April 2010

URS

Determination of Effect

S.R. 7404 Sec. 07M

Coplay-Northampton Bridge Replacement Project

Coplay Borough, Lehigh County
Northampton Borough, Northampton Countiy, PA

E.R. No. 06-8045-042

Prepared for:

PENNDOT Engineering District 5-0

and

LEHIGH COUNTY

Determination of Effect Report

Coplay-Northampton Bridge Replacement Project

S.R. 7404 Sec. 07M

E.R. No. 06-8045-042

Prepared for:
Lehigh County
Pennsylvania Department of Transportation Engineering District 5-0

Prepared By:
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April 2010

ABSTRACT

This report documents the background research and field visits that comprise a Determination of Effect Report performed in association with the proposed replacement of the Coplay-Northampton Bridge in Coplay Borough, Lehigh County and Northampton Borough, Northampton County, Pennsylvania. Lehigh County, in conjunction with the Pennsylvania Department of Transportation, proposes to replace the bridge, as well as perform highway improvements to the approaches on either side of the bridge. Under Section 36 CFR 800.4, two National Register-eligible resources were identified within the Area of Potential Effect: Coplay-Northampton Bridge and Lehigh Valley Railroad. In addition, a Phase Ia Archaeological Investigation was performed and it was determined no archaeological sites are located within the Area of Potential Effect.

Under the direction of 36 CFR 800.4 and 800.6, a Definition of Effect and Criteria of Adverse Effect were applied to the historic resources. This resulted in a recommendation that the undertaking will have an Adverse Effect on the Coplay-Northampton Bridge and No Effect on the Lehigh Valley Railroad.

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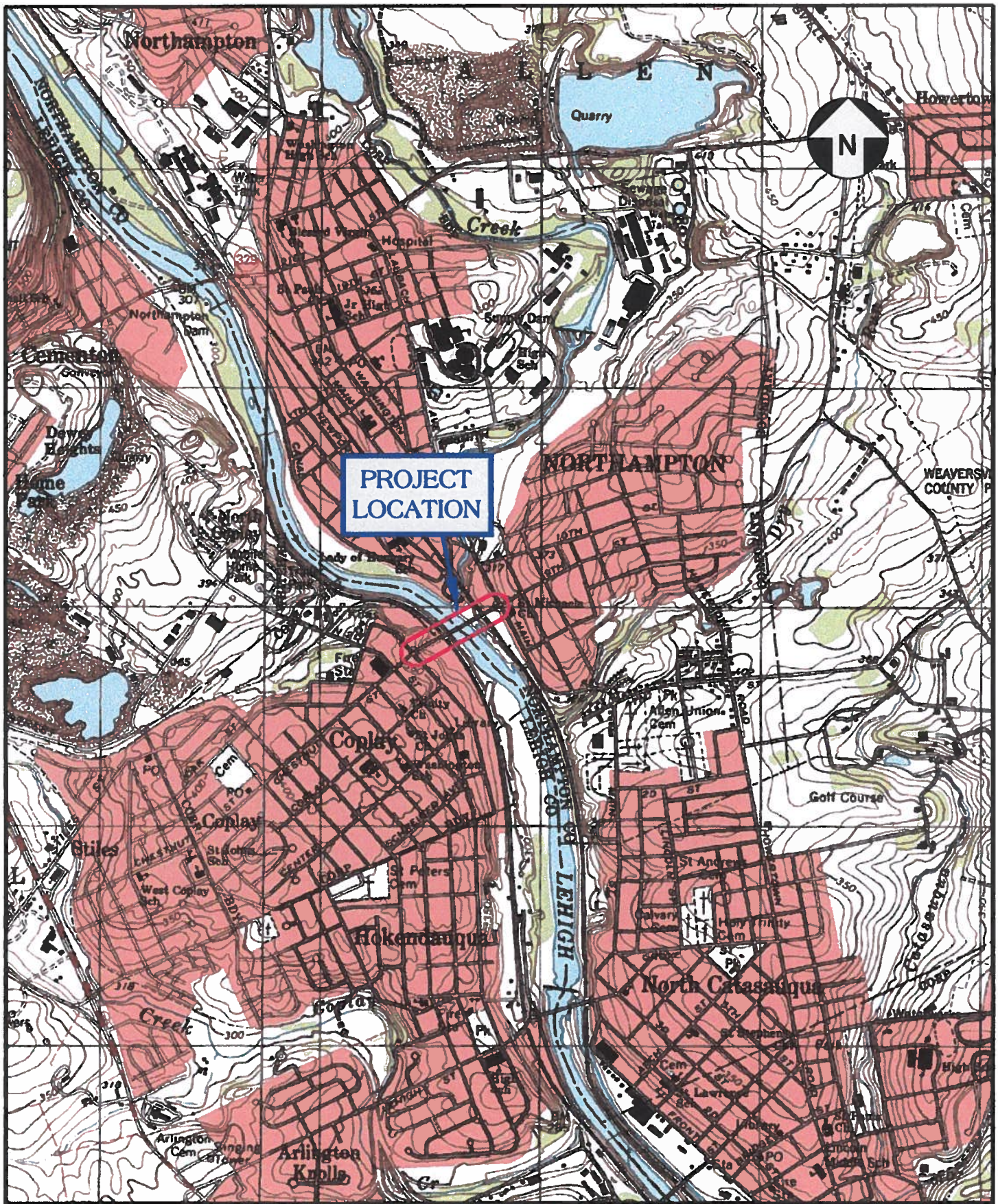
I. INTRODUCTION

This report documents an assessment of the potential effects of the proposed replacement of the Coplay-Northampton Bridge in Coplay Borough, Lehigh County and Northampton Borough, Northampton County, Pennsylvania (see Figure 1). Lehigh County, in conjunction with the Pennsylvania Department of Transportation (PennDOT) Engineering District 5-0, proposes to replace the bridge, as well as perform highway improvements to the approaches on either side of the bridge.

A study of historic resources in the vicinity of the project is required by Federal law, specifically Sections 106 and 110 of the National Historic Preservation Act of 1966, as amended. These regulations mandate that all federal undertakings, including those undertakings using federal funds or requiring a federal permit, must undergo Section 106 Review (36 CFR Part 800, "Protection of Historic Properties"). The Section 106 Review process involves the identification of historic resources, evaluation of how the undertaking will or will not affect the resources, and mitigation of the adverse or potentially adverse effects of the undertaking upon the historic resources. This process involves the federal agency taking the subject action in consultation with the State Historic Preservation Office (SHPO) of the state(s) in which the historic resources are located. In Pennsylvania, the SHPO is the Pennsylvania Historical and Museum Commission (PHMC). This bridge rehabilitation project involves funding from FHWA. This Determination of Effect Report was prepared for Lehigh County and PennDOT by URS Corporation of Fort Washington, Pennsylvania.

The Area of Potential Effect contains two National Register-eligible resources: Coplay-Northampton Bridge and the Lehigh Valley Railroad from Allentown to Wilkes-Barre (hereafter referred to as the Lehigh Valley Railroad). Under 36 CFR 800.4 and 800.6, the Definition of Effect and Criteria of Adverse Effect were applied and resulted in the recommendation that the proposed bridge replacement will have an Adverse Effect on the Coplay-Northampton Bridge and No Effect on the Lehigh Valley Railroad.

In addition to 36 CFR Part 800, this study has been conducted in accordance with, and pursuant to, the following applicable federal laws and regulations: 36 CFR Part 60, "National Register of Historic Places"; Section 101(b)(4) of the National Environmental Policy Act of 1969, as amended; Sections 1(3) and 2(b) of Executive Order 11593, "Protection and Enhancement of Cultural Environment"; and the Pennsylvania History Code (37 P.S. 5).



PROJECT LOCATION MAP

COPLAY - NORTHAMPTON BRIDGE REPLACEMENT PROJECT

SOURCE: CATASAUQUA, PA 7.5 MINUTE USGS QUADRANGLE MAP

URS

DATE: SEPTEMBER 2009

SCALE: 1" = 2000'

FIGURE 1

t:\21387147\CADD\Civil\Chestnut Street\also\historic\hist_location.dgn
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II. PROJECT PURPOSE AND NEED

The purpose of the project is to maintain highway connectivity on S.R. 7404, an urban collector street. This project is needed because the inspection history of the bridge indicates steady degradation of the structural elements of the main arch spans and both approach spans. Continued deterioration will only further reduce the load-carrying capacity of the bridge and could result in periodic or long-term closures to perform emergency repairs. The deterioration would also eventually render the bridge unsafe, which would lead to the closing of the bridge to vehicular traffic. Such a closing would be an adverse impact to the community relative to emergency services. The detour for emergency vehicles would be approximately 3.1 miles.

The project is also needed due to other potential risks associated with bridge deterioration. Collapse of the truss span would block Norfolk Southern trackage and be a significant emergency. Collapse of the arch spans into the river has flooding implications for Northampton. Failure of a portion of the deck with traffic on the bridge presents a potential loss of life issue. Lastly, traffic and congestion issues at the Northampton end of the bridge need to be addressed. A left-hand turning lane is needed on the bridge to reduce accidents at the signalized intersection at the east end of the bridge as well as reduce road user costs due to inherent delays.

In an effort to retain all of the historic elements of this bridge, design exceptions and requests of PennDOT's Chief Bridge Engineer, along with County officials can be expected. For example, PennDOT may need to rule on whether this historic bridge must be retrofit to accommodate the loading of modern truck weights or would a design exception be allowed. Although, historic bridges have remained in service with truck postings, a 70 year old bridge may have difficulty in carrying all of the present legal loads allowable on highways. This bridge is presently posted at 17 tons, but analysis shows it cannot meet much more than an HS-20 truck loading which is 36 tons. Therefore, care must be exercised that trucks such as the TK-527 and other multi-axle trucks weighing more than 36 tons do not use this bridge if it is rehabilitated. This creates a problem in policing as it is difficult to ensure on a day to day basis that no overloaded truck will use the bridge. Another problem is that trucks are unable for various reasons to use two of the adjacent bridges as an alternate route. S.R.0329 located one mile up stream is not posted but has inadequate vertical clearance for many trucks, is narrow with high traffic volumes, and has a high accident history. The Lehigh Street Bridge, located downstream, is posted lower than this bridge and cannot presently be used by trucks. The only present alternative then becomes for truck traffic to use S.R. 0022 which is all ready congested. In the future, after it is rehabilitated, the Lehigh Street Bridge will be able to take truck traffic, but until then, if the Chestnut Street Bridge cannot carry heavy trucks, they must use 2nd Street and Main Street which are narrow and not conducive to use by the heavy, long trucks which typically travel through the area.

Traffic flow and efficiency are improved by this bridge carrying full legal loads. The included location map shows three highway bridges crossing the Lehigh River that are equally spaced. Admittedly the other two are more important to the traffic network as

they connect directly to S.R. 0145 which is a north south Arterial. The Chestnut Street Bridge is to be used as the detour route for reconstruction of the Lehigh Street Bridge. When repair work is occurring on the S.R. 0329 bridge, local people traditionally use the Chestnut Street Bridge as an alternate. A problem in efficiency would exist in the north/south direction if the Chestnut Street Bridge is eliminated as an alternative. The local north/south street network is narrow and has only two lanes so closing Chestnut Street would increase north/south congestion and degrade air quality. A review of the delay times clearly show a significant improvement in traffic flow if a turning lane is included on the bridge.

In terms of addressing the need for recreational use, the Lehigh Valley Planning Commission (LVPC) has identified the Chestnut Street Bridge location as a hub in their greenway system. This system includes both the Lehigh River and Hokendauqua Creek as greenways. Another recreational use is the two trails running under the bridge. Presently, the Ironton Trail is active on the west side of the river and LVPC has planned for 2009/2010, construction of a Lehigh Canal Trail that will pass under the bridge on the East side of the river. The Chestnut Street Bridge then becomes a logical connector across the river for these two trails.

III. PROJECT DESCRIPTION

Lehigh County proposes to replace on existing alignment the Coplay-Northampton Bridge, a 1930 National Register-eligible reinforced concrete bridge that links Coplay Borough and Northampton Borough, Lehigh and Northampton Counties, Pennsylvania. The bridge is 1,124 feet long and consists of seven spans: three arch spans, three girder spans, and a through truss.

The Preferred Alternative is presented by bridge segment: west approach (west abutment to the first arch pier); main arch spans (three arch spans over the Lehigh River); and east approach (truss span between arch pier and east abutment). See Appendix E for project plans.

West Approach: Bridge Street will remain as it currently is and the three girder spans will be replaced with continuous concrete I-beam or steel girder spans on new pier stems built on the existing pier foundations. The existing abutment, which is in good condition, will be reused with a retained fill approach. The existing north side staircase will be removed. The existing 40'-11" deck width will be widened to 44'-8¼" out-to-out. This includes a 1'-8¼" barrier, a 6'-0" shoulder, (2) 12'-0" travel lanes, a 4'-0" shoulder, and an 8'-0" sidewalk with a 1'-0" barrier.

Main Arch Spans: Everything above the plinth of the four massive river piers will be demolished. Thus, the arches and superstructure will be removed and the three spans that will replace them will be continuous, multi-girder steel sections, with a deck width of 44'-8¼" out-to-out. This cross section will be the same as the proposed cross section for the west approach, using a 6'-0" shoulder on the barrier side and a 4'-0" shoulder on the sidewalk side. A portion of the fourth span will need to have splayed girders to accommodate the wider deck for the turning lane transition. The shoulder on the sidewalk side will taper down to 2'-0" and the travel lanes will be reduced to 11'-0" and a 10'-0" turning lane will be added. Thus, the deck will taper out for the last 80'-0" to a final width of 50'-8¼" out-to-out.

East Approach: In order to provide a left turning lane at the 9th and Main Street intersection in Northampton, the existing truss will be removed and replaced with a two-span bridge (one 85'-0" span and one 133'-10" span) over Norfolk Southern Railroad's two tracks, one of which requires a double stack clearance of 24'-3", by using a spread box beam superstructure. With the rest of the structure having a 6-foot westbound shoulder, the same shoulder will be incorporated on this segment. Maintaining this shoulder will improve safety. The out-to-out width of this segment is 50'-8¼", which meets PennDOT's criteria for width, thus improving safety.

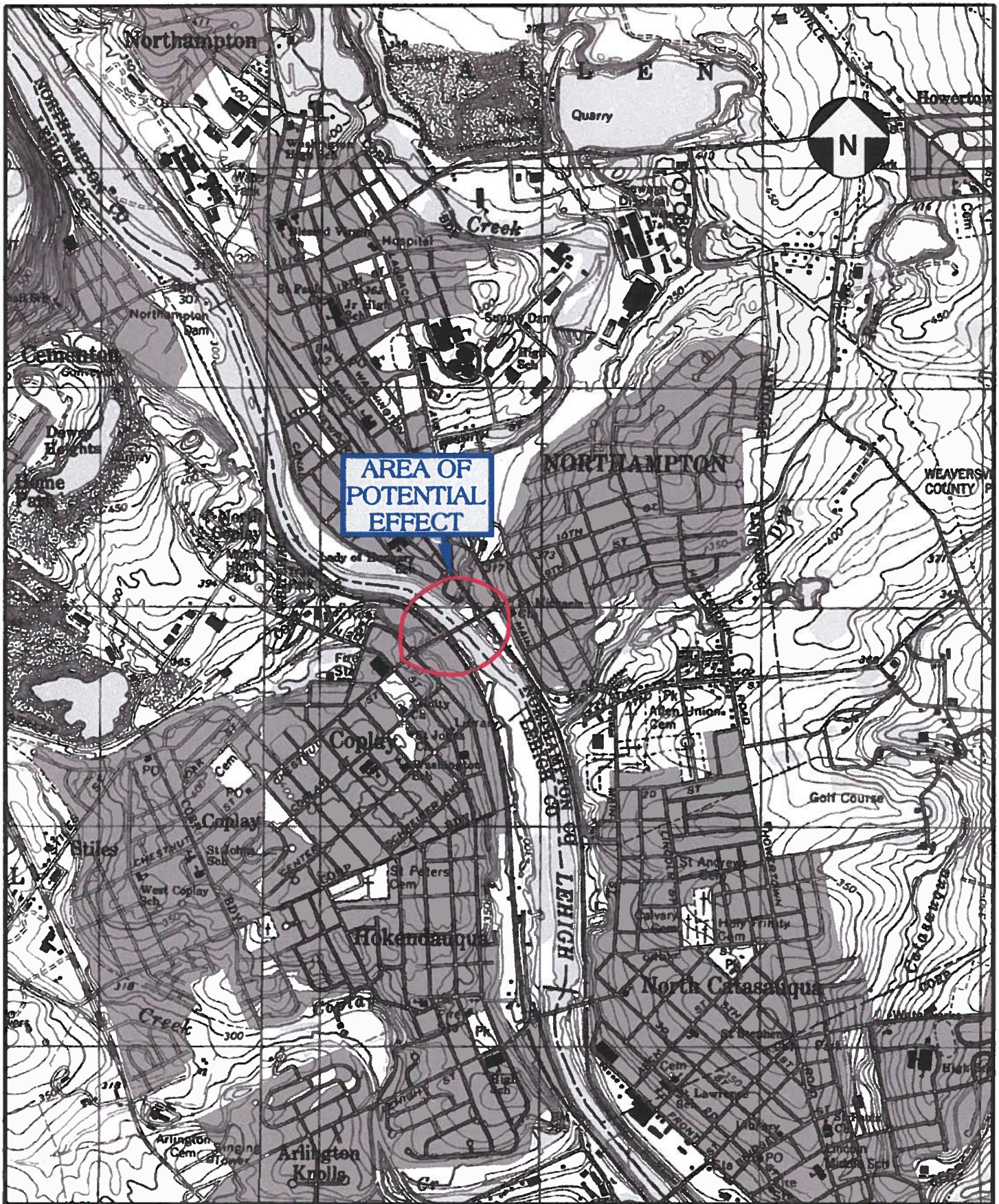
IV. THE AREA OF POTENTIAL EFFECT

According to 36 CFR Part 800, "Protection of Historic Properties" (1986, revised 1999) the APE is defined as:

> the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

A. Area of Potential Effect

The APE for this project encompasses the Coplay-Northampton Bridge, areas north and south of the bridge along the Lehigh River from which the bridge is prominent and visible, and residential and commercial blocks that frame the bridge in Coplay and Northampton. In addition, the APE encompasses sections of the Lehigh Canal and the Norfolk-Southern rail line located beneath the bridge on the Northampton side (see Figure 2). This APE was determined in relation to potential improvements to be made by the project to the Coplay-Northampton Bridge. It encompasses the area within which the project may cause changes in the character or use of historic resources. PHMC reviewed and concurred with this APE at the beginning of the project (Appendix A).



AREA OF POTENTIAL EFFECT

COPLAY - NORTHAMPTON BRIDGE REPLACEMENT PROJECT

SOURCE: CATASAUQUA, PA 7.5 MINUTE USGS QUADRANGLE MAP

URS

DATE: SEPTEMBER 2009

SCALE: 1" = 2000'

FIGURE 2

V. DESCRIPTION OF EFFORTS USED TO IDENTIFY HISTORIC PROPERTIES

The identification of historic properties commenced with a windshield survey that revealed eight properties 50 years or older in the APE: Coplay-Northampton Bridge, two adjacent neighborhood groupings, a historic dwelling, a lumberyard, a former silk mill, and sections of two railroad lines. In addition, an in-filled section of the Lehigh Canal was noted in the APE.

URS staff then examined the holdings of PHMC in Harrisburg to determine previous survey efforts and identify cultural resource reports and studies pertinent to the project area. Research revealed the Coplay-Northampton Bridge and one of the railroad lines, the Lehigh Valley Railroad, were previously surveyed and determined to be eligible for the National Register. Also, the Lehigh Canal was noted as being listed on the National Register. The other six resources had not been previously surveyed.

Following PHMC research, background research was initiated to gain an understanding of the project area's historical and architectural development. URS staff conducted historical research at the Lehigh County Historical Society, the Northampton County Historical Society, and the Historical Society of Pennsylvania. In addition, URS conducted research specific to Lehigh Valley silk mills at the Pennsylvania Canal Museum. Property title searches were conducted at the Recorder of Deeds in the Lehigh County Government Complex, Allentown, and the Northampton County Government Complex, Easton.

URS staff undertook field investigations designed to document the appearance, condition, and integrity of resources fifty years or older within the project area. Each resource was recorded photographically, and field notes were taken describing the resource's appearance, integrity, and proximity to the proposed improvements. As there are no above-ground resources associated with the Lehigh Canal in the APE, the canal was investigated as a potential archaeological resource (see Section VI). Information gathered during the background research and field survey phases was entered on Pennsylvania Historic Resource Survey Forms and submitted to PHMC. None of the additional six resources was determined to be eligible for the National Register (see Appendix A). Thus, the APE contains two National Register-eligible resources: Coplay-Northampton Bridge and the Lehigh Valley Railroad.

VI. DESCRIPTION OF HISTORIC RESOURCES

A. Coplay-Northampton Bridge

The Coplay-Northampton Bridge is a seven-span, 1,124'-long viaduct built in 1930. The three middle spans are open spandrel arches, the three western spans are deck girders, and the easternmost span is a steel Parker thru truss. It carries two lanes of traffic in each direction (see Plates 1 – 7).

The Coplay-Northampton Bridge was found eligible for the National Register under Criterion C for its representation of a complicated engineering solution to a complex crossing (see Appendix B). The bridge is composed of three different bridge technologies and spans the Lehigh River as well as railroad corridors on each bank. The National Register boundary consists of a rectangle whose vertices coincide with the outside corners of the bridge's abutments and wingwalls (see Figure 3).

Plate 1. Northwest view of the Coplay-Northampton Bridge.

Plate 2. Southeast view of the Coplay-Northampton Bridge.

Plate 3. Deck view of Coplay-Northampton Bridge looking northeast towards Northampton.

Plate 4. Northeast view of girder spans from Bridge Street in Coplay.

Plate 5. Northeast view of concrete arches from riverbank in Coplay.

Plate 6. View southwest of through truss that comprises easternmost span.

Plate 7. View south of through truss over rail line at Northampton end of bridge.

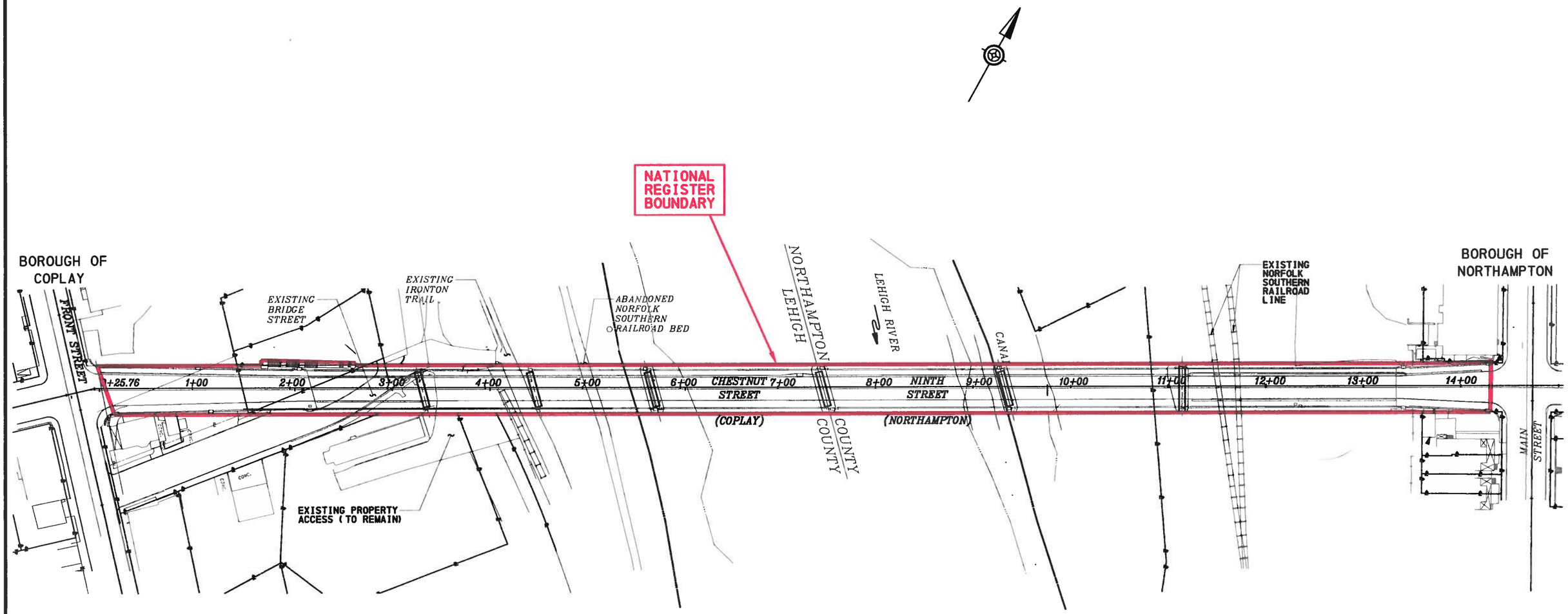


FIGURE 3. NATIONAL REGISTER BOUNDARY

COPLAY - NORTHAMPTON BRIDGE
COPLAY BOROUGH, LEHIGH COUNTY
NORTHAMPTON BOROUGH, NORTHAMPTON COUNTY

URS | DATE: SEPTEMBER 2009 | SCALE:1"= 100'

B. Lehigh Valley Railroad

The Lehigh Valley Railroad corridor at the Coplay-Northampton Bridge consists of two improved walking trails located between the Lehigh River to the east and the General Supply Company lumberyard to the west. The trails occupy the former track locations of the Lehigh Valley Railroad. One of the two trails is part of the Ironton Rail Trail, a 9.2-mile recreational trail. Presently, this corridor is the property of the Norfolk Southern Railroad (see Plates 8-11).

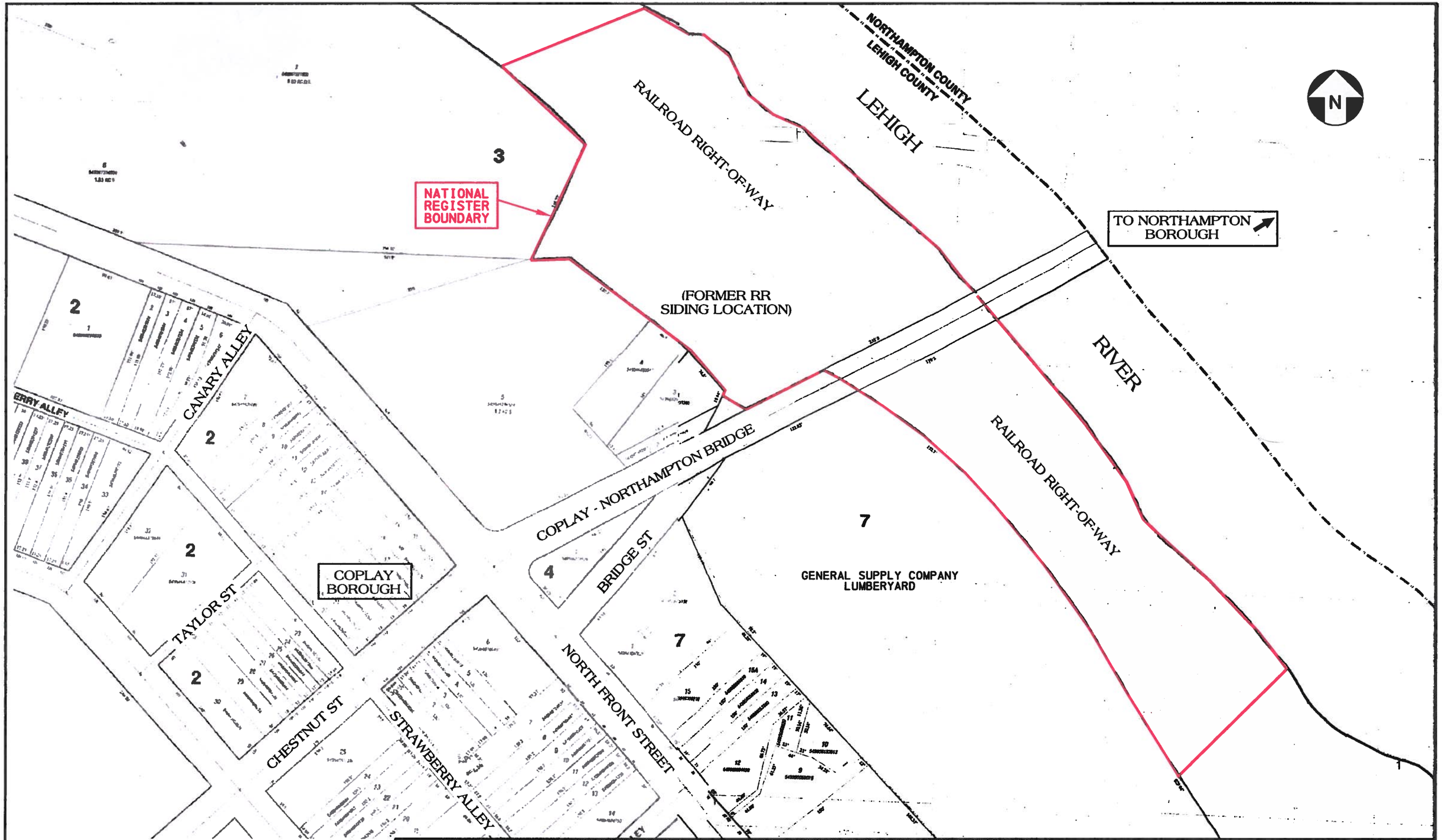
The Lehigh Valley Railroad was found eligible for the National Register of Historic Places in September 1993 under Criteria A and C for its significance in transportation history, economic history, and the development of Pennsylvania industries and communities. The National Register boundary is the railroad right-of-way (see Figure 4).

Plate 8. View south of the Lehigh Valley Railroad corridor from the Coplay-Northampton Bridge. The Lehigh River is beyond the trees to the left.

Plate 9. View north of the Lehigh Valley Railroad corridor from the Coplay-Northampton Bridge. The Ironton Rail Trail is the trail to the left.

Plate 10. View north of the Lehigh Valley Railroad corridor at the Coplay-Northampton Bridge.

Plate 11. View south of the Lehigh Valley Railroad corridor at the Coplay-Northampton Bridge.



NATIONAL REGISTER BOUNDARY - LEHIGH VALLEY RAILROAD

URS

COPLAY BOROUGH, LEHIGH COUNTY

SOURCE: COPLAY BOROUGH TAX MAP

SCALE: 1"=100' (APPROX)

DATE: SEPTEMBER 2009

FIGURE 4

VII. STATUS OF ARCHAEOLOGY

URS submitted a Phase Ia Archaeological Investigation to PennDOT in September 2006. Phase Ia fieldwork consisted of four backhoe trenches within the APE. One trench was placed on the Coplay side of the Lehigh River and three were placed on the Northampton side of the river. The excavation of the trenches determined that the entire APE has been extensively disturbed from industrial activities such as quarrying and iron industry development, as well as transportation-related disturbance from road, bridge, railroad and canal construction. These activities have disturbed the landforms and negated the possibility of any archaeological deposits within the APE. In addition, the Lehigh Canal prism has been completely obliterated within the APE. The investigation concluded that no archaeological sites are located within the project APE and the project will have no effect on significant archaeological resources. PHMC concurred with the study's recommendation by signature on a PennDOT Cultural Resources Submission letter dated October 2, 2006 (see Appendix A).

VIII. METHODOLOGY

Since there are National Register-eligible historic resources within the project APE, it is necessary to assess potential project impacts. Project impacts were assessed based upon the guidelines specified in the Section 106 Regulations (1999) as published in the Federal Register and on the Advisory Council on Historic Preservation's (ACHP) Internet Web site.

In accordance with Section 800.5, it is necessary to apply the Definition of Effect and Criteria of Adverse Effect. In consultation with the PHMC, the Agency Official will apply the Criteria of Adverse Effect to historic properties within the APE. The Agency Official will consider any views concerning such effects that have been provided by consulting parties and the public.

A. Definition of Effect

Effect means alteration to the characteristics of a historic property that qualify it for inclusion in or eligibility for the National Register. The two possible results of identification and evaluation are as follows:

No Historic Properties Affected. If the agency official finds that either there are no historic properties present or there are historic properties present, but the undertaking will have no effect upon them as defined in Section 800.16(i), the agency official will provide documentation of this finding, as set forth in Section 800.11(d), to the SHPO. The agency official will notify all consulting parties and make documentation available for public inspection prior to approving the undertaking. If the SHPO, or the Council, if it has entered into the process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under Section 106 are fulfilled.

Historic Properties Affected. If the agency official finds that there are historic properties that might be affected by the undertaking, or the SHPO or the Council objects to the agency official's finding under paragraph (d)(1) of this section, the agency official will notify all consulting parties and invite their views on the effects and assess adverse effects, if any, in accordance with Section 800.5.

B. Criteria of Adverse Effect

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. Adverse effects on historic properties include, but are not limited to:

(i) Physical destruction of or damage to all or part of the property;

(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's standards for the treatment of historic properties (36 CFR part 68) and applicable guidelines;
(iii) Removal of the property from its historic location;
(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
(v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;
(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

C. Results of Assessment of Adverse Effect

No Adverse Effect. The Agency Official shall maintain a record of the finding and provide information on the finding to the public upon request, consistent with the confidentiality provisions of Section 800.11(c). Implementation of the undertaking in accordance with the finding as documented fulfills the Agency Official's responsibilities under Section 106 and this part. If the Agency Official will not conduct the undertaking as proposed in the finding, the Agency Official shall reopen consultation under Section 800.5(a).

Adverse Effect. If an Adverse Effect is found, the Agency Official will consult further to resolve the Adverse Effect pursuant to Section 800.6.

Section 800.6 of the National Historic Preservation Act describes the resolution of Adverse Effect. The procedures for resolution include continuing consultation with the Agency and the SHPO, and preparing a Memorandum of Agreement (MOA).

IX. APPLICATION OF THE DEFINITION OF EFFECT AND CRITERIA OF ADVERSE EFFECT

A. Coplay-Northampton Bridge

The proposed project will require demolition of the Coplay-Northampton Bridge down to the pier foundations and the plinths of the river piers. The proposed undertaking will have an Effect (see Table 1).

Table 1. Results of Effect Evaluation for the Coplay-Northampton Bridge

Definition of Effect	Evaluation
An effect may occur when there is alteration to the characteristics of a historic property qualifying it for inclusion in or eligible for the National Register as defined in Section 800.16(i).	The proposed project will result in the physical destruction of the Coplay-Northampton Bridge and, thus, have an effect.
Finding: **Historic Properties Affected.** Pursuant to 36 CFR 800.11(e) the Criteria of Adverse Effect must be applied.	

Additionally, the demolition of the bridge will have an Adverse Effect on the historic resource (see Table 2).

Table 2. Application of the Criteria of Adverse Effect for the Coplay-Northampton Bridge

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.	
Examples of Adverse Effects (36 CFR 800.5(a)(2))	**Evaluation**
Adverse effects on historic properties include, but are not limited to:	
(i) Physical destruction of or damage to all or part of the property;	The project will result in the physical destruction of the Coplay-Northampton Bridge.
(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR Part 68) and applicable guidelines;	The project will involve alteration of a historic property that is inconsistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*.
(iii) Removal of the property from its historic location;	The project will involve removal of the Coplay-Northampton Bridge from its historic location.
(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;	The project will involve a change of the character of the Coplay-Northampton Bridge's use or of physical features within the property's setting that contribute to its historic significance.
(v) Introduction of visual, audible, or atmospheric elements that diminish the integrity of the property's significant historic features;	The project will not introduce visual, audible, or atmospheric elements that diminish the integrity of the Coplay-Northampton Bridge's significant historic features.
(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and	The project will not result in the neglect of the Coplay-Northampton Bridge.
(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.	The project will not result in the transfer, lease, or sale of the Coplay-Northampton Bridge.
Finding: **Adverse Effect**	

Proposed Mitigation: To be determined.

B. Lehigh Valley Railroad

The proposed undertaking will not alter any of the characteristics that qualify the Lehigh Valley Railroad for inclusion in the National Register. The Lehigh Valley Railroad is eligible for the National Register for its role in Pennsylvania's transportation and economic history, and its influence upon the development of industries and communities. The proposed bridge replacement will be constructed on existing alignment and new pier stems will be built on existing pier foundations. In addition, the replacement bridge will retain the existing vertical clearance over the former railroad corridor.

During construction, temporary easements and aerial easements totaling approximately 1.05 acres will be required from the Lehigh Valley Railroad for vehicle and equipment access. The temporary occupancy will:

(1) be temporary and less than the time needed for construction of the project, and will not change the ownership or result in the retention of long-term or indefinite interests in the land for transportation purposes;
(2) be minor; both the nature and the magnitude of the changes to the historic property will be minimal;
(3) not have anticipated permanent physical impacts, nor will it cause interference with the activities or purposes of the property, on either a temporary or permanent basis; and
(4) be fully restored to a condition which is at least as good as that which existed prior to the project.

The proposed bridge replacement will not alter, directly or indirectly, any of the significant characteristics of the historic railroad corridor. Thus, the proposed project will have No Effect on the Lehigh Valley Railroad (see Table 3).

Table 3. Results of Effect Evaluation for the Lehigh Valley Railroad

Definition of Effect	Evaluation
An effect may occur when there is alteration to the characteristics of a historic property qualifying it for inclusion in or eligible for the National Register as defined in Section 800.16(i).	Replacement of the Coplay-Northampton Bridge will not alter any of the characteristics of the Lehigh Valley Railroad that qualify it for inclusion in the National Register. The Coplay-Northampton Bridge does not contribute to the Lehigh Valley Railroad. The replacement bridge will be in the same location as the existing bridge and will not impact physical features associated with the railroad.
Finding: **No Historic Properties Affected.**	

X. PUBLIC INVOLVEMENT

In August 2009, PennDOT identified seventeen individuals/organizations that were invited to apply for consideration as Section 106 consulting parties. Six parties expressed interest and were approved as consulting parties: Borough of Coplay, Delaware and Lehigh National Heritage Corridor, Historic Bridge Foundation, Lehigh Valley Planning Commission, and two adjacent property owners, John W. Binder and William Mardorf. The six consulting parties were provided copies of the Needs and Alternatives Analysis Report (November 2009) for review prior to a Consulting Parties Meeting.

PennDOT conducted a Public Meeting, Public Official's Meeting, and Consulting Parties Meeting on December 14, 2009 at Coplay Borough Hall. Three of the consulting parties attended in person and one participated via speaker phone. Likewise, a representative from PHMC participated via speaker phone. At each meeting, PennDOT presented an overview of the project and responded to comments. Meeting minutes, sign-in sheets, and comment forms/response letters are found in Appendix D.

Regarding the Consulting Parties Meeting, a comment form was received from a Coplay Borough representative, David Royer, and a response letter was received from the Historic Bridge Foundation. David Royer commented that he agreed with the findings and recommendations in the Needs and Alternatives Analysis Report regarding bridge replacement and stated that he thought rehabilitation of the existing concrete spans would be a "band aid" that, if chosen, would result in a posted bridge with higher maintenance costs and a shorter life expectancy. The Historic Bridge Foundation questioned the assumed lifespan of a new bridge, requested additional information on the maintenance costs for a new bridge, and requested additional information on the feasibility of rehabilitating the existing concrete arch spans.

The comments gathered at the Consulting Parties Meeting were considered by the project team and URS Corporation, the engineering consultant on the project, prepared a response to the Historic Bridge Foundation's inquiries (see Appendix D). Both the two Consulting Parties comment forms and URS's response were circulated to PHMC and the other consulting parties. The consulting parties will have the opportunity to review this Determination of Effect Report and participate in discussions regarding mitigation options.

XI. ALTERNATIVES CONSIDERED

As part of the alternatives analysis, the following alternatives were evaluated: no-action alternative; two rehabilitation alternatives; a replacement alternative on existing alignment; and two replacement alternatives on new alignment. The following is excerpted from the *Needs and Alternatives Analysis Report (November 2009).*

Alternative 1: No-Action (no span changes)
The No-Action Alternative would leave the bridge in its existing condition without any proposed improvements to the structure. The main arch spans and both approach spans are currently in poor condition. Continued deterioration will only further reduce the load-carrying capacity of the bridge and could result in periodic or long-term closures to perform emergency repairs. This option could also include re-decking without any change to the three girder spans or the truss span. Such re-decking could increase load carrying capacity, but would not address traffic and congestion at the Northampton end of the bridge. A re-decking would also retain non-redundant structures which require yearly inspection and, coupled with the fact that the bridge is 75 years of age, are a safety issue relative to catastrophic collapse potential.

Alternative 2A: Bridge Rehabilitation Maximized on Existing Alignment
This alternative would rehabilitate the existing bridge in keeping with the Secretary of the Interior's *Standards for Rehabilitation of Historic Properties*. It would preserve the historic character of the bridge, protect it from further deterioration, and restore the vehicle load carrying capacity to the required rehabilitation minimum HS-20 truck. This alternative will retain the most distinguishing characteristics of the bridge, namely the arch spans and the truss span. Rehabilitation would require physical alteration to the historic structure, and historic materials would require extensive maintenance. Under this alternative, approximately 25 percent of the original material would require replacement. The rehabilitated structure would be expected to remain in service another 50 years.

For rehabilitation, a complete deck replacement would be required for all spans. Additionally, each of the bridge types would require significant inspection and analysis to verify their integrity and provide the minimum load carrying capacity of HS-20 truck. Consistent with smart transportation initiatives, meeting current seismic criteria may not be required by PennDOT for all of the spans, as other state owned structures in the area should be able to provide a crossing over the Lehigh River if a significant seismic event were to occur. An exception to this is the truss span over the Norfolk Southern Rail line. Norfolk Southern classifies this as a "tactical" rail line. Therefore, from a seismic standpoint, measures should be taken to insure the truss span would not fall on the tracks during a seismic event.

For this Rehabilitation Alternative, the existing road centerline would be maintained in its present location. Additionally, various rehabilitation options could be conducted with varying degrees of physical alteration to the existing bridge types. The following is presented by bridge type.

West Approach

The three existing built-up girder spans will remain simple spans and retain much of their concrete encasement. Sequential fixed and expansion bearings as well as three inch movement strip seals will be needed for the three spans. Anticipated is the removal of the concrete encasement for five feet on either side of each expansion joint allowing inspection of the main girders, stringers and end floor beams. This area will later be painted with three coats of paint. Also anticipated are the rehabilitation of the fixed bearings and the replacement of the expansion bearings. Some bearing seat work will be necessary as deterioration of concrete directly below the bearings is evident.

Using the existing cross section, the stringers would need replacement or modification as composite members to carry HS-20 loads. This is a two girder system, which is fracture critical and non-redundant. As such, a safety issue exists, as a girder flange could crack causing a span to drop. The girders are of riveted construction which is a category "D" fatigue detail. As the girders are made from plates and angles there is some internal redundancy with the individual elements. Nonetheless the 70 years of traffic have imparted fatigue damage to the critical areas of bottom flange cover plate cut-off locations. Such locations must be inspected and therefore concrete encasement must be removed.

The Replacement Alternative, discussed later, allows for the elimination of the two deck joints above piers 1 and 2 and significantly reduces maintenance costs over time as well as extends the life of bridge components. Since these girders are designed as simple spans URS cannot eliminate the joints over the piers. Such elimination would require flange tie plates and change the fatigue behavior of the girders, creating tension in the top flange near the piers. However, as the final curb-to-curb width provided must be less than 34'-0", a design exception will be required because this bridge width would not meet current PennDOT criteria.

Using the lever rule to determine the live load distribution factor, the bridge girders, floor beams, stringers and cantilever brackets were evaluated for two lanes of live load. Based on STLRFD program results, URS determined that the primary girders rate for all legal loads including the TK-527 vehicle. The floor beams rate for inventory and operating from HS-20 and H-20 vehicles only. To minimize modifications to these spans, posting would be necessary to eliminate trucks such as the TK-527 and other multi-axle trucks. The live load carrying stringers all rate only when made composite with the deck.

The other area of concern is the expansion bearings for the girders. The roller nests appear to be frozen, which imparts significant loads on the supporting piers. It will be necessary to replace the expansion bearings of each of the three girder spans. In addition, the bearing seats of the fixed bearings need work, as concrete spalling has reduced the available bearing area.

The three girder spans are supported by two piers containing concrete that lacks air entrainment and therefore are spalling due to rusting reinforcement. The lack of air entrainment makes the concrete susceptible to freeze/thaw deterioration. This is

evidenced by aggregate being exposed and falling off the piers. To remedy the concrete characteristics and satisfy strength requirements, jacketing of the piers would be necessary to improve strength and provide a vapor barrier to reduce moisture infiltration. This will not resolve deterioration of reinforcement, which no longer has protection associated with a high pH in the concrete. Due to carbonization of the concrete the pH is near neutral and the iron oxidizes, resulting in expansion spalling the concrete. Thus, even with wrapping, the concrete spalling will persist and the piers cannot be expected to last beyond 50 years.

Main Arch Spans

As with the girder spans it would be necessary to replace the deck. Strip seal expansion joints are also proposed at each of the piers to allow the deck to move as a result of temperature changes. There will be two expansion joints at each pier. This matches the existing joint configuration. At the piers, the tops of the columns would require casting to repair damage resulting from de-icing salts. The floor beams below the deck are also in an advanced state of deterioration, requiring replacement to attain HS-20 load carrying capacity. The spandrel columns above the arches are lightly reinforced and lack bending capacity. Due to the height of the spandrel columns, they do not adequately compute for combined axial and bending loads. For the floor beams and arches to work properly the spandrel columns must be rigidly connected to the floor beams. This presently is not the case and significant gaps presently exist in this connection. Thus, for the shorter columns, replacement is necessary to properly imbed the replacement reinforcement. The longer columns could be retained if the upper portion is doweled into the floor beams and the columns are fiber wrapped to improve their strength. The better method would be to replace all spandrel columns with properly air-entrained concrete, allowing use of protected reinforcement and minimizing the potential for freeze/thaw damage.

The arches have the similar problem of concrete lacks air entrainment. Additionally, the arches have pockets of deterioration resulting from deck leaks at contraction joints. These leaks are aggravated by the flat slope (less than 0.44%) on the existing deck which allows salt water to linger longer. An interesting feature of snow removal is the deck grating in the center of the span over the river. This grating was to allow snow to be pushed through the deck to fall to the river below. As a result of salt-laden runoff, the arches have significant areas of delamination. In addition, the third span arches were sounded and found to contain weak concrete near the crown of the arches.

The delaminations can be repaired by removal of surface concrete and installation of formed patches, bonded and reinforced with ties into sound concrete. The third arch spans will require bands of concrete on each arch to be removed and replaced to properly maintain flow of compressive forces and avoidance of concentration of dead-load compressive forces that would reduce live-load carrying capacity. The point being that load history is important in bridge rehabilitation. If concrete is deteriorating under full dead load, and repairs are made with the dead load in place, then that dead load passes through remaining elements and the new concrete only sees live load. Two possibilities exist to avoid this. One is to construct scaffolding or supports that temporarily carry the load to the ground while repairs are made. Once new concrete has cured the scaffolding

can be removed and loads evenly distributed through the section. The other method is to jack up the structure corresponding to the dead load being carried. This involves changing the deflected shape of the structure during repairs. Once the repairs are made and the concrete is cured, the jacks can be released and dead load is redistributed between old and new sections of concrete. Jacking of a superstructure is analogous to removing dead load, making repairs, and re-installing dead load components.

The cost of rehabilitation will be influenced by contractor's means and methods of work. Considering the height of the bridge and velocity of the river, it is expected that the contractor will demolish the deck, floorbeams, and spandrel columns by working from the center toward the abutments, or working from one end of the bridge toward the other. In either case, a causeway will be required. URS anticipates a causeway to be built from one bank to the nearest river pier which will allow for pier jacketing at the water level and the ability of a crane to reach two of the arch spans by being placed near the center of the river. A crane positioned in this way would enable half of the river to flow, and still allow for the necessary delivery of forms and concrete for the reconstruction of the spandrel columns, floor beams and deck. For repair of the arches which have both intrados and extrados delaminations, it is expected that the contractor will rig the arches with worker support platforms that will allow repair of the delaminations and placement of forms for concrete, or the use of gunite to build up adequate concrete to protect the reinforcement that must remain.

For the Rehabilitation Alternative, the deck and sidewalk on the arches will remain a maintenance issue. This alternative would require that the profile remain the same as which presently exists, resulting in continued poor deck drainage because improving the profile would result in a heavier superstructure which could potentially overstress the arches. More scuppers than presently exist would be installed to help insure salt-laden water is removed from the deck.

Although the arches do have some excess capacity, URS proposes to minimize any widening of the deck from the existing out-to-out dimension so as not to create a significant imbalance or overload on the arches from resulting additional live or dead load. Also, the proposed deck width for the West Approach spans is set to maintain the existing 40'-11" deck width to allow for re-use of as many of the stringer and cantilever brackets as possible without risk of overstress.

With rehabilitation and spandrel column replacement, numerous contraction joints can be eliminated but must retain strip seals at each of the piers, as thermal behavior with the arches causes both vertical and longitudinal movements which can cause significant deck cracking if a three-span continuous deck were attempted. As with the western spans, multiple scuppers are necessary to properly drain the deck. URS proposes free-dropping of drained water from some scuppers into the river. However, if piping this water to land is necessary, the resulting flat slopes of the piping necessitated by the relatively flat profile of the arch spans presents ongoing drainage maintenance problems.

Another issue with the arch spans is repair of the massive piers containing concrete that lacks air entrainment just as for the West Approach piers. Evidence of deterioration is in the form of rubilization of some of the concrete on the top of the pier plinths. This is a pier area experiencing freeze/thaw as both moisture and sunlight affect the plinths. The remedy is to scarify 3 to 6 inches of depth of concrete and replace with new concrete that has air entrainment. Areas of scarification require epoxy-coated reinforcement that is doweled into sound concrete.

The pier in the middle of the river has experienced scour pockets and erosion of concrete at the water line. The scour has been addressed on an interim basis with concrete scour bags. The river velocity ranges from a velocity of 5 feet per second (fps) to 9 fps during the 100 year flood. Proposed is a three-pronged approach to scour and plinth damage.

1. The area around the pier is to be dewatered by installation of a temporary coffer dam which will allow scarification of surface concrete to a depth of 3 to 6 inches and construction of a jacket around the pier with properly air-entrained concrete and epoxy-coated reinforcing. Due to backwater problems with the river this concrete jacket can only replace concrete that is removed. The pier cannot get wider.
2. At the pier interface with surrounding rock, concrete scour bags are to be inspected and loose rock is to be removed and replaced with additional concrete bags, which are to be doweled together.
3. The bottom of the stream bed is elevation 267.5 at its deepest location. The bottom of the pier footing is elevation 261.0. It is proposed to excavate down 5 feet around the pier and install R-7 rock. Installation of this scour protection rock should minimize the need for concrete bags being placed in the river in the future. The use of the R-7 rock is also anticipated on the banks of the river, thereby protecting the river side of the piers against stream migration and scour in the 100-year storm event.

East Approach

For this alternative, in an effort to minimize change to a historic resource, the through Parker Truss with double counters will require rehabilitation to maintain carrying capacity for HS-20 vehicles. This end of the bridge has been identified as needing a turning lane. Under this alternative, no turning lane is provided as the curb-to-curb width is 24 feet allowing only 2 lanes. It should be noted it is extremely rare that a truss is split and widened.

The paint above the deck is in relatively good condition and the top of the deck surface looks good. Below the deck, concrete encasement was used on the truss members and there is evidence of corrosion. It is recommended that the deck and sidewalks be replaced due to chloride infiltration and to maintain consistency with the repair cycle on the other portions of the bridge.

The concrete encasement prevents quality inspection of the structural steel. Removal of the concrete encasement below the deck allows inspection and prevents injury from concrete falling from the structural members, but requires later painting of the steel floor

beams to prevent corrosion. The expansion joints at each end of the truss show evidence of failure and repairs or replacement of the end floor beams is expected. This will also facilitate installation of new strip seal expansion joints.

The historic survey identifies this truss as containing rolled sections as diagonals, verticals and top chord members. The bottom chord is the tension element and is comprised of 16" steel sections. The truss is inherently non-redundant, meaning that if a tension member should fail, or any single primary member should fail, then the bridge would collapse. With the tension bottom chord comprised of panels containing only one H-section per panel, the bottom chord lacks any internal redundancy. Thus, if a single H-section should fail, then the truss will fail. To mitigate this situation, two actions are appropriate. The first action is to properly inspect the H-sections and identify those containing flaws or severe corrosion. Flaws can be detected by ultra-sonic testing and visual inspection after the deck is removed. A second option would be to make the deck composite with the truss bottom chord and floor beams. This would provide an alternate load path which could improve the load carrying capacity of the bridge while changing some of the truss characteristics.

The expansion bearings for the truss are located where the truss meets the arch span. The seats for these bearings are deteriorated and require repair. The expansion bearings also require cleaning, painting and lubrication, or replacement.

Abutments
Under this rehabilitation option both abutments would require crack repairs. The abutment walls are generally in good condition. The tops of the walls, parapets, sidewalks, and roadway surface in the area of the abutments should be replaced. This is necessary to create a uniformity of appearance in the structure. In particular the parapets are a yearly maintenance issue. To fix the parapets the sidewalk must be removed. The roadway surface may need replacement to allow for grade transitions to match into deck changes on the adjoining spans.

The Rehabilitation Alternative includes 8 expansion joints along with continued concrete maintenance on the arches occurring roughly every 10 years. Other maintenance costs would also exist. These costs include the expansion joints (every 15 years), deck concrete (every 30 years), and maintenance on drainage and bearings (every 15 years).

<u>Alternative 2B: Bridge Rehabilitation on Existing Alignment Addressing Need</u>
Alternative 2B would rehabilitate the existing bridge by preserving as much of the historic character of the bridge as possible while still addressing community and transportation needs. Smart transportation, traffic calming and other PennDOT initiatives are intended to temper modern criteria to the realities of a bridge setting within a community. This alternative would retain the arch rings of the arch spans, perhaps the most distinguishing characteristic of the bridge, but would require the removal of the truss span. Under this alternative, approximately 45 percent of the original material would require replacement.

As far as community and transportation needs, the Chestnut Street Bridge connects the Boroughs of Coplay and Northampton on each side of the Lehigh River. Although the school systems on each side of the river are separate, there is sharing of services, especially in times of emergency. Agreements exist relative to police and fire emergencies. Ambulances use the bridge to get to hospitals. The street networks in the two boroughs are generally 2 lanes with parking on one or both sides. Northampton has identified turning movement problems on Main Street and installed short turning lanes, by eliminating on street parking at the 9th and Main Street intersection. In the 70 years of bridge existence, traffic has grown and is anticipated to grow further. The accident history at the bridge indicates both rear-end collisions and side-swipe collisions. The existing approach roadways at each end of the bridge are 34 feet in width, but the curb-to-curb dimension is 24 feet on the bridge. There is an existing taper from 34 feet to 24 feet with the approach to each abutment.

Another safety issue with non-existent shoulders is drainage of the roadway. This is especially critical in an area that can have significant snow falls. Currently, the county removes snow from the sidewalks by pushing it into the roadway. The roadway plows push the snow to the face of the curb. With a viaduct 1,105 feet long, snow cannot be pushed to the ends of the bridge for removal. Present day methods also include de-icing salts to melt the snow. The bridge is relatively flat with a grade of 0.44% down to the east. This is a very flat grade and results in water spreading into the roadway. Potential exists for hydroplaning, even at the 25 mph posted speed. Inclusion of shoulders with 4 percent deck cross slope would help to control rain accumulation and snow removal.

At the Coplay side of the bridge, Chestnut Street shifts slightly at Front Street. This can promote accidents, as distracted drivers have little warning of the abrupt change existing at the unsignalized free flow intersection. One mitigation option would be to place a stop sign at Chestnut and Front Streets. Another mitigation option would be to provide wider shoulders, which allows recovery if a vehicle strays out of its lane.

On the Northampton side, 9th and Main Streets cross at 90 degrees. 9th Street has a turning lane but the bridge does not. Introduction of a turning lane and changes to the signal timings at the intersection would result in some significant time delay reductions in the AM and PM rush hours. Unfortunately, to include the turning lane on the bridge would require either widening or replacement of the truss span. Considering that the truss span presently barely carries adequate live load, it is not prudent to widen the truss.

For these rehabilitation alternatives, constraints are placed on the roadway width; at a minimum, the goal is not to exceed the existing out-to-out dimensions. To improve upon the shoulders, URS has proposed to eliminate the upstream sidewalk and shift the roadway to the north. To mitigate the upstream appearance, URS is proposing the Texas Type C411 crash tested railing, which is acceptable for 30 mph speeds. However, PennDOT Bureau of Design would have to authorize the use of this railing, which only meets a TL-2 crash level. Generally, across the bridge, URS is able to maintain 2'-3" shoulders and two twelve foot lanes. In the third arch span on the Northampton Borough side of the river, URS has introduced a taper in the roadway allowing development of a

center turning lane. By eliminating the truss span, there can be a 10-foot turning lane and two thru lanes of 11 feet maintaining shoulders. The sidewalk has been placed on the downstream side of the bridge and a pedestrian railing is proposed for the entire length of the bridge.

Due to these changes added repair work would be needed to each of the three bridge types comprising this bridge as compared to Alternative 2A. The load carrying capacity would be HS-20 and the added work is as follows to provide for a 50-year service life.

Concrete Encased Girder Spans
The additional work with these spans involves new cantilever brackets on the upstream or north girder. With live load over the bracket, two supporting stringers would have to be replaced. The girders remain non-redundant and the north girder will now see more fatigue demand on the bottom flange. The girder fatigue issue is further complicated by the introduction of "out of plane" loads. Such loads presently exist with the floor beams and knee braces. With the cantilever brackets the out of plane demand requires proper detailing of the cantilever bracket connection which involves a strap plate passing through the girder web.

With the increased dead load and live load, consideration should be given to removing the concrete encasement of the girders, allowing full inspection and painting to protect the steel from corrosion. On the side of the bridge with no sidewalk, a full lane of live load could occur directly over the girder, thus a new cantilever bracket will be necessary along with new stringers on the bracket. As the cantilever is sensitive to live load, a strap attachment from the cantilever to the floor beam will be necessary. This strap can pass either over the girder top flange or through the girder web. For reasons of strength to carry live load, it will be advisable to have all stringers and girders composite with the deck, which is not presently the case. Thus, a cost for welding shear studs is included.

Concrete Arch Spans
For these spans, URS is proposing replacement of the deck, floor beams, and spandrel columns. The map cracking, efflorescence, and 70 years of inadequate concrete cover over the reinforcement all indicate that both the reinforcing and concrete have exceeded their useful life. During the project field view, it was observed that some of the taller spandrel columns might be saved. This could result in a much higher rehabilitation cost because of the care the demolition contractor must use in removing these columns around the ones to be saved. URS is recommending, therefore, that all spandrel columns be removed both to reduce the cost of demolition and to ensure that all epoxy coated reinforcement with adequate concrete cover is used in the members to be connected to the arches. What would remain for periodic maintenance are only the existing arches. For these, URS estimated a repair cost at 10 year intervals to correct anticipated corner spalls which cannot be prevented considering the age, condition, and presence of arch reinforcement without adequate concrete cover.

URS has attempted to improve drainage as much as possible by using 2'-3" shoulders with 4 percent cross slopes. For this alternative, a metal railing on the sidewalk side is

proposed. Clearing snow from the sidewalk will require pushing the snow through the metal railing, as the concrete barrier along the gutter line prevents pushing the snow on to the narrow shoulder.

The additional work with these spans is predominately at the deck level. Two of the spans would be the same. The third span or that on the Northampton Borough side requires floor beams that cantilever significantly (4 foot) beyond the existing outside face of the bridge. As URS is proposing to replace the floor beams, the strength aspect of the cantilever can be addressed.

At issue is the treatment of the piers and the column fluting which presently extends above the deck level. Additionally, at the piers of the concrete spans, the railing balustrade is interrupted at the pier with a step that helps in the pier definition. For piers 3, 4 and 5, URS proposes to maintain the outside dimension of the bridge so the exterior fluting and step could be maintained on the upstream side of the bridge. Pier 6 ends the arch span and with the turning lane the bridge is wider by 4 feet upstream and the column fluting would have to end below the deck. An exterior step in the bridge barrier could be incorporated if it is supported by the deck.

For these 3 spans on the downstream side, URS proposes an aluminum or steel railing for the length of the bridge. It would be possible to interrupt this railing with concrete balustrade or stepped features similar to existing for Piers 3, 4 and 5. The condition of Pier 6 is similar to the upstream side in that the fluting would extend to the underside of the deck, and a step or concrete detail could be incorporated above the deck at this pier.

It should be noted with the arch spans, URS is attempting to maintain load balance on the arches similar to the existing. This is somewhat critical as there is approximately a 75 degree skew on the arch piers. The floor beams are oriented parallel to the piers, and with dead load being over 80 percent of the load on the arches, symmetry with dead load maintains balance between upstream and downstream arch loads. With live load, the lanes are shifted approximately 4 feet to the north which will put more live load on the upstream arch.

Replacement of Truss Span
This is the significant change from option 2A. URS is proposing removal of the truss to obtain the turning lane on the bridge. Due to traffic volumes, the full 216 feet of this span needs an additional 10 foot turning lane. Span 6 of the arch span contains the taper for the lane.

As stated previously, it is not prudent and reasonable to widen a truss from 26’-4” center to center of truss to 39’-8” center to center of truss to accommodate the turning lane. Such a widening would be 13’-4” which would result in replacing all floor beams and strengthening all truss members. And then remains the redundancy issue and the fracture critical characteristics of the bottom chord H sections. All of this would be with increased live load.

For the rehabilitation alternative, the east approach is treated similarly as for the replacement alternative described below. However, for the rehabilitation, the deck width is set at a narrower 48'-11 ½" which allows for two 11-foot lanes a 10-foot turning lane and 2'-3" shoulders. Again the sidewalk is positioned on the downstream or south side of the structure as cross section configuration aligns the lanes well with 9th Street. This sidewalk location provides a Main Street crossing location that minimizes pedestrian interference with primary vehicle movements turning north onto Main Street or traveling straight on 9th Street. As with the replacement alternative, URS has determined that 6 spread box beams can be extended to an 85 foot span over Norfolk Southern Railroad's two tracks, one of which requires double stack clearance of 24'-3". This span will also require a 3 inch movement expansion joint at the last arch pier, and an expansion device in the approach slab beyond the abutment. A second span has been added as a result of railroad coordination.

The historical significance of the bridge would be violated with removal of the truss as it was a long-span engineering solution to the problem of spanning a rail yard that passed under the bridge. In 1930 it was not possible to span 216 feet with concrete beams and rail yards needed 20 foot of clearance. Therefore, in 1930 a truss was a good engineering solution to the span and clearance problem as dimension from the roadway surface to the bottom of the truss was approximately 3'-2". Today only one track passes under the bridge and prestressed spread box beams provide the appropriate engineering solution of spanning 85 feet and having a roadway surface to bottom of beam dimension of 4'-3", allowing 24'-3" vertical clearance over the railroad.

Abutment modifications
The western abutment would be handled similar to Alternate 2A as the out-to-out dimension does not change. The difference at the west end is with the single sidewalk and center line shift of the roadway. With rebuilding the roadway and tops of walls, the necessary changes could be made. Note that the north face stair would be removed; there is not a connecting sidewalk.

At the eastern abutment a more significant change is necessary. The abutment will be generally re-used, as the loads from the truss were greater than those from the proposed girder spans. The upstream side of the abutment will be similar to Alternate 2A. The downstream side of the Abutment will require 8 feet of widening. Additionally, the downstream side will require a 91-foot long new retaining wall to enable the widening and minimize property damages.

<u>Alternative 3: Bridge Replacement on Existing Alignment</u>
This alternative involves the reuse of the West Abutment, the foundations of the two West Approach piers, and the foundations of the four Main Arch Span piers. As a result of discussions concerning future leasing of railroad right-of-way along the west bank of the Lehigh River by the County, it was determined that the Replacement Alternative must maintain the right-of-way for both the former Lehigh Valley Railroad corridor and the Ironton Rail Trail. Thus, the Replacement Alternative depicts a 3-span continuous pre-stressed concrete I-beam bridge spanning the former railroad corridor in the same span

arrangement as the existing bridge. The treatment of the East Approach, which spans the active Norfolk Southern Railroad tracks, is to be similar to the Rehabilitation Alternative described previously. However, the cross section is slightly wider as a new Main Span superstructure can support a wider bridge with shoulder widths that meet PennDOT criteria. The result is a 50'-8 1/4" out-to-out deck width which provides a 6-foot shoulder on the barrier side and a 2'-0" shoulder on the sidewalk side. That the narrow 2'-0" shoulder is adjacent to the curb of the 8-foot sidewalk was considered acceptable to the Pro-Team as a means of reducing the deck width and thus, the overall bridge cost. Under this alternative, approximately 95 percent of the original material would require replacement. Specific aspects of each of the bridge segments are discussed as follows:

West Approach
Bridge Street will remain as it currently is and the three girder spans will be replaced with continuous concrete I-beams spans on new pier stems built on the existing pier foundations. The existing abutment, which is in good condition, will be re-used. The existing north side staircase will be removed. The existing 40'-11" deck width will be widened to 44'- 8 1/4" out-to-out. This includes a 1'- 8 1/4" barrier, a 6'-0" shoulder, two 12'-0" travel lanes, a 4'-0" shoulder, and a 6'-0" to 8'-0" variable width sidewalk with a 1'-0" barrier. (The sidewalk width varies to avoid a business impact). The resulting structure will be of lesser maintenance than the rehabilitation alternative and last well beyond 50 years. Additionally, replacement of the structure above the pier foundations would accomplish several things:

- Eliminate the fracture-critical nature of the two-girder system by replacing it with a redundant multi-girder system that adheres to current AASHTO and PennDOT design standards.
- Allow for the elimination of the two deck joints above piers 1 and 2 and significantly reduces maintenance costs over time, as well as extend the life of bridge components.
- The steel of the existing bridge is encased in concrete, thus the state of corrosion beneath cannot be fully evaluated. Replacement would eliminate any questions regarding the quality of original steel.

Main Arch Spans
URS proposes to demolish everything above the plinth of the four massive river piers. Thus, the arches and superstructure would be removed and the three spans that would replace them would be a continuous, multi-girder steel section 75 inches deep with a deck width of 44'-8 ¼" out-to-out. This cross section would be the same as proposed for the west approach using a 6 foot shoulder on the barrier side and a 4'-0" shoulder on the sidewalk side. A portion of the fourth span will need to have splayed girders to accommodate the wider deck for the turning lane transition. The travel lanes will be reduced to 11'-0" and a 10'-0" turning lane will be added. Thus, the deck will taper out for the last 80'-0" to a final width of 50'-8 1/4" out-to-out. The elevation view depicts new pier shafts to be constructed above the existing plinths. These plinths will require scarification and a concrete jacket in order to prevent future freeze/thaw damage.

This segment of structure would not require any deck joints until it reaches the pier at station 11+00 so there would be less of a maintenance issue. The profile for this alternative allows for a crest curve over the river, which would improve deck drainage. Scuppers for the westbound roadway could be piped to ground and scuppers for the eastbound roadway would have to be frequent, due to the narrow shoulder. The design life for this segment would approach 100 years with maintenance in the form of deck replacements. Use of weathering steel would minimize maintenance painting. The cost of rebuilding the main arch spans is less than the cost of rehabilitating them, but would result in an extremely altered bridge.

East Approach
In order to provide a left turning lane at the 9th and Main Streets intersection in Northampton, the East Abutment will be retained and widened, but the existing truss will be removed and replaced by a two-span bridge that uses a spread box beam superstructure. The Norfolk Southern Railroad property spanned by the truss includes two active tracks, one of which requires a double stack clearance of 24'-3".

For this alternative, the span over Norfolk Southern Railroad can be met with the same number of beam lines as for the rehabilitation alternative, but the box beams are 3 inches deeper due to the greater deck thickness at the sidewalk. Note that this depth increase is possible because the bridge profile can more easily be raised with the rebuild alternative than with the rehabilitation alternative. With the rest of the structure using a 6 foot west bound shoulder, this same shoulder is utilized for this segment. Maintaining this shoulder for the entire bridge length improves safety, especially for bicyclists, resulting in an out-to-out width of 50'-8 ¼". In summary, replacement of the truss span would accomplish the following:

- Eliminate the fracture-critical nature of the truss system by replacing it with a redundant multi-beam system.
- The steel of the existing truss below the deck is encased in concrete, thus the state of corrosion beneath cannot be fully evaluated. Replacement would eliminate any questions regarding the quality of original steel.
- The new pier would meet current AASHTO and PennDOT as well as seismic criteria.
- The deck could be widened in this span to allow for a left-turn lane at the intersection of 9th St. and Main St. in Northampton. This widening is not possible with a truss.

URS and the bridge owner, Lehigh County, are recommending Alternative 3, as it is a prudent and reasonable alternative and meets the project need.

<u>Alternative 4: Bridge Replacement on New Alignment, Upstream (3 Options)</u>
This alternative would involve construction of a new structure on a new alignment upstream of the existing bridge location, to allow for maintenance of traffic while the bridge is under construction. Upon completion of the new bridge, the existing Chestnut Street Bridge would be demolished. The upstream option would consist of constructing a

new bridge between Keefer Street on the west side of the Lehigh River and Main Street on the east side of the Lehigh River. The ideal end point for this bridge on the Northampton side of the river is a matter for debate. To meet the needs of traffic, the Northampton end point should be Main Street because of the commercial development. The connection point could be near 14th Street, or at the intersection of Main Street and Laubach Avenue. Both of these connection points allow the bridge to pass over Norfolk Southern's Lehigh Line, which has in excess of 70 train movements a day. The likelihood of connecting to 14th Street is low due to the potential historic impacts to Northampton Historic District. The connection to the Laubach/Main intersection involves significant right-of-way taking and is therefore also unlikely. The length and height of this structure would result in a cost 20 percent greater than that of Alternative 4.

The other possibility with Alternative 4 would be to touch down on the Northampton side at Stewart Street. This would reduce the cost of the bridge, but would not meet the traffic needs of the project. Stewart Street and Canal Street do not provide good access to the Northampton Business District or the southern end of Northampton. The connection at Stewart Street would create an impact to Northampton Historic District. This would also create noise impacts for Canal Street Park, which is also a Section 4(f) resource.

An Option C for an upstream alternative exists by connecting Chestnut Street in Coplay with E. 10th Street in Northampton. From a traffic standpoint, this has merit, as E. 10th Street is a direct connection to township road T463 where development is occurring in East Allen Township. Option C would go over Norfolk Southern's Lehigh Line and provides a good connection to the Northampton business district. This connection may be difficult due to the bridge profile needing to meet the Main Street profile, which is lower at E. 10th Street. Unfortunately E. 10th Street is not very wide and most likely would need an upgrade if the bridge connected directly to the street. The cost of Option C would be similar to or greater than Alternative 3. At issue would be the impacts to Norfolk Southern's spur track and to Hokendauqua Creek and any remnants of the Lehigh Canal. Constructing piers adjacent to Hokendauqua Creek would be a challenge relative to erosion and sedimentation control and access. URS's Phase 1 Environmental Site Assessment also indicates this area of Northampton has potential to contain buried environmental contaminants that should be avoided.

Alternative 5: Bridge Replacement on New Alignment, Downstream

This alternative would involve construction of a new structure on a new alignment downstream from the existing bridge. A reasonable connection could be made between Coplay Street and 7th Street. This would afford a connection to Main Street in Northampton but the connection would be 725 feet further south of Chestnut Street and away from the business district. A crossing at this location would be comparable in cost to Alternative 3 and at a similar height elevation. The engineering required for this crossing would be challenging as it would pass over the potentially historic railroad bridge that spans the river south of the Chestnut Street Bridge. A new highway bridge at this location would create visual impacts and scour impacts in the river with the two bridges in such close proximity. A new bridge in this location could also potentially impact the visible prism of the former Lehigh Canal. With the alignment on 7th Street,

increased traffic would be expected around Alliance Playground, a Section 4(f) resource, Alliance Playground. Presently, the existing Chestnut Street Bridge is equidistant between the 21st Street crossing to the north and the Eugene Street crossing to the south.

For additional information on the analysis of the bridge alternatives, please see URS Corporation memo in Appendix D or the *Coplay-Northampton Bridge Replacement Project Needs and Alternatives Analysis Report (November 2009),* available upon request at PennDOT District 5-0.

XII. CONCLUSION

This Determination of Effect Report has evaluated the potential impacts of the proposed replacement of the Coplay-Northampton Bridge on historic resources that are eligible for or listed in the National Register of Historic Places. There are two historic resources located within the project's APE: Coplay-Northampton Bridge and Lehigh Valley Railroad. A Phase Ia Archaeological Investigation was performed and it was determined no archaeological sites are located within the Area of Potential Effect.

Application of the Definition of Effect and Criteria of Adverse Effect has resulted in the recommendation that the proposed bridge replacement will have an Adverse Effect on the Coplay-Northampton Bridge and No Effect on the Lehigh Valley Railroad. If PHMC concurs with this finding, a Memorandum of Agreement will be prepared for the project.

APPENDIX A:
PHMC CORRESPONDENCE

Appendix A: PHMC Correspondence

July 5, 2006	PHMC to PennDOT Area of Potential Effect Concurrence
October 2, 2006	PennDOT to PHMC Cultural Resources Submission for Archaeology (addresses Lehigh Canal)
February 2, 2007	PHMC to PennDOT Determination of Eligibility Concurrence
September 3, 2009	PHMC to PennDOT Boundaries for Lehigh Valley Railroad
December 24, 2009	PHMC to PennDOT Concrete Conditions Report
March 1, 2010	PHMC to PennDOT Needs and Alternatives Analysis Report

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093

July 5, 2006

R. Scott Christie, P.E., Director
Bureau of Design, Dept. of Transportation
P O Box 2966
Harrisburg, PA 17105

TO EXPEDITE REVIEW USE BHP REFERENCE NUMBER

Re: ER 06-8045-042-A
Lehigh and Northampton Counties, Coplay and Northampton Boroughs
SR 96237 Section 07M Coplay-Northampton Bridge Rehabilitation Project
Area of Potential Effect

Dear Mr. Christie:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999. These requirements include consideration of the project's potential effect upon both historic and archaeological resources.

We concur with the Area of Potential Effect developed for both archaeological and historic resources. If additional resources or a change in project plans change the Area of Potential Effect may need to be revised.

If you need further information regarding archaeological survey please contact Steven McDougal at (717) 772-0923. If you need further information concerning historic structures please consult Susan Zacher at (717) 783-9920.

Sincerely,

Susan M. Zacher for
Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/smz

~~05-600~~

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

PENNDOT Cultural Resources Submission

DATE: October 2, 2006

SUBJECT:

District: 5-0 County: Lehigh & Northampton MPMS Num: 11614
Municipality: Coplay Borough & Northampton Borough

SR: 7404 Section: 07M
Project Name: Coplay-Northampton Bridge Rehabilitation

ER Number: Fed-Aid: Y Fed Permit: Y

RECEIVED
OCT 04 2006
HISTORIC
PRESERVATION

TO: Jean H. Cutler, Director
Bureau for Historic Preservation
PA Historical and Museum Commission

ER# 07-8000-048-A

FROM: Scott Christie, PE
Director
Bureau of Design

As per 36CFR800, on behalf of the Federal Highway Administration (FHWA), please find enclosed one copy of URS Corporation's *Phase Ia Archaeological Investigations for the Proposed Coplay-Northampton Bridge Rehabilitation Project* (September 2006) report prepared by PENNDOT District 5-0 in association with the above referenced project.

Phase Ia fieldwork consisted of four backhoe trenches within the Area of Potential Effect. One trench was placed on the Coplay side of the Lehigh River and three were placed on the Northampton side of the river. The excavation of the trenches determined that the entire APE has been extensively disturbed from industrial activities such as quarrying and iron industry development, as well as transportation related disturbance from road, bridge, railroad and canal construction. These activities have disturbed the landforms and negated the possibility of any archaeological deposits within the APE. In addition, even the Lehigh Canal prism has been completely obliterated within the APE.

No archaeological sites are located within the project APE and the project will have ***no effect*** on significant archaeological resources.

The PennDOT Architectural Historian for District 5-0 will complete the Section 106 process regarding above ground resources. This submission will be forthcoming.

We respectfully request your review and comment on the enclosed report. If the Department does not receive a response from the SHPO within thirty (30) days, we will proceed with the project.

ER# 07-8000-042-A

If you have any questions, please call Steve Barry at 610-798-4263.

Enclosure

4350/SEB/sb

cc: Dan Stewart, PE, KB, 7N, BOD
Deborah Suciu Smith, FHWA
Christine Kula, KB, 7W, BOD
Jerry Neal, Environmental Manager, PennDOT District 5-0
Rob Linn, Architectural Historian, PennDOT District 5-0
Brian Graver, Project Manager, PennDOT District 5-0

RECEIVED
OCT 0 4 2006
HISTORIC PRESERVATION

Agreement by: _____ Date: 10/23/06
PHMC Representative

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

February 2, 2007

R. Scott Christie, P.E., Director
Bureau of Design, Dept. of Transportation
P O Box 2966
Harrisburg, PA 17105

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Re: ER 06-8045-042-C
Northampton and Lehigh Counties
S.R. 9900, Section 015S, Coplay-Northampton Rehabilitation Project
Determination of Eligibility

Dear Mr. Christie:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

We concur with the findings of the agency that the following properties are not eligible for the National Register of Historic Places.

1. General Supply Company Lumberyard, 1 Bridge St., Coplay, Lehigh County
2. Ninth & Main Street Grouping, Northampton, Northampton County
3. Edward Schreiber House, 113 N. Front St., Coplay, Lehigh County
4. Front & Chestnut Street Grouping, Coplay, Lehigh County
5. Dery Silk Mill, 902 Main St., Northampton, Northampton County
6. Lehigh & Susquehanna Railroad in Northampton, Northampton County

We do not concur with the finding that the Lehigh Valley Railroad, a resource previously determined eligible for the National Register of Historic Places, is no longer eligible because of the removal of rail and ties. It has been shown through review and a court case that removal or these items does not affect the integrity of a railroad and the eligibility determination or listing still applies.

If you need further information in this matter please consult Susan Zacher at (717) 783-9920.

Sincerely,

Andrea MacDonald

Andrea MacDonald, Chief
Division of Preservation Services

AM/smz

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

Sept. 3, 2009

Brian G. Thompson, P.E., Director
Bureau of Design, Dept. of Transportation
P O Box 2966
Harrisburg, PA 17105

Re: ER 06-8045-042-D
Lehigh and Northampton Counties
S.R. 7404, Section 07M, Coplay-Northampton Bridge
Boundaries for Lehigh Valley Railroad

Dear Mr. Thompson:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

We concur with the boundary proposed for the National Register eligible, Lehigh Valley Railroad, in the Area of Potential Effect for the above listed project.

If you need further information regarding historic structures please consult with Susan Zacher at (717) 783-9920.

Sincerely,

Susan Zacher for

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/smz

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

December 24, 2009

Brian G. Thompson, P.E., Director
Bureau of Design, Dept. of Transportation
P O Box 2966
Harrisburg, PA 17105

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Re: ER 06-8045-042-F
Lehigh and Northampton Counties
S.R. 7404, Section 07M, Coplay-Northampton Bridge Project
Concrete Condition Report

Dear Mr. Thompson:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

Thank you for supplying a copy of the above listed report so that we can better understand the condition of the Coplay-Northampton Bridge and the options for preservation. We will continue to wait for the comments of the consulting parties before commenting on the Needs and Alternatives Report.

If you need further information regarding historic structures please consult with Susan Zacher at (717) 783-9920.

Sincerely,

Susan Zacher for

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/smz

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093
www.phmc.state.pa.us

March 1, 2010

Brian Thompson, P.E., Director
Bureau of Design, Dept. of Transportation
P O Box 2966
Harrisburg, PA 17105

TO EXPEDITE REVIEW USE
SHP REFERENCE NUMBER

Re: ER 06-8045-042-G
Lehigh and Northampton Counties
S.R. 7401, Section 07M, Coplay-Northampton Bridge Project
Needs and Alternatives Analysis Report

Dear Mr. Thompson:

The Bureau for Historic Preservation (the State Historic Preservation Office) has reviewed the above named project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation as revised in 1999 and 2004. These regulations require consideration of the project's potential effect upon both historic and archaeological resources.

We are in receipt of the above listed report and the additional information concerning concrete materials assessment. While the Bureau concurs that the concrete in the bridge is in poor condition and we appreciate the difficulty with rehabilitating a concrete bridge we do not officially comment on need. Likewise, as per our preservation mission, we will always support a preservation alternative over a replacement alternative. We will await additional comments from the consulting parties concerning these reports and review the determination of effect report when it submitted.

If you need further information in this matter please consult Susan Zacher at (717) 783-9920.

Sincerely,

Susan Zacher for

Douglas C. McLearen, Chief
Division of Archaeology &
Protection

DCM/smz

APPENDIX B:
HISTORIC PROPERTY DOCUMENTATION

Appendix B: Historic Property Documentation

Documentation noted in the table below is attached.

Historic Resource	NRHP Status	Documentation	Date
Coplay-Northampton Bridge	Eligible	PA Historic Bridge Survey	1996
Lehigh Valley Railroad	Eligible	PHMC Letter	1993
		PA Survey Form - Abbreviated	2009

Coplay-Northampton Bridge

BMS#:	39740400009002	Push to Search	Old BMS #:		
BMS#:	39740400009002	Push to Search	Old BMS #:		
Dist:	5	Cty: 39 LEHIGH	City/Boro/Twp:	404	COPLAY
Owner:	2	LEHIGH&NORTH.CO.			
Fac Car:	CHESTNUT STREET		Loc:	COPLAY/NORTHAMPTON	
Name/Feat Intrsect:	CHESTNUT STREET		LEHIGH RIV/LEHIGH CANAL/CONRAIL		
Total Spans:	7	Length: 1032 (314.6 m)	Width:	40.7	(12.4 m)
Type:	OPEN SPANDREL ARCH	Design: RIBBED	Mat'l:	REINFORCED CONCRETE	
UTM:	18/458587/4502584	BHP Key#:			
Yr Built:	1930	Alteration: 1958	Source:	PLAQUE	
Setting/Context:	Designer/Builder:	WHITTAKER & DIEHL, CONTRACTOR			

The bridge carries a 2 lane road over the Lehigh River between Coplay and Northampton. On the east bank of the river, the bridge spans over the abandoned Lehigh Canal and an active track of Conrail, the former Central RR of NJ established in the late 1860s. The right-of-way of the canal is a National Register-listed historic district with a period of significance from 1840 to 1931, the active years of the canal. On the west bank of the river, the bridge spans over the abandoned right-of-way of the former Lehigh Valley RR main line in a late-19th residential neighborhood in Coplay. The houses are significantly altered, and the area does not have historic district potential. The LV RR main line has been determined by PHMC to be a historic corridor.

CY 01 Contributing Status:	Not Contributing
CY 01 Individual Eligibility:	Eligible
Expert Panel Summary CY 01:	
Pre-Survey NR Status:	Not Previously Evaluated
AGL NR Recommendation:	Eligible

AGL Summary:

The 7 span, 1032'-long viaduct built in 1930 consists of three reinforced-concrete deck girders, three open spandrel arches, and a steel Parker thru truss. It is a joint county bridge over many transportation routes, including the National Register-listed Lehigh Canal and the determined eligible Lehigh Valley Railroad main line. The viaduct utilizes several important bridge technologies, including open spandrel arches for the main spans. It represents the a complicated engineering solution to a complex crossing, and, since it is complete, it is historically and technologically significant. The viaduct incorporates most of the bridge technologies for longer spans that were used in 1930.

Photo Index:	3/97 Report	Reviewed By/Date:	EPV (8/96)
USGS Quad:			
St Rte ID:		Design #:	
Comments:			

Lehigh Valley Railroad

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

September 14, 1993

David J. Sands, P.E.
Consolidated Rail Corporation
Two Commerce Square
2001 Market Street 12-B
P O Box 41412
Philadelphia, PA 19101-1412

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Re: ER 93-4041-042-A
Pennsylvania Double-Stack Clearance Improvement Project
Consolidated Rail Corporation
Statewide

Dear Mr. Sands:

The Bureau for Historic Preservation has reviewed this State funded, assisted or licensed project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 507 et seq. (1988). This review includes comments on the project's potential effect on both historic and archaeological resources.

It is the opinion of the State Historic Preservation Officer that the following properties are eligible for listing in the National Register of Historic Places. These resources meet National Register criteria A and C for their state-wide significance in transportation, economy and the development of Pennsylvania's industries and communities.

1. Main Line of the Pennsylvania Railroad from Philadelphia to Harrisburg (Harrisburg Line)
2. Main Line of the Pennsylvania Railroad from Harrisburg to Pittsburgh (Pittsburgh Line, Conemaugh Line, Monongahela Line, Port Perry Line)
3. Pennsylvania Railroad from Pittsburgh to the Ohio State Line (Fort Wayne Line)
4. Reading Railroad ~~from~~ Philadelphia to Harrisburg (Main through Reading, Bird to Cumru-westbound, Wyomissing to Bird-eastbound)
5. Pennsylvania Railroad: Morrisville Line
6. Lehigh Valley Railroad from Allentown to Wilkes-Barre (Reading/Lehigh Lines)

Because of the complex nature of this project a Memorandum of Agreement outlining the numerous actions and process for review, evaluation and mitigation will be developed.

Abbreviated Historic Resource Survey Form
Pennsylvania Historical & Museum Commission

IDENTIFICATION AND LOCATION

ER #
Survey Code: Tax Parcel: 495907A 7-4
County: Lehigh Municipality: Coplay Borough
Address: Lehigh Valley RR Right-of-Way at Coplay-Northampton Bridge
Historic/Other Name: Lehigh Valley Railroad from Allentown to Wilkes-Barre
Owner Name/Address: Pennsylvania Lines LLC c/o Norfolk Southern RR
Roanoke, VA 24042
Owner Category: Private
USGS Quad: Catasauqua
UTM: 18/458546E/4502863N

PHYSICAL DESCRIPTION

Resource Classification: District # Resources: 1
Historic Property Type: Transportation/Rail-related
Current Property Type: Landscape/Walking Trail
Year Built: 1855
Architectural Style: n/a
Structural System: n/a
Materials: Foundation: n/a
Walls: n/a
Roof: n/a
Width in Bays: n/a Stories: n/a

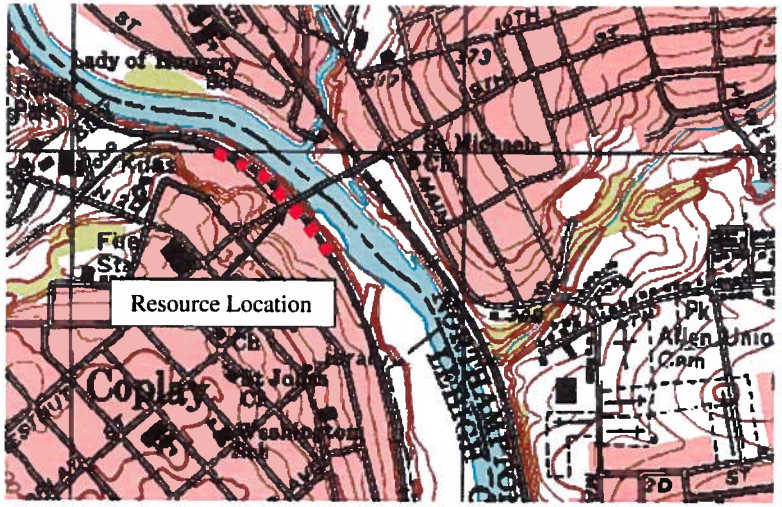
NATIONAL REGISTER DETERMINATION

Eligible
Lack of integrity
Lack of significance

Justification: The Lehigh Valley Railroad from Allentown to Wilkes-Barre was determined eligible for the National Register on 9/14/1993.

SURVEY INFORMATION

Name: Martin Abbot Date: March 2009
Project name: Coplay-Northampton Bridge Replacement Project
Location: Coplay Boro, Lehigh County/Northampton Boro, Northampton County
Organization: URS Corp., 335 Commerce Drive, Ft. Washington, PA 19034
Previous Survey(s): PHMC Key No.



Scale: 1" = 2000' Source: Catasauqua USGS Quad

No	Description of View
1	View N. of the Lehigh Valley Railroad at the Coplay-Northampton Bridge.

APPENDIX C:
LEHIGH CANAL

Appendix C: Lehigh Canal

An infilled section of the former Lehigh Canal is present in the project APE. The Lehigh Canal is listed on the National Register of Historic Places. As there are no above-ground resources associated with the canal in the APE, it was determined that the canal would be treated as an archaeological resource. URS performed a Phase Ia archaeological investigation in September 2006 and determined that the Lehigh Canal prism had been completely obliterated. PHMC concurred with this finding (see Appendix A).

View southwest. Former canal ran adjacent to pier.

View northwest at pier.

APPENDIX D:
PUBLIC INVOLVEMENT

Appendix D: Public Involvement

- Meeting Minutes: Consulting Parties Meeting, Public Officials Meeting, and Public Meeting (December 14, 2009)
- Meeting Sign-In Sheets
- Consulting Party Comment Forms and URS Response Memo
- Public Meeting/Public Official's Meeting Comment Forms Synopsis

Meeting Minutes

21387147-19.0

MINUTES OF MEETING

Date:	December 14, 2009	
Location:	Coplay Borough Hall 98 S. Fourth Street Coplay, PA 18037	
Attendees:	Glenn Solt	Lehigh County
	Kris Thompson	PennDOT 5-0
	Sean Brown	PennDOT 5-0
	Sandy Martin	McCormick Taylor
	John Lang	URS Corp.
	Martin Abbot	URS Corp.
	Lee Wolfe	URS Corp.
	Jason Gilmore	URS Corp.
	Deb Poppel	URS Corp.
	Doug Robbins	URS Corp.
Reference:	Lehigh County Chestnut Street Bridge, Coplay, PA Consulting Parties Meeting, Public Officials Meeting, and Public Meeting	

The schedule for the three meetings held on December 14th in Coplay Borough Hall for the above listed project was as follows:

Consulting Parties – 3:00PM to 4:30PM
Public Officials - 4:30PM to 5:30PM
Public Meeting - 6:00PM to 8:00PM

For each meeting, the attached sign-in-sheets were used. Also, three (3) handouts were provided. The first handout was a single page Purpose and Need Statement for attendees to take with them and the second and third handouts were, respectively, a comment form for the Consulting Parties meeting, and a survey form for both the Public Officials and Public Meetings. The attendees of all three meetings were encouraged to fill out their respective forms and submit.

1. Consulting Parties Meeting

An introduction was conducted by Ms. Thompson where all four (4) of the consulting parties in attendance were introduced including Ms. Kitty Henderson of the Historic Bridge Foundation, who was on the phone. Ms. Susan Zacher of the Pennsylvania Historic Museum Commission (PHMC), an invited guest for these proceedings due to her capacity as a regulatory agent, was also on the phone.

Ms. Thompson indicated that this informal meeting will consist of discussion of the Needs and Alternatives Analysis Report that has been sent to the Consulting Parties for their review. She stated that no final decision has been made as to the alternative to be endorsed by PennDOT and Consulting Party input was a very important part of the process. She further stated that their suggestions will be requested in the future if mitigation of historic properties is required.

Mr. Abbot then stated that 17 people were invited to be consulting parties but only 6 indicated that they were interested. Ms. Zacher asked for a complete list of invited consulting parties. The list is attached to these minutes. At this point, Mr. Binder, a consulting party, asked if his house at 101 N. Front Street, converted into Binney's Hotdog Shop, predates the bridge built in 1930. Ms. Zacher asked if his house was part of the historic evaluation. Mr. Abbot stated that is was and that he believed the house did predate the bridge. He will verify this for Mr. Binder. Mr. Abbot then stated that there are two (2) features of this project that have historical significance: the Bridge itself which was at its' time an innovative solution to a complex crossing, and the Lehigh Valley Railroad bed, now abandoned, that has become part of the Ironton Rail Trail.

Mr. Lang then began to present the boards as follows:

Purpose and Need – Mr. Lang described in detail the existing conditions of the bridge, why it needs to be rehabilitated or replaced and what proposed improvements could be expected with each alternative.

Plan & Elevation, Cross Sections – Mr. Lang discussed the preferred Rebuild Alternative and contrasted its' benefits over the two Rehabilitation Alternatives, Alternative 2A which would involve minimal rehabilitation but would not meet project need because the truss would remain, and Alternative 2B which addresses the need for the turning lane but provides minimal, inadequate shoulders that could not accommodate bicyclists. Mr. Lang talked about the nature of the existing concrete and that because it is not air entrained, it will continue to produce rubble, which Mrs. Binder said she could attest to, even after the $10 million rehabilitation. Ms. Zacher then asked to be sent a copy of the report which evaluates the condition of the arch concrete. Mr. Lang emphasized that the rebuilt bridge would last 100 years while the rehabbed bridge would last at most, another 50 years. He further emphasized that if the left turning lane were not provided, by the time of the design year 2029, an up to 10 minute delay could be anticipated for the movement.

Detour – Mr. Lang lastly discussed the proposed detour stating that is was approximately 3.1 miles long and is anticipated for 2 years regardless of whether the bridge is rehabilitated or replaced.

Mr. Solt then stated that the County's position is that the Rebuild Alternative is preferred. He stated that the County does not want to be left with an inferior product which still lacks "redundancy" even after construction. He stated further that any future maintenance and repairs would be borne by local tax payers.

A question and answer session then ensued:

1. Ms. Henderson asked which costs she should consider- those that were listed in the Needs and Alternatives Report or those listed on a cost-breakdown sheet e-mailed to her and provided to the other consulting parties at the meeting. Mr. Lang said that the new sheet was a more refined breakdown of costs by span type than the general summation ones used in the report.

2. Ms. Henderson asked why the cost of rehabilitating the arches was so high. Mr. Lang stated that the contractor's limited means and methods will drive up the cost. The demolition for the rehab option will have to be done very slowly and meticulously at a higher cost than just dropping the span in the river for complete demolition. Further, the Lehigh River is fast moving and the arches rise up to 80 ft. above the water surface making access difficult for the contactor. Further, the fact the bridge is posted at 17 tons makes it impossible for very large cranes to be positioned on the deck. All of these issues drive up the cost.

3. Ms. Henderson asked if the truss and girder spans could be replaced but the arch span be rehabilitated. Mr. Lang reiterated the high cost of this and the limitations this would still place on the finished bridge: a 50 year life, narrow shoulders, no improved drainage and higher future maintenance costs.

4. Mr. Royer expressed his support for the Rebuild Alternative, indicating that he would prefer a bridge with wide travel lanes, shoulders, proper drainage, and a 100 year lifespan.

5. Mr. Mardorf indicated that he has witnessed a number of accidents on the Northampton side of the bridge and expressed the need for a left-turn lane.

Ms. Thompson concluded this meeting by saying that she will gather all of the responses to the various meetings and the make them available to the consulting parties. Ms. Zacher then stated that when she receives this information, she will submit her comments to Ms. Thompson by letter. Comments are to be received by December 28th.

Following the meeting, Mr. Lang discussed with both Mr. Binder and Mr. Mardorf, the areas of land which must be purchased for this project. Mr. Binder's property will have temporary easements which affect his outdoor eating area for Binnie's Hot Dog Shop. Mr. Mardorf will have a strip of land 10 to 20 foot wide taken parallel to the bridge. This will affect a shed at the rear of his property. Mr. Mardorf also indicated that drainage on the slope at the rear of his property was currently a problem which he hoped this project would address.

2. Public Officials Meeting

Fifteen (15) people attended this meeting. The presentation was comprised of 8 boards

which were presented as follows:

Meeting Agenda – Mr. Solt provided an overview and introduction of the project.

Purpose and Need – Mr. Lang described in detail the existing conditions of the bridge, why it needs to be rehabilitated or replaced and what proposed improvements could be expected with each alternative.

Cultural Resources and Environmental – Mr. Abbot defined and described what the cultural and historic resources are for this project and Mr. Gilmore then discussed the proposed temporary impacts, if any, to adjacent trails, waterways, or wetlands. After Mr. Gilmore had mentioned the boat launch on the east bank of the Lehigh River, north of the project site, and the Aids to Navigation Plan, Mr. Zarayko stated that this launch has not been used for 50 years since the upstream dam was in use, but that an upstream boat launch is currently in use.

Left Turning Lane Detail – Mr. Lang discussed the need for the turning lane emphasizing the greatly improved timing of 3 movements especially for the design year of 2029.

Existing Conditions Photographs – Mr. Lang discussed existing bridge conditions emphasizing the deteriorated condition of the concrete in the arches, the problems with frozen bearings in the girder and truss spans and the concrete encasement of the girder and truss spans, which makes them difficult to inspect. Thus, it is really unknown what the condition of the steel is.

Plan & Elevation, Cross Sections – Mr. Lang discussed the preferred Rebuild Alternative and contrasted its' benefits over the Rehabilitation Alternative which would involve minimal rehabilitation but would not meet project need because the truss would remain, and would provide minimal, inadequate shoulders that could not accommodate bicyclists. Mr. Lang talked about the nature of the existing concrete and that because it is not air entrained, it will continue to produce rubble even after the $10 million rehabilitation. Mr. Lang emphasized that the rebuilt bridge would last 100 years while the rehabbed bridge would last at most, another 50 years.

Detour – Mr. Lang lastly discussed the proposed detour stating that is was approximately 3.1 miles long and is anticipated for 2 years.

A question and answer session then ensued:

1. Mr. Zarayko asked why the 8 ft. sidewalk could not be made smaller and a wider shoulder to accommodate bicycles could not be used instead. Mr. Lang stated that this would be looked at but PennDOT criteria needed to be taken into account.

3. Public Meeting

Seven (7) people attended this meeting. The presentation was comprised of 8 boards

which were presented as follows:

Meeting Agenda – Mr. Solt provided an overview and introduction of the project.

Purpose and Need – Mr. Lang described in detail the existing conditions of the bridge, why it needs to be rehabilitated or replaced and what proposed improvements could be expected with each alternative.

Cultural Resources and Environmental – Mr. Abbot defined and described what the cultural and historic resources are for this project and Mr. Gilmore then discussed the proposed temporary impacts, if any, to adjacent trails, waterways, or wetlands.

Left Turning Lane Detail – Mr. Lang discussed the need for the turning lane emphasizing the greatly improved timing of 3 movements especially for the design year of 2029.

Existing Conditions Photographs – Mr. Lang discussed existing bridge conditions emphasizing the deteriorated condition of the concrete in the arches, the problems with frozen bearings in the girder and truss spans and the concrete encasement of the girder and truss spans, which makes them difficult to inspect. Thus, it is really unknown what the condition of the steel is.

Plan & Elevation, Cross Sections – Mr. Lang discussed the preferred Rebuild Alternative and contrasted its' benefits over the Rehabilitation Alternative which would involve minimal rehabilitation but would not meet project need because the truss would remain, and would provide minimal, inadequate shoulders that could not accommodate bicyclists. Mr. Lang talked about the nature of the existing concrete and that because it is not air entrained, it will continue to produce rubble even after the $10 million rehabilitation. Mr. Lang emphasized that the rebuilt bridge would last 100 years while the rehabbed bridge would last at most, another 50 years.

Detour – Mr. Lang lastly discussed the proposed detour stating that is was approximately 3.1 miles long and is anticipated for 2 years.

A question and answer session then ensued:

1. Of greatest concern for those present was the detour. One business owner asked exactly what portion of Chestnut St./9th Street would be closed as he was concerned about Front St. being closed. Mr. Lang assured him that if the intersection at Front Street were closed, it would be a very short time for minor intersection improvements.

2. Mr. Holencik asked, "How do you propose to get construction vehicles to the job site?" Mr. Rosato suggested that contact be made with Norfolk Southern Railroad to determine if its' right-of-way from 21st Street could be used which would help save the pavement on Coplay Road from being ruined by construction traffic.

3. Ms. Killeen asked whether construction will occur during the day or at night. Mr.

Lang answered that generally daytime work is anticipated. Ms. Killeen further stated that if we can make the bridge better by making it wider and taking more property, we should do that now.

4. Ms. Killeen and others mentioned that some people ride their bicycles on the sidewalk of the existing bridge.. Mr. Lang indicated that the police should instruct them to walk their bicycle across the bridge when on the sidewalk.

5. Mr. Holencik asked whether concrete or steel girders will be used. Mr. Lang indicated that this is determined by contractor as the PennDOT process involves bidding a low cost bridge. Thus, either steel or concrete girders could occur depending on its relative cost at the time of bidding.

The final meeting was concluded at 7:45PM.

Sign-In Sheets

Chestnut Street Bridge Replacement Project

Public Meeting

6:00 to 8:00 p.m. December 14, 2009

Sign-in Sheet

Name	Organization (if any)	Address & Zip Code	Phone	Email
Donna Killian		32 S 4 St Catasauqua PA 18037	610 262 7921	SHARKSHOME@HOTMAIL.COM
Mark Halewicz		430 Chestnut 18037	610 972 5170	
MIKE HERTZOG		31 S 3rd ST. Coplay 18037	610 440-1586	
ELIAS DIAZ JR		123 Chestnut st coplay	610-2622432	
Frank Grigoli		851 main St Northampton	484.358.1125	
Antonino Grigoli		" " "	"	
Enzo Vitoriani		" " "	"	

Chestnut Street Bridge Replacement Project

Public Officials Meeting

4:30 to 5:30 p.m. December 14, 2009

Sign-in Sheet

Name	Organization (if any)	Address & Zip Code	Phone	Email
MATT RECKER	REP. JOSEPH BRENNAN			
GENE ZARAYKO	NORTHAMPTON	1401 LAUBACH AVE	610-262-2571	
DAVID BUSKARITZ	COPLAY FIRE DEPT.	98 S. 4TH ST. COPLAY	484-239-6334	
John Yurish	Northampton Boro	1401 Laubach Ave.	610-262-2571	
DARREN SCHLICHTER	COPLAY FD.		610-262-9313	
MICHAEL MAZUR	COPLAY COUNCIL	44 N 4TH St	610-261-	1251
Roger Bodner	Northampton Planning	2310 Main St.	610-526-6007	
Lou Bodgh	Coplay Council	101 N 8th St	610-261-1782	
VINCE GENOVESE	COPLAY P.D.	98 S. FOURTH ST	610 262-2288	
Thomas Reenock	Northampton	2112 Penny Ave.	610-262-4256	
MARVIN P. MANN II	COPLAY COUNCIL	3N 4TH ST COPLAY	610-262-6933	
DAN PAVELKO	COPLAY PUBLIC WKS DIR	15 N. 6TH ST COPLAY	610-262-1771	
SANDRA GYECSEK	BORO SECT.	42 N 4th ST COPLAY	610-262-6088	sandyg@boroughofcoplay.com
WENDY SCHLAPPICH	REP. JULIE HARHART	2030 Center St Northampton	610-502-2701	wschlapp@pahousegop.com
B. Moller	Coplay Council	407 N. 5TH ST. - Coplay	610-262-0807	
ANNE KILLEEN		22 S 4th St Apt	610 2442	

Chestnut Street Bridge Replacement Project

Consulting Parties Meeting

3:00 to 4:30 p.m. December 14, 2009

Sign-in Sheet

Name	Organization (if any)	Address & Zip Code	Phone	Email
William Marzdorf		840 Main St Northampton	610-905-3132	cwtrolsz00c@aol.com
John Bender		101 N Front Coplay Pa	610 262 6451	DOGMAN1@ptd.net
Nick Rosato	County of Lehigh		610 871-0285	nickrosato@lehighcounty.org
DAVID S. ROYER	COPLAY BORO	23 N. 7th ST COPLAY PA	610 2627718	DROYER105@RCN.com
Sandy Martin	PennDOT Dist 5-0 - McCormick Taylor	2001 Valley Creek Blvd. Exton 19341	610-640-3500	sgmartin@mccormicktaylor.com

Consulting Party Comment Forms and URS Response Memo

COPLAY-NORTHAMPTON BRIDGE REPLACEMENT PROJECT

SECTION 106 CONSULTING PARTY COMMENT FORM

NAME: DAVID S. ROYER

ORGANIZATION (if applicable): BOROUGH OF COPLAY

Do you agree with the information and findings presented in the Needs and Alternatives Analysis Report? ☑ Yes ☐ No ☐ No Opinion

Comments:

Do you agree with the recommendation that bridge replacement is the most prudent and feasible alternative? ☑ Yes ☐ No ☐ No Opinion

Comments:

Do you have any other comments? REHAB TO ARCHES + PIERS IS A BAND AID TO PROJECT. NO INCREASE IN WEIGHT CAPACITY OF BRIDGE, HIGHER MAINTENANCE COSTS, 50 YR. LIFE EXPECTANCY. REPLACEMENT BRIDGE OFFERS SAFER/WIDER BRIDGE DECK + PIERS, HIGHER WEIGHT CAPACITY, LOWER MAINTENANCE, AND 100 YR LIFE EXPECTANCY. INITIAL COST OF REPLACEMENT LOWER THAN REHAB.

Please return by 12/28/09 to Kristina L. Thompson, PennDOT District 5-0, 1002 Hamilton Street, Allentown, PA, 18101-1013.

Rec'd 12/16/09

December 30, 2009

Kris Thompson
District 5-0. PennDOT
1002 Hamilton Street
Allentown, Pennsylvania 18101

Re: SR 7404, Section 07M, Coplay-Northampton Bridge Project, Lehigh County, Pennsylvania

Dear Ms. Thompson:

The Historic Bridge Foundation provides the following comments to the Needs and Alternatives Report for the above referenced bridge.

1. We question the assumption that a new bridge will last 100 years. Repeated discussions by our office with structural engineers suggest that this is an inflated assumption that derails the discussion of rehabilitation. In addition, maintenance costs are not provided for the new bridge, which skews the cost comparisons for replacement vs. rehabilitation.

2. We would like to see information on rehabilitating the arch spans and replacing the other bridge spans. This is discussed in Alternative 2B. As the report states, the most distinguishing characteristics of the bridge are the arch spans and we believe this warrants further discussion and further breakdown in the cost analysis, which simply divides the discussion into rehab and replacement rather than focusing on the different rehabilitation options. The Concrete Materials Assessment we received on December 29, suggests that the piers, arches and struts can be repaired. The Needs and Alternative Analysis Report suggests Alternative 2B would replace 45 percent of the original material, but it is not clear whether the 45 % relates only to the arch spans or includes the fact that both the girder and truss spans would be removed. However, regardless of this, there are several instances in Pennsylvania where the PHMC has approved rehabilitation of a structure with large replacement of original material. We would be interested in their evaluation of this alternative.

We recognize the need for changes and repairs to the existing historic bridge. However, we believe a safe and functional crossing can be achieved using the arch spans. As Pennsylvania continues to lose its historic bridges at a rapid rate, we hope that discussion may continue toward a solution that supports rehabilitation of at least part of this notable structure.

Sincerely yours,

Kitty Henderson
Executive Director

Cc: Susan Zacher

URS Corporation
Response to Kitty Henderson comments on SR 7404 Section 07M, Coplay Northampton Bridge
2/12/10

Comment 1
We question the assumption that a new bridge will last 100 years. Repeated discussions by our office with structural engineers suggest that this is an inflated assumption that derails the discussion of rehabilitation. In addition, maintenance costs are not provided for the new bridge, which skews the cost comparisons for replacement vs. rehabilitation.

Response
There are thousands of bridge engineers in the US, and it is not surprising repeated discussions find those skeptical of bridges lasting 100 years. The extensive experience of the Historic Bridge Foundation should lead to the conclusion that bridges can and do last more than 100 years if properly maintained and are functionally useful. In the case of this bridge, it presently is 80 years old and if we rehabilitate the bridge for 50 more years of life the underlying structure would be 130 years old.

The conclusion that FHWA and the State Bridge Engineers, represented by Association of State Highway and Transportation Officials (AASHTO), has reached is that with proper design and specifications, coupled with maintenance, bridges should last 100 years. This is contained in AASHTO Bridge specifications 11.5.1 and in PennDOT's Design Manual Part 4 sections PP5.5.4 and D11.5.1.

Actions such as using high performance concrete, high performance steel, epoxy or galvanized reinforcement, minimal expansion joints, etc. all work together to attain a 100 year life. The Coplay Northampton Bridge, for example, would have more easily attained greater than 80 years of life had air-entrained concrete been used, or: had corrosion protection beyond a high pH been used with the reinforcement; had fewer expansion joints been used and leak proof joints been employed; had a membrane been used on the deck or the deck been replaced as maintenance at a more frequent interval; had lubrication and painting been applied to the expansion bearings on a more frequent basis; etc.

Bridge engineers working within the day-to-day constraints of various bridge locations, and over a number of years realize the difficulty in predicting functional need 100 years into the future. Looking back just 100 years, horses were a primary mode of transportation within towns and the Lehigh Canal still existed for canal boats. Working engineers also realize that new analytical tools are allowing designs to be better balanced, such that materials are utilized to the fullest extent possible. In the past, designs performed completely by hand calculation and graphical methods were more conservative as engineering judgment, which reasonably allowed for a small but well thought out number of load cases, was utilized, in comparison to the hundreds of load cases that can be easily analyzed by computer today. In the end, the science and art of bridge engineering will remain dynamic and, in all fairness, 100 years of bridge life is not unreasonable.

Comment 2 *(separated into four individual comments by URS)*
a) We would like to see information on rehabilitating the arch spans and replacing the other bridge spans. This is discussed in Alternative 2B. b) As the report states, the most distinguishing characteristics of the bridge are the arch spans and we believe this warrants further discussion and further breakdown in the cost analysis, which simply divides the discussion into rehab and replacement rather than focusing on the different rehabilitation options. The Concrete Materials Assessment we received on December 29, suggests that the piers, arches and struts can be repaired. c) The Needs and Alternative Analysis Report suggests Alternative 2B would replace 45 percent of the original material, but it is not clear whether the 45 % relates only to the arch spans or includes the fact that both the girder and truss spans would be

removed. d) However, regardless of this, there are several instances in Pennsylvania where the PHMC has approved rehabilitation of a structure with large replacement of original material. We would be interested in their evaluation of this alternative.

Response

a) Cost analysis for replacing the 3 girder spans and truss span and rehabilitating the arch spans is roughly as follows:

	Construction Cost	Demolition Cost
Replace Girder Spans/add 2 new piers	$2,012,810	$472,800
Rehab 3 Arch Spans/modify 2 piers	$6,550,150	$384,300
Replace Truss Span/add 1 new pier, modify pier and abutment/2 box beam spans	$1,510,700	$145,300

The cost for this alternative is $11,076,060 and provides 2 lanes, turning lane, and 2'-6" shoulders. The cost of a new bridge is $11,000,000 (see Needs Report) and provides 2 lanes, turning lane, and 4'& 6' shoulders. In both cases there would be one sidewalk. Incorporating added costs for site work, the total project cost is approximately $12,000,000.

b) The elements of the cost analysis associated with rehabilitation of the arch spans is as follows.

The cost for the arch spans rehabilitation ($6,550,150) is higher than for replacement ($4,812,000) due to a number of factors:

i. The bridge is 80 feet above the river valley, which is a significant height. Such a tall bridge influences the height and size of the crane needed to perform services. Higher crane booms impact a contractor's labor and rental costs.
ii. The Lehigh River has a velocity of 5 fps and changes elevation easily within a week by 2 to 4 feet. The 2 ½ year recurring storm for causeway design requires more than 12 feet of fill in the river.
iii. The arch spans are 543 feet long comprising 50% of the length of the bridge.
iv. The deck and floor beams must be replaced and must be cut into small enough pieces to be carefully removed from the arch spans.
v. Whether rehabilitation or replacement is done, the short columns should at a minimum, be replaced. Demolition for the rehabilitation alternative is a significant cost as the intent would be to protect both the arches and the scored pier shafts.
vi. There is over 4,320 square feet of delaminations which must be removed from the arches. Some of this is overhead work requiring scaffolding for access.
vii. Removal of concrete around the plinths of the piers will be necessary for both arch rehabilitation or replacement and is included in the common cost to all options.

Replacing Deck and Floor Beams	$1,232,770
Modifying Piers 3 thru 6	$ 882,400
Repairing Delaminations on Arches	$1,812,800
Repairing north arch in Span 3	$ 79,200
Patches on piers and columns to remain	$ 294,690
Present worth estimate of required future Arch repairs (Assume 10% of arches near joints will require repair every 10 years)	$1,038,290
Mobilization, cofferdam, causeway, scaffolding	$1,210,000
Total Arch Rehabilitation cost:	$6,550,150

c) Alternative 2B indicated 45% of original material would be replaced. The break down by bridge type is as follows:

	Rehabilitation	Full Contributing Area
Girder spans	10 %	32 %
Arch spans	16 %	49 %
Truss Span	19%	19 %
Total	45 %	100 %

As can be seen by the numbers, the full contributing area is primarily a function of the length of spans within the viaduct. The rehabilitation options then determined how much within a bridge type was to be visually affected. The result was 45 %. As can be seen, Alternative 2B removes the truss span which affects 19 % of the visual quality of the bridge. If an Alternative 2C were to involve removal of the truss and girder spans and rehabilitation of the arches, then the percent of the historic bridge affected would be 32+16+19 = 67%.

d) The concept of rehabilitation of a large portion of a historic structure, in this case replacement of girder and truss spans and rehabilitation of the arches, must be considered a reasonable and prudent alternative. The end result of the rehabilitation would be a narrower structure because of the constraint of the arch capacity to carry a deck with adequate shoulders and one sidewalk. It is reasonable to attempt to maintain balance of dead load about the centerline of the bridge. It is also reasonable to keep the out-to-out dimension of the arch spans close to present dimensions. It is also reasonable to maintain the centerline of the roadway close to present dimensions because of the connecting street system within the two boroughs. Retention of the arches and the above constraints results in a roadway with sub-standard shoulders, even with elimination of one sidewalk.

On the issue of prudence, the economics comes into play which can be looked at through life cycle costs, or present worth analysis of future costs. Some recognition also must be given to all historic structures - that at some time they will wear out. Bridges are more sensitive to deterioration than buildings due to the constant wear and tear of moving loads. FHWA and PennDOT are willing to consider rehabilitations that will last for 50 years. Note that the cost of a new bridge in 50 years will be significantly greater than today's $11,000,000 dollars.

Assuming a 3 percent inflation factor over 50 years would produce the following multiplier in a present worth analysis:

$(1+i)^n$
i = the inflation rate percentage per year expressed as a decimal
n = the number of years at which the inflation rate is applied

$(1+.03)^{50} = 4.3839$

This would mean that a replacement bridge will cost $48,223,000 in today's dollars.

See the cost comparison between Life Cycle Costs and Present Worth Costs for a 100 year time frame below:

	Present Worth Costs	Life Cycle Costs
Partial Rehabilitation - Present Cost	$10,000,000	$10,000,000
Maintenance cost over 50 years	$ 4,000,000	$ 4,000,000
Replacement Cost at the end of 50 years	$11,000,000	$48,223,000
	Total $25,000,000	$62,223,000
Full Replacement - Present Cost	$11,000,000	$11,000,000
Maintenance cost over 50 years	$ 3,000,000	$ 3,000,000
Maintenance cost 50 to 100 years	$ 3,000,000	$13,151,800
	Total $17,000,000	$27,151,800

In terms of Present Worth Costs, there is only an $8 million differential between the two alternatives. However, in terms of Life Cycle Costs, the differential is $35,071,200 which is considerably more sizable. An argument could be made that not all costs in the bridge will go up by 3% per year. However, my primary point is that while $8 million is the minimum savings for a full replacement now, the life cycle analysis indicates there could be more than $35 million in savings over 100 years.

Maintenance costs will also grow by 3 percent per year, but they will be somewhat comparable between partial rehabilitation and full replacement as these costs occur mostly for the deck, expansion joints, and bearings, which are common to both options. The true dollar values are dependent on the year increments for maintenance. The point is waiting 50 years to replace the bridge is only financially sound if we expect significant **deflation** during that period.

The elements of maintenance that are common to both rehabilitation and replacement are:

- Superstructure and underdeck cleaning of road salts & pigeon droppings
- Repairing impact damage to barrier along the sidewalk
- Deck replacement
- Expansion joint replacement
- Bearing replacement
- Removal of graffiti
- Changing lighting standard light bulbs
- Line re-striping
- Concrete crack injection for repairs
- Cleaning of scuppers and downspouts
- Depositing stone at surface erosion points
- bridge inspection every two years
- Underwater bridge inspections at least every five years
- Adding stone as a scour counter measure

The maintenance work associated with retention of the arches and massive pier plinths includes patching of concrete spalls, and ensuring protection of steel reinforcing bars that remain. In their report dated April 10, 2006, our sub, CTL Group, recommended a 10 year frequency of repairs to old concrete.

- Arch Patching
- Column and Pier Plinth Patching
- Cathodic protection for exposed existing steel reinforcing bars (new reinforcing bars to be epoxy coated for protection)
- Concrete crack injection for repairs
- Coating of the concrete to reduce carbonation and water infiltration

Comment 3

We recognize the need for changes and repairs to the existing historic bridge. However, we believe a safe and functional crossing can be achieved using the arch spans. As Pennsylvania continues to lose its historic bridges at a rapid rate, we hope that discussion may continue toward a solution that supports rehabilitation of at least part of this notable structure.

Response

Pennsylvania has a rich history of bridge building and the goal of historic bridge preservation is important to the state. The state has been able to rehabilitate a number of arch bridges in eastern Pennsylvania. However, Lehigh County, with a somewhat smaller budget, is burdened with a significant number of old bridges due to the age of the county, its terrain and river system, and the nature of economic development over time creating bridge crossings necessary to maintain strong robust communities. Lehigh County does not see rehabilitation as reasonable and prudent for the Coplay Northampton Bridge. The County has indicated that the two adjoining boroughs would have to assume the cost of maintaining the arches on this bridge if they are to be retained. Both boroughs are struggling economically and would place arch maintenance at a low priority, which could result in future bridge problems in less than 50 years. In addition, local consulting parties indicated zero support for the rehabilitation option at the December 14, 2009 Consulting Parties meeting. Considering all of the factors associated with this bridge location, the recommendation remains to replace the total structure and only keep substructure elements.

Public Meeting Comment Forms Synopsis

CHESTNUT STREET BRIDGE REPLACEMENT PROJECT
PUBLIC OPEN HOUSE PLANS DISPLAY/ DECEMBER 14, 2009

COMMENT FORM RESULTS - 15 Comment Forms were returned.
(Not everyone answered every question so numbers may not always add up to 15).

1. Did you have the opportunity to view the plans?		
Comment	Number	Percentage
Yes	14	93%
No	1	7%

2. Are the plans presented informative? Please indicate the effectiveness of the display by circling a number from 1 to 5, with 1 being very informative and 5 being not at all informative.

Comment	Number	Percentage
1	8	53%
2	0	0%
3	3	20%
4	3	20%
5	1	7%

What could be done to improve the presentation?
Comment
Fine as presented by John Lang.
A little more info, overall good presentation.

3. Do you have questions about the project?		
Comment	Number	Percentage
Yes	5	33%
No	10	67%

If so, please list your questions and the project team will get back to you.
Comment
Are union contractors going to be used?
Union contractors?

Detour route 329 and Coplay Rd. left turn
I would like to be informed whether a barrier could be added next to the sidewalk on the bridge? This would prevent snow from being plowed back onto walkway after being cleaned off.
Please provide a barrier for snow removal on sidewalks.

4. Do you agree with the proposed replacement recommendation?

Comment	Number	Percentage
Yes	15	100%
No	0	0%

Please list any reasons.

Comment
I would like to have a bike lane on the new bridge.
Safety.
It needs replacement, it's deteriorating badly, maintaining it is a lot of work, it constantly needs maintaining, whether its patching concrete work or snow removal its always something.
Lower costs for update, safer bridge. (Higher weight capacity, wider deck area, 100yr. life of superstructure.)

5. Do you agree with the need to provide a left turn lane on W. 9th Street in Northampton Borough?

Comment	Number	Percentage
Yes	15	100%
No	0	0%

Please list any reasons.

Comment
I encounter frequent backups as a result of vehicles waiting to turn left onto Main St.; sometimes for as many as three traffic light cycles
It will increase traffic flow.
It would eliminate backup of traffic due to people making the left turn.
Ease rush hour traffic, congestion of bridge.

CHESTNUT STREET BRIDGE REPLACEMENT PROJECT
PUBLIC OPEN HOUSE PLANS DISPLAY/ DECEMBER 14, 2009

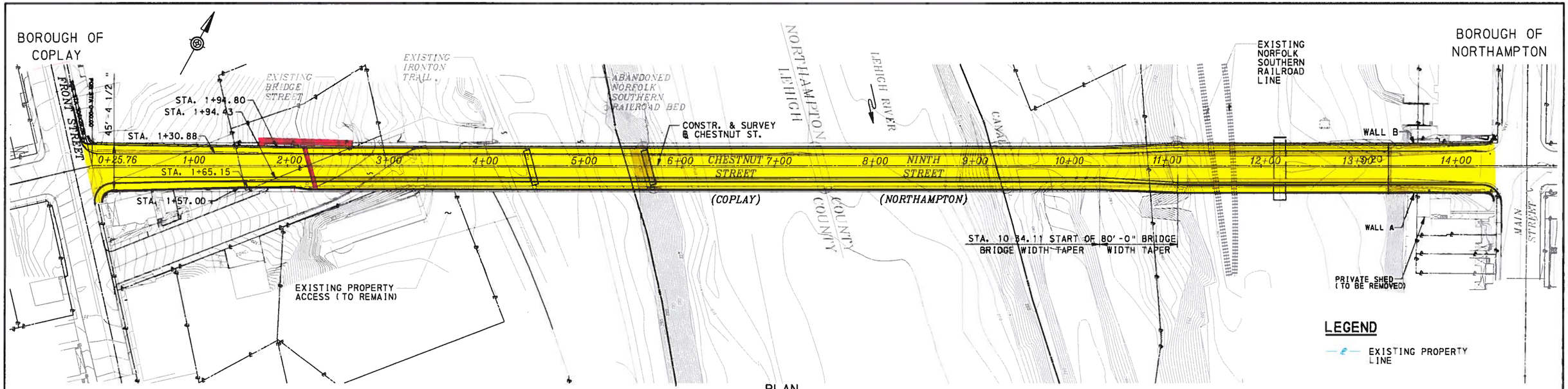
6. The proposed Detour Route presented has been researched and developed to provide the most cost effective and the least disruptive plan for the project. Please tell us your likes and dislikes.
Comment
The Route is fine.
I agree.
It is fine. Also, the 'locals' will find shorter routes.
Well thought out, good job.
The detour routes are the options available. There isn't many alternatives.

7. Do you have other specific comments, concerns or questions? If so, please list them and the project team will get back to you.
Comment
Should be a total replacement. The sooner this occurs, the less money will be spent on "band-aid" repairs.
What provision for drainage or water runoff on the new bridge?
Use calcium instead of salt to melt snow on bridges
I think it makes more sense for total replacement of the bridge rather than repairing it. The cost is only slightly more and it will last twice as long. It makes sense to me.
5' sidewalk, wider travel lanes

8. How did you find out about the tonight's meeting?		
Comment		
Local Newspaper	0	0%
Direct Mail Flyer	4	27%
Poster	1	7%
Neighbors, Friends or Family	2	13%
Other – • *Through Glenn Solt* • *Supervisor* • *Bridge and Utility Department*	7	47%

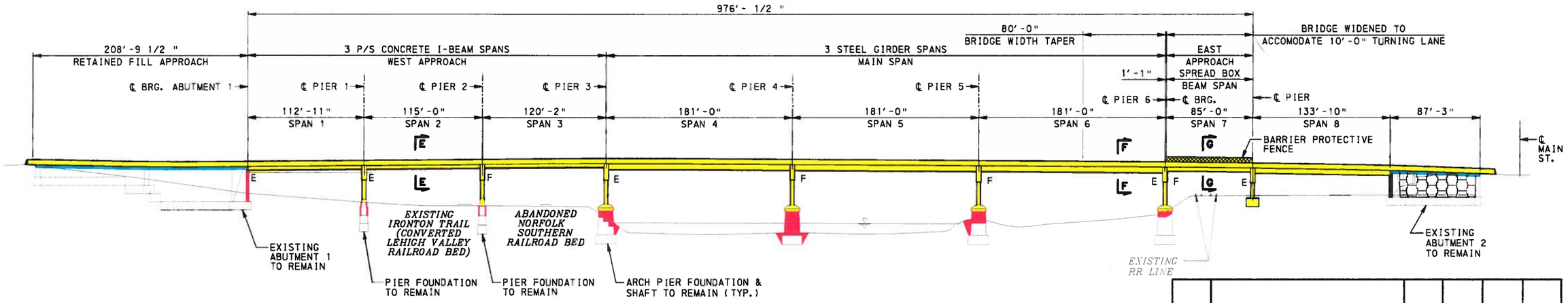
9. What town do you live in?		
Comment		
Coplay	10	67%
Northampton	1	7%
Allentown	2	13%
Whitehall	1	7%
Bethlehem	1	7%

APPENDIX E:
PROJECT PLANS



PLAN

50 0 50
SCALE IN FEET



ELEVATION

50 0 50
SCALE IN FEET

EXISTING MAJOR REHABILITATION
EXISTING MODIFIED
EXISTING REPLACED

BRIDGE REPLACEMENT ON EXISTING ALIGNMENT
ALTERNATIVE 3

Mark	Description	By	Chk'd.	App'd.	Date
REVISIONS					

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

LEHIGH & NORTHAMPTON COUNTIES
S.R. 7404 SEC. 07M
CONCEPTUAL
CHESTNUT STREET OVER
THE LEHIGH RIVER

GENERAL PLAN AND ELEVATION

PREPARED BY
URS
CONSULTING ENGINEERS
FORT WASHINGTON, PA

RECOMMENDED _____

SHEET ___ OF ___

DES.	LLW
DWN.	BT
CK'D.	JWL

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3/12/2010 11:31:46 AM mark_funk

APPENDIX F:
QUALIFICATIONS OF RESEARCHER

Martin Abbot graduated from Cornell University in 1988 with a B.S. in Urban and Regional Studies from the Department of City and Regional Planning and has been employed as a Historic Preservation Specialist with URS Corporation, Fort Washington, PA since July 2001. While at URS, Mr. Abbot has written and produced a wide range of historic architectural reports, including Section 106 compliance reports and Section 4(f) evaluations, for a variety of clients, including PennDOT, NJDOT, and FEMA. Prior to joining URS, Mr. Abbot was employed as a Historic Preservation Specialist with Kise Straw & Kolodner in Philadelphia, PA for eleven years.

URS Corporation
335 Commerce Drive, Ste. 300
Fort Washington, PA 19034-2623

Prepared for:

PENNDOT Engineering District 5-0

and

LEHIGH COUNTY

URS