which effectively excludes the majority of the 46,700-mile interstate system from consideration as a historic property under Section 106 of the National Historic Preservation Act. As a consequence, a property type for bridges associated with the interstate highway system will not be developed as part of this MPDF.

The PDH also concentrated on building multiple-lanes, limited-access bypasses around population centers. These Planned Roads and individual bridges associated with them may be eligible for NRHP listing.

### Registration Requirements: Road Corridor Historic Districts

A PDH-sponsored and built highway bypass project is significant under NRHP Criterion A if it was constructed between 1956 and 1970 *and* there is evidence that the project was a priority with the PDH. Evidence that it was a priority project includes its specific identification as such in the PDH's 12-Year Plan or in a single or series of PDH annual reports. Because such bypass projects are of recent construction, a bypass must retain *all* original, unaltered elements

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in order to be eligible for NRHP listing, including alignment, width, number of lanes, profile, grade, guiderails (if they were part of the project), pavement material, and exit/entrance lane configurations and interchanges. Subsequent upgrades including pavement striping, lighting, traffic signals, and guiderails (if not originally part of the project) would be considered reversible and would not be counted against integrity. Likewise, the setting should be similar to the setting from when the road was constructed. Retention of historic setting can be confirmed by comparing historic USGS maps and aerial photographs found at [www.pennpilot.psu.edu](http://www.pennpilot.psu.edu) with current conditions. The road must not have been widened. If the design, materials, and workmanship are unaltered and the setting is substantially unaltered, then the road will also have feeling and association.

Contributing resources would include bridges and culverts built as part of the bypass projects, provided they have not been widened or significantly altered. This would include bridges that both carry traffic on and carry traffic over the bypass, and bridges built as part of exit/entrance ramps and interchanges. Because significance is focused on PDH priority road improvements, buildings along the road would not contribute to the Road Corridor Historic District, even if they were present when the improvement was made.

**Registration Requirements: Individual Bridges**

An individual bridge associated with a PDH-sponsored highway bypass project cannot be eligible for NRHP listing for Criterion A for transportation. The significant resource is the bypass, not its individual components.

An individual bridge could be eligible under Criterion C if it is significant for its engineering. PennDOT’s Historic Highway Bridge Inventory and Evaluation did not address bridges constructed after 1956. Consequently, a historic context, criteria for evaluation, and registration requirements for evaluating bridges built between 1957 and 1970 under NRHP Criterion C for engineering have yet to be developed.

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**G. Geographical Data**

This MDPF covers Bucks, Chester, Delaware and Montgomery counties plus the city and county of Philadelphia. Since the founding of Pennsylvania in 1681, this area has comprised Pennsylvania's portion the Greater Philadelphia and has been referred to as Southeastern Pennsylvania for more than 300 years. The area is contiguous with Pennsylvania's original three counties, Bucks, Chester, and Philadelphia. Montgomery County was created out of Philadelphia County in 1784; Delaware County was formed from Chester County in 1786.

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**United States Department of the Interior**

National Park Service

**National Register of Historic Places  
Continuation Sheet**

Name of Property

Bucks, Chester, Delaware, Montgomery, and  
Philadelphia, Pennsylvania

County and State

Road and Highway Resources of  
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Name of multiple listing (if applicable)

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